HP OpenVMS Version 8.3 Upgrade and Installation Manual

OpenVMS I64 Version 8.3
OpenVMS Alpha Version 8.3

For OpenVMS Alpha, this manual supersedes the *HP OpenVMS Version 8.2 Upgrade and Installation Manual*; for OpenVMS I64, this manual supersedes the *HP OpenVMS Version 8.2-1 for Integrity Servers Upgrade and Installation Manual.*

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The HP OpenVMS documentation set is available on CD-ROM.

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Preface

Intended Audience

This manual is intended for anyone responsible for installing or upgrading the HP OpenVMS Alpha operating system or the HP OpenVMS for Integrity servers operating system (OpenVMS I64), and for the startup, shutdown, and backup operations required on Alpha or Integrity servers running this software.

When to Use This Manual

Use this manual if you need to install or upgrade the OpenVMS operating system software yourself or if you need to perform certain startup, shutdown, or backup operations. If you received factory-installed software (FIS) with your Alpha system or Integrity server, see the release notes provided with the software, and use this manual for any information not covered in those release notes.

Document Structure

This manual is organized as follows:

- Chapter 1 defines key terms and provides information about hardware and software components. Review this chapter before performing any installation or upgrade.
- Chapter 2 provides preliminary information.
- Chapter 3 explains how to install the OpenVMS Alpha and OpenVMS I64 operating systems.
- Chapter 4 describes how to prepare your system for an upgrade.
- Chapter 5 supplements Chapter 4 with additional tasks you must perform before upgrading an OpenVMS Cluster system.
- Chapter 6 describes how to upgrade the operating system.
- Chapter 7 describes the tasks you must perform after installing or upgrading the operating system.
- Appendix A contains instructions for booting, halting, and shutting down OpenVMS Alpha systems. It also includes instructions for configuring boot options.
- Appendix B provides an overview of the utilities available with HP Integrity servers, and explains how to configure the system console, how to configure boot options, and how to boot the OpenVMS operating system.
- Appendix C explains how to set up and perform network booting for upgrades using the InfoServer utility, a software application available on OpenVMS Alpha and OpenVMS I64 systems.
- Appendix D explains how to boot the Fibre Channel storage device.
- Appendix E explains how to back up and restore the system disk.
- Appendix F discusses the OpenVMS internationalization data kit (VMSI18N) and how to install it.
- Appendix G explains how to prepare your OpenVMS system and your PC to run the OpenVMS Management Station server and client software.
- Appendix H explains how to remove the OpenVMS operating system from your disk.
- Appendix I explains alternate methods of initializing an OpenVMS Alpha or OpenVMS I64 system disk and includes information about diagnostic partitions on OpenVMS I64 system disks.

- The Glossary defines key terms used in this manual.

Related Documents

Before installing, upgrading, or using the OpenVMS operating system on your computer, be sure you have access to the following documents. Some of the documents listed here are from the OpenVMS Version 8.2 documentation set; although they have not been revised, they remain valid for OpenVMS Version 8.3.

- *Cover Letter for HP OpenVMS Version 8.3* and any other cover letters included with your kit.
- *HP OpenVMS Version 8.3 New Features and Documentation Overview*, which describes enhancements and new features included in this release of the OpenVMS Alpha and I64 operating systems and includes an overview of the documentation that supports OpenVMS.
- *HP OpenVMS Version 8.3 Release Notes*, which provides important supplementary information about the OpenVMS Alpha and I64 operating systems.
- *HP OpenVMS Cluster Systems* and *Guidelines for OpenVMS Cluster Configurations*, if you plan to install your system in an OpenVMS Cluster environment.
- The most recent version of the *DECwindows Motif for OpenVMS Installation Guide* and *Managing DECwindows Motif for OpenVMS Systems* (if you plan to install and customize DECwindows Motif for OpenVMS software).
- *HP Open Source Security for OpenVMS, Volume 1: Common Data Security Architecture*, which provides information about CDSA software.
- *HP Open Source Security for OpenVMS, Volume 2: HP SSL for OpenVMS*, which provides information about HP SSL software.
- *HP Open Source Security for OpenVMS, Volume 3: Kerberos*, which provides information about Kerberos software.
- *HP Availability Manager Installation Instructions*, which provides information about Availability Manager software and is available at the following Web site:

  `http://www.hp.com/products/openvms/availabilitymanager`
- For documentation related to the Performance Data Collector (TDC), see the following Web site:

  `http://www.hp.com/products/openvms/tdc/`
- The following networking software documents (if you plan to install and configure DECnet-Plus for OpenVMS, DECnet Phase IV for OpenVMS, or TCP/IP Services for OpenVMS software):

  — *HP TCP/IP Services for OpenVMS Installation and Configuration*

  — *DECnet-Plus for OpenVMS Installation and Basic Configuration*

  Documentation for the networking products listed above is included on the OpenVMS Online Documentation CD. Hardcopy documentation must be purchased separately.
- For documentation related to Instant Capacity (iCAP) and Pay per use (PPU), see the *HP Instant Capacity User's Guide* and *HP Pay per use User's Guide* on the following Web site:

  `http://docs.hp.com/en/hplex.html#Utility%20Pricing`
- The hardware manuals that are supplied with your Alpha or Integrity server computer. These manuals provide detailed information about your system hardware, including the operation of the system unit, the drives, and the monitor.

During the course of installing, upgrading, or using the OpenVMS operating system on your computer, you could refer to the following documents as well:

- *HP OpenVMS License Management Utility Manual*, which contains detailed information about registering your software licenses.
- *HP OpenVMS System Manager's Manual* and the *HP OpenVMS System Management Utilities Reference Manual*, which contain information about system management operations and utilities that you might need to use when you install, upgrade, customize, and maintain your OpenVMS system. The *HP OpenVMS System Management Utilities Reference Manual: M-Z* provides complete information about using the PCSI utility PRODUCT command to add or remove files, install other software, and related operations.
- *HP Volume Shadowing for OpenVMS*, which you might need if you are installing or upgrading the OpenVMS operating system on a shadowed system disk.
- *HP OpenVMS Management Station Installation Guide*, which provides information about getting started, setting up, and using OpenVMS Management Station.

For additional information about HP OpenVMS products and services, see the following Web site:

`http://www.hp.com/go/openvms`

For information about managing nPartitions on midrange or Superdome servers, see the *HP System Partitions Guide: Administration for nPartitions*.

For the latest hardware documentation for HP Integrity servers, see the following Web site:

`http://docs.hp.com/en/hw.html`

For the latest hardware documentation for Alpha computers, see the following Web site:

`http://www.hp.com/go/alphadocs`

Reader's Comments

HP welcomes your comments on this manual.

Please send comments to either of the following addresses:

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How to Order Additional Documentation

Visit the following World Wide Web address for information about how to order additional documentation:

`http://www.hp.com/go/openvms/doc/order`

Conventions

The following conventions are used in this manual:

Convention	Meaning
Ctrl/*x*	A sequence such as **Ctrl/*x*** indicates that you must hold down the key labeled Ctrl while you press another key or a pointing device button.
PF1 *x*	A sequence such as **PF1 *x*** indicates that you must first press and release the key labeled PF1 and then press and release another key (***x***) or a pointing device button.
Enter	In examples, a key name in bold indicates that you press that key.
...	A horizontal ellipsis in examples indicates one of the following possibilities: – Additional optional arguments in a statement have been omitted. – The preceding item or items can be repeated one or more times. – Additional parameters, values, or other information can be entered.
. . .	A vertical ellipsis indicates the omission of items from a code example or command format; the items are omitted because they are not important to the topic being discussed.
( )	In command format descriptions, parentheses indicate that you must enclose choices in parentheses if you specify more than one. In installation or upgrade examples, parentheses indicate the possible answers to a prompt, such as: `Is this correct? (Y/N) [Y]`
[ ]	In command format descriptions, brackets indicate optional choices. You can choose one or more items or no items. Do not type the brackets on the command line. However, you must include the brackets in the syntax for OpenVMS directory specifications and for a substring specification in an assignment statement. In installation or upgrade examples, brackets indicate the default answer to a prompt if you press **Enter** without entering a value, as in: `Is this correct? (Y/N) [Y]`
|	In command format descriptions, vertical bars separate choices within brackets or braces. Within brackets, the choices are optional; within braces, at least one choice is required. Do not type the vertical bars on the command line.
{ }	In command format descriptions, braces indicate required choices; you must choose at least one of the items listed. Do not type the braces on the command line.
bold type	Bold type represents the introduction of a new term. It also represents the name of an argument, an attribute, or a reason. In command and script examples, bold indicates user input.
italic type	Italic type indicates important information, complete titles of manuals, or variables. Variables include information that varies in system output (Internal error *number*), in command lines (/PRODUCER=*name*), and in command parameters in text (where *dd* represents the predefined code for the device type).

Convention	Meaning
UPPERCASE TYPE	Uppercase type indicates a command, the name of a routine, the name of a file, or the abbreviation for a system privilege.
`Example`	This typeface indicates code examples, command examples, and interactive screen displays. In text, this type also identifies URLs, UNIX command and pathnames, PC-based commands and folders, and certain elements of the C programming language.
–	A hyphen at the end of a command format description, command line, or code line indicates that the command or statement continues on the following line.
numbers	All numbers in text are assumed to be decimal unless otherwise noted. Nondecimal radixes—binary, octal, or hexadecimal—are explicitly indicated.

1 Getting Started

This chapter defines key terms and describes preliminary procedures you must perform before installing or upgrading your OpenVMS Alpha or OpenVMS I64 system.

NOTE Throughout this book, examples are taken from OpenVMS I64 installations or upgrades except where stated otherwise. OpenVMS DCL commands are in uppercase, while HP Integrity servers console commands are in lowercase.

1.1 Key Terms

Table 1-1 lists a few key terms you need to know before you install or upgrade the system.

Table 1-1 Definitions of Terms

Term	Definition
HS*x* device	A self-contained, intelligent, mass storage subsystem that lets computers in an **OpenVMS Cluster** environment share disks. The disk on which you install or upgrade the operating system can be connected to one of these systems (for example, an HSV or HSG).
InfoServer	A general-purpose disk storage server. For OpenVMS Alpha systems, the InfoServer may be an independent hardware device or, beginning with OpenVMS Version 8.3, it may be a utility (software application) on an OpenVMS system. On OpenVMS I64 systems, the InfoServer is only available as a software application on an OpenVMS system. The InfoServer hardware can serve CDs only (it does not support DVDs); thus, the hardware device cannot serve the OpenVMS I64 operating environment DVD. The InfoServer utility can serve both DVDs and CDs (for OpenVMS I64 and OpenVMS Alpha systems, respectively). The systems connected to the same LAN can **boot** the OpenVMS operating system from a virtual drive (instead of the local drive) using the InfoServer utility. For more information about the InfoServer utility, see the *HP OpenVMS Version 8.3 New Features and Documentation Overview*.
Local drive	A drive on your computer system, such as a CD, DVD, or disk drive (hard drive), that is connected directly to the computer. If you have a standalone computer, it is likely that all drives connected to the computer system are local drives.
Operating system media	The OpenVMS Alpha **operating system CD** or the OpenVMS for Integrity servers **Operating Environment (OE) DVD** included with your OpenVMS distribution kit, which contains the OpenVMS operating system and the installation and other procedures described in this manual.

Table 1-1 Definitions of Terms (Continued)

Term	Definition
Source drive	The drive that holds the operating system media during an upgrade or installation. This can be a local drive or an InfoServer virtual drive. The drive contains the OpenVMS Alpha operating system CD or the OpenVMS for Integrity servers Operating Environment DVD, or a copy of it.
System disk	The disk from which OpenVMS is booted. During an installation or upgrade, this is the source drive. After installation, the target drive is booted and becomes the system disk.
Target drive	The drive that holds the target system disk during the upgrade or installation. Note: the target drive must be a hard drive, not a CD or DVD.

1.2 New with OpenVMS Version 8.3

Note the following changes implemented with OpenVMS Version 8.3 (other changes are noted elsewhere in this manual):

- The OpenVMS operating system distribution media menu provides a new option (7) that enables you to perform patch-related operations.

  When you select option 7, you are brought to a submenu that provides options enabling you to search for patch kits, install patches, remove recent patches for which there is recovery data, and to show and delete recovery data. You can perform these operations even when the operating system cannot be booted (in which case you would not be able to use the DCL command PRODUCT). For more information, see Section 1.5.7.

- **Common Data Security Architecture (CDSA)** is configured and initialized automatically during installation and upgrades and is required for **Secure Delivery** purposes and other security features.

  If you install a newer version of CDSA without upgrading the base operating system, you must initialize the CDSA software, using the following command. Enter the command from an account that has both SYSPRV and CMKRNL privileges (for example, the SYSTEM account).

  ```
  $ @SYS$STARTUP:CDSA$UPGRADE
  ```

- HP SSL is now included as part of the OpenVMS operating system.

  Secure Sockets Layer (SSL) for OpenVMS Alpha and I64 systems provides secure transfer of sensitive information over the Internet.

- Most kits included on the OpenVMS Version 8.3 distribution media are signed using Secure Delivery.

  Most of the software kits included on the distribution media are now signed using Secure Delivery. A notable exception is the OpenVMS operating system, which is not signed because it is shipped in bootable form rather than as a signed, single file kit.

  For OpenVMS I64, when you install or upgrade the operating system by booting from the distribution media, layered products that have been signed are validated by the PCSI utility with the aid of a digital signature file (also referred to as a manifest). Validation involves using the Secure Delivery component of CDSA to authenticate the originator of the product kit and to verify its contents.

For OpenVMS Alpha, layered product validation is not performed initially when installing or upgrading from the distribution media (CD). This restriction is due to space limitations of the OpenVMS Alpha distribution CD, which prevents CDSA from being present in usable form while booted from the CD. However, after installing or upgrading OpenVMS to Version 8.3, any signed kits that you install subsequently are validated, including signed kits that ship on the distribution media.

In addition, on both OpenVMS Alpha and OpenVMS I64 systems, the DCL command PRODUCT SHOW HISTORY displays the validation status of installed products and identifies those that were installed from unsigned kits or were installed prior to the availability of the Secure Delivery functionality.

- Encryption for OpenVMS is now installed as part of the OpenVMS operating system rather than as a separately installed and licensed product.

  When you install or upgrade OpenVMS, Encryption for OpenVMS creates its own ENCRYPT and DECRYPT commands. Encryption for OpenVMS starts automatically (after SSL for OpenVMS, which also starts automatically). If during an upgrade an earlier version of ENCRYPT software is found, the upgrade procedure removes the product. For more information about Encryption for OpenVMS, see the *HP OpenVMS Version 8.3 New Features and Documentation Overview*.

CAUTION **DECRAM Users**: With Version 8.3 of OpenVMS, the DCL command DECRAM has been removed because it conflicts with the new DECRYPT command (DECRYPT overwrites the default definition of DECR, which you might have been using to run DECram). You should update any command procedures that use the DECRAM command so that they use the foreign command style of DCL to run DECRAM:

```
$ DECRAM == "$MDMANAGER"
```

This change affects only the use of the DCL command; all other aspects of the DECram product remain the same. For pre-upgrade requirements regarding DECram, see Section 4.4.1.

- DECwindows client files are made available through the DWMOTIF_SUPPORT kit (prior to Version 8.3, the client files were included directly with the OpenVMS operating system kit).

  The OpenVMS installation and upgrade procedures install this kit automatically. The DWMOTIF_SUPPORT kit name is listed during the installation or upgrade of the operating system, or when using certain OpenVMS operating system menu options or DCL commands (such as the PRODUCT SHOW PRODUCT command).

- WBEM (Web-Based Enterprise Management) Services for OpenVMS is available as an optional product on OpenVMS I64 systems. This product is based on the Common Information Model (CIM), differentiating it from the original OpenVMS WBEM offering that is based on the Simple Network Maintenance Protocol (SNMP). This product is required for use of **Instant Capacity (iCAP)** and **Pay per use (PPU)** (supported on cell-based Integrity servers). (Note that Instant Capacity and Pay per use are mutually exclusive on any cell-based Integrity server.)

- The HP nPartition Provider has been ported to OpenVMS to support Instant Capacity (iCAP) features on cell-based Intel® Itanium® servers (OpenVMS I64 only). The OpenVMS Version 8.3 nPartition Provider does not support local or remote management of nPartitions (such as remote WBEM connections).

- OpenVMS I64 now supports satellite booting.

- Using the OpenVMS InfoServer utility (software application), OpenVMS I64 now supports network booting of the OpenVMS I64 OE DVD for installations as well as upgrades.

- OpenVMS I64 can take advantage of **Hyper-Threading** on systems that have dual-core Intel Itanium 2 processors. Hyper-Threading provides the ability for processors to create a second virtual core that may allow additional efficiencies of processing. For example, a dual-core processor with Hyper-Threading active can run four threads. (A **core** is the actual data processing engine within a processor. A single processor can have multiple cores. Cores are also referred to as logical CPUs.) For more details about enabling (and disabling) Hyper-Threading, see Section B.4.

1.3 Getting to Know Your Integrity Server

The OpenVMS operating system is now supported on a wide variety of HP Integrity servers, including the following:

- Entry-class servers (for example, the rx1600 or rx4600 series)
- Midrange servers (for example, the rx7620 and rx8620)
- High-end servers (Superdome)

For an up-to-date list of servers supported by the current release of OpenVMS, see the *HP OpenVMS Version 8.3 for Alpha and Integrity Servers Software Product Description* (SPD 82.35.*xx*).

The hardware, firmware, and software supported might vary significantly from system to system. Integrity servers are available in many different configurations. The hardware, utilities, and hardware configuration procedures might differ significantly across models, and even across versions of the same model. This manual provides basic information about the firmware, hardware, and utilities offered on Integrity servers. This information is not meant to replace the hardware documentation. For the most up-to-date and relevant information for your particular model, see the hardware documentation for your Integrity server. The hardware documentation includes model-specific illustrations to guide you. The latest version of documentation for your server can be found online at:

`http://docs.hp.com/en/hw.html`

`http://docs.hp.com`

`http://www.hp.com/support/itaniumservers`

For the latest information about firmware and software requirements and for considerations for your Integrity server, see also the *HP OpenVMS Version 8.3 Release Notes*.

1.3.1 Entering Commands at Integrity Server Console Interfaces

When entering commands for the Integrity server, if you press **Delete** on a VT*xxx* terminal (or press the key you have mapped to send the DEL/RUBOUT character code in your terminal emulator), the last character typed is not deleted, as would be expected on an OpenVMS Alpha system. Integrity server facilities use **Ctrl/H** to delete the last character typed. For information about how to remap a terminal to use **Ctrl/H** instead of DEL/RUBOUT, see Section B.1.3.

1.3.2 Integrity Server Tools

Integrity servers include multiple interfaces for working with various aspects of the server or **server complex**. The **Management Processor (MP)**, which is also known on entry-class Integrity servers as **Integrated Lights-Out (iLO)**, is available on most systems. It provides a service interface that allows

access to all hardware and, in a complex, all **nPartitions**. MP is always available, even when the main power source is turned off (MP can operate on standby power). On **cell-based servers** (such as rx7620, rx8620, and Superdome), MP is available whether or not nPartitions are configured or booted in the server complex. You can navigate from MP to and from the operating system (if it is booted).

The **Extensible Firmware Interface (EFI)** provides support for operating system loaders and allows you to configure the firmware and control the booting environment. EFI is accessible only when the operating system is not booted. On cell-based servers, each nPartition has a separate EFI console interface. EFI provides support for managing nPartitions. The EFI interface is available from an nPartition console only when the nPartition is in an active state but has not booted an operating system.

You can move from the EFI interface to MP and back again. Similarly, you can move from MP to the operating system and back.

1.3.3 Cell-Based Server Terminology

A cell-based server—such as the HP rx7620, rx8720, or Superdome server—is a hardware complex that can run one or more operating systems and that supports dividing hardware resources into nPartitions. Thus, it enables you to configure a complex into one large system or into several smaller systems.

All processors and memory are contained in cells, each of which can be assigned for exclusive use by an nPartition. An nPartition defines a subset of the server hardware resources that is used as an independent system environment. An nPartition has its own EFI system boot interface and each nPartition boots and reboots independently. Each nPartition provides both hardware and software isolation so that hardware or software faults in one nPartition do not affect other nPartitions within the same server complex.

By using HP software-based nPartition management tools, you can configure nPartition definitions for a server without physically modifying the server hardware configuration. The main administration tools for nPartitions are the Partition Manager, which provides a graphical interface, and the nPartition Commands, which provides a command-line interface. Versions of these interfaces are provided on HP-UX and Microsoft® Windows® systems. nPartition Commands is also available on Linux® systems. MP and EFI can also perform nPartition administrative tasks. Slightly different tool sets and capabilities are available on different server models. For more information, see your hardware documentation. In addition, see the *HP System Partitions Guide: Administration for nPartitions*.

1.3.4 Getting Started: Main Steps After You Unpack Your Integrity Server

When you unpack your Integrity server, the main steps for getting OpenVMS up and running are those listed in Table 1-2. As indicated in the third column, some of the instructions are provided in this manual. However, for the most up-to-date information specific to your Integrity server model and version, always resort to the hardware documentation provided for your Integrity server.

Table 1-2 Getting OpenVMS Started on Integrity Servers

Step	Action	Documentation
1	Connect your console cable to the serial port; if MP is present on your server, connect to the MP serial port	Section B.2
2	Optionally, configure MP to accept connections over TCP/IP Services for OpenVMS	Hardware manual
3	Set the EFI console input, output, and error devices	Section B.2; if you ordered your server preinstalled, console selections are already made but you might need to change them

Table 1-2 Getting OpenVMS Started on Integrity Servers (Continued)

Step	Action	Documentation
4	Power on your Integrity server, insert the OpenVMS I64 distribution media (DVD) into the drive, cycle power, and then use the EFI boot menu to boot from the DVD	For how to power on and recycle power, see the hardware documentation; for instructions on booting the DVD, see Section 3.2.2

After this, you need not use EFI to configure boot options. You can configure EFI boot options while OpenVMS is running by using the OpenVMS I64 Boot Manager (SYS$MANAGER:BOOT_OPTIONS.COM), as explained in Section B.5.2. This utility is easier to use than EFI and allows you to configure the most pertinent options for your system. In addition, the OpenVMS installation (and upgrade) procedure can assist you in establishing and validating boot options for your system disk.

1.4 Examining Software and Hardware Components

Before beginning an installation or upgrade, be sure you have all the required hardware and software components, as described in the following sections.

1.4.1 Hardware Components

Before you begin an installation or upgrade, do the following:

- Be sure the hardware has been installed and checked for proper operation. For detailed information, see the hardware manuals you received with your computer.

  For initial installations on Integrity servers, your console terminal requires a standard PC-to-PC file transfer cable (also known as a null modem cable; 9-pin female connectors at each end) to connect a PC, laptop, or similar device that includes terminal emulation software. For information about setting up your system console, see Section B.2.
- Be sure you know how to turn on and operate the components of your system, including the system unit, console, monitor, drives, terminals, and printers. If necessary, read the hardware manuals that came with these components.
- Make sure you record the installation procedure. You need a transcript if a problem occurs during installation. If you are using terminal emulation software, set the software to log the session. Otherwise, set up your system to record the installation procedure on either a hardcopy terminal or a printer attached to the console terminal. (See your hardware manuals for more details about connecting those components to your system.)

1.4.2 Software Components

Before you begin an installation or upgrade, do the following:

- Be sure you have all the items listed on the bill of materials contained in the distribution kit. If your distribution kit is incomplete, notify HP Customer Support and request priority shipment of any missing items.
- Before installing the OpenVMS operating system software, review all cover letters and release notes.

1.4.3 OpenVMS Alpha Operating System CD

Included in your OpenVMS Alpha kit is the OpenVMS Alpha operating system CD, which you use to install or upgrade the operating system, or to perform operations such as backing up the system disk. The CD is labeled similar to the following:

CD label	HP OpenVMS Alpha Version 8.3 Operating System
Volume label	ALPHA083

The CD label is the printed label on the CD. The **volume label** is the machine-readable name that the OpenVMS Alpha operating system and InfoServer systems (or utilities) use to access the CD.

1.4.4 OpenVMS for Integrity Servers Operating Environment (OE) DVD

Included in your OpenVMS I64 kit is the OpenVMS for Integrity Servers OE DVD, which you use to install the operating system or to perform operations such as backing up the system disk. The DVD is labeled similar to the following:

DVD label	HP OpenVMS Version 8.3 for Integrity Servers Operating Environment
Volume label	I64083

The DVD label is the printed label on the OE DVD. The volume label is the machine-readable name that the OpenVMS I64 operating system uses to access and identify the DVD.

1.4.5 Firmware on Alpha Systems

OpenVMS Alpha Version 8.3 performs a firmware check each time the system is booted. When you **boot** the OpenVMS Alpha operating system CD, the system automatically checks the version of console firmware that is running on your computer. The system also provides information about how to update the firmware.

If you do not have the *required* version of console firmware, the system displays a message similar to the following:

```
%SYSBOOT-F-FIRMREV, Firmware rev.nnn is below the absolute minimum of nnn.
       Please update your firmware to the recommended revision nnn,
         Alpha Systems Firmware Update Vn.n.
```

If you do not have the *recommended* version of console firmware, the system displays a message similar to the following:

```
%SYSBOOT-W-FIRMREV, Firmware rev.nnn is below the recommended minimum of nn.
       Please update your firmware to the recommended revision,
       which can be found on the firmware CD labeled:
         Alpha Systems Firmware Update Vn.n.
```

The latest firmware CD is included with your OpenVMS Alpha media kit. It includes system firmware for current and recent Alpha systems and some I/O adapters. Firmware for older hardware might not be included on the current CD but can be found on previous CDs or online at:

`http://ftp.digital.com/pub/DEC/Alpha/firmware/`

HP recommends updating to the latest released firmware for all systems and I/O adapters. Firmware is released more often than the OpenVMS Alpha operating system. The firmware version recommendations included in OpenVMS Alpha Version 8.3 might be superseded before the next version of the OpenVMS Alpha operating system is released.

1.4.6 Firmware on Integrity Server Systems

HP Integrity servers include several firmware components (varying with system type), any of which might need updating. For the minimum versions recommended, see the *HP OpenVMS Version 8.3 Release Notes*.

To update entry-class Integrity server firmware, follow the instructions provided in this section; for cell-based servers (midrange and high-end), contact HP Customer Support.

To update your firmware, perform the following steps:

Step 1. Determine the current firmware versions on your Integrity server (see Section 1.4.6.1).

Step 2. Create a firmware update CD on any system equipped with a CD or CD/DVD-recordable drive (see Section 1.4.6.2).

NOTE HP continuously strives to improve firmware update methods. In a coming release, HP will provide a method that can be initiated from the running operating system. You will not have to update the firmware offline from a CD. To receive notification of new firmware releases for the Integrity server you own, you can subscribe (free of charge) for drivers and software alerts, as instructed in Section 1.4.6.1.

Step 3. Update the firmware on your Integrity server (see Section 1.4.6.3).

1.4.6.1 Checking Firmware Version

To determine the firmware version in place on your Integrity server, use the **Extensible Firmware Interface (EFI)** `info fw` command at the EFI Shell> prompt, as in the following example (for cell-based servers, check the firmware at the nPartition console). If MP is available, use the MP `sysrev` command.

```
Shell> info fw
```

NOTE The `info fw` command at the EFI> Shell prompt cannot be used while OpenVMS is running. You can use the MP interface to check firmware on your system while OpenVMS is running.

NOTE EFI Shell commands are not case sensitive. However, in this manual, EFI and other Integrity server interface commands are displayed in lowercase to help distinguish them from OpenVMS DCL commands.

If MP is available, use the MP `sysrev` command.

For more information about the latest firmware for your Integrity server, check the *HP OpenVMS Version 8.3 Release Notes*. In addition, see the information and resources provided on the HP Support Web site by following these steps:

Step 1. Go to the following Web site:

```
http://www.hp.com/support/itaniumservers
```

Step 2. Select the appropriate server in the provided list.

The HP Support page that appears provides a list of tasks and services to choose. To automatically receive drivers and support alerts from HP (free of charge), select "Signups: drivers and support alerts" from the list of services, and fill out the forms as instructed.

To find more information about firmware for your Integrity server, select "Download drivers and software" from the list of tasks, and continue with the next step.

Step 3. From the "Download drivers and software page", select "Cross operating system (BIOS, Firmware, Diagnostics, etc)".

Step 4. From the resulting page, locate the appropriate firmware (look for the latest update; previous versions might also be listed along with the latest), select the link for the firmware in the "Description" column.

Step 5. Select the "Release Notes" tab and read the information about the current version of firmware and the instructions for determining the firmware in currently in place on your Integrity server. Compare your installed version with firmware versions listed in the release notes.

1.4.6.2 Creating a Firmware Update CD

To create a firmware update CD for your entry-class Integrity server, you need a CD-recordable drive and software, plus a blank CD-R or CD-RW disk. (For updating firmware on a cell-based server, you must contact HP Customer Support.)

NOTE The following instructions are for recording a DVD on an OpenVMS system. You can record the DVD on any system or PC, such as a Microsoft Windows computer, a Linux system, or an HP-UX system.

Note that in a future update, a tool will be available from HP that enables you to update the firmware while the operating system is running. To receive notification of new firmware releases for the Integrity server you own, you can subscribe (free of charge) for drivers and software alerts, as instructed in Section 1.4.6.1.

Step 1. Follow steps 1 through 3 from the preceding section.

Step 2. Locate the appropriate ISO-image firmware file (look for the latest update; previous versions might also be listed along with the latest), select the link for that file and read the instructions for the file included in the release notes, and then download the ISO-image firmware (zip-compressed) file to your system (to access the release notes, see step 5 in the preceding section).

Step 3. Unzip the firmware file into the corresponding .ISO file. The .ISO file is a block copy of the firmware disk for the Integrity server system. On OpenVMS systems, you can obtain the INFO-ZIP utility from the OpenVMS Freeware CD and use the UnZip utility provided with INFO-ZIP. The following example shows the command for unzipping an .ISO image of the latest firmware for an rx2600 system (the file name changes with each update of the firmware available on the Web site):

```
$ UNZIP PF_CPEAKSYS0nnn.ZIP
Archive: SYS$SYSROOT:[SYSMGR]PF_CPEAKSYS0nnn.ZIP
 inflating: PF_CPEAKSYS0nnn.ISO
```

Step 4. Record the data on the CD, specifying the .ISO file as the source for the CD. For instructions on doing this, enter the following command:

```
$ @SYS$MANAGER:CDRECORD HELP
```

NOTE OpenVMS software includes the CD recording tool CDRECORD. For online help, enter the @SYS$MANAGER:CDRECORD HELP command at the OpenVMS DCL prompt as shown previously. For source files, check the OpenVMS Open Source Tools CD supplied with your OpenVMS I64 OE DVD. For more information about the software, visit the following Web site:

`http://www.hp.com/go/openvms/freeware/`

1.4.6.3 Updating Your Firmware from the Firmware Update CD

You update the firmware of an entry-class Integrity server from the firmware update CD created in the preceding section. For instructions, see the release notes provided for the firmware you downloaded.

IMPORTANT To update Integrity server firmware on cell-based servers, contact HP Customer Support.

1.4.7 Device-Naming Conventions

When you perform specific operations, you are asked to specify a **device name** for the source drive and one for the target drive. When specifying those device names, note the following naming conventions:

- When the source drive is a local CD or DVD drive, the device name is similar to the following:

  `DQA0`

- When the target drive is a local disk, the device name is similar to the following:

  `DKA0:`

  Note the following device name conventions:

  — *DQ* or *DK* is the device code of the boot device.

  — *A* is the boot device controller designation.

  — *0* is the unit number of the boot device.

- When the source drive is a virtual DVD drive served by the InfoServer, the device name is typically the following:

  `DAD1`

- On OpenVMS systems configured in certain OpenVMS Cluster or HS*x* environments, the device naming convention is similar to the following:

  `DUA20.14.0.2.0`

  The values you specify identify components such as the boot device, controller, unit number of the boot device, HS*x* controller node number, and channel numbers. Because these values vary depending on your specific hardware configuration, see the owner, operator, and technical service manuals that came with your computer for detailed information.

1.5 Using the Operating System Menu

The following sections describe how to use the operating system menu to install, upgrade, and modify your system disk, and perform other related tasks.

NOTE The OpenVMS Alpha CD and OpenVMS I64 DVD menu options are very similar. This section provides examples from the OpenVMS I64 menu system.

The OpenVMS operating system main menu displays automatically when you boot the OpenVMS operating system from the operating system **media** (for instructions on how to boot from the operating system media, see Section 3.2). From the menu, you can choose options to perform any of the following tasks:

- Install or upgrade the operating system from the operating system media.
- Display a list of products that can be installed from the operating system media.
- Install or upgrade **layered products** from the operating system media.
- Show which products are installed on your system.
- Reconfigure layered products installed on your system.
- Remove products.
- Find, install, and remove patches, and display and remove recovery data.
- Enter the DCL environment from which you can perform preinstallation or maintenance tasks, such as mounting or showing devices and backing up or restoring files on the system disk.
- Shut down the system.

The following is a sample display of the OpenVMS main menu:

```
OpenVMS I64 Operating System, Version 8.3

(c) Copyright 1976-2006 Hewlett-Packard Development Company, L.P.


Installing required known files...

Configuring devices...

************************************************************
You can install or upgrade the OpenVMS I64 operating system
or you can install or upgrade layered products that are included
on the OpenVMS I64 distribution media (CD/DVD).

You can also execute DCL commands and procedures to perform
"standalone" tasks, such as backing up the system disk.

Please choose one of the following:

  1) Upgrade, install or reconfigure OpenVMS I64 Version 8.3
  2) Display layered products that this procedure can install
```

```
       3) Install or upgrade layered products
       4) Show installed products
       5) Reconfigure installed products
       6) Remove installed products
       7) Find, Install, or Undo patches; Show or Delete recovery data
       8) Execute DCL commands and procedures
       9) Shut down this system

   Enter CHOICE or ? for help: (1/2/3/4/5/6/7/8/9/?)
```

Review the following sections to understand how the menu works. Then you can choose appropriate menu options when you are asked to do so before, during, and after an installation or upgrade.

1.5.1 Using the Install, Upgrade, or Reconfigure OpenVMS Option (1)

Select option 1 on the operating system main menu to install, upgrade, or reconfigure your OpenVMS software. Selecting option 1 implements a PCSI utility concept called a **platform**. The OpenVMS platform contains:

- The OpenVMS operating system
- The required **Kerberos**, CDSA, SSL, **Performance Data Collector (TDC)** (base), and **Availability Manager** (base) products
- The optional **DECwindows Motif for OpenVMS**, **DECnet-Plus**, **DECnet Phase IV**, **TCP/IP Services for OpenVMS** products and, for OpenVMS I64 only, the WBEM Services for OpenVMS product

---

NOTE For use of Instant Capacity (iCAP) and Pay per use (PPU) features (supported on cell-based Integrity servers), you must install TCP/IP Services for OpenVMS and WBEM Services for OpenVMS on Integrity servers (SSL for OpenVMS is required and installed automatically). In addition, you can use the OpenVMS nPartition Provider to support Instant Capacity (iCAP).

Including the optional products in the OpenVMS platform allows you to install or upgrade these products along with the OpenVMS operating system.

When you choose to upgrade the system disk, and the OpenVMS software on the disk is the same version, you are given options to reinstall or to reconfigure the OpenVMS system or reconfigure the OpenVMS platform.

Before installing or upgrading OpenVMS, see the information in the following chapters, as appropriate:

- Chapter 2, "Preparing to Install in an OpenVMS Cluster Environment," on page 45
- Chapter 3, "Installing the OpenVMS Operating System," on page 51
- Chapter 4, "Before Upgrading the OpenVMS Operating System," on page 91
- Chapter 5, "Preparing to Upgrade in an OpenVMS Cluster Environment," on page 105
- Chapter 6, "Upgrading the OpenVMS Operating System," on page 113

NOTE Before installing or upgrading OpenVMS on a target drive in an OpenVMS Cluster, make sure the target system disk is not mounted elsewhere in the cluster. The target system disk must be dismounted clusterwide (except on the system from which the installation or upgrade is being performed) and must remain so during the installation or upgrade.

When you select option 1 on the operating system main menu, the system asks whether you want to preserve or initialize the system disk. The display is similar to the following:

```
     There are two choices for Installation/Upgrade:

     INITIALIZE - Removes all software and data files that were
       previously on the target disk and installs OpenVMS I64.

     PRESERVE -- Installs or upgrades OpenVMS I64 on the target disk
       and retains all other contents of the target disk.

     * Note: You cannot use PRESERVE to install OpenVMS I64 on a disk on
       which any other operating system is installed. This includes
       implementations of OpenVMS for other architectures.

   Do you want to INITIALIZE or to PRESERVE? [PRESERVE]
```

1.5.1.1 INITIALIZE Option

When you specify the INITIALIZE option, the following operations take place:

- All software and data files that already exist on the target disk are removed. The software can only be recovered from a backup of the disk, so make sure that you either have a backup or will not need the data again.
- The operating system is installed.

Specify the INITIALIZE option and perform a full installation under any of the following conditions:

- If your computer is new (it has never had any version of any operating system running on it, including factory-installed software).
- If your computer is already running a version of the OpenVMS operating system and you want to overwrite the entire contents of the system disk (the operating system, application software, and user files).
- If you want to keep an existing system disk and install OpenVMS on a different disk.
- If you are running the OpenVMS operating system but cannot upgrade. For example, if you changed the names of system directories on the system disk, the upgrade procedure will not work correctly. Therefore, unless you restore the system disk to its original directory structure, you must reinstall the operating system using the INITIALIZE option.

NOTE During initialization of an OpenVMS I64 target system disk, the installation process creates a **diagnostic partition**, visible only at the console prompt. For more information about this partition and options you can take, see Appendix I.

For systems that support the Instant Capacity (iCAP) feature, CPU status (how many cores are available and how much time they have remaining) is not affected by initialization of the system disk. Such information is stored in NVRAM on the Integrity server.

With both OpenVMS Alpha and I64 systems, the installation procedure initializes the target disk with volume expansion (INITIALIZE/LIMIT). This renders the disk incompatible with versions of OpenVMS prior to Version 7.2. In most cases, this does not present a problem. However, if you intend to mount the new disk on a version of OpenVMS prior to Version 7.2, you must perform the alternate method of initialization described in Appendix I. Note that as a result of this alternate method, your new system disk might include a relatively large

minimum allocation size (as defined by /CLUSTER_SIZE). Small files will use more space than would be used otherwise. Therefore, perform these steps *only* for system disks that must be mounted on versions of OpenVMS prior to Version 7.2.

1.5.1.2 PRESERVE Option

When you specify the PRESERVE option, the following operations take place:

IF ...	THEN ...
The OpenVMS operating system *is not* already installed on the target disk	• The operating system is *installed*. • All other contents of the target disk are retained.
The OpenVMS operating system *is* installed on the target disk	The operating system is *upgraded*, as follows: • Old operating system files and new files are merged or replaced. • All other contents of the target disk are retained.

NOTE If you intend to choose the PRESERVE option (because there are certain files on the disk that you want to retain), HP recommends that you first make a backup copy of your system disk. If there is any problem during the installation or upgrade that might affect the integrity of the disk, you will have the backup copy as a safeguard.

If you choose the PRESERVE option and choose a target disk that already contains the OpenVMS Version 8.3 software, you are provided with the option to either reconfigure or reinstall the OpenVMS operating system:

- Reconfigure the operating system if you want to change the options you chose to include when the operating system was installed.
- Reinstall the operating system if you think that your system files might have become corrupted.

For additional configuration information, see Section 7.12.

1.5.2 Using the Display Layered Products Option (2)

Use option 2 to display layered products that can be installed. Although this option displays any patch kits available from the OpenVMS distribution media, HP recommends using option 7 to display patch kits; option 7 enables you to specify locations to search in addition to the standard location.

When you select option 2 on the operating system main menu, the following information is displayed:

- The version of OpenVMS and versions of the required components and optional products that can be installed or upgraded when you select option 1 on the main menu.
- The layered product kits that are available for installation when you select option 3 on the operating system main menu. The DECwindows graphical user interface and HP networking products are shown again, along with other layered products.

NOTE The two lists of products (the products that can be installed or upgraded and the layered product kits available for installation) might be the same or very similar. Generally, products that can be installed or upgraded along with the OpenVMS operating system should be installed or upgraded with the OpenVMS operating system.

The following is an example of a display. In this display, WBEMCIM is the file name used in the PCSI kit for the WBEM Services for OpenVMS product, which is available on OpenVMS I64 systems only. CIM stands for the Common Information Model, which differentiates the current OpenVMS WBEM product from the original one that is based on the Simple Network Maintenance Protocol (SNMP).

```
  The following versions of the OpenVMS operating system,
  required components, and optional products
  are available on the OpenVMS Distribution media.
  They can be installed by selecting option 1:

HP I64VMS VMS version V8.3
HP I64VMS AVAIL_MAN_BASE V8.3
HP I64VMS CDSA version V2.2
HP I64VMS KERBEROS version V3.0
HP I64VMS SSL V1.3
HP I64VMS DWMOTIF version V1.6
HP I64VMS DWMOTIF_SUPPORT V8.3
HP I64VMS DECNET_PLUS version V8.3
HP I64VMS DECNET_PHASE_IV version V8.3
HP I64VMS TCPIP version V5.6
HP I64VMS TDC_RT version V2.2
HP I64VMS WBEMCIM version V2.0


  The following Layered Product kits are available on the OpenVMS
  Distribution media (CD/DVD). They can be installed by selecting
  option 3. If they are already installed, they can be reconfigured
  by selecting option 5, or removed by selecting option 6.

----------------------------------- ----------- ----------
PRODUCT                             KIT TYPE    KIT FORMAT
----------------------------------- ----------- ----------
HP I64VMS AVAIL_MAN_BASE V8.3       Full LP     Compressed
HP I64VMS CDSA V2.2                 Full LP     Compressed
HP I64VMS DECNET_PHASE_IV V8.3      Full LP     Compressed
HP I64VMS DECNET_PLUS V8.3          Full LP     Compressed
HP I64VMS DWMOTIF V1.6              Full LP     Compressed
HP I64VMS DWMOTIF_SUPPORT V8.3      Full LP     Compressed
HP I64VMS KERBEROS V3.0             Full LP     Compressed
HP I64VMS SSL V1.3                  Full LP     Compressed
HP I64VMS TCPIP V5.6                Full LP     Compressed
HP I64VMS TDC_RT V2.2               Full LP     Compressed
HP I64VMS WBEMCIM V2.0              Full LP     Compressed
----------------------------------- ----------- ----------

9 items found

Press Return to continue...
```

1.5.3 Using the Install or Upgrade Layered Products Option (3)

Use option 3 on the operating system main menu for normal installations or upgrades of the layered products.

Although this option installs any patch kits available from the OpenVMS distribution media, HP recommends using option 7 to install patch kits; option 7 enables you to install patch kits that are located elsewhere than the standard location. In addition, option 7 saves recovery data. When you use option 7 to remove patch kits, only kits with recovery data are removed.

Note that you can install or upgrade the DECwindows graphical user interface and HP networking products along with the OpenVMS operating system by selecting option 1 on the main menu.

When you select option 3, the PCSI utility allows you to choose whether to install layered products or to register layered products that are on the target disk but are not in the Product Database. If you attempt to reinstall the same version of a product that is already installed, the product is reinstalled. Note that any patches that were applied to the product are removed. If you want to reconfigure, select the reconfigure option (5) on the main menu.

As of Version 8.3, most of the software kits included on the OpenVMS distribution media are signed using Secure Delivery. When you use option 3 of the OpenVMS I64 operating system menu, these kits are validated by the PCSI utility. When you use option 3 from the OpenVMS Alpha operating system menu, these kits are not validated; this restriction is due to the CD's space limitations. You can install kits created before the secure delivery process was enabled in OpenVMS Version 8.3. (However, after you install or upgrade to OpenVMS Version 8.3, signed kits that you install subsequently are validated, including any signed kits included on the distribution media). The DCL command PRODUCT SHOW HISTORY displays the validation status of these kits as unsigned rather than as a validated kit.

As shown in the following example, you are also prompted for a target disk and asked whether you want brief or detailed descriptions. The procedure presents a list of products and allows you to select any or all of these products. Alternatively, you can exit without installing or upgrading any products. (This particular example includes notes about installing DECwindows Motif and DECnet.)

NOTE The layered products listed include CDSA, Kerberos, SSL, TDC, and Availability Manager, which are required, and DECwindows, DECnet Phase IV, DECnet-Plus, TCP/IP Services for OpenVMS, and WBEM Services for OpenVMS, which are optional. WBEM Services for OpenVMS is available on OpenVMS I64 systems only. Support of Instant Capacity (iCAP), Temporary Instant Capacity (TiCAP), and Pay per use (PPU) requires that WBEM Services for OpenVMS be installed as well as TCP/IP Services for OpenVMS. (SSL for OpenVMS is required and installed automatically.)

You can install (or upgrade to) the new implementation of TCP/IP Services for OpenVMS (Version 5.6) as part of the OpenVMS upgrade. If you want to install Version 5.6 separately, choose the following product (option 5 in the example that follows):

```
HP I64VMS TCPIP V5.6
```

```
Do you want to INSTALL or REGISTER? (INSTALL/REGISTER/?) [INSTALL] INSTALL
  ************************************************************

  If you choose to install or upgrade DECwindows Motif,
  please note the following:

   o If you did not select the OpenVMS DECwindows server support
     and workstation files options, DECwindows Motif will not run.
     You must add these options to use DECwindows Motif.

  If you choose to install or upgrade DECnet-Plus or DECnet Phase IV,
```

```
  please note the following:

   o If you did not select the OpenVMS DECNET option, neither version
     of DECnet will run. You must add this option to use DECnet.

  If you want to install a patch kit, please use main menu option 7.

Press Return to continue...

  ************************************************************

  The procedure will ask a series of questions.

     () - encloses acceptable answers
     [] - encloses default answers

  Type your response and press the <Return> key. Type:

     ? - to repeat an explanation
     ^ - to change prior input (not always possible)
     Ctrl/Y - to exit the installation procedure


  You must enter the device name for the target disk on which
  the layered product(s) installation will be performed.

Enter device name for target disk: [DKB300] (? for choices) DKB300
  DKB300: is labeled V82SYS.


  The install operation can provide brief or detailed descriptions.
  In either case, you can request the detailed descriptions by typing "?".

Do you always want detailed descriptions? (Yes/No) [No] NO

  1 - HP I64VMS AVAIL_MAN_BASE V8.3      Layered Product
  2 - HP I64VMS CDSA V2.2                Layered Product
  3 - HP I64VMS DECNET_PHASE_IV V8.3     Layered Product
  4 - HP I64VMS DECNET_PLUS V8.3         Layered Product
  5 - HP I64VMS DWMOTIF V1.6             Layered Product
  6 - HP I64VMS DWMOTIF_SUPPORT V8.3     Layered Product
  7 - HP I64VMS KERBEROS V3.0            Layered Product
  8 - HP I64VMS SSL V1.3                 Layered Product
  9 - HP I64VMS TCPIP V5.6               Layered Product
 10 - HP I64VMS TDC_RT V2.2              Layered Product
 11 - HP I64VMS WBEM V2.0                Layered Product
 12 - All products listed above
  ? - Help
  E - Exit

Choose one or more items from the menu separated by commas:5
```

NOTE When you boot the OpenVMS operating system media and select the option to install layered products, that installation procedure does not run the Installation Verification Procedure (IVP) for layered products. Because the operating system is booted from the media and the layered

products are installed on a different device (the target drive), the IVPs cannot execute correctly. However, you can run the IVP for each layered product after you boot the target system (see the layered product installation documents for information about running the IVP).

1.5.4 Using the Show Installed Products Option (4)

Use option 4 on the operating system main menu to display a list of products that have been installed on a selected target disk by the PCSI utility. Products that were installed by VMSINSTAL or other installation methods do not appear in this display unless they have been registered in the PCSI utility's product database.

The following is a sample display of the prompts and information that appear when you select option 4. WBEM Services for OpenVMS is available on OpenVMS I64 systems only.

```
    You must enter the device name for the system disk for which
    you want to display installed products.

    If you enter an invalid device or one which is not a system disk
    an error will coccur.

    (Enter "^" and press Return to return to main menu.)

  Enter device name for system disk: [DKB300] (? for choices) DKB300
  %MOUNT-I-MOUNTED, V82SYS mounted on _DKB300:

    The default is an 80-column display that does not include
    Maintenance (patches) or Referenced by information.

  Do you want the full, 132-column display? (Yes/No) [No] NO

  ---------------------------------- ----------- ------------
  PRODUCT                            KIT TYPE    STATE
  ---------------------------------- ----------- ------------
  HP I64VMS AVAIL_MAN_BASE V8.3      Full LP     Installed
  HP I64VMS CDSA V2.2                Full LP     Installed
  HP I64VMS DECNET_PLUS V8.3         Full LP     Installed
  HP I64VMS DWMOTIF V1.6             Full LP     Installed
  HP I64VMS KERBEROS V3.0            Full LP     Installed
  HP I64VMS OPENVMS V8.3             Platform    Installed
  HP I64VMS TCPIP V5.6               Full LP     Installed
  HP I64VMS VMS V8.3                 Oper System Installed
  HP I64VMS SSL V1.3                 Full LP     Installed
  HP I64VMS TDC_RT V2.2              Full LP     Installed
  HP I64VMS WBEM V2.0                Full LP     Installed
  ---------------------------------- ----------- ------------

  11 items found
  Do you wish to display product history? (Yes/No) [No] YES
  ---------------------------------- ----------- ----------- --------------------
  PRODUCT                            KIT TYPE    OPERATION   DATE AND TIME
  ---------------------------------- ----------- ----------- --------------------
  HP I64VMS AVAIL_MAN_BASE V8.3      Full LP     Install     25-JUL-2006 18:04:23
  HP I64VMS CDSA V2.2                Full LP     Install     25-JUL-2006 18:04:23
  HP I64VMS DECNET_PLUS V8.3         Full LP     Install     25-JUL-2006 18:04:23
  HP I64VMS DWMOTIF V1.6             Full LP     Install     25-JUL-2006 18:04:23
  HP I64VMS KERBEROS V3.0            Full LP     Install     25-JUL-2006 18:04:23
  HP I64VMS OPENVMS V8.3             Platform    Install     25-JUL-2006 18:04:23
  HP I64VMS TCPIP V5.6               Full LP     Install     25-JUL-2006 18:04:23
```

```
HP I64VMS VMS V8.3                  Oper System Install     25-JUL-2006 18:04:23
HP I64VMS SSL V1.3                  Full LP     Install     25-JUL-2006 18:04:23
HP I64VMS WBEM V2.0                 Full LP     Install     25-JUL-2006 18:04:23
HP I64VMS TDC_RT V2.2               Full LP     Install     25-JUL-2006 18:04:23
HP I64VMS AVAIL_MAN_BASE V8.2-1     Full LP     Remove      25-JUL-2006 18:04:23
HP I64VMS CDSA V2.1                 Full LP     Remove      25-JUL-2006 18:04:23
HP I64VMS DECNET_PHASE_IV V8.2      Full LP     Remove      25-JUL-2006 18:04:23
HP I64VMS DWMOTIF V1.5              Full LP     Remove      25-JUL-2006 18:04:23
HP I64VMS OPENVMS V8.2-1            Platform    Remove      25-JUL-2006 18:04:23
HP I64VMS VMS V8.2-1                Oper System Remove      25-JUL-2006 18:04:23
HP I64VMS KERBEROS V2.1             Transition  Remove      25-JUL-2006 18:04:23
HP I64VMS KERBEROS V2.1             Transition  Reg Product 25-JUL-2006 17:20:44
HP I64VMS CDSA V2.1                 Full LP     Install     27-AUG-2004 21:07:15
HP I64VMS DECNET_PHASE_IV V8.2      Full LP     Install     27-AUG-2004 21:07:15
HP I64VMS DWMOTIF V1.5              Full LP     Install     27-AUG-2004 21:07:15
HP I64VMS OPENVMS V8.2              Platform    Install     27-AUG-2004 21:07:15
HP I64VMS TCPIP V5.4-18             Full LP     Install     27-AUG-2004 21:07:15
HP I64VMS VMS V8.2                  Oper System Install     27-AUG-2004 21:07:15
---------------------------------- ----------- ----------- --------------------

25 items found

Press Return to continue...
```

NOTE The products listed in the product history vary from system to system, depending on the actual history of the system. For definitions of the kit types, see the *HP POLYCENTER Software Installation Utility Developer's Guide*.

1.5.5 Using the Reconfigure Installed Products Option (5)

Use option 5 to reconfigure layered products, including the DECwindows graphical user interface and HP networking products. This allows you to change the product choices you made during a previous installation or upgrade.

You can reconfigure a product only if all of the following conditions are true:

- The product is available for installation while your system is booted from the operating system media. For information about displaying products that are available for installation, see Section 1.5.2 (option 2 on the main menu).
- The product is installed. For information about displaying installed products, see Section 1.5.4 (option 4 on the main menu).
- The version of the product that is available for installation is the same as the version of the product that is installed.

When you select option 5 on the operating system main menu, the procedure prompts you for a target disk name and asks whether you want brief or detailed descriptions about the reconfiguration options. The procedure then lists the products you can configure. You can select any or all of these products, or you can exit without reconfiguring products.

The following is a sample display of the prompts and information that might appear when you select option 5:

```
This procedure will ask a series of questions.

    () - encloses acceptable answers
    [] - encloses default answers
```

```
  Type your response and press the <Return> key. Type:

     ? - to repeat an explanation
     ^ - to change prior input (not always possible)
     Ctrl/Y - to exit the installation procedure


  You must enter the device name for the target disk on which
  the layered product(s) reconfiguration will be performed.

Enter device name for target disk: [DKB300] (? for choices) DKB300
 DKB300: is labeled V82SYS.


  The reconfigure operation can provide brief or detailed descriptions.
  In either case, you can request the detailed descriptions by typing "?".

Do you always want detailed descriptions? (Yes/No) [No]NO


  1 - HP I64VMS AVAIL_MAN_BASE V8.3      Layered Product
  2 - HP I64VMS CDSA V2.2                Layered Product
  3 - HP I64VMS DECNET_PHASE_IV V8.3     Layered Product
  4 - HP I64VMS DECNET_PLUS V8.3         Layered Product
  5 - HP I64VMS DWMOTIF V1.6             Layered Product
  6 - HP I64VMS DWMOTIF_SUPPORT V8.3     Layered Product
  7 - HP I64VMS KERBEROS V3.0            Layered Product
  8 - HP I64VMS SSL V1.3                 Layered Product
  9 - HP I64VMS TCPIP V5.6               Layered Product
 10 - HP I64VMS TDC_RT V2.2              Layered Product
 11 - HP I64VMS WBEM V2.0                Layered Product
 12 - All products listed above
  ? - Help
  E - Exit

Choose one or more items from the menu separated by commas:
```

1.5.6 Using the Remove Installed Products Option (6)

Option 6 allows you to remove products that were installed or registered with the PCSI utility. (This option removes complete products. To remove patches, use option 7, as described in Section 1.5.7.)

IMPORTANT Do not remove the SIPs: Availability Manager, CDSA, Kerberos, SSL, and TDC_RT. These products are tightly bound with the operating system. Attempts to remove any of these products do not work cleanly and can create undesirable side effects.

NOTE When you remove a product that was registered using a transition kit (in other words, a product that has been installed using VMSINSTAL or some method other than PCSI), some of the product's directories, files, or other objects are not removed. Transition kits typically do not contain all the directories, files, and other objects that make up the product.

When you select option 6, you are prompted for a target disk name and whether you want brief or detailed descriptions about the remove options. The procedure then lists the products you can remove. You can select any or all of these products, or you can exit without removing any products.

The following is a sample display of the prompts and information that appear when you select option 6:

```
    This procedure will ask a series of questions.

       () - encloses acceptable answers
       [] - encloses default answers

    Type your response and press the <Return> key. Type:

       ? - to repeat an explanation
       ^ - to change prior input (not always possible)
       Ctrl/Y - to exit the installation procedure


    You must enter the device name for the target disk on which
    the layered product(s) removal will be performed.

Enter device name for target disk: [DKB300:] (? for choices) DKB300

    DKB300: is labeled V82SYS.


    The remove operation can provide brief or detailed descriptions.
    In either case, you can request the detailed descriptions by typing "?".

Do you always want detailed descriptions? (Yes/No) [No] NO


    1 - HP I64VMS AVAIL_MAN_BASE V8.3      Layered Product
    2 - HP I64VMS CDSA V2.2                Layered Product
    3 - HP I64VMS DECNET_PHASE_IV V8.3     Layered Product
    4 - HP I64VMS DECNET_PLUS V8.3         Layered Product
    5 - HP I64VMS DWMOTIF V1.6             Layered Product
    6 - HP I64VMS DWMOTIF_SUPPORT V8.3     Layered Product
    7 - HP I64VMS KERBEROS V3.0            Layered Product
    8 - HP I64VMS SSL V1.3                 Layered Product
    9 - HP I64VMS TCPIP V5.6               Layered Product
   10 - HP I64VMS TDC_RT V2.2              Layered Product
   11 - HP I64VMS WBEM V2.0                Layered Product
   12 - All products listed above
    ? - Help
    E - Exit

Choose one or more items from the menu separated by commas
```

1.5.7 Using the Patches and Recovery Data Option (7)

Select option 7 to install or undo patches and to perform related operations. When you select option 7, the following options submenu appears:

```
    This procedure can perform one of the following operations:

       1) Install one or more patches
       2) Undo recent patches for which there is recovery data
```

```
       3) Show recovery data
       4) Delete recovery data
       5) Find patch kits

   Enter CHOICE or X to return to main menu: (1/2/3/4/5/X)
```

Note the following about these options:

- When you choose submenu option 1, the following information is displayed:

```
      NOTE: Some patch kits cannot be correctly installed by this
            procedure; this includes patch kits for versions of
            OpenVMS prior to V8.3.  Patches for OpenVMS V8.3 and
            later install correctly.  For patches to other products,
            check with the patch kit provider, or install the patch
            from the running system.

            Options 2 through 5 (undo, show, delete, and find) will work
            correctly for all patch kits.
```

- When you choose submenu option 1, 2, 3, or 4, you are prompted for the target device on which the operation will be performed:

```
         You must enter the device name for the target disk on which
         the operation will be performed.

     Enter device name for target disk: [DKB300]
```

- When you choose submenu option 1, you are prompted to choose detailed or brief descriptions, as follows:

```
           The patch operation can provide brief or detailed descriptions.
           In either case, you can request the detailed descriptions by typing ?.

      Do you always want detailed descriptions? (Yes/No) [No]
```

- For each of the submenu options (1 through 5), you are prompted for the patch kit source. You can specify alternate locations. You can use wildcards when you specify the location. The prompt and introductory information are displayed as follows:

```
           This procedure will look for patch kits in

                  SYS$SYSDEVICE:[KITS.*]

           If you want to add an additional location, enter the
           device and directory specification and press return.
           Wildcards are allowed. For example:

                   dka100:[dir1]
                   dkb0:[dir1,dir2]
                   dka200:[dir1,*]
                   dkb300:[dir1...]
```

```
Enter additional patch kit location (or just press Return):
```

After you provide the necessary information, a PCSI /PRODUCT command automatically performs the operation you requested. If you chose options 1, 2, or 4 from the submenu, the PCSI utility prompts you for additional input and displays additional information.

1.5.8 Using the Execute DCL Option (8)

When you select option 8, you get access to a subset of DCL commands (such as SHOW DEVICE, MOUNT, and BACKUP) to perform specific preinstallation and maintenance operations. Note, however, that this is a restricted DCL environment in that certain DCL commands (such as PRODUCT) and certain utilities (such as VMSINSTAL) do not function as expected because you are booting from read-only or write-locked media, and because a full system startup has not been performed.

A triple dollar sign prompt ($$$) indicates that you are in this restricted DCL environment, as in the following example:

```
$$$ SHOW DEVICE
```

To exit the DCL environment and return to the main menu, enter the LOGOUT command.

1.5.9 Using the Shut Down Option (9)

When you select option 9 on the operating system main menu, your system shuts down and you are returned to the console prompt (>>> on Alpha systems; P00>>> on Integrity servers). The system displays a message similar to the following (this examples shows the message from an OpenVMS I64 system):

```
    Shutting down the system

      SYSTEM SHUTDOWN COMPLETE

**** Primary HALTED with code HWRPB_HALT$K_REMAIN_HALTED

****   Hit any key to cold reboot   ****
P00>>>
```

1.6 Making the Install/Upgrade/Backup Selection

Now that you have reviewed key terms, examined hardware and software requirements, and learned how to use the menu system included on the OpenVMS operating system media, you can do the following:

IF ...	THEN GO TO...
You want to install the operating system in an OpenVMS Cluster environment	Chapter 2, and then Chapter 3. Perform postinstallation tasks described in Chapter 7.

IF ...	THEN GO TO...
You want to install the operating system in a nonclustered environment	Chapter 3. Perform postinstallation tasks described in Chapter 7.
You want to upgrade the operating system in an OpenVMS Cluster environment	Chapter 4, Chapter 5, and then Chapter 6. Perform postupgrade tasks described in Chapter 7.
You want to upgrade the operating system in a standalone environment	Chapter 4, and then Chapter 6. Perform postupgrade tasks described in Chapter 7.
You want only to back up or restore your system disk	Appendix E.

2 Preparing to Install in an OpenVMS Cluster Environment

This chapter contains information to review and steps to perform before installing OpenVMS in an OpenVMS Cluster environment. If you are not installing your operating system in an OpenVMS Cluster environment, go to Chapter 3 for information about installing your system.

2.1 Preinstallation Tasks for OpenVMS Cluster Environments

Use the checklist in Table 2-1 to ensure that you perform all necessary tasks prior to installing your system in an OpenVMS Cluster environment.

Table 2-1 Preinstallation Checklist

	Task	Section
❑	Review relevant OpenVMS operating system and OpenVMS Cluster documentation.	Section 2.2
❑	Familiarize yourself with mixed-version, mixed-architecture, and migration support in OpenVMS Cluster systems.	Section 2.3
❑	Have information ready to provide at the system prompt during an installation.	Section 2.4
❑	Make sure the target system disk is not mounted elsewhere in the cluster.	Section 2.5
❑	Begin the installation.	Chapter 3

2.2 Review OpenVMS Cluster Documentation and Other Sources of Information

Before installing the operating system in an OpenVMS Cluster environment, be sure you review any relevant OpenVMS Cluster information contained in the following documents:

OpenVMS Version 8.3 Documents

- The *Cover Letter for HP OpenVMS Version 8.3* and the Software Product Descriptions included with your distribution kit
- *HP OpenVMS Version 8.3 Release Notes*
- *HP OpenVMS Version 8.3 New Features and Documentation Overview*

OpenVMS Version 8.2 Documents

Although not revised for OpenVMS Version 8.3, the following documents remain valid:

- *HP OpenVMS Cluster Systems*
- *Guidelines for OpenVMS Cluster Configurations*

Be sure to consult your network or system manager as well.

2.3 Mixed-Version Support in OpenVMS Cluster Systems

HP provides two levels of support for mixed-version and mixed-architecture OpenVMS Cluster systems: warranted support and migration support.

Warranted support means that HP has fully qualified the two specified versions coexisting in an OpenVMS Cluster and will address all problems identified by customers using this configuration.

Migration support means that HP has qualified the versions for use together in configurations that are migrating in a staged fashion to a newer version of OpenVMS VAX, OpenVMS Alpha, or OpenVMS I64. Problem reports submitted against these configurations will be answered by HP. However, in exceptional cases, HP may request that you move to a warranted configuration as part of the solution. Migration support helps customers move to warranted OpenVMS Cluster pairs. For the minimum version supported for an upgrade to OpenVMS Version 8.3, see Section 4.3.1.

Warranted cluster support is provided for the combinations shown in Table 2-2. (OpenVMS VAX systems are not supported with OpenVMS I64 systems in the same cluster.)

Table 2-2 Warranted Cluster Support

If your system is...	It is warranted in combination with...
OpenVMS Alpha Version 8.3	OpenVMS Alpha Version 8.3 and OpenVMS I64 Version 8.3 or OpenVMS Alpha Version 8.3 and OpenVMS VAX Version 7.3
OpenVMS I64 Version 8.3	OpenVMS I64 Version 8.3 and OpenVMS Alpha Version 8.3

NOTE Only two architectures are supported in the same OpenVMS Cluster: OpenVMS I64 and OpenVMS Alpha, or OpenVMS Alpha and OpenVMS VAX, but not OpenVMS I64 and OpenVMS VAX. Only one version of each architecture is supported in the same OpenVMS Cluster: Version 8.3 of OpenVMS Alpha and OpenVMS I64, and Version 7.3 of OpenVMS VAX.

System disks are architecture specific and can be shared only by systems of the same architecture. An Alpha and I64 system, or an Alpha and VAX system, cannot boot from the same system disk. However, cross-architecture satellite booting is supported between an Alpha and VAX system. When you configure an OpenVMS Cluster to take advantage of cross-architecture booting, make sure that at least one system from each architecture is configured with a disk that can be used for installations and upgrades. For more information, see the *Guidelines for OpenVMS Cluster Configurations* and *HP OpenVMS Cluster Systems*.

Table 2-3 shows the supported migration pairs.

Table 2-3 Supported Migration Pairs

If your system is...	It is supported with any one of the following being migrated to version 8.3...
OpenVMS Alpha Version 8.3	OpenVMS Alpha Version 8.2
or	OpenVMS Alpha Version 7.3-2
OpenVMS I64 Version 8.3	OpenVMS I64 Version 8.2-1
	OpenVMS I64 Version 8.2

For more information, see the OpenVMS Technical Software Support Service Web site at:

`http://www.hp.com/go/openvms/support`

In addition, see the OpenVMS Operating System Support Chart at:

`http://www.hp.com/go/openvms/supportchart`

Before introducing an OpenVMS Version 8.3 system into an existing OpenVMS Cluster, you might need to install certain patch kits (also known as remedial kits) on cluster members running earlier versions of OpenVMS. For a complete list of required patch kits, see the *HP OpenVMS Version 8.3 Release Notes*.

For information about supporting the TDC_RT software in OpenVMS Clusters, see Section 7.9.8.5.

2.4 OpenVMS Cluster Information You Need

If during the installation you answer YES to the system prompt asking whether your system will be a member of an OpenVMS Cluster, you need to provide the following information after you boot the system disk:

Required Information	Explanation
Type of configuration	Configuration types (CI, DSSI, SCSI, local area, or mixed-interconnect) are distinguished by the interconnect device that the VAX, Alpha, or Integrity server computers in the OpenVMS Cluster use to communicate with one another. Note that HP Integrity servers do not support CI, DSSI, or MEMORY CHANNEL devices.
DECnet node name and node address	To obtain the DECnet node name and node address for the computer on which you are installing the OpenVMS operating system, consult the network or system manager. If you install DECnet-Plus for OpenVMS (Phase V) software and do not plan to use DECnet Phase IV for OpenVMS addresses, then you do not need to provide this information.

Required Information	Explanation
Allocation class value	During the installation procedure, you might be asked for the allocation class value (ALLOCLASS) of the computer on which you are installing the OpenVMS operating system. For example: `Enter a value for this_node ALLOCLASS parameter:` Note that in an OpenVMS Cluster environment, the allocation class value cannot be zero if the node serves DSSI or CI disks to other cluster members, or if volume shadowing will be used on this system or in the cluster. In either case, the ALLOCLASS value must be a number from 1 to 255. After you enter the allocation class value, the installation procedure uses it to automatically set the value of the ALLOCLASS system parameter. HP recommends that you thoroughly review the chapter on cluster storage devices in the *HP OpenVMS Cluster Systems* manual. This manual also includes the rules for specifying allocation class values.
Whether you want a quorum disk	To help you determine whether you need a quorum disk in the cluster, see the *HP OpenVMS Cluster Systems* manual.
Location of the page and swap files	On a nonclustered system, the page and swap files are on one or more local disks, but on a clustered system, the files might be on one or more local or clustered disks. See the *HP OpenVMS Cluster Systems* manual to help you determine where the page and swap files will be located for the system on which you are installing the OpenVMS operating system software.
Systems that will be **MOP servers**[a], **disk servers**, and tape servers	If you are going to set up either a local area or a mixed-interconnect cluster, you need to make these determinations.
Cluster group number and cluster password[b]	If you are going to set up a local area or mixed-interconnect cluster that is LAN-based (Gigabit Ethernet), use the following rules to determine the cluster group number and password: • Cluster group number—A number in the range from 1 to 4095 or 61440 to 65535. • Cluster password—Must be from 1 to 31 alphanumeric characters in length and can include dollar signs ($) and underscores(_).

a. Servers that use the Maintenance Operations Protocol (MOP).
b. Cluster group number and password are required by any cluster nodes that use the local area network for cluster communications. In a cluster that uses mixed interconnects, if any of the interconnects require the cluster number and password, then you must set the cluster number and password for all nodes.

2.5 Dismount the Target System Disk Elsewhere in the Cluster

Before installing OpenVMS on a target drive in an OpenVMS Cluster, make sure the target system disk is not mounted elsewhere in the cluster. The target system disk must be dismounted clusterwide (except on the system from which the installation is being performed) and must remain so during the installation. For instructions on dismounting cluster disks, see Section 5.5.2.3.

2.6 Beginning the Installation

After you have completed all the tasks in this chapter, go to Chapter 3 to begin the installation.

3 Installing the OpenVMS Operating System

This chapter explains how to install the OpenVMS Alpha and I64 operating systems. It includes sample output similar to what you might see during an installation and explains how to respond to the prompts.

If you purchased a system with the operating system preinstalled, then most of the information in this chapter does not apply. The first time you power up your preinstalled system, you are prompted to enter only the information necessary to customize your installation. See the documentation provided with your system.

This chapter includes the procedures for booting the OpenVMS operating system kit. The boot procedures differ significantly between Alpha and Itanium-based systems. For additional information about booting Alpha systems, see Appendix A. Information about setting up and booting Itanium-based systems is located in Appendix B. If you are installing OpenVMS for the first time, see the appropriate appendix.

Once the system kit is booted, the procedures for installing OpenVMS Alpha and OpenVMS I64 are very similar.

NOTE Before you install the OpenVMS operating system, ensure that the correct version of firmware is running in your computer. For information about Alpha system firmware, see Section 1.4.5. For I64 system firmware, see Section 1.4.6.

This chapter is organized into sections and steps that describe the major tasks for installing OpenVMS, in the order in which these tasks must be performed. Section 3.1 includes a checklist that you can use to make sure you perform all the installation tasks described in this chapter.

3.1 Installation Tasks

Use the checklist in Table 3-1 to ensure that you perform all necessary installation tasks. For most of the installation tasks, the information provided is common (with minor exceptions) to both the OpenVMS Alpha and I64 operating systems. Where the tasks are significantly unique for each operating system and, therefore, documented separately, this table identifies each subsection for the task specific to each operating system.

Table 3-1 Installation Checklist

	Task	Section
❑	Boot the OpenVMS operating system media.	Section 3.2
❑	Install the OpenVMS operating system onto a system disk.	Section 3.3
❑	Boot the OpenVMS system disk.	Section 3.4
❑	Join the OpenVMS Cluster (optional).	Section 3.5
❑	Run AUTOGEN.	Section 3.6

Table 3-1 Installation Checklist (Continued)

	Task	Section
❑	Reboot the operating system after AUTOGEN completes (this should occur automatically).	Section 3.7
❑	Log in to the SYSTEM account.	Section 3.8
❑	Perform postinstallation tasks, as necessary.	Chapter 7

3.2 Booting the OpenVMS Operating System Media

The OpenVMS Version 8.3 operating system includes procedures and tools (such as the PCSI utility) that enable you to install the operating system easily. First, you must boot the OpenVMS Alpha CD or the OpenVMS I64 OE DVD. To boot the OpenVMS Alpha system CD, see Section 3.2.1. To boot the OpenVMS I64 OE DVD, see Section 3.2.2.

3.2.1 Booting the OpenVMS Alpha CD

This section explains how to boot the OpenVMS Alpha operating system CD, either from your local CD drive, as described in Section 3.2.1.2, or from a CD drive served by the InfoServer, as described in Section 3.2.1.3. First, you need to identify the name of the CD drive, as explained in Section 3.2.1.1. For more information about booting operations, see Section A.1.

3.2.1.1 Determining the Boot Device

To boot the operating system CD, you need to determine the identity of the CD drive. Follow these steps:

Step 1. Insert the operating system CD into the local CD drive.

Step 2. Enter the SHOW DEVICE command at the console prompt (>>>) and look for the correct drive listed in the output (for example, DKA400). If you are booting from the InfoServer, look for a device listed with its hardware address, as in the last line of the following example (EWA0):

```
>>>SHOW DEVICE

dva0.0.0.1000.0     DVA0                    RX23
dka200.2.0.5.0      DKA200                  RZ28M  1004
dka300.3.0.5.0      DKA300                  RZ29B  0016
dka400.4.0.5.0      DKA400                  RRD42  442E
ewa0.0.0.3.0        EWA0          00-00-F8-1F-70-3D
```

For additional information, see the *HP OpenVMS Version 8.3 for Alpha and Integrity Servers Software Product Description (SPD 82.35.xx)* and the hardware manuals that you received with your Alpha computer.

3.2.1.2 Booting from the Local Drive

To boot the operating system CD from the local CD drive, enter the boot command in the following format:

```
BOOT -FLAGS 0,0 source-drive
```

Substitute the device name of the CD drive for *source-drive*, such as DKA400, as listed in the SHOW DEVICE display example in Section 3.2.1.1. In this case, you would enter the following command and press **Enter**:

```
>>> BOOT -FLAGS 0,0 DKA400
```

3.2.1.3 Booting from the InfoServer

To boot the operating system CD using either the InfoServer hardware or the InfoServer utility, follow these steps. To use the InfoServer utility, certain configuration steps are required initially (one time only), as described in Appendix C; note that the operating system CD must be mounted systemwide.

Step 1. Make sure that your operating system CD is being served from either the InfoServer hardware or the InfoServer utility. If you are using the InfoServer utility, certain configuration steps are required (one time only); see Appendix C.

Step 2. At the console prompt, enter the boot command in the following format:

```
>>> BOOT -FLAGS 0,0 -FILE APB_083 lan-device-name
```

Substitute the name of the local area network device for *lan-device-name*, such as EWA0, as listed in the SHOW DEVICE display example in Section 3.2.1.1.

The APB file name is the unique file name that was assigned to the APB.EXE file when it was copied from the operating system CD to the InfoServer. This file is the name of the APB program used for the initial system load (ISL) boot program.

NOTE If you are using a DEC 3000 or 4000 series system, note the following:

- On DEC 3000 series systems, you can boot through the InfoServer using an alternate TURBOchannel device, such as a PMAD (Ethernet) or DEFTA (FDDI), by specifying the device name as "*n*/ESA0". The value for *n* is the TURBOchannel slot number, which you can obtain by entering the SHOW CONFIGURATION command at the console prompt (>>>) and examining the display. For more information, see Section A.1.8.
- On DEC 4000 series systems, you *must* specify the ISL file name in uppercase (APB_083).

Step 3. The InfoServer ISL program then displays the following menu:

```
Network Initial System Load Function
Version 1.2


  FUNCTION          FUNCTION
    ID
    1      -        Display Menu
    2      -        Help
    3      -        Choose Service
    4      -        Select Options
```

```
    5     -        Stop

Enter a function ID value:
```

Step 4. Respond to the prompts as follows, pressing **Enter** after each entry:

a. Enter 3 for the function ID.

b. Enter 2 for the option ID.

c. Enter the service name (ALPHA083 is the default service name for the InfoServer hardware; for the InfoServer utility, ask your system or network manager for the service name).

A sample display follows:

```
Enter a function ID value: 3
OPTION          OPTION
   ID
   1     -       Find Services
   2     -       Enter known Service Name

Enter an Option ID value: 2
Enter a Known Service Name: ALPHA083
```

NOTE If you boot the OpenVMS Alpha operating system CD from an InfoServer but lose your connection during the installation procedure (the system is unresponsive and pressing **Ctrl/Y** does not return you to the menu), do the following:

IF ...	THEN ...
You previously chose the INITIALIZE option	1. Boot the OpenVMS Alpha operating system CD again from the network. 2. Choose the install option (1) on the menu and perform the installation again, as described in this chapter.
You previously chose the PRESERVE option	1. Boot the OpenVMS Alpha operating system CD again from the network. 2. Enter the DCL environment by choosing option 8 on the menu. 3. Mount the device containing your backup copy of the target disk and the device that is your target disk. 4. Restore the backup copy of your target disk by entering the appropriate BACKUP commands. (See Appendix E for complete information about using MOUNT and BACKUP commands to restore a system disk.) 5. Log out from the DCL environment. 6. Choose the install option (1) on the menu and perform the installation again, as described in this chapter.

3.2.2 Booting the OpenVMS I64 OE DVD

Before you can boot your OpenVMS DVD, you must make sure your console is configured correctly. You must use a serial device for the console. OpenVMS does not support VGA graphics or USB keyboards as console devices for booting. For information about configuring your system console, see Section B.2.

HP recommends that you load and use the most current system firmware. For more information about system firmware, see Section 1.4.6 and the *HP OpenVMS Version 8.3 Release Notes*. For information about other required and optional tasks to be performed before or after booting the system, see Appendix B.

CAUTION To boot your OpenVMS I64 operating system on a cell-based server (Superdome servers, or midrange servers such as rx8620 and rx7620), note the following:

- The ACPI configuration must be set correctly. For more information, see Section B.5.1.
- The nPartition on which OpenVMS I64 is booted must have all memory configured as interleaved memory (memory that can be mapped across more than one cell). For more information about cell memory and general notes on nPartition booting, see Section B.6.1 and see your hardware documentation.

This section explains how to boot the OpenVMS I64 operating environment DVD, either from your local DVD drive, as described in Section 3.2.2.1, or from a virtual DVD drive served over the network by the InfoServer utility, as described in Section 3.2.2.2. For more information about booting operations, see Section B.6.

3.2.2.1 Booting from the Local Drive

Boot the OpenVMS I64 OE DVD from a local DVD drive by performing the steps included in this section. To boot the DVD on a cell-based server, a DVD device must be accessible by the nPartition on which OpenVMS is being installed.

Step 1. Make sure your Integrity server is powered on. If your system has an attached external device, make sure it is turned on and operational.

Step 2. Insert the DVD into the drive.

Step 3. Cycle power.

Step 4. From the main EFI boot menu (for cell-based servers, this must be the EFI boot menu for the nPartition on which OpenVMS is to be booted), select the appropriate item from the boot options list. Note that the EFI boot menu is timed; press any key to stop the countdown timer.

For some systems, the boot option to select is the Internal Bootable DVD option. If that option is not listed in your EFI boot menu, move to the Boot From a File menu and select the Removable Media Boot option, if present.

Alternatively (and this method is recommended for cell-based servers), boot the DVD drive from the EFI Shell prompt by entering the command shown in the following example, where fs*n*: corresponds to the Integrity server DVD drive (such as fs0:). Note that if you have navigated to a particular file system, the EFI Shell prompt reflects that file system; for example, if the current file system is fs0:, the EFI Shell prompt is fs0:>.

```
Shell>fsn:\efi\boot\bootia64.efi
```

To determine which device is the bootable DVD drive, examine the list of mapped devices and look for an fs device listing that includes the letters "CDROM", as in the following line. In this line, fs*n* is the file system associated with the drive, which is usually fs0: (instead of "fs*n*", you might see

something similar to "V8.3"; instead of Ata, you might see Scsi, depending on the server model):

```
fsn : Acpi(HWP0002,400)/Pci(4|1)/Ata(Primary,Master)/CDROM(Entry0)
```

You can use the following command to display the mapping of various EFI device names to OpenVMS device names, where fs*n* is the device you want to check (such as fs0:):

```
Shell>fsn:\efi\vms\vms_show dev -fs
```

On most Integrity servers, the DVD drive is DQA0:. On systems that include a SCSI bus, such as the Superdome server, the DVD drive is DKA0:. For more information about the `vms_show` command, see the *HP OpenVMS System Management Utilities Reference Manual*.

NOTE Remember that by default EFI interprets the **Delete** (or **Backspace**) key differently than do OpenVMS Alpha systems or Microsoft Windows computers. Use **Ctrl/H** to delete the last character entered. For more information, see Section B.1.3.

When the DVD boots properly, the OpenVMS operating system banner is displayed, followed by the operating system menu. You can now install your OpenVMS I64 operating system onto the target disk; see Section 3.3. If the methods documented in this section do not succeed in booting the DVD, see Section B.6.2.1.

NOTE When booting OpenVMS from the installation DVD for the first time on any OpenVMS I64 system with a SAN storage device, you might experience a delay in EFI initialization because the entire SAN is scanned. Depending on the size of the SAN, this delay might range from several seconds to several minutes.

3.2.2.2 Booting from the InfoServer utility

To use the InfoServer utility to boot from the network, certain configuration steps are required initially (one time only); see Appendix C. The instructions for booting over the network from a virtual DVD drive over the network are also included in Appendix C.

3.3 Installing the OpenVMS Operating System onto a System Disk

After booting the operating system media, you can create an operating system disk by using option 1 of the menu provided by the operating system media. The procedure for installing an OpenVMS I64 system is similar to that for installing OpenVMS Alpha operating systems. Exceptions are summarized in Section 3.3.1 and are noted in the installation instructions in Section 3.3.3.

3.3.1 Differences Between OpenVMS I64 and Alpha Installations

If you have not installed an OpenVMS I64 system before and are familiar with OpenVMS Alpha installations, the main differences between installations of these two systems onto a system disk include the following:

- Output from the installation procedure is nearly identical for both Alpha and I64 except, of course, the operating system names as well as names of products included with the installation. For example, the OpenVMS I64 windowing and networking product names are all displayed as HP I64VMS *product-name*, such as HP I64VMS KERBEROS, while OpenVMS Alpha product names are displayed in any of three different ways, depending on the product and version:
  - HP *product-name*, such as HP AXPVMS KERBEROS
  - DEC *product-name*, such as DEC AXPVMS DWMOTIF
  - CPQ *product-name*, such as CPQ AXPVMS CDSA
- The default target system disk and volume labels are unique for each system.
- The OpenVMS I64 procedure does not ask whether your system will be an instance in an OpenVMS Galaxy; OpenVMS I64 does not support OpenVMS Galaxy.
- The OpenVMS Alpha operating system includes several components that are not included with the OpenVMS I64, such as C Object Libraries and software support for translating images.
- When installing OpenVMS I64 onto the system disk the first time, you are advised to set up the system with a boot option for the system disk (and to set it as the default boot device); you can allow the installation procedure to assist you in setting up and validating a boot entry. Whereas on Alpha systems you can configure boot devices only by shutting down the system and entering commands at the console, on I64 systems you can configure boot devices either before you shut down the system (using the installation procedure or, once OpenVMS is running, using the OpenVMS I64 Boot Manager utility) or after you shut down the system (using EFI Utilities for OpenVMS or EFI itself).
- For OpenVMS I64, when you install the operating system by booting from the distribution media, the PCSI utility uses the Secure Delivery component of CDSA to validate kits that were signed. For OpenVMS Alpha, such validation is not performed when installing the operating system from the distribution media (CD). (Because of limitations of the OpenVMS Alpha CD boot environment, CDSA is not present on the distribution CD in usable form.) On both OpenVMS Alpha and I64 systems, signed PCSI kits that you install subsequently (including signed kits on the distribution media) are validated. In addition, on both OpenVMS Alpha and OpenVMS I64 systems, the DCL command PRODUCT SHOW HISTORY displays the validation status of installed products and identifies those that were installed from unsigned kits or wwere installed prior to the availability of the Secure Delivery functionality.

3.3.2 Responding to Prompts During the Installation

At different points during the installation, you must respond to prompts that ask you to supply specific information. This manual and the help text available during the installation procedure tell you how to obtain most of this information and how to make decisions when responding to specific prompts.

To repeat an explanation provided by the installation procedure, type a question mark (?) at the prompt. To change or correct a response made to an earlier question, enter the caret (^) character as many times as needed. Note that entering this character might take you back more than one question. To return to the main menu, press **Ctrl/Y**, which aborts the installation.

HP recommends that you review the following summary before you begin the installation so that you understand beforehand the types of information you need to provide.

During the installation, the procedure prompts you for the following information:

- The names of the source drive, target drive, and LAN device (if booting is served by an InfoServer).
- Whether you want to select the INITIALIZE or PRESERVE option (as described in Section 1.5.1).
- A volume label for the target disk (if you choose not to use the default volume label).

- A password for the SYSTEM account.
- Whether you want to form or join an OpenVMS Cluster system and, if so, what kind (as described in Section 2.4).
- DECnet node name and address (or values for the system parameters, SCSNODE and SCSSYSTEMID).

NOTE If you install the DECnet-Plus for OpenVMS software, but you want to use addresses compatible with DECnet Phase IV software, you still need to provide this information. These settings identify your system by name and number in a DECnet or cluster environment. Note that if you supply a DECnet Phase IV address, the procedure automatically calculates the SCSSYSTEMID value. If necessary, consult the network or system manager to obtain this information.

- Information listed on Product Authorization Keys (PAKs) for your OpenVMS licenses. To register your licenses, you must enter the information listed on the PAK for each license. You may register your licenses after installing OpenVMS.
- Optional operating system components that you want to install. You can install all components (by default), or you can select specific components from this list:

  — DECwindows Motif for OpenVMS (a graphical user interface)

  If you install this product, you must also include the DECwindows Server Support component. If you are not installing DECwindows as part of the OpenVMS installation now, but you plan to install it later, install the DECwindows Server Support component now.

  — OpenVMS Management Station

  If you need to create a kit to install the PC component of the **OpenVMS Management Station** software, then you must include the OpenVMS Management Station Software PC files component.

  — TCP/IP Services for OpenVMS

  — Either DECnet-Plus for OpenVMS or DECnet Phase IV for OpenVMS (but not both)

  If you install either DECnet implementation, you must also include the Support for DECnet component. If you are not installing DECnet-Plus or DECnet Phase IV now, but you plan to install one of them later, you should install the Support for the DECnet-Plus or DECnet Phase IV component now. (The same support component applies to both implementations of DECnet.)

  For a list of component options included with the OpenVMS operating system, see Figure 3-1 on page 76.

3.3.3 Installing OpenVMS Using Option 1 of the Operating System Menu

After booting the OpenVMS operating system media, install the OpenVMS operating system by following these steps:

Step 1. Select Option 1 on the Menu: When you boot the OpenVMS operating system CD or DVD (as instructed in Section 3.2), the initial HP copyright message and other messages are displayed, followed by the operating system main menu that is shown in the following example. Choose option 1 to install the operating system, as shown. Note that after the initial copyright message, few minutes might pass before the OpenVMS operating system menu appears.

```
.
.
.
Installing required known files...
```

```
Configuring devices...

******************************************************************

You can install or upgrade the OpenVMS I64 operating system
or you can install or upgrade layered products that are included
on the OpenVMS I64 distribution media (CD/DVD).

You can also execute DCL commands and procedures to perform
"standalone" tasks, such as backing up the system disk.

Please choose one of the following:

    1)  Upgrade, install or reconfigure OpenVMS I64 Version 8.3
    2)  Display layered products that this procedure can install
    3)  Install or upgrade layered products
    4)  Show installed products
    5)  Reconfigure installed products
    6)  Remove installed products
    7)  Find, Install, or Undo patches; Show or Delete recovery data
    8)  Execute DCL commands and procedures
    9)  Shut down this system

Enter CHOICE or ? for help: (1/2/3/4/5/6/7/8/9?) 1
```

The OpenVMS operating system kit might contain patch kits. If it does, information similar to the following is displayed:

```
The following PATCH kits are present on the OpenVMS I64
distribution media.

----------------------------------- ----------- ----------
PRODUCT                             KIT TYPE    KIT FORMAT
----------------------------------- ----------- ----------
DEC I64VMS TCPIP_ECO V5.n-nnn       Patch       Compressed
----------------------------------- ----------- ----------

1 item found

Please consult the OpenVMS I64 Upgrade and Installation Manual,
the Release Notes, and the Cover Letter to determine if any or
all of these patches may be required for your system.
```

If you have not already done so, determine whether you need to install any patches.

The initial display from the procedure also includes information about how to respond to prompts (as described in Section 3.3.2):

```
******************************************************
This procedure will ask a series of questions.

      () - encloses acceptable answers
      [] - encloses default answers
```

```
Type your response and press the <Return>key.  Type:

      ? - to repeat an explanation
      ^ - to change prior input (not always possible)
      Ctrl/Y - to exit the installation procedure
```

Step 2. Create the System Disk: The procedure allows you to begin creating the system disk. First it displays the following information, followed by the prompt asking whether you want to initialize or preserve the disk:

```
      There are two choices for Installation/Upgrade:

      INITIALIZE - Removes all software and data files that were
          previously on the target disk and installs OpenVMS I64.

      PRESERVE -- Installs or upgrades OpenVMS I64 on the target disk
          and retains all other contents of the target disk.

     * NOTE: You cannot use preserve to install OpenVMS I64 on a disk on
           which any other operating system is installed. This includes
           implementations of OpenVMS for other architectures.

  Do you want to INITIALIZE or to PRESERVE? [PRESERVE] INITIALIZE
```

Respond to the INITIALIZE or PRESERVE prompt as follows:

IF ...	THEN ...
Your disk is new	Type INITIALIZE and press **Enter**.
You want to remove all files from an existing system disk	Type INITIALIZE and press **Enter**.
You want to retain OpenVMS files on an existing disk	Press **Enter** to accept the default (PRESERVE); go to Chapter 6.

NOTE You cannot install OpenVMS on a disk where another operating system is installed. For example, you cannot take a UNIX disk, select the PRESERVE option, and then install OpenVMS on the disk. The UNIX disk is not structured in the format that OpenVMS requires.

During initialization of an OpenVMS I64 target system disk, the installation process creates a diagnostic partition, visible only at the console prompt. For more information about this partition and the options you can take, see Appendix I.

With both OpenVMS Alpha and I64 systems, the installation procedure initializes the target disk with volume expansion (INITIALIZE/LIMIT). This renders the disk incompatible with versions of OpenVMS prior to Version 7.2. In most cases, this does not present a problem. However, if you intend to mount the new disk on a version of OpenVMS prior to Version 7.2, you must perform the alternate method of initialization described in Appendix I. Note that this alternate method might cause your new system disk to include a relatively large minimum allocation size (as

defined by /CLUSTER_SIZE). As a result, small files use more space than would be used otherwise. Therefore, perform these steps *only* for system disks that must be mounted on versions of OpenVMS prior to Version 7.2.

Step 3. Specify the System Disk (Target Disk): The procedure next asks you for the name of the target disk. If you do not know the name of the disk, enter a question mark (?). The procedure displays a list of devices on your system. Select the appropriate disk and respond to the prompt. For example:

```
You must enter the device name for the target disk on which
OpenVMS I64 will be installed.

Enter device name for target disk: (? for choices)  DKB400
```

If this is the first installation on this system, no default device is indicated, as in this example. A default device name is listed if this is not the first installation (for example, [DKB400] or, for a Fibre Channel disk device, [1DGA567]).

If you select a device that is not available or that cannot be used for some other reason, the procedure displays information indicating why the device cannot be used. For example, if you enter MKA500, a tape device, a message similar to the following is displayed:

```
MKA500 is not a disk device
```

Step 4. Specify the Volume Label: If you select a device that can be used, the procedure then informs you of the volume label currently assigned to this device (if one was previously defined) and asks whether you want to keep that label. If you choose not to keep that label, you are prompted for a new label, as shown in the following example. The OpenVMS operating system uses the volume label to identify and reference the disk. Make sure the label you use is unique; problems occur if the same label is used by different disk volumes.

```
DKB400: is now labeled V82_nnn.

Do you want to keep this label? (Yes/No) [Yes] NO

Enter volume label for target system disk: [I64SYS] I64083
```

You can keep the label already assigned to the disk, accept the default label assigned by the system (for I64 systems, I64SYS), or specify a different volume label (with a limit of 12 characters that can include A to Z, 0 through 9, the dollar sign ($), hyphen (-), and underscore (_) characters).

NOTE OpenVMS requires that the volume labels for all disks on your system or OpenVMS Cluster have unique labels. If a disk having the same label as the system disk is mounted, various OpenVMS components do not function as intended or a node might crash during boot.

Step 5. Specify On-Disk Structure Level: After you enter the volume label for the target system disk, when you selected INITIALIZE, you are asked whether you want to initialize the target system disk with On-Disk Structure Level 2 (ODS-2) or Level 5 (ODS-5).

```
        The target system disk can be initialized with On-Disk Structure
        Level 2 (ODS-2) or Level 5 (ODS-5). (? for more information)

    Do you want to initialize with ODS-2 or ODS-5? (2/5/?)
```

For details about ODS-2 and ODS-5 file systems, see the *HP OpenVMS System Manager's Manual, Volume 1: Essentials*. A brief summary follows:

NOTE HP recommends that your system disk be initialized in ODS-5 format, unless you plan to use software that requires ODS-2. Hard links are supported on ODS-5 disks only.

If you are installing WBEM Services for OpenVMS, which is supported on OpenVMS I64 systems only, note that although this product can be installed on an ODS-2 disk, the WBEM Services for OpenVMS data repository requires an ODS-5 disk. In addition, the WBEM Services for OpenVMS SDK kit requires an ODS-5 disk. If you install WBEM Services for OpenVMS onto an ODS-5 disk, you can have everything on the same disk.

- ODS-2

  ODS-2 allows for full compatibility with all OpenVMS VAX systems and with OpenVMS Alpha systems prior to Version 7.2.

- ODS-5

  — ODS-5 supports file names that are longer, have a wider range of legal characters, and allow for mixed-case file names. This feature permits use of file names similar to those in a Microsoft Windows or UNIX® environment.

  — ODS-5 supports hard links to files, access dates, and files whose names differ only by case.

  — ODS-5 volumes cannot be mounted on any version of OpenVMS prior to Version 7.2.

  — Systems running OpenVMS VAX Version 7.2 and higher can mount ODS-5 volumes, but cannot create or access files having extended names. (Lowercase file names are seen in uppercase on OpenVMS VAX systems.)

Select ODS-2 or ODS-5 by entering 2 or 5 at the prompt.

Step 6. Enable Hard Links (ODS-5 Only): If you selected ODS-5, the procedure asks whether you want to enable hard links (if you selected ODS-2, skip to the next step). Enter YES or NO to indicate your choice.

```
        Hard links can be enabled on ODS-5 disks. (? for more information)

    Do you want to enable hard links? (Yes/No/?) YES
```

Both ODS-2 and ODS-5 support aliases, which are additional names for a file or directory. Only ODS-5 supports hard links. One of the main differences with hard links enabled is the way the DCL DELETE command works. With hard links enabled, if you enter the DELETE command to delete a file that has one or more aliases associated with it, the command only deletes the alias by which the file is being accessed. The actual file continues to exist and is accessible by any remaining alias. The file is deleted only when the last remaining alias is deleted. Without hard

links enabled, the DELETE command deletes both the alias by which the file is being accessed and the file itself. Any other aliases remain but the file is no longer accessible because it is no longer present. Thus, the remaining aliases are unusable. If enabling hard links has any drawbacks, they are minor and probably of concern only in rare circumstances. For example, if disk quotas are in effect, though owners of a file can delete any links to a file in a directory they can access, hard links in other users' directories might cause a file to be retained, and the file size continues to be charged against that owner's disk quota.

In general, be aware that enabling hard links does change the file system's behavior and that applications and management practices should respond accordingly (instead of being alias-specific, for example).

For more information about hard links, see the *HP OpenVMS System Manager's Manual, Volume 1: Essentials*.

Step 7. Confirm Target System Disk Choices: The procedure displays your target system disk choices and asks you to confirm that they are correct. In the following example, the choices made were to initialize the disk with ODS-5 and with hard links. The volume label is I64083.

```
You have chosen to install OpenVMS I64 on a new disk.

       The target system disk, DKB400:, will be initialized
       with structure level 5 (ODS-5).
       Hard links WILL be enabled.
       It will be labeled I64083.
       Any data currently on the target system disk will be lost.

   Is this OK? (Yes/No) YES

         Initializing and mounting target....
   %EFI-I-VOLINIT, FAT volume DIAGNOSTICS has been initialized

       Creating page and swap files....
```

Step 8. Configure and Validate Boot Options (I64 Only): On OpenVMS I64 installations, the procedure next asks whether you want to create or validate boot options.

```
   Boot options in the EFI Boot Manager boot option menu can provide a
   convenient way to boot your system.  The installation  procedure can
   automatically create a new boot option (if none exists) or validate
   existing boot options.

Do you want to create or validate boot options? (Yes/No) [Yes] YES
```

If your newly installed system disk will normally be booted on this system and this device, and if you want the installation procedure to assist you in setting up or validating boot options on the EFI console in the EFI Boot Manager menu, answer YES. The installation procedure creates and validates a new boot option if one does not exist, or validates existing boot options, just before the installation completes (see step 22).

When you answer YES and no boot option exists, the procedure allows you to set OpenVMS boot flags (VMS_FLAGS), as shown in the following example. Enter the OpenVMS flags (for example, 0,1), or press **Enter** to set no flags (the default). If a boot option exists, you can change boot flags after the installation completes (for information about changing boot flags, see Section B.5.2).

```
   You can set VMS_FLAGS or accept the default, 0,0.

Enter the value for VMS_FLAGS: (n.n) [0,0]
```

If you do not want the installation procedure to assist you in setting up or validating boot options on the EFI console, answer NO.

HP recommends that you allow the installation procedure to assist you in setting up and validating boot options.

NOTE If your newly installed system disk is a Fibre Channel device, HP recommends that you add it as a boot option in the EFI boot menu. If you do not allow the installation procedure to add the device to the boot menu, you can add it by using the OpenVMS I64 Boot Manager utility (SYS$MANAGER:BOOT_OPTIONS.COM) after the installation completes. (To add Fibre Channel devices to the EFI boot menu, use this utility instead of EFI.)

HP recommends using the OpenVMS I64 Boot Manager utility to add shadowed system disks in a multiple-member shadow set to the EFI boot device list and dump device list. Be sure to add all members to both lists.

For information about the OpenVMS I64 Boot Manager utility, see Section B.5.2. For more information about configuring and booting Fibre Channel devices, see Appendix D.

Step 9. Specify SYSTEM Account Information (Initialized Disks Only): If you are initializing the target disk, you are prompted for SYSTEM account information. Before you respond to the prompt asking you to enter a password for the SYSTEM account, note the following:

- Passwords must be at least 8 characters in length (but must not exceed 31 characters). Valid characters for the password include A through Z, 0 through 9, the dollar sign ($), and underscore (_). Passwords must contain at least one alphabetic character (A through Z). The system converts all characters to uppercase, so the case of characters you enter does not matter.
- Press **Enter** after you enter the password. (The password does not display as you type it.)
- After you enter the password, the procedure checks to make sure it meets the requirements for a valid password.
- Reenter the password for verification.

The following is a sample display:

```
        You must enter a password for the SYSTEM account.

        The password must be a minimum of 8 characters in length, and
        may not exceed 31 characters.  It will be checked and verified.
        The system will not accept passwords that can be guessed easily.

        The password will not be displayed as you enter it.

    Password for SYSTEM account:

    Re-enter SYSTEM password for verification:
```

If you reenter the password incorrectly or if the procedure determines that the password is too easy for another user to guess, the procedure displays an error message and allows you to specify a valid password.

Step 10. Declare OpenVMS Cluster Membership: The procedure now asks whether your system will be part of an OpenVMS Cluster. The display is similar to the following:

```
Will this system be a member of an OpenVMS Cluster? (Yes/No)
```

You should answer YES if the system will be a member of an OpenVMS Cluster. Answering YES to this question causes SYS$MANAGER:CLUSTER_CONFIG.COM to run automatically when your newly installed system is first booted. The CLUSTER_CONFIG procedure asks a series of questions about the cluster. Your response to this question determines how the VAXCLUSTER system parameter is set (the VAXCLUSTER system parameter is set for OpenVMS I64 systems as well as Alpha and VAX systems; it is not specific to OpenVMS VAX systems). For more information, see the *Guidelines for OpenVMS Cluster Configurations* manual.

If you answer YES to the cluster question, the display is similar to the following:

```
When your new system is first booted you will be required to answer
additional questions in order to configure the OpenVMS Cluster.
```

If you answer NO to the cluster question, the system can still be a member of an OpenVMS Cluster. However, in this case you must explicitly configure the node into the cluster after the installation is completed. For more information, see Section 3.5.

For more information about cluster configuration, see the *HP OpenVMS Cluster Systems* manual.

Step 11. Declaring System as OpenVMS Galaxy Instance (Alpha only): The procedure next asks whether your system will be an instance in an OpenVMS Galaxy. (This question is asked in OpenVMS Alpha installations only. OpenVMS I64 does not support OpenVMS Galaxy.) The display is similar to the following:

```
Will this system be an instance in an OpenVMS Galaxy? (Yes/No)
```

Your answer to this question determines how the GALAXY system parameter is set.

Step 12. Set SCSNODE System Parameter: The procedure now asks you to specify a value for the first of two system parameters, the SCSNODE parameter. (Step 13 describes the output and prompts for the second system parameter, SCSSYSTEMID.) SCSNODE is a name that can be from one to six letters or numbers; it must include at least one letter. If this system is part of an OpenVMS Cluster, SCSNODE must be unique within the cluster. If you are using DECnet Phase IV for OpenVMS or DECnet-Plus for OpenVMS with DECnet Phase IV addresses, then SCSNODE must be the same as your DECnet node name.

The following is an example of the display and a valid response:

```
For your system to operate properly, you must set two parameters:
SCSNODE and SCSSYSTEMID.

SCSNODE can be from 1 to 6 letters or numbers. It must contain at
least one letter.

If you plan to use DECnet, SCSNODE must be the DECnet Phase IV
node name, or the DECnet-Plus (Phase V) node synonym.

If you have multiple OpenVMS systems, the SCSNODE on each system
must be unique.
```

```
Enter SCSNODE: I64CSI
```

Step 13. Declare Use of DECnet; Setting SCSSYSTEMID System Parameter: The next prompt asks whether you plan to use DECnet. It also informs you that the SCSYSYSTEMID system parameter is based on the DECnet Phase IV address. SCSSYSTEMID must also be unique within an OpenVMS Cluster.

```
If you plan to use DECnet, SCSSYSTEMID must be set based on the
DECnet Phase IV address.

Do you plan to use DECnet (Yes/No) [YES]: YES
```

If you answer YES, the information about the DECnet Phase IV addresses is displayed along with a prompt for a DECnet Phase IV address. Enter a valid DECnet Phase IV address, as in the following example.

```
DECnet Phase IV addresses are in the format

  DECnet_area_number.DECnet_node_number

DECnet_area_number is a number between 1 and 63.
DECnet_node_number is a number between 1 and 1023.

If you plan to use DECnet WITHOUT Phase IV compatible addresses,
enter 0.0.


Enter DECnet (Phase IV) Address [1.1]: 63.180
```

A display such as the following informs you of the value assigned to SCSSYSTEMID:

```
SCSSYSTEMID will be set to 64692.

 This was calculated as follows:

 (DECnet_area_number * 1024) + DECnet_node_number
```

If you are not using DECnet, or if you enter 0.0 as the DECnet Phase IV address, you are prompted to enter a SCSSSYSTEMID in the range of 1 to 65535. If this is a **standalone system**, the default of 65534 is acceptable. However, if this system is part of an OpenVMS Cluster, you must enter a SCSSYSTEMID that is unique within the cluster. The following is a sample display:

```
The system cannot calculate SCSSYSTEMID from an address that is not
compatible with DECnet Phase-IV.
You will have to choose a value for SCSSYSTEMID.


If you plan to use LAT software, you may have to add /NODECNET to any
CREATE LINK commands in SYS$MANAGER:LATSYSTARTUP.COM.

Please choose a SCSSYSTEMID between 1 and 65535. If you have multiple
OpenVMS systems, the SCSSYSTEMID on each system must be unique.
```

```
Enter SCSYSTEMID [65535]: 12345
```

Step 14. Set Local Time Zone: Now the procedure asks you to configure the local time zone. For local time zone support to work correctly, the installation procedure must set the time zone that accurately describes the location you want to be your default time zone. Usually, this is the time zone in which your system is running. In addition, the procedure asks you to set the OpenVMS time differential factor (TDF).

The procedure displays the main time zone menu. You can select the time zone in either of two ways:

- Select the number in the main time zone menu that best represents the time zone desired. (If multiple time zones exist for the selection you make, you must select the exact time zone from another menu.)
- Use a search option that allows you to bypass the time zone menu and search by name (partial or full).

If you select one of the numbers in the time zone menu, the corresponding time zone is selected. At any prompt, you can enter a question mark (?) for help information.

NOTE An asterisk (*) next to a number indicates that more than one time zone exists for that selection. If you select such a number, an additional menu displays choices that allow you to select the appropriate time zone. For example, if you choose the United States (US) time zone from the main time zone menu, a second menu displays the specific time zones within the United States.

The following example shows how you would select the Eastern time zone for the United States by using the menu number:

```
  Configuring the Local Time Zone

TIME ZONE SPECIFICATION -- MAIN Time Zone Menu       "*" indicates a menu

  0* GMT
  1* AFRICA          17) EST            33) IRAN           49) PORTUGAL
  2* AMERICA         18) EST5EDT        34) ISRAEL         50) PRC
  3* ANTARCTICA      19* ETC            35) JAMAICA        51) PST8PDT
  4* ARCTIC          20* EUROPE         36) JAPAN          52) ROC
  5* ASIA            21) FACTORY        37) KWAJALEIN      53) ROK
  6* ATLANTIC        22) GB-EIRE        38) LIBYA          54) SINGAPORE
  7* AUSTRALIA       23) GB             39) MET            55) TURKEY
  8* BRAZIL          24) GMT-0          40* MEXICO         56) UCT
  9* CANADA          25) GMT            41* MIDEAST        57) UNIVERSAL
 10) CET             26) GMT0           42) MST            58* US
 11* CHILE           27) GMTPLUS0       43) MST7MDT        59) UTC
 12) CST6CDT         28) GREENWICH      44) NAVAJO         60) W-SU
 13) CUBA            29) HONGKONG       45) NZ-CHAT        61) WET
 14) EET             30) HST            46) NZ             62) ZULU
 15) EGYPT           31) ICELAND        47* PACIFIC
 16) EIRE            32* INDIAN         48) POLAND
```

```
Press "Return" to redisplay, enter "=" to search or "?" for help, or
Select the number above that best represents the desired time zone: 58

US Time Zone Menu                                        "*" indicates a menu

  0* RETURN TO MAIN TIME ZONE MENU
  1) ALASKA           5) EAST-INDIANA     9) MICHIGAN        13) SAMOA
  2) ALEUTIAN         6) EASTERN         10) MOUNTAIN
  3) ARIZONA          7) HAWAII          11) PACIFIC-NEW
  4) CENTRAL          8) INDIANA-STARKE  12) PACIFIC

Press "Return" to redisplay, enter "=" to search or "?" for help, or
Select the number above that best represents the desired time zone: 6

You selected US /EASTERN as your time zone.
Is this correct? (Yes/No) [YES]:
```

To use the search option instead of menu numbers to select the time zone, enter an equals sign (=) at the menu prompt instead of a number. You can enter one or more words or partial words immediately after the equals string, or you can enter the equals sign alone, in which case the procedure prompts you for the words or partial words of the time zone you want to select. After you enter that information, the procedure displays all matching time zones, and you can then select the appropriate one.

The following example shows how you would select the Eastern time zone for the United States by using the search option:

```
  Configuring the Local Time Zone

TIME ZONE SPECIFICATION -- MAIN Time Zone Menu       "*" indicates a menu

  0* GMT
  1* AFRICA          17) EST             33) IRAN            49) PORTUGAL
  2* AMERICA         18) EST5EDT         34) ISRAEL          50) PRC
  3* ANTARCTICA      19* ETC             35) JAMAICA         51) PST8PDT
  4* ARCTIC          20* EUROPE          36) JAPAN           52) ROC
  5* ASIA            21) FACTORY         37) KWAJALEIN       53) ROK
  6* ATLANTIC        22) GB-EIRE         38) LIBYA           54) SINGAPORE
  7* AUSTRALIA       23) GB              39) MET             55) TURKEY
  8* BRAZIL          24) GMT-0           40* MEXICO          56) UCT
  9* CANADA          25) GMT             41* MIDEAST         57) UNIVERSAL
 10) CET             26) GMT0            42) MST             58* US
 11* CHILE           27) GMTPLUS0        43) MST7MDT         59) UTC
 12) CST6CDT         28) GREENWICH       44) NAVAJO          60) W-SU
 13) CUBA            29) HONGKONG        45) NZ-CHAT         61) WET
 14) EET             30) HST             46) NZ              62) ZULU
 15) EGYPT           31) ICELAND         47* PACIFIC
 16) EIRE            32* INDIAN          48) POLAND

Press "Return" to redisplay, enter "=" to search or "?" for help, or
Select the number above that best represents the desired time zone: =EAST

Search for Time Zone by Full or Partial Name
```

```
        "*" indicates a menu

        1) BRAZIL / EAST
        2) CANADA / EAST-SASKATCHEWAN
        3) CANADA / EASTERN
        4) CHILE / EASTERISLAND
        5) MIDEAST / RIYADH87
        6) MIDEAST / RIYADH88
        7) MIDEAST / RIYADH89
        8) PACIFIC / EASTER
        9) US / EAST-INDIANA
       10) US / EASTERN

   Press "Return" to redisplay this menu,
   enter "=" to search for a new zone,
   enter "0" to return to the Main Time Zone Menu, enter "?" for help, or
   Select the number above that best represents the desired time zone: 10

   You selected US / EASTERN as your time zone.
   Is this correct? (Yes/No) [YES]:
```

The procedure then prompts you for the TDF.

For more information about local time zone support, see the *HP OpenVMS System Manager's Manual, Volume 1: Essentials*.

Step 15. Set Time Differential Factor (TDF): The procedure now provides information about and prompts you to enter the time differential factor (TDF). The TDF is the difference between your system time and Coordinated Universal Time (UTC), which is an international standard (similar to Greenwich Mean Time) for measuring time of day. The procedure supplies a default for TDF, which is generally the correct response. If the time zone you selected supports daylight saving time, the procedure asks you whether daylight saving time is currently in effect. The following example shows TDF information and prompts displayed by the procedure:

```
        Configuring the Time Differential Factor (TDF)


        Default Time Differential Factor for standard time is -5:00.
        Default Time Differential Factor for daylight saving time is -4:00.


        The Time Differential Factor (TDF) is the difference between your
        system time and Coordinated Universal Time (UTC).  UTC is similar
        in most respects to Greenwich Mean Time (GMT).

        The TDF is expressed as hours and minutes, and should be entered
        in the hh:mm format.  TDFs for the Americas will be negative
        (-3:00, -4:00, etc.); TDFs for Europe, Africa, Asia and Australia
        will be positive (1:00, 2:00, etc.).

   This time zone supports daylight saving time.
   Is this time zone currently on daylight saving time? (Yes/No): Y
```

```
Enter the Time Differential Factor [-4:00]:

   NEW SYSTEM TIME DIFFERENTIAL FACTOR = -4:00

Is this correct? [Y]:
```

For more information about TDF support, see the *HP OpenVMS System Manager's Manual, Volume 1: Essentials*. Once OpenVMS has been installed and booted from the system disk, you can determine whether your system is set for daylight saving time by using the following DCL command to display the translation for the daylight saving time logical:

```
$ SHOW LOGICAL *TIMEZONE*
"SYS$TIMEZONE_DAYLIGHT_SAVING"="1"
      .
      .
      .
```

Step 16. Register Licenses (Optional at this time): After setting the TDF, the procedure asks whether you want to register any Product Authorization Keys (PAKs), as in the following display:

```
  If you have Product Authorization Keys (PAKs) to register,
  you can register them now.

Do you want to register any Product Authorization Keys? (Yes/No) [Yes]
```

You can register the PAKs now by responding YES to the prompt, or later by responding NO. You register licenses later by following the directions in Section 7.3.

To register your licenses now, be sure you have the following before proceeding:

- A copy of the Product Authorization Key (PAK) for each license that you are registering.
- The *HP OpenVMS License Management Utility Manual*, which contains complete, detailed information about the licensing procedure (note that this manual has not been revised for this release of OpenVMS and, therefore, the licensing terminology is out of date; for details on the terminology changes, refer to the *HP OpenVMS Version 8.3 New Features and Documentation Overview*).

For the OpenVMS I64 operating system, a single **Operating Environment (OE)** license grants the right to use all the components bundled in the purchased OE. Each OE is offered with Per Core Licenses (PCLs). One PCL is required for each active processor **core** in the system or hard partition. (If additional processor cores are added later to the system or hard partition, each requires an additional PCL.) The License Management utility supports these OpenVMS I64 licensing practices. The OpenVMS Unlimited User License is included with the **Foundation Operating Environment (FOE)** and, therefore, is included with the other OEs available. For more information, see the *HP Operating Environments for OpenVMS for Integrity Servers Software Product Description* (SPD 82.34.*xx*).

The OpenVMS Alpha operating system uses one or more of several types of licenses, as described in the *HP OpenVMS Version 8.3 for Alpha and Integrity Servers Software Product Description (SPD 82.35.xx)* .

For more information about licensing terms and policies, contact your local HP sales office, or see the HP software licensing information at the following location:

```
http://h18000.www1.hp.com/products/software/info/terms/swl_sld.html
```

When you answer YES to the prompt to register your licenses now, the installation procedure launches the SYS$UPDATE:VMSLICENSE.COM procedure, which displays the following options menu:

```
VMS License Management Utility Options:

    1. REGISTER a Product Authorization Key
    2. AMEND an existing Product Authorization Key
    3. CANCEL an existing Product Authorization Key
    4. LIST Product Authorization Keys
    5. MODIFY an existing Product Authorization Key
    6. DISABLE an existing Product Authorization Key
    7. DELETE an existing Product Authorization Key
    8. COPY an existing Product Authorization Key
    9. MOVE an existing Product Authorization Key
   10. ENABLE an existing Product Authorization Key
   11. SHOW the licenses loaded on this node
   12. SHOW the unit requirements for this node

   99. Exit this procedure

   Type '?' at any prompt for a description of the information
   requested. Press Ctrl/Z at any prompt to return to this menu.

Enter one of the above choices [1]
```

Select the REGISTER option and enter each license key until you have successfully registered all required PAKs. After you register all your licenses, exit the License Management procedure by entering 99 at the prompt.

Step 17. Install Windowing, Networking, and Related Products: The procedure now asks whether you want to install the optional DECwindows GUI (DECwindows Motif for OpenVMS) and networking software (DECnet and TCP/IP) included with OpenVMS. The software that you choose to install (including the required software) is installed along with the OpenVMS operating system. You can change the default values for these products later in the installation procedure.

NOTE The following display is what might be seen during an OpenVMS I64 installation. Some of the products listed are supported on OpenVMS I64 systems only.

```
You can install the following products along with the OpenVMS operating
system:

  o Availability Manager (base) for OpenVMS I64 (required part of OpenVMS
  o CDSA for OpenVMS I64 (required part of OpenVMS)
  o KERBEROS for OpenVMS I64 (required part of OpenVMS)
  o SSL for OpenVMS I64 (required part of OpenVMS)
  o Performance Data Collector (base) for OpenVMS I64 (required part of
       OpenVMS)
  o DECwindows Motif for OpenVMS I64
```

```
  o DECnet-Plus for OpenVMS I64
  o DECnet Phase IV for OpenVMS I64
  o HP TCP/IP Services for OpenVMS
  o WBEM Services for OpenVMS

 If you want to change your selections, you can do so later in the
 installation by answering "NO" to the following question:

     "Do you want the defaults for all options?"

 Do you want to install DECwindows Motif for OpenVMS I64 V1.6?
(Yes/No) [Yes] Y
```

If you want to install the OpenVMS graphical user interface and you have the hardware that supports it and the license to use it, answer YES; otherwise, answer NO.

You may install any of the optional software products separately after the OpenVMS installation completes.

NOTE Beginning with OpenVMS Version 8.3, DECwindows client files are made available through the DWMOTIF_SUPPORT kit. (Prior to Version 8.3, the client files were included directly with the OpenVMS operating system kit.) The OpenVMS installation procedure installs this kit automatically. The DWMOTIF_SUPPORT kit name is listed during the installation.

The OpenVMS installation menu offers the choice to install DECnet-Plus for OpenVMS or DECnet Phase IV for OpenVMS networking software. You cannot have both installed on your system at the same time. You can also choose to install neither DECnet product; however, certain products that depend on DECnet might be adversely affected.

If you have installed DECnet-Plus and TCP/IP on your system, you can run DECnet applications over your TCP/IP network. For more information about DECnet over TCP/IP, see the *DECnet-Plus for OpenVMS Network Management* manual.

The software products display is similar to the following and includes the prompts for DECwindows Motif, DECnet-Plus, and WBEM Services for OpenVMS:

```
 Beginning with OpenVMS V7.1, the DECnet-Plus kit is provided with
 the OpenVMS operating system kit.  HP strongly recommends that
 DECnet users install DECnet-Plus.  DECnet Phase IV applications are
 supported by DECnet-Plus.

 DECnet Phase IV is also provided as an option.

 If you install DECnet-Plus and TCP/IP  you can run DECnet
 applications over a TCP/IP network.  Please see the OpenVMS
 Management Guide for information on running DECnet over TCP/IP.

 Do you want to install DECnet-Plus for OpenVMS I64 V8.3?
(Yes/No) [YES]
```

If you answer NO to the DECnet-Plus prompt, you are prompted to install DECnet Phase IV:

```
 Do you want to install DECnet Phase IV for OpenVMS I64 V8.3?
(Yes/No) [Yes]
```

Finally, you are asked whether you want to install TCP/IP Services for OpenVMS and, on OpenVMS I64 systems, WBEM Services for OpenVMS:

```
 Do you want to install HP TCP/IP Services for OpenVMS V5.6?
(Yes/No) [Yes] Y

 Do you want to install WBEM Services for OpenVMS V2.0?
(Yes/No) [Yes] Y
```

NOTE For support of Instant Capacity (iCAP) and Pay per use (PPU) functionality (supported on cell-based Integrity servers), you must install TCP/IP Services for OpenVMS and WBEM Services for OpenVMS. SSL for OpenVMS is required and installed automatically.

Step 18. Choose Descriptive Help Text (Optional): After you respond to the prompt for TCP/IP Services for OpenVMS, the final stages of the installation proceed. First, the procedure asks whether you want detailed descriptions:

```
The installation can provide brief or detailed descriptions.
In either case, you can request the detailed descriptions by typing ?.

Do you always want detailed descriptions? (Yes/No) [No]
```

If you answer YES, the procedure displays additional explanatory text with each prompt.

As of Version 8.3, most PCSI kits included on the OpenVMS distribution media are signed using Secure Delivery. Each target file includes an associated digital signature file that is used for Secure Delivery validation. This validation involves authenticating the originator (HP, in this case) and verifying the contents of the target file. (The digital signature file is also referred to as a manifest; it has the same file name as the target file plus _ESW appended to the file extension, as in *filename*.PCSI$COMPRESSED_ESW.) When you install OpenVMS I64 Version 8.3 from the distribution media, the procedure validates any signed PCSI kits that are being installed. For each kit successfully validated, you see a message similar to the following:

```
Performing product kit validation ...
%PCSI-I-VALPASSED, validation of
DKB400:[KITS.CDSA]HP-I64VMS-CDSA-Vnnnn-nnn-n.PCSI$COMPRESSED;1 succeeded
 .
 .
 .
```

Note that because of limitations in the OpenVMS Alpha CD boot environment, OpenVMS Alpha kits are not validated when installed from the distribution CD. On both OpenVMS Alpha and I64 systems, signed PCSI kits that you install susbsequently (including any signed kits on the distribution media) are validated. In addition, on both OpenVMS Alpha and OpenVMS I64 systems, the DCL command PRODUCT SHOW HISTORY displays the validation status of installed products.

Step 19. Select Product Component Options (Accept All Defaults or Select Individually): The procedure displays a message such as the following, indicating that it is ready to install the operating system:

```
The following product has been selected:
  HP I64VMS OPENVMS V8.3           Platform (product suite)


Configuration phase starting ...


You are asked to choose options, if any, for each selected product and for
any products that need to be installed to satisfy software dependency
requirements.

HP I64VMS OPENVMS V8.3: OPENVMS and related products Platform

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Do you want the defaults for all options? [YES]
```

When selecting options, note the following:

- If you want all the default values, press **Enter**.

  If you want to select options individually, answer NO. The procedure then prompts you for each option and suboption shown in Figure 3-1 on page 76.

- Review the list of options and compare them with the requirements for your system. If you are selecting components individually, be sure that you include all components necessary to support the needs of your users. Note also that certain components depend on the installation of other components.

- If you are not sure whether you want certain options, request help by entering a question mark (?) at the prompt for that option.

- After you select all the options you want, you can view your selections and make changes (if necessary).

- OpenVMS Management Station software is automatically installed on your OpenVMS system disk when you accept all the default values. If you do not accept the default values, you must select the OpenVMS Management Station component (server and client files) if you plan to use this product. After the installation is complete, you can prepare your OpenVMS system and your PC to run OpenVMS Management Station by following the procedures described in Appendix G.

- If you decide after the installation to change which OpenVMS operating system options you want installed on your system, you must reconfigure the installation as described in Section 1.5.1.2 and Section 7.12.

- After you boot the new system disk and log in, you can obtain information about individual system files by entering HELP SYSTEM_FILES at the dollar sign prompt ($).

NOTE Unless you have specific reasons to do otherwise, HP recommends that you accept the defaults and install all OpenVMS options. OpenVMS and layered products have various dependencies on many of these options. Even if you think you do not need certain options, some OpenVMS or layered product operations might not work correctly if other OpenVMS options are not installed.

Note also that, for OpenVMS I64 installations, the availability of certain options depends on the OE you have purchased. For example, OpenVMS Management Station is available with the **Enterprise Operating Environment (EOE)** and the **Mission Critical Operating Environment (MCOE)**.

If you answer YES to accept the defaults for all options, the procedure displays a message similar to the following, the contents of which depend on the products you chose to install. If you answer NO, the procedure prompts you for each option and suboption.

```
Availability Manager (base) for OpenVMS I64 (required part of OpenVMS)

CDSA for OpenVMS I64 (required part of OpenVMS)

KERBEROS for OpenVMS I64 (required part of OpenVMS)

SSL for OpenVMS I64 (required part of OpenVMS)

Performance Data Collector for OpenVMS (required part of OpenVMS)

  HP I64VMS DWMOTIF V1.6: DECwindows Motif

   If a Language Variant is installed, refer to the Installation Guide.

   Do you want to continue? [YES]
```

If you answer NO, the installation procedure returns to the main menu, aborting the installation. If you answer YES and you chose to install DECnet Phase IV or WBEM Services for OpenVMS (which is supported with OpenVMS I64 only), the procedure displays additional text similar to the following before continuing. In the display, WBEMCIM is the WBEM Services for OpenVMS file name used in the PCSI kit. CIM stands for the Common Information Model, which differentiates the current OpenVMS WBEM product from the original one that is based on the Simple Network Maintenance Protocol (SNMP).

```
HP I64VMS WBEMCIM V2.0: HP WBEM for OpenVMS V2.0

 Copying HP WBEM Services for OpenVMS Release Notes to SYS$HELP

 Installing HP WBEM Services for OpenVMS software.
```

Step 20. Finish Installation onto System Disk – Review and Confirm Options: When you have answered all the prompts and selected the options you want installed, the procedure displays information about the products you have selected. The procedure allows you to review your selections and make changes if necessary, then installs the product, provides informational messages, and returns you to the original menu.

First, you are asked whether you want to review the options:

```
    Do you want to review the options? [NO]
```

If you answer YES, the procedure displays all the selected options and suboptions, similar to the example in Figure 3-1. If you answer NO, the installation continues as described with the sample script (beginning with "Execution phase starting ...") that follows.

Figure 3-1 Component Options and Suboptions

```
DECdtm Distributed Transaction Manager
Support for DECnet-Plus or DECnet for OpenVMS
Programming Support
    Debugger Utility
    Image Dump Utility
    Macro libraries
    Macro-32 Migration Compiler
    TLB intermediary form of STARLET
    C Object Libraries  <-------------  Alpha only
    C Header Files
    VMS text libraries of Ada declarations
RMS Journaling Recovery Utility
System Programming Support
    Delta Debugger
    System Dump Analyzer Utility
    Miscellaneous Symbol Table Files
OpenVMS Management Station Software -- PC files
Utilities
    Phone Utility
    Error Log Generator Utility
    XPG4 Internationalization Utilities
    World Wide PostScript Printing Subsystem
Bliss Require Files
Example Files
Message Facility Files (HELP/MESSAGE)
Translated Image Support
UETP Files
DECwindows Server Support
    DECwindows workstation files
    Video fonts
        100 dots-per-inch video fonts
    Euro base support
        Euro 100 dots-per-inch video fonts
Delete any obsolete OpenVMS files
Delete files archived by OpenVMS remedial kits
```

The component options listed in Figure 3-1 are included within the OpenVMS Version 8.3 operating system. Except as noted, these options apply to both OpenVMS Alpha and I64 systems. Depending on the products you chose to install with the operating system, additional components are included as well. After the procedure displays all selected options and suboptions, you are prompted as follows:

```
    Are you satisfied with these options? [YES]
```

If you answer NO to this question, you are allowed to selectively configure options and suboptions, even if you did not do so previously. When you finish, you are asked again whether you are satisfied with the options you selected. When you answer YES to indicate you are satisfied with the selections, the installation begins installing OpenVMS onto the target disk. The following is a sample display:

NOTE **Alpha systems only**: If you perform two installations at the same time to systems connected by MEMORY CHANNEL, you might see a message similar to the following every 5 seconds:

```
%PMA0 CPU00: 27-JUL-2006 14:58:40 Remote System Conflicts with
 Known System - REMOTE NODE
%PMA0 CPU00: 27-JUL-2006 14:58:45 Remote System Conflicts with
 Known System - REMOTE NODE
```

Disregard the message. The installation or upgrade will proceed normally and the message is not present when the system reboots with its actual node name.

NOTE Names of products installed with OpenVMS differ between OpenVMS Alpha and I64 installations. For example, the OpenVMS I64 windowing and networking product names are all displayed as HP I64VMS *product-name*, such as HP I64VMS KERBEROS, while OpenVMS Alpha product names are displayed in any of three different ways, depending on the product and version:

- HP *product-name*, such as HP AXPVMS KERBEROS V3.0
- DEC *product-name*, such as DEC AXPVMS DWMOTIF V1.6
- CPQ *product-name*, such as CPQ AXPVMS CDSA V2.2

```
Execution phase starting ...

    The following products will be installed to destinations:
        HP I64VMS AVAIL_MAN_BASE V8.3        DISK$I64SYS:[VMS$COMMON.]
        HP I64VMS CDSA V2.2                  DISK$I64SYS:[VMS$COMMON.]
        HP I64VMS DECNET_PLUS V8.3           DISK$I64SYS:[VMS$COMMON.]
        HP I64VMS DWMOTIF V1.6               DISK$I64SYS:[VMS$COMMON.]
        HP I64VMS DWMOTIF_SUPPORT V8.3       DISK$I64SYS:[VMS$COMMON.]
        HP I64VMS KERBEROS V3.0              DISK$I64SYS:[VMS$COMMON.]
        HP I64VMS OPENVMS V8.3               DISK$I64SYS:[VMS$COMMON.]
        HP I64VMS SSL V1.3                   DISK$I64SYS:[VMS$COMMON.]
        HP I64VMS TCPIP V5.6                 DISK$I64SYS:[VMS$COMMON.]
        HP I64VMS TDC_RT V2.2                DISK$I64SYS:[VMS$COMMON.]
        HP I64VMS VMS V8.3                   DISK$I64SYS:[VMS$COMMON.]
        HP I64VMS WBEMCIM V2.0               DISK$I64SYS:[VMS$COMMON.]


     Portion done: 0%..10%..20%..30%..40%..50%..60%..70%..80%..90%

    %PCSI-I-PRCOUTPUT, output from subprocess follows ...
```

```
% - Execute SYS$MANAGER:TCPIP$CONFIG.COM to proceed with configuration of
%   HP TCP/IP Services for OpenVMS.
%
  Portion done: 100%
```

Depending on the options you selected, certain messages such as the preceding TCP/IP message might be displayed at this point.

Step 21. Final Installation Confirmation and Information Messages: The installation continues, displaying the products that have been installed and relevant information:

```
The following products have been installed:
    HP I64VMS AVAIL_MAN_BASE V8.3       Layered Product
    HP I64VMS CDSA V2.2                 Layered Product
    HP I64VMS DECNET_PLUS V8.3          Layered Product
    HP I64VMS DWMOTIF V1.6              Layered Product
    HP I64VMS DWMOTIF_SUPPORT V8.3      Layered Product
    HP I64VMS KERBEROS V3.0             Layered Product
    HP I64VMS OPENVMS V8.3              Platform (product suite)
    HP I64VMS SSL V1.3                  Layered Product
    HP I64VMS TCPIP V5.6                Layered Product
    HP I64VMS TDC_RT V2.2               Layered Product
    HP I64VMS VMS V8.3                  Operating System
    HP I64VMS WBEMCIM V2.0              Layered Product

HP I64VMS OPENVMS V8.3: OPENVMS and related products Platform

   HP I64VMS KERBEROS V3.0

     Configure and set up Kerberos

     If Kerberos will be run on this system, but has not been
     used previously, you need to perform the following steps.

     o Run the Kerberos cofniguration procedure:

       @SYS$STARTUP:KRB$CONFIGURE.COM

     o Add the following line to SYS$MANAGER:SYSTARTUP_VMS.COM:

       $ @SYS$STARTUP:KRB$STARTUP

     o Add the following line to SYS$MANAGER:SYLOGIN.COM:

       $ @SYS$MANAGER:KRB$SYMBOLS
Press RETURN to continue:

  HP I64VMS SSL V1.3: SSL for OpenVMS I64 V1.3 (Based on OpenSSL 0.9.7e)

    There are post-installation tasks that you must complete

    after upgrading from previous SSL versions
```

```
    including verifying startup command procedures and logical names.

    Refer to SYS$HELP:SSL013.RELEASE_NOTES for more information.

  HP I64VMS TDC_RT V2.2: The Performance Data Collector (base) for OpenVMS

    Users of this product require the following privileges:
     (CMKRNL,LOG_IO,WORLD,PHY_IO,SYSPRV,SYSLCK)

    Users of this product require the following process resource limits:
     WSQUO minimum 7000

    A read-me file is available in SYS$COMMON:[TDC]TDC_README.TXT

    Release notes are available in SYS$COMMON:[TDC]TDC_RELEASE_NOTES.TXT


  HP I64VMS DWMOTIF V1.6: DECwindows Motif

    System reboot is required.

    If using a language variant, reboot after upgrade of language variant.

    Installation Verification Procedure can be run after reboot.

  HP I64VMS TCPIP V5.6   : HP TCP/IP Services for OpenVMS.

    Check the release notes for current status of the product.
```

Step 22. Installation Creates and Validates Boot Options (I64 only): At this point in an OpenVMS I64 installation, the procedure creates and validates boot options if you chose to have the procedure do so (see step 8).

- **If you answered NO** in step 8, the following message is displayed:

```
If there is an existing boot option that was used to boot this
system disk, you may be able to use it. Otherwise, you will have
to use the EFI Shell the first time that you boot the newly
installed system. After booting, use the OpenVMS I64 Boot Manager
to create a Boot Option. To do this log in to a privileged
account and execute this command:

    $ @SYS$MANAGER:BOOT_OPTIONS
```

  The procedure then informs you that the installation is complete and prompts you to press **Return** (**Enter**) to continue, at which point it returns you to the OpenVMS main menu. You can select option 8 ("Execute DCL commands and procedures") on the OpenVMS main menu and enter the command at the DCL triple dollar sign prompt ($$$) to start the OpenVMS I64 Boot Manager utility.

- **If you answered YES** in step 8, the installation procedure determines whether a boot entry already exists for the system disk (in this example, DKB400:):

— **If an entry is found**, a message similar to the following is displayed:

```
      The EFI Boot Manager menu includes the following boot option(s)
          for DKB400:

      EFI Boot Options list:    Timeout = 0 secs.
      ------------------------------------------------------------------------
01. DKB400 PCI(0|20|1|0)  Scsi(Pun1,Lun0)  "OpenVMS on DKB400: PKA0.1"
      ------------------------------------------------------------------------
      1 entries found.
```

In this example, one boot option is found. If multiple entries are found and if they are all SCSI devices, the procedure displays the following message and then notifies you that the installation is complete:

```
   Please use the OpenVMS I64 Boot Manager to ensure that you
   have a valid boot option for the system you have just installed.
```

When one entry is found, or when multiple Fibre Channel entries are found, the procedure validates the boot options, as in the following example, in which the found entry fails to boot and is then fixed and validated:

```
   Validate EFI Boot Options list:    Timeout = 0 secs.
   ------------------------------------------------------------------
      1 OpenVMS on DKB400: PKA0.1
         DKB400 PCI(0|20|1|0) Scsi(Pun1,Lun0)
         efi$bcfg: Option Failed. Fixing Boot Entry automatically.

    efi$bcfg: Entry 1 Boot0001 removed.
    efi$bcfg: DKB400 PCI(0|20|1|0) Scsi(Pun1,Lun0)  (Boot0001) Option
    successfully added

------------------------------------------------------------------------
   1 entries validated.
```

— **If no existing entry is found**, a boot option is created and the procedure displays the validation text, as in the following example:

```
efi$bcfg: DKB400: (Boot0003)  Option successfully added

    The Boot Option is called OpenVMS on DKB400:;
    it is the first entry in the Boot Options menu, and is
    configured (by default) to boot from SYS0.
```

Step 23. Installation Completes and Returns to OpenVMS Menu: The installation procedure is now complete. The procedure displays information about the special startup procedure that runs when the newly installed system is first booted. It then prompts you to press **Return** (**Enter**) to continue. After you do so, you are returned to the OpenVMS operating system menu. The following is a sample display:

```
The installation is now complete.

 When the newly installed system is first booted, a special
 startup procedure will be run.  This procedure will:

 o  Configure the system for standalone or OpenVMS Cluster operation.
```

```
o  Run AUTOGEN to set system parameters.
o  Reboot the system with the newly set parameters.


   You may shut down now or continue with other operations.


 Process I64VMS_INSTALL logged out at 15-JUL-2006 14:45:49.54

Press Return to continue...

************************************************************

You can install or upgrade the OpenVMS I64 operating system
or you can install or upgrade layered products that are included
on the OpenVMS I64 distribution media (CD/DVD).

You can also execute DCL commands and procedures to perform
"standalone" tasks, such as backing up the system disk.

Please choose one of the following:

    1)  Upgrade, install, or reconfigure OpenVMS I64 Version 8.3
    2)  Display layered products that this procedure can install
    3)  Install or upgrade layered products
    4)  Show installed products
    5)  Reconfigure installed products
    6)  Remove installed products
    7)  Find, Install, or Undo patches; Show or Delete recovery data
    8)  Execute DCL commands and procedures
    9)  Shut down this system

Enter CHOICE or ? for help: (1/2/3/4/5/6/7/8/9/?)
```

Step 24. Shut Down the System: Unless you want to perform other operations prior to booting the new system disk, choose the shutdown option (9) on the OpenVMS main menu to shut down the operating system, as shown in the following example. If you want to install layered products that have not been installed yet, HP recommends doing so during the postinstallation phase, as described in Section 7.15.

```
Enter CHOICE or ? for help: (1/2/3/4/5/6/7/8/9/?)  9
  Shutting down the system


SYSTEM SHUTDOWN COMPLETE
```

After you complete the installation and shut down the system, you can boot your new operating system disk, as explained in Section 3.4.2. If you are installing OpenVMS I64, make sure you remove the DVD from the drive before booting the system disk.

3.4 Booting the New OpenVMS System Disk

After you have successfully installed the OpenVMS operating system, the next step is to make the new system disk the default boot device. For OpenVMS Alpha systems, see Section 3.4.1.1. For OpenVMS I64 systems, this step may already have been done (see step 22 of the installation procedure in Section 3.3.3), in which case you can boot the OpenVMS I64 system disk by performing the steps in Section 3.4.2.

To boot the OpenVMS Alpha system disk, follow the instructions provided in Section 3.4.1.

3.4.1 Booting the OpenVMS Alpha System Disk

For booting the OpenVMS Alpha system disk, first designate the new system disk as the default boot device by performing the steps in Section 3.4.1.1. Then, to boot the disk, perform the steps in Section 3.4.1.2.

3.4.1.1 Specifying the Default Boot Device on Alpha Systems

Before you boot the new system disk, perform the following steps:

Step 1. Halt the system by pressing either **Ctrl/P** or the **Halt** button. For more information about halting your Alpha computer, see Appendix A.

Step 2. At the console prompt (>>>), enter the SET BOOTDEF_DEV command in the following format:

SET BOOTDEF_DEV *target-drive*

Substitute the device name of the system disk for *target-drive*. The SET BOOTDEF_DEV command tells the system which disk to boot from. For example, if the system disk has the device name DKA400, enter the following command and press **Enter**:

```
>>> SET BOOTDEF_DEV DKA400
```

If the system disk is connected to a hierarchical storage device (HS*x*), the format for specifying that drive is different. For example, on a DEC 7000 series system connected to an HSC device, the command is similar to the following:

```
>>> SET BOOTDEF_DEV DUA20.14.0.2.0
```

For more information about setting and showing the default boot device, see Appendix A.

3.4.1.2 How to Boot the New System Disk

To boot the system disk, enter the following command and press **Enter**:

```
>>> BOOT -FLAGS 0,0
```

When the system starts booting, the initial informational messages displayed are similar to the following:

```
OpenVMS (TM) Alpha Operating System, Version 8.3

Installing required known files...

Configuring devices...

(c) Copyright 1976-2006 Hewlett-Packard Development Company, L.P.
```

3.4.2 Booting the OpenVMS I64 System Disk

The following steps explain how to boot your new OpenVMS I64 system disk. For more information about this and special booting operations, see Section B.6

NOTE Make sure you remove the DVD from the DVD/CD drive before booting the system disk.

Take the following actions to boot the new system disk, depending on whether you have configured your system with a boot option for your system disk (see steps 8 and 22 in Section 3.3.3):

- **If you have configured your system with a boot option for your system disk**, your system disk is displayed as a boot option in the EFI Boot Manager menu. Select your system disk and press **Enter**. If your system disk is the first option in the EFI Boot Manager menu, it might boot automatically after the 10-second countdown.
- **If you have not configured your system with a boot option for your disk**, follow these steps:

  1. Press **Enter** or any other key (you might see text that instructs you to "hit any key to cold reboot"). The machine displays several boot-related messages and then displays the EFI Boot Manager menu.
  2. Go to the EFI Shell prompt by selecting the EFI Shell [Built-in] option from the EFI Boot Manager menu. (This might be selected automatically if you do not make a selection before the EFI countdown completes.) A display similar to the following is displayed. An explanation of the two types of devices shown (**blk** and **fs**) follows the example.

```
Loading.: EFI Shell [Built-in]
 EFI Shell version 1.10 [14.61]
 Device mapping table
fs  { fs0  : Acpi(HWP0002,100)/Pci(1|0)/Scsi(Pun0,Lun0)/HD(Part1,Sig8FCF6F11-...
    { fs1  : Acpi(HWP0002,100)/Pci(1|0)/Scsi(Pun0,Lun0)/HD(Part4,Sig8FCF6F10-...)
      blk0 : Acpi(HWP0002,0)/Pci(2|0)/Ata(Primary,Master)
blk { blk1 : Acpi(HWP0002,100)/Pci(1|0)/Scsi(Pun0,Lun0)
    { blk2 : Acpi(HWP0002,100)/Pci(1|0)/Scsi(Pun0,Lun0)/HD(Part1,Sig8FCF6F11-...)
    { blk3 : Acpi(HWP0002,100)/Pci(1|0)/Scsi(Pun0,Lun0)/HD(Part2,Sig8FCF6F10-...)
    { blk4 : Acpi(HWP0002,100)/Pci(1|0)/Scsi(Pun0,Lun0)/HD(Part3,Sig8FCF6F11-...)
    { blk5 : Acpi(HWP0002,100)/Pci(1|0)/Scsi(Pun0,Lun0)/HD(Part4,Sig8FCF6F10-...)
    { blk6 : Acpi(HWP0002,100)/Pci(1|0)/Scsi(Pun0,Lun0)/HD(Part5,Sig8FCF6F10-...)
 Shell>
```

fs The fs devices are file-structured logical partitions on physical disks that are included with your Integrity server system. One or more fs device exists for each volume with a bootable **partition** or diagnostic partition. Generally, fs0: corresponds to the target disk on which you installed OpenVMS I64 (unless the DVD was not removed, in which case fs1: corresponds to the target disk). For example, if the target disk is DKA0, then fs0: most likely corresponds to the target disk. On the other hand, if the target disk is a DKA100 or DKB200 or similar, the corresponding EFI device depends on what partitions are configured on the target disk.

blk The blk devices are block devices. Multiple blk devices exist for each volume that has a bootable partition or diagnostic partition. These devices may include the DVD device as well as the diagnostic partitions on OpenVMS system disks. Diagnostic partitions are intended and reserved for use by HP Services. (For more information about this partition, see Appendix I.)

3. To boot the OpenVMS I64 system disk, enter the following command at the EFI Shell prompt, where fs*n*: is the device associated with the system disk (probably fs0:):

```
Shell> fsn:\efi\vms\vms_loader.efi
```

The OpenVMS I64 operating system now starts booting. A display similar to the following is displayed, followed by the prompt for user name and password:

```
HP OpenVMS Industry Standard 64 Operating System, Version 8.3
 (c) Copyright 1976-2006 Hewlett-Packard Development Company, L.P.
```

Note that HP Integrity servers maintain a system event log (SEL) within system console storage, and OpenVMS I64 automatically transfers the contents of the SEL into the OpenVMS error log. On certain machines, during a successful boot operation while using a console, you might see a message indicating that the **Baseboard Management Controller (BMC)** SEL is full. You can safely continue when the BMC SEL is full by following the prompts; OpenVMS processes the contents of the SEL.

3.4.3 Next Steps

When you boot OpenVMS from a new system disk, a special startup procedure runs that does the following:

- Gives you the opportunity to configure the system for standalone or OpenVMS Cluster operation (see Section 3.5).
- Runs AUTOGEN to evaluate your hardware configuration, estimate typical workloads, and set system parameters (see Section 3.6).
- Reboots your system with the new parameters (see Section 3.7)

After the system is rebooted with the new parameters, you can log into your SYSTEM account, as explained in Section 3.8. On Integrity servers, if you did not allow the OpenVMS installation procedure to create a boot option for your system disk, you can set up such an option now, as explained in Section B.5. Appendix B includes additional information regarding setting up and booting HP Integrity servers.

3.5 Joining an OpenVMS Cluster

If you answered YES to the question about joining an OpenVMS Cluster, the system now asks a series of questions about your configuration (CI, DSSI, SCSI, local area, or mixed interconnect; the choices depend on which operating system you are installing). If you answered NO to this question, the system immediately runs AUTOGEN, as described in Section 3.6. If you answered NO, you can still set up or join an OpenVMS Cluster after the installation is completed by manually running the cluster configuration utility. You can do this by entering the following command:

```
$ @SYS$MANAGER:CLUSTER_CONFIG
```

For more information about cluster configuration, see the *HP OpenVMS Cluster Systems* manual or the *Guidelines for OpenVMS Cluster Configurations* manual.

Table 3-2 lists the OpenVMS Cluster prompts and suggested responses. These prompts appear if you answered YES to the question about joining an OpenVMS Cluster or if you manually run SYS$MANAGER:CLUSTER_CONFIG.COM. Note that, depending on your responses and the particular cluster configuration, some prompts are not displayed.

Table 3-2 Prompts for OpenVMS Cluster Configurations

Question	How to Respond
Will this node be a cluster member (Y/N)?	Enter Y.
What is the node's DECnet node name?	Enter the DECnet node name (for example, MYNODE). The DECnet node name can be from one to six alphanumeric characters in length and cannot include dollar signs ($) or underscores (_). This is the name you specified in step 12 of the installation procedure.
What is the node's DECnet node address?	Enter the DECnet node address; for example, 2.2. This is the address you specified in step 13 of the installation procedure.
Will the Ethernet be used for cluster communications (Y/N)? (Alpha only)	Enter N for a **CI-only** or **DSSI-only** OpenVMS Cluster. Otherwise, answer Y.[a]
Enter this cluster's group number:[b]	Enter a number in the range of 1 to 4095 or 61440 to 65535.
Enter this cluster's password:[b]	Enter the cluster password. The password must be from 1 to 31 alphanumeric characters in length and can include dollar signs ($) and underscores (_).
Reenter this cluster's password for verification:	Reenter the password.
Will MYNODE be a disk server (Y/N)?	Enter Y if you want local disks to be served to the cluster (mandatory for local area and mixed-interconnect configurations). See the *HP OpenVMS Cluster Systems* manual for information about served cluster disks.
Will MYNODE serve RFxx disks (Y)? (Alpha only)	Enter a response appropriate for your DSSI configuration, if such disks are available.
Enter a value for MYNODE's ALLOCLASS parameter.	In an OpenVMS Cluster environment, the allocation class value cannot be zero if the node serves DSSI or CI disks to other cluster members, or if volume shadowing will be used on this system. In either case, the ALLOCLASS value must be a number from 1 to 255. HP recommends that you thoroughly review the chapter on cluster storage devices in the *HP OpenVMS Cluster Systems* manual. This manual also includes the rules for specifying allocation class values.
Does this cluster contain a quorum disk (Y/N)?	For CI-only, SCSI, local area, and mixed-interconnect configurations, enter Y or N, depending on your configuration. For most DSSI systems, enter Y. However, if you are adding a two-system DSSI configuration to an existing cluster (in which case you might not need a quorum disk), you can answer N. If you enter Y, the system asks for the name of the quorum disk. Enter the device name of the quorum disk. For information about quorum disks, see the *HP OpenVMS Cluster Systems* manual.

a. The Ethernet might not be required for communication within a **local area OpenVMS Cluster system** configured with FDDI devices. Within certain DSSI or CI (computer interconnect) mixed-interconnect configurations, neither the Ethernet nor FDDI are required for communication. If your configuration fits either scenario, you can answer NO (N) to this question.
b. Cluster group number and password are required by any cluster nodes that use the local area network. In a cluster that uses mixed interconnects, if any of the interconnects require the cluster number and password, then you must set the cluster number and password for all nodes.

3.6 Running AUTOGEN

At this point, the system automatically runs AUTOGEN to evaluate your hardware configuration and estimate typical workloads. AUTOGEN then sets system parameters, the sizes of page, swap, and dump files, and the contents of VMSIMAGES.DAT. When AUTOGEN finishes and your system reboots, the installation procedure is complete.

The installation procedure displays messages similar to the following:

```
      AUTOGEN will now be run to compute the new system parameters. The system
      will then shut down and reboot, and the installation or upgrade will be
      complete.

      After rebooting you can continue with such system management tasks as:

           Decompressing the System Libraries (not necessary on OpenVMS I64)
           Configuring networking software (TCP/IP Services, DECnet, other)
           Using SYS$MANAGER:CLUSTER_CONFIG.COM to create an OpenVMS Cluster
           Creating FIELD, SYSTEST, and SYSTEST_CLIG accounts if needed

%AUTOGEN-I-BEGIN, GETDATA phase is beginning.
%AUTOGEN-I-NEWFILE, A new version of SYS$SYSTEM:PARAMS.DAT has been created.
        You may wish to purge this file.
%AUTOGEN-I-END, GETDATA phase has successfully completed.
%AUTOGEN-I-BEGIN, GENPARAMS phase is beginning.
%AUTOGEN-I-NEWFILE, A new version of SYS$MANAGER:VMSIMAGES.DAT has been created.
         You may wish to purge this file.
%AUTOGEN-I-NEWFILE, A new version of SYS$SYSTEM:SETPARAMS.DAT has been created.
        You may wish to purge this file.
%AUTOGEN-I-END, GENPARAMS phase has successfully completed.
%AUTOGEN-I-BEGIN, GENFILES phase is beginning.
%SYSGEN-I-EXTENDED, SYS$SYSROOT:[SYSEXE]PAGEFILE.SYS;1 extended
%SYSGEN-I-EXTENDED, SYS$SYSROOT:[SYSEXE]SWAPFILE.SYS;1 extended
%SYSGEN-I-CREATED, SYS$SYSROOT:[SYSEXE]SYSDUMP.DMP;1 created

%AUTOGEN-I-REPORT, AUTOGEN has produced some informational messages that
        have been stored in the file SYS$SYSTEM:AGEN$PARAMS.REPORT. You may
        wish to review the information in that file.

%AUTOGEN-I-END, GENFILES phase has successfully completed.
%AUTOGEN-I-BEGIN, SETPARAMS phase is beginning.
%AUTOGEN-I-SYSGEN, parameters modified
```

```
%AUTOGEN-I-END, SETPARAMS phase has successfully completed.
%AUTOGEN-I-BEGIN, REBOOT phase is beginning.

The system is shutting down to allow the system to boot with the
generated site-specific parameters and installed images.
```

NOTE After booting and running AUTOGEN, several messages are displayed at DECwindows startup. For information about these messages and how to avoid them, see the *HP DECwindows Motif for OpenVMS Release Notes*.

3.7 Rebooting after AUTOGEN

After AUTOGEN finishes, the system automatically shuts down and displays messages similar to the following:

```
The system will automatically reboot after the shutdown and the
installation will be complete.



     SHUTDOWN -- Perform an Orderly System Shutdown
                 on node I64CSI

%SHUTDOWN-I-BOOTCHECK, performing reboot consistency check...
%SHUTDOWN-I-CHECKOK, basic reboot consistency check completed
   .
   .
   .
```

The OpenVMS Alpha system should automatically reboot after the shutdown; the installation is finished. However, if the Alpha system does not reboot automatically, reboot the system manually. For example, if the system disk is on an RZ25 disk drive with a unit number of 1, enter the following command and press **Enter**:

```
>>> BOOT DKA400
```

After shutdown of an OpenVMS I64 system, it reboots automatically only if you have set the system disk boot option accordingly; otherwise, you must boot the system manually, as described in Section 3.4.2.

When the system reboots, it displays informational messages and accounting information indicating that your OpenVMS operating system has finished booting and is now ready for use. For example:

```
%SET-I-INTSET, login interactive limit = 64, current interactive value = 0
  SYSTEM       job terminated at  15-JUL-2006 14:51:23.47
   Accounting information:
   Buffered I/O count:            2177     Peak working set size:    6848
   Direct I/O count:              1358     Peak page file size:    179552
   Page faults:                   1805     Mounted volumes:             0
   Charged CPU time:     0 00:00:13.37     Elapsed time:    0 00:01:06.20
```

3.8 Logging In to the SYSTEM Account

The following two sections explain how to log in to the SYSTEM account from a character-cell terminal and from a workstation.

3.8.1 Logging In from a Character-Cell Terminal

Log in from a character-cell terminal by entering the user name SYSTEM followed by the password. The display is similar to the following:

```
          OpenVMS I64 Operating System, Version 8.3

Username: SYSTEM
Password:
   .
   .
   .
       OpenVMS I64 Operating System, Version 8.3
```

If you forget your password for an OpenVMS I64 SYSTEM account, follow the instructions in Section B.6.10 to perform an emergency startup. If you forget your password for an OpenVMS Alpha SYSTEM account, see Section A.1.9.

3.8.2 Logging In from a Workstation

If you installed the DECwindows Motif for OpenVMS software on your workstation, do the following after the login window is displayed on your screen:

Step 1. Enter the user name SYSTEM, press **Tab**, and then enter the password.

Step 2. Press **Enter** or click on the **OK** button with your mouse.

Step 3. At this point, you can create a DECterm session or initiate other management functions. For information about creating a DECterm session, see the *DECwindows Motif for OpenVMS Applications Guide*.

3.9 Postinstallation Tasks

After you have successfully installed the OpenVMS operating system and logged in to the SYSTEM account, you must perform certain postinstallation tasks before you can use the system. For complete information, see Chapter 7.

4 Before Upgrading the OpenVMS Operating System

This chapter describes which tasks you should perform prior to beginning an upgrade. Section 4.1 includes a checklist that you can use to make sure you perform all the tasks described in this chapter.

4.1 Preupgrade Tasks

Use the checklist in Table 4-1 to ensure that you perform all necessary tasks prior to upgrading your system.

Table 4-1 Preupgrade Checklist

	Task	Section
❑	Review relevant documentation.	Section 4.2
❑	Review notes, cautions, and restrictions about the following: • Upgrade paths to Version 8.3 • Update license requirements • Components you choose not to install • Upgrade issues after the system disk directory structure has been changed • Licenses and possible reinstallation requirements for layered products	Section 4.3
❑	Check for software that must be manually removed.	Section 4.4
❑	Save files that you do not want deleted by the upgrade procedure.	Section 4.5
❑	Prepare the system disk.	Section 4.6
❑	Ensure that you have a recent FEEDBACK.DAT file.	Section 4.7
❑	Perform required actions before upgrading in a volume shadowing environment.	Section 4.8
❑	Back up the current system disk.	Section 4.9
❑	Shut down the system.	Section 4.10

4.2 Documentation to Review Before Upgrading Your System

In addition to reviewing the information in this chapter, you might need to refer to the following sources of information as well:

OpenVMS Version 8.3 Documents

- The *Cover Letter for HP OpenVMS Version 8.3* and the Software Product Descriptions included with your distribution kit
- *HP OpenVMS Version 8.3 Release Notes*
- *HP OpenVMS Version 8.3 New Features and Documentation Overview*

OpenVMS Version 8.2 Documents

Although not revised for OpenVMS Version 8.3, the following documents remain valid:

- *HP OpenVMS Cluster Systems*
- *Guidelines for OpenVMS Cluster Configurations*
- *HP OpenVMS System Manager's Manual, Volume 2: Tuning, Monitoring, and Complex Systems* (specifically, the chapter entitled "Managing System Parameters"), for information about using AUTOGEN, modifying the system parameters file (MODPARAMS.DAT), and related operations
- *HP OpenVMS System Management Utilities Reference Manual*, for information about using system management utilities such as SYSMAN and ANALYZE/DISK_STRUCTURE
- *HP OpenVMS Guide to System Security*, for information about reestablishing your security environment after the upgrade

4.3 Notes, Cautions, and Restrictions

This section provides important information that can affect the success of your upgrade. Review the cautions, restrictions, and notes carefully before you begin the upgrade.

4.3.1 Upgrade Paths

The following subsections describe the various types of upgrades to OpenVMS Version 8.3.

4.3.1.1 Direct Upgrade Paths

You can upgrade directly to OpenVMS I64 Version 8.3 from only the following versions of OpenVMS I64:

- Version 8.2-1
- Version 8.2

You can upgrade directly to OpenVMS Alpha Version 8.3 from only the following versions of OpenVMS Alpha:

- Version 8.2
- Version 7.3-2

4.3.1.2 Indirect Upgrade Paths

If you are running a version of OpenVMS Alpha earlier than Version 7.3-2, you cannot upgrade directly to Version 8.3. Instead, you must first upgrade to Version 7.3-2 (depending on the version of OpenVMS you are running, you might need to upgrade to an intermediate version first). For example, if you are running OpenVMS Alpha Version 7.1, you first need to upgrade to either Version 7.2, 7.2-1, or 7.2-2, and then you can upgrade to Version 7.3-2, and then to Version 8.3. If you are running OpenVMS Alpha Version 7.2 or later, you can upgrade directly to Version 7.3-2, and then to Version 8.3.

4.3.2 Update License Requirements

IMPORTANT To upgrade to OpenVMS Version 8.3, you must have an appropriate license.

HP software licenses grant the right to use the current version of a product or any previous version of the product at the time of purchase.

NOTE When you initially purchase the OpenVMS software and license, HP provides a Product Authorization Key (PAK) that is required to enable the License Management Facility (LMF) to register the license and to validate and authorize subsequent use of the product. A PAK does not provide license or new version rights. For more information about licensing and the License Management Facility, see the *HP OpenVMS License Management Utility Manual*.

If you need an Update License, please contact your HP Sales representative.

4.3.3 Components You Choose Not to Install

If you choose not to install optional OpenVMS networking software (DECnet or TCP/IP) or the DECwindows/Motif GUI during the upgrade, the upgrade procedure removes these products from the system disk. For information about checking for appropriate versions of software on your system and for certain products requiring that you manually remove older versions, see Section 4.4.

NOTE Unless you have specific reasons to do otherwise, HP recommends that you accept the defaults and install all OpenVMS options. OpenVMS and layered products have various dependencies on many of these options. Even if you think you do not need certain options, some OpenVMS or layered product operations might not work correctly if other OpenVMS options are not installed.

Note also that, for OpenVMS I64 installations, the availability of certain options depends on the OE you have purchased. For example, OpenVMS Management Station is available with the Enterprise Operating Environment (EOE) and the Mission Critical Operating Environment (MCOE).

4.3.4 Licenses and Layered Products

The upgrade procedure is designed so that you do not need to reinstall most layered products after the upgrade. However, you might need to reinstall certain layered products because of product-specific installation procedures.

The upgrade procedure leaves your OpenVMS license and layered product licenses intact. You do not need to reinstall these licenses after you upgrade.

4.4 Software That Must Be Manually Removed

Before upgrading, if you are currently using DECram or TDC V2.0, these products must be removed manually; otherwise, the upgrade might fail. For other information about software that might need to be removed manually, see the *HP OpenVMS Version 8.3 Release Notes*.

NOTE The OpenVMS Alpha upgrade procedure checks for older versions of SSL and removes them if found.

4.4.1 Remove Older Versions of DECram for OpenVMS (Alpha Only)

Beginning with OpenVMS Version 8.2, DECram for OpenVMS becomes an integral part of the OpenVMS operating system. Before upgrading to OpenVMS Alpha Version 8.3, you must manually remove earlier versions of DECram for OpenVMS that were customer installed. The upgrade procedure cannot remove DECram for OpenVMS automatically. If an old version of DECram for OpenVMS is installed, the upgrade procedure might abort; if the upgrade does complete, DECram for OpenVMS might cause errors or work improperly. This section explains how to remove an older version of DECram for OpenVMS from your operating system.

Before you shut down the operating system that you plan to upgrade, follow these steps to remove DECram for OpenVMS (if you have already shut down your operating system, you must reboot before continuing).

IMPORTANT Perform these steps *only* on versions of OpenVMS Alpha prior to 8.2.

Step 1. Check for a POLYCENTER software installation (PCSI) utility DECram for OpenVMS installation by logging on to a privileged account and entering the following command:

```
$ PRODUCT SHOW PRODUCT DECRAM
```

If the resulting display shows that DECram is not found on the system, skip to step 3; otherwise, proceed to step 2.

Step 2. If the SHOW PRODUCT display shows that DECram for OpenVMS is installed, enter the following command to remove the product:

```
$ PRODUCT REMOVE DECRAM
```

Once this command has completed successfully, you are finished; you do not need to perform the next steps. If the product removal fails, go on to step 3.

Step 3. Check for files on your system from a VMSINSTAL utility DECram for OpenVMS installation by entering the following commands:

```
$ DIRECTORY SYS$SYSDEVICE:[SYS*.SYS$LDR]SYS$MDDRIVER.EXE
$ DIRECTORY SYS$SYSDEVICE:[SYS*.SYSEXE]MDMANAGER.EXE
$ DIRECTORY SYS$SYSDEVICE:[SYS*.SYSMGR]MDRECOVER.EXE
$ DIRECTORY SYS$SYSDEVICE:[SYS*.SYSHLP]DECRAM$HELP.HLB;*
$ DIRECTORY SYS$SYSDEVICE:[SYS*.SYSTEST]DECRAM$IVP.COM;*
```

If files are found, use the commands in step 4 to remove them. If no files are found, skip to step 5.

Step 4. Remove the files found in step 3 by entering the appropriate DELETE commands (the /NOCONFIRM/NOLOG qualifiers are optional):

```
$ DELETE/NOCONFIRM/NOLOG SYS$SYSDEVICE:[SYS*.SYS$LDR]SYS$MDDRIVER.EXE*
$ DELETE/NOCONFIRM/NOLOG SYS$SYSDEVICE:[SYS*.SYSEXE]MDMANAGER.EXE;*
$ DELETE/NOCONFIRM/NOLOG SYS$SYSDEVICE:[SYS*.SYSMGR]MDRECOVER.EXE;*
$ DELETE/NOCONFIRM/NOLOG SYS$SYSDEVICE:[SYS*.SYSHLP]DECRAM$HELP.HLB;*
$ DELETE/NOCONFIRM/NOLOG SYS$SYSDEVICE:[SYS*.SYSTEST]DECRAM$IVP.COM;*
```

Step 5. In addition, remove the DECram for OpenVMS startup file from the startup database by entering the following commands:

```
$ RUN SYS$SYSTEM:SYSMAN
SYSMAN> STARTUP SET DATABASE STARTUP$STARTUP_LAYERED
SYSMAN> STARTUP REMOVE FILE MDRECOVER.EXE
```

Ignore any "-STARTUP-E-FILNOTFND, STARTUP file MDRECOVER.EXE not found" errors. To exit from SYSMAN, press **Ctrl/Z** or enter EXIT.

4.4.2 Remove TDC Version 2.0 (Alpha Only)

TDC Version 2.0 was released for use on OpenVMS Alpha Version 7.3-2 systems. Prior to installing the current release of OpenVMS Alpha, remove TDC Version 2.0 from your system. (When you install the current version of TDC from the Web site mentioned in Section 7.9.8.3, the Version 2.0 files are removed automatically.)

Before you shut down the operating system that you plan to upgrade, follow these steps to remove TDC V2.0 (if you have already shut down your operating system, you must reboot before continuing):

Step 1. Check for a POLYCENTER software installation (PCSI) utility TDC V2.0 installation by logging on to a privileged account and entering the following command:

```
$ PRODUCT SHOW PRODUCT TDC
```

If the resulting display shows that TDC is not found on the system, no action is required; if TDC is found, proceed to step 2.

Step 2. If the SHOW PRODUCT display shows that TDC V2.0 is installed, enter the following command to remove the product:

```
$ PRODUCT REMOVE TDC
```

4.5 Saving Files from Being Deleted by the Upgrade

The upgrade procedure deletes archived files that were saved with the _OLD file extension on OpenVMS Alpha or I64 systems and any files you might have added or modified in the SYS$EFI.SYS boot partition on OpenVMS I64 systems. You can save these files from being deleted, as described in the following sections.

4.5.1 Saving Archived Files

By default, the upgrade procedure deletes files that were archived as *filename.type*_OLD by OpenVMS remedial kits. If you do not want these files deleted, you can rename them before you perform the ugprade. Alternatively, you can have the upgrade procedure save them by responding to the prompts, as described in Section 6.4.4.

4.5.2 Saving Files Added or Modified in the SYS$EFI.SYS Boot Partition (OpenVMS I64 Upgrades from Version 8.2 Only)

When you upgrade the system disk directly from OpenVMS I64 Version 8.2, the upgrade removes the old SYS$LOADABLE_IMAGES:SYS$EFI.SYS file and replaces it with a new one. When you upgrade from OpenVMS I64 Version 8.2-1 or higher, the upgrade preserves this file instead of replacing it; therefore, if you are upgrading from OpenVMS Version 8.2-1 or higher, you can disregard this section.

SYS$LOADABLE_IMAGES:SYS$EFI.SYS is the storage area for the boot partition used by the Integrity server EFI console. When you upgrade the system disk from OpenVMS Version 8.2, any files that were in this partition before the upgrade are deleted. Thus, in the unlikely event that you have added or modified files in the boot partition (you would have used EFI commands to make these changes), you must first store copies of these files off of the system disk before completing the upgrade, and then copy them back to the partition after the upgrade is complete. Be careful not to confuse these files with any boot options that you might have added or modified in the EFI Boot Manager menu; the boot options are entirely separate from the boot partition and are not removed by upgrades.

4.6 Preparing the System Disk

The following sections describe how to prepare the system disk for the upgrade. Operations include the following:

- Checking for appropriate directory structure and preserving your security protections
- Checking the SYSCOMMON directories
- Examining the system disk
- Checking the size of the system disk
- Returning authorization and AGEN$INCLUDE files to the system disk
- Verifying system parameters

4.6.1 Checking the Directory Structure and Preserving Your Security Protections

If you changed the directory structure on your system disk, the upgrade procedure does not work correctly. Restore your system disk to a standard directory structure before you attempt an upgrade.

The OpenVMS upgrade procedure provides new files and directories in the directory [VMS$COMMON...]. If you have any special protections and access control lists (ACLs), you need to reapply them to reestablish the security environment you currently have. For more information about creating and maintaining a secure environment, see the *HP OpenVMS Guide to System Security* manual.

4.6.2 Checking the SYSCOMMON Directories

For the upgrade to be successful, the SYSCOMMON directories in all system roots must be aliases (or hard links) for the VMS$COMMON directory. To check whether this is the case, enter the following commands if you are booted from the system disk that you are upgrading, and compare the displayed file identifiers to ensure that they are all the same:

```
$ DIRECTORY/FILE_ID/NOHEADING/NOTRAILING SYS$SYSDEVICE:[000000]VMS$COMMON.DIR
$ DIRECTORY/FILE_ID/NOHEADING/NOTRAILING SYS$SYSDEVICE:[SYS*]SYSCOMMON.DIR
```

If you did not boot from the system disk that you are upgrading, mount the disk to be upgraded and specify the actual device name in the command. For example, if the system disk to be upgraded is mounted on DKA100, you would use commands similar to the following:

```
$ DIRECTORY/FILE_ID/NOHEADING/NOTRAILING DKA100:[000000]VMS$COMMON.DIR
$ DIRECTORY/FILE_ID/NOHEADING/NOTRAILING DKA100:[SYS*]SYSCOMMON.DIR
```

Output from the first command should list a single file. Output from the second command should list one file for each system root on the disk. Check whether the file ID is the same for all of the listed files and take action as follows:

- If all the file IDs are the same, continue with the procedure described in the next section.
- If all the file IDs are not the same, this system disk does not have the directory structure that OpenVMS requires, and the upgrade will not succeed. For assistance on resolving this, contact your software support representative.

4.6.3 Examining the System Disk

Examine and repair (if necessary) the system disk using the ANALYZE/DISK_STRUCTURE command. (See the *HP OpenVMS System Management Utilities Reference Manual: A-L* for more information about this command.) Use the following procedure:

Step 1. Analyze the system disk for inconsistencies and errors in the file structure by entering the following command:

```
$ ANALYZE/DISK_STRUCTURE SYS$SYSDEVICE
```

Ignore the following message:

```
%ANALDISK-I-OPENQUOTA, error opening QUOTA.SYS
```

Step 2. If you find any other errors on the system disk, repair the errors by entering the following command:

```
$ ANALYZE/DISK_STRUCTURE/REPAIR SYS$SYSDEVICE
```

Repeat steps 1 and 2 until no errors (other than the one shown in step 1) are returned.

4.6.4 Checking the Size of the System Disk

It is difficult to determine in advance how many blocks of disk space you need for the upgrade. It depends on how many files you have on the target disk already and on how many components you select during the upgrade procedure. However, the following information will help:

- The *maximum* amount of disk space you need is approximately 675,000 blocks, but your system might use substantially less.

- After you select the components you want installed on the system for the upgrade, the upgrade procedure calculates whether you have enough disk space, displaying the number of available blocks and the number required for the upgrade. If the procedure determines that your disk does not have enough space to perform the upgrade, it displays a message to alert you and allows you to terminate the upgrade so you can create more disk space and try the upgrade again.

NOTE If the files on your system disk are badly fragmented, you might not be able to complete an upgrade, even when the amount of disk space appears to be sufficient. HP recommends that you back up and restore the system disk prior to upgrading. Restoring the system disk from an image backup defragments the disk. For information about backing up and restoring your system disk, see Appendix E.

To see how much space you have on the system disk, enter the following command:

```
$ SHOW DEVICE SYS$SYSDEVICE
```

4.6.5 Returning Authorization and AGEN$INCLUDE Files to the System Disk

If you place authorization and AGEN$INCLUDE files on disks other than the system disk, the upgrade procedure will not find these files. This is because the other disks are not mounted during the upgrade. In addition, the logical names you set up to point to these files are not defined during the upgrade. The following sections explain how to make these files available to the upgrade procedure.

4.6.5.1 Authorization Files

OpenVMS allows you to relocate certain system files (mostly authorization files) off the system disk. You do this by copying the files to another location and then defining logical names as documented in the file SYS$SYSTEM:SYLOGICALS.TEMPLATE. The logical names are defined in SYS$STARTUP:SYLOGICALS.COM.

When you boot your system from the OpenVMS operating system media, the logical names pointing to these files are not defined, and the disks where they are located are not mounted. Because of this, the upgrade cannot access the relocated files, possibly resulting in an incorrect or incomplete upgrade. The upgrade might finish without error, but the files might not be in place as expected.

Before upgrading your system, check the definitions of these logical names on your system. (If a file has not been relocated, the corresponding logical name might not be defined. This is acceptable.) If any logical name points to a location or file name other than the location and file name listed in Table 4-2, return the file to the default location and file name. To prevent the system from referencing the files located off the system disk, either delete the associated logical name (using the DCL command DEASSIGN/SYSTEM/EXEC), or shut down the operating system and reboot from the operating system media. After the upgrade and before booting the operating system, you can move these files back to their original locations off the system disk, using the DCL option (8) from the OpenVMS operating system menu.

Table 4-2 Logical Names for Relocated Authorization Files

Logical Name	Location and File Name
LAN$NODE_DATABASE	SYS$SYSTEM:LAN$NODE_DATABASE.DAT
LMF$LICENSE	SYS$SYSTEM:LMF$LICENSE.LDB
NETNODE_REMOTE	SYS$SYSTEM:NETNODE_REMOTE.DAT

Table 4-2 Logical Names for Relocated Authorization Files (Continued)

Logical Name	Location and File Name
NETNODE_UPDATE	SYS$MANAGER:NETNODE_UPDATE.COM
NETOBJECT	SYS$SYSTEM:NETOBJECT.DAT
NETPROXY	SYS$SYSTEM:NETPROXY.DAT
NET$PROXY	SYS$SYSTEM:NET$PROXY.DAT
RIGHTSLIST	SYS$SYSTEM:RIGHTSLIST.DAT
SYSUAF	SYS$SYSTEM:SYSUAF.DAT
SYSUAFALT	SYS$SYSTEM:SYSUAFALT.DAT
SYSALF	SYS$SYSTEM:SYSALF.DAT
VMSMAIL_PROFILE	SYS$SYSTEM:VMSMAIL_PROFILE.DATA
VMS$AUDIT_SERVER	SYS$MANAGER:VMS$AUDIT_SERVER.DAT
VMS$OBJECTS	SYS$SYSTEM:VMS$OBJECTS.DAT
VMS$PASSWORD_DICTIONARY	SYS$LIBRARY:VMS$PASSWORD_DICTIONARY.DATA
VMS$PASSWORD_HISTORY	SYS$SYSTEM:VMS$PASSWORD_HISTORY.DATA
VMS$PASSWORD_POLICY	SYS$LIBRARY:VMS$PASSWORD_POLICY.EXE

4.6.5.2 AGEN$INCLUDE Files

If you use the AGEN$INCLUDE feature in SYS$SYSTEM:MODPARAMS.DAT to include files containing additional parameter settings, and the files that are being included are not on the system disk, then do the following before upgrading:

1. Move the files to the system disk.
2. Update the AGEN$INCLUDE entries to reflect the new locations of these files. For these entries, do not use logical names that you defined in SYS$STARTUP:SYLOGICALS.COM or elsewhere for your normal startup procedure. When you boot the system from the OpenVMS operating system media for an upgrade, your normal startup procedure is not run, and so these logical names are not defined for the upgrade. In addition, when you first boot the upgraded system, a special startup procedure is used.

After the upgrade is complete, you can move these included files back to their original locations. If you do so, remember to re-set the AGEN$INCLUDE entries in SYS$SYSTEM:MODPARAMS.DAT.

4.6.6 Verifying System Parameters

Verify (and modify if necessary) system parameters as follows. (See the *HP OpenVMS System Manager's Manual, Volume 2: Tuning, Monitoring, and Complex Systems* for more information about modifying system parameters.) Any system parameters that you modified and *did not* enter in the SYS$SYSTEM:MODPARAMS.DAT file are lost during the upgrade. To retain these parameters, enter their names and the values that you have in use for them in SYS$SYSTEM:MODPARAMS.DAT. (When AUTOGEN runs after the upgrade, it uses the values in SYS$SYSTEM:MODPARAMS.DAT.)

For example, if the current value of GBLPAGES is 30000, and you modified GBLPAGES by 128 pages above the default, add the following line to SYS$SYSTEM:MODPARAMS.DAT:

```
MIN_GBLPAGES=30128   !Increased by 128 by PLM for product z 12/12/04
```

AUTOGEN uses this new value as a base, compares it with collected data, and increases the value of GBLPAGES if necessary. Each time AUTOGEN runs, it makes the same comparison and adjusts the value of GBLPAGES, but never below the minimum indicated by MIN_GBLPAGES.

During an upgrade, everything is set back to the default. Use current feedback.

IMPORTANT If you modify system parameters, note the following:

- In general, you should allow AUTOGEN to calculate system parameters. You can hardcode values (such as GBLPAGES=*value*), but doing so overrides AUTOGEN and might not allow it to set an optimal value based on observed usage.
- Whenever possible, use MIN_*parameter* values (such as MIN_GBLPAGES) to set the minimum value that can be set for a parameter by AUTOGEN. AUTOGEN increases the value if necessary. It also adjusts related parameters, unless they are hardcoded, in which case information is provided in the AGEN$PARAMS.REPORT file. Use MAX_*parameter* values to set a maximum value when you need to limit a parameter to a known maximum value.
- Enter numeric values as integers, without commas (for example, 10000). Enter alphabetic characters in lowercase or uppercase.
- HP recommends that you include comments in the MODPARAMS.DAT file indicating who changed the value, when it was done, and why it was done. An exclamation point serves as a comment starter and can appear anywhere on a line. The following is an example illustrating the modifications recommended in the preceding bulleted items:

```
! the following changes made by K.Newcomb on 9/20/03
!
SWAPFILE=0                    ! don't re-size the SWAPFILE on AUTOGEN runs
MIN_gblsections=750           ! required for DECwindows MOTIF
MIN_NPAGEDYN=2750000          ! set npagedyn to a min of 2.75 million
```

For more information about using AUTOGEN as recommended, see Section 7.24.

If your system was upgraded previously, a new SYS$SYSTEM:MODPARAMS.DAT file was created then. This file has comments and possibly duplicated entries that were created during that upgrade. If you upgrade again, SYS$SYSTEM:MODPARAMS.DAT can become unnecessarily large and potentially confusing. HP recommends that you edit and reorganize SYS$SYSTEM:MODPARAMS.DAT before you upgrade again.

NOTE On a cluster system disk, the MODPARAMS.DAT file should exist in SYS$SYSROOT:[SYSEXE] for each root. You must edit MODPARAMS.DAT as necessary for each root.

4.7 Ensuring You Have a Recent FEEDBACK.DAT File

Before upgrading your system, HP recommends that you have a recent AGEN$FEEDBACK.DAT file. This file is in SYS$SPECIFIC:[SYSEXE] (that is, in [SYS*x*.SYSEXE], where *x* is the root; for example, SYS0 or SYS1). In OpenVMS Cluster systems, this file should exist in each node's SYS$SPECIFIC directory. When the system (or each system in a cluster) is rebooted after the upgrade, AUTOGEN runs. If a recent AGEN$FEEDBACK.DAT file is available, it is used. The data in this file helps AUTOGEN set system parameters for your specific applications and workload.

NOTE If you do not have a current AGEN$FEEDBACK.DAT file, AUTOGEN might calculate system parameters that do not reflect your system's requirements. In that case, multiple cycles of running AUTOGEN and rebooting might be necessary before all layered products can be started. In some cases, successful startup can require additional entries in MODPARAMS.DAT. This should not be necessary if a current AGEN$FEEDBACK.DAT file is available.

If you do not have the AGEN$FEEDBACK.DAT file on your system, HP recommends that you create a current AGEN$FEEDBACK.DAT file during a time when your system is running under a typical workload. To ensure the greatest data reliability, the system should be running for more than 24 hours but less than 30 days. Enter the following command:

```
$ RUN SYS$SYSTEM:AGEN$FEEDBACK.EXE
```

This runs very quickly and should not affect the performance of your system while it executes.

You can also specify the SAVE_FEEDBACK option when you execute the SYS$SYSTEM:SHUTDOWN.COM procedure; however, the data captured might not fully reflect the typical workload on your system.

IMPORTANT If you start AUTOGEN without specifying the execution-mode parameter (FEEDBACK, NOFEEDBACK, or CHECK_FEEDBACK), AUTOGEN uses the feedback information in its calculations. However, if the feedback information reflects system up time of less than 24 hours, or if the feedback information is more than 30 days old, AUTOGEN includes warnings in the AGEN$PARAMS.REPORT file to alert you to potential problems with the feedback data. If you wrongly assume the feedback is valid, the parameter settings might vary significantly from your expectations.

If you specify FEEDBACK (or NOFEEDBACK), AUTOGEN uses (or does not use) the feedback regardless of the data's reliability. AUTOGEN proceeds through the SETPARAMS phase (if you specified SETPARAMS, SHUTDOWN, or REBOOT as the end phase) and sets system parameters to the values it computed.

If you specify CHECK_FEEDBACK, AUTOGEN checks the validity of the feedback data. If AUTOGEN determines the feedback is suspect, then AUTOGEN ignores the feedback when computing parameter values. It stops at the TESTFILES phase and issues a warning in the report that parameters have not been changed. You must read the report and decide whether the calculated values are acceptable. You can either use them (by running the AUTOGEN SETPARAMS phase) or rerun AUTOGEN with valid feedback data.

4.8 Shadowing Environment

Because you cannot upgrade the operating system on a shadowed system disk (the upgrade will fail), you need to disable shadowing of the system disk and perform other operations before you can upgrade the operating system.

There are several methods for creating a nonshadowed target disk. This chapter describes how to change one of your *existing* shadowed system disks in a multiple-member shadow set to a nonshadowed disk that you can use as your target disk for the upgrade.

If you have a larger configuration with disks that you can access physically, you might want to use a copy of the system disk as your target disk. *HP Volume Shadowing for OpenVMS* describes two methods you can use to create this copy (using volume shadowing commands or BACKUP commands) and how to disable volume shadowing.

4.8.1 Setting the Boot Device

Be sure your system is set to boot by default from the disk you intend to upgrade. For OpenVMS Alpha systems, use the SHOW BOOTDEF_DEV and SET BOOTDEF_DEV console commands to accomplish this task. (For more information, see Appendix A.)

For OpenVMS I64 systems, HP recommends using the OpenVMS I64 Boot Manager utility (SYS$MANAGER:BOOT_OPTIONS.COM) to add shadowed system disks in a multiple-member shadow set to the EFI boot device list and dump device list. Be sure to add all members to both lists. For more information about setting boot options and using this utility, see Section B.5.2.

4.8.2 Creating a Nonshadowed Target Disk

Perform the steps described in this section to change one of your existing shadowed system disks to a nonshadowed disk.

IMPORTANT If you simply use a MOUNT/OVERRIDE=SHADOW_MEMBERSHIP command to mount the volume to be upgraded, volume shadowing can overwrite the newly upgraded disk with information from a prior volume that has not been upgraded.

Step 1. Shut down all systems booted from the shadowed system disk.

Step 2. Perform a conversational (interactive) boot (for OpenVMS Alpha systems, see Section A.1.4; for OpenVMS I64 systems, see Section B.6.6) on the system disk you have chosen for your target disk. For OpenVMS Alpha systems, for example, enter the following command:

```
>>> BOOT -FLAGS 0,1 DKA100
```

For OpenVMS I64 systems, enter the following command at the EFI Shell prompt, where fs*n*: is the device associated with the system disk (such as fs1:):

```
Shell>fsn:\efi\vms\vms_loader.efi -flags 0,1
```

Step 3. At the SYSBOOT> prompt, enter the following command to disable volume shadowing of the system disk:

```
SYSBOOT> SET SHADOW_SYS_DISK 0
```

Step 4. Enter the CONTINUE command to resume the boot procedure. For example:

```
SYSBOOT> CONTINUE
```

Step 5. After the boot completes, go to Section 4.10.

You now have a nonshadowed system disk that you can use for the upgrade.

4.9 Backing Up the System Disk

HP strongly recommends that you make a backup copy of the system disk and, if your configuration allows it, upgrade the backup copy. Then, if there are problems, you still have a working system disk.

NOTE OpenVMS Engineering has encountered cases where recovery from a failed upgrade has been difficult, expensive, or impossible because no backup of the preupgrade system disk was available. Various hardware or software failures or a power failure can make a partially upgraded system disk unusable. A backup copy might be the only route to recovery. The minimal time required to make a backup is a very wise investment.

To back up the system disk, follow these steps:

Step 1. Shut down the system (for OpenVMS Alpha systems, see Section A.3.2; OpenVMS I64 systems, see Section B.7.2).

Step 2. Boot the operating system media, following the instructions for OpenVMS I64 in Section B.6, and for OpenVMS Alpha in Section A.1.

Step 3. Use the menu system to enter the DCL environment (option 8).

Step 4. Mount the system device and the target device on which you will make the backup copy. (If you are backing up to tape, skip to the next step.) For example, if your system disk is on DKA0: and the target device is on DKA100:, you might use the following commands. The /OVERRIDE qualifier used in this example allows you to mount the system disk without entering its volume label. The /FOREIGN qualifier is required for the target disk when you use the BACKUP /IMAGE command.

```
$$$ MOUNT /OVERRIDE=IDENTIFICATION DKA0:
$$$ MOUNT /FOREIGN DKA100:
```

Step 5. To back up the system disk to a magnetic tape, enter the following commands, where MTA0: is the magnetic tape drive and *label* is the volume label. Note that the BACKUP command automatically mounts the tape and begins the backup to it.

```
$$$ INITIALIZE MTA0: label
$$$ MOUNT /OVERRIDE=IDENTIFICATION DKA0:
$$$ BACKUP /IMAGE /LOG DKA0: MTA0:label.BCK
```

Step 6. To back up to a device other than a magnetic tape drive, enter the BACKUP command. For example, if your system disk is on DKA0: and your target disk is on DKA100:, use the following command (the colons are required):

```
$$$ BACKUP /IMAGE /LOG DKA0: DKA100:
```

The /IMAGE qualifier causes the backup to produce a functionally equivalent copy of the system disk, which is also bootable. The /LOG qualifier causes the procedure to display the specification of each save set file being processed. To compare the backed up files to the source files, use the /VERIFY qualifier. If any discrepancies are detected, the Backup utility displays error message.

Step 7. Log out from the DCL environment.

Step 8. Shut down the system by selecting option 9 on the menu.

For more complete information about backup operations, including a description of an alternative method that does not require booting from the operating system media, see Appendix E. For more information about the Backup utility, see the *HP OpenVMS System Management Utilities Reference Manual: A–L*.

4.10 Finishing Preupgrade Tasks

Continue the preupgrade tasks as follows, depending on whether you are upgrading in a standalone or OpenVMS Cluster environment:

IF ...	THEN ...
You are upgrading a **standalone system**	1. Log in to the SYSTEM account. 2. Enter the following command: `$ @SYS$SYSTEM:SHUTDOWN` 3. When the procedure asks whether an automatic system reboot should be performed, enter N (NO). 4. Go to the checklist at the beginning of this chapter to verify that you have performed the necessary tasks. 5. Go to Chapter 6 to begin the upgrade procedure.
You are upgrading an **OpenVMS Cluster system**	1. Review the checklist at the beginning of this chapter to verify that you have performed the necessary tasks. 2. Go to Chapter 5.

5 Preparing to Upgrade in an OpenVMS Cluster Environment

This chapter describes how to prepare to upgrade in an OpenVMS Cluster environment. If you are not upgrading in an OpenVMS Cluster environment, go to Chapter 6.

5.1 Preupgrade Tasks for OpenVMS Cluster Environments

NOTE Be sure you have performed the preupgrade tasks described in Chapter 4 before you upgrade your OpenVMS Cluster system.

Use the checklist in Table 5-1 to ensure that you perform all necessary tasks prior to upgrading your system in an OpenVMS Cluster environment.

Table 5-1 Preupgrade Checklist for OpenVMS Cluster Environments

	Task	Section
❑	Review relevant OpenVMS operating system and OpenVMS Cluster documentation.	Section 5.2
❑	Familiarize yourself with mixed-version, mixed-architecture, and migration support in OpenVMS Cluster systems.	Section 5.3
❑	If you are adding a new OpenVMS computer system to an existing OpenVMS Cluster, choose one of two options for upgrading.	Section 5.4
❑	Perform the preliminary tasks required for the type of upgrade you want to perform: • Concurrent upgrade • Rolling upgrade	Section 5.5: • Section 5.5.1 • Section 5.5.2
❑	Begin the upgrade.	Chapter 6

5.2 Review Documentation

When you upgrade the operating system in an OpenVMS Cluster environment, be sure the following information is available to review:

OpenVMS Version 8.3 Documents

- The *Cover Letter for HP OpenVMS Version 8.3* and the Software Product Descriptions included with your distribution kit
- *HP OpenVMS Version 8.3 Release Notes*
- *HP OpenVMS Version 8.3 New Features and Documentation Overview*

OpenVMS Version 8.2 Documents

Although not revised for OpenVMS Version 8.3, the following documents remain valid:

- *HP OpenVMS Cluster Systems*
- *Guidelines for OpenVMS Cluster Configurations*

5.3 Mixed-Version Support in an OpenVMS Cluster Environment

HP provides two levels of support for mixed-version and mixed-architecture OpenVMS Cluster systems: warranted support and migration support.

Warranted support means that HP has fully qualified two specified versions coexisting in an OpenVMS Cluster and will address all problems identified by customers using these configurations.

Migration support means that HP has qualified the versions for use together in configurations that are migrating in a staged fashion to a newer version of OpenVMS. Problem reports submitted against these configurations will be answered by HP. However, in exceptional cases, HP may request that you move to a warranted configuration as part of the solution. Migration support helps customers move to warranted OpenVMS Cluster pairs.

Warranted cluster support is provided for the combinations shown in Table 5-2.

Table 5-2 Warranted Cluster Support

If your system is...	It is warranted in combination with...
OpenVMS Alpha Version 8.3	OpenVMS Alpha Version 8.3 and OpenVMS I64 Version 8.3 or OpenVMS Alpha Version 8.3 and OpenVMS VAX Version 7.3
OpenVMS I64 Version 8.3	OpenVMS I64 Version 8.3 and OpenVMS Alpha Version 8.3

NOTE Only two architectures are supported in the same OpenVMS Cluster: OpenVMS I64 and OpenVMS Alpha, or OpenVMS Alpha and OpenVMS VAX, but not OpenVMS I64 and OpenVMS VAX. Only one version of each architecture is supported in the same OpenVMS Cluster: Version 8.3 of OpenVMS Alpha and OpenVMS I64, and Version 7.3 of OpenVMS VAX.

System disks are architecture specific and can be shared only by systems of the same architecture. An Alpha and I64 system, or an Alpha and VAX system, cannot boot from the same system disk. However, cross-architecture satellite booting is supported between an Alpha and VAX system. When you configure an OpenVMS Cluster to take advantage of cross-architecture booting, make sure that at least one system from each architecture is configured with a disk that can be used for installations and upgrades. For more information, see the *Guidelines for OpenVMS Cluster Configurations* and *HP OpenVMS Cluster Systems* manuals.

Table 5-3 shows the supported migration pairs.

Table 5-3 Supported Migration Pairs

If your system is...	It is supported with any one of the following being migrated to version 8.3...
OpenVMS Alpha Version 8.3	OpenVMS Alpha Version 8.2
or	OpenVMS Alpha Version 7.3-2
OpenVMS I64 Version 8.3	OpenVMS I64 Version 8.2-1
	OpenVMS I64 Version 8.2

For information about valid upgrade paths, see Section 4.3.1.

For more information, see the OpenVMS Technical Software Support Service Web site at:

`http://www.hp.com/go/openvms/support`

In addition, see the following Web site for the OpenVMS Operating System Support Chart at:

`http://www.hp.com/go/openvms/supportchart`

Before introducing an OpenVMS Version 8.3 system into an existing OpenVMS Cluster, you might need to install certain patch kits (also known as remedial kits) on cluster members running earlier versions of OpenVMS. In a mixed-architecture cluster, you need to install an LMF patch on any OpenVMS Version 7.3-2 Alpha members. For a complete list of required patch kits, see the *HP OpenVMS Version 8.3 Release Notes*.

For information about supporting the Performance Data Collector base software (TDC_RT) in OpenVMS Clusters, see Section 7.9.8.5.

5.4 Adding a New System to an OpenVMS Cluster

To add a new OpenVMS Version 8.3 Alpha or I64 computer to an existing OpenVMS Cluster configuration, all existing Alpha nodes in the cluster must be running OpenVMS Alpha Version 7.3-2 or higher, and all existing OpenVMS I64 nodes must be running OpenVMS I64 Version 8.2 or higher. Any node in the cluster

that is running an older version of OpenVMS must be upgraded appropriately before a Version 8.3 node can be added. If you have a VAXcluster, any node running an older version of OpenVMS VAX must be upgraded to Version 7.3 of OpenVMS VAX before an Alpha Version 8.3 node can be added.

Alternatively, any OpenVMS Alpha or I64 node that needs to be upgraded can be removed temporarily from the cluster and added back after it has been upgraded. This allows you to form a supported cluster immediately, adding nodes back into the cluster as they are upgraded. Note that, depending on the number of nodes being added, you might need to adjust the EXPECTED_VOTES system parameter to reflect the number of voting nodes and any quorum disk votes (if a quorum disk is being used). In addition, for any node being removed from the cluster, you should specify the REMOVE_NODE option during system shutdown so that the quorum for the remaining nodes is correctly adjusted.

NOTE Currently, OpenVMS Clusters support a maximum of two architectures. Therefore, an OpenVMS Cluster that contains both Alpha and VAX nodes cannot have an I64 node added to it.

5.5 Types of Upgrades

Two types of cluster upgrades are available: **concurrent** and **rolling**. The type of upgrade you use depends on whether you want to maintain the availability of the cluster during the upgrade and whether you have more than one system disk. Review this chapter and then perform the preliminary tasks for the upgrade procedure (concurrent or rolling) that best suits your configuration.

5.5.1 Concurrent Upgrade

This section describes the following:

- How a concurrent upgrade works
- Preparing your system for a concurrent upgrade

5.5.1.1 How a Concurrent Upgrade Works

During a concurrent upgrade, you must shut down the entire cluster and upgrade each system disk. No one can use the cluster until you upgrade each system disk and reboot each computer. When the cluster reboots, each computer will run the upgraded version of the OpenVMS operating system.

If all systems in the OpenVMS Cluster environment are booted from one system disk, you must perform a concurrent upgrade.

5.5.1.2 Preparing Your System for a Concurrent Upgrade

To prepare for a concurrent upgrade, follow these steps:

Step 1. Log in locally to the SYSTEM account.

If you have more than one system disk, make sure that you have performed the preupgrade tasks on each system disk that you are upgrading. Make sure the target system disk is not mounted on any other node in the cluster and remains dismounted during the upgrade. It should be mounted only on the system that is performing the upgrade. (For information about dismounting disks, see

Section 5.5.2.3.) Then go to Chapter 6 and perform an upgrade on each system disk. You do not have to reboot the operating system media for each upgrade. You only need to choose option 1 on the menu for each upgrade.

Step 2. Shut down all systems by entering the following command on each system (**satellite nodes** first, then the boot nodes):

```
$ @SYS$SYSTEM:SHUTDOWN
```

Step 3. When the procedure asks whether an automatic system reboot should be performed, enter N (NO).

Step 4. Choose the CLUSTER_SHUTDOWN option.

Step 5. When the shutdown procedure is finished on all nodes, halt each system by either pressing **Ctrl/P** or the **Halt** button. For more information about halting your Integrity server, see Section B.7.1. For information about halting your Alpha computer, see Section A.3.1.

Step 6. If you have only one system disk for your cluster, go to Chapter 6 to begin the upgrade procedure.

After the upgrade is complete, you are instructed to reboot each computer in the OpenVMS Cluster environment before beginning other postupgrade procedures.

5.5.2 Rolling Upgrade

This section describes the following:

- How a rolling upgrade works
- Notes and restrictions
- Preparing your system for a rolling upgrade

5.5.2.1 How a Rolling Upgrade Works

A rolling upgrade allows you to have a mixed-version cluster. During a rolling upgrade, you keep some of the computers in the cluster running and available while you upgrade others (you must have more than one system disk). You upgrade each system disk individually, allowing old and new versions of the operating system to run together in the same cluster.

5.5.2.2 Notes and Restrictions

The following restrictions apply to rolling upgrades. For additional compatibility issues and restrictions information, see the *HP OpenVMS Version 8.3 Release Notes* .

- The system being upgraded does not attempt to access any disk that is being accessed by one or more of the remaining OpenVMS Cluster systems.
- The remaining OpenVMS Cluster systems do not attempt to access the target disk of the system being upgraded.

  If the target disk being upgraded is locally attached to the system performing the upgrade, then it is not accessible to the remaining OpenVMS Cluster systems. (The OpenVMS system booted from the operating system media does not MSCP serve local disks.) HP recommends that, whenever possible, you perform the upgrade on a local disk or that you perform a concurrent upgrade.

During the upgrade, be sure that the target disk you select, as well as any disk you access from the DCL menu option, is either a local disk or one that is not being accessed by any of the remaining OpenVMS Cluster members. Make sure the target system disk is not mounted on any other node in the cluster and remains dismounted during the upgrade. It should be mounted only on the system that is performing the upgrade. (For information about dismounting disks, see Section 5.5.2.3.)

NOTE Any attempt to access the target system disk from the remaining OpenVMS Cluster members will corrupt the target disk. Even if the target system disk is mounted only by a remaining cluster member and no file access is performed, the target disk will probably be corrupted. If a disk is corrupted in this way, the only supported recovery is to restore the backup copy of the corrupted disk.

- HP recommends that all Alpha computers in a cluster run the same (preferably the latest) version of the OpenVMS Alpha operating system, and that all Integrity servers run the same version of the OpenVMS I64 operating system. In a mixed-architecture cluster, you need to install an LMF patch on any OpenVMS Version 7.3-2 Alpha members.
- You cannot perform a rolling upgrade if all systems boot from a single system disk. Perform a concurrent upgrade instead.
- The upgrade procedure affects the queuing system as follows:
  - — The queuing system is not active on the system you are upgrading; do not attempt to execute a START/QUEUE/MANAGER command.
  - — You cannot create a queue database on the operating system CD/DVD (because it is not writable).
  - — The queue manager process on other nodes in the cluster can continue to run during the upgrade if the queue database is not on the disk being upgraded.

5.5.2.3 Preparing Your System for a Rolling Upgrade

To prepare for a rolling upgrade, follow these steps:

Step 1. Log in to any node where the target disk is mounted as a data disk rather than as the system disk. (That disk must be the one on which you already performed the preupgrade tasks described in Chapter 4.)

Step 2. Check the votes and make adjustments to maintain the proper quorum so the cluster can continue to operate throughout the upgrade. (*HP OpenVMS Cluster Systems* describes this procedure in detail.)

Step 3. Use the DCL command DISMOUNT/CLUSTER to dismount the data disk. (You can also perform this operation using the SYSMAN utility.)

Note that you can ignore messages from nodes where the specified data disk is being used as the system disk.

Step 4. Verify that the data disk has been dismounted successfully by entering the following commands:

```
$ MCR SYSMAN
SYSMAN> SET ENVIRONMENT/CLUSTER
SYSMAN> DO SHOW DEVICE disk-name
```

Examine the display to be sure the disk is not mounted on any nodes as a data disk. Noting the value listed in the Trans Count field can help you make that determination: A value of less than 50 indicates that the disk is mounted as a data disk rather than as the system disk; a much larger value (for example, 300) indicates that the disk most likely is the system disk.

Step 5. If the disk is still mounted on any nodes as a data disk, use the SYSMAN utility to dismount the disk; otherwise, exit the SYSMAN utility.

Step 6. Use the following command to shut down any nodes that boot from the system disk you are upgrading (shut down satellite nodes first):

```
$ @SYS$SYSTEM:SHUTDOWN
```

a. When the procedure asks whether an automatic system reboot should be performed, enter N (NO).

b. Choose the REMOVE_NODE option.

If a proper quorum is not maintained at any time during the upgrade procedure, the shutdown procedure hangs the cluster. If the cluster hangs during a shutdown, you can use the Interrupt Priority C (IPC) facility to adjust quorum from the system console of a system that is still a cluster member.

From an OpenVMS Alpha (or VAX) cluster member, press **Ctrl/P**. The IPC facility displays help information about IPC commands. Enter the commands at the console:

```
$ Ctrl/P
>>> D SIRR C
>>> C
Interrupt Priority C

Commands:

  C device    Cancel Mount Verification
  Q           Adjust Quorum
  CTRL-Z      Exit IPC
  CTRL-P      Prompt for Crash

IPC> Q
IPC> Ctrl/Z
```

From an OpenVMS I64 cluster member, pressing **Ctrl/P** puts the system directly into the IPC facility, which displays help information about IPC commands. To adjust quorum, enter the commands shown in the following example. Note that if systems are booted with XDELTA, pressing **Ctrl/P** brings the OpenVMS I64 system into XDELTA. The IPC facility is not available in this case.

```
$ Ctrl/P
Interrupt Priority C

Commands:

  C device    Cancel Mount Verification
  Q           Adjust Quorum
  CTRL-Z      Exit IPC
  CTRL-P      Prompt for Crash

IPC> Q
IPC> Ctrl/Z
```

You can also adjust quorum using Availability Manager or DECamds. The method is equivalent to that used by IPC except you do not have to use the console (this assumes the Data Analyzer is running on a system outside the OpenVMS Cluster, which is recommended). For more information, see the "Adjust Quorum" section in the *Availability Manager User's Guide* or the *DECamds User's Guide*. The *Availability Manager User's Guide* is available at:

`http://www.hp.com/products/openvms/availabilitymanager`

After the shutdown procedure is finished on all nodes, go to Chapter 6 to begin the upgrade procedure.

CAUTION During the upgrade it is very important that the system disk being upgraded is accessed *only* by the node on which the upgrade is being performed. If the disk can be accessed from other nodes in the cluster, for example, through an HSC or HSJ device, you *must* ensure that this does not happen. Even if the disk is only mounted and no file access is performed, the disk can still become corrupted.

Ensure that any users who might mount disks know that they must not access the system disk being upgraded. Also make sure that any procedures that might mount the disk do not run during the upgrade. If you have automatic procedures that periodically check and remount disks, it would be wise to disable them during the upgrade.

---

6 Upgrading the OpenVMS Operating System

This chapter explains how to upgrade the OpenVMS operating system from a local CD or DVD drive and includes information about reinstalling or reconfiguring your system.

This chapter is organized into sections that describe the major tasks for upgrading OpenVMS, in the order in which these tasks must be performed. Section 6.1 includes a checklist that you can use to make sure you perform all the upgrade tasks described in this chapter.

6.1 Upgrade Tasks

Use the checklist in Table 6-1 to ensure that you perform all necessary upgrade tasks.

Table 6-1 Upgrade Checklist

	Task	Section
❑	Boot the OpenVMS operating system media.	Section 6.2.2
❑	Use option 1 of the operating system menu to upgrade your OpenVMS operating system, respond to the prompts, and shut down the system when the upgrade completes.	Section 6.3, Section 6.4
❑	If you did not allow the upgrade procedure to create a boot option for your upgraded system disk, add a boot option now, if desired. (OpenVMS I64 only)	Section B.5.2
❑	Reboot your system. (The steps vary according to the type of upgrade you are performing.)	Section 6.5
❑	Perform postupgrade tasks, as necessary.	Chapter 7

6.2 Booting the Operating System Media

The OpenVMS operating system includes procedures that allow you to easily upgrade the operating system using the PCSI utility. To upgrade your system, you must boot the OpenVMS Alpha CD or the OpenVMS I64 OE DVD. To boot the OpenVMS Alpha system CD, see Section 6.2.1. To boot the OpenVMS I64 OE DVD, see Section 6.2.2.

6.2.1 Booting the OpenVMS Alpha Operating System CD

To get started, boot the OpenVMS Alpha operating system CD either from your local CD drive or from a CD drive served by the InfoServer, as described in Section 6.2.1.2 and Section 6.2.1.3. First, you need to identify the name of the CD drive, as explained in Section 6.2.1.1. For more information about booting operations, see Section A.1.

6.2.1.1 Determining the Boot Device

To boot the operating system CD, you need to determine the identity of the CD drive. Follow these steps:

Step 1. Insert the operating system CD into the local CD drive.

Step 2. Enter the SHOW DEVICE command at the console prompt (>>>) and look for the correct drive listed in the output (for example, DKA400). If you are booting from the InfoServer, look for a device listed with its hardware address, as in the last line of the following example (EWA0):

```
>>>SHOW DEVICE

dva0.0.0.1000.0     DVA0                    RX23
dka200.2.0.5.0      DKA200                  RZ28M  1004
dka300.3.0.5.0      DKA300                  RZ29B  0016
dka400.4.0.5.0      DKA400                  RRD42  442E
ewa0.0.0.3.0        EWA0          00-00-F8-1F-70-3D
```

For additional information, see the *HP OpenVMS Version 8.3 for Alpha and Integrity Servers Software Product Description* (SPD 82.35.*xx*) and the hardware manuals that you received with your Alpha computer.

6.2.1.2 Booting from the Local Drive

To boot the operating system CD from the local CD drive, enter the boot command in the following format:

```
BOOT -FLAGS 0,0 source-drive
```

Substitute the device name of the CD drive for *source-drive*, such as DKA400, as listed in the SHOW DEVICE display example in Section 6.2.1.1. In this case, you would enter the following command and press **Enter**:

```
>>> BOOT -FLAGS 0,0 DKA400
```

6.2.1.3 Booting from the InfoServer

To boot the operating system CD using either the InfoServer hardware or the InfoServer utility, follow these steps. To use the InfoServer utility, certain configuration steps are required initially (one time only), as described in Appendix C; note that the operating system CD must be mounted systemwide.

Step 1. At the console prompt, enter the boot command in the following format:

```
>>> BOOT -FLAGS 0,0 -FILE APB_083 lan-device-name
```

Substitute the name of the local area network device for *lan-device-name*, such as EWA0, as listed in the SHOW DEVICE display example in Section 6.2.1.1.

The APB file name is the unique file name that was assigned to the APB.EXE file when it was copied from the operating system CD to the InfoServer. This file is the name of the APB program used for the initial system load (ISL) boot program.

NOTE If you are using a DEC 3000 or 4000 series system, note the following:

- On DEC 3000 series systems, you can boot through the InfoServer using an alternate TURBOchannel device, such as a PMAD (Ethernet) or DEFTA (FDDI), by specifying the device name as *n*/ESA0. The value for *n* is the TURBOchannel slot number, which you can obtain by entering the SHOW CONFIGURATION command at the console prompt (>>>) and examining the display. For more information, see Section A.1.8 in Appendix A.
- On DEC 4000 series systems, you must specify the ISL file name in uppercase (APB_083).

Step 2. The InfoServer ISL program then displays the following menu:

```
Network Initial System Load Function
Version 1.2


  FUNCTION          FUNCTION
    ID
    1      -        Display Menu
    2      -        Help
    3      -        Choose Service
    4      -        Select Options
    5      -        Stop

Enter a function ID value:
```

Step 3. Respond to the prompts as follows, pressing **Enter** after each entry:

a. Enter 3 for the function ID.

b. Enter 2 for the option ID.

c. Enter the service name (ALPHA083 is the default service name for the InfoServer hardware; for the InfoServer utility, ask your system or network manager for the service name).

A sample display follows:

```
 Enter a function ID value: 3
  OPTION           OPTION
    ID
    1      -       Find Services
    2      -       Enter known Service Name

Enter an Option ID value: 2
Enter a Known Service Name: ALPHA083
```

NOTE If you boot the OpenVMS Alpha operating system CD from an InfoServer system but lose your connection during the upgrade procedure (the system is unresponsive and pressing **Ctrl/Y** does not return you to the menu), do the following:

1. Boot the OpenVMS Alpha operating system CD again from the network.

2. Enter the DCL environment by choosing option 8 on the menu.
3. Mount the device containing your backup copy of the target disk and the device that is your target disk.
4. Restore the backup copy of your target disk by entering the appropriate BACKUP commands. (See Appendix E for complete information about using MOUNT and BACKUP commands to restore a system disk.)
5. Log out from the DCL environment.
6. Perform the upgrade again by choosing the upgrade option (1) on the menu and following the procedures described in this chapter.

6.2.2 Booting the OpenVMS I64 Operating System DVD

This section explains how to boot the OpenVMS I64 operating environment DVD, either from your local DVD drive, as described in Section 6.2.2.1, or from a virtual DVD drive served over the network by the InfoServer utility, as described in Section 6.2.2.2. For more information about booting operations, see Section B.6.

6.2.2.1 Booting from the Local Drive

To boot a local OpenVMS I64 OE DVD, follow these steps. To boot the DVD on a cell-based server, a DVD device must be accessible by the nPartition that OpenVMS is being installed on.

Step 1. Make sure your Integrity server is powered on. If your system has an attached external device, make sure it is turned on and operational.

Step 2. Insert the DVD into the drive.

Step 3. Cycle power.

Step 4. From the main EFI boot menu (for cell-based servers, this must be the EFI boot menu for the nPartition on which OpenVMS is to be booted), select the appropriate item from the boot options list. Note that the EFI boot menu is timed; press any key to stop the countdown timer.

For some systems, the boot option to select is the Internal Bootable DVD option. If that option is not listed in your EFI boot menu, move to the Boot From a File menu and select the Removable Media Boot option, if present.

Alternatively (and this method is recommended for cell-based servers), boot the DVD drive from the EFI Shell prompt by entering the command shown in the following example, where fs*n*: corresponds to the Integrity server DVD drive (such as fs0:). Note that if you have navigated to a particular file system, the EFI Shell prompt would reflect that file system; for example, if the current file system is fs0:, the EFI Shell prompt would be fs0:>.

```
Shell>fsn:\efi\boot\bootia64.efi
```

To determine which device is the bootable DVD drive, examine the list of mapped devices and look for an fs device listing that includes the letters "CDROM", as in the following line, where fs*n* is the file system associated with the drive, which is usually fs0: (instead of "fs*n*", you might see something similar to "V8.3"; instead of Ata, you might see Scsi, depending on the server model):

```
fsn : Acpi(HWP0002,400)/Pci(4|1)/Ata(Primary,Master)/CDROM(Entry0)
```

You can use the following command to display the mapping of various EFI device names to OpenVMS device names, where fs*n* is the device you want to check (such as fs0:):

```
Shell>fsn:\efi\vms\vms_show dev -fs
```

On most Integrity servers, the DVD drive is DQA0:. On systems that include a SCSI bus, such as the Superdome server, the DVD drive is DKA0:. For more information about the `vms_show` command, see the *HP OpenVMS System Management Utilities Reference Manual*.

NOTE Remember that by default EFI interprets the **Delete** (or **Backspace**) key differently than do OpenVMS Alpha systems or Microsoft Windows computers. Use **Ctrl/H** to delete the last character entered. For more information, see Section B.1.3.

When the DVD boots properly, the OpenVMS operating system banner appears, followed by the operating system menu. You can now upgrade your OpenVMS I64 operating system on the target disk (see Section 6.3). If the methods documented in this section do not succeed in booting the DVD, see Section B.6.2.1.

NOTE When booting OpenVMS from the installation DVD for the first time on any OpenVMS I64 system with a SAN storage device, you might experience a delay in EFI initialization because the entire SAN is scanned. Depending on the size of the SAN, this delay might range from several seconds to several minutes.

6.2.2.2 Booting from the InfoServer Utility

To use the InfoServer utility to boot from the network, certain configuration steps are required initially (one time only); see Appendix C. The instructions for booting over the network from a virtual DVD drive over the network are also included in Appendix C.

6.3 Performing the Upgrade

The following sections describe how to upgrade from the operating system media.

6.3.1 Upgrading the System Using Option 1 of the Operating System Menu

After you boot the operating system CD (OpenVMS Alpha) or DVD (OpenVMS I64 OE DVD), the HP copyright banner and several messages appear, followed eventually by the operating system main menu. Choose the upgrade option (1) on the menu, as in the following example:

```
Installing required known files...

Configuring devices...
   .
   .
   .
******************************************************************

You can install or upgrade the OpenVMS I64 operating system
or you can install or upgrade layered products that are included
on the OpenVMS I64 distribution media (CD/DVD).

You can also execute DCL commands and procedures to perform
```

```
       "standalone" tasks, such as backing up the system disk.

       Please choose one of the following:

           1)  Upgrade, install or reconfigure OpenVMS I64 Version 8.3
           2)  Display layered products that this procedure can install
           3)  Install or upgrade layered products
           4)  Show installed products
           5)  Reconfigure installed products
           6)  Remove installed products
           7)  Find, Install, or Undo patches; Show or Delete recovery data
           8)  Execute DCL commands and procedures
           9)  Shut down this system

    Enter CHOICE or ? for help: (1/2/3/4/5/6/7/8/9/?) 1
```

6.3.2 Choosing INITIALIZE or PRESERVE

The procedure displays the following information and prompts:

```
       ************************************************************

       This procedure will ask a series of questions.

             () - encloses acceptable answers
             [] - encloses default answers

       Type your response and press the <Return>key.  Type:

             ? - to repeat an explanation
             ^ - to change prior input (not always possible)
             Ctrl/Y - to exit the installation procedure

       There are two choices for installation/upgrade:

       Initialize - removes all software and data files that were
           previously on the target disk and installs OpenVMS I64.

       Preserve -- installs or upgrades OpenVMS I64 on the target disk
           and retains all other contents of the target disk.

      * NOTE: You cannot use preserve to install OpenVMS I64 on a disk on
           which any other operating system is installed. This includes
           implementations of OpenVMS for other architectures.

    Do you want to INITIALIZE or to PRESERVE? [PRESERVE])
```

For an upgrade, press Enter (or Return) to accept the default (PRESERVE).

6.3.3 Specifying the Target Disk

Next the procedure asks for the name of the target disk. If you enter a question mark (?), the system displays a list of devices on your system. Select the appropriate disk and respond to the prompt. For example:

```
    You must enter the device name for the target disk on which
    OpenVMS I64 will be installed.

Enter device name for target disk: [DKB300] (? for choices)  DKB400
```

If you select a device that is not available or that cannot be used for some other reason, the system displays information indicating why the device cannot be used. For example, if you enter MKA500, a tape device, a message similar to the following is displayed:

```
MKA500 is not a disk device
```

6.3.4 Selecting Reinstallation and Reconfiguration Options

If you are using the OpenVMS Version 8.3 operating system media and you selected a target disk that already has Version 8.3 installed, you are presented with several configuration options. A sample display follows. See also the example in Section 7.12.

```
Version 8.3 of the OpenVMS operating system is already installed
on DKB400:.

Please choose one of the following:

   1)  Reconfigure the OpenVMS platform.
   2)  Reconfigure the OpenVMS operating system.
   3)  Reinstall the OpenVMS operating system.
   4)  Return to the Main Menu (abort the upgrade/installation).

   Enter a "?" for more information.
```

If you enter a question mark (?), the following information is displayed:

```
o Reconfigure the OpenVMS platform.

  This action will allow you to change your selections of which
  products you installed along with the OpenVMS operating system
  installation.

  This will NOT change any options in the OpenVMS operating system,
  nor will it reinstall any operating system files.

o Reconfigure the OpenVMS operating system.

  This action will allow you to change your choices about which
  options you included for the OpenVMS operating system.

  This will NOT change any options for the products you installed
  along with the OpenVMS operating system installation, nor will
  it reinstall or upgrade any of them.

o Reinstall the OpenVMS operating system.

  This action will cause ALL operating system  files to be replaced.
  You can also change your choices about which options you included
  for the OpenVMS operating system.
```

```
    This will NOT change any options for the products you installed
    along with the OpenVMS operating system installation, nor will
    it reinstall or upgrade any of them.

    Reinstall will take longer than Reconfigure.  Reinstall may be
    appropriate if you suspect that files in the operating system,
    or in the windowing and network products have become corrupted.


  If you want to reinstall or upgrade any of the products you installed
  along with the OpenVMS operating system installation, choose "Install
  or upgrade layered products" (option 3) from the main menu.

  If you want to change your choices about which options you included
  for any of the products you installed along with the OpenVMS operating
  system installation, choose "Reconfigure installed products" (option 5)
  from the main menu.
```

Next the menu is redisplayed:

```
  Please choose one of the following:

     1)  Reconfigure the OpenVMS platform.
     2)  Reconfigure the OpenVMS operating system.
     3)  Reinstall the OpenVMS operating system.
     4)  Return to the Main Menu (abort the upgrade/installation).


  Enter choice or ? for help: (1/2/3/4/?)
```

For additional configuration information, see Section 7.12.

6.3.5 Checking for Recovery Data

If you specify the /SAVE_RECOVERY_DATA qualifier with the PRODUCT INSTALL command, the PCSI utility saves information that can be used to remove patches and mandatory update kits at a later time. Use the PRODUCT UNDO PATCH command to remove the patches and kits. The /SAVE_RECOVERY_DATA qualifier and PRODUCT UNDO PATCH command were first added to OpenVMS Alpha in Version 7.3-2; they were backported to OpenVMS Alpha Version 7.2-2, 7.3, and 7.3-1.

The upgrade procedure now checks the disk for recovery data saved by the PCSI utility. Any recovery data must be removed before the upgrade can continue because this data becomes invalid after the upgrade. If no recovery data is present, the upgrade continues. If recovery data is present and all the data found applies only to the OpenVMS operating system, the upgrade procedure deletes the data and continues. (The procedure does not display the deletion of the files because earlier patches to OpenVMS are always removed as part of the upgrade.) If any of the recovery data applies to products other than the OpenVMS operating system, then the upgrade procedure displays a message similar to the following:

```
    The target system has recovery data from PRODUCT operations which
    used the /SAVE_RECOVERY_DATA qualifier.  This data must be deleted
    to continue the OpenVMS upgrade.

    Please examine the following display.

    If you wish to delete this data and continue the OpenVMS upgrade,
```

```
    answer YES to the question "Do you want to continue?"

    If you do not wish to delete this data, answer NO.  A NO answer
    will preserve the recovery data and abort the OpenVMS upgrade.

  The following patch recovery data has been selected:

  RECOVERY DATA SET 001 created 8-JUL-2006 15:23:39.69
    ------------------------------------ ------------------------------------
    PATCH                                APPLIED TO
    ------------------------------------ ------------------------------------

    JAK VMS RM1 V1.0                     JAK VMS RMTEST V1.0
    ------------------------------------ ------------------------------------

* If you continue, recovery data for the patches listed above will be deleted.
* The deletion of recovery data does not affect the installation status of
* patches applied to products that are not participating in this operation.
* However, continuing with this operation prevents you from uninstalling
* these patches at a future time by use of the PRODUCT UNDO PATCH command.

  Do you want to continue? [YES]
```

If you answer YES (the default), the recovery data sets are deleted and the OpenVMS upgrade continues.

```
Deleting RECOVERY DATA SET 001 ...
```

If you answer NO, the recovery data sets are not deleted and the OpenVMS upgrade aborts.

```
  Do you want to continue? [YES] NO
  %PCSIUI-I-USERABORT, operation terminated by user request

      You chose to retain recovery data on the target system disk.
      The OpenVMS upgrade cannot continue.

      Please correct the situation that prevents you from deleting the
      recovery data and then retry the upgrade.
```

6.3.6 Specifying the Volume Label

After you specify the target disk and, if applicable, check for recovery data, the procedure informs you of the volume label currently assigned to the target disk (if one was previously defined) you specified and asks whether you want to keep that label. As shown in the following example, if you choose not to keep the label, you are prompted for a new label. The OpenVMS operating system uses the volume label to identify and reference the disk. Make sure the label you use is unique; problems occur if the same label is used by different disk volumes.

```
    DKB400: is now labeled I64SYS.

  Do you want to keep this label? (Yes/No) [Yes] NO

  Enter volume label for target system disk: [I64SYS] I64083
```

You can accept the default label assigned by the system or specify a different volume label. (The label name has a limit of 12 characters that can include A to Z, 0 to 9, the dollar sign ($), hyphen (-), and underscore(_) characters).

NOTE OpenVMS requires that the volume labels for all disks on your system or OpenVMS Cluster have unique labels. If a disk that has the same label as the system disk is mounted, various OpenVMS components will not function as intended or a node might crash during boot.

If you change the volume label for a disk in an OpenVMS Cluster, be sure to change the command that mounts the disk on other nodes in the cluster; otherwise, the disk will not mount on those nodes once they are rebooted.

6.3.7 Specifying the On-Disk Structure Level

If the target disk is currently initialized with On-Disk Structure Level 2 (ODS-2), the procedure informs you and gives you the option to convert the disk to On-Disk Structure Level 5 (ODS-5), as in the following example. If the target disk is currently initialized with ODS-5, the upgrade continues without displaying information about the disk structure.

```
The  target  system disk is currently at On-Disk Structure Level 2
(ODS-2).  It can be converted to On-Disk Structure Level 5 (ODS-5).
(? for more information)

Do you want to convert the target system disk to ODS-5? (Yes/No/?)
```

If you answer YES, the disk will be converted to ODS-5. The procedure informs you that you can use the BACKUP/CONVERT command to convert ODS-5 disks back to ODS-2 format; for more information, see the *HP OpenVMS System Management Utilities Reference Manual: A-L*.

NOTE HP recommends that your system disk be structured in ODS-5 format unless you use software that requires ODS-2. Hard links are supporetd on ODS-5 disks only. A brief comparison of ODS-2 and ODS-5, including advantages and disadvantages, follows this note.

If you are installing WBEM Services for OpenVMS, which is supported on OpenVMS I64 systems only, note that although this product can be installed on an ODS-2 disk, the WBEM Services for OpenVMS data repository requires an ODS-5 disk. In addition, the WBEM Services for OpenVMS SDK kit requires an ODS-5 disk. If you install WBEM Services for OpenVMS onto an ODS-5 disk, you can have everything on the same disk.

A brief summary of ODS-2 and ODS-5 file systems follows; for more information, see the *HP OpenVMS System Manager's Manual, Volume 1: Essentials*:

- ODS-2

  ODS-2 allows for full compatibility with all OpenVMS VAX systems and with OpenVMS Alpha systems prior to Version 7.2.

- ODS-5

  — ODS-5 supports file names that are longer and have a wider range of legal characters. This feature permits use of file names similar to those in a Windows or UNIX environment.

  — ODS-5 supports hard links to files, access dates, and files whose names differ only by case.

  — ODS-5 volumes cannot be mounted on any version of OpenVMS prior to Version 7.2.

  — Systems running OpenVMS VAX Version 7.2 and higher can mount ODS-5 volumes but cannot create or access files that have extended names. (On OpenVMS VAX systems, lowercase file name characters are seen in uppercase.)

If you choose not to change to ODS-5, the upgrade continues and the target disk is mounted. For example:

```
Do you want to convert the target system disk to ODS-5? (Yes/No/?) NO

  OpenVMS I64 will be upgraded on DKB400:.
```

If you choose to change to ODS-5, you are given the option to enable hard links. (For more information about hard links, see the *HP OpenVMS System Manager's Manual, Volume 1: Essentials*.) The upgrade then continues.

```
Do you want to convert the target system disk to ODS-5? (Yes/No/?) YES

  DKB400: has been converted to ODS-5.

  You can use the BACKUP/CONVERT command to convert ODS-5 disks back
  to ODS-2 format. For more information, refer to the OpenVMS System
  Management Utilities Reference Manual.

  Hard links can be enabled on ODS-5 disks. (? for more information)
  (***Enabling hard links can take from 5-10 minutes to an hour or more.***)

Do you want to enable hard links? (Yes/No/?) YES
```

If you choose to enable hard links, the procedure automatically executes an ANALYZE/DISK_STRUCTURE/REPAIR operation to correctly set the reference counts. This operation can take from 5 to 10 minutes to an hour or more, depending on the complexity of the system disk configuration, the number of layered products installed, and the number of user files. During the process, messages similar to the following are displayed:

```
   Hard links have been enabled on DKB400:.

   The newly enabled hard links are not correct and need to be updated.
   The Analyze/Disk_Structure utility will now be run to do this.

   This can take from 5 - 10 minutes to an hour or more.  It is a normal
   requirement when hard links are enabled on an existing disk.

%ANALDISK-I-COUNT, 1000 hard link updates completed
%ANALDISK-I-COUNT, 2000 hard link updates completed
%ANALDISK-I-COUNT, 3000 hard link updates completed
%ANALDISK-I-COUNT, 4000 hard link updates completed
%ANALDISK-I-COUNT, 5000 hard link updates completed
%ANALDISK-I-COUNT, 6000 hard link updates completed

   OpenVMS I64 will be upgraded on DKB400:.
```

6.3.8 Choosing Whether to Allow the Procedure to Create and Validate Boot Options (I64 only)

On OpenVMS I64 upgrades, the procedure next asks whether you want to create or validate boot options.

```
Boot options in the EFI Boot Manager boot option menu can provide a
convenient way to boot your system.   The installation procedure can
automatically create a new boot option (if none exists) or validate
```

```
    existing boot options.

Do you want to create or validate boot options? (Yes/No) [Yes] YES
```

If your system disk will normally be booted on this system and this device, and if you want the upgrade procedure to assist you in setting up or validating boot options on the EFI console in the EFI Boot Manager menu, answer YES. The procedure creates and validates a new boot option if one does not exist, or it validates existing boot options, just before the upgrade completes. (See Section 6.4.7.)

If you answer YES and no boot option exists, the procedure allows you to set OpenVMS boot flags (VMS_FLAGS), as shown in the following example. Enter the OpenVMS flags (for example, 0,1), or press **Enter** to set no flags (the default). If a boot option exists, you can change boot flags after the upgrade completes (for information about changing boot flags, see Section B.5.2).

```
    You can set VMS_FLAGS or accept the default, 0,0.

Enter the value for VMS_FLAGS: (n.n) [0,0]
```

If you do not want the procedure to assist you in setting up or validating boot options on the EFI console, answer NO.

HP recommends that you allow the procedure to assist you in setting up and validating boot options.

NOTE If your newly upgraded system disk is a Fibre Channel device, HP recommends that you add it as a boot option in the EFI boot menu. If you do not allow the upgrade procedure to add the device to the boot menu, you can add it by using the OpenVMS I64 Boot Manager utility (SYS$MANAGER:BOOT_OPTIONS.COM) after the upgrade completes. (To add Fibre Channel devices to the EFI boot menu, you must use this utility instead of EFI.)

HP recommends using the OpenVMS I64 Boot Manager utility to add shadowed system disks in a multiple-member shadow set to the EFI boot device list and dump device list. Be sure to add all members to both lists.

For information about the OpenVMS I64 Boot Manager utility, see Section B.5.2. For more information about configuring and booting Fibre Channel devices, see Appendix D.

6.3.9 Warning About Removal of the DECRAM Command

When upgrading from versions of OpenVMS prior to 8.3, the procedure displays a message similar to the following that warns you that the DCL command DECRAM is being removed to prevent conflict with the DECRYPT command:

```
    Beginning with OpenVMS V8.3, the DCL commands ENCRYPT and DECRYPT
    are provided as part of OpenVMS.

    Because "DECRYPT" conflicts with the existing command "DECRAM",
    this upgrade will remove the DECRAM command.

    If you use the command DECRAM interactively or in command
    procedures, please see the release notes for more information.
```

The DECRYPT command (introduced with OpenVMS Version 8.3) overwrites the default definition of DECR, which you might have been using to run DECram. You should update any command procedures that use the DECRAM command so that they use the foreign command style of DCL to run DECram:

```
$ DECRAM == "$MDMANAGER"
```

This change affects only the use of the DCL command; all other aspects of the DECram product remain the same.

6.3.10 Setting OpenVMS Cluster Membership Information

The procedure now asks whether your system will be part of an OpenVMS Cluster. For example:

```
Will this system be a member of an OpenVMS Cluster? (Yes/No)
```

Unlike an installation, answering YES to this question does *not* cause the SYS$MANAGER:CLUSTER_CONFIG.COM procedure to be run. However, correct cluster membership information is required by the upgrade procedure. Note that you can run SYS$MANAGER:CLUSTER_CONFIG.COM manually to configure or reconfigure your system as a member of an OpenVMS Cluster. For more information about configuring a member of an OpenVMS Cluster, see *Guidelines for OpenVMS Cluster Configurations*.

6.3.11 Setting OpenVMS Galaxy Information (Alpha Only)

The procedure next asks whether your system is an instance in an OpenVMS Galaxy. The display is similar to the following:

```
Will this system be an instance in an OpenVMS Galaxy? (Yes/No)
```

If you answer YES to this question, and you also answered YES to the OpenVMS Cluster question, then information about required remedial kits is displayed. Your answer to this question determines how the system parameter GALAXY is set.

6.3.12 Updating Time Zone Information

For local time zone support to work correctly, the time zone that accurately describes the location you want to be considered as your default time zone must be set. In addition, your system must be configured correctly to use a valid OpenVMS time differential factor (TDF).

If the installation procedure determines that time zone information is incomplete, it prompts you to set the correct default time zone and TDF for your system. For information about setting the time zone information, see Section 3.3.3.

For more information about TDF and local time zone support, see the *HP OpenVMS System Manager's Manual, Volume 1: Essentials*.

6.3.13 Upgrading Windowing, Networking, and Related Products

The procedure now presents information about the optional DECwindows GUI (DECwindows Motif for OpenVMS) and networking (DECnet and TCP/IP) products that will be upgraded along with the OpenVMS operating system. As noted by the procedure, you can change the default values for these products later in the installation procedure.

NOTE The following display is what might be seen during an OpenVMS I64 installation. Some of the products listed are supported on OpenVMS I64 systems only.

```
If necessary, the following products will be upgraded along with
the OpenVMS operating system:

  o Availability Manager (base) for OpenVMS I64 (required part of OpenVMS)
```

```
  o CDSA for OpenVMS I64 (required part of OpenVMS)
  o KERBEROS for OpenVMS I64 (required part of OpenVMS)
  o SSL for OpenVMS I64 (required part of OpenVMS)
  o Performance Data Collector (base) for OpenVMS I64 (required part of OpenVMS)
  o DECwindows Motif for OpenVMS I64
  o DECnet-Plus for OpenVMS I64
  o DECnet Phase IV for OpenVMS I64
  o HP TCP/IP Services for OpenVMS
  o WBEM Services for OpenVMS

If you want to add or delete these products, you can do so later in
the upgrade by answering NO to the following question:

    "Do you want the defaults for all product options?"

Availability Manager (base) for OpenVMS I64 (required part of OpenVMS)
is installed on your system. It will be upgraded.

CDSA for OpenVMS I64 (required part of OpenVMS)
is installed on your system. It will be upgraded.


KERBEROS for OpenVMS I64 (required part of OpenVMS)
is installed on your system. It will be upgraded.

SSL for OpenVMS I64 (required part of OpenVMS)
is installed on your system. It will be upgraded.

Performance Data Collector (base) for OpenVMS I64 (required part of OpenVMS)
is installed on your system. It will be upgraded.

DECwindows Motif for OpenVMS I64
is installed on your system. It will be upgraded.

Beginning with OpenVMS V7.1, the DECnet-Plus kit is provided with
the OpenVMS operating system kit.  HP strongly recommends that
DECnet users install DECnet-Plus.  DECnet Phase IV applications are
supported by DECnet-Plus.

DECnet Phase IV is also provided as an option.

If you install DECnet-Plus and TCP/IP you can run DECnet
applications over a TCP/IP network.  Please see OpenVMS
Management Guide for information on running DECnet over TCP/IP.

Do you want to install DECnet-Plus for OpenVMS I64 V8.3? (Yes/No) [Yes]

HP TCP/IP Services for OpenVMS
is alredy installed on your system. An upgrade is not required.

WBEM Services for OpenVMS is not installed on your system.
It will not be installed.
```

NOTE Beginning with OpenVMS Version 8.3, DECwindows client files are made available through the DWMOTIF_SUPPORT kit. (Prior to Version 8.3, the client files were included directly with the OpenVMS operating system kit.) The OpenVMS installation procedure installs this kit automatically. The DWMOTIF_SUPPORT kit name is listed during the installation.

Required versions of some of the windowing and networking products might already be installed on the system. If so, you will see a message to this effect, as seen for most of the products in the previous example. For some of the windowing and networking products, earlier versions might be installed that still work on OpenVMS Version 8.3. In this case, you will see a message indicating the software is already installed and asking whether you want to install the newer version. You can keep the currently installed version or upgrade to the newer version supplied with OpenVMS Version 8.3. If you choose to keep the currently installed version, you should verify what level of support for this version is available from HP.

Some windowing and networking products might have versions installed that do not work on OpenVMS Version 8.3. In this case, you are not given a choice to upgrade—the software is upgraded automatically. (On OpenVMS Alpha upgrades, if older versions of SSL for OpenVMS are found, the procedure removes them.)

NOTE For support of Instant Capacity (iCAP) and Pay per use (PPU) functionality (supported on cell-based Integrity servers), you must install TCP/IP Services for OpenVMS and WBEM Services for OpenVMS. SSL for OpenVMS is required and installed automatically.

6.4 Completing the Upgrade

The following sections describe the remaining steps that you need to perform to complete the upgrade.

6.4.1 Choosing Descriptive Help Text

The procedure next prompts you as follows:

```
      The installation operation can provide brief or detailed descriptions.
      In either case, you can request the detailed descriptions by typing ?.

  Do you always want detailed descriptions? (Yes/No) [No]
```

If you answer YES, the procedure displays additional explanatory text with each prompt.

6.4.2 Removing Older Versions of ENCRYPT

Beginning with OpenVMS Version 8.3, Encryption for OpenVMS is included with the operating system. If an older version of ENCRYPT (HP I64VMS ENCRYPT or HP AXPVMS ENCRYPT) is found on your system, the upgrade procedure removes the product. Confirmation of the removal of the ENCRYPT product is displayed, as in the following example:

```
      HP I64VMS ENCRYPT will now be removed.
      This is required because OpenVMS now includes ENCRYPT.

  The following product has been selected:
      HP I64VMS ENCRYPT V1.6                Layered Product
```

```
The following product will be removed from destination:
    HP I64VMS ENCRYPT V1.6                DISK$I64083:[VMS$COMMON.]

Portion done: 0%...20%...30%...40%...50%...60%...70%...80%...90%...100%

The following product has been removed:
    HP I64VMS ENCRYPT V1.6                Layered Product
```

6.4.3 Secure Delivery Validation

With Version 8.3, most PCSI kits included on the OpenVMS distribution media are signed using Secure Delivery. Each target file includes an associated digital signature file (also referred to as a manifest) that is used to for Secure Delivery validation. This validation involves authenticating the originator (HP, in this case) and verifying the contents of the target file. (The digital signature file has the same file name as the target file plus _ESW appended to the file extension, as in *filename*.PCSI$COMPRESSED_ESW.) When you upgrade OpenVMS I64 Version 8.3 from the distribution media, the procedure validates any PCSI kits that are being installed. For each kit successfully validated, you see a message similar to the following:

```
Performing product kit validation ...
%PCSI-I-VALPASSED, validation of
DKB400:[KITS.CDSA]HP-I64VMS-CDSA-Vnnnn-nnn-n.PCSI$COMPRESSED;1 succeeded
 .
 .
 .
```

Note that because of limitations in the OpenVMS Alpha CD boot environment, OpenVMS Alpha kits are not validated when booted from it. On both OpenVMS Alpha and I64 systems, signed PCSI kits that are installed subsequently (including signed kits on the distribution media) are validated. In addition, on both OpenVMS Alpha and OpenVMS I64 systems, the DCL command PRODUCT SHOW HISTORY displays the validation status of installed products.

6.4.4 Saving Archived Files

By default, the OpenVMS upgrade deletes files that were archived as *filename.type*_OLD by OpenVMS remedial kits. If you do not want to delete these files, you can save them by performing one of the following actions:

- When the script asks whether you want the defaults for all options, answer NO. (This script is shown in the example in Section 6.4.5.) Step through the options and answer NO to the option for deleting files archived by remedial kits. This action saves all such files.
- Before beginning the upgrade, rename any _OLD files that you want to save. Files that you do not rename are deleted.

Note that the upgrade does not delete all files with a file extension ending in _OLD. Rather, it deletes only those _OLD files that were archived by OpenVMS remedial kits.

NOTE OpenVMS patches save these _OLD files in VMS$REMEDIAL_OLD_FILES.TXT in the SYS$UPDATE directory. All files listed in this file are supposed to have _OLD appended to their names; however, some patch kits add the files without this extension. If the upgrade procedure detects files without _OLD appended, it displays a message similar to the following:

```
%UPGRADE-I-FIXUP, appending _OLD to file names in
 PCSI$DESTINATION:[SYSUPD] VMS$REMEDIAL_OLD_FILES.TXT
    [SYSUPD]VMSKITBLD.DAT
    [SYSHLP]XFC$SDA.HLP
    [SYS$LDR]SYSTEM_SYNCHRONIZATION.EXE-OLD
    [SYS$LDR]SYS$XFCACHE.DSF
    [SYS$LDR]SHELL9K.EXE_STB
    [000000]HP-I64VMS-VMS-V0820-1-2.PCSI$DESCRIPTION
```

6.4.5 Selecting Product Component Options

As you begin the upgrade procedure, the procedure asks whether you want all the default values (meaning all the files and subgroups of files for each component included in the operating system). The display is similar to the following:

```
The following product has been selected:
    HP I64VMS OPENVMS V8.3             Platform (product suite)


Configuration phase starting ...

You will be asked to choose options, if any, for each selected product and for
any products that may be installed to satisfy software dependency requirements.

HP I64VMS OPENVMS V8.3: OPENVMS and related products Platform

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Do you want the defaults for all options? [YES]
```

During an upgrade, the PCSI utility defines default values as the values that you selected when you last installed or upgraded the OpenVMS operating system on your system. Therefore, before you respond to the prompt, note the following:

- If you accept the default values, you receive the same components that you selected when you last installed or upgraded the system (instead of *all* the components currently available) plus any new components that were not in the previous version of the OpenVMS operating system.
- If you want to include or exclude any components differently than you did in the last installation or upgrade, you must answer NO and then respond to the prompts for *each* option, even those that you are not changing.
- If you want to review the current defaults first, answer NO. Then answer YES when the procedure asks whether you want to view the values.

  If you review the defaults and are satisfied, answer YES to the prompt asking whether you are satisfied with the values. If you want to make changes, answer NO to that question and then answer YES when the procedure asks whether you want to reenter the values.

When you select component options, also note the following:

- Whether you choose all the default values or select individual files, the procedure allows you to view your selections and make changes.

- If you are not sure whether you want certain component options, you can request help by entering a question mark (?) at the prompt for that component (or group of components).
- You should review the list of options and compare them with the requirements for your procedure. If you are selecting components individually, be sure that you include all components necessary to support the needs of your users. Note also that certain components depend upon the installation of other components.
- OpenVMS Management Station software is installed automatically on your OpenVMS system disk when you accept all the default values. If you do not accept the default values, you must select the OpenVMS Management Station component (server and client files) if you plan to use that product. After the upgrade is complete, you can then prepare your OpenVMS system and your PC to run OpenVMS Management Station by following the procedures described in Appendix G.
- If you decide after the upgrade to change which OpenVMS operating system components you want installed on your system, you must reconfigure the installation as described in Section 7.12.
- After you boot the upgraded system disk and log in, you can obtain information about individual system files by entering HELP SYSTEM_FILES at the dollar sign prompt ($).

NOTE Unless you have specific reasons to do otherwise, HP recommends that you accept the defaults and install all OpenVMS options. OpenVMS and layered products have various dependencies on many of these options. Even if you think you do not need certain options, some OpenVMS or layered product operations might not work correctly if other OpenVMS options are not installed.

If you answer YES to accept the defaults for all options, the procedure displays a message similar to the following, the contents of which depend on the products you chose to install. If you answer NO, the procedure prompts you for each option and suboption.

```
Availability Manager (base) for OpenVMS I64 (required part of OpenVMS)

CDSA for OpenVMS I64 (required part of OpenVMS)

KERBEROS for OpenVMS I64 (required part of OpenVMS)

SSL for OpenVMS I64 (required part of OpenVMS)

Performance Data Collector (base) for OpenVMS I64 (required part of OpenVMS)

 HP I64VMS DWMOTIF V1.6: DECwindows Motif

   If a Language Variant is installed, refer to the Installation Guide.

  Do you want to continue? [YES]
```

For a list of component options included with the OpenVMS Version 8.3 operating system, see Figure 3-1 on page 76.

6.4.6 Component and Product Installation Confirmation Messages

When you have answered all the prompts and selected the components you want installed, the procedure allows you to review your selections and make changes, and then displays information about the various components and products that were installed, as shown in the following sample display in which the review is not chosen. You might see an %UPGRADE-I-FIXUP message, which indicates that obsolete files on the system were incorrectly saved by remedial kits. The "fixup" allows them to be correctly removed.

NOTE If you perform two installations at the same time to OpenVMS Alpha systems connected via MEMORY CHANNEL, you might see a message similar to the following every 5 seconds:

```
%PMA0 CPU00: 30-AUG-2004 14:58:40 Remote System Conflicts with
Known System - REMOTE NODE
%PMA0 CPU00: 30-AUG-2004 14:58:45 Remote System Conflicts with
Known System - REMOTE NODE
```

Disregard the message. The installation or upgrade will proceed normally and the messages will not be present when the system reboots with its real node name.

```
Do you want to review the options? [NO] NO

Execution phase starting ...

 The following products will be installed to destinations:
    HP I64VMS AVAIL_MAN_BASE V8.3          DISK$I64083:[VMS$COMMON.]
    HP I64VMS CDSA V2.2                    DISK$I64083:[VMS$COMMON.]
    HP I64VMS DECNET_PLUS V8.3             DISK$I64083:[VMS$COMMON.]
    HP I64VMS DWMOTIF V1.6                 DISK$I64083:[VMS$COMMON.]
    HP I64VMS DWMOTIF_SUPPORT V8.3         DISK$I64083:[VMS$COMMON.]
    HP I64VMS KERBEROS V3.0                DISK$I64083:[VMS$COMMON.]
    HP I64VMS OPENVMS V8.3                 DISK$I64083:[VMS$COMMON.]
    HP I64VMS SSL V2.2                     DISK$I64083:[VMS$COMMON.]
    HP I64VMS TCPIP V5.6                   DISK$I64083:[VMS$COMMON.]
    HP I64VMS TDC_RT V2.2                  DISK$I64083:[VMS$COMMON.]
    HP I64VMS VMS V8.3                     DISK$I64083:[VMS$COMMON.]

The following products will be removed from destinations:
    HP I64VMS AVAIL_MAN_BASE V8.2          DISK$I64083:[VMS$COMMON.]
    HP I64VMS CDSA V2.1                    DISK$I64083:[VMS$COMMON.]
    HP I64VMS DECNET_PLUS V8.2             DISK$I64083:[VMS$COMMON.]
    HP I64VMS DWMOTIF V1.5                 DISK$I64083:[VMS$COMMON.]
    HP I64VMS KERBEROS V2.1                DISK$I64083:[VMS$COMMON.]
    HP I64VMS OPENVMS V8.2                 DISK$I64083:[VMS$COMMON.]
    HP I64VMS TCPIP V5.5                   DISK$I64083:[VMS$COMMON.]
    HP I64VMS TDC_RT V2.1                  DISK$I64083:[VMS$COMMON.]
    HP I64VMS VMS V8.2                     DISK$I64083:[VMS$COMMON.]

Portion done: 0%..10%..20%..30%..40%..50%..60%..70%..80%..90%..100%

The following products have been installed:
    HP I64VMS AVAIL_MAN_BASE V8.3          Layered Product
    HP I64VMS CDSA V2.2                    Layered Product
    HP I64VMS DECNET_PLUS V8.3             Layered Product
```

```
      HP I64VMS DWMOTIF V1.6                  Layered Product
      HP I64VMS DWMOTIF_SUPPORT V8.3          Layered Product
      HP I64VMS KERBEROS V3.0                 Layered Product
      HP I64VMS OPENVMS V8.3                  Platform (product suite)
      HP I64VMS SSL V2.2                      Layered Product
      HP I64VMS TCPIP V5.6                    Layered Product
      HP I64VMS TDC_RT V2.2                   Layered Product
      HP I64VMS VMS V8.3                      Operating System

   The following products have been removed:
      HP I64VMS AVAIL_MAN_BASE V8.2           Layered Product
      HP I64VMS CDSA V2.1                     Layered Product
      HP I64VMS DECNET_PLUS V8.2              Layered Product
      HP I64VMS DWMOTIF V1.5                  Layered Product
      HP I64VMS KERBEROS V2.1                 Layered Product
      HP I64VMS OPENVMS V8.2                  Platform (product suite)
      HP I64VMS TCPIP V5.5                    Layered Product
      HP I64VMS TDC_RT V2.1                   Layered Product
      HP I64VMS VMS V8.2                      Operating System

   HP I64VMS OPENVMS V8.3: OPENVMS and related products Platform

      HP I64VMS KERBEROS V3.0

        Configure and set up Kerberos

        If Kerberos will be run on this system, but has not been
        used previously, you need to perform the following steps.

        o Run the Kerberos cofniguration procedure:

          @SYS$STARTUP:KRB$CONFIGURE.COM

        o Add the following line to SYS$MANAGER:SYSTARTUP_VMS.COM:

          $ @SYS$STARTUP:KRB$STARTUP

        o Add the following line to SYS$MANAGER:SYLOGIN.COM:

          $ @SYS$MANAGER:KRB$SYMBOLS


      Press RETURN to continue:

      HP I64VMS SSL V1.3: SSL for OpenVMS IA64 V1.3 (Based on OpenSSL 0.9.7e)

       There are post-installation tasks that you must complete

       after upgrading from previous SSL versions

       including verifying startup command procedures and logical names.

       Refer to SYS$HELP:SSL013.RELEASE_NOTES for more information.
```

```
HP I64VMS TDC_RT V2.2: The Performance Data Collector (base) for OpenVMS

  Users of this product require the following privileges:
   (CMKRNL,LOG_IO,WORLD,PHY_IO,SYSPRV,SYSLCK)

  Users of this product require the following process resource limits:
   WSQUO minimum 7000

  A read-me file is available in SYS$COMMON:[TDC]TDC_README.TXT

  Release notes are available in SYS$COMMON:[TDC]TDC_RELEASE_NOTES.TXT


HP I64VMS DWMOTIF V1.6: DECwindows Motif

  System reboot is required.

  If using a language variant, reboot after upgrade of language variant.

  Installation Verification Procedure can be run after reboot.

HP I64VMS TCPIP V5.6   : HP TCP/IP Services for OpenVMS.

  Check the release notes for current status of the product.
```

6.4.7 Upgrade Creates and Validates Boot Options (I64 Only)

At this point in an OpenVMS I64 upgrade, the procedure creates and validates boot options if you chose to have the procedure do so (see Section 6.3.8).

- **If you answered NO** , the following message is displayed:

  ```
  If there is an existing boot option that was used to boot this
  system disk, you may be able to use it. Otherwise, you will have
  to use the EFI Shell the first time that you boot the newly
  installed system. After booting, use the OpenVMS I64 Boot Manager
  to create a Boot Option. To do this log in to a privileged
  account and execute this command:

      $ @SYS$MANAGER:BOOT_OPTIONS
  ```

  The procedure then informs you that the upgrade is complete and prompts you to press **Return** (**Enter**) to continue, at which point it returns you to the OpenVMS main menu. You can select option 8 ("Execute DCL commands and procedures") on the OpenVMS main menu and enter the command at the DCL triple dollar sign prompt ($$$) to start the OpenVMS I64 Boot Manager utility.

- **If you answered YES**, the procedure determines whether a boot entry already exists for the system disk (in this example, DKB400:):

  — **If an entry is found**, a message similar to the following is displayed:

```
      The EFI Boot Manager menu includes the following boot option(s)
          for DKB400:

      Validate EFI Boot Options list:    Timeout = 0 secs.
      ------------------------------------------------------------------------
 1 DKB400 PCI(0|20|1|0)  Scsi(Pun1,Lun0)  "OpenVMS on DKB400: PKA0.1"
      ------------------------------------------------------------------------
      1 entries found.
```

In this example, one boot option is found. If multiple entries are found and if they are all SCSI devices, the procedure displays the following message and then notifies you that the upgrade is complete:

```
Please use the OpenVMS I64 Boot Manager to ensure that you
have a valid boot option for the system you have just installed.
```

When one entry is found, or when multiple Fibre Channel entries are found, the procedure validates the boot options, as in the following example, in which the found entry fails to boot and is then fixed and validated:

```
Validate EFI Boot Options list:    Timeout = 0 secs.
-------------------------------------------------------------------
1 DKB400: PKA0.1
      DKB400 PCI(0|20|1|0) Scsi(Pun1,Lun0)
      efi$bcfg: Option Failed. Fixing Boot Entry automatically.

 efi$bcfg: Entry 1 Boot0001 removed.
  efi$bcfg: DKB400 PCI(0|20|1|0) Scsi(Pun1,Lun0)  (Boot0001) Option
     successfully added
     ------------------------------------------------------------------------
     1 entries validated.
```

— **If no existing entry is found**, a boot option is created and the procedure displays validation text as in the following example:

```
efi$bcfg: DKB400: (Boot0003)  Option successfully added

    The Boot Option is called OpenVMS on DKB400:;
    it is the first entry in the Boot Options menu, and is
    configured (by default) to boot from SYS0.
```

6.4.8 Upgrade Completes and Returns to OpenVMS Operating System Menu

The upgrade procedure is now complete. The procedure displays information about the special startup procedure that runs when the newly installed system is first booted. It then prompts you to press **Return** (**Enter**) to continue. After you do so, you are returned to the OpenVMS operating system menu. The following is a sample display:

```
The upgrade is now complete.

 When the newly upgraded system is first booted, a special
 startup procedure will be run.  This procedure will:

   o  Run AUTOGEN to set system parameters.
   o  Reboot the system with the newly set parameters.
```

```
You may shut down now or continue with other operations.

 Process I64VMS_INSTALL logged out at 15-JUL-2006 14:45:49.54

Press Return to continue...

************************************************************

You can install or upgrade the OpenVMS I64 operating system
or you can install or upgrade layered products that are included
on the OpenVMS I64 distribution media (CD/DVD).

You can also execute DCL commands and procedures to perform
"standalone" tasks, such as backing up the system disk.

Please choose one of the following:

    1)  Upgrade, install, or reconfigure OpenVMS I64 Version 8.3
    2)  Display layered products that this procedure can install
    3)  Install or upgrade layered products
    4)  Show installed products
    5)  Reconfigure installed products
    6)  Remove installed products
    7)  Find, Install, or Undo patches; Show or Delete recovery data
    8)  Execute DCL commands and procedures
    9)  Shut down this system

Enter CHOICE or ? for help: (1/2/3/4/5/6/7/8/9/?)
```

6.4.9 Shutting Down the System

Unless you want to perform any other operations prior to booting the upgraded disk, shut the system down by choosing the shutdown option (9) on the menu:

```
Enter CHOICE or ? for help: (1/2/3/4/5/6/7/8/9/?)  9
  Shutting down the system
    .
    .
    .

SYSTEM SHUTDOWN COMPLETE
```

6.5 What to Do After Shutdown

After an OpenVMS Alpha system shuts down, you can make the newly upgraded system disk the default boot device, if necessary, and then boot the system disk. After an OpenVMS I64 system shuts down, you can add and validate a boot option for the newly upgraded system disk, using the OpenVMS I64 Boot Manager utility, and then boot the newly upgraded system disk. For either operating system, AUTOGEN runs automatically, after which the system shuts down again and automatically reboots. If you are doing a concurrent or rolling upgrade in an OpenVMS Cluster environment, do not boot any other cluster members now.

Now go to Chapter 7 and check for any postupgrade tasks that need to be performed before the system and cluster can be used. Once you have completed all required postupgrade tasks, you can reboot and then use other cluster members.

7 After Installing or Upgrading the OpenVMS Operating System

After you have installed or upgraded the OpenVMS operating system, you must perform several important tasks to prepare the system for operation. Section 7.1 includes a checklist that you can use to make sure you perform all the postinstallation or postupgrade tasks necessary for your system.

7.1 Postinstallation and Postupgrade Tasks

Use the checklist in Table 7-1 to ensure that you perform all necessary postinstallation or postupgrade tasks. Unless indicated otherwise, these tasks are applicable as both postinstallation and postupgrade tasks.

Table 7-1 Postinstallation and Postupgrade Checklist

	Task	Section
❑	For a newly installed system disk, you can back up the disk. (At this point, you could reinstall OpenVMS onto the disk instead.) For a newly upgraded system disk, if it is *not* going to be a shadow set member, back up the system disk as a safeguard before proceeding with the next steps. If your newly upgraded system disk is going to be a shadow set member, re-form the shadow set. As an optional precaution, you can back up the system disk as well.	Section 7.2
❑	Register any licenses that were not registered during the installation; for an upgrade, register any new licenses.	Section 7.3
❑	*New installations only (optional):* Set system parameters to enable **volume shadowing**.	Section 7.4
❑	Tune BAP system parameters (Alpha upgrades only).	Section 7.5
❑	If you set system parameters to enable volume shadowing or removed hardcoded BAP system parameters, run AUTOGEN and reboot.	Section 7.6
❑	If you want to form a shadow set for a newly installed system disk, you can do this now or later. If you upgraded a disk in a volume shadowing environment, re-form the shadow set.	Section 7.7
❑	*New installations, some upgrades:* Perform the following tasks that generally apply to new installations only but could also apply after an upgrade:	
	❑ Create proxy files, if required.	Section 7.8.1

Table 7-1 Postinstallation and Postupgrade Checklist (Continued)

	Task	Section
	❑ Set up the queue manager and start the default batch and print queues.	Section 7.8.2
	❑ Configure a multihead system, if applicable.	Section 7.8.3
	❑ Configure DECnet if it was installed. After an upgrade, perform only if DECnet was added during the upgrade.	Section 7.8.4
	❑ Configure TCP/IP Services for OpenVMS if it was installed. After an upgrade, configure TCP/IP Services only if it was added during the upgrade.	Section 7.8.5
	❑ If you are using neither DECnet nor TCP/IP Services, install and configure third-party networking software, if necessary. Networking software is required to download patches and for certain layered products.	Section 7.8.6
❑	Initialize or configure the following optional products, as needed:	
	❑ Initialize CDSA if you have installed a new version of CDSA without upgrading the base operating system.	Section 7.9.1
	❑ Configure Availability Manager.	Section 7.9.2
	❑ Configure Kerberos.	Section 7.9.3
	❑ Configure SSL for OpenVMS.	Section 7.9.4
	❑ Configure WBEM Services for OpenVMS	Section 7.9.5
	❑ On Integrity servers that include Instant Capacity (iCAP), configure the iCAP software.	Section 7.9.6
	❑ On Integrity servers that include Pay per use (PPU), configure the PPU software.	Section 7.9.7
	❑ Initialize and run the Performance Data Collector base software (TDC_RT).	Section 7.9.8
	❑ Prepare your OpenVMS system and your PC to run OpenVMS Management Station, and follow procedures in Appendix G.	Section 7.9.9
	❑ Install OpenVMS Debugger clients on a PC.	Section 7.9.10
❑	Create or edit a system-specific or clusterwide login welcome message SYS$MANAGER:WELCOME.TXT (optional).	Section 7.10
❑	*Upgrades only:* Examine command procedures for which the upgrade may have provided new template files.	Section 7.11
❑	Add and remove operating system files (optional).	Section 7.12
❑	Expand the system libraries using LIBDECOMP.COM (optional; Alpha only).	Section 7.13

Table 7-1 Postinstallation and Postupgrade Checklist (Continued)

	Task	Section
❑	Download and apply any relevant OpenVMS or networking patches that are available (optional but recommended).	Section 7.14
❑	*New installations, some upgrades:* Install and configure layered products.	Section 7.15
❑	*Upgrades only (optional)*: Reinstall optional DECevent software (which is automatically removed during an upgrade)	Section 7.16
❑	*New installations, some upgrades:* Create print queues.	Section 7.17
❑	Update SYSTARTUP_VMS.COM to have layered products, print queues, and other products or devices start at boot.	Section 7.18
❑	Create user accounts.	Section 7.19
❑	Run the **User Environment Test Package (UETP)** to test the system (optional).	Section 7.20
❑	Back up the system disk and start a systematic routine for backing up the application, data, and user disks.	Section 7.21
❑	If the system disk was pulled out of the shadow set and all the appropriate postupgrade steps recommended in this chapter thus far were performed on that disk, then re-form the shadow set once again.	Section 7.22
❑	*Upgrades only:* Reboot cluster members, if applicable.	Section 7.23
❑	Tune your operating system: After the system has run for at least 24 hours with users or a typical application workload on the system, run AUTOGEN to collect feedback and, if necessary, modify the MODPARAMS.DAT file.	Section 7.24 Section 7.25

7.2 Backing Up Your System Disk

Unless your newly installed or upgraded system disk will be part of a shadow set, HP recommends that you back up the system disk before performing the tasks described in this chapter. If you encounter problems while performing any of these tasks, having a backup copy of the system disk ensures that you can restore it to a known condition without having to repeat the installation or upgrade.

If your system disk will be part of a multiple-member shadow set, then a backup is not necessary. Either form or re-form the shadow set, as described in Section 7.7; this creates a backup copy of the newly installed or upgraded system disk through the shadow copy operation. Remember to dismount any added shadow set members after the shadow copy has completed, complete any steps described in this chapter that you need to perform and, when you are finished, re-form the shadow set.

If your newly installed or upgraded system disk will not be in a shadow set, back up the system disk by performing the following steps. (For a newly installed system disk, it might be just as easy to reinstall the operating system.)

Step 1. Shut down the system (for OpenVMS Alpha systems, described in Section A.3.2; for OpenVMS I64 systems, described in Section B.7.2).

Step 2. Boot the operating system media, as described in Section 3.2.

Step 3. Use the OpenVMS operating system menu to enter the DCL environment (option 8).

Step 4. Mount the system device and the target device on which you are making the backup copy. (If you are backing up to tape, skip to the next step.) For example, if your system disk is on DKA0: and the target device is on DKA100:, you might use the following commands (colons are required). The /OVERRIDE qualifier used in this example enables you to mount the system disk without entering its volume label. The /FOREIGN qualifier is required for the target disk when you use the BACKUP /IMAGE command.

```
$$$ MOUNT /OVERRIDE=IDENTIFICATION DKA0:
$$$ MOUNT /FOREIGN DKA100:
$$$ BACKUP /IMAGE /LOG DKA0: DKA100:
```

Step 5. To back up the system disk to a magnetic tape, enter the following commands, where MTA0: is the magnetic tape drive and *label* is the volume label. Note that the BACKUP command automatically mounts the tape and begins the backup to it.

```
$$$ INITIALIZE MTA0: label
$$$ MOUNT /OVERRIDE=IDENTIFICATION DKA0:
$$$ BACKUP /IMAGE /LOG DKA0: MTA0:label.BCK
```

The /IMAGE qualifier causes the backup to produce a functionally equivalent copy of the system disk, which is also bootable. The /LOG qualifier causes the procedure to display the specification of each save set file being processed. To compare the backed up files to the source files, use the /VERIFY qualifier. If any discrepancies are detected, the Backup utility displays an error message.

Step 6. Log out from the DCL environment.

Step 7. Shut down the system by selecting option 9 on the menu.

Step 8. Boot from the disk on which you either upgraded or installed OpenVMS.

In addition to backing up the system disk now before you customize it, you should back up your system disk again after you successfully complete your customization tasks and install layered products.

For more complete information about backup operations, including a description of an alternative method that does not require booting from the operating system media and that enables you to back up a shadowed disk without disabling the shadow set, see Appendix E. For more information about the Backup utility, see the *HP OpenVMS System Management Utilities Reference Manual: A-L*.

7.3 Registering Your Licenses

If you did not register your OpenVMS licenses during the installation, you must do so before you can use the OpenVMS operating system. You must also register the licenses for OpenVMS layered products. If your operating system came preinstalled, you must register licenses. The licenses are not preinstalled. If you plan to form a volume shadow set for your newly installed system disk, you must enter and load the VOLSHAD license.

If you have upgraded your operating system, register any new OpenVMS or layered product licenses. Note that licensing schemes differ between OpenVMS Alpha and I64 systems. For OpenVMS I64 systems, a single OE license grants the right to use all the components bundled in the purchased OE. Each OE is offered with Per Core Licenses (PCLs).

For information about registering licenses, see the following:

- *HP OpenVMS License Management Utility Manual*
- *HP OpenVMS Version 8.3 Release Notes* and, for OpenVMS I64 systems, the *HP Operating Environments for OpenVMS for Integrity Servers Software Product Description* (SPD 82.34.*xx*).

To register licenses, use the OpenVMS License utility as follows:

1. Start the OpenVMS License utility by entering the following command at the OpenVMS system prompt. (You can also use the LICENSE REGISTER command.)

   ```
   $ @SYS$UPDATE:VMSLICENSE
   ```

2. The utility displays a menu screen similar to the following. Select the REGISTER option (press **Enter** or enter 1 at the prompt), and enter each license key until you have successfully registered all required PAKs.

   ```
   VMS License Management Utility Options:

          1. REGISTER a Product Authorization Key
          2. AMEND an existing Product Authorization Key
          3. CANCEL an existing Product Authorization Key
          4. LIST Product Authorization Keys
          5. MODIFY an existing Product Authorization Key
          6. DISABLE an existing Product Authorization Key
          7. DELETE an existing Product Authorization Key
          8. COPY an existing Product Authorization Key
          9. MOVE an existing Product Authorization Key
         10. ENABLE an existing Product Authorization Key
         11. SHOW the licenses loaded on this node
         12. SHOW the unit requirements for this node

         99. Exit this procedure

         Type '?' at any prompt for a description of the information
         requested. Press Ctrl/Z at any prompt to return to this menu.

       Enter one of the above choices [1]
   ```

3. After each license is successfully registered, the procedure asks whether the license should be loaded. Answer YES.

4. After you have registered and loaded all your licenses, exit the License Management procedure by entering option 99.

7.4 Set System Parameters for Volume Shadowing (New Installations Only; Optional)

If you plan to form a shadowed system disk, you must add system parameters to the SYS$SYSTEM:MODPARAMS.DAT file. Add the following lines to the bottom of the MODPARAMS.DAT file:

```
SHADOWING=2             !Enable volume shadowing
SHADOW_SYS_DISK=1       !Enable shadowing of the system disk
SHADOW_SYS_UNIT=n       !Optional: default is 0, which creates DSA0
SHADOW_MAX_COPY=4       !Allow up to 4 shadow copies or merges going on at the same time
ALLOCLASS=x             !This number must be non-zero;
                        !it must be used if local non-FC devices are going to be
                        !shadow set members
```

If a nonzero ALLOCLASS value is already in use for your system, do not change the ALLOCLASS value. For more information about these and other system parameters you can set for volume shadowing, see the *HP Volume Shadowing for OpenVMS* manual. For more information about setting ALLOCLASS for clusters, see the *HP OpenVMS Cluster Systems* manual.

7.5 Tuning BAP System Parameters (Alpha Upgrade Only)

OpenVMS Alpha Version 7.1 and later contains system parameters that control the operation of bus-addressable pool (BAP).

The CIPCA, CIXCD, KFMSB, and Qlogic ISP 1020 (KZPSM-AA) adapters are some of the adapters that use bus-addressable pool to improve performance. BAP is a non-paged dynamic, physical-address-filtered memory pool used to overcome I/O bus and 32-bit adapter physical addressing limits.

The following table lists the BAP system parameters and their default values:

System Parameter	Default Value
NPAG_BAP_MIN	0
NPAG_BAP_MAX	0
NPAG_BAP_MIN_PA	0
NPAG_BAP_MAX_PA	-1

The default values of these parameters enable the system to boot with any configuration. When AUTOGEN is run on a configured system, it resets these parameters to values that should enhance performance for the current system configuration.

If this is an upgrade of OpenVMS, or if the system fails to boot after a hardware change and displays a message that refers to incorrect BAP parameters, HP recommends that you perform the following steps:

Step 1. To begin the conversational boot, use the BOOT command in the following format:

```
BOOT -FLAGS 0,1 [device-name]
```

For *device-name*, substitute the device name of your system disk drive from which you want to boot. For example, if the system disk has a device name of DKA400, enter the following command and press the **Enter** key:

```
>>> BOOT -FLAGS 0,1 DKA400
```

Step 2. At the SYSBOOT> prompt, enter the following:

```
NPAG_BAP_MIN 0
NPAG_BAP_MAX 0
NPAG_BAP_MIN_PA 0
NPAG_BAP_MAX_PA -1
```

Step 3. This should enable the system to boot. Once completed, enter the following command:

```
$ RUN SYS$SYSTEM:AGEN$FEEDBACK.EXE
```

Step 4. The command entered in the preceding step creates a file that will contain the BAP values for the system in its current configuration. To see what they are, enter the following command (the BAP parameters in AGEN$FEEDBACK.DAT do not include the NPAG_ prefix):

```
$ SEARCH SYS$SYSTEM:AGEN$FEEDBACK.DAT BAP
```

Step 5. Check MODPARAMS.DAT for any hardcoded BAP values by entering the following command:

```
$ SEARCH SYS$SYSTEM:MODPARAMS.DAT BAP
```

IMPORTANT If any BAP parameters are defined in MODPARAMS.DAT, HP strongly recommends removing them. Their presence in MODPARAMS.DAT could be the source of the current boot problem or might be a source of one in the future if a change is made to the adapter card configuration in the system.

If you make changes to adapters in the future and the system boots successfully, immediately run AUTOGEN, by entering the following command:

```
$ @SYS$UPDATE:AUTOGEN GETDATA SETPARAMS NOFEEDBACK
```

7.6 Running AUTOGEN to Set System Parameter Changes

If you modified MODPARAMS.DAT to enable or modify shadowing parameters (see Section 7.4), or if you removed hardcoded BAP system parameters (see Section 7.5), then run AUTOGEN and reboot the system by performing the following steps. This makes the changes take effect.

Step 1. Run AUTOGEN by entering the following command:

```
$ @SYS$UPDATE:AUTOGEN GETDATA TESTFILES NOFEEDBACK
```

Step 2. After AUTOGEN completes, display or print the SYS$SYSTEM:AGEN$PARAMS.REPORT file and review it. This file lists changes being made to SYSGEN parameters or changes that AUTOGEN wanted to make but could not because of a hardcoded or maximum value that was specified in MODPARAMS.DAT.

Step 3. If other changes need to be made to MODPARAMS.DAT based on a review of the AGEN$PARAMS.REPORT file, make them now and then resume at step 1.

Step 4. Once you are satisfied with the parameter settings, enter the following AUTOGEN command:

```
$ @SYS$UPDATE:AUTOGEN GENPARAMS SETPARAMS NOFEEDBACK
```

This command makes the parameter changes permanent so that they are used on subsequent reboots.

Step 5. Reboot the system by entering the following command:

```
$ @SYS$SYSTEM:SHUTDOWN
```

7.7 Forming the Shadow Set

If you have upgraded a disk in a volume shadowing environment, you must now re-form the shadow set. If you want to form a shadow set for a newly installed system disk, you can do this now or later. To do so requires that the VOLSHAD license has been entered and loaded. In addition, you must set several system parameters, as explained in Section 7.4, and then you must run AUTOGEN and reboot the system, as explained in Section 7.6.

Forming the shadow set with the newly installed or upgraded disk as the master causes the other disks in the shadow set to be updated with a copy of the disk. (In a single-member shadow set, although no other disks exist to be updated, the shadow set can be used to facilitate replacement of a failed drive.)

After forming the shadow set, you can then dismount one of the shadow set members and keep it as a backup. After you perform the steps recommended in this chapter, you can place another volume into the shadow set instead of doing the final backup, or re-add the volume that was dismounted.

Form the shadow set as follows:

Step 1. Enter the SHOW DEVICE D command to display a list of disks available on your system. For example:

```
$ SHOW DEVICE D
Device                  Device     Error    Volume        Free  Trans Mnt
 Name                   Status     Count    Label        Blocks Count Cnt
$11$DKB100:   (NODE1)  Online         0
$11$DKB200:   (NODE1)  Mounted        0     I64083       918150     1  31
```

Step 2. Enter a command in the following format:

```
MOUNT/CONFIRM/SYSTEM DSAn: /SHADOW=(upgraded-disk:,new-member:) volume-label
```

In this format:

- DSA*n*: is the virtual unit name of the shadow set, where *n* is a unique number from 0 to 999.
- *upgraded-disk*: is the name of the shadowed system disk on which you just upgraded or installed OpenVMS.
- *new-member*: is the name of the disk you want to add as a member of the shadow set.
- *volume-label* is the volume label of the shadow set you just upgraded or the disk you are creating.

NOTE When you form the shadow set, the contents of the new member are replaced by the contents of the disk you upgraded. Specifying the /CONFIRM qualifier reminds you of this fact, confirming that you are specifying the correct name of a disk that either is blank or contains files you no longer need.

Example

```
$ MOUNT/CONFIRM/SYSTEM DSA54: /SHADOW=($11$DKB200:,$11$DKB100:) I64083

%MOUNT-F-SHDWCOPYREQ, shadow copy required
Virtual Unit - DSA54 Volume label I64A083
     Member                    Volume label Owner UIC
     $11$DKB100:  (NODE1)      SCRATCH      [100,100]
Allow FULL shadow copy on the above member(s)? [N]: YES
```

NOTE Before continuing with the next step in this chapter, after the shadow copy completes, dismount one of the shadow set members to use as a backup. Normally, this should be the unit you just added to the upgraded volume when you formed the shadow set (in the preceding example, 11DKB100:).

For OpenVMS I64, to add a shadowed system disk in a multiple-member shadow set to the EFI boot device list and dump device list, HP recommends using the OpenVMS I64 Boot Manager utility (SYS$MANAGER:BOOT_OPTIONS.COM). Be sure to add all members to both lists.

7.8 Customizing the System (New Installations, Some Upgrades)

You can customize the system to meet your site-specific needs. In addition, if your Integrity server is part of an OpenVMS Cluster environment, you must prepare the cluster environment and configure the cluster. The following subsections describe the customization tasks you can perform at this time. In general, these tasks apply to new installations only; however, in some cases, they apply to upgrades. The tasks are as follows:

Step 1. Create network proxy authorization files (Section 7.8.1).

Step 2. Set up the queue manager, configure shared files (when multiple system disks are present), and start the default batch and print queues (Section 7.8.2).

Step 3. Configure your multihead system, if applicable (Section 7.8.3).

Step 4. Configure DECnet if it was installed or added during an upgrade (Section 7.8.4).

Step 5. Configure TCP/IP Services for OpenVMS if it was installed or added during an upgrade (Section 7.8.5).

Step 6. If neither DECnet nor TCP/IP Services for OpenVMS is being used, install and configure third-party networking software, if necessary (Section 7.8.6).

Step 7. Update SYSTARTUP_VMS.COM to have networking software (and, optionally, any other additional products you have installed) start at boot (Section 7.18).

For instructions on customizing the system, review the following documentation:

- The release notes, for notes and restrictions that might be relevant to your customization plans
- The *HP OpenVMS System Manager's Manual*, for instructions on customizing and using your system

Note that other customization tasks are described later in this chapter.

7.8.1 Creating Network Proxy Authorization Files

After a new installation of OpenVMS that includes DECnet, or after an upgrade in which you have added DECnet, create your network proxy authorization files. These files include security authorization information for users using network proxy accounts. If you do not create these network authorization files before starting up your system, you might see messages such as the following during startup:

```
Message from user SYSTEM on HOMER
%SECSRV-E-NOPROXYDB, cannot find proxy database file NET$PROXY.DAT
%RMS-E-FNF, file not found
```

The NET$PROXY.DAT file is the primary network proxy authorization file. The other network authorization file to be created is NETPROXY.DAT. To create the network proxy authorization files, enter the following commands:

```
$ SET DEFAULT SYS$COMMON:[SYSEXE]
$ MC AUTHORIZE CREATE/PROXY
$ SET DEFAULT SYS$LOGIN
```

NOTE Be sure you create the network proxy authorization files before starting the queue manager (as described in Section 7.8.1).

If you see messages similar to the following when you create the proxy files, you can ignore them:

```
%UAF-W-NETCHANERR, error assigning a channel to NET:
-SYSTEM-W-NOSUCHDEV, no such device available
```

For more information about network proxy accounts and files, see the *HP OpenVMS System Manager's Manual, Volume 1: Essentials*. For more information about the Authorize utility, see the *HP OpenVMS System Management Utilities Reference Manual: A-L*.

7.8.2 Setting Up the Queue Manager and Default Queues

The initial installation of OpenVMS does not create the queue manager or any queues. HP recommends that you create the queue manager and your default batch and print queues now. When you install layered products (as described in Section 7.15), some of these products expect such queues to be present or try to create queues themselves.

NOTE Normally, you create a queue manager only once. The system stores the START QUEUE command in the queue database to enable the queue manager to start automatically whenever the system reboots. If the queue manager has been started before on your system, do not specify this START QUEUE command again; the /NEW_VERSION qualifier causes your system to overwrite your current queue database files.

To configure shared files on multiple system disks or off the system disk, edit the SYS$MANAGER:SYLOGICALS.COM file as described in *HP OpenVMS System Manager's Manual, Volume 1: Essentials*.

To set up the queue manager and a batch queue, enter the following commands at the DCL prompt:

```
$ START QUEUE /MANAGER /NEW_VERSION
$ INITIALIZE /QUEUE /START /BATCH SYS$BATCH
```

As noted, the queue manager starts automatically the next time you boot your OpenVMS system. To have the SYS$BATCH queue start automatically, edit the line in the SYS$STARTUP:SYSTARTUP_VMS.COM file that starts the SYS$BATCH queue by removing the exclamation mark (!) and, if present, the extra dollar sign ($). The following example shows the line before and after editing. In that section, you can also define a default system print queue (SYS$PRINT).

Before: `$!$ START /QUEUE SYS$BATCH`

After: `$ START /QUEUE SYS$BATCH`

For more information about starting and creating queues, see the *HP OpenVMS System Manager's Manual, Volume 1: Essentials*.

7.8.3 Configuring a Multihead System (Optional)

A multihead configuration consists of a single system (such as an HP AlphaServer ES40) that supports multiple graphics options. A graphics option consists of a graphics controller (card) and a graphics display interface (monitor).

Your system can be configured automatically for multihead use if you copy the private server setup template file to a command procedure file type (.COM). The DECwindows Motif server loads this command procedure on startup or restart.

To set up your system for multihead support, perform these steps:

Step 1. After installing the DECwindows Motif software on your system, log in to your system.

Step 2. Copy the private server setup template file to a new .COM file by entering the following command:

```
$ COPY SYS$MANAGER:DECW$PRIVATE_SERVER_SETUP.TEMPLATE
_To: SYS$MANAGER:DECW$PRIVATE_SERVER_SETUP.COM
```

Step 3. Restart the DECwindows server by entering the following command:

```
$ @SYS$STARTUP:DECW$STARTUP RESTART
```

For more information about customizing your DECwindows environment using the SYS$MANAGER:DECW$PRIVATE_SERVER_SETUP.COM file, see the most recent version of the *DECwindows Motif for OpenVMS Installation Guide* and *Managing DECwindows Motif for OpenVMS Systems*.

7.8.4 Configuring DECnet

If you installed DECnet, or if you added DECnet during an upgrade, you must now configure DECnet. Follow the instructions provided for the version of DECnet you installed. To use either version of DECnet, you must first register and load the license for the product. If you have not yet done this, perform the steps described in Section 7.3.

If you installed DECnet-Plus for OpenVMS software, see the *DECnet-Plus for OpenVMS Release Notes* and the *HP DECnet-Plus for OpenVMS Installation and Configuration* manual for information about how to configure this software using the NET$CONFIGURE procedure.

If you installed DECnet Phase IV, see the *DECnet for OpenVMS Guide to Networking* manual for information about configuring this software using the NETCONFIG command procedure.

Once you have configured DECnet Phase IV, edit SYS$COMMON:[SYSMGR]SYSTARTUP_VMS.COM so that the software starts when the system reboots. (This step is not required if you are running DECnet Phase V.) You can have the software start interactively or in batch mode by making one of the following changes:

Interactive mode:	**Before**: `$!$ START/NETWORK DECNET`
	After: `$ START/NETWORK DECNET`
Batch mode:	**Before**: `$!$ SUBMIT SYS$MANAGER:STARTNET.COM`
	After: `$ SUBMIT SYS$MANAGER:STARTNET.COM`

IMPORTANT If you intend to run DECnet Phase IV with a TCP product, DECnet must start first. In this case, HP recommends starting DECnet using interactive mode.

For information about editing STARTUP-VMS.COM, see Section 7.18.

7.8.5 Configuring HP TCP/IP Services for OpenVMS

If you plan to run TCP/IP Services for OpenVMS software, note the following:

- After you register and load the license for TCP/IP Services for OpenVMS software, configure your system for networking by executing the interactive command procedure SYS$MANAGER:TCPIP$CONFIG.COM. Be sure to consult Chapter 3 of the *HP TCP/IP Services for OpenVMS Installation and Configuration* manual for specifics about configuring TCP/IP Services for OpenVMS, and to Chapter 4 of that manual for specifics about configuring IPv6 support.
- After completing the configuration, edit the command pertaining to TCP/IP Services for OpenVMS in SYS$COMMON:[SYSMGR]SYSTARTUP_VMS.COM (as instructed in Section 7.18) so that the TCP/IP Services software starts automatically when your system is rebooted.

IMPORTANT Do not configure TCP/IP Services for OpenVMS without first starting the queue manager.

7.8.6 Installing and Configuring Third-Party Networking Software

You need networking software to download patches and as a requirement for certain layered products. If you are using neither DECnet nor TCP/IP Services for OpenVMS, you should install and configure third-party networking software now. See the appropriate vendor's product documentation.

7.9 Initializing or Configuring Installed Optional Components

Initialize and/or configure any of the following products as necessary, following the instructions in the sections indicated:

- CDSA (Section 7.9.1)
- Availability Manager (Section 7.9.2)
- Kerberos (Section 7.9.3)
- SSL for OpenVMS (Section 7.9.4)
- WBEM Services for OpenVMS (Section 7.9.5)
- Instant Capacity (iCAP) software (Section 7.9.6)
- Pay per use (PPU) software (Section 7.9.7)
- Performance Data Collector base software, TDC_RT (Section 7.9.8)
- OpenVMS Management Station (Section 7.9.9)

7.9.1 Initializing CDSA (Optional)

The Common Data Security Architecture (CDSA) software is installed, configured, and initialized automatically with the operating system installation or upgrade. CDSA is required for Secure Delivery purposes and other security features; otherwise, use of CDSA is not required.

Note that if you installed a new CDSA kit without upgrading the base operating system, you must enter the following command to initialize CDSA prior to its first use. Enter the command from an account that has both SYSPRV and CMKRNL privileges (for example, the SYSTEM account).

```
$ @SYS$STARTUP:CDSA$UPGRADE
```

The following is an example of the output you might see:

```
@sys$startup:cdsa$upgrade
Module uninstalled successfully.
Module uninstalled successfully.
Module uninstalled successfully.
Module uninstalled successfully.
Module uninstalled successfully.
Module uninstalled successfully.

CDSA-I-Init, CDSA has previously been initialized on this system.
CDSA-I-Init, Re-initializing CDSA.

CDSA-I-Init, Initializing CDSA
MDS installed successfully.
Module installed successfully.
Module installed successfully.
Module installed successfully.
Module installed successfully.
Module installed successfully.
Module installed successfully.
Module installed successfully.
Module installed successfully.
Module installed successfully.
```

```
Module installed successfully.
Module installed successfully.
CDSA-I-Init, CDSA Initialization complete
CDSA-I-Init, Initializing Secure Delivery
Install completed successfully.
Install completed successfully.
Module installed successfully.
Module installed successfully.
CDSA-I-Init, Secure Delivery Initialization complete
```

NOTE Do not attempt to explicitly remove CDSA from your system. The PRODUCT REMOVE command is not supported for CDSA although there appears to be an option to remove CDSA. CDSA is installed with the operating system and is tightly bound with it. Attempts to remove it do not work cleanly and can create undesirable side effects. An attempt to remove it results in a message similar to the following:

```
%PCSI-E-HRDREF, product HP I64VMS CDSA V2.2 is referenced by HP I64VMS OPENVMS
V8.3

   The two products listed above are tightly bound by a software dependency.
   If you override the recommendation to terminate the operation, the
   referenced product will be removed, but the referencing product will have
   an unsatisfied software dependency and may no longer function correctly.
   Please review the referencing product's documentation on requirements.

   Answer YES to the following question to terminate the PRODUCT command.
   However, if you are sure you want to remove the referenced product then
   answer NO to continue the operation.

 Terminating is strongly recommended. Do you want to terminate? [YES]
```

For more information about CDSA, see *HP Open Source Security for OpenVMS, Volume 1: Common Data Security Architecture*.

7.9.2 Configuring the Availability Manager Base Software (Optional)

The Availability Manager base kit is installed automatically with the operating system. However, use of Availability Manager is not required. If you do not plan to use Availability Manager or any products that depend on it, skip to the next section.

The files in the Availability Manager base kit make up what is called the Data Collector. The Data Collector is used to collect data for the Availability Manager and DECamds products. To display the data, you need to install an Availability Manager Data Analyzer kit on a node in the local LAN. The kit is included in the OpenVMS upgrade media, or you can obtain it from the following Web site:

`http://www.hp.com/products/openvms/availabilitymanager`

The base kit files are the same files that have been provided with the OpenVMS installation kit since Version 7.2. The only change for OpenVMS Version 8.2 and higher is that these files are now installed as a required product rather than being an optional software product in the operating system kit. Procedures for configuring and using these files remain unchanged.

For more information about how to configure and use the files in the Availability Manager base kit, see the section "Performing Postinstallation Tasks" in the Availability Manager installation instructions for OpenVMS (*HP Availability Manager Installation Instructions*). This and other Availability Manager documents are available at:

```
http://www.hp.com/products/openvms/availabilitymanager
```

NOTE Do not attempt to explicitly remove the Availability Manager from your system. The PRODUCT REMOVE command is not supported for Availability Manager although there appears to be an option to remove Availability Manager. The Availability Manager base software is installed with the operating system and is tightly bound with it. Attempts to remove it do not work cleanly and can create undesirable side effects. An attempt to remove it results in a message similar to the following:

```
%PCSI-E-HRDREF, product HP I64VMS Availability Manager V8.3 is referenced by HP
I64VMS OPENVMS V8.3

   The two products listed above are tightly bound by a software dependency.
   If you override the recommendation to terminate the operation, the
   referenced product will be removed, but the referencing product will have
   an unsatisfied software dependency and may no longer function correctly.
   Please review the referencing product's documentation on requirements.

   Answer YES to the following question to terminate the PRODUCT command.
   However, if you are sure you want to remove the referenced product then
   answer NO to continue the operation.

 Terminating is strongly recommended. Do you want to terminate? [YES]
```

7.9.3 Configuring Kerberos (Optional)

The Kerberos for OpenVMS software, which is based on MIT Kerberos, is installed automatically with the operating system. However, use of Kerberos is not required. If you do not plan to use Kerberos or any products that depend on Kerberos, skip to the next section.

To configure Kerberos, perform the following steps from a privileged OpenVMS user account (for example, SYSTEM).

Step 1. Run the following command procedure to configure the Kerberos clients and servers:

```
$ @SYS$STARTUP:KRB$CONFIGURE.COM
```

Step 2. Add the following line to your SYLOGIN command procedure or to the LOGIN.COM of each user who will use Kerberos:

```
$ @SYS$MANAGER:KRB$SYMBOLS
```

Step 3. Edit SYS$MANAGER:SYSTARTUP_VMS.COM to remove the exclamation point from the KRB$STARTUP.COM line so that it appears as shown in the following example. (Note that SYSTARTUP_VMS.COM has HP TCP/IP Services for OpenVMS starting before Kerberos. This is required.)

```
$ @SYS$STARTUP:KRB$STARTUP.COM
```

For additional setup and configuration information, see the *HP Open Source Security for OpenVMS, Volume 3: Kerberos* manual. This document contains links to the MIT Kerberos documentation and is available from the OpenVMS Version 8.3 kit.

NOTE Do not attempt to explicitly remove Kerberos from your system. The PRODUCT REMOVE command is not supported for Kerberos although there appears to be an option to remove Kerberos. Kerberos is installed with the operating system and is tightly bound with it. Attempts to remove it do not work cleanly and can create undesirable side effects. An attempt to remove it results in a message similar to the following:

```
%PCSI-E-HRDREF, product HP I64VMS Kerberos V3.0 is referenced by HP I64VMS OPENVMS
V8.3

   The two products listed above are tightly bound by a software dependency.
   If you override the recommendation to terminate the operation, the
   referenced product will be removed, but the referencing product will have
   an unsatisfied software dependency and may no longer function correctly.
   Please review the referencing product's documentation on requirements.

   Answer YES to the following question to terminate the PRODUCT command.
   However, if you are sure you want to remove the referenced product then
   answer NO to continue the operation.

 Terminating is strongly recommended. Do you want to terminate? [YES]
```

7.9.4 Configuring SSL for OpenVMS

The HP SSL for OpenVMS software is installed automatically with the operating system. However, use of SSL is not required. If you do not plan to use SSL or any products that depend on it, skip to the next section.

The SSL$STARTUP.COM command procedure has been added to VMS$LPBEGIN-050 to enable SSL to start automatically.

Add the following line to SYS$MANAGER:SYSHUTDOWN.COM:

```
$ @SYS$STARTUP:SSL$SHUTDOWN.COM
```

If you are upgrading and have an earlier version of SSL installed, copy your SSL$STARTUP.TEMPLATE file (located in SYS$STARTUP) to SSL$STARTUP.COM in the SYS$STARTUP directory.

Several other post-installation and post-upgrade tasks are required, as described in the SSL release notes, available in SYS$HELP:SSL*nnn*.RELEASE_NOTES, where *nnn* is the version of the SSL software, such as 013.

For more information about SSL, see *HP Open Source Security for OpenVMS, Volume 2: HP SSL for OpenVMS*.

NOTE Do not attempt to explicitly remove SSL from your system. The PRODUCT REMOVE command is not supported for SSL although there appears to be an option to remove SSL. SSL is installed with the operating system and is tightly bound with it. Attempts to remove it do not work cleanly and can create undesirable side effects. An attempt to remove it results in a message similar to the following:

```
%PCSI-E-HRDREF, product HP I64VMS SSL V1.3 is referenced by HP I64VMS OPENVMS V8.3

   The two products listed above are tightly bound by a software dependency.
   If you override the recommendation to terminate the operation, the
   referenced product will be removed, but the referencing product will have
   an unsatisfied software dependency and may no longer function correctly.
   Please review the referencing product's documentation on requirements.
```

```
    Answer YES to the following question to terminate the PRODUCT command.
    However, if you are sure you want to remove the referenced product then
    answer NO to continue the operation.

  Terminating is strongly recommended. Do you want to terminate? [YES]
```

7.9.5 Configure WBEM Services for OpenVMS (Optional; I64 only)

If you chose to install WBEM Services for OpenVMS as part of your OpenVMS I64 installation or upgrade, you must now configure the software by following these steps. WBEM Services for OpenVMS is necessary for supporting applications such as Instant Capacity and Pay per use.

Step 1. Enter the following command

```
$ RUN SYS$SYSROOT:[WBEM_SERVICES]WBEM_SERVICES$SETUP
```

This command invokes a utility that initializes the environment for WBEM Services for OpenVMS. It can take four or five minutes to complete, depending on the speed of your computer and disks.

Step 2. The utility prompts you for the root directory where the WBEM Services for OpenVMS environment is to be established, as in the following example. The default is the location where the configuration procedure is running. The files created by the configuration procedure need not be in the same disk or directory as where WBEM Services for OpenVMS was installed.

```
Enter ODS-5 Disk:[VIOLET$DKA0:[SYS0.SYSCOMMON.][WBEM_SERVICES]]:
```

This example assumes the user takes the default location indicated. This is the directory in which the utility creates the Cimserver repository tree. The Cimserver is the WBEM Services for OpenVMS process that runs on the system to support certain applications. The repository, a compiled version of the Common Information Model (CIM) class schema, requires an ODS-5 formatted disk (the repository uses UNIX-style file names, which are not supported on ODS-2 formatted disks).

Step 3. Next, the utility creates SYS$STARTUP:WBEM_SERVICES$STARTUP.COM, which will define system logicals for the WBEM Services for OpenVMS environment, as indicated by the following message generated by the utility. If you see the "WARNING - WARNING" delimiters to the message as in this example, you can disregard them; the message is intended for informational purposes only; no response is necessary.

```
********* WARNING - WARNING **********

This program creates SYS$STARTUP:WBEM_SERVICES$STARTUP.COM which
will define the following system logicals:

   PEGASUS_HOME as  /violet$dka0/sys0/syscommon/wbem_services
   WBEM_VAR as violet$dka0:[sys0.syscommon.][wbem_services.var.]
   WBEM_ETC as sys$common:[wbem_services.etc.]
   WBEM_OPT as sys$common:[wbem_services.opt.]
   WBEM_LIB as sys$library

********* WARNING - WARNING *********
```

The WBEM_SERVICES$SETUP utility is a UNIX application ported to OpenVMS, which explains why the PEGASUS_HOME logical includes UNIX directory syntax. In addition, the WBEM_VAR, WBEM_ETC, and WBEM_OPT logicals define UNIX-style root directories (`var`, `etc`, and `opt`). WBEM_LIB points to the location of the WBEM providers. Disk and directory locations in this message reflect your response to the prompt in step 2.

The utility also creates SYS$COMMON:[WBEM_SERVICES]WBEM_SERV_STARTUP.COM, which WBEM users can add to their LOGIN.COM file, as indicated in the following example:

```
This program creates SYS$COMMON:[WBEM_SERVICES]WBEM_SERV_STARTUP.COM
which WBEM users can add to their login.com.

Do you want to continue with this setup (Y/N) {Y}?
```

Step 4. Continue the procedure by pressing **Enter**.

Step 5. If you choose to continue, a message informs you that the repository is being restored. To save time, the repository is being restored from a backup save set. The restore process could take up to four or five minutes. When this completes, the Cimserver environment setup is complete.

Step 6. Next, you are asked whether the Cimserver should be started:

```
Do you want to start the Cimserver now (Y/N) {Y}?:
```

Cimserver must be running to enable your system to take advantage of Instant Capacity or Pay per use services. You can start Cimserver now or perform other postinstallation or postupgrade tasks first, and then start Cimserver.

Step 7. To ensure that Cimserver is started automatically at each reboot, add the following line to SYS$MANAGER:SYSTARTUP_VMS.COM:

```
$ @SYS$STARTUP:WBEM_SERVICES$STARTUP.COM
```

For more information about HP WBEM products, see the following Web site:

`http://www.hp.com/go/wbem`

7.9.6 Configure the Instant Capacity Software (Optional; I64 only)

Instant Capacity (iCAP) software is supported on cell-based Integrity servers.

If you choose to use Instant Capacity, configure the software by entering the following command:

```
$ @SYS$MANAGER:ICAP$CONFIG.COM
```

For more information about configuring and using Instant Capacity, see the *HP Instant Capacity User's Guide* on the following Web site:

`http://docs.hp.com/en/hplex.html#Utility%20Pricing`

7.9.7 Configure the Pay per use Software (Optional; I64 only)

Pay per use (PPU) software is supported on cell-based Integrity servers leased from HP Finance.

If you choose to use Pay per use, configure the software by entering the following command:

```
$ @SYS$MANAGER:PPU$CONFIG.COM
```

For more information about configuring and using Pay per use, see the *HP Pay per use User's Guide* on the following Web site:

http://docs.hp.com/en/hplex.html#Utility%20Pricing

7.9.8 Initializing and Running the Performance Data Collector Base Software (Optional)

The Performance Data Collector for HP OpenVMS (TDC) collects and manages configuration and performance data for analysis by other applications. TDC_RT Version 2.2 is a run-time only (base) variant of the TDC software that is installed automatically with the OpenVMS operating system for use on specific operating system platforms.

Use of the TDC_RT software is not required. If you do not plan to use TDC_RT or any products that depend on it, you can skip to the next section.

TDC_RT does not run automatically when the system starts, but any suitably privileged user can start the software manually. This section includes information about system parameters, privileges and quotas, startup, and installation in OpenVMS Clusters.

NOTE Do not attempt to explicitly remove TDC_RT from your system. The PRODUCT REMOVE command is not supported for TDC_RT although there appears to be an option to remove it. TDC_RT is installed with the operating system and is tightly bound with it. HP or third-party applications might require TDC_RT. Attempts to remove it do not work cleanly and can create undesirable side effects. An attempt to remove it results in a message similar to the following:

```
%PCSI-E-HRDREF, product HP TDC_RT V2.2 is referenced by HP I64VMS OPENVMS V8.3

   The two products listed above are tightly bound by a software dependency.
   If you override the recommendation to terminate the operation, the
   referenced product will be removed, but the referencing product will have
   an unsatisfied software dependency and may no longer function correctly.
   Please review the referencing product's documentation on requirements.

   Answer YES to the following question to terminate the PRODUCT command.
   However, if you are sure you want to remove the referenced product then
   answer NO to continue the operation.

 Terminating is strongly recommended. Do you want to terminate? [YES]
```

7.9.8.1 User Privileges and Quotas

Users of TDC_RT require various privileges, depending on the types of data to be collected. Online help is available when running the collector application and specifies the privileges required to collect each type of data. Enabling the following set of privileges enables collection of all data items: CMKRNL, LOG_IO, NETMBX, PHY_IO, SYSLCK, SYSPRV, WORLD.

Users of the product also require working set quotas (WSQUO) greater than the following:

6000 pagelets on Alpha systems
7000 pagelets on I64 systems

7.9.8.2 Startup File

TDC_RT provides a startup file that should be launched during system startup. The startup file defines several logical names required for use of the product, but the startup file does not actually start the data collector.

Add the following line to SYS$MANAGER:SYSTARTUP_VMS.COM:

```
$ @SYS$STARTUP:TDC$STARTUP
```

To directly run TDC$STARTUP.COM, SYSNAM privilege is required.

7.9.8.3 Compatibility with Prior Releases

Note the following about prior releases of TDC software.

- TDC Version 1.*n*

  For users of some third-party system-management applications, TDC Version 1.*n* was distributed by web download. Applications developed using TDC Version 1.*n* will not work with TDC Version 2.2 software until they are rebuilt using the TDC Version 2.2 Software Developer's Kit (SDK). You can obtain this SDK kit from the following Web site:

  `http://www.hp.com/products/openvms/tdc/`

  Data files created using TDC Version 1.*n* cannot be read by TDC_RT Version 2.2. Data files created using TDC_RT Version 2.2 cannot be read using TDC Version 1.*n*.

  When TDC_RT Version 2.1 or any newer version of TDC is installed, files associated with TDC Version 1.*n* are not removed. In any case, TDC_RT Version 2.1 (or higher) and TDC Version 1.*n* can safely coexist on a system. You can remove the older TDC files by uninstalling TDC (use the DCL command PRODUCT REMOVE).

- TDC Version 2.0

  TDC Version 2.0 was released for use on OpenVMS Alpha Version 7.3-2 systems. Prior to installing the current release of OpenVMS Alpha, you should have removed TDC Version 2.0 from your system. (When you install the current version of TDC from the Web site mentioned in this section, the Version 2.0 files are removed automatically.)

  Applications developed using TDC Version 2.0 will not work with TD_RTC Version 2.2 until they have been rebuilt using the TDC Version 2.2 Software Developer's Kit (SDK).

  Software developers relying on the Software Developer's Kit (SDK) provided with TDC Version 2.0 should obtain the updated SDK that is included with the latest complete Performance Data Collector kit. You can obtain that kit from the following Web site:

  `http://www.hp.com/products/openvms/tdc/`

  Data files created using TDC Version 2.0 cannot be read by TDC_RT Version 2.2. Data files created using TDC_RT Version 2.2 cannot be read using TDC Version 2.0.

- TDC Version 2.1

  With one known exception, applications developed using TDC Version 2.1 should continue to work with TDC_RT Version 2.2; however, they will not be able to access the new TDC features or data. HP Enterprise Capacity and Performance (ECP) Version 5.5 specifically requires TDC/TDC_RT Version 2.1 as its data collector with OpenVMS Version 8.2 or later. For interoperability with TDC/TDC_RT Version 2.2 or later, ECP must be upgraded to Version 5.6A or later.

  TDC_RT Version 2.2 should be able to read data files created using TDC Version 2.1. However, data files created using TDC_RT Version 2.2 are not readable by TDC Version 2.1 software.

Files shared by TDC_RT Version 2.2 and TDC Version 2.1 are updated; these files are the documentation and support files listed in SYS$COMMON:[TDC]README.TXT as common to all kit variants. Image files installed with TDC Version 2.1 are retained in their installed locations. The TDC Version 2.1 SDK (if installed) and any additional documentation files installed with TDC Version 2.1 are retained. You can continue to use the TDC Version 2.1 SDK to develop software to interact with TDC; however, you must download and install the TDC Version 2.2 kit (including its SDK) to access new data records and features.

Running SYS$STARTUP:TDC$STARTUP.COM causes the TDC_RT Version 2.2 images (instead of the Version 2.1 images) to be used at runtime.

You can remove TDC Version 2.1 without affecting the integrity of the TDC_RT Version 2.2 installation.

- TDC Version 2.2 on an earlier version of OpenVMS

  If you upgrade to OpenVMS Version 8.3 from an earlier version of OpenVMS on which TDC Version 2.2 was installed, files shared by TDC_RT Version 2.2 and TDC Version 2.2 are updated; these files are the documentation and support files listed in SYS$COMMON:[TDC]README.TXT as common to all kit variants. Unless the TDC and TDC_RT kits share the same baselevel number (for example, 102), image files installed with TDC Version 2.2 are retained in their installed locations. Most likely, the downloaded TDC Version 2.2 software will be more recent (higher baselevel number) than the TDC_RT Version 2.2 software installed with OpenVMS Version 8.3. The TDC Version 2.2 SDK (if installed) and any additional documentation files installed with TDC Version 2.2 are retained.

  Running SYS$STARTUP:TDC$STARTUP.COM causes the most recent TDC/TDC_RT Version 2.2 images to be used at runtime, regardless of whether they were installed with TDC Version 2.2 or with TDC_RT Version 2.2.

  You can remove TDC Version 2.2 without affecting the integrity of the TDC_RT Version 2.2 installation if their baselevel numbers differ.

- TDC_RT Version 2.1

  When you upgrade to OpenVMS Version 8.3 from OpenVMS Version 8.2 or 8.2-1, TDC_RT Version 2.2 completely supersedes TDC_RT Version 2.1; all files shared by the two releases are updated appropriately, and any files used by TDC_RT Version 2.1 that are not also used by TDC_RT Version 2.2 are removed from the system.

As of OpenVMS Version 8.2 of OpenVMS, TDC and TDC_RT use the same naming scheme for image files. A build number is tagged to the image file names. For example, if the version of TDC_RT that ships with your operating system is Version 2.1-60 (where 60 is the build number), then the files that are installed will have names such as TDC$APISHR$A_V830-0060.EXE, where $A denotes Alpha ($I denotes I64), V830 denotes the version of OpenVMS (8.3), and 0060 is the build number. The SYS$STARTUP:TDC$STARTUP.COM startup file, which is also identical for both TDC and TDC_RT, uses this build number to determine which image files to use. When a subsequent installation is performed with software that has higher build numbers, the TDC$STARTUP.COM startup file uses the image files with the highest build number appropriate for the current platform.

7.9.8.4 Running TDC_RT

To run the collector application, users can enter the TDC command at the DCL prompt. But first, because the TDC command is not included in the system command table SYS$LIBRARY:DCLTABLES.EXE, each user must add the command to their table by entering the following command at the DCL prompt:

```
$ SET COMMAND SYS$COMMON:[TDC]TDC$DCL
```

Each user can add this SET command to their LOGIN.COM file. However, because elevated privileges are required for most data collection operations, it might not be appropriate to add this command to SYS$MANAGER:SYLOGIN.COM.

To start the collector application, enter the TDC command:

```
$ TDC
```

For more information about running the application, see the file SYS$COMMON:[TDC]TDC_README.TXT. Release notes are located in the file SYS$COMMON:[TDC]TDC_RELEASE_NOTES.TXT. See both of these files before running the collector application.

7.9.8.5 Installation in OpenVMS Clusters

TDC_RT is installed in SYS$COMMON:[TDC] by default. Included are only those files required to run the data collector with the particular operating system version it was distributed with. Once TDC_RT is installed and SYS$STARTUP:TDC$STARTUP.COM has been run on each cluster member, then all cluster members in a single-version, single-architecture OpenVMS Cluster should be able to run the software.

For mixed-version and mixed-architecture clusters, you should obtain and install a complete Performance Data Collector kit (TDC Version 2.2) from the following Web site:

`http://www.hp.com/products/openvms/tdc`

The complete kit provides an SDK and run-time environments for all supported OpenVMS configurations. It supports installation on a clusterwide basis in mixed-version and mixed-architecture OpenVMS Clusters.

7.9.9 Preparing to Use OpenVMS Management Station (Optional)

If you installed the OpenVMS Management Station software on your system (either by accepting all default values or by selecting the component manually during the installation or upgrade procedure), you must perform several tasks on your OpenVMS system and your PC before you can use OpenVMS Management Station. These tasks include the following:

- Editing system files
- Starting OpenVMS Management Station on other nodes
- Verifying that you have the proper memory, disk space, media, and the required software to install and run OpenVMS Management Station on your PC
- Installing the client software on your PC
- Defining DECnet nodes (after a new installation only)

For complete information about preparing your OpenVMS system and your PC to run the OpenVMS Management Station server and client software, see Appendix G.

7.9.10 Installing OpenVMS Debugger Clients on a PC (Optional)

The latest version of the OpenVMS Debugger runs on OpenVMS Alpha and I64 systems. The debug server runs on OpenVMS, while a debug client, which is the user interface to the server, runs on OpenVMS and on Microsoft® Windows® 95, Windows 98, Windows NT®, Windows 2000, and Windows XP. There is no special installation procedure for the components that run on OpenVMS. The installation guide and kit for the OpenVMS debugger client is located on the Layered Products CD that comes with the OpenVMS binary CD set. The directory on the CD is DEBUG_CLIENTS011. The KIT.DIR subdirectory contains the following files:

```
40COMUPD.EXE
DEBUGX86011.EXE
```

For installation instructions, see the INSTALLATION_INFO.PS or INSTALLATION_INFO.TXT file in the DOCUMENTATION.DIR subdirectory.

7.10 Creating a System-Specific Login Welcome Message (Optional)

You can use SYS$WELCOME to display a system-specific welcome message at login. The message could inform users of scheduled down time, recent updates to the system, whom to contact about system problems, and so forth. A template file is provided by the operating system. To create your own SYS$WELCOME file, do the following:

Step 1. Copy the template file using the following command:

```
$ COPY SYS$MANAGER:WELCOME.TXT SYS$SPECIFIC:[SYSMGR]WELCOME.TXT
```

For a clusterwide welcome message, you can copy the file to SYS$COMMON:[SYSMGR].

Step 2. Replace the text in SYS$SPECIFIC:[SYSMGR]WELCOME.TXT with text specific to your system.

Step 3. Edit SYS$MANAGER:SYSTARTUP_VMS.COM to remove the exclamation point (!) from the line that defines SYS$WELCOME.

If you do not want to use a node-specific welcome file, you can optionally define the logical in SYS$MANAGER:SYSTARTUP_VMS.COM to display a message, such as in the following example:

```
$ DEFINE SYS$WELCOME "Welcome to node HOMER"
```

For more information about creating login welcome messages, see the *HP OpenVMS System Manager's Manual, Volume 1: Essentials*.

7.11 Examining Your Command Procedures (Upgrades Only)

The upgrade procedure retains the site-specific versions of the following files located in the [VMS$COMMON] directory:

```
[SYSMGR]LAT$SYSTARTUP.COM
[SYSMGR]LOGIN.COM
[SYSMGR]SYCONFIG.COM
[SYSMGR]SYLOGICALS.COM
[SYSMGR]SYLOGIN.COM
[SYSMGR]SYPAGSWPFILES.COM
[SYSMGR]SYSECURITY.COM
[SYSMGR]SYSHUTDWN.COM
[SYSMGR]SYSTARTUP_VMS.COM
[SYSMGR]TFF$SYSTARTUP.COM
[SYSMGR]WELCOME.TXT
[SYS$STARTUP]ESS$LAST_STARTUP.DAT
```

The upgrade procedure might provide new templates for some of these files with the .TEMPLATE file extension. The new templates might include features that are not in your site-specific files. Check the templates against your site-specific files and edit your files as necessary.

NOTE With Version 8.3 of OpenVMS, the DCL command DECRAM has been removed because it conflicts with the new DECRYPT command (DECRYPT overwrites the default definition of DECR, which you might have been using to run DECram). You should update any command procedures that use the DECRAM command so that they use the foreign command style of DCL to run DECRAM:

```
$ DECRAM == "$MDMANAGER"
```

This change affects only the use of the DCL command; all other aspects of the DECram product remain the same.

7.12 Adding and Removing Operating System Files (Optional)

If you decide after the installation or upgrade to change which OpenVMS operating system files you want installed on your system, you can use the menu system contained on the OpenVMS operating system media to add or remove files.

NOTE You can obtain information about individual system files by entering the HELP SYSTEM_FILES command at the dollar sign prompt ($).

IMPORTANT Unless you have a specific need to exclude operating system files from your system disk, HP strongly recommends that you accept the defaults and install all files that are part of OpenVMS. In general, limited disk space is not a good reason to exclude files; problems encountered when needed files are missing can cost much more than the cost of a larger disk.

To add or remove operating system files:

Step 1. Mount and boot the OpenVMS operating system media.

Step 2. Choose option 1 on the menu.

Step 3. Choose the PRESERVE option.

Step 4. Enter the name of the device that contains the system disk and answer the questions.

Step 5. After you answer the question "Do you want detailed descriptions?," information regarding reconfiguring or reinstalling is displayed. Read the instructions, then choose the desired entry on the menu of options.

The following is a sample display:

```
Please choose one of the following:

    1)  Upgrade, install or reconfigure OpenVMS I64 Version 8.3
    2)  Display layered products that this procedure can install
    3)  Install or upgrade layered products
    4)  Show installed products
    5)  Reconfigure installed products
```

```
        6)  Remove installed products
        7)  Find, Install, or Undo patches; Show or Delete recovery data
        8)  Execute DCL commands and procedures
        9)  Shut down this system

Enter CHOICE or ? for help: (1/2/3/4/5/6/7/8/9/?) 1
    ************************************************************

  .
  .
  .

Do you want to INITIALIZE or to PRESERVE? [PRESERVE] PRESERVE


  .
  .
  .
    Version 8.3 of the OpenVMS operating system is already installed
    on the target disk.  You may choose one of the following actions:

    o Reconfigure the OpenVMS platform.

      This action will allow you to change your selections of which
      of the windowing and network products you included with your
      OpenVMS operating system installation.

    o Reconfigure the OpenVMS operating system.
      This action will allow you to change your choices about which
      options you included for the OpenVMS operating system.

    o Reinstall the OpenVMS operating system.

      This action will cause ALL operating system  files to be replaced.
      You can also change your choices about which options you included
      for the OpenVMS operating system.

      Reinstall will take longer than Reconfigure.  Reinstall may be
      appropriate if you suspect that files in the operating system,
      or in the windowing and network products have become corrupted.

    If you want to reinstall any of the windowing and network products,
    choose "Install or upgrade layered products" from the main menu.

    If you want to change your choices about which options you included
    for any of the windowing and network products, choose "Reconfigure
    installed products" (option 5) from the main menu.

    Please choose one of the following:

        1)  Reconfigure the OpenVMS platform.
        2)  Reconfigure the OpenVMS operating system.
        3)  Reinstall the OpenVMS operating system.
```

```
          4)  Return to the Main Menu (abort the upgrade/installation).


Enter choice or ? for help: (1/2/3/4/?) 2
The following product has been selected:
    HP I64VMS VMS V8.3                Operating System


Configuration phase starting ...

You will be asked to choose options, if any, for each selected product
and for any products that may be installed to satisfy software dependency
requirements.

HP I64VMS OPENVMS V8.3: OpenVMS and related products Platform

     COPYRIGHT 1976, 5-JUN-2006
     Hewlett-Packard Development Company, L.P.


Do you want the defaults for all options? [YES] NO
```

Answer NO to this question as shown, and select the options you want, as described in step 19 of the installation procedure in Section 3.3.3 (Figure 3-1 on page 76 shows a list of the component options). After you respond to the prompts, the display continues and the installation procedure completes. The following is a continuation of the sample display:

```
    Do you want to review the options? [NO]

Execution phase starting ...
The following product will be reconfigured:
    HP I64VMS VMS V8.3
Portion done: 0%...10%...20%...30%...40%...50%...60%...80%...90%...100%
The following product has been reconfigured:
    HP I64VMS VMS V8.3
  .
  .
  .
```

For detailed instructions on how to remove the OpenVMS operating system from your disk, see Appendix H.

7.13 Expanding the System Libraries (Optional; OpenVMS Alpha Only)

Libraries included with the OpenVMS Alpha operating system kit are in data-reduced (compressed) format. Unless disk space is limited, HP recommends expanding (decompressing) these libraries to give the system faster access to them.

The libraries included with the OpenVMS I64 operating system kit are in expanded (uncompressed) format. HP recommends keeping the libraries in expanded format. Compressing them can hinder system performance. However, you can compress any of these libraries if necessary.

To expand libraries that are in data-reduced format or compress libraries that are in expanded format, use the OpenVMS Library Decompression utility (LIBDECOMP.COM). The utility runs on both OpenVMS Alpha and I64 systems. To run the utility, enter the following command:

```
$ @SYS$UPDATE:LIBDECOMP
```

For additional information about the utility, you can request help by entering the following command:

```
$ @SYS$UPDATE:LIBDECOMP HELP
```

You can list the sizes and format (reduced or expanded) of the libraries by using the following command:

```
$ @SYS$UPDATE:LIBDECOMP LIST
```

For complete information about expanding and reducing system library files and using LIBDECOMP.COM, see the *HP OpenVMS System Manager's Manual, Volume 2: Tuning, Monitoring, and Complex Systems*.

Table 7-2 lists the libraries that ship on OpenVMS Version 8.3 and shows the approximate sizes of the libraries in both data-reduced (compressed) and expanded format. Note that library sizes differ for Alpha and I64 systems.

NOTE File sizes are subject to change. In addition, layered products and user applications might add entries to the HELPLIB.HLB and STARLET.OLB libraries. The sizes listed in Table 7-1 do not reflect such entries. For the most accurate information, run the Library Decompression utility on your own system and review the output from the list function.

The LIBDECOMP.COM utility lists the following libraries as "Library not present":

- [SYSLIB]SYSBLDMLB.MLB
- [SYSLIB]DECCRTL.OLB
- [SYSLIB]SYSBLDLIB.OLB

These libraries are not used with OpenVMS Alpha or OpenVMS I64; they are used with OpenVMS VAX only. These libraries are omitted from Table 7-2.

Table 7-2 Reduced and Expanded Sizes of Libraries

Library Name/Description	OpenVMS Alpha		OpenVMS I64	
	Reduced Size (as shipped)	Expanded Size	Reduced Size	Expanded Size (as shipped)
[SYSHLP] directory; Help library files (.HLB)				
ACLEDT.HLB Access Control List Editor help	70	102	70	103
BKM$HELP.HLB Backup Manager help	156	248	156	251

Table 7-2 Reduced and Expanded Sizes of Libraries (Continued)

Library Name/Description	OpenVMS Alpha		OpenVMS I64	
	Reduced Size (as shipped)	Expanded Size	Reduced Size	Expanded Size (as shipped)
DBG$HELP.HLB OpenVMS Debugger help	1237	2144	1237	2164
DBG$UIHELP.HLB OpenVMS Debugger help	271	441	271	465
EDTHELP.HLB EDT Editor help	154	229	154	233
EVE$HELP.HLB EVE Editor help	676	1197	676	1177
EVE$KEYHELP.HLB EVE Keypad help	99	145	99	148
EXCHNGHLP.HLB Exchange Utility help	83	118	83	118
HELPLIB.HLB[a] DCL help (see footnote at end of table)	10055	18701	10830	21426
LANCP$HELP.HLB LAN Control Program help	116	169	113	163
LATCP$HELP.HLB LAT Control Program help	157	243	157	243
MAILHELP.HLB Mail Utility help	211	316	211	316
NCPHELP.HLB Network Control Program help	262	412	262	412
SDA.HLB System Dump Analyzer help	384	581	384	587
SHWCLHELP.HLB Show Cluster Utility help	88	127	88	127
SYSGEN.HLB System Generation Utility help	369	582	366	578
SYSMANHELP.HLB System Management Utility help	539	871	559	907
TPUHELP.HLB Text Processing Utility help	575	1036	575	1015
UAFHELP.HLB Authorize Utility help	253	391	249	384
[SYSLIB] directory; Macro library files (.MLB)				

Table 7-2 Reduced and Expanded Sizes of Libraries (Continued)

Library Name/Description	OpenVMS Alpha		OpenVMS I64	
	Reduced Size (as shipped)	Expanded Size	Reduced Size	Expanded Size (as shipped)
LANIDEF.MLB LAN internal driver macros	196	261	196	275
LIB.MLB Operating system macros	3039	5254	3226	5515
STARLET.MLB Operating system macros	2558	3827	2595	3576
[SYSLIB] directory; Object library files (.OLB)				
STARLET.OLB[a] System object library and run-time library	30664	49858	69916	116397
VAXCRTL.OLB HP C RTL routine name entry points; VAX G_floating double-precision, floating-point entry points	1271	1689	Not included	
VAXCRTLD.OLB Limited support of VAX D_floating double-precision, floating-point entry points	1732	2802	Not included	
VAXCRTLDX.OLB VAX D_floating support; support for /L_DOUBLE_SIZE=128 compiler qualifier	1663	2648	Not included	
VAXCRTLT.OLB IEEE T_floating double-precision, floating-point entry points	1578	2491	Not included	
VAXCRTLTX.OLB IEEE T_floating support; support for /L_DOUBLE_SIZE=128 compiler qualifier	1596	2493	Not included	
VAXCRTLX.OLB G_floating support; support for /L_DOUBLE_SIZE=128 compiler qualifier	1422	2003	Not included	
VMS$VOLATILE_PRIVATE_INTERFACES.OLB OpenVMS bugcheck processing codes	601	873	1519	2121
[SYSLIB] directory; Text library files (.TLB)				
BASIC$STARLET.TLB BASIC language variant of the STARLET library, containing version-independent declarations for system services	3896	8129	3865	8197
ERFLIB.TLB ANALYZE ERROR device descriptions	64	85	Not included	
LIB_ADA_SUBSET.TLB Ada programmers toolkit of operating system definitions	1915	3535	1914	3615

Table 7-2 Reduced and Expanded Sizes of Libraries (Continued)

Library Name/Description	OpenVMS Alpha		OpenVMS I64	
	Reduced Size (as shipped)	Expanded Size	Reduced Size	Expanded Size (as shipped)
NTA.TLB Windows NT definition files	34	42	34	52
STARLETPAS.TLB Pascal language variant of the STARLET library, containing version-independent declarations for system services	3817	8959	3802	8967
STARLET_RECENT_ADA_SUBSET.TLB Ada programmers toolkit of operating system definitions	1144	2030	1144	2058
STARLETSD.TLB Language-independent STARLET definitions used during layered product installations	4328	7758	4297	7936
SYS$LIB_C.TLB C language variant of the LIB library, containing internal and version-dependent declarations for system services	10544	22218	17356	35869
SYS$STARLET_C.TLB C language variant of the STARLET library, containing version-independent declarations for system services	6324	13694	6559	14130
TOTALS:	**94141**	**168857**	**132963**	**239525**

a. Layered products and user applications might add entries to the HELPLIB.HLB and STARLET.OLB libraries. The sizes listed in this table do not reflect such additional entries.

7.14 Installing Patches (Optional but Recommended)

HP recommends installing any relevant OpenVMS and networking patches that are available. Most patches are optional, but some layered products might require one or more patches on the system before their software is installed. For more information about patches that might be required on your system, see the *HP OpenVMS Version 8.3 Release Notes*.

As of Version 8.3 of OpenVMS, patch files are validated using the Secure Delivery feature. Each patch file includes an associated digital signature file (also referred to as a manifest) that is used to validate the patch file. This validation involves authenticating the originator (HP, in this case) and verifying the contents of the file.

To download and install OpenVMS patches, do the following:

NOTE HP strongly recommends backing up your system disk before installing patches.

Step 1. Create a directory on a nonsystem disk called [PATCHES] and set default to that directory.

Step 2. Enter the following command at the system prompt:

```
$ FTP FTP.ITRC.HP.COM
```

Step 3. Log in as an anonymous user (user name: anonymous). The password is your e-mail address.

Step 4. Once you are logged in, enter the `bin` command at the FTP> prompt to get into binary mode, as in the following example. Binary mode is necessary for downloading patches correctly. Enter commands in this and the following steps in the exact case shown (lowercase or uppercase).

```
FTP> bin
200 Type is set to I.
```

Step 5. Enter the command PASSIVE ON, as in the following example:

```
FTP> passive on
Passive is on.
```

Step 6. Move to the directory containing the patches by entering the command cd openvms/openvms_patches/*os*, where *os* is the operating system (specify either i64 or alpha). For example, to move to the directory containing patches for the OpenVMS I64 operating system, enter the following command:

```
FTP> cd openvms_patches/i64
250 CWD command successful.
```

For TCP/IP Services or DECnet patches, use the command `cd openvms/layered_products/`*os*, where *os* is either alpha or i64. For example:

```
FTP> cd layered_products/i64
250 CWD command successful.
```

Step 7. Move to the directory that corresponds to the version of OpenVMS for which you want patches. For example, for OpenVMS Version 8.3, move to the directory V8.3.

To obtain patches for OpenVMS I64 Version 8.3, enter the following command (in the exact case indicated in the list; for example, uppercase V as in "V8.3", not lowercase as in "v8.3")

```
FTP> cd V8.3
250 CWD command successful.
```

Step 8. Search for the patch you want by using the `ls` command, specifying a few unique letters of the patch name in uppercase (all patch names are in uppercase) surrounded by asterisks. For example, to look for a patch named VMS83I_MX2-V0100, enter the following command:

```
FTP> ls *MX2*
   227 Entering Passive Mode (192,151,52,14,235,168)
   150 Opening ASCII mode data connection for file list.
   VMS83I_MX2-V0100.ZIPEXE
   VMS83I_MX2-V0100.txt

   226 Transfer complete.
   47 bytes received in 00:00:00.00 seconds (45.90 Kbytes/s)
```

The patch to be downloaded has the .ZIPEXE file extension. Alpha patches have a .PCSI-DCX_AXPEXE file extension.

Step 9. If the patch is an UPDATE patch or a TCP/IP patch, you might want to enter the `hash` command as shown in the following example so that you can verify that the download is happening (`hash` displays # symbols on the screen as the file is being downloaded).

```
FTP> hash
   Hash mark printing on (1024/hash mark).
```

Step 10. When you find the patch file, use the get command to download the file, as in the following example. Remember that case is important and that all patch file names are in uppercase.

```
FTP> get VMS83I_MX2-V0100.ZIPEXE
227 Entering Passive Mode (192,6,165,75,248,228)
150 Opening BINARY mode data connection for VMS83I_MZX2-V0100.ZIPEXE
(36218732 bytes).
#####################################################################
  .
  .
  .
#####################################################################
#########
226 Transfer complete.
local: USER5:[PATCHES]VMS83I_MX2-V0100.ZIPEXE;1
remote: VMS83I_MX2-V0100.ZIPEXE
2238464 bytes received in 00:00:01.29 seconds (1.65 Mbytes/s)
```

Step 11. Repeat steps 8 through 10 until you have downloaded all the patches you need.

Step 12. When you are finished, press **Ctrl/Z** to exit FTP and return to the DCL prompt. The patches are downloaded as compressed files. To decompress them, use the RUN command, as in the following example:

```
$ RUN VMS83I_MX2-V0100.ZIPEXE
```

This decompresses the patch into either a .PCSI file or .A file.

Step 13. Install .PCSI or .A patches as follows:

a. To install .PCSI patches, use the following PCSI utility command:

```
$ PRODUCT INSTALL *
```

If more than one file is available, the command lists the installable products (patches) in a numbered menu. Select the patch you want to install. If only one file is available, the command displays the patch being selected for installation. In either case, you are prompted to confirm that you want to install the selected patch.

You then have the option of saving directories, files, and libraries that are replaced, modified, or deleted by the installation of this patch. Saving this recovery data facilitates removing it later (using the PRODUCT UNDO PATCH command). If you do not save this recovery data, you cannot remove the patch. However, you are given the option of renaming replaced files (by appending _OLD to the file extension).

b. To install .A patches, use the following VMSINSTAL command:

```
$ @SYS$UPDATE:VMSINSTAL
```

You might see a list of processes running on the system and be asked whether you want to continue. Usually, it is safe to answer YES. You then are asked whether you are satisfied with the backup of your system disk. HP recommends that you have a current backup available in case problems occur with the installation.

Then you are asked where the distribution volumes are to be mounted. Provide a disk and directory reference for the patch (DKA100:[PATCHES]) to be installed.

Finally, you are asked the name of the patch to be installed. This is the file name of the patch, *not* including the file extension. (For example, if the patch file name is DIAA.A, just specify DIAA.) You then see informational messages and might be prompted for additional information during the installation.

Step 14. After the patch is installed, delete the .PCSI or .A file, leaving the compressed file in case you need it again.

7.15 Installing and Configuring Layered Products (New Installations, Some Upgrades)

The OpenVMS operating system kit includes several layered products. These include the system-integrated product (SIP) kits for the following products that are installed automatically:

- Availability Manager (base) for OpenVMS (required)
- CDSA for OpenVMS (required)
- Kerberos for OpenVMS (required)
- SSL for OpenVMS (required)
- Performance Data Collector base software, TDC_RT (required)

These layered products also include the system-integrated product (SIP) kits for the following products that you can install optionally as part of the OpenVMS operating system installation:

- DECwindows Motif for OpenVMS
- DECnet-Plus for OpenVMS
- DECnet Phase IV for OpenVMS
- TCP/IP Services for OpenVMS
- WBEM Services for OpenVMS (OpenVMS I64 only)

These five layered products are included in the operating system media and can be installed using either the steps shown in this section or the alternative procedure described in Section 7.15.1. Other layered products—whether provided by HP on other CDs in the operating system distribution, in the Software Product Library CD set, or on a CD provided by a third-party company—should be installed using the steps shown in Section 7.15.1.

In addition to the SIPs, the OpenVMS I64 OE DVD includes kits for various products that are part of the OpenVMS OEs. HP does not support installing these OE product kits while booted from the OE DVD. To install these OE products, you must use the procedure described in Section 7.15.1.

As of Version 8.3, most PCSI kits included on the OpenVMS distribution media are signed using Secure Delivery. Signed PCSI kits that are installed from the OpenVMS I64 operating system distribution media are validated. (Kits installed from the OpenVMS Alpha operating system distribution CD are not validated; this restriction is due to space limitations of the distribution CD.) On both OpenVMS Alpha and I64 systems, signed PCSI kits that you install subsequently are validated (including signed kits on the distribution media).

NOTE To use menu option 3, the target system must have the identical version of the OpenVMS operating system as the operating system media. If you need to install layered products on a target system that has a different version of the operating system, use the alternative procedure.

To use menu option 3 of the operating system menu, follow these steps:

Step 1. Before you install any layered products, be sure you back up the system disk.

Step 2. If you are not already booted from the operating system media, shut down the system and boot the operating system media. For instructions on how to shut down the OpenVMS I64 system, see Section B.7; for instructions on how to shut down the OpenVMS Alpha system, see Section B.7.2.

Step 3. To view a list of products that can be installed, choose option 2 on the menu. If the layered product that you want to install is not listed in the display, install the product by using the alternative procedure described in Section 7.15.1, or see the documentation you received with the layered product. Note that HP does not support VMSINSTAL, PRODUCT INSTALL, or other PRODUCT commands from the DCL option on the operating system menu.

Step 4. To install layered products, choose option 3 on the menu. For more instructions, see Section 1.5.3.

Step 5. After the installation completes, shut down the system by selecting option 9 on the menu. When you boot the target system, the layered products you installed will be present.

For additional information about installing layered products, see the *HP OpenVMS System Manager's Manual*.

7.15.1 Alternative Procedure

Use this alternative procedure to install the following products:

- Layered products on a target system that has a different operating system version than that of the operating system media (CD/DVD).
- Layered products that require VMSINSTAL (indicated in the directories by save-set file names with file types of .A, .B, and so on)
- OpenVMS I64 OE products
- SIP kits (as an alternative to using menu option 3 of the operating system menu on the media)
- Products on the Layered Products, Freeware, System Tools, and e-Business Integration and Infrastructure CDs
- Third-party software products (such as database products, accounting software, and so forth)

For a list of layered products you can install, see the Software Product Descriptions included with your operating system kit. Note that some products require a license key (PAK) from HP.

Follow these steps:

Step 1. Before you install all your layered products, be sure you back up the system disk. In addition, ensure that a license has been loaded for the software. Note also that most layered products require changes to SYSGEN parameters or AUTHORIZE values, and to system files such as SYLOGICALS.COM, SYLOGIN.COM, and SYSTARTUP_VMS.COM. For more information, see the following:

- Installation guides for these layered products

- *HP OpenVMS System Manager's Manual, Volume 1: Essentials*
- Section 7.25 in this manual
- Section 7.18 in this manual

Step 2. After your target system disk runs AUTOGEN and boots (if necessary), mount the OpenVMS operating system media. For example, if the device with the operating system media is DKA400, use the following command:

```
$ MOUNT/OVERRIDE=IDENTIFICATION DKA400
```

Step 3. Locate the directories and files containing the available layered products. For example, if the device name is DKA400:, enter the following command:

```
$ DIRECTORY /NOHEAD/NOTRAIL DKA400:[*.KIT]
```

You can use the PRODUCT FIND command to locate kits by using the PCSI utility. For example:

```
$ PRODUCT FIND * /SOURCE=DKA400:[*.KIT]
```

Step 4. To install layered products that require VMSINSTAL (indicated in the directories by save-set file names with file types of .A, .B, and so on), enter the @SYS$UPDATE:VMSINSTAL command and then specify the device name and directory at the prompt. For example:

```
$ @SYS$UPDATE:VMSINSTAL
* Where will the distribution volumes be mounted: DKA400:[DIAA032.KIT]
```

To install layered products that require the PCSI utility (indicated in the directories by file names with file types of .PCSI or .PCSI$COMPRESSED), use the PRODUCT INSTALL command to specify the device name and directory. Following is an example of the PRODUCT INSTALL command on an I64 system:

```
$ PRODUCT INSTALL FORTRAN /SOURCE=DKB400:[I64_FORT075.KIT]
```

7.16 Reinstall DECevent Software (Upgrades only; optional)

The optional DECevent software is automatically removed during an OpenVMS upgrade. If you want to continue using the DECevent product, you must manually install this software after the upgrade has completed.

7.17 Creating Print Queues (New Installations, Some Upgrades)

If you want to add new print queues to the system, do so now. If you have a large number of print queues to add and you need to get the system in use quickly, you can set up one print queue per area or work group and then add the other print queues later, after the user accounts are added (Section 7.19). For more information about adding print queues, see the *HP OpenVMS System Manager's Manual, Volume 1: Essentials*.

Print queues need to be re-created each time the system starts up. To have this done automatically, add the commands that create print queues to either the SYSTARTUP_VMS.COM file or to a user-created file located in SYS$STARTUP and called from the SYSTARTUP_VMS.COM file.

7.18 Updating SYSTARTUP_VMS.COM to Start Layered Products and Print Queues

After installing and configuring any layered products and adding new print queues, you should update the SYSTARTUP_VMS.COM file to start these products and print queues. For more about updating the SYSTARTUP_VMS.COM file, see the *HP OpenVMS System Manager's Manual, Volume 1: Essentials*.

7.19 Creating Accounts (New Installations, Some Upgrades)

During installation, DEFAULT and SYSTEM accounts are created automatically. You should create additional user accounts now. If you plan to have HP service representatives test your system or if you plan to run testing software such as UETP, you must create accounts for each representative and a SYSTEST (standalone system) or SYSTEST_CLIG (OpenVMS Cluster system) account to run UETP.

For complete information about creating and managing user accounts and about creating accounts for HP service representatives and UETP, see the *HP OpenVMS System Manager's Manual, Volume 1: Essentials*.

7.20 Testing the System with UETP (Optional)

The **User Environment Test Package (UETP)** is a software package that tests whether the OpenVMS operating system is installed correctly. It tests the hardware, including disk drives, tape drives, CD drives, line printers (if any), network cards, and so forth. Running UETP is optional; HP recommends that you run UETP after an installation or if new hardware was added as part of an upgrade.

Before using UETP, you must create a SYSTEST (standalone system) or SYSTEST_CLIG (OpenVMS Cluster system) account. You should also create an account for HP service representatives to use. You can use the CREATE_SPECIAL_ACCOUNTS.COM file to create these accounts, as explained in *HP OpenVMS System Manager's Manual, Volume 1: Essentials*.

For complete information about using UETP, see the *HP OpenVMS System Manager's Manual, Volume 2: Tuning, Monitoring, and Complex Systems*.

7.21 Backing Up the Customized System Disk and Initiating Systematic Backups

After you customize the OpenVMS operating system to your satisfaction and perform the other steps recommended thus far in this chapter that are relevant to your system, protect your work by making a standalone backup copy of the system disk to tape. To do so, follow the instructions in Section 7.2. If you are going to be saving to disk, specify a disk that will not be (or is not) part of a shadow set.

For complete information about backup operations, including a description of an alternative method that does not require booting from the operating system media, see Appendix E.

HP also recommends creating a systematic routine for backing up the application, data, and user disks. For more information, see the *HP OpenVMS System Manager's Manual, Volume 1: Essentials*.

7.22 Reforming the Shadow Set as Final Postupgrade Backup

If your system disk participates in a volume shadowing environment, re-form the shadow set again to generate another shadow copy onto the other disks in the set. To do so, follow the instructions in Section 7.7.

7.23 Rebooting Cluster Members (Upgrades Only)

If you are performing a **rolling upgrade** in an OpenVMS Cluster environment and have completed all the postupgrade tasks required thus far for your upgraded system disk, reboot each system that boots from that system disk.

For more information about booting your system, see Appendix A for OpenVMS Alpha systems and Appendix B for OpenVMS I64 systems.

At this point, your system is ready for general use.

7.24 Running AUTOGEN to Tune the System

When you install or upgrade the OpenVMS operating system, the system executes the AUTOGEN.COM procedure to set the values of system parameters and the sizes of the page, swap, and dump files according to the system configuration.

After running your system for at least 24 hours with users or a typical application workload on the system, run the AUTOGEN.COM procedure again to tune the system properly. Run AUTOGEN as follows. (In an OpenVMS Cluster, you must follow these steps to run AUTOGEN on each cluster node.)

Step 1. Run AUTOGEN in feedback mode, examine AGEN$PARAMS.REPORT, and reboot the system. To run AUTOGEN in feedback mode, use the following command:

```
$ @SYS$UPDATE:AUTOGEN SAVPARAMS SETPARAMS FEEDBACK
```

To view AGEN$PARAMS.REPORT on your screen, enter the following command:

```
$ TYPE SYS$SYSTEM:AGEN$PARAMS.REPORT
```

You can print this file or examine it using the EDIT/READ_ONLY command.

If the report includes a message similar to the following, you might need to modify the size of the page, swap, or dump file:

```
%AUTOGEN-W-DSKSPC, The disk on which DKA0:[SYS0.SYSEXE]PAGEFILE.SYS
   resides would be over 95% full if it were modified to hold 20000 blocks.
```

For more information about AGEN$PARAMS.REPORT, see the *HP OpenVMS System Manager's Manual, Volume 2: Tuning, Monitoring, and Complex Systems*.

Step 2. Run AUTOGEN again in feedback mode two work days later and examine AGEN$PARAMS.REPORT, and then reboot the system. (For information about the importance of having a current AGEN$FEEDBACK.DAT file, see Section 4.7.)

Step 3. HP recommends that you run AUTOGEN from the SAVPARAMS phase through the TESTFILES phase weekly thereafter until the system stabilizes (that is, until AUTOGEN finds nothing that needs to be adjusted). Make sure you run AUTOGEN when your system is running under a typical workload. Examine AGEN$PARAMS.REPORT to determine the need for additional changes.

IMPORTANT If you start AUTOGEN without specifying the execution-mode parameter (FEEDBACK, NOFEEDBACK, or CHECK_FEEDBACK), AUTOGEN uses the feedback information in its calculations. However, if the feedback information reflects system up time of less than 24 hours, or if the feedback information is more than 30 days old, AUTOGEN includes warnings in the AGEN$PARAMS.REPORT file to alert you to potential problems with the feedback data. If you wrongly assume the feedback is valid, the parameter settings might vary significantly from your expectations.

If you specify FEEDBACK (or NOFEEDBACK), AUTOGEN uses (or does not use) the feedback regardless of the data's reliability. AUTOGEN proceeds through the SETPARAMS phase (if you specified SETPARAMS, SHUTDOWN, or REBOOT as the end phase) and sets system parameters to the values it computed.

If you specify CHECK_FEEDBACK, AUTOGEN checks the validity of the feedback data. If AUTOGEN determines the feedback is suspect, then AUTOGEN ignores the feedback when computing parameter values. It stops at the TESTFILES phase and issues a warning in the report that parameters have not been changed. You must read the report and decide whether the calculated values are acceptable. You can either use them (by running the AUTOGEN SETPARAMS phase) or rerun AUTOGEN with valid feedback data.

Step 4. After the system has stabilized, HP recommends that you run AUTOGEN at least monthly to save feedback information for future use. Use the following command:

```
$ @SYS$UPDATE:AUTOGEN SAVPARAMS
```

If you do not maintain current feedback information for AUTOGEN, you will not have the needed information the next time you upgrade your system. As a result, you may have to reboot and rerun AUTOGEN several times to make your upgraded system operational.

For more information about running AUTOGEN, see the *HP OpenVMS System Manager's Manual, Volume 2: Tuning, Monitoring, and Complex Systems*.

7.25 Modifying System Parameters

Based on your examination of AGEN$PARAMS.REPORT, you might need to modify parameter values in MODPARAMS.DAT. Read the notes in Section 7.25.1. These notes apply both to modifications being made either after a new installation or after an upgrade. If you are modifying system parameters after an upgrade, also see Section 7.25.2.

7.25.1 General Notes About Modifying System Parameters

When modifying system parameters, note the following:

- In general, let AUTOGEN calculate system parameters. You can hardcode values (such as GBLPAGES=*value*), but doing so overrides AUTOGEN and might not allow it to set an optimal value based on observed usage.
- Whenever possible, use MIN_*parameter* values (such as MIN_GBLPAGES) to set the minimum value that can be set for a parameter by AUTOGEN. AUTOGEN increases the value if necessary. It also adjusts related parameters unless they are hardcoded, in which case information is provided in the AGEN$PARAMS.REPORT file. Use MAX_*parameter* values to set a maximum value when it is necessary to limit a parameter to a known maximum value (this is rarely necessary).
- Enter numeric values as integers without commas (for example, 10000). Enter alphabetic characters in lower or uppercase.
- HP recommends that you include comments in the MODPARAMS.DAT file indicating who changed the value, when it was done, and why it was done. An exclamation point (!) serves as a comment starter and can appear anywhere on a line. The following example illustrates the modifications recommended in the preceding bulleted items:

```
! the following changes made by K.Newcomb on 9/20/03
!
SWAPFILE=0                    ! don't re-size the SWAPFILE on AUTOGEN runs
MIN_gblsections=750           ! required for DECwindows MOTIF
MIN_NPAGEDYN=2750000          ! set npagedyn to a min of 2.75 million
```

For more information about the MODPARAMS.DAT file and about using AUTOGEN in general, see the *HP OpenVMS System Manager's Manual, Volume 2: Tuning, Monitoring, and Complex Systems*.

7.25.2 Modifying System Parameters After an Upgrade

Review the file SYS$SYSTEM:MODPARAMS.DAT. The upgrade procedure created a new version of this file. The old version is named SYS$SYSTEM:MODPARAMS.DAT_OLD. The new MODPARAMS.DAT file contains all the parameters in the old file, plus various parameters that the upgrade procedure added to ensure that all necessary system parameters are properly propagated from the earlier version of OpenVMS. The upgrade procedure also adds comment lines to explain the source of the parameters in each section of the new MODPARAMS.DAT file.

Note that the old MODPARAMS.DAT is included in the new MODPARAMS.DAT each time an upgrade is performed. Because of this, if MODPARAMS.DAT is not reviewed and cleaned up after each upgrade, it might eventually contain many levels of duplicated parameters. For this reason, you should review MODPARAMS.DAT after each upgrade. This enables you to eliminate any duplication. You can also take this opportunity to modify any parameters, if necessary.

Based on your examination of AGEN$PARAMS.REPORT, you might need to modify parameter values in MODPARAMS.DAT.

The following subsections are examples of instances where you need to modify parameters in MODPARAMS.DAT.

7.25.2.1 System File Sizes

AUTOGEN sets the following files at sizes appropriate for your system:

- [SYSEXE]SYSDUMP.DMP
- [SYSEXE]PAGEFILE.SYS
- [SYSEXE]SWAPFILE.SYS

If you have special workloads or configurations, you can specify different sizes for these files by performing the following steps:

Step 1. Log in to the SYSTEM account.

Step 2. Enter the following command:

```
$ @SYS$UPDATE:AUTOGEN SAVPARAMS TESTFILES
```

Step 3. If the file sizes displayed need to be adjusted, add symbols to the MODPARAMS.DAT file (described in detail in the *HP OpenVMS System Manager's Manual, Volume 2: Tuning, Monitoring, and Complex Systems*), and repeat step 2 until you are satisfied with the file sizes.

Step 4. When you are satisfied with the file sizes, enter the following command to ensure that the modified system files are installed when the system is rebooted:

```
$ @SYS$UPDATE:AUTOGEN GENPARAMS SETPARAMS
```

7.25.2.2 OpenVMS Cluster Parameters

If you are upgrading an OpenVMS Cluster system, note the following:

- The upgrade procedure creates a new MODPARAMS.DAT for each system root on your system disk. Normally, there is one root for each computer that boots from the system disk. You must review and adjust each of these MODPARAMS.DAT files individually.

  The MODPARAMS.DAT file for the system on which you are running is located in the SYS$SYSTEM:MODPARAMS.DAT file. The MODPARAMS.DAT files for other roots on the same system disk can be found in SYS$SYSDEVICE:[SYS*x*.SYSEXE]MODPARAMS.DAT, where *x* represents the root number; for example, SYS0, SYS1, SYS2, and so forth. (Valid root numbers might include hexadecimal digits -- SYSA, SYSB, and so forth.)

- Be sure the EXPECTED_VOTES value is correct. This value is the sum of all votes in the cluster. For example, if there are five computers in the cluster and each has one vote, the value is 5.

A Booting and Shutting Down Your OpenVMS Alpha System

This appendix applies to Alpha systems only and explains how to halt, boot, and shut down the operating system. It also includes related information, such as setting the system for automatic booting and using the Writeboot utility. This appendix also includes brief troubleshooting procedures.

This appendix contains the following information:

- Booting operations, including the following:
  - — Booting the operating system CD locally and from an InfoServer system
  - — Booting manually from the system disk
  - — Performing a conversational (interactive) boot
  - — Booting with minimum startup
  - — Booting with the XDelta utility (XDELTA)
  - — Booting from a different directory
  - — Booting with a PMAZB or PMAZC TURBOchannel adapter
  - — Booting over the network with an alternate TURBOchannel adapter
  - — Booting in an emergency
- Set, Show, and WRITEBOOT operations, including the following:
  - — Setting the system for automatic booting
  - — Setting and showing boot devices
  - — Setting boot parameters
  - — Writing a new boot block
- Halt and shutdown operations
- Troubleshooting procedures

For the latest hardware documentation for Alpha computers, see the documents at:

`http://www.hp.com/go/alphadocs`

A.1 Booting Operations

The following sections describe different methods of booting your OpenVMS Alpha system.

A.1.1 Booting the OpenVMS Alpha Operating System CD

If you need to boot the OpenVMS Alpha operating system CD, either to perform an installation or upgrade or to perform related operations such as mounting or backing up the system disk, perform the steps in the following sections, depending on whether you are booting locally or from the InfoServer.

A.1.1.1 Booting from the Local Drive

Boot from the local drive as follows:

Step 1. Insert the operating system CD into the local CD drive.

Step 2. At the console prompt (>>>), enter the SHOW DEVICE command so you can identify the name of the CD drive (for example, DKA400:)

Step 3. Enter the boot command in the following format:

```
BOOT –FLAGS 0,0 source-drive
```

Substitute the device name of the CD drive (as listed in the SHOW DEVICE display) for *source-drive*.

For example, if the SHOW DEVICE display lists the device name of your CD drive as DKA400, enter the following command and press **Enter**:

```
>>> BOOT –FLAGS 0,0 DKA400
```

After you boot, the system displays a menu from which you can choose options to perform the following tasks:

- Install or upgrade the operating system using the PCSI utility.
- Enter a DCL environment from which you can perform preinstallation or maintenance tasks such as mounting or showing devices and backing up or restoring files on the system disk.
- Shut down the system.

A.1.1.2 Booting from the InfoServer

To boot the operating system CD using either the InfoServer hardware or the InfoServer utility, follow these steps. To use the InfoServer utility, certain configuration steps are required initially (one time only), as described in Appendix C; note that the operating system CD must be mounted systemwide.

Step 1. At the console prompt (>>>), enter the SHOW DEVICE command and scan the devices listed in the output to determine the name of the CD drive. Look for a device listed with its hardware address, as in the last line of the following example; compare this information with that provided by the table in step 2.

```
>>>SHOW DEVICE

dva0.0.0.1000.0     DVA0                    RX23
dka200.2.0.5.0      DKA200                  RZ28M  1004
dka300.3.0.5.0      DKA300                  RZ29B  0016
dka400.4.0.5.0      DKA400                  RZ26L  442E
ewa0.0.0.3.0        EWA0          00-00-F8-1F-70-3D
```

For additional information, see the *HP OpenVMS Version 8.3 for Alpha and Integrity Servers Software Product Description* (SPD 82.35.*xx*) and the hardware manuals that you received with your Alpha computer.

Step 2. At the console prompt, enter the following command, where *lan-device-name* is the LAN device (for example, EWA0) identified with your computer:

```
>>> B -FLAGS 0,0 -FILE APB_083 lan-device-name
```

For information about the LAN devices your system supports, see Table A-1. Ethernet device EWA0 refers to the first EW device. Subsequent devices are named EWB0, EWC0, and so on. For most systems, you can use the SHOW CONFIGURATION console command to list LAN devices available for boot. For additional information, see the hardware manuals that you received with your Alpha computer and the OpenVMS software product description (SPD). The APB file name in the previous command is the unique file name that was assigned to the APB.EXE file when it was copied from the operating system CD to the InfoServer. This file is the name of the APB program used for the initial system load (ISL) boot program.

Table A-1 Supported LAN Devices

Alpha Computer	Ethernet Device	FDDI Device
ALPHAbook 1	EOA0	-
AlphaServer 400 series	EWA0	FWA0
AlphaServer 1000 series	ERA0, EWA0	FRA0
AlphaServer 1000A series	EWA0	FWA0
AlphaServer 1200 series	EWA0	FWA0
AlphaServer 2000 series	ERA0, EWA0	FRA0
AlphaServer 2100, 2100A series	ERA0, EWA0	FRA0
AlphaServer 4100 series	EWA0	FWA0
AlphaServer 8200 series	EXA0, EWA0	FXA0
AlphaServer 8400 series	EXA0, EWA0	FXA0
AlphaStation 200 series	EWA0	FWA0
AlphaStation 400 series	EWA0	FWA0
AlphaStation 500 series	EWA0	FWA0
AlphaStation 600 series	ERA0, EWA0	FWA0
DEC 2000 series	ERA0	—
DEC 3000 series	ESA0	"n/ESA0"
DEC 4000 series	EZA0	—
DEC 7000 series	EXA0	FXA0
DEC 10000 series	EXA0	FXA0
DIGITAL Personal Workstation (DPWS) series	EWA0	FWA0

Table A-1 Supported LAN Devices (Continued)

Alpha Computer	Ethernet Device	FDDI Device
AlphaServer DS15	EWA0, EIA0, EGA0	FWA0
AlphaServer DS20	EWA0, EIA0, EGA0	FWA0
AlphaServer DS20e	EWA0, EIA0, EGA0	FWA0
AlphaServer DS25	EWA0, EIA0, EGA0	FWA0
AlphaServer ES40	EWA0, EIA0, EGA0	FWA0
AlphaServer ES45	EWA0, EIA0, EGA0	FWA0
AlphaServer ES47	EWA0, EIA0, EGA0	FWA0
AlphaServer ES80	EWA0, EIA0, EGA0	FWA0
AlphaServer GS60	EWA0, EGA0	FWA0
AlphaServer GS80	EWA0, EIA0, EGA0	FWA0
AlphaServer GS140	EWA0, EGA0	FWA0
AlphaServer GS160	EWA0, EIA0, EGA0	FWA0
AlphaServer GS320	EWA0, EIA0, EGA0	FWA0
AlphaServer GS1280	EWA0, EIA0, EGA0	FWA0

NOTE Note the following about devices and computers listed in Table A-1:

1. The console LAN device EGA0 is the Gigabit Ethernet device DEGXA. OpenVMS refers to this device as an EW device rather than an EG device. To correlate the console device names for EG and EW devices, compare the MAC address listed for each device by the console and by the LANCP SHOW CONFIGURATION commands.
2. If you are using a DEC 3000 or 4000 series system, note the following:
   - On DEC 3000 series systems, you can boot through the InfoServer with an Ethernet PMAD device or FDDI DEFTA device by specifying the device name as "*n*/ESA0". The value for *n* is the TURBOchannel slot number, which you can obtain by entering the SHOW CONFIGURATION command at the console prompt (>>>) and examining the display. For more information, see Section A.1.2.
   - On DEC 4000 series systems, you *must* specify the ISL file name in uppercase (for example, APB_083).

Step 3. The InfoServer ISL program then displays the following menu:

```
Network Initial System Load Function
Version 1.2
```

```
 FUNCTION          FUNCTION
   ID
   1      -        Display Menu
   2      -        Help
   3      -        Choose Service
   4      -        Select Options
   5      -        Stop

Enter a function ID value:
```

Step 4. Respond to the prompts as follows, and press **Enter** after each entry:

a. Enter 3 for the function ID.

b. Enter 2 for the option ID.

c. Enter the service name (ALPHA083 is the default service name for the InfoServer hardware; for the InfoServer utility, ask your system or network manager for the service name).

A sample display follows:

```
Enter a function ID value: 3
 OPTION           OPTION
   ID
   1      -       Find Services
   2      -       Enter known Service Name

Enter an Option ID value: 2
Enter a Known Service Name: ALPHA083
```

After you boot, the system displays a menu from which you can choose options to perform the such tasks as the following:

- Install or upgrade the operating system using the PCSI utility.
- Enter a DCL environment from which you can perform preinstallation or maintenance tasks such as mounting or showing devices and backing up or restoring files on the system disk.
- Shut down the system.

NOTE If you boot the OpenVMS Alpha operating system CD from an InfoServer but lose your connection during the installation or upgrade procedure (the system is unresponsive and pressing Ctrl/Y does not return you to the menu), do the following:

IF ...	THEN ...
You previously chose the INITIALIZE option	1. Reboot the OpenVMS Alpha operating system CD. 2. Choose the install/upgrade option (1) on the menu and perform the installation or upgrade procedure again.

IF ...	THEN ...
You previously chose the PRESERVE option	1. Reboot the OpenVMS Alpha operating system CD. 2. Enter the DCL environment by choosing option 8 on the menu. 3. Mount the device containing your backup copy of the target disk and the device that is your target disk. 4. Restore the backup copy of your target disk by entering the appropriate BACKUP commands. (See Appendix E for complete information about using MOUNT and BACKUP commands to restore a system disk.) 5. Log out from the DCL environment. 6. Choose the install/upgrade option (1) on the menu and perform the installation or upgrade procedure again.

A.1.2 Booting with a PMAZB or PMAZC TURBOchannel Adapter

PMAZB and PMAZC TURBOchannel adapters are adapters that are software-compatible with the integrated SCSI ports on DEC 3000 Alpha series systems. If your system is not a DEC 3000 Alpha series system, skip to the next section.

The DEC 3000 Alpha series system consoles implement the SHOW CONFIGURATION console command, which displays information about the TURBOchannel options and the built-in adapters in the system. When a PMAZB or PMAZC adapter is installed in the TURBOchannel, the SHOW CONFIGURATION command displays the "PMAZB-AA" or "PMAZC-AA" string, the TURBOchannel slot number, and the device status.

The DEC 3000 Alpha series consoles also implement the SHOW DEVICE command, which displays information about the devices in the system. Because the integrated SCSI adapter is built into every DEC 3000 Alpha series system, the SHOW DEVICE console command can display the SCSI devices connected to the integrated SCSI ports. However, the SHOW DEVICE console command cannot display the SCSI devices connected to the PMAZB or PMAZC SCSI ports.

To make the console display the devices connected to the PMAZB or PMAZC SCSI ports, enter the following command at the console prompt, where *x* is the TURBOchannel slot number in which the PMAZB or PMAZC adapter is installed:

```
>>> TEST TCx CNFG
```

This command displays the devices that are connected to each SCSI port of the PMAZB or PMAZC adapter. The device controller letters are either A or B, based upon the PMAZB or PMAZC ports to which the devices are connected. Do not confuse these devices with any DKA*xxx* or DKB*xxx* devices displayed by the SHOW DEVICE command, which shows SCSI devices on the integrated SCSI ports only.

To boot from a device connected to a PMAZB or PMAZC adapter, enter the boot command as follows:

```
>>> BOOT "x/dkyzzz"
```

The following conventions are used:

- *x* is the TURBOchannel slot number in which the PMAZB or PMAZC adapter is installed.
- *dk* is the device code of the boot device.
- *y* is either A or B, depending on the SCSI port of the PMAZB or PMAZC adapter that contains the boot device.
- *zzz* is the SCSI unit number of the boot device.

The OpenVMS Alpha operating system does not distinguish between the PMAZB or PMAZC adapter and the integrated SCSI adapter. The operating system views them as identical adapters. Because the operating system searches for I/O adapters in backplane slot number order, device controller letters are assigned that correspond to the backplane order of the TURBOchannel options, followed by the integrated adapters. This is different from console SCSI device naming, which always designates SCSI devices on the integrated SCSI ports as either A or B port devices.

On a DEC 3000 Model 500 Alpha system with no TURBOchannel options installed, the OpenVMS Alpha operating system names the integrated SCSI ports PKA0 and PKB0, and the devices connected to the ports inherit the controller letter from the port controller letter (A or B). However, if a PMAZB or PMAZC adapter is installed in the TURBOchannel, the operating system names the PMAZB or PMAZC SCSI ports PKA0 and PKB0 and names the integrated SCSI ports PKC0 and PKD0. The devices connected to the ports inherit the controller letter from the port controller letter (A, B, C, or D).

A.1.3 Booting Manually from the System Disk

Boot the system disk manually as follows:

IF ...	THEN GO TO...
The OpenVMS Alpha operating system is running	Step 1
The OpenVMS Alpha operating system is *not* running	Step 4

Step 1. Log in to the SYSTEM account.

Step 2. Enter the following command and press **Enter**:

```
$ @SYS$SYSTEM:SHUTDOWN
```

Step 3. Answer the questions displayed by the system. When the procedure asks whether an automatic reboot should be performed, press **Enter** for NO. When the procedure is finished, it displays the following message:

```
SYSTEM SHUTDOWN COMPLETE
```

Step 4. Halt the system by pressing either **Ctrl/P** or the **Halt** button. (See Section A.3.1for more information about how to halt your Alpha computer.)

Step 5. Enter the BOOT command in the following format:

```
BOOT device-name
```

Substitute the device name of the system disk for *device-name*. For example, to boot from a drive with a device name of DKA400, enter the following command and press **Enter**:

```
>>> BOOT DKA400
```

To boot from the network, enter the following command and press **Enter**:

```
>>> BOOT ESA0
```

A.1.4 Performing a Conversational (Interactive) Boot

A conversational boot is most commonly used in research and development environments and during software upgrades. Perform a conversational boot to stop the boot process before it completes. The boot process stops after it loads SYS$SYSTEM:SYSBOOT.EXE and displays the SYSBOOT> prompt. At the SYSBOOT> prompt, you can enter specific OpenVMS System Generation utility (SYSGEN) commands to do the following:

- Examine system parameter values
- Change system parameter values
- Specify another parameter file
- Specify another system startup command procedure
- Select the default system parameter file (ALPHAVMSSYS.PAR) if you modified system parameters to values that render the system unbootable
- Specify a minimum startup

There are several ways to perform a conversational boot. The following procedure is the most direct:

IF ...	THEN GO TO...
The OpenVMS Alpha operating system is running	Step 1
The OpenVMS Alpha operating system is *not* running	Step 4

Step 1. Log in to the SYSTEM account.

Step 2. Enter the following command and press **Enter**:

```
$ @SYS$SYSTEM:SHUTDOWN
```

Step 3. Answer the questions displayed by the system. When the procedure asks whether an automatic reboot should be performed, press **Enter** for NO. When the procedure is finished, it displays the following message:

```
SYSTEM SHUTDOWN COMPLETE
```

Step 4. Halt the system by pressing either **Ctrl/P** or the **Halt** button. (For more information about how to halt your Alpha computer, see Section A.3.1.)

Step 5. To begin the conversational boot, enter the BOOT command in the following format:

```
BOOT -FLAGS 0,1 [device-name]
```

for *device-name*, substitute the device name of the drive from which you want to boot. For example, if the system disk has a device name of DKA400, enter the following command and press **Enter**:

```
>>> BOOT -FLAGS 0,1 DKA400
```

If you do not specify a device name, the system boots from the boot device assigned when you entered the SET BOOTDEF_DEV command.

Step 6. At the SYSBOOT> prompt, you can enter any of the SYSGEN commands listed in Table A-2. For more information about these SYSGEN commands, see the *HP OpenVMS System Management Utilities Reference Manual: M-Z*.

Step 7. When you finish using the SYSGEN commands, enter the CONTINUE command to complete the boot process.

Table A-2 SYSGEN Commands Used in the SYSBOOT Procedure

Command	Description
CONTINUE	Resumes the boot procedure.
DISABLE CHECKS	Inhibits checking of parameter values specified with the SET command.
ENABLE CHECKS	Permits checking of parameter values specified with the SET command.
HELP	Displays a summary of the SYSBOOT commands on the terminal screen.
SET *parameter-name*	Establishes the value of a system parameter.
SET/STARTUP	Sets the name of the system startup command procedure.
SHOW [*parameter*]	Displays active, current, default, maximum, and minimum values for specific parameters. (Use qualifiers to display characteristics of parameters grouped by categories.)
USE [*file-spec*]	Specifies a parameter file to be used as a source of values. You must enter the entire file specification, including device and directory; you cannot specify a logical name.

For examples of using conversational booting, see Section A.1.5 and Section A.1.9.

A.1.5 Booting with Minimum Startup

In certain cases, you might want to boot your system without performing the full sequence of startup events. For example, if a startup event prevents you from logging in, you might want to boot the system without executing the startup so that you can log in and fix the problem. You can use the conversational boot to specify a minimum startup.

NOTE Because this procedure bypasses specific startup operations, it does not autoconfigure the system's peripheral devices.

Boot the system with minimum startup as follows:

Step 1. Begin the conversational boot by entering the BOOT command in the following format:

```
BOOT -FLAGS 0,1 [device-name]
```

For *device-name*, substitute the device name of the drive from which you want to boot. For example, if the system disk has a device name of DKA400, enter the following command and press **Enter**:

```
>>> BOOT -FLAGS 0,1 DKA400
```

Step 2. Enter the following command and press **Enter**:

```
SYSBOOT> SET STARTUP_P1 "MIN"
```

Step 3. Enter the following command to ensure that the operating system does not record for subsequent system reboots the STARTUP_P1 parameter change you made in step 2:

```
SYSBOOT> SET WRITESYSPARAMS 0
```

Step 4. Enter the following command to continue booting:

```
SYSBOOT> CONTINUE
```

A.1.6 Booting with the XDelta Utility (XDELTA)

The XDelta utility (XDELTA) is a debugging tool that system programmers use. The procedure for booting all Alpha computers with XDELTA is the same.

The following table describes the valid values you can specify when booting with XDELTA:

Value	System Response
0	Normal, nonstop boot (default).
1	Begins a conversational boot and then displays the SYSBOOT prompt.
2	Includes XDELTA but does not take the initial breakpoint.
3	Displays the SYSBOOT prompt and includes XDELTA but does not take the initial breakpoint.
6	Includes XDELTA and takes the initial breakpoint.
7	Includes XDELTA, displays the SYSBOOT prompt, and takes the initial breakpoint at system initialization.

The following is an example of booting with XDELTA from the console prompt:

```
>>> BOOT -FLAGS 0,7
```

For more information about using XDELTA, see the *HP OpenVMS Delta/ XDelta Debugger Manual*.

A.1.7 Booting from a Different Root Directory

By default, the OpenVMS Alpha operating system is installed in the system root directory [SYS0]. However, if you have created a cluster system disk, you can use the SYS$MANAGER:CLUSTER_CONFIG.COM procedure to add a copy of the operating system to a different root directory. (See the *HP OpenVMS System Manager's Manual* for more information about using the SYS$MANAGER:CLUSTER_CONFIG.COM procedure.)

To boot from a different directory (for example, [SYS3]), enter the BOOT command as follows:

```
>>> BOOT -FLAGS 3,0  DKA200
```

A.1.8 Booting over the Network with an Alternate TURBOchannel Adapter

You can use an alternate TURBOchannel adapter to boot a DEC 3000 series Alpha computer (with the TURBOchannel option) over the network in an InfoServer or OpenVMS Cluster environment. Examples of alternate TURBOchannel adapters are the PMAD (which connects to the Ethernet) and the DEFTA (which connects to the FDDI).

To boot from a TURBOchannel device connected to one of these alternate adapters, enter the boot command as follows:

```
>>> BOOT "n/ESA0"
```

The value for *n* is the TURBOchannel slot number for the device, which you can obtain by entering the SHOW CONFIGURATION command at the console prompt (>>>) and examining the display. In the following example, the TURBOchannel slot number (listed under the "TCINFO" column) is 0:

```
>>> SHOW CONFIG
DEC 3000 - M300
Digital Equipment Corporation
  VPP PAL X5.56-80800101/OSF PAL X1.34-80800201 - Built on 18-DEC-1996 11:376

             TCINFO     DEVNAM     DEVSTAT
             ------     --------   --------
               CPU      OK KN16-AA -V3.2-S6CD-I151-sV2.0-DECchip 21064 P3.0-150
              ASIC      OK
               MEM      OK
               MEM      OK
6
               CXT      OK
5
               NVR      OK
               SCC      OK
                NI      OK
              ISDN      OK
4
              SCSI      OK
0-PMAD-AA     TC0
```

A.1.9 Booting in an Emergency

If a system problem prevents your system from booting, you might need to perform an emergency boot operation. Table A-3 summarizes these emergency boot operations, and the sections that follow describe each boot operation in more detail.

Table A-3 Emergency Boot Procedures

Operation	When to Use
Booting with default system parameters	When parameter values in the parameter file have been modified so that the system is unbootable
Booting without startup and login procedures	If an error in the startup or login procedure prevents you from logging in
Booting without the user authorization file	If you have forgotten the password and cannot log in to a privileged account

A.1.9.1 Booting with Default System Parameters

If the current values stored in the parameter file have been incorrectly modified, these incorrect values might cause the system to become unbootable. With a conversational boot operation, you can reset the active values for all system parameters to the default value. (In most cases, HP recommends that you use AUTOGEN to modify system parameters. In certain cases, however, you can use a conversational boot to modify a

parameter value *temporarily*. To change a parameter value *permanently*, you must edit MODPARAMS.DAT and run AUTOGEN. For instructions, see the *HP OpenVMS System Manager's Manual, Volume 2: Tuning, Monitoring, and Complex Systems*.) The default values allow you to boot the system temporarily so you can correct the problem.

How to Perform This Task

Step 1. Begin the conversational boot by entering the BOOT command in the following format:

```
BOOT –FLAGS 0,1 [device-name]
```

For *device-name*, substitute the device name of the drive from which you want to boot. For example, if the system disk has a device name of DKA400, enter the following command and press **Enter**:

```
>>> BOOT –FLAGS 0,1 DKA400
```

Step 2. At the SYSBOOT> prompt, enter the following command:

```
SYSBOOT> USE DEFAULT
```

The USE DEFAULT command specifies that default values should be used for all parameters.

Step 3. To avoid starting all layered products on a system that is not tuned for them, possibly causing the system to hang, set the STARTUP_P1 system parameter as follows:

```
SYSBOOT>  SET STARTUP_P1 "MIN"
```

Step 4. Enter the following command to ensure that the operating system does not record for subsequent system reboots the STARTUP_P1 parameter change you made in step 3:

```
SYSBOOT> SET WRITESYSPARAMS 0
```

Step 5. Enter the following command to continue booting:

```
SYSBOOT> CONTINUE
```

Step 6. When the system finishes booting, determine which changed parameter caused the problem and reset the parameter value. If you specified the value for the parameter in the AUTOGEN parameter file MODPARAMS.DAT, fix the value in that file and run AUTOGEN. For more information, see the *HP OpenVMS System Manager's Manual, Volume 2: Tuning, Monitoring, and Complex Systems*.

Step 7. Shut down and reboot the system.

Example

```
SYSBOOT> USE DEFAULT
SYSBOOT> SET STARTUP_P1 "MIN"
SYSBOOT> SET WRITESYSPARAMS 0
SYSBOOT> CONTINUE
Username: SYSTEM
Password:
$ EDIT SYS$SYSTEM:MODPARAMS.DAT
.
.
.
[Insert line(s) to reset parameter value(s)]
```

```
.
.
.
$ @SYS$UPDATE:AUTOGEN SAVPARAMS REBOOT
```

A.1.9.2 Booting Without Startup and Login Procedures

If the system does not complete the startup procedures or does not allow you to log in, you might need to bypass the startup and login procedures. The startup and login procedures provided by HP should always work. However, if you introduce an error when modifying the startup or login procedure, it is possible to accidentally lock yourself out of the system.

How to Perform This Task

Step 1. Begin the conversational boot by entering the BOOT command in the following format:

```
BOOT -FLAGS 0,1 [device-name]
```

For *device-name*, substitute the device name of the drive from which you want to boot. For example, if the system disk has a device name of DKA400, enter the following command and press **Enter**:

```
>>> BOOT -FLAGS 0,1 DKA400
```

Step 2. Enter the following command at the SYSBOOT> prompt:

```
SYSBOOT> SET/STARTUP OPA0:
```

Step 3. Enter the following command to ensure that the operating system does not record for subsequent system reboots the STARTUP_P1 parameter change you made in step 2:

```
SYSBOOT> SET WRITESYSPARAMS 0
```

Step 4. Enter the following command to continue booting:

```
SYSBOOT> CONTINUE
```

Step 5. When the system is booted, the operator console displays the DCL command prompt ($). You are logged in.

Step 6. Enter the following DCL command:

```
$ SET NOON
```

This command directs the operating system to ignore any errors that might occur. If you do not enter this command and you invoke an error, the system logs you out.

Step 7. Correct the error condition that caused the login failure. (That is, make the necessary repairs to the startup or login procedure, or to the SYSUAF.DAT file.)

Use a text editor to correct the startup or login file. Note that some system consoles might not supply a screen-mode editor. You can also copy a corrected file and delete the incorrect version by using the RENAME and DELETE commands.

Step 8. Perform a normal startup by entering the following command:

```
$ @SYS$SYSTEM:STARTUP
```

Example

```
SYSBOOT> SET/STARTUP OPA0:
SYSBOOT> SET WRITESYSPARAMS 0
SYSBOOT> CONTINUE
$ SET NOON
$ SET DEFAULT SYS$SYSROOT:[SYSEXE]
$ @SYS$SYSTEM:STARTUP
```

A.1.9.3 Booting Without the User Authorization File

Ordinarily, the startup and login procedures provided by HP always work; however, certain conditions can cause them to fail. A simple way to lock yourself out of the system is to set passwords to login accounts and forget them. Another way to be locked out is if one or more core system Product Authorization Key (PAK) software licenses are unavailable or expired. In such emergencies, perform a conversational emergency boot by performing the steps given in this section.

How to Perform This Task

Step 1. Halt the system by pressing **Ctrl/P** or whatever method is used for your computer. (See Section A.3 for more information about how to halt Alpha computer systems.)

Step 2. Begin the conversational boot by entering the BOOT command in the following format:

```
BOOT -FLAGS 0,1 [device-name]
```

For *device-name*, substitute the device name of the drive from which you want to boot. For example, if the system disk has a device name of DKA400, enter the following command and press **Enter**:

```
>>> BOOT -FLAGS 0,1 DKA400
```

If your system has a hardware password (various systems support a password that prevents unauthorized access to the console), you need this password for logging in to the console. If you do not have this password, contact HP customer support to reset the hardware console password.

Step 3. Enter the following commands at the SYSBOOT> prompt:

```
SYSBOOT> SET/STARTUP OPA0:
SYSBOOT> SET WINDOW_SYSTEM 0
SYSBOOT> SET WRITESYSPARAMS 0
SYSBOOT> CONTINUE
```

The first three commands request that:

- OpenVMS read the system startup commands directly from the system console
- The Windows system (if any) not start
- OpenVMS not record the parameter changes for subsequent system reboots

The last command causes the booting to continue.

Step 4. At the DCL prompt, the system now accepts startup commands directly from the console. Enter the following two commands as shown. These commands allow a normal system startup while you are left logged in on the console. Without the SPAWN command, you would be logged out when the startup completes.

```
$ SPAWN
$ @SYS$SYSTEM:STARTUP
```

Step 5. Once you log out of this session, the system completes the startup and can be used normally. Optionally, you can choose to reboot the system.

NOTE Instead of using the SET/STARTUP OPA0: command, an alternative method of booting under these emergency conditions is to set the UAFALTERNATE system parameter to use the alternate authorization file rather than the standard user authorization file. Setting the system parameter UAFALTERNATE defines the logical name SYSUAF to refer to the file SYS$SYSTEM:SYSUAFALT.DAT. If this file is found during a normal login, the system uses it to validate the account and prompts you for the user name and password.

HP does not recommend this method. If an alternate SYSUAFALT.DAT file has been configured on your system, the UAFALTERNATE method will likely fail (assuming you do not know the password for the privileged account stored within the SYSUAFALT.DAT file). In addition, the OPA0: system console is critical to system operations and system security and allows access when the SYSUAF system authorization database is unavailable or corrupted; when core product license PAKs are not registered, are expired, or are disabled; and in various system failures.

Example

```
SYSBOOT> SET/STARTUP OPA0:
SYSBOOT> SET WINDOW_SYSTEM 0
SYSBOOT> SET WRITESYSPARAMS 0
SYSBOOT> CONTINUE
$ SPAWN
$ @SYS$SYSTEM:STARTUP
$
```

A.2 Configuring Boot Behavior for Alpha Systems

The following sections describe how to set up automatic booting, set and show the default boot device, modify boot parameters, and create a bootable OpenVMS Alpha system disk using the Writeboot utility.

A.2.1 Setting the System for Automatic Booting

Alpha computers can boot automatically from a designated boot device. When you installed the OpenVMS Alpha operating system, you designated the system disk as the default boot device. Section A.2.2 describes how to change the default boot device.

Alpha computers can boot automatically from the default boot device under the following conditions:

- When you first turn on system power
- When system power comes on after a power failure
- After you shut down the system (if you enter Y when the shutdown procedure asks whether an automatic reboot should be performed)

- After a bugcheck or system crash
- If the system halts under program control

Set the system to boot automatically by performing one of the following steps:

IF ...	THEN GO TO...
The OpenVMS Alpha operating system is running	Step 1
The OpenVMS Alpha operating system is *not* running	Step 4

Step 1. Log in to the SYSTEM account.

Step 2. Enter the following command and press **Enter**:

```
$ @SYS$SYSTEM:SHUTDOWN
```

Step 3. Answer the questions displayed by the system. When the procedure asks whether an automatic reboot should be performed, press **Enter** for NO. When the procedure is finished, it displays the following message:

```
SYSTEM SHUTDOWN COMPLETE
```

Step 4. Halt the system by pressing either **Ctrl/P** or the **Halt** button. (See Section A.3.1 for more information about how to halt your Alpha computer.)

Step 5. If you have an SMP system with multiple CPUs, enter the following command at the console prompt (>>>) to stop the other CPUs:

```
>>> INITIALIZE
```

Step 6. Enter the following command to show whether the system has been set to boot automatically:

```
>>> SHOW AUTO_ACTION
```

The system displays one of the following:

- Restart
- Boot
- Halt

Step 7. Enter the SET AUTO_ACTION command if you want to change the automatic booting behavior. HP recommends that AUTO_ACTION be set to RESTART. This forces the system to attempt to write a crash dump to the dump file, and after the dump write completes, the system tries to reboot itself automatically. For example, the following command sets the system to reboot automatically:

```
>>> SET AUTO_ACTION RESTART
```

Step 8. After you set this variable, HP recommends that you set the boot device and operating system flags as well, using the SET BOOTDEF_DEV and SET BOOT_OSFLAGS commands described in the following sections.

A.2.2 Setting and Showing Boot Devices

Use the SET BOOTDEF_DEV command to tell the system which drive you want to boot from (that drive becomes the default boot device). Use the SHOW BOOTDEF_DEV command to display the current default boot device.

Note that when you set this variable, HP recommends that you set the operating system boot parameters as well, using the SET BOOT_OSFLAGS command.

At the console prompt (>>>), enter the SET BOOTDEF_DEV command in the following format:

`SET BOOTDEF_DEV` *`device-name`*

Substitute the device name of the system disk for *device-name*. For example, to boot from a drive with a device name of DKA400 on a DEC 3000 Alpha series computer, enter the following command and press **Enter**:

```
>>> SET BOOTDEF_DEV DKA400
```

The next time you boot the system, you can enter the BOOT command without specifying a device name (because DKA400 is now the default boot device). For example:

```
>>> BOOT
```

NOTE If you have not used the SET BOOTDEF_DEV command to set the drive to boot from and you enter the BOOT command without specifying a device name, the system displays an error message.

Use the SHOW BOOTDEF_DEV command to find out what drive was specified in the last SET BOOT command. For example:

```
>>> SHOW BOOTDEF_DEV
```

To cancel the drive specified in a previous SET BOOTDEF_DEV command, enter the following command and press **Enter**:

```
>>> SET BOOTDEF_DEV
```

NOTE This command is not valid on DEC 3000 Alpha series systems.

A.2.3 Setting Boot Flag Parameters

By default, when you boot the operating system, the flags parameter is set to 0. If you want to define parameters to enable specific functions during the booting process, use the SET BOOT_OSFLAGS console command.

The following is a list of values you can specify with the SET BOOT_OSFLAGS command.

NOTE HP recommends that you keep the BOOT_OSFLAGS parameter at the default value 0 unless you have a specific need to change it (for example, to troubleshoot a system boot problem).

Hexadecimal Value	System Response
1	Allows a conversational boot (the system displays the SYSBOOT> prompt).

Hexadecimal Value	System Response
2	Maps XDELTA to a running system.
4	Stops the boot procedure at the initial system breakpoint.
8	Performs a diagnostic **bootstrap**.
10	Stops the boot procedure at the bootstrap breakpoints.
20	Omits header from secondary bootstrap image.
80	Prompts for the name of the secondary bootstrap file.
100	Halts the system before the secondary bootstrap.
2000	Marks corrected read data error pages as bad.
10000	Displays extensive, detailed debug messages during the boot process.
20000	Displays selected user-oriented messages during the boot process.

The following examples show how to use the SET BOOT_OSFLAGS command:

- The following command specifies the root directory as 0 and the parameter as 1, which sets the system to perform a conversational boot from the [SYS0] directory when you enter the BOOT command:

```
>>> SET BOOT_OSFLAGS 0,1
```

- The following command specifies the root directory as 1 and the parameter as 0, which sets the system (for example, the second host in a two-system DSSI OpenVMS Cluster configuration) to boot from the [SYS1] directory (instead of [SYS0]) when you enter the BOOT command:

```
>>> SET BOOT_OSFLAGS 1,0
```

- The following example specifies the root directory as 0 and the parameters as 1, 2, 4, and 20000 (for a total hexadecimal value of 20007). As a result, when you enter the BOOT command, the system performs a conversational boot from the [SYS0] directory with XDELTA, stops at the initial system breakpoint, and displays relevant user messages.

```
>>> SET BOOT_OSFLAGS 0,20007
```

To display the parameters you have just set, use the SHOW BOOT_OSFLAGS command. For example:

```
>>> SHOW BOOT_OSFLAGS
BOOT_OSFLAGS = 0,20007
```

Now that the boot parameters have been set, to boot the system using the parameters you have specified, simply type BOOT or B at the prompt (>>>).

A.2.4 Writing a New Boot Block

The boot block is block 0 of the system disk. It contains the size and location of the primary bootstrap image (APB.EXE) used to boot the system. If you suspect that the boot block on your system disk is invalid, you can use the Writeboot utility (WRITEBOOT.EXE) to write a new boot block.

The Writeboot utility is copied to your system disk during the installation procedure. It enables you to create a bootable OpenVMS Alpha system disk from one that was originally created by one of the following methods:

- A nonimage backup of an Alpha system disk (possibly corrupting the boot block)
- A nonimage restore of an Alpha system disk from an image save set

The Writeboot utility also enables you to rewrite the boot block of an OpenVMS Alpha system disk to point to a new version of the OpenVMS Alpha primary bootstrap file (APB.EXE) that you have previously copied to the disk. (Note that the file must be contiguous.)

NOTE The file must be contiguous and movefile operations on the file must be disabled. If the file is not contiguous, use the DCL command COPY/CONTIGUOUS (or similar) to re-create a contiguous version of the file. To disable movefile operations, use the DCL command SET FILE/NOMOVE. This prevents bootstrap failures that could result from the normal and expected operations of disk defragmentation tools.

To start the Writeboot utility, enter the following command:

```
$ RUN SYS$SYSTEM:WRITEBOOT
```

The utility prompts you as follows:

```
Update VAX portion of boot block (default is Y):
Update Alpha portion of boot block (default is Y):
```

Answer N (NO) to the VAX prompt. If you answer Y (YES) to update the Alpha boot block, the utility prompts you for the Alpha boot file:

```
Enter Alpha boot file:
```

Specify *device-name*:[VMS$COMMON.SYSEXE]APB.EXE in response to this prompt, where *device-name* indicates the device on which the system disk is mounted. The utility writes the specified information to the boot block on the system disk. For more information, see the *HP OpenVMS System Manager's Manual, Volume 1: Essentials*.

A.3 Halt and Shutdown Operations

The following sections describe halt and shutdown operations for Alpha computers.

A.3.1 Halting the System

During installation, upgrade, and related system operations, you might need to halt your system. The methods for halting Alpha computers differ slightly with certain models, as described in the next section.

The following table summarizes the ways you can halt specific Alpha computers:

Alpha Computer	How to Halt
AlphaServer 300, 800, 1000, 1200, 2000, 2100 series	Do one of the following: • Press the **Halt** button. • Press **Ctrl/P**.
AlphaServer 8200, 8400 series	Press **Ctrl/P**.

Alpha Computer	How to Halt
AlphaStation 200, 400, 500, 600 series	Do one of the following: • Press the **Halt** button (if the graphics monitor is serving as the console). • Press **Ctrl/P** (if you are using the alternate console and port).
DEC 2000, 3000 series	Do one of the following: • Press the **Halt** button (if the graphics monitor is serving as the console). • Press **Ctrl/P** (if you are using the alternate console and port).
DEC 4000 series	Do one of the following: • Press the **Halt** button. • Press **Break** on the console (the default setting). • Press **Ctrl/P**, but only after using the console command SET TTA0_HALTS*n* to enable this key combination, where *n* can be 6 (enables the **Break** key and **Ctrl/P**) or 2 (enables **Ctrl/P** but disables the **Break** key).
DEC 7000, 10000 series	Press **Ctrl/P**.

A.3.2 Shutting Down the System

Before you shut down the operating system, decide if you want it to reboot automatically or if you want to enter console-mode commands after the shutdown completes.

You can perform the following three types of shutdown operations:

- An orderly shutdown with SYS$SYSTEM:SHUTDOWN.COM (see Section A.3.2.1)
- An emergency shutdown with OPCCRASH.EXE (see Section A.3.2.2)
- An emergency shutdown with crash commands (see Section A.3.2.3)

If you want the system to reboot automatically after the shutdown, see Section A.2.1.

A.3.2.1 Orderly Shutdown

The SHUTDOWN.COM procedure shuts down the system while performing maintenance functions such as disabling future logins, stopping the batch and printer queues, dismounting volumes, and stopping user processes. To use the SHUTDOWN.COM command procedure, log in to the SYSTEM account, enter the following command, and press **Enter**:

```
$ @SYS$SYSTEM:SHUTDOWN
```

For more information about the SHUTDOWN.COM command procedure, see the *HP OpenVMS System Manager's Manual, Volume 1: Essentials*.

A.3.2.2 Emergency Shutdown with OPCCRASH.EXE

If you cannot perform an orderly shutdown with the SHUTDOWN.COM procedure, run the OPCCRASH.EXE emergency shutdown program. To run the OPCCRASH.EXE program, log in to the SYSTEM account, enter the following command, and press **Enter**:

```
$ RUN SYS$SYSTEM:OPCCRASH
```

For more information about the OPCCRASH program, see the *HP OpenVMS System Manager's Manual, Volume 1: Essentials*.

A.3.2.3 Emergency Shutdown with Crash Commands

Use crash commands only if the system "hangs" (stops responding to any commands) and you cannot log in to the SYSTEM account to use the SHUTDOWN.COM procedure or the OPCCRASH.EXE program.

NOTE The method described here works on all Alpha computers. However, on certain systems, you can force your processor to fail (crash) by entering a specific console command. See the hardware manuals that came with your computer for that information.

To force your processor to fail, do the following:

Step 1. Halt the system by pressing either **Ctrl/P** or the **Halt** button. (See Section A.3.1 for more information about how to halt your Alpha computer.)

Step 2. To examine processor registers, enter the following commands and press **Enter**:

```
>>> E -N F R0
>>> E PS
```

The system displays the contents of the registers. Write down these values if you want to save information about the state of the system.

Step 3. Enter the following commands and press **Enter**:

```
>>> D PC FFFFFFFF00000000
>>> D PS 1F00
```

By depositing these values, you cause the system to write a memory dump to the system dump file on the disk.

Step 4. Enter the following command and press **Enter**:

```
>>> CONTINUE
```

This causes the system to perform a bugcheck.

Step 5. After the system reboots, log in to the SYSTEM account.

Step 6. To examine the dump file, enter the following commands and press **Enter** after each one:

```
$ ANALYZE/CRASH SYS$SYSTEM:SYSDUMP.DMP
SDA> SHOW CRASH
```

For more information about the System Dump Analyzer (SDA) utility, see the *HP OpenVMS System Analysis Tools Manual*.

A.4 Troubleshooting Procedures

The following sections describe procedures that you can follow if you encounter problems with your system.

A.4.1 If the System Does Not Boot

If the system does not boot because a hardware problem occurs, a question mark(?) usually precedes the error message displayed on the console terminal. An example of a hardware problem is a read error on a disk.

A.4.1.1 For Hardware Problems

If you suspect a hardware problem, do the following:

Step 1. Consult the hardware manual for your Alpha computer.

Step 2. Contact an HP support representative.

A.4.1.2 For Software Problems

When the operating system is loaded into memory, a message similar to the following is displayed on the terminal screen:

```
SYSTEM   job terminated at 27-AUG-2004 15:05:03.17
```

If the system does not display this message, a software problem has probably occurred. Do the following:

Step 1. Turn off the system. Turn it back on and try to reboot.

Step 2. Perform a conversational boot using the default system parameters or try one of the emergency boot procedures described in Section A.1.9.

Step 3. If the system boots, run the AUTOGEN procedure. For more information about the AUTOGEN procedure, see the *HP OpenVMS System Manager's Manual, Volume 2: Tuning, Monitoring, and Complex Systems*.

A.4.2 Detecting and Responding to System Problems

If your system exhibits unexpected behavior, note the following:

- If the system displays a bugcheck message on the console terminal and shuts itself down, it means the system encountered a problem that made further operation impossible or dangerous. If the system does not reboot automatically, set up your system to boot automatically as explained in Section A.2.1, or reboot the system manually as explained in Section A.1.3.
- If the system stops responding to your commands (that is, the system "hangs"), there is a possible failure in a system software or hardware component or a possible power failure.
- If the system exhibits erratic behavior (it does not respond according to specifications), it indicates a possible failure in a system software or hardware component.

To determine whether the failure is a system problem:

- Be sure that you did not press **F1** (the **Hold Screen** key). The Hold Screen light goes on when you press either **F1** or press **Ctrl/S**.

- Press **Ctrl/T** to check the status of your process. A status line should appear, indicating the name of the program that is executing and other information. If the status line does not appear, the program you are executing might be stalled or "hanging." (If you have disabled **Ctrl/T** by entering the command SET NOCONTROL=T or have set the terminal to NOBROADCAST mode by entering the command SET TERMINAL/NOBROADCAST, this procedure does not work.)
- Make sure the cable connecting the terminal or monitor to the system is secure.

If you determine that you have a system problem:

Step 1. Force an exit from a stalled or hanging program by pressing **Ctrl/Y**. Note that when you press **Ctrl/Y**, any work performed by the program and not saved on disk is lost.

Step 2. If the system is still unresponsive, halt it by pressing either **Ctrl/P** or the **Halt** button. (See Section A.3.1 for more information about how to halt your Alpha computer.)

Step 3. Note in detail the sequence of events that caused the problem and notify an HP support representative.

B Configuring OpenVMS I64 Hardware Operation and Boot Operations, and Booting and Shutting Down Your System

This appendix briefly describes the configuration and management tools that might be available on HP Integrity servers, and explains how to set up the system console, configure boot options, boot the OpenVMS I64 operating system, and shut down the operating system. The appendix also includes brief troubleshooting procedures.

Specifically, this appendix contains the following information:

- Hardware/firmware configuration and management interfaces and their features
- Setting up your system console
- Overview of using the Extensible Firmware Interface (EFI)
- Enabling or disabling Hyper-Threading on systems that have dual-core processors that support it
- Configuring and managing boot operations such as the following:
  - Setting the system for automatic booting
  - Setting and showing boot devices
  - Setting boot parameters
  - Writing a new boot block
- Booting operations, including the following:
  - Booting the OE DVD from the local drive (for network booting information, see Appendix C; for Fibre Channel booting information, see Appendix D)
  - Booting manually from the system disk
  - Performing a conversational (interactive) boot
  - Booting with minimum startup
  - Booting with the XDelta utility (XDELTA)
  - Booting from a different root directory
  - Booting in an emergency
- Halting and shutting down operations
- Troubleshooting procedures

NOTE Any information about Integrity server hardware and utilities is provided in this manual for your convenience and is not intended to replace the hardware documentation included with your Integrity server system or the latest documentation available on the Web. HP Integrity servers are available in many different configurations. Hardware, utilities, and certain hardware configuration procedures might differ significantly across models, and even across versions of the same model. Please see your hardware documentation for the most up-to-date

information specific to your particular model and version. Note that the hardware documentation includes model-specific illustrations to guide you. The latest version of documentation for your server can be found online at:

```
http://docs.hp.com/en/hw.html

http://docs.hp.com

http://www.hp.com/support/itaniumservers
```

B.1 Configuration and Management Utilities for HP Integrity Servers

This section provides a brief overview of the configuration and management utilities that are typically available for your Integrity server system. For more information, see the appropriate hardware documentation.

B.1.1 Overview of Utilities and Console Options

The main interfaces that are typically available for configuring and managing your HP Integrity server environment are the Extensible Firmware Interface (EFI) and the Management Processor (MP). On entry-class Integrity servers, MP has been replaced by the **Integrated Lights-Out (iLO)** Management Processor, which includes all the functionality of MP plus additional features. On some models, the Baseboard Management Control (BMC) utility is provided. Cell-based servers include additional management tools.

EFI is the main boot and preboot interface; it is the core interface to the system firmware and console commands on all models. BMC is provided on entry-class HP Integrity servers (although on a few systems the interface itself is hidden). BMC provides basic management capabilities and access to EFI. MP (or iLO) is available on most systems; on some systems it is available only if the necessary console hardware has been installed and configured. In addition to providing access to EFI, MP provides advanced management functionality (beyond that which is available through BMC), including remote management, network console and Web-based access, and enhanced diagnostic capabilities. Both BMC and MP (iLO) can operate on standby power—even when the Integrity server's main power switch is turned to the off position.

EFI is the base console environment. You can either use MP (iLO) or BMC to interact with the capabilities of the console interface.

The OpenVMS I64 installation and upgrade procedures assist you in adding a boot option for your newly installed or upgraded system disk. Before you can boot your OpenVMS system, your console must be configured correctly, as explained in Section B.2.

The following briefly describes some of the main features of EFI, MP, and BMC.

- Extensible Firmware Interface (EFI)

  EFI is a menu and command-line interface between the operating system and the system firmware. The EFI interface is available only when the operating system is not booted; on cell-based servers, the interface is available from an nPartition console when the nPartition is in an active state but has not

booted an operating system. To configure EFI boot options while the operating system is running, OpenVMS provides the OpenVMS I64 Boot Manager utility (SYS$MANAGER:BOOT_OPTIONS.COM). Changes made by this utility do not take effect until the system is rebooted.

The EFI Boot Manager, like the OpenVMS I64 Boot Manager, provides support for operating system loaders and enables you to configure the firmware and control the booting environment for your OpenVMS operating system. A FAT partition on the boot disk stores the system loader. The Boot Configuration menu (or in some versions of EFI, the Boot Option Maintenance Menu) enables you to add or delete a boot option, change the boot order, select the active console, and more. After you power up the server, the EFI boot manager presents different ways to bring up the system, depending on how you have set up the boot options. For example, you can boot to the EFI Shell. When you select the EFI Shell command-line interface option, you can enter commands at the EFI Shell prompt. For more information about EFI options and commands, see Section B.3 and the appropriate hardware documentation.

NOTE In some HP documents, you might see the acronym **POSSE** used in place of or in combination with EFI. EFI is an Intel specification of an interface between firmware and the operating system. **POSSE (Pre-OS System Environment)** is the HP implementation of EFI that extends the EFI Shell and EFI Boot Manager to include additional features for managing hardware and system boot options.

- Management Processor (MP)

  Management Processor (or, on entry-class Integrity servers, iLO) provides both local and remote access for controlling the system console, reset/power management, and transfer of control (TOC) capabilities. It also enables you to monitor tasks and display detailed information about various internal subsystems. On cell-based servers, MP is a complex-wide tool and is always available, even if nPartitions are not configured or booted in the server complex. In contrast, EFI does not operate as a complex-wide tool and is only available when the nPartition is in an active state but has not booted an operating system; each nPartition has its own EFI interface. Using MP, you can select the partition for which you want EFI access. You can access all hardware and nPartitions in the complex. The following is a brief summary of MP's main features:

  — Console connectivity

    As a console interface, MP enables you to interact with EFI and to power the server on or off; ultimately, it can function as the OPA0: terminal port on OpenVMS.

  — Virtual Front Panel (VFP)

    MP provides a virtual front panel that you can use to monitor the front panel LEDs from a remote location.

  — Command interface

    MP provides an extensive menu system and a command-line interface.

  — Multiple, simultaneous viewers

    Multiple users can access the MP console or a particular nPartition console. Only one user at a time is allowed interactive access. All other users have read-only access. (Output from the interactive user is reflected to the read-only users currently accessing the console.) Access to MP can be restricted by password-protected user accounts.

  — Availability/standby power

    MP is available whenever the system is connected to a power source, even if the server's main power switch is in the off position.

— Accessibility

MP is accessible in several ways, including by direct monitor connection using a terminal, PC, laptop or desktop computer connected to the MP serial port; by modem through an EIA-232 port; or by Telnet or Web browser on the LAN. MP is accessible through Secure Shell (SSH), which is provided by TCP/IP Services for OpenVMS. This method of access is more secure than any of the other methods.

— Console log

MP records recent output from the system console. The `cl` command enables you to view the recorded information.

— Event logs

MP includes event logs that include information about system events and booting. The `sl` command displays the contents of system status logs.

On some systems, such as the rx1600, MP is optional. For more information about MP options and commands, see the appropriate hardware documentation.

NOTE MP provides much more functionality than BMC and might be more appropriate for your needs. On some systems, MP is an optional component and on others it is built into the system.

- Baseboard Management Controller (BMC)

  BMC is more limited in functionality than MP. BMC enables you to control some management features built into the system board, such as diagnostics, configuration, and hardware management. BMC provides a console connection on some systems. As with MP, BMC enables you to interact with EFI; it can function as the OPA0: terminal port on OpenVMS. BMC also operates on standby power. However, BMC is accessible only through the serial port on the back of the system. BMC commands enable you to control the BMC interface, view logs, get help, display firmware revisions, reset the system, turn the system locator LED on or off, and change the BMC password.

  BMC is not provided on cell-based Integrity servers. On some systems, such as the rx4640, the BMC user interface is hidden but is still present and functional. For more information about BMC commands, see the appropriate hardware documentation.

B.1.2 Configuration and Management Utilities on Cell-Based Servers

For the more complex environments provided by cell-based Integrity servers, a wider variety of tools is provided. Systems with multiple nPartitions provide a separate EFI interface for each nPartition. MP provides access to, and allows management across, the complex and each nPartition EFI interface.

In addition to MP and EFI (cell-based servers do not provide BMC), these systems offer Partition Manager and other tools that vary from system to system and operating system to operating system. The Partition Manager (parmgr) utility provides a graphical interface for managing nPartitions and complex hardware. It centralizes all nPartition management functions in one place, providing the system manager with the tools to dynamically reconfigure, power on, power off, create, delete, and modify nPartitions to ensure smooth and well-controlled operation. Partition Manager can be run on HP-UX or Microsoft Windows systems. You can use either version of Partition Manager to manage nPartitions for OpenVMS Version 8.3. Partition Manager is a free product that you can download from the following Web site (PARMGR must be uppercase as shown):

`http://www.docs.hp.com/en/PARMGR2/download.html`

For more information about Partition Manager, see the *HP System Partitions Guide: Administration for nPartitions*.

For more information about these and other tools available for configuring or managing Integrity servers, see the appropriate hardware documentation.

B.1.3 Using the Delete or Backspace Key with Integrity Server Utilities

The EFI environment and the MP and BMC console interfaces on Integrity server systems interpret the **Delete** (or **Backspace**) key as do UNIX systems, which is different from the way OpenVMS Alpha systems or Microsoft Windows systems interpret them. While the OpenVMS operating system uses the ASCII DEL/RUBOUT character (7F hexadecimal) to delete the last character typed in a command line, the Integrity server facilities use **Ctrl/H**. When you enter commands for the Integrity server, if you press **Delete** at a VT*xxx* terminal (or press the key you have mapped to send the DEL/RUBOUT character code in your terminal emulator), the last character typed is not deleted.

You can remap a terminal so that the **Delete** key removes the last character typed by adding the following command to your login command procedure (generally, LOGIN.COM):

```
$ SET TERMINAL/BACKSPACE=DELETE
```

This command remaps **Ctrl/H** to DEL. The driver does not remap these keys if the terminal is in one of the following states:

- Terminal attribute is set to PASSALL
- Terminal attribute is set to PASTHRU
- IO$_READALL
- IO$_READPBLK
- **Ctrl/V** is entered, which tells the driver to pass the next character and skip the remap check.

Alternatively, you can set up your terminal emulator so that the **Backspace** key deletes the last character typed. However, for the key to work properly on OpenVMS, you must still enter the SET TERMINAL command described earlier.

B.2 Selecting Your OpenVMS Console for the Integrity Server System

For a console terminal, you need a laptop, PC, or similar device that has terminal emulation software. OpenVMS supports serial console devices only; OpenVMS does not support using a VGA graphics display as a console device. To connect your console terminal to your Integrity server, you need a standard PC-to-PC file transfer cable (also known as a 9-pin null-modem serial cable). The serial port on the server system is typically set to 9600 baud, 8-bit, no parity, and stop bit 1 (check your hardware documentation: the settings can vary, depending on the port and access method). Set up your terminal emulation software accordingly, and specify VT100 mode.

NOTE For connections that require the three-connector cable (M-cable) included with your server, make sure you connect your PC-to-PC cable to the connection port labeled "Console" on the three-connector cable. All three connection ports on that cable are DB9 9-pin connectors, but only the port labeled "Console" will work. The other two connection ports are for remote (modem) and UPS connections only.

OpenVMS requires that you select the correct console device from an EFI firmware selection menu. The console cable must be connected to the port for the device selected. If you are already using the system console, you can skip this section. If you have ordered a machine with OpenVMS preinstalled, your console selections have been chosen for you, but you might want to change these default console selections. If you have changed your system configuration, or if you are installing OpenVMS on a new (uninstalled) Integrity server, or if you are reinstalling OpenVMS using the INITIALIZE option (removing all the software and data files that were previously installed on the target system disk), you might need to select the correct console. If the correct console is not selected, OpenVMS might use an unexpected device as the console, causing your system to appear to be hanging; or OpenVMS either will fail to boot or will boot with output sent to the wrong location.

If MP is present on your system, HP recommends using MP for your system console. With some servers, the MP console is preselected for your Integrity server. You still might need to select the correct console device to use the MP serial port for the console because the Integrity server might not initially know where to perform console I/O operations. If you intend to set up LAN or remote access for an MP console interface, you must initially use the serial port for console operations when you set up the Integrity server for the first time. (See your hardware documentation for instructions on setting LAN or remote access for the MP console interface.)

To set up the correct console, follow these steps:

NOTE The process for selecting the correct console might vary for each Integrity server model and for each version of the EFI firmware.

Step 1. Decide what console you want to use. Depending on your system configuration, OpenVMS can use one of the following types of consoles:

- System serial port
- MP serial port (if present)

Be sure you select the console you want to use. OpenVMS uses a default console that you might not want to use. Select only one console type. Selecting more than one type might bring unexpected results.

Step 2. Power on the system. If using an MP serial port, log in to MP and access EFI. If you are setting the system serial port as your system console, skip to the next step. If you are setting the MP serial port as your system console, and you have just powered on your Integrity server, the MP console interface prompts you to log in. (By default, both user name and password are set to Admin. For security purposes, you should change the password immediately. See your hardware documentation for more information.)

NOTE To see the MP login user name and password prompts, you might need to press **Enter** one or more times on your console keyboard. If this does not work, then try pressing **Ctrl/B**.

If you see only the MP password prompt, press the **Enter** key to get to the MP login prompt.

If the login prompt still fails to appear, the system might be powered off. (When you powered on the system, you might have pressed the power button twice, which turns it on and then off.)

If you see a message similar to the following, another user has the console (only one user can write to the console although multiple users can view it).

```
[Read only - use Ctrl-Ecf for console write access]
```

To gain control of the console from the other user, press **Ctrl/E**, release the key combination, and then immediately type the letters `cf`. Alternatively, you can have the other user log off.

Note that the system will not work if it has MP firmware older than version E02.22. For information about updating the MP firmware, see Section 1.4.6.

When the MP> prompt is displayed, move to the EFI interface by using the `co` (console mode) command.

On Integrity servers without nPartitions, the `co` command brings you directly to the EFI Boot Manager screen; if you do not enter a command before the EFI countdown timer expires (10 seconds by default), the EFI Shell> prompt is displayed. (When the operating system is running, the `co` command brings you to the console port of the operating system.)

On cell-based servers, unless you are using a single-partition user account, the `co` command first brings you to a console menu that lists the available nPartitions. Select the appropriate nPartition to access the EFI Boot Manager console for that nPartition. The following example shows a console menu (menus and displays such as this may vary from system to system):

```
Partitions available:

  #   Name
---   ----
 1)   MIA1
 2)   MIA2
 3)   TESTING
 4)   LAN
 5)   AMYS
 6)   ACCNTS
 Q)   Quit

Please select partition number:
```

If the `co` command results in a screen that is unexpected or difficult to interpret, pressing **Enter** might help. If you are at an EFI submenu instead of the main menu, navigate to the main menu by exiting from the submenu and any subsequent submenus until you return to the EFI main menu.

For more information about determining which nPartition to access, see the *HP System Partitions Guide, Administration for nPartitions* or the appropriate hardware documentation.

Step 3. Access the initial EFI boot menu. When you power on the Integrity server or move to console mode from MP, the EFI Boot Manager begins loading. Several messages should indicate so. If you are using the MP serial port and you do not see any messages, the system might be powered off (MP is "alive" even when the system is powered off, as long as the power cord is connected). Make sure you power on the system. Wait until you see the EFI Boot Manager screen with the boot menu. The default menu option is highlighted, as shown in the following example of a boot menu.

NOTE The appearance of EFI Boot Manager screens and menus differ from version to version of the firmware. This boot menu example is what might be seen with the latest version of the EFI firmware.

```
      Boot Menu

EFI Shell [Built-in]
Internal Bootable DVD
---------------------
Boot Configuration
System Configuration
Security Configuration
```

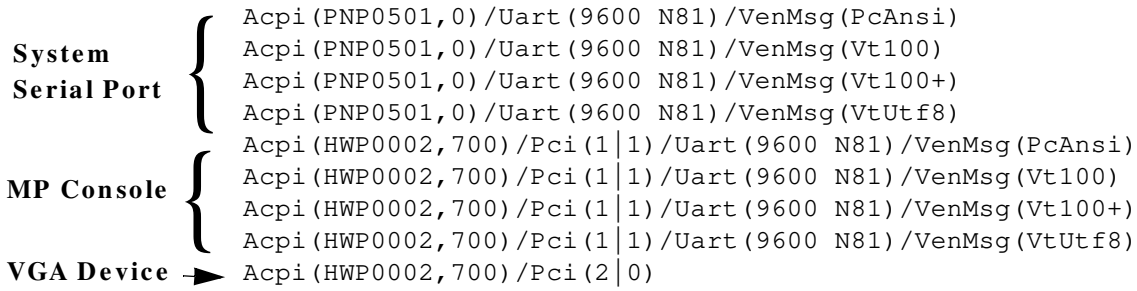
Step 4. Access the EFI Boot Configuration menu. From the initial EFI boot menu, select the Boot Configuration option (or, in some versions of EFI, the Boot Option Maintenance Menu). To move to an option, use the up or down arrow key. (With some terminal emulators, you might have to use the letter v to scroll down or the caret (^) to scroll up.) Press **Enter** to toggle the selection. If you do not select an option within the default 10-second countdown, EFI moves to the default option—the EFI Shell in the example given in step 3, in which case the EFI Shell> prompt is displayed. Exit the EFI Shell to return to the Boot Configuration menu. If lines from the preceding screen linger to obscure the EFI Shell prompt, press **Enter** to bring the EFI Shell prompt into view.

Step 5. Configure the Console Input, Console Output, and Console Error Devices. If you have the latest EFI firmware, select the Console Configuration option from the Boot Configuration menu to list the console input, console output, and console error device options. Some versions of EFI list the three console device options directly in the Boot Option Maintenance Menu. Configure each of the console options one at a time, as follows:

NOTE For OpenVMS, the input, output, and error console all must point to the same serial-line console device. New systems might be shipped with multiple devices selected for each of the console types, so you must make sure only one device is selected for each. If you see an error message mentioning multiple device path instances for the console input or output device, perform the steps outlined in this procedure to select a single console only.

OpenVMS does not support booting using a USB keyboard or a VGA graphics display device. The system might boot with these devices but you does not display any visible indication that the system is booting. You might receive a warning when the system begins to boot. You might also see other errors in later stages of the boot. Additionally, you might lose output that you normally see during booting.

a. Select the Console Input Device. EFI displays a list of devices available for console input. Select only one device from this list, and deselect any unused devices. The following is a sample list of devices, annotated with explanatory text below the list. (This example shows the devices for an entry-class Integrity server; the procedure and display differ on cell-based servers.)



System Serial Port — These four lines indicate any of the valid devices that you can define for the console using the system serial port. Any line that has the letters Uart but not the letters Pci is one of the system serial ports. Notice the lines are almost identical except for the text following the VenMsg portion, which indicates the terminal emulation protocol. Thus, each of the four entries is the same device with different emulation protocols.

MP Console — These four lines (the HWP lines) appear only on systems that have an MP port. Any lines that include both Uart and Pci are MP serial port devices. As with the serial port devices, these four lines are the same device with different emulation protocols.

VGA Device — This is the graphic console device. Do not select this. OpenVMS does not support VGA graphics as a console output device for booting.

Select a device using the protocol appropriate for your terminal emulator (in most cases, VT100+ is the best choice). Remember that you should select only one device line. OpenVMS does not operate if more than one device is selected.

b. Save your settings to NVRAM.

c. Select the Console Output Device. Repeat steps a and b to configure the console output device. Select the same device selected for the console input device.

d. Select the Console Error Device. Repeat steps a and b to configure the console error device (also referred to as the standard error device). Select the same device selected for the console input and output devices.

Step 6. Perform a Cold Reset if required. Your system might require a cold reset. Newer versions of EFI do not require a cold reset. See your hardware documentation for more information.

At this point, you can boot the OpenVMS I64 DVD to install the operating system onto a system disk. Follow the instructions in Chapter 3 (specifics for booting are provided in this appendix).

NOTE Any time new potential console devices are added to a system, or anytime NVRAM on a system is cleared, review your console selections. When you change serial devices, you must also make changes to the input, output, and error console device options to ensure proper operation.

B.3 Overview of Using EFI

EFI is the basic interface between the operating system and firmware on all Integrity server systems; it is similar to SRM on Alpha systems. EFI provides a boot option menu and the ability to configure boot options. EFI is accessible when the operating system is not booted. On cell-based servers, EFI is available when the nPartition is in an active state but has not booted an operating system. Each nPartition has its own EFI interface and system boot environment that enables you to interact with the nPartition before an operating system has booted on it.

When you first power on a new Integrity server system, you see a series of diagnostic messages followed by the EFI Boot Manager screen (unless MP is available, in which case you see the MP login screen). However, if your Integrity server came with the OpenVMS I64 operating system installed, then the OpenVMS I64 operating system is the first option and it boots automatically.

NOTE On some systems that include MP, you might first see the MP login screen. In addition, on cell-based servers, you initially must select the console for the nPartition you want to access. As noted previously, the behavior of Integrity server systems can vary significantly from model to model as well as from version to version of the firmware.

To select an option from the EFI Boot Manager menu, use the up or down arrow key to highlight an item (or for some (with some terminal emulators, you might have to use the letter v to scroll down and the caret (^) to scroll up), and then press **Enter** to activate the selection. You can use EFI to configure numerous options for your Integrity server and OpenVMS operating system.

For the first boot of a system on which OpenVMS is not preinstalled, you probably need to use EFI to get started. When you select the EFI Shell, the console displays much activity before the EFI Shell prompt is displayed. If you do not see the EFI Shell> prompt, press **Enter**. (Note also that the EFI Shell prompt might change, as explained in Section B.3.1.)

The EFI boot menu lists boot options. Each item in the boot options list references a specific boot device and provides a specific set of boot options or arguments to be used when booting the device. You can add boot options to the boot menu. The OpenVMS installation procedure (as well as the upgrade procedure) can assist you in adding and validating a boot option for your newly installed system disk. The procedure uses the OpenVMS I64 Boot Manager utility (SYS$MANAGER:BOOT_OPTIONS.COM) to add and validate boot options. You can use this utility directly at the OpenVMS DCL prompt. HP recommends using either of these methods for configuring boot options rather than using EFI. The OpenVMS I64 Boot Manager utility is easier to use than EFI and enables you to configure the most pertinent options for your system (while OpenVMS is running), including the following:

- Display boot options known to the EFI Boot Manager.
- Add a boot option to the EFI Boot Manager so that your system disk boots automatically when the system is powered on or rebooted.
- Remove or change the position of a boot option in the EFI Boot Manager list.
- Validate and fix the boot option list.
- Change how long EFI pauses before booting or rebooting.

Use of this utility is optional for most devices but is required for configuring boot options on Fibre Channel devices. HP recommends using this utility to add members of a multiple-member shadow set to the boot list and dump device list. (Be sure to add all members to both lists.) For instructions on how to use the utility, see Section B.5. For more information about configuring Fibre Channel devices with this utility, see Appendix D. For information about using the OpenVMS I64 Boot Manager utility to display boot options, see Section

B.5.2.2. For information about setting the pause length, see Section B.5.2.3. The OpenVMS I64 Boot Manager utility also enables you to configure dump off the system disk (DOSD) devices and debug devices; for more information about this, see the *HP OpenVMS System Manager's Manual, Volume 2: Tuning, Monitoring, and Complex Systems*.

B.3.1 General Notes About Using EFI

Note the following:

- **Using EFI on cell-based servers:** Remember that on an Integrity server with nPartition support, a separate EFI interface exists for each nPartition. Be sure to access the appropriate nPartition console.

  To determine which nPartition EFI interface you are using, use the `info sys` command at the EFI Shell prompt. This lists the local nPartition number and details about active cells. For processor details, use the `info cpu` command. (You can also use MP to provide information about the nPartition you are using, as described in the *HP System Partitions Guide, Administration for nPartitions*.)

  You can use the MP console interface to access any nPartition's EFI console. Press **Ctrl/B** to move from EFI (or from your OpenVMS session) to the MP interface. Log in to MP if you are prompted. A menu then displays the names of all available nPartitions. Select from this list the nPartition that you want to access. To gain console write access for an nPartition console, press **Ctrl/E** and enter the letters `cf`. You can use the MP `pd` command to set a default nPartition for MP login; this helps to ensure you are brought to the intended nPartition (for example, to help prevent you from accidentally reconfiguring an nPartition you do not own).

  To return to the EFI console (when OpenVMS is not booted), enter the `co` command at the MP> prompt.

- **Navigating EFI file system directories:** To switch to a different file system, enter the file system name. The following example shows how to switch to fs3: from the current location (top level of the EFI Shell):

  ```
  Shell> fs3:
  fs3:\>
  ```

  Note that the prompt is now fs3:\ >. The EFI Shell prompt changes to reflect the file system currently accessed. The Shell> prompt is displayed again if you reset the system. Also note that the file system number might change when remapped after hardware changes are made to the server (for example, after an I/O drive is added to the server and the nPartition boots or the `map -r` command is issued).

- **File structure of EFI file systems:** The file structure of an fs disk is identical to MS-DOS and the commands to move around the structure are similar to MS-DOS commands. For example, to move to directory efi on disk fs0:, enter the `cd` command:

  ```
  fs0:\> cd efi
  fs0:\efi>
  ```

  To display the contents of the `efi` directory, use the `dir` command.

- **EFI commands for OpenVMS:** Most commands that you issue for OpenVMS purposes at the EFI Shell prompt are issued from `\efi\vms` on the file system associated with the system disk. You can enter such commands directly from the top level by specifying `\efi\vms` in the path for subsequent commands, or by first moving to `\efi\vms` and entering the commands without the path specification. The first example that follows shows how to enter commands from the top level. The second example shows how to move to `\efi\vms` before entering the commands. The `vms_show` command displays the equivalent OpenVMS device name for devices mapped by EFI, and the `vms_set` command can be used to set a debug or dump device. These EFI commands for OpenVMS, known as EFI Utilities for OpenVMS, are usable only when the operating system is not running. To display and set EFI-mapped devices while the operating system

is running, use the OpenVMS I64 Boot Manager utility (SYS$MANAGER:BOOT_OPTIONS.COM), as described in Section B.5. The EFI Utilities for OpenVMS are described in the *HP OpenVMS System Management Utilities Reference Manual*.

Example 1. From top level:

```
fs0:\> \efi\vms\vms_show device
.
.
.
fs0:\> \efi\vms\vms_set dump_dev dga3730
```

Example 2. Moving first to \efi\vms:

```
fs0:\> cd \efi\vms
fs0:\efi\vms> vms_show device
.
.
.
fs0:\efi\vms> vms_set dump_dev dga3730
```

NOTE The directory structure and contents of the OpenVMS system disk differs from those of the OpenVMS I64 OE DVD. Note also that the **bootstrap** on the system disk is located at \efi\vms\vms_loader.efi, while on the DVD it is at \efi\boot\bootia64.efi. (These two files are identical in content.)

- **EFI aliases:** You can define aliases for EFI commands that are easier to remember. For example, to define the alias dir for the ls command, use the alias command as follows:

  ```
  fs0:\> alias dir "ls"
  ```

  To define an alias for the command that boots OpenVMS from fs0:, enter the following command:

  ```
  fs0:\> alias bvms "fs0:\efi\vms\vms_loader.efi"
  ```

NOTE Setting an alias to point to a specific device can lead to unexpected results. For example, if you insert a DVD in the DVD/CD drive, fs0: now points to the DVD/CD drive. HP recommends using the OpenVMS I64 Boot Manager utility to set your system disk as a boot device for EFI, as explained in Section B.5.

To list the aliases currently defined, enter the alias command:

```
fs0:\> alias
   dir   : ls
   bvms  : fs0:\efi\vms\vms_loader.efi
```

- **Boot device list:** Any changes in storage configuration after the system is booted to EFI (such as inserting a DVD into a DVD removable drive or adding SCSI drives on storage enclosures) is not automatically detected by the EFI Shell environment. To have the EFI Shell recognize the device, you must reconnect the device driver (on cell-based servers, use the EFI search command; on other servers, use the EFI reconnect command).

The EFI shell environment creates default mappings for all the device handles that support a recognized file system. After you change the system configuration or add a new device, you must regenerate these mappings. For information about reconnecting devices and regenerating mappings, see Section B.6.2.1 and your hardware documentation or the Web site listed at the end of this section.

- **Moving between EFI and MP:** To move from MP interface to EFI, type `co` (for Console) at the MP> prompt. If you are in command mode (at the MP:CM> prompt), first press **Ctrl/B** to return to the MP> prompt.

  When you move to EFI from MP, confirm that you are at the main EFI main menu. If you are at a submenu, to access the main menu exit from the submenu and any subsequent submenus until you return to the main menu.

  To move from the EFI to MP, press **Ctrl/B** (this assumes MP is present and configured).

For more information about using EFI, see the documentation provided for your Integrity server. Extensive information can also be found online at:

`http:://developer.intel.com/technology/efi/help/efidocs.htm`

B.4 Enabling or Disabling Hyper-Threading on Dual-Core Processors

Systems that have dual-core Intel Itanium 2 processors can support Hyper-Threading. Hyper-Threading provides the ability for processors to create an additional logical CPU that might allow additional efficiencies of processing. For example, a dual-core processor with Hyper-Threading active provides four logical CPUs, two on each core. The effect that Hyper-Threading has on performance depends heavily on the applications running on your system. HP recommends that you start with Hyper-Threading disabled and experiment later, if you wish.

You can enable or disable Hyper-Threading for a system whose processors support it. To display the Hyper-Threading state for a system, use the EFI `info cpu` or `cpuconfig` command. (The display indicates that "CPU threads" are turned on or off.) For example:

```
Shell> cpuconfig

PROCESSOR MODULE INFORMATION

        # of               L3      L4      Family/
CPU     Logical            Cache   Cache     Model          Processor
Module     CPUs   Speed    Size    Size      (hex.)    Rev   State
------  -------  ------   ------  ------  ---------  ---   -----
 0           4   1.4 GHz   6 MB   None    20/00      CO    Active

CPU threads are turned on.
```

To enable or disable Hyper-Threading, use the EFI `cpuconfig threads on` or `cpuconfig threads off` command. For more information, enter `help cpuconfig` at the EFI Shell prompt or see the appropriate hardware documentation. The recent release of the Partition Manager also supports Hyper-Threading.

After enabling or disabling Hyper-Threading, the system must be reset for the change to take effect. Use the EFI Shell `reset` command. When Hyper-Threading is enabled, it remains active on the next reboot of the system.

B.5 Configuring and Managing OpenVMS Booting on Integrity Servers

This section explains how to configure and manage the booting behavior of your Integrity server. You can use the EFI Boot Manager (while the operating system is not running) or the OpenVMS I64 Boot Manager (while the operating system is running) to configure boot options. HP recommends using the latter.

You can configure multiple boot entries for a single operating system. On a cell-based Integrity server running multiple operating systems, you can configure boot options for all currently installed operating systems. On cell-based servers, each nPartition has a local instance of EFI that is specific to that partition. Each partition can be booted and stopped independently of other nPartitions in the system, and each partition executes its own operating system image.

On cell-based servers, to successfully boot an operating system you must first ensure that the ACPI configuration is correct for the operating system being booted, as explained in Section B.5.1. Each nPartition has its own ACPI configuration value.

IMPORTANT To configure booting on a Fibre Channel storage device, you must use the OpenVMS I64 Boot Manager utility. (For information about configuring Fibre Channel devices, see Appendix D.) HP also recommends using this utility to add members of a multiple-member shadow set to the boot device list and dump device list. Be sure to add all members to both lists.

If you have just completed the initial setup of your Integrity server, perform the following steps before continuing:

Step 1. Power up your server system, as explained in the hardware documentation for your server. If you use the power button on the front panel, press it only once.

NOTE If you see a warning that the BMC system event log (SEL) is full, you can safely continue by following the prompts; OpenVMS processes the contents of the SEL. If you want to clear the SEL manually, see the instructions in the first note of Section B.6.

HP recommends that you load and use the most current system firmware. For more information about updating the system firmware, see Section 1.4.6.

Step 2. If you have a cell-based server, check that the ACPI configuration is correct for the OpenVMS operating system. For more information, see Section B.5.1.

Step 3. At the EFI Boot Manager menu, select the EFI Shell [Built-in] option. You can now boot your OpenVMS I64 system manually, or you can add a new entry to the EFI Boot Manager menu to have your system booted automatically whenever you power on your Integrity server or reboot.

This section discusses the following topics:

- Checking the ACPI configuration for nPartition booting (Section B.5.1)
- Setting automatic booting and boot flags for your system disk (Section B.5.2) (also includes how to set automatic booting using EFI commands)
- Displaying EFI boot entries and mapped OpenVMS devices, using the OpenVMS I64 Boot Manager utility (Section B.5.2.2) (also includes how to display boot entries using EFI commands)
- Setting the EFI boot option timeout value, using the OpenVMS I64 Boot Manager utility (Section B.5.2.3)
- Writing a new boot block, using the OpenVMS I64 SET BOOTBLOCK command (Section B.5.3)
- Comparing Alpha and Integrity server system boot commands (Section B.5.4)

B.5.1 Checking the ACPI Configuration for Booting OpenVMS in an nPartition

To boot your OpenVMS I64 operating system on a cell-based server, the ACPI configuration must be set correctly. The ACPI configuration value determines, among other things, the EFI Path format used when referencing devices. If your Integrity server was factory installed, the ACPI configuration is set correctly. If the nPartition on which you want to boot your OpenVMS system had previously been running a Windows or Linux system, then enter the following command at the EFI Shell prompt to set the partition to boot correctly with OpenVMS:

```
EFI> acpiconfig default
```

To make this new value take effect, you must reset the nPartition by using the EFI Shell `reset` command:

```
EFI> reset
```

If the ACPI configuration value is not set properly, when the operating system boots, it fails with bugcheck code INCONSTATE.

You cannot modify the ACPI configuration value for Integrity servers that do not support nPartitions (for example, the rx2600 server).

To display the current configuration value, enter the `acpiconfig` command with no arguments:

```
EFI> acpiconfig
Acpiconfig settings: default
```

NOTE The `acpiconfig` command does not necessarily report the setting that was used on the current nPartition boot stage. It reports only the current setting, which is used for the next boot of the nPartition.

B.5.2 Setting Boot Options for Your System Disk

You can establish and manage boot options for your system disk in any of three ways:

- During installation or upgrade, allowing the OpenVMS I64 installation/upgrade procedure to automatically establish an EFI boot option for your system disk
- Using the OpenVMS I64 Boot Manager utility (SYS$MANAGER:BOOT_OPTIONS.COM) while the operating system is running
- Using EFI (after the system disk has been created or updated and only while the operating system is not running)

HP recommends that you allow the OpenVMS I64 installation or upgrade procedure to establish a boot option for your system disk. However, you still have the option of modifying the boot option or adding other boot options for your system disk by using the OpenVMS I64 Boot Manager utility from the OpenVMS DCL prompt (or by using EFI itself).

The OpenVMS I64 Boot Manager utility is a menu-based utility that enables you to configure EFI boot options for your Integrity server. It is easier to use than EFI. With this OpenVMS utility, you can perform actions such as the following:

- Add your system disk as an EFI boot option (you can optionally configure it to boot automatically on hardware startup and reboot).
- Manage multiple system disks.
- Set boot flags.
- Display the EFI boot options.
- Add, move, and remove boot options in the EFI Boot Manager menu.
- Enable or disable the EFI boot countdown timer (timeout) and set the countdown value.

This section explains how to perform most of these operations (except moving and removing boot options). For more information about the OpenVMS Boot Manager utility, see the *HP OpenVMS System Manager's Manual, Volume 1: Essentials*. This section also explains how to use EFI to add a boot option for automatic booting.

HP recommends that you configure your system with a boot option for your system disk. You can enable automatic reboot of the system disk by specifying your system disk as the first boot option in the EFI Boot Manager menu. When the EFI timeout (countdown) occurs (the default is 10 seconds), your system disk boots automatically.

NOTE To configure booting on Fibre Channel devices, you must use the OpenVMS I64 Boot Manager utility. (Use of this utility is optional for other devices but mandatory for Fibre Channel devices.) HP also recommends using this utility to add members of a multiple-member shadow set to the boot device list and dump device list. Be sure to add all members to both lists. For more information about the utility, see the *HP OpenVMS System Manager's Manual, Volume 1: Essentials*. For more information about configuring and booting Fibre Channel devices, see Appendix D.

B.5.2.1 Adding a Boot Option and Setting Boot Flags

To add a boot option and set boot flags using the OpenVMS I64 Boot Manager utility, follow these steps:

Step 1. At the DCL prompt, enter the following command to start the OpenVMS I64 Boot Manager utility:

```
$ @SYS$MANAGER:BOOT_OPTIONS.COM
```

Step 2. When the utility starts, the main menu is displayed. To add your system disk as a boot option, enter 1 at the prompt, as in the following example:

```
OpenVMS I64 Boot Manager Boot Options List Management Utility

(1) ADD an entry to the Boot Options list
(2) DISPLAY the Boot Options list
(3) REMOVE an entry from the Boot Options list
(4) MOVE the position of an entry in the Boot Options list
(5) VALIDATE boot options and fix them as necessary
```

```
   (6) Modify Boot Options TIMEOUT setting

   (B) Set to operate on the Boot Device Options list
   (D) Set to operate on the Dump Device Options list
   (G) Set to operate on the Debug Device Options list

   (E) EXIT from the Boot Manager utility

   You can also enter Ctrl-Y at any time to abort this utility

Enter your choice: 1
```

NOTE While using this utility, you can change a response made to an earlier prompt by entering the caret (^) character as many times as needed. To end and return to the DCL prompt, press **Ctrl/Y**.

Step 3. The utility prompts you for the device name. Enter the system disk device you are using for this installation. In the following example, the device name is DKA0:.

```
Enter the device name (enter "?" for a list of devices): DKA0:
```

Step 4. The utility prompts you for the position you want your entry to take in the EFI boot option list. To see a list of the current boot options, enter a question mark (?):

```
Enter the desired position number (1,2,3,,,) of the entry.
To display the Boot Options list, enter "?" and press Return.
Position [1]: ?
```

Step 5. The list in the following example includes only one boot option. To add your boot option entry to the top of the list (the default) so that your system disk boots automatically when the server starts or the EFI countdown timer expires, enter 1:

```
EFI Boot Options list:     Timeout = 0 secs.
------------------------------------------------------------------
01. VenHw(d65a6b8c-71e5-4df0-d2f009a9) "EFI Shell [Built-in]"
------------------------------------------------------------------
1 entries found.

Enter the desired position number (1,2,3,...) of the entry.
To display the Boot Options list, enter "?" and press Return.
Position [1]: 1
```

Step 6. The utility prompts you for OpenVMS boot flags. By default, no flags are set. Enter the OpenVMS flags (for example, 0,1), or press **Enter** to set no flags, as in the following example:

```
Enter the value for VMS_FLAGS in the form n,n.
VMS_FLAGS [NONE]:
```

Optionally, you can use any of the standard OpenVMS boot flags such as the following:

Flags	Description
0,1	Enable SYSBOOT to change system parameters; enable conversational booting for debugging purposes.
0,2	Load XDELTA.
0,4	Take the initial EXEC_INIT breakpoint.
0,20000	Print debug messages on boot.
0,30000	Print more debug messages on boot.

Step 7. The utility prompts you for a description to include with your boot option entry. By default, the device name is used as the description. You can enter more descriptive information as in the following example. This example shows a sample confirmation message (for devices with multiple paths, such as Fibre Channel devices, a separate confirmation message is displayed for each path). EFI$BCFG is the name of the executor file for the OpenVMS I64 Boot Manager utility.

```
Enter a short description (do not include quotation marks).
Description ["DKA0"]: DKA0: OpenVMS V8.3 for PLMs System

efi$bcfg: DKA0: (BOOT003) Option successfully added
```

Step 8. When you have successfully added your boot option, exit the utility by entering E at the prompt:

```
Enter your choice: E
$
```

B.5.2.1.1 Using EFI to Set Automatic Booting of Your System Disk HP recommends allowing the OpenVMS installation or upgrade procedure to set your system disk to boot automatically. Or, use the OpenVMS I64 Boot Manager utility (SYS$MANAGER:BOOT_OPTIONS.COM). However, you can use EFI. This section explains how to use EFI to set up your Integrity server firmware to automatically boot your OpenVMS I64 system from your system disk. (HP also recommends using the OpenVMS I64 Boot Manager utility to set boot flags. Optionally, you can use the `vms_loader.efi -flags n,n` command at the EFI prompt to set any of the standard OpenVMS boot flags, as documented earlier in this appendix.)

Access the EFI Shell and enter the following line at the prompt, where fs*n*: (such as fs0: or fs1:) is the device associated with the system disk:

```
Shell> bcfg boot add 1 fsn:\efi\vms\vms_loader.efi "HP OpenVMS I64"
```

This command adds the OpenVMS I64 operating system to position 1 in the EFI Boot Manager menu. The quoted text in the command line (“HP OpenVMS I64”) is displayed at position 1 in the EFI boot menu. You can enter any text that helps you identify the operating system disk. During system power up, the position 1 item is automatically executed after the default 10-second countdown.

Alternatively, you can add an EFI boot menu option by using the EFI menu interface:

Step 1. Select the Boot Configuration option (or in some versions of EFI, the Boot Option Maintenance Menu).

Step 2. Select Add a Boot Option.

Step 3. Select the boot device and boot file.

NOTE All EFI boot options embed the disk Globally Unique ID (GUID). Therefore, if you reinstall OpenVMS or restore a system disk from an image backup, you must first delete the old boot options and then add a new boot option. To delete a boot option, use the Delete Boot Option(s) option in the Boot Configuration menu (or Boot Option Maintenance Menu).

Still another method to add a boot entry to the EFI Boot Manager menu is to use the EFI Utilities for OpenVMS (I64 only) `vms_bcfg` command, which accepts OpenVMS device names and also enables you to set flags. However, note that this command has limited capabilities; for example, it cannot handle Fibre Channel paths as can the OpenVMS I64 Boot Manager utility. In the following example, DKA0: is the OpenVMS system disk being added as the first boot option:

```
Shell> \efi\vms\vms_bcfg boot add 1 dka0: -fl 0,2 "HP OpenVMS I64"
```

For more information about EFI utilities for OpenVMS (I64 only), see the *HP OpenVMS System Management Utilities Reference Manual*.

B.5.2.2 Displaying EFI Boot Entries and Mapped OpenVMS Devices

The Integrity server EFI Boot Manager shows the various paths to the boot device. You can use the OpenVMS I64 Boot Manager utility to display the OpenVMS boot device options known to EFI.

Start the utility at the DCL prompt (@SYS$MANAGER:BOOT_OPTIONS.COM) and select option 2 on the main menu (the main menu is shown in Section B.5.2). The utility displays the following prompt. In this example, the listings for the DQA0: device are requested and displayed.

```
    To display all entries in the Boot Options list, press Return.
    To display specific entries, enter the entry number or device name.
    (Enter "?" for a list of devices):DQA0

EFI Boot Options list:   Timeout = 20 secs.
-------------------------------------------------------------------------------
04. DQA0 PCI(0|0|2|0) ATA(Primary,Master) "DVD-ROM "
-------------------------------------------------------------------------------
1 entries found.
```

You can also display all bootable devices mapped by the EFI console and their equivalent OpenVMS device names by using the EFI Utilities for OpenVMS `vms_show` command at the EFI Shell prompt (from `\efi\vms`). For more information about EFI utilities for OpenVMS, see the *HP OpenVMS System Management Utilities Reference Manual*.

B.5.2.3 Setting EFI Boot Option Countdown Timer (Timeout)

Whenever the EFI Boot Manager menu displays, it waits for you to select an option. By default, it waits 10 seconds, after which EFI boots the first boot option. If the first option is not available or does not boot, EFI waits the same duration before booting the next option in the list. The OpenVMS I64 Boot Manager utility (SYS$MANAGER:BOOT_OPTIONS.COM) allows you to change the duration for this countdown value and also to disable the countdown (so that there is no wait) and enable it.

Select option 6 on the OpenVMS I64 Boot Options main menu (the main menu is shown in Section B.5.2). The utility displays the following prompt. To change the value, enter YES and then enter the new value. In this example, the timeout value is changed to 20 seconds.

```
efi$bcfg: Boot Timeout period is 10 secs

Would you like to modify the Timeout value? (Yes/No) [NO] YES
```

```
Please enter the Timeout value in seconds: 20

 efi$bcfg: Boot Timeout period is 20 secs
```

To disable the timeout so that automatic booting occurs instantaneously, enter 0 as the value, as in the following example:

```
Please enter the Timeout value in seconds: 0

  efi$bcfg: Boot Timeout is Disabled
```

B.5.2.4 Saving and Restoring EFI Settings

Certain EFI settings such as the Hyper-Threading setting supported on some cell-based systems cannot be restored if lost. HP recommends that you write down your customized EFI settings in case they are lost in a system hardware or firmware failure. You can use the EFI `info cpu` command or the EFI `cpuconfig` command to display current settings, such as the setting of the Hyper-Threading feature.

You might need to restore boot options, such as if they get lost during a firmware upgrade. You can save and restore your EFI boot path settings on Integrity servers by using the OpenVMS I64 Boot Manager (SYS$MANAGER:BOOT_OPTIONS.COM) utility. You can also use the EFI `variable -s` command to save boot option variables and the `variable -r` command to restore them. After using the `variable` command to restore boot options, a reset might be required. Use the EFI Shell `reset` comand.

You can use the OpenVMS-specific EFI utility `vms_bcfg` (\ efi\ vms\ vms_bcfg) to set boot options, and the `vms_show` utility (\ efi\ vms\ vms_show) to display them; however, these utilities are more limited in scope than the OpenVMS I64 Boot Manager utility. For example, they cannot work with Fibre Channel boot paths as can the OpenVMS I64 Boot Manager utility. You can use the EFI `variable` command to restore the boot options list from a previously saved file.

You could also use the EFI Shell `variable` command to restore variables such as boot path options; you must have first saved them in a known location by using the `variable -save` command. For more information, see the service manual provided for your Integrity server.

B.5.3 Writing a New Boot Block

The boot block structures on the system disk contain the size and location of the boot partition and other details relevant to the bootstrap of OpenVMS I64. The size and location of the boot partition stored within the boot block structures must be maintained and must reference the current location of the OpenVMS file SYS$EFI.SYS.

Current versions of BACKUP maintain the boot block structures as well as the size and location of the boot partition during image operations (analogous to the similar BACKUP/IMAGE operations that maintain the boot block on OpenVMS Alpha disks). Older versions of BACKUP do not maintain these structures and do not correctly locate core OpenVMS I64 bootstrap files.

If the boot partition file SYS$EFI.SYS is manually replaced or relocated, you must use the DCL command SET BOOTBLOCK or the SYS$SETBOOT image to rewrite the boot block structures. The SET BOOTBLOCK command and SYS$SETBOOT are analogous to the OpenVMS Alpha Writeboot utility; they provide OpenVMS I64 with the equivalent of what the Writeboot utility provides on OpenVMS Alpha. (Do not use the OpenVMS Alpha Writeboot utility to rewrite boot block structures on an OpenVMS I64 system disk.)

The SET BOOTBLOCK command enables you to establish the boot block pointers necessary for the EFI console to find and bootstrap an OpenVMS I64 system disk. You must use this command if the target OpenVMS I64 system disk was originally created by one of the following methods:

- A version of BACKUP that does not support the OpenVMS I64 system disk structure. HP recommends that you do *not* use these versions of BACKUP for archiving or restoring an OpenVMS I64 system disk.
- A nonimage backup of an OpenVMS I64 system disk (possibly corrupting the boot block and various directory backlinks that must be manually reset). HP recommends that you do *not* use nonimage backups.
- A nonimage restore of an OpenVMS I64 system disk from an image save set. HP recommends that you do *not* use a nonimage restoration.

NOTE If the target OpenVMS I64 system disk has an incorrectly-placed [000000]GPT.SYS file, the disk cannot be used reliably as an OpenVMS I64 system disk. Typically, the file gets incorrectly placed due to the use of an older version of BACKUP/IMAGE, a file-based BACKUP disk restoration, or an errant disk defragmentation tool (the file is set with /NOMOVE to disable move operations; defragmentation tools that do not honor this setting will corrupt the file). A correctly-located GPT.SYS file will have at least two file extents, the first beginning at LBN 0 and the last at the disk capacity minus the size of the last extent (an extent is one or more adjacent clusters allocated to a file). The size of each of the two extents varies according to the disk cluster factor on the target disk. The first extent size is currently 34 or more blocks, and the last extent 33 or more blocks. For example:

```
$  DUMP/HEADER/BLOCK=END=0 SYS$SYSDEVICE:[000000]GPT.SYS ...
Map area
   Retrieval pointers:
        Count:          36    LBN:          0
        Count:          36    LBN:   71132925
```

This example is from a disk with 71132960 blocks. The placement of the final extent is 71132924, which is calculated by subtracting 36 (the size of the last extent) from the disk capacity (71132960).

You may be able to temporarily recover from this condition and attempt to bootstrap the target OpenVMS I64 system disk by renaming GPT.SYS to GPT.BAD, and then entering the SET BOOTBLOCK command. To correctly recover from this condition, you must INITIALIZE the target disk and then reload the disk contents using a file-based BACKUP restoration or a file-based COPY operation. No supported means exists for adding a GPT.SYS file onto an existing disk nor for adding the file during a BACKUP/IMAGE restoration operation.

To write the boot block structures onto an OpenVMS I64 system disk, enter the SET BOOTBLOCK command using the following format:

```
$ SET BOOTBLOCK [/PRESERVE=SIGNATURES] [/I64] [boot-partition-name]
```

You can specify the file name for the boot partition (*boot-partition-name*). If you do not specify a file or device name, the command defaults to the following file for the boot partition:

SYS$SYSDEVICE:[VMS$COMMON.SYS$LDR]SYS$EFI.SYS

The command also assumes the current architecture. To specify OpenVMS I64, include /I64 in the command line.

Use the /PRESERVE=SIGNATURES qualifier to preserve the existing GUID disk signature value and the associated root aliases. Note that using the OpenVMS Backup utility creates a new disk signature when restoring a bootable disk image.

If you reset the boot block structures, you might need to remove any EFI boot aliases that reference the disk, and then add them back again. You can use the EFI `alias` command to remove and add aliases; HP recommends using the OpenVMS I64 Boot Manager utility (SYS$MANAGER:BOOT_OPTIONS.COM) to maintain EFI console boot aliases.

NOTE The boot partition file must be contiguous and movefile operations on the file must be disabled. If the file is not contiguous, use the DCL command COPY/CONTIGUOUS (or equivalent) to re-create a contiguous version of the file. To disable movefile operations, use the DCL command SET FILE/NOMOVE. This prevents bootstrap failures that could result from the normal and expected operations of disk defragmentation tools.

Alternatively, you can write a boot block by entering the following command:

```
$ RUN SYS$SYSTEM:SYS$SETBOOT
```

The utility prompts you for the required input (in a way similar to the operation of the OpenVMS Alpha Writeboot utility).

B.5.4 Alpha and Equivalent Integrity Server System Boot Commands

The Extensible Firmware Interface (EFI) on Integrity servers performs most of the same functions that the SRM console does on Alpha processors. If you are familiar with the Alpha tool, use the following table to find EFI commands equivalent to the Alpha commands you commonly use on Alpha systems. Note that some of the commands listed might not be available on certain hardware systems.

Table B-1 Alpha and Integrity Server EFI Command Equivalents

Task	Alpha SRM command at P00> prompt	Integrity Server EFI command at Shell prompt
Display help information	HELP	`help`
Display list and version of devices found on the most recently initialized system	SHOW CONFIGURATION or SHOW VERSION	`info fw`
Display devices and controllers in the system, including bootable devices and mappings	SHOW DEVICE	`map`, `vms_show devices` (from \ efi\ vms)[a]
Display all system information	SHOW FRU	`info all`, or `pci`, or `info io`
Display memory information	SHOW MEMORY	`info mem`

Table B-1 Alpha and Integrity Server EFI Command Equivalents (Continued)

Task	Alpha SRM command at P00> prompt	Integrity Server EFI command at Shell prompt
Display volume information of the file system	SHOW DEV DKA0	`vol fs0`
Display hardware information about CPU resources	SHOW CONFIGURATION	`info cpu`
Display power status	SHOW POWER	`info all`[b]
Set system dump disk	SET DUMP_DEV *disk1*, *disk2*...	`vms_set dump_dev` *disk1*, *disk2*, ... (from \ efi\ vms)[a]
Set boot flags	SET BOOT_OSFLAGS 0,0	`set vms_flags "0,0"`[a]
Set boot behavior to automatic boot	SET AUTO_ACTION BOOT	`bcfg boot add 1 fs`*x*`:\efi\vms\vms_loader.efi "I64"`[a]
Change the current boot option	SET AUTO_ACTION HALT	`bcfg boot mv 1 2`[a]

a. Similar functionality is provided by the OpenVMS I64 Boot Manager utility (SYS$MANAGER:BOOT_OPTIONS.COM), launched at the OpenVMS DCL prompt. Regarding the display of devices, BOOT_OPTIONS.COM displays only the boot entries and also a selected dump device for DOSD and a debug device; `vms_show` can display all devices mapped by the EFI console and their equivalent OpenVMS device names. The `map` command shows all devices currently mapped on the EFI Shell.
b. Best source of information about power status is the MP PS command.

B.6 Booting Operations

This section describes various methods for booting your OpenVMS I64 operating system.

NOTE To boot your OpenVMS I64 operating system, you must be using a serial device for the console. OpenVMS does not support VGA graphics (nor USB keyboards) as console devices for booting. For information about setting up the console on your Integrity server, see Section B.2.

NOTE HP Integrity servers maintain a system event log (SEL) within system console storage, and OpenVMS I64 automatically transfers the contents of the SEL into the OpenVMS error log. During a successful boot operation while using a console, you might see a message indicating that the BMC SEL is full. You can safely continue when the BMC SEL is full by following the prompts; OpenVMS processes the contents of the SEL.

HP recommends that the latest system firmware be loaded and used. For more information about updating the system firmware, see Section 1.4.6. For midrange and high-end Integrity servers, contact HP Customer Support to update your firmware.

B.6.1 Overview of Booting on a Cell-Based Server

This section gives an overview of booting the nPartition hardware and booting OpenVMS on an nPartition.

B.6.1.1 Booting the nPartition Hardware

Each nPartition runs its own firmware and has its own system boot environment. You can boot an nPartition independently of any other nPartitions in the same server complex.

The nPartition boot process includes two phases: the cell boot phase and the nPartition boot phase. Note that these phases occur only as part of the hardware boot process, not as part of the operating system boot.

- Cell boot phase—This phase occurs when cells are powered on or reset. The main activities during this phase are the power-on-self-test activities. During this phase, cells operate independently of other cells in the complex. Cells do not necessarily proceed through this phase at the same pace, because each cell may have a different amount of hardware to discover and test, or cells might be reset or powered on at different times.
- nPartition boot phase—This phase occurs when an nPartition has been booted, after its cells have completed their self tests. During this phase, "nPartition rendezvous" occurs, in which each cell contacts the other active cells in the nPartition and selects a **core cell** that is responsible for managing the rest of the nPartition boot process. A processor on the core cell runs the nPartition EFI system boot environment. When the operating system boot process is initiated, the core cell passes control to the operating system loader.

You can view progress of these phases by using the Virtual Front Panel (VFP) to check the nPartition boot state. Access VFP from the MP main menu.

For information about how to boot the nPartition hardware, see your hardware documentation.

B.6.1.2 Booting OpenVMS I64 on an nPartition

CAUTION To boot your OpenVMS I64 operating system and prevent loss of data, note the following.

- You must first ensure that the nPartition has its ACPI configuration set to the default (see Section B.5.1).
- OpenVMS I64 does not support the use of cell local memory (CLM). The nPartition on which OpenVMS I64 is booted must have all memory configured as interleaved memory (memory that can be mapped across more than one cell). Although you might be able to run OpenVMS I64 on an nPartition that has cell local memory configured, such a configuration is untested and is not supported. To check cell local memory configuration details, use the Partition Manager. For more information, see the *HP System Partitions Guide: Administration for nPartitions*. You can also use the EFI Shell `info mem` command. If the reported "NonInterleaved Memory" is less than 512 MB, the cell is configured completely as interleaved memory (the indicated amount of noninterleaved memory is used by the firmware).

As with all Integrity servers that run OpenVMS, you can boot OpenVMS I64 either by selecting a boot entry from the EFI Boot Manager or by starting the system loader (VMS_LOADER.EFI) from the EFI Shell. To boot OpenVMS I64, access the nPartition console and use either of these two methods:

- From the EFI Boot Manager, select the OpenVMS I64 boot entry from the boot options list and press **Enter**.
- From the EFI Shell, start the OpenVMS system loader by entering the following command at the EFI Shell prompt, where fs*n*: (such as fs1:) is the device associated with the OpenVMS I64 system disk:

  ```
  Shell>fsn:\efi\vms\vms_loader.efi
  ```

  When starting the VMS_LOADER.EFI system loader, you must either specify its full path (as shown in this example) or start it from the `\efi\vms` directory. For more information, see Section B.3.1.

  For booting the OpenVMS I64 OE DVD, the path is different. Enter the following command instead:

  ```
  Shell>fsn:\efi\boot\bootia64.efi
  ```

NOTE The nPartition must be at EFI before beginning the OpenVMS I64 boot process. If the nPartition is not at EFI, you can use VFP to check the nPartition boot state. An nPartition might be inactive or cells might be powered off. If VFP indicates that all cells in the nPartition are in the boot-is-blocked (**BIB**) state, the nPartition is inactive and you must use the MP `bo` command to boot the nPartition past BIB and make it active. For more information, see your hardware documentation.

B.6.2 Booting the OpenVMS I64 OE DVD from the Local Drive

To boot the OpenVMS I64 OE DVD, follow these steps. To boot the DVD on a cell-based server, a DVD device must be accessible for the nPartition that OpenVMS is being installed on.

Step 1. Make sure your Integrity server is powered on. If your system has an attached external device, make sure it is turned on and operational.

Step 2. Insert the DVD into the drive.

Step 3. Cycle power.

Step 4. From the main EFI boot menu (for cell-based servers, this must be the EFI boot menu for the nPartition on which OpenVMS is to be booted), select the appropriate item from the boot options list. Note that the EFI boot menu is timed; press any key to stop the countdown timer.

For some systems, the boot option to select is the Internal Bootable DVD option. If that option is not listed in your EFI boot menu, move to the Boot From a File menu and select the Removable Media Boot option, if present.

Alternatively (and this method is recommended for cell-based servers), boot the DVD drive from the EFI Shell prompt by entering the command shown in the following example, where fs*n*: corresponds to the Integrity server DVD drive (such as fs0:). Note that if you have navigated to a particular file system, the EFI Shell prompt would reflect that file system; for example, if the current file system is fs0:, the EFI Shell prompt would be fs0:>.

```
Shell>fsn:\efi\boot\bootia64.efi
```

To determine which device is the bootable DVD drive, examine the list of mapped devices and look for an fs device listing that includes the text CDROM, as in the following example, where fs*n* is the file system associated with the drive, which is usually fs0: (instead of fs*n*, you might see something like V8.3; instead of Ata, you might see Scsi, depending on the server model):

```
fsn : Acpi(HWP0002,400)/Pci(4|1)/Ata(Primary,Master)/CDROM(Entry0)
```

Use the `vms_show dev` command to display the mapping of various EFI device names to OpenVMS device names, as in the following example where fs*n* is the device you want to check (such as fs0:):

```
Shell>fsn:\efi\vms\vms_show dev -fs
```

For more information about the `vms_show` command, see the *HP OpenVMS System Management Utilities Reference Manual*.

NOTE Remember that by default EFI interprets the **Delete** (or **Backspace**) key differently than do OpenVMS Alpha or Microsoft Windows systems. Press **Ctrl/H** to delete the last character entered. For more information, see Section B.1.3.

When the DVD boots properly, the OpenVMS operating system banner is displayed, followed by the operating system menu. You can now install your OpenVMS I64 operating system onto the target disk; see Section 3.3. If the DVD fails to boot properly use the alternate method of booting described in Section B.6.2.1.

NOTE When booting OpenVMS from the installation DVD for the first time on any OpenVMS I64 system with a SAN storage device, you might experience a delay in EFI initialization because the entire SAN is scanned. Depending on the size of the SAN, this delay might range from several seconds to several minutes.

B.6.2.1 Alternate Method of Using EFI to Boot the DVD

If the DVD does not boot using the methods described above, follow these steps:

Step 1. To ensure that EFI can access the DVD, enter the following commands at the EFI Shell prompt of a entry-class or single-cell Integrity server. Enter the commands in the order shown. (The EFI Shell prompt may not necessarily be Shell> as in this example; it could be a prompt that reflects the current file system, such as fs0:>.)

```
Shell> reconnect -r
Shell> map -r
```

For a multiple-cell nPartition on a cell-based server, use the `search all` command instead of the `reconnect -r` command, followed by the `map -r` command. See your hardware documentation for more information about EFI commands.

The `reconnect -r` command discovers any devices added after booting the server. The `search all` command discovers all devices including any that were not in the boot options list or connected to the core cell's I/O chassis. (On large server systems, the `search all` command could take significant time to complete. You can reduce the search time by specifying a more directed search, such as for a specific I/O chassis connected to a cell or a specific PCI card in a chassis. For more information, see the help information provided for the `search` command.)

The `map -r` command remaps and rebuilds the list of known devices that have a bootable EFI system partition. For a multiple-cell nPartition on a cell-based server, if you insert the DVD after EFI is loaded, you must use the search command to allow EFI to detect the inserted DVD; otherwise, EFI would not recognize the DVD in the DVD drive. When EFI detects a valid, bootable

DVD in the DVD drive, it maps an fs device to it and lists that device in the mapping table displayed by the
`map -r` command.

Step 2. To boot the DVD, enter the following command at the EFI Shell prompt, where fs*n*: is the Integrity server DVD drive (such as fs0:).

```
Shell>fsn:\efi\boot\bootia64.efi
```

If this command does not work, or if you have doubts about which device maps to the DVD drive, you can use the EFI Boot Manager menu system to boot the OE DVD, as described in the following steps:

a. From the main EFI boot menu, select the Boot Configuration option (or in some versions of EFI, the Boot Option Maintenance Menu).

b. From the Boot Configuration menu, select the Boot From a File option.

c. From the Boot From a File menu, select the menu item that includes the text CDROM, as in the following example, and press **Enter**.

NOTE The contents of the screens shown in the following examples vary according to the firmware and devices installed on your Integrity server.

```
Boot From a File. Select a Volume

  V8.3 [Acpi(HWP0002,400)/Pci(2|0)/Ata(Primary,Master)/CDROM(Entry0)
  Load File [EFI Shell [Built-in]]
  Load File [Acpi(HWP0002,0)/Pci(3|0)/Mac(00306EF3A2B6)]
  Load File [Acpi(HWP0002,100)/Pci(2|0)/Mac(00306EF312E4)]
  Exit
```

d. A screen is displayed that shows the top-level directory structure of the DVD, similar to the screen in the following example. Select the `efi` directory.

```
EFI Boot Maintenance Manager ver n.nn[nn.nn]

   Select file or change to new directory:

    n/nn/nn   06:21a<DIR>   2,048 efi
     [Treat like Removable Media Boot]
    Exit
```

e. The next screen to appear shows the first level of subdirectories below the top level, similar to the following example. Select the boot directory (it contains the boot file).

```
EFI Boot Maintenance Manager ver n.nn[nn.nn]

Select file or change to new directory:

       n/nn/nn 06:21a<DIR>      2,048 .
       n/nn/nn 06:21a<DIR>        0       ..
       n/nn/nn 06:21a<DIR>      2,048 boot
       n/nn/nn 06:21a<DIR>      2,048 vms
  Exit
```

f. The next screen displays the files within the boot directory. Select the file named bootia64.efi.

```
EFI Boot Maintenance Manager ver n.nn[nn.nn]

  Select file or change to new directory:

       n/nn/nn 06:21a<DIR>      2,048 .
       n/nn/nn 06:21a<DIR>      2,048 ..
          .
          .
          .
       n/nn/nn 06:21a            334,848 BOOTIA64.EFI
          .
          .
          .
  Exit
```

B.6.3 Booting the OpenVMS I64 OE DVD from the InfoServer

To boot from a virtual DVD drive on the LAN using OpenVMS I64 InfoServer software, you must initially perform certain configuration steps (one time only). These steps and the instructions for performing the network boot are described in Appendix C.

B.6.4 Booting from a Fibre Channel Device

For instructions on booting from a Fibre Channel (FC) storage device, see Appendix D.

B.6.5 Booting Manually from the Local System Disk

HP recommends setting up your Integrity server EFI console with a boot option for your OpenVMS I64 operating system disk. In this way, booting the system disk simply requires selecting the boot option from the EFI Boot Manager boot options list. You can set the EFI boot option to boot automatically on powering on or rebooting. The OpenVMS installation and upgrade procedures can assist you in adding and validating a boot option for your system disk; you can also use the OpenVMS I64 Boot Manager utility (SYS$MANAGER:BOOT_OPTIONS.COM), as explained in Section B.5.2.

To boot the OpenVMS I64 operating system disk manually, follow these steps:

NOTE If you have recently booted the OpenVMS I64 OE DVD, make sure you remove this DVD before booting the system disk.

On Integrity server systems, the system disk must be mounted locally (on the system you are booting) or on a SAN storage device.

Step 1. If OpenVMS is not running, skip to the next step. If OpenVMS is running, access the EFI console by shutting down the operating system (see the instructions in Section B.7).

Step 2. Boot the system disk manually by entering the following command at the EFI Shell prompt, where fs*n*: (such as fs1:) is the device associated with the system disk:

```
Shell>fsn:\efi\vms\vms_loader.efi
```

You must either specify the full path (as shown in this example) or start the system loader from the `\efi\vms` directory. For more information, see Section B.3.1.

B.6.6 Performing a Conversational (Interactive) Boot

A conversational boot is most commonly used in research and development environments and during software upgrades. Perform a conversational boot to stop the boot process before it completes. The boot process stops after it loads SYS$SYSTEM:SYSBOOT.EXE and displays the SYSBOOT> prompt. At the SYSBOOT> prompt, you can enter specific OpenVMS System Generation utility (SYSGEN) commands to do the following:

- Examine system parameter values
- Change system parameter values
- Specify another parameter file
- Specify another system startup command procedure
- Select the default system parameter file (IA64VMSSYS.PAR) if you modified system parameters to values that render the system unbootable
- Specify a minimum startup

There are several ways to perform a conversational boot. The following procedure is the most direct:

IF ...	THEN GO TO...
The OpenVMS I64 operating system is running.	Step 1
The OpenVMS I64 operating system is *not* running.	Step 4

Step 1. Log in to the SYSTEM account.

Step 2. Enter the following command:

```
$ @SYS$SYSTEM:SHUTDOWN
```

Step 3. Answer the questions displayed by the system. When the procedure asks whether an automatic reboot should be performed, press **Enter** for NO. When the procedure is finished, it displays the following message:

```
SYSTEM SHUTDOWN COMPLETE
```

Step 4. Halt the system or nPartition. (See Section B.7 for more information about how to halt your Integrity server).

Step 5. Begin the conversational boot by entering the following command at the EFI Shell prompt, where fs*n*: is the device (such as fs1:) associated with the system disk:

```
Shell>fsn:\efi\vms\vms_loader.efi -flags 0,1
```

Step 6. At the SYSBOOT> prompt, you can enter any of the SYSGEN commands listed in Table B-2. For more information about these SYSGEN commands, see the *HP OpenVMS System Management Utilities Reference Manual: M-Z*.

Step 7. When you finish using the SYSGEN commands, enter the CONTINUE command to complete the boot process.

Table B-2 SYSGEN Commands Used in the SYSBOOT Procedure

Command	Description
CONTINUE	Resumes the boot procedure.
DISABLE CHECKS	Inhibits checking of parameter values specified with the SET command.
ENABLE CHECKS	Permits checking of parameter values specified with the SET command.
HELP	Displays a summary of the SYSBOOT commands on the terminal screen.
SET *parameter-name*	Establishes the value of a system parameter.
SET/STARTUP	Sets the name of the system startup command procedure.
SHOW [*parameter*]	Displays active, current, default, maximum, and minimum values for specific parameters. (Use qualifiers to display characteristics of parameters grouped by categories.)
USE [*file-spec*]	Specifies a parameter file to be used as a source of values. You must enter the entire file specification, including device and directory; you cannot specify a logical name.
USE DEFAULT	Specifies that default values be used for all parameters.

For examples of conversational booting, see Section B.6.7 and Section B.6.10.

B.6.7 Booting with Minimum Startup

In certain cases, you might want to boot your system without performing the full sequence of startup events. For example, if a startup event prevents you from logging in, you might want to boot the system without executing the startup so that you can log in and fix the problem. You can use the conversational boot to specify a minimum startup.

NOTE Because this procedure bypasses specific startup operations, it does not autoconfigure the system's peripheral devices.

Boot the system with minimum startup as follows:

Step 1. Begin the conversational boot by entering the following command at the EFI Shell prompt, where fs*n*: is the device (such as fs1:) associated with the system disk and the system root is [SYS0...]:

```
Shell>fsn:\efi\vms\vms_loader.efi -flags 0,1
```

Step 2. Enter the following command:

```
SYSBOOT> SET STARTUP_P1 "MIN"
```

Step 3. Enter the following command to ensure that the operating system does not record for subsequent system reboots the STARTUP_P1 parameter change you made in step 2:

```
SYSBOOT> SET WRITESYSPARAMS 0
```

Step 4. Enter the following command to continue booting:

```
SYSBOOT> CONTINUE
```

B.6.8 Booting with the XDelta Utility (XDELTA)

The XDelta utility (XDELTA) is a debugging tool that system programmers use. The procedure for booting all Integrity servers with XDELTA is the same.

The following table describes the valid values you can specify when booting with XDELTA:

Value	System Response
0	Normal, nonstop boot (default).
1	Begins a conversational boot and then displays the SYSBOOT prompt.
2	Includes XDELTA but does not take the initial breakpoint.
3	Displays the SYSBOOT prompt and includes XDELTA but does not take the initial breakpoint.
6	Includes XDELTA and takes the initial breakpoint.
7	Includes XDELTA, displays the SYSBOOT prompt, and takes the initial breakpoint at system initialization.

```
EFI> fs1:\efi\vms\vms_loader.efi -flags 0,7
```

The following is an example of booting with XDELTA from fs1: at the EFI> prompt:

For more information about using XDELTA, see the *HP OpenVMS Delta/ XDelta Debugger Manual*.

B.6.9 Booting from a Different Root Directory

By default, the OpenVMS I64 operating system is installed in the system root directory [SYS0]. However, if you have created a cluster system disk, you can use the SYS$MANAGER:CLUSTER_CONFIG.COM procedure to add a copy of the operating system to a different root directory. (See the *HP OpenVMS System Manager's Manual* for more information about using the SYS$MANAGER:CLUSTER_CONFIG.COM procedure.)

To boot from a different root (for example, [SYS3]), enter the following command at the EFI Shell prompt, where fs*n*: (such as fs1:) is the device associated with the system disk:

```
Shell>fsn:\efi\vms\vms_loader.efi -flags 3,0
```

B.6.10 Emergency Booting

If a system problem prevents your system from booting, you might need to perform an emergency boot operation. Table B-3 summarizes these emergency boot operations, and the sections that follow describe each boot operation in more detail.

Table B-3 Emergency Boot Procedures

Operation	When to Use
Booting with default system parameters	When parameter values in the parameter file have been modified so that the system is unbootable
Booting without startup and login procedures	If an error in the startup or login procedure prevents you from logging in
Booting without the user authorization file	If you have forgotten the password and cannot log in to a privileged account

B.6.10.1 Booting with Default System Parameters

If the current values stored in the parameter file have been incorrectly modified, these incorrect values might cause the system to become unbootable. With a conversational boot operation, you can reset the active values for all system parameters to the default value. (In most cases, HP recommends that you use AUTOGEN to modify system parameters. In certain cases, however, you can use a conversational boot to modify a parameter value *temporarily*. To change a parameter value *permanently*, you must edit MODPARAMS.DAT and run AUTOGEN. For instructions, see the *HP OpenVMS System Manager's Manual, Volume 2: Tuning, Monitoring, and Complex Systems*.) The default values allow you to boot the system temporarily so you can correct the problem.

How to Perform This Task

Step 1. Begin the conversational boot by entering the following command at the EFI Shell prompt, where fs*n*: (such as fs1:) is the device associated with the system disk:

```
Shell>fsn:\efi\vms\vms_loader.efi -flags 0,1
```

Step 2. At the SYSBOOT> prompt, enter the following command:

```
SYSBOOT> USE DEFAULT
```

The USE DEFAULT command specifies that default values should be used for all parameters.

Step 3. To avoid starting all layered products on a system that is not tuned for them, possibly causing the system to hang, set the STARTUP_P1 system parameter as follows:

```
SYSBOOT>  SET STARTUP_P1 "MIN"
```

Step 4. Enter the following command to ensure that the operating system does not record for subsequent system reboots the STARTUP_P1 parameter change you made in step 3:

```
SYSBOOT> SET WRITESYSPARAMS 0
```

Step 5. Enter the following command to continue booting:

```
SYSBOOT> CONTINUE
```

Step 6. When the system finishes booting, determine which changed parameter caused the problem and reset the parameter value. If you specified the value for the parameter in the AUTOGEN parameter file MODPARAMS.DAT, fix the value in that file and run AUTOGEN. For more information, see the *HP OpenVMS System Manager's Manual, Volume 2: Tuning, Monitoring, and Complex Systems*.

Step 7. Shut down and reboot the system.

Example

```
SYSBOOT> USE DEFAULT
SYSBOOT> SET STARTUP_P1 "MIN"
SYSBOOT> SET WRITESYSPARAMS 0
SYSBOOT> CONTINUE
Username: SYSTEM
Password:
$ EDIT SYS$SYSTEM:MODPARAMS.DAT
  .
  .
  .
[Insert line(s) to reset parameter value(s)]
  .
  .
  .
$ @SYS$UPDATE:AUTOGEN SAVPARAMS REBOOT
```

B.6.10.2 Booting Without Startup and Login Procedures

If the system does not complete the startup procedures or does not allow you to log in, you might need to bypass the startup and login procedures. The startup and login procedures provided by HP should always work. However, if you introduce an error when you modify the startup or login procedure, you could accidentally lock yourself out of the system.

How to Perform This Task

Step 1. Begin the conversational boot by entering the following command at the EFI Shell prompt, where fs*n*: (such as fs1:) is the device associated with the system disk:

```
Shell>fsn:\efi\vms\vms_loader.efi -flags 0,1
```

Step 2. Enter the following command at the SYSBOOT> prompt:

```
SYSBOOT> SET/STARTUP OPA0:
```

Step 3. Enter the following command to ensure that the operating system does not record for subsequent system reboots the STARTUP_P1 parameter change you made in step 2:

```
SYSBOOT> SET WRITESYSPARAMS 0
```

Step 4. Enter the following command to continue booting:

```
SYSBOOT> CONTINUE
```

Step 5. When the system is booted, the operator console displays the DCL command prompt ($). You are now logged in.

Step 6. Enter the following two DCL commands:

```
$ SPAWN
$ SET NOON
```

The SPAWN command enables you to stay connected to the console, and the second command instructs the operating system to ignore any errors that might occur. If you do not enter these commands and you invoke an error, the system logs you out. Without the SPAWN command, you are logged out when the startup procedure completes in step 8.

Step 7. Correct the error condition that caused the login failure. (That is, make the necessary repairs to the startup or login procedure, or to the SYSUAF.DAT file.)

Use a text editor to correct the startup or login file. Note that some system displays might not support a screen-mode editor. You can also copy a corrected file and delete the incorrect version by using the RENAME and DELETE commands.

Step 8. Perform a normal startup by entering the following command:

```
$ @SYS$SYSTEM:STARTUP
```

Example

```
SYSBOOT> SET/STARTUP OPA0:
SYSBOOT> SET WRITESYSPARAMS 0
SYSBOOT> CONTINUE
$ SPAWN
$ SET NOON
$ SET DEFAULT SYS$SYSROOT:[SYSEXE]
$ @SYS$SYSTEM:STARTUP
```

B.6.10.3 Booting Without a User Authorization File

Ordinarily, the startup and login procedures provided by HP work; however, certain conditions can cause them to fail. A simple way to lock yourself out of the system is to set passwords to login accounts and forget them. Another way to be locked out is if one or more core system Product Authorization Key (PAK) software licenses are unavailable or expired. In such emergencies, perform a conversational emergency boot by performing the steps given in this section.

How to Perform This Task

Step 1. Halt the system or nPartition. (See Section B.7 for more information about how to halt your Integrity server.)

Step 2. Begin the conversational boot by entering the following command at the EFI Shell prompt, where fs*n*: (such as fs1:) is the device associated with the system disk:

```
Shell>fsn:\efi\vms\vms_loader.efi -flags 0,1
```

You need your hardware system's password for logging in to the console. By default, both the user name and password are set to Admin. If you do not have this password, contact HP Customer Support to reset the hardware console password.

Step 3. Enter the following commands at the SYSBOOT> prompt:

```
SYSBOOT> SET/STARTUP OPA0:
SYSBOOT> SET WINDOW_SYSTEM 0
SYSBOOT> SET WRITESYSPARAMS 0
SYSBOOT> CONTINUE
```

The first three commands request the following:

- OpenVMS read the system startup commands directly from the system console.
- The windowing system (if any) not start.
- OpenVMS not record the parameter changes for subsequent system reboots.

The last command causes the booting to continue.

Step 4. At the DCL prompt, the system now accepts startup commands directly from the console. Enter the following two commands. These commands allow a normal system startup while you are left logged in on the console. Without the SPAWN command, you are logged out when the startup completes.

```
$ SPAWN
$ @SYS$SYSTEM:STARTUP
```

Step 5. Once you log out of this session, the system completes the startup and can be used normally. Optionally, you can choose to reboot the system.

Example

```
SYSBOOT> SET/STARTUP OPA0:
SYSBOOT> SET WINDOW_SYSTEM 0
SYSBOOT> SET WRITESYSPARAMS 0
SYSBOOT> CONTINUE
$ SPAWN
$ @SYS$SYSTEM:STARTUP
$
```

NOTE Instead of using the SET/STARTUP OPA0: command in emergency conditions, you can set the UAFALTERNATE system parameter to use the alternate authorization file rather than the standard user authorization file. Setting the system parameter UAFALTERNATE defines the logical name SYSUAF to refer to the file SYS$SYSTEM:SYSUAFALT.DAT. If this file is found during a normal login, the system uses it to validate the account and prompts you for the user name and password.

HP does not recommend this method. If an alternate SYSUAFALT.DAT file has been configured on your system, the UAFALTERNATE method will likely fail (assuming you do not know the password for the privileged account stored within the SYSUAFALT.DAT file). In addition, the OPA0: system console is critical to system operations and system security and

allows access when the SYSUAF system authorization database is unavailable or corrupted; when core product license PAKs are not registered, are expired, or are disabled; and in various system failures.

B.7 Halt and Shutdown Procedures

The following sections describe halt and shutdown procedures for Integrity servers and OpenVMS I64.

B.7.1 Halting the Integrity Server to Recover from Hangs and Crashes

If your system hangs and you want to force a crash, you can use MP, if available. Use the `tc` command. Confirm your intention when prompted. The `tc` command forces a crash dump. You can reset the machine (without forcing a crash) by using the MP `rs` command.

For cell-based servers, when you enter the `tc` or `rs` command, you are first prompted to select the partition for which you want the operating system shut down.

Alternatively, when the operating system controls the console, press **Ctrl/P**. The next step taken by the system depends on whether XDELTA is loaded:

- If XDELTA is loaded, the system enters XDELTA after you press **Ctrl/P**. The system displays the instruction pointer and current instructions. You can force a crash from XDELTA by entering ;C, as in the following example:

```
$
Console Brk at 8068AD40
 8068AD40!                  add    r16 = r24, r16 ;; (New IPL = 3)
 ;C
```

- If XDELTA is not loaded, pressing **Ctrl/P** causes the system to enter the IPC facility. Pressing **Ctrl/P** within the utility brings the "Crash? (Y/N)" prompt. Enter Y to cause the system to crash and to bring you eventually to EFI. If you enter any other character, the system returns back to the IPC facility.

B.7.2 Shutting Down the System

Before you shut down the operating system, decide if you want it to reboot automatically or if you want to enter console-mode commands after the shutdown completes. If you want the system to reboot automatically after the shutdown, first set up automatic booting, as described in Section B.5.2.

You can perform the following two types of shutdown operations, as discussed in the indicated sections:

- An orderly shutdown with SYS$SYSTEM:SHUTDOWN.COM (see Section B.7.2.1)
- An emergency shutdown with OPCCRASH.EXE (see Section B.7.2.2)

B.7.2.1 Orderly Shutdown

The SHUTDOWN.COM procedure shuts down the operating system while performing maintenance functions such as disabling future logins, stopping the batch and printer queues, dismounting volumes, and stopping user processes. To use the SHUTDOWN.COM command procedure, log in to the SYSTEM account, enter the following command:

```
$ @SYS$SYSTEM:SHUTDOWN
```

For more information about the SHUTDOWN.COM command procedure, see the *HP OpenVMS System Manager's Manual, Volume 1: Essentials*.

On cell-based Integrity servers, two special types of nPartition reboot are supported: reboot for reconfiguration, which reboots an nPartition and enables cell configuration changes to occur, and shutdown for reconfiguration, which puts an nPartition into an inactive state.

- To perform a reboot for reconfiguration from OpenVMS I64 running on an nPartition, enter the OpenVMS @SYS$SYSTEM:SHUTDOWN command and then answer YES to the prompt asking whether to perform an automatic system reboot.

  On cell-based Integrity servers, an operating system reboot is equivalent to a reboot for reconfiguration. Performing a reboot for reconfiguration enables any cell assignment changes for the nPartition (for example, removing an active cell or activating a newly added cell).

  The reboot for reconfiguration takes all cells assigned to the nPartition through a cell boot phase. The cells with a Yes use-on-next-boot attribute proceed through the nPartition boot phase to become active cells whose resources are available to software running on the nPartition.

- To perform a shutdown for reconfiguration of an nPartition running OpenVMS I64, first enter the OpenVMS @SYS$SYSTEM:SHUTDOWN command and then answer NO to the prompt asking whether to perform an automatic system reboot. Next, access MP and use the `rr` command (specify the OpenVMS nPartition to shutdown for reconfiguration).

  A shutdown for reconfiguration takes all cells assigned to the nPartition through a cell boot phase and then stops their boot progress at the boot-is-blocked (BIB) state. When all cells assigned to the nPartition are at the BIB state, the nPartition is inactive and no software can run on the nPartition until it is manually booted past BIB.

  To boot an inactive nPartition past BIB, use the MP `bo` command and specify which nPartition to make active. Booting past the BIB state involves all cells that are assigned to the nPartition and that have a Yes use-on-next-boot attribute. The cells are taken through the nPartition boot phase to become active cells whose resources are available to software running on the nPartition.

For more information about shutting down an Integrity server or an nPartition, see the appropriate hardware documentation.

B.7.2.2 Emergency Shutdown with OPCCRASH.EXE

If you cannot perform an orderly shutdown with the SHUTDOWN.COM procedure, run the OPCCRASH.EXE emergency shutdown program. To run the OPCCRASH.EXE program, log in to the SYSTEM account and enter the following command:

```
$ RUN SYS$SYSTEM:OPCCRASH
```

For more information about the OPCCRASH program, see the *HP OpenVMS System Manager's Manual, Volume 1: Essentials*.

On cell-based Integrity servers, entering the OpenVMS RUN SYS$SYSTEM:OPCCRASH command results in the system dumping memory and then halting at the P00>>> prompt. To reset the nPartition following OPCRASH, access the nPartition console and press any key to reboot.

Using the MP `tc` command to reset an nPartition results in the system dumping memory and then automatically resetting the nPartition.

B.8 Troubleshooting Procedures

The following sections describe procedures that you can follow if you encounter problems with your system.

B.8.1 If the System Does Not Boot

If the system does not boot because a hardware problem occurs, a question mark (?) usually precedes the error message displayed on the console terminal. An example of a hardware problem is a read error on a disk. Another is a BIB condition in an nPartition on a cell-based server. You can use VFP to check the nPartition boot state. If VFP indicates that all cells in the nPartition are at BIB, the nPartition is inactive and you must use the MP `bo` command to boot the nPartition past BIB and make it active.

One way to get to the EFI Boot Manager to attempt to reboot is to use the MP `rs` command.

For more information about using VFP and MP, see your hardware documentation.

B.8.1.1 For Hardware Problems

If you suspect a hardware problem, do the following:

Step 1. Consult the hardware manual for your Integrity server.

Step 2. Contact HP Customer Support.

B.8.1.2 For Software Problems

When the operating system is loaded into memory, a message similar to the following is displayed on the terminal screen:

```
SYSTEM   job terminated at 27-JUL-2006 15:05:03.17
```

If the system does not display this message, a software problem has probably occurred. Do the following:

Step 1. Turn off the system. Turn it back on and try to reboot.

Step 2. Perform a conversational boot using the default system parameters or try one of the emergency boot procedures described in Section B.6.10.

Step 3. If the system boots, run the AUTOGEN procedure. For more information about the AUTOGEN procedure, see the *HP OpenVMS System Manager's Manual, Volume 2: Tuning, Monitoring, and Complex Systems*.

B.8.2 Detecting and Responding to System Problems

If your system exhibits unexpected behavior, note the following:

- If the system displays a bugcheck message on the console terminal and shuts itself down, it means the system encountered a problem that made further operation impossible or dangerous. If the system does not reboot automatically, set up your system to boot automatically as explained in Section B.5, or reboot the system manually as explained in Section B.6.5.
- If the system stops responding to your commands (that is, if the system hangs), there is a possible failure in a system software or hardware component or a possible power failure.
- If the system exhibits erratic behavior (it does not respond according to specifications), it indicates a possible failure in a system software or hardware component.

To determine whether the failure is a system problem:

- Be sure that you did not press **F1** (**Hold Screen**). The Hold Screen light turns on when you press either **F1** or **Ctrl/S**.
- Press **Ctrl/T** to check the status of your process. A status line should appear indicating the name of the program that is executing and other information. If the status line does not appear, the program you are executing might be stalled or hanging. (If you have disabled **Ctrl/T** by entering the command SET NOCONTROL=T, or if you have set the terminal to NOBROADCAST mode by entering the command SET TERMINAL/NOBROADCAST, this procedure does not work.)
- Make sure the cable connecting the terminal or monitor to the system is secure.

If you determine that you have a system problem, take the following steps:

Step 1. Force an exit from a stalled or hanging program by pressing **Ctrl/Y**. Note that pressing **Ctrl/Y** causes any work performed by the program and not saved on disk to be lost.

Step 2. If the system is still unresponsive, halt it (see Section B.7.1 for more information.)

Step 3. Note in detail the sequence of events that caused the problem and notify HP Customer Support.

C Setting Up and Performing Network Booting

This appendix explains the steps required to enable your system to boot over the LAN using the OpenVMS InfoServer utility, a software application available on OpenVMS Alpha (Version 8.3 or higher) and OpenVMS I64 (Version 8.2-1 or higher) systems. It also describes how to boot the virtual DVD/CD drive from the network.

C.1 About the OpenVMS InfoServer Utility

InfoServer network booting is supported for OpenVMS installations and upgrades on any OpenVMS Alpha system and on any Integrity servers that support OpenVMS. For OpenVMS I64 systems, InfoServer network booting is supported on all LAN cards (also referred to as LAN devices or adapters) that are supported by EFI.

For both OpenVMS Alpha and I64 Version 8.3 installations and upgrades, you can boot from a virtual DVD/CD drive on the LAN using the OpenVMS InfoServer utility. You can use the OpenVMS InfoServer software application on all Version 8.2-1 or higher OpenVMS I64 systems as well as on any OpenVMS Alpha Version 8.3 systems that support a DVD drive. This support provides the additional advantage of allowing a network administrator to boot multiple OpenVMS systems on the network from a single copy of the OpenVMS distribution CD or DVD.

Using the InfoServer utility on Integrity servers for network booting requires several one-time-only configuration steps unique to OpenVMS I64. Likewise, using the InfoServer utility on OpenVMS Alpha servers requires an additional, one-time-only software configuration step. Any configuration procedures that might have been performed for network booting using an InfoServer hardware system (traditionally used by Alpha systems) are not valid for the OpenVMS I64 or OpenVMS Alpha InfoServer application.

Booting from the InfoServer utility for OpenVMS I64 on Integrity servers differs significantly from booting from the InfoServer hardware system traditionally used by OpenVMS Alpha systems or from the InfoServer utility on OpenVMS Alpha systems. For example, while Alpha systems use the Maintenance Operations Protocol (MOP) to request the primary bootstrap file (APB.EXE) to start the boot, the Integrity server console uses the Intel® Preboot Execution Environment (PXE) bootstrap protocol in conjunction with the TCP/IP Services for OpenVMS BOOTP server and TFTP. The Integrity server EFI console first loads the primary bootstrap file VMS_LOADER.EFI, which is formatted for EFI compatibility. VMS_LOADER.EFI then uses TFTP to request the primary bootstrap IPB.EXE from the **boot server**. IPB.EXE is formatted in OpenVMS ODS file structure and is needed for booting the OpenVMS I64 operating system.

To install or upgrade the operating system over the network, OpenVMS I64 systems must use the InfoServer utility that is integrated with the OpenVMS operating system. The InfoServer hardware traditionally used by OpenVMS Alpha systems is not equipped to handle DVD drives required for the OpenVMS I64 distribution media. OpenVMS Alpha systems can use the OpenVMS InfoServer utility or the traditional

InfoServer hardware system that is independent of OpenVMS. OpenVMS Alpha systems can boot from the distribution CD on DVD drives (DVD drives support both DVDs and CDs). Table C-1 summarizes the major differences between Alpha and I64 InfoServer booting.

Table C-1 InfoServer Booting: Differences Between Alpha and I64 Systems

Component	Alpha	I64
Downline load protocol	MOP	PXE (DHCP/BOOTP/TFTP)
Boot file	APB_*version* (for example, APB_083)	VMS_LOADER.EFI and IPB.EXE (both files are version specific)
Boot server	Any MOP-enabled system with the specified file	Only those BOOTP servers having the network device MAC address defined in the BOOTP database
LAN server	InfoServer hardware, or InfoServer utility running on OpenVMS Alpha Version 8.3 or higher, or on OpenVMS I64 Version 8.2-1 or higher	InfoServer application running on OpenVMS Alpha Version 8.3 or OpenVMS I64 Version 8.2-1 or higher

Because of these differences, any procedures used for Alpha systems to set up booting from the InfoServer hardware are not valid for setting up booting from the OpenVMS InfoServer utility. In addition, actions for setting up booting from the OpenVMS I64 InfoServer utility differ from those required for setting up booting from an OpenVMS Alpha InfoServer utility. Table C-2 lists the various actions that need to be performed to enable network booting using the OpenVMS InfoServer utility on OpenVMS I64 or OpenVMS Alpha systems. These actions need be performed only once except where noted.

Table C-2 Procedure for Enabling InfoServer Network Booting

InfoServer Client Setup		
Architecture	**Actions Required**	**Section**
I64 clients only	1. Determine the LAN I/O card to be used on your local Integrity server for the network boot and report the associated OpenVMS device name, its IP address, and its MAC address to the network administrator responsible for setting up the BOOTP server. 2. Optionally (and recommended), add this network device as an EFI boot option—this procedure can be repeated on any other system in the LAN that will use the InfoServer server for network booting. 3. Verify that the network device is supported by EFI as a bootable device.	Section C.2
InfoServer Utility Setup		
Architecture	**Actions Required (You or Network Administrator)**	**Section**

Table C-2 Procedure for Enabling InfoServer Network Booting (Continued)

	InfoServer Client Setup	
I64 or Alpha	Designate at least one OpenVMS system in the LAN as the InfoServer server. Upgrade the system if necessary (OpenVMS I64 must be Version 8.2-1 or higher; OpenVMS Alpha must be Version 8.3 or higher).	Upgrade instructions in Chapter 6 (Prior to upgrading, review Chapter 4, and Chapter 5.)
I64 or Alpha	1. Modify parameters in SYS$STARTUP:ESS$LAD_STARTUP.DAT. 2. Determine which network device will be used for InfoServer LAD operations. 3. Add a line to SYS$MANAGER:SYSTARTUP_VMS.COM to start the SYS$STARTUP:ESS$LAD_STARTUP.COM file at startup. 4. If you changed any SYSGEN parameters, run AUTOGEN and reboot; if you did not change SYSGEN parameters, skip the reboot and execute the SYS$STARTUP:ESS$LAD_STARTUP.COM file manually. 5. Use the InfoServer control program to create a service for the DVD drive.	Section C.3
Alpha only	Enable MOP on the boot server and then copy APB_083.SYS from the OpenVMS Version 8.3 distribution media to the MOP download database (LAN$DLL, which defaults to MOM$SYSTEM).	See the LANCP chapter in *HP OpenVMS System Management Utilities Reference Manual: A-L*
I64 only	Set up the TCP/IP Services for OpenVMS BOOTP server. (For each new release of OpenVMS I64, update the client entries in the BOOTP database to point to the new version-specific boot file.) The person responsible for setting up the boot server needs information about your InfoServer client. OpenVMS I64 boot files are unique for each version of OpenVMS I64. Latest boot files must be available and referenced in the BOOTP server database.	Section C.4

NOTE The discussion of InfoServer booting in this manual pertains to environments where the boot clients and servers are located in the same LAN. For more complex circumstances, consult HP Customer Support.

C.2 Setting Up Your System as an InfoServer Client (I64 Only)

To set up your local OpenVMS I64 system as an InfoServer client for network booting, you must perform the following steps. Detailed instructions are provided in the subsections that follow. For OpenVMS Alpha systems, no extra steps are required for setting up an InfoServer client.

Step 1. Determine the LAN I/O card to be used on your local Integrity server for the network boot. Report the associated OpenVMS device name and its IP address and MAC address to the network administrator responsible for setting up the BOOTP server.

Step 2. Optionally (and recommended), add the network device as a boot option in the EFI Boot Manager menu.

Step 3. Verify that the network device is supported by EFI as a bootable device.

NOTE The ability to boot over the network requires that the nearest switch or router be configured to autonegotiate.

C.2.1 Determining the Local Network I/O Card to Be Used

Select a LAN I/O card (also referred to as a LAN I/O device or adapter) on your Integrity server. This device must be supported by your Integrity server's EFI firmware. At minimum, EFI supports the **core I/O** LAN cards installed in the Integrity server. On all Integrity servers, devices supported by OpenVMS are either EI or EW devices (for example, EIA0 or EWA0). The EFI firmware might also support variants of the core I/O cards, such as additional network interface cards (NICs) of the same type. It might also support other NICs that are installed in the system but not classified as core I/O cards. In any case, you can verify that the device you select is supported by EFI.

If multiple I/O cards are available on your system, you can choose more than one to serve for network booting.

To list the installed LAN I/O devices known to your OpenVMS I64 system, follow these steps:

Step 1. If your operating system is not running, access the OpenVMS DCL triple dollar sign prompt ($$$) from your OpenVMS I64 OE DVD by selecting option 8 (Execute DCL commands and procedures) on the OpenVMS operating system main menu. Otherwise, skip to the next step.

Step 2. At the DCL prompt, enter the following command to start the OpenVMS I64 Boot Manager utility.

```
@SYS$MANAGER:BOOT_OPTIONS
```

Step 3. Start the LANCP utility and enter the LANCP command SHOW CONFIGURATION at the LANCP prompt:

```
$$$ RUN SYS$SYSTEM:LANCP
LANCP> SHOW CONFIGURATION

LAN Configuration:
       Parent or
Device  PrefCPU  Medium/User Version  Link  Speed  Duplex Auto BufSize   MAC Address          Type      Description
------  -------  ---------- -------  ----  -----  ------ ---- -------  -----------------   ----------  -----------
 EIA0      0      Ethernet    X-21     Up    1000   Full   Yes   1500  AA-00-04-00-A5-38  UTP i82546
                                                                       00-13-21-5B-85-E4 (default)
 EIB0      1      Ethernet    X-21     Up    1000   Full   Yes   1500  AA-00-04-00-A5-38  UTP i82546
                                                                       00-13-21-5B-85-E5 (default)
 EWA0      0      Ethernet    X-59    Down     -      -     Yes   1500  00-11-0A-43-23-D8  UTP AB465A
 EWB0      1      Ethernet    X-59    Down     -      -     Yes   1500  00-11-0A-43-23-D9  UTP AB465A
```

This display example lists four LAN devices, two of which are available (connected), as indicated by the Link column (Up means the device is available; Down means it is not). You can use a device that is in use by other protocols. Decide which available devices you want to use for network booting and record the device's name, MAC address, and IP address. (The MAC address should be labeled

on the physical device.) Once the LAN device is verified as bootable by EFI, you provide this information to the person responsible for maintaining the BOOTP server database (see Section C.4).

C.2.2 Adding the Network Boot Option to the EFI Boot Manager

To add the LAN device (virtual DVD drive) as a network boot option, use the OpenVMS I64 Boot Manager utility, as follows:

Step 1. At the DCL prompt, enter the following command to start the OpenVMS I64 Boot Manager utility:

```
@SYS$MANAGER:BOOT_OPTIONS
```

Step 2. The OpenVMS I64 Boot Manager Boot Options main menu is displayed. To add a network boot option, enter 1 at the prompt:

```
OpenVMS I64 Boot Manager Boot Options List Management Utility

(1) ADD an entry to the Boot Options list
(2) DISPLAY the Boot Options list
(3) REMOVE an entry from the Boot Options list
(4) MOVE the position of an entry in the Boot Options list
(5) VALIDATE boot options and fix them as necessary
(6) Modify Boot Options TIMEOUT setting

(B) Set to operate on the Boot Device Options list
(D) Set to operate on the Dump Device Options list
(G) Set to operate on the Debug Device Options list

(E) EXIT from the Boot Manager utility

You can also enter Ctrl-Y at any time to abort this utility
Enter your choice: 1
```

NOTE While using this utility, you can change a response made to an earlier prompt by entering the caret (^) character as many times as needed. To end and return to the DCL prompt, press **Ctrl/Y**.

Step 3. The utility prompts you for the device name. Enter the device name. In the following example, the device name is EIA0:.

```
Enter the device name (enter "?" for a list of devices): EIA0:
```

Step 4. The utility prompts you for the position you want your entry to take in the EFI boot option list. Enter any position number other than 1. (The number 1 position sets the device for automatic rebooting, which is not desirable for upgrades.)

```
Enter the desired position number (1,2,3,,,) of the entry.
To display the Boot Options list, enter "?" and press Return.
Position [1]: 4
```

Step 5. The utility prompts you for OpenVMS boot flags. By default, no flags are set. Enter the OpenVMS flags (for example, 0,1), or accept the default (NONE) to set no flags as in the following example:

```
Enter the value for VMS_FLAGS in the form n,n.
VMS_FLAGS [NONE]:
```

Step 6. The utility asks whether the device will be used for cluster satellite booting. Answer NO as in the following example.

```
Will EIA0 be used for cluster satellite boot? (Yes/No): NO
```

(For information about establishing a device for cluster satellite booting, see the *HP OpenVMS Version 8.3 New Features and Documentation Overview* and the *HP OpenVMS Cluster Systems* manuals.)

Step 7. The utility prompts you for a description to include with your boot option entry. By default, the device name and MAC address is used as the description. You can enter more descriptive information, as in the following example. As shown in the display of boot entries that follows, the device name and MAC address (without dashes) are included anyway in the boot entry line.

```
Enter a short description (do not include quotation marks).
Description ["EIA0"]: I64 UPGRADE VIA NET

efi$bcfg: eia0 (Boot0002) Option successfully added
```

Using the utility to display the devices at this point (selecting 2 on the main menu), you see your device listed, as in the following example:

```
Enter your choice: 2

To display all entries in the Boot Options list, press Return.
To display specific entries, enter the entry number or device name.
(Enter "?" for a list of devices):

EFI Boot Options list:   Timeout = 10 secs.
-------------------------------------------------------------------------------
01. DKB0 PCI(0|20|1|1) Scsi(Pun0,Lun0) "Boot VMS from DKB0" OPT
02. DKB200 PCI(0|20|1|1) Scsi(Pun2,Lun0) "Boot VMS from DKB200" OPT
03. VenHw(d65a6b8c-71e5-4df0-d2f009a9) "EFI Shell [Built-in]"
04. EIA0 PCI(0|0|2|0) Mac(0013215b85e4) "I64 Upgrade VIA NET"
-------------------------------------------------------------------------------
4 entries found.
```

Step 8. Exit the utility by entering E at the prompt:

```
Enter your choice: E
```

C.2.3 Verifying the Network I/O Device Is Bootable by EFI

Finally, verify that the LAN device you selected for your system's InfoServer client is bootable by EFI. Verification is recommended if the selected device is not one of the core I/O LAN devices installed on your Integrity server. To verify that the selected LAN device is bootable by EFI, follow these steps:

Step 1. Access the EFI console for your Integrity server. If your operating system is running, you must shut down your system to access EFI. (For details about accessing and using EFI, see your hardware documentation.)

Step 2. From the EFI main menu, select the Boot Configuration option (or in some versions of EFI, the Boot Option Maintenance Menu). Make a selection before the EFI timeout expires; otherwise, the first entry of the EFI Boot Manager is selected automatically. If you are brought to the EFI Shell prompt, enter the `exit` command at the prompt to move back to the EFI main menu. If an autoboot

begins, you can perform a cold reset of the Integrity server to get back to the EFI console. (For more information, see your hardware documentation.) Otherwise, you must wait for your system to boot and shut it down again.

Step 3. At the EFI Boot Configuration menu, select the Boot From a File option. In the Boot From a File list, look for the load file that corresponds to the LAN device you selected for network booting. This is the load file with a matching MAC address, as in the following example:

```
Load File [Acpi(HWP0002,0)/Pci(2|0)/Mac(0013215b85e4)]
```

The MAC address of the EIA0 network device selected earlier was 00-13-21-5B-85-E4, which matches the MAC address shown (without dashes). This verifies that the selected device is visible to the EFI console. If none of the Boot From a File options listed matches your selected device, then try another available device (as listed with the LANCP command SHOW CONFIGURATION in Section C.2.1).

Step 4. Provide the device name and its IP address and MAC address to the person responsible for setting up the BOOTP server.

C.3 Setting Up the InfoServer Server

At least one system in the LAN must be designated as the InfoServer server. This is the system that hosts the physical DVD drive from which network booting is performed. This system must be running OpenVMS I64 Version 8.2-1 or higher or OpenVMS Alpha Version 8.3 or higher. The InfoServer software comes as part of the base operating system on these systems.

The following steps are necessary to set up the InfoServer software on the designated system:

Step 1. Copy SYS$STARTUP:ESS$LAD_STARTUP.TEMPLATE to ESS$LAD_STARTUP.DAT (save the ESS$LAD_STARTUP.TEMPLATE file as a backup).

Step 2. Edit SYS$STARTUP:ESS$LAD_STARTUP.DAT to modify parameters as needed. This file configures InfoServer parameters affecting the OpenVMS LASTport/Disk™ (LAD) server, which allows access to the DVD drive. The following is an example of the configuration file (with default settings):

```
!++
! ESS$LAD_STARTUP.TEMPLATE
!
! Copy this file to SYS$STARTUP:ESS$LAD_STARTUP.DAT and edit it
! to suit your local situation.
!
! This file is used by SYS$STARTUP:ESS$LAD_STARTUP.COM to set up
! the parameters for the InfoServer Application on OpenVMS
! LASTport/Disk (LAD) server.
!
! Note:
! The LAD disk block cache is structured as a number of fixed-size
! buckets.  You must specify both the bucket size and the number of
! buckets for the cache.
!
! The LAD cache is allocated from non-paged pool and is in no way
! associated with the XFC cache. The total LAD cache size in bytes
! may be determined by the formula:
```

```
!
! cache-bytes = bucket-size-in-blocks * number-of-buckets * 512
!
! Be sure the SYSGEN parameters NPAGDYN/NPAGEVIR are sized appropriately.
!
! The following keywords with values are accepted by this procedure:
!
!       BUFFER_SIZE -   A number between 3 and 8 denoting the
!                       bucket size in blocks as follows:
!                       3 -   8 blocks
!                       4 -  16 blocks
!                       5 -  32 blocks
!                       6 -  64 blocks
!                       7 - 128 blocks
!                       8 - 256 blocks
!       CACHE_BUCKETS - Number of buckets
!       MAXIMUM_SERVICES - Maximum number of services (max=1024)
!       WRITE_LIMIT -   Server wide count of asynchronous writes
!--

BUFFER_SIZE = 3         ! default (8 block buckets)
CACHE_BUCKETS = 512     ! Default setting
WRITE_LIMIT = 0         ! No async writes
MAXIMUM_SERVICES = 256  ! default (typically more than enough)
```

The following table provides a short description of each of the parameters:

Parameter	Description
BUFFER_SIZE	The InfoServer block cache is structured as an array of fixed-size buffers (also called buckets). The BUFFER_SIZE parameter determines the size of each buffer or bucket. The numeric value of this parameter is an integer in the range 3 through 8, representing the bucket size in 512-byte blocks as follows. Note that bucket sizes larger than 32 blocks might not be appropriate for most users. The OpenVMS client segments I/O requests larger than 31 blocks into 31-block chunks, which could result in excessive I/O activity to the disk. The cache is allocated from nonpaged pool and is dedicated solely to the LAD driver. 3 — 8 blocks (default) 4 — 16 blocks 5 — 32 blocks 6 — 64 blocks 7 — 128 blocks 8 — 256 blocks
CACHE_BUCKETS	Determines the number of buckets in the cache. The default is 512. Numbers larger than 16384 might adversely affect performance. To reach a desirable cache size, consider increasing the BUFFER_SIZE parameter.

Parameter	Description
MAXIMUM_SERVICES	Sets the maximum number of services that can be defined at one time for the server. The value of this parameter must be a power of 2. The default and minimum value is 256 (adequate for most circumstances); the maximum value is 1024. Each service descriptor consumes nonpaged pool; however, unused services consume 4 bytes each.
WRITE_LIMIT	The number of asynchronous write operations that can be outstanding for the server at any time. The default is 0 (no outstanding asynchronous write operations).

NOTE As indicated in the file comments, the LAD cache comes out of nonpaged pool. If you increase the cache significantly, you might need to increase the nonpaged pool SYSGEN parameters (NPAGEDYN and NPAGEVIR).

Step 3. Determine which network device will be used for InfoServer LAD operations. You can use any network device that is visible to OpenVMS. Typically, any network device that works with DECnet or TCP/IP Services for OpenVMS should work. Use the LANCP command SHOW CONFIGURATION to determine which device to use, as described in Section C.2.1.

For this release of OpenVMS, the LASTport protocol runs on only a single network device. To enable this one device, open the SYS$STARTUP:ESS$LAST_STARTUP.DAT file and make the following changes:

a. Comment out the line that specifies ALL_CONTROLLERS = TRUE (comment out a line by inserting an exclamation point (!) at the beginning of the line).

b. Remove the comment (!) from the line that has the following text: DEVICE = (). Within the parentheses, specify the device name. For example: DEVICE = (EIA).

The following example shows the SYS$STARTUP:ESS$LAST_STARTUP.DAT file with the suggested changes made (shown in **bold**):

```
!++
! This file will be used to set the appropriate LASTCP qualifiers. The following
! LASTCP qualifiers: ALL_CONTROLLERS, CHECKSUM, TRANSMIT_QUOTA, or SLOW_MODE
! can be set by using the following statement format:
! LASTCP qualifier = 1 to enable   e.g. SLOW_MODE = 1 enables  SLOW_MODE
! LASTCP qualifier = 0 to disable  e.g. SLOW_MODE = 0 disables SLOW_MODE
! The remaining LASTCP qualifiers will require the appropriate value settings.
  DEVICE          = (EIA)
! TIMEOUT         = n                          minimum interval in seconds
! CIRCUIT_MAXIMUM = n                          maximum number of nodes
! GROUP           = n                          Group number
! NODE_NAME       = name                       Node name
! CONTROLLERS     = ([{controller letter,}...]) Controller list
! TRANSMIT_QUOTA  = n                          Number of transmit buffers
!--
!ALL_CONTROLLERS = ON
```

Step 4. Add the following line to the system startup file SYS$MANAGER:SYSTARTUP_VMS.COM:

```
@SYS$STARTUP:ESS$LAD_STARTUP.COM
```

Step 5. If you changed any SYSGEN parameters, run AUTOGEN and reboot (for information about running AUTOGEN, see Section 7.24). If no SYSGEN parameters were changed, you can skip the reboot and execute the SYS$STARTUP:ESS$LAD_STARTUP.COM file manually.

After you complete these steps, the InfoServer server software is running and available to serve boot requests. Note that the network devices are LAD0 (the LAD Server Virtual Device) and LAST0 (the LAST Transport Layer Virtual Device).

Step 6. The InfoServer server can run on the same system as the InfoServer client. You might want to start the InfoServer client on this system, allowing the system to mount InfoServer devices. To start the InfoServer on this system, enter the following command at the DCL prompt:

```
$$$ @SYS$STARTUP:ESS$STARTUP DISK
```

To have the InfoServer client start at system boot, include the command in SYS$MANAGER:SYSTARTUP_VMS.COM.

Step 7. Now that you have set up and enabled the InfoServer server, you must use the InfoServer control program to create a service for the DVD drive. Follow these steps:

a. Mount the OpenVMS distribution media systemwide. In the following example, DQA0 is the DVD drive name (typically, DQA0 is the drive name) and I64083 is the volume label (for OpenVMS I64):

```
$ MOUNT/SYSTEM DQA0 I64083
```

b. Enter the following command at the DCL prompt to define the InfoServer control program as a foreign command, or enter the line in a startup or login command file:

```
$ INFOSERVER :== $ESS$INFOSERVER
```

Alternatively, you can enter the following command to start the program:

```
$ RUN SYS$SYSTEM:ESS$INFOSERVER
```

c. Start the InfoServer control program and create the service, as in the following example (the colon after the device name DQA0 is required):

```
$ INFOSERVER
INFOSERVER> CREATE SERVICE I64083 DQA0:
INFOSERVER> EXIT
```

The created service should now be available for any InfoServer clients in the same LAN (these clients broadcast service solicitations over the LAN).

Started as in this example, the InfoServer control program accepts multiple commands until you exit by entering the EXIT command (or pressing **Ctrl/Z**). You can also enter a single command at the DCL prompt, returning you immediately to the DCL prompt again:

```
$ INFOSERVER CREATE SERVICE I64083 DQA0:
$
```

The InfoServer control program commands are similar, though not identical, to those supported by the hardware InfoServer used traditionally by OpenVMS Alpha systems. For more information, see the InfoServer help (at the InfoServer prompt, type HELP) or the *HP OpenVMS System Management Utilities Reference Manual*.

Step 8. On OpenVMS Alpha systems only, you must perform the following steps:

a. Enable MOP to use LANACP or DECnet on the system on which the OpenVMS InfoServer utility is being used. For information about enabling MOP, see the LANCP chapter in the *HP OpenVMS System Management Utilities Reference Manual: A-L*.

b. Copy the APB_083.SYS file from the OpenVMS Alpha distribution media to the MOP download directory (LAN$DLL, which defaults to MOM$SYSTEM).

C.4 Setting Up the BOOTP Boot Server (I64 Only)

The BOOTP boot server for use with the OpenVMS I64 InfoServer utility can be on the same system or on any system in the same LAN as the InfoServer application. TFTP is required on the boot server for supplying the boot files to the client systems.

The steps necessary to set up the boot server and boot files are as follows:

NOTE All instructions and examples assume the use of TCP/IP Services for OpenVMS. Other IP products might work but have not been tested and are not supported at this time.

Step 1. Make sure TCP/IP Services for OpenVMS is installed and that:

- The BOOTP server and TFTP server are configured and started.
- At least one IP interface is defined.
- Optionally, make sure TELNET and FTP are configured and started.

Use the TCPIP SHOW SERVICES command to verify the servers are started (enabled), and the TCPIP SHOW INTERFACE command to display IP interface information. For more information about configuring and starting TCP/IP Services for OpenVMS components, see the *HP TCP/IP Services for OpenVMS Installation and Configuration* and *HP TCP/IP Services for OpenVMS Management* manuals.

NOTE If you are currently using the DHCP service, you must disable it. The BOOTP service must be enabled instead. For information about disabling or enabling services, see the *HP TCP/IP Services for OpenVMS Management* manual.

Step 2. Set up a location for the OpenVMS I64 Version 8.3 boot files by creating the directory accessible by TFTP, as in the following example. (HP recommends that you create a separate boot file directory for each version of the operating system.)

```
$ CREATE/DIRECTORY TCPIP$TFTP_ROOT:[V83]
```

IMPORTANT For each subsequent upgrade of OpenVMS, you must create a separate directory for the boot files specific to the OpenVMS version and, where appropriate, modify the path specified for each client's boot files (as in step 6). To make subsequent upgrades easier, you can use systemwide or clusterwide logical names.

Step 3. Copy the following two files from the DVD to the TCPIP$TFTP_ROOT:[V083] directory:

- [SYSEXE]VMS_LOADER.EFI
- [SYSEXE]IPB.EXE

Step 4. Gather data for each boot client (that is, each node that is going to boot the DVD over the network), including the following information for the client's network device (the client Integrity server core I/O card):

- IP address
- MAC address

Step 5. Define each boot client's host name in the TCP/IP Services for OpenVMS local host database using the TCPIP SET HOST command. In the following example, *hostname* is the host name of the boot client and *ipaddress* is its IP address.

```
$ TCPIP SET HOST hostname/ADDRESS=ipaddress
```

The IP address does not have to be the actual address you plan to use for the boot client host; it must be in the same LAN as the BOOTP server and must not be currently in use. However, if you use statically assigned IP addresses, HP recommends (for simplicity) using the assigned address of the boot client's network device. (To display the assigned IP address, use the TCPIP SHOW HOST command.)

Step 6. For each boot client, add an entry in the BOOTP database to associate the MAC address of the client's LAN device with the boot file to be loaded from the boot server, as in the following example. In this example, *hostname* is the host name of the boot client, and *MACaddress* is the client's MAC address in the format *xx-xx-xx-xx-xx*; the boot file specification need not include "TCPIP$TFTP_ROOT:".

```
$ TCPIP SET BOOTP hostname /HARDWARE=ADDRESS=MACaddress-
_TCPIP> /FILE=[V083]VMSLOADER.EFI
```

You might need to specify a gateway (/GATEWAYS) and network mask (/NETWORK_MASK). Consult your network administrator or see the TCP/IP Services for OpenVMS documentation.

IMPORTANT For each new version of OpenVMS I64, you must modify the client entry in the BOOTP database to point to the new, version-specific boot file.

Example C-1 shows the commands for setting up a boot server for a client named MOZART.

Example C-1 Setting Up the Boot Server MOZART and Client

```
[1] $ CREATE/DIRECTORY TCPIP$TFTP_ROOT:[V083]
[2] $ COPY DQA0:[SYSEXE]VMS_LOADER.EFI TCPIP$TFTP_ROOT:[V83]VMS_LOADER.EFI
[3] $ COPY DQA0:[SYSEXE]IPB.EXE TCPIP$TFTP_ROOT:[V83]IPB.EXE
[4] $ TCPIP SET HOST MOZART/ADDRESS=16.32.110.117
[5] $ TCPIP SET BOOTP MOZART/HARDWARE=ADDRESS=00-13-21-5B-85-E4-
    _TCPIP> /FILE=[V83]VMSLOADER.EFI
[6] $ TCPIP SHOW HOST MOZART/FULL

   Host:    16.32.110.117   MOZART
                                          Hardware Address: 00-13-21-5B-85-E4
   Network Mask: 255.0.0.0
   File:           [V83]VMS_LOADER.EFI
     .
     .
     .
```

The commands shown in Example C-1 perform the following functions:

1. Creates the directory TCPIP$TFTP_ROOT:[V83] on the system to be the TFTP and BOOTP server.
2. Copies [SYSEXE]VMS_LOADER.EFI from the DVD to TCPIP$TFTP_ROOT:[V83].
3. Copies [SYSEXE]IPB.EXE from the DVD to TCPIP$TFTP_ROOT:[V83].
4. Adds the boot client host MOZART to the TCP/IP hosts database, specifying MOZART's IP address as 16.32.110.117.
5. Adds host MOZART as a client entry in the BOOTP database, where the MAC address of the client's LAN device is 00-13-21-5B-85-E4 (as was determined in the example for the client in Section C.2.1) and the boot file for the client is [V83]VMS_LOADER.EFI.
6. Displays information about the client MOZART (use this command to verify that the client has been configured appropriately).

After you complete these steps, in addition to the required steps in the preceding sections, you can boot a client over the network using the InfoServer application. Instructions for performing the InfoServer boot are in Section C.5. A troubleshooting section is included in Section C.6.

C.5 Booting from the InfoServer

After you set up the InfoServer software and the boot server properly and ensure that the InfoServer service is available, you can boot the remote CD or DVD served by the InfoServer by following these steps:

Step 1. Make sure the CD or DVD is mounted systemwide on the OpenVMS system serving as the InfoServer, and make sure an InfoServer service for the DVD drive is available on the network and accessible from your client system (the system to be booted from the InfoServer). The service should point to the server DVD drive on which the OpenVMS CD or DVD is mounted. To ensure that the InfoServer service is available on the network, use the following command:

```
$ MC ESS$LADCP SHOW SERVICES
```

The following is a sample display:

```
Interrogating network for Disk services, please wait...
    .
    .
    .
Disk services offered by node MOOSIC (LAD V3.1, Address: AA-00-04-00-AB-4E)

                                                 Current       Writes
Service:                        Device:      Rating: Connects:     Allowed?:
I64083                           OpenVMS      65535       0          No
    .
    .
    .
```

In this example, the service I64083 is the virtual disk unit that corresponds to the DVD drive on the InfoServer server named MOOSIC. This is the drive from which the OpenVMS distribution media is booted. The display shows that this service is available and that a service binding to the InfoServer DVD drive is established.

Step 2. Access EFI on your Integrity server. If you added a boot option for network (InfoServer) booting to the EFI Boot Manager options list, as described in Section C.2.2; then select the appropriate boot option from the list. To move to the option, use the up or down arrow key. (Depending on how your terminal emulator is set up, you might have to use the letter v to scroll down or the caret (^) to scroll up.) Press **Enter** to toggle the selection.

NOTE If you do not select an option within the default 10-second limit, the first option in the list is selected automatically.

If you did not add a boot option for InfoServer booting to the EFI Boot Manager options list, then you have to perform the following steps; otherwise, skip to step 3.

a. From the EFI Boot Manager screen, select the Boot Configuration option (or in some versions of EFI, the Boot Option Maintenance Menu).

b. From the EFI Boot Configuration menu, select the Boot From a File option.

c. The Boot From a File menu lists the bootable devices (in EFI terminology, load files), including their MAC addresses. The composition of the list depends on how your Integrity server is set up. Select the appropriate device (search for the correct MAC address). For example, the following load file listed in the Boot From a File menu corresponds to the LAN device with MAC address 00-13-21-5B-85-E4:

```
Load File [Acpi(HWP0002,0)/Pci(2|0)/Mac(0013215b85e4)]
```

Note that each device is identified by the unique MAC address assigned to the device by the hardware vendor. Normally, the MAC address is labeled on the physical device. See your hardware documentation for more information.

To further help you identify the LAN devices, you can use the EFI `pci` command, which displays all devices. Alternatively, you can try each of the LAN devices one at a time until you find the right one. Finally, you can make sure all LAN devices are connected to the appropriate network and are bootable using the InfoServer, in which case it does not matter which one you select. Note also that once you have OpenVMS running, you can display the devices and their corresponding MAC addresses by using the LANCP command SHOW CONFIG at the DCL prompt. The command lists the OpenVMS device names along with the MAC address and other characteristics. Likewise, with OpenVMS running, the EFI Utilities for OpenVMS `vms_show` command might provide additional information about any devices on the local system.

Step 3. When you select the appropriate entry, you see several lines of messages and then the InfoServer boot menu (the same boot menu you would see on an Alpha system), as in the following example. The DHCP (Dynamic Host Communication Protocol) message indicates the loading of the loader image (VMS_LOADER.EFI) that uses the EFI console to load and start the OpenVMS bootstrap (IPB.EXE). The Trivial File Transfer Protocol (TFTP) loads the bootstrap. In this example, "I64 Upgrade VIA NET" is the boot option for the InfoServer service. It was selected from the EFI Boot Manager options list (not shown).

NOTE If the InfoServer boot menu does not appear, you have probably selected the wrong LAN device. Try selecting another device. Verify the BOOTP database (see the *HP TCP/IP Services for OpenVMS Management* manual). Make sure the Integrity server that serves the network drive is running.

```
Loading.: Network Boot, 10/100
Running LoadFile()

CLIENT MAC ADDR: 00 13 21 5H 85 E4
DHCP./
CLIENT IP: 16.32.24.219   MASK: 255.0.0.0   DHCP IP: 0.240.0.0
Running LoadFile()

Starting: I64 Upgrade VIA NET
%EIA-I-BOOTDRIVER, Starting auto-negotiation
%EIA-I-BOOTDRIVER, Auto-negotiation selected 100BaseTX FDX

Network Initial System Load Function
Version 1.2


  FUNCTION          FUNCTION
    ID
    1      -        Display Menu
    2      -        Help
    3      -        Choose Service
    4      -        Select Options
    5      -        Stop

Enter a function ID value:
```

Step 4. Respond to the prompts, pressing **Enter** after each entry; use the default service name indicated or one suggested by the system manager:

a. Enter 3 for the function ID.

b. Enter 2 for the option ID.

c. Enter the service name (ALPHA083 is the default for service name for the InfoServer hardware; for an OpenVMS Alpha or OpenVMS I64 system using the InfoServer utility, ask your system or network manager for the service name).

A sample display follows:

```
Enter a function ID value: 3
 OPTION           OPTION
   ID
   1      -       Find Services
   2      -       Enter known Service Name

Enter an Option ID value: 2
Enter a Known Service Name: I64083
```

After you boot, the system displays the OpenVMS menu. To install your OpenVMS operating system, follow the instructions in Section 3.3. To upgrade your system, follow the instructions in Section 6.3.

NOTE If you boot the OpenVMS Alpha operating system CD or OpenVMS I64 OE DVD from an InfoServer but lose your connection during the installation or upgrade procedure (the system is unresponsive and pressing Ctrl/Y does not return you to the menu), do the following:

IF ...	THEN ...
You previously chose the INITIALIZE option	1. Reboot the OpenVMS CD DVD. 2. Choose the install/upgrade option (1) on the menu and perform the installation or upgrade procedure again.
You previously chose the PRESERVE option	1. Reboot the OpenVMS CD or DVD. 2. Enter the DCL environment by choosing option 8 on the menu. 3. Mount the device containing your backup copy of the target disk and the device that is your target disk. 4. Restore the backup copy of your target disk by entering the appropriate BACKUP commands. (See Appendix E for complete information about using MOUNT and BACKUP commands to restore a system disk.) 5. Log out from the DCL environment. 6. Choose the install/upgrade option (1) on the menu and perform the installation or upgrade procedure again.

C.6 Troubleshooting InfoServer Boot Problems

For problems using the OpenVMS I64 InfoServer software for network booting, consider the following:

1. When you attempt to boot over the network, check your console display for the following:

   a. The IP address of the boot server that sends your EFI console the OpenVMS I64 loader file (VMS_LOADER.EFI). If this IP address is not as expected, your client host might be in the database of the wrong boot server. Enter your client host IP address in the database of the correct boot server (see step 5 of Section C.4), and remove your client from the database of any other boot servers.

   b. The version number of the IPB.EXE bootstrap file that is loaded (for this release, the version should be 8.3). If this version number is not the correct version of OpenVMS I64, a message indicates there is a mismatch. The boot server might be the source of the problem. Make sure that it is configured correctly. Make sure the client entry in the boot server's database has been updated to point to the current version of the loader file (see steps 3 and 7 of Section C.4).

   c. Evidence that DHCP is not responding. If you do not see a message indicating autonegotiation has been started, make sure the closest network device or switch is set for autonegotiation.

2. If the network boot succeeds but your attempt to choose a service or to display services at the InfoServer menu fails, a device might be filtering the LASTport/Disk (LAD) protocol. This protocol does not provide routing functions and only works within a LAN. If filtering devices are used in an extended LAN, the devices must allow this protocol (protocol type is 80-41) to pass through unfiltered so that clients can access the InfoServer across the filtering device.

For LANCP and LANACP problems, see the *HP OpenVMS System Manager's Manual, Volume 2: Tuning, Monitoring, and Complex Systems* for more information.

D Setting Up and Booting Fibre Channel Storage Devices

This appendix describes how to set up and boot from a Fibre Channel (FC) Storage Area Network (SAN) storage device on OpenVMS Alpha and I64 systems. You may prefer booting from an FC storage device because of its speed and because it can serve as a common cluster system disk in a SAN. FC storage is supported on all storage arrays that are supported on OpenVMS systems. For a list of supported devices, see the *HP OpenVMS Version 8.3 for Alpha and Integrity Servers Software Product Description* (SPD 82.35.*xx*).

The HBA requires the latest RISC firmware and EFI firmware and driver.

Fibre Channel device booting supports point-to-point topology. There is no plan to support FC arbitrated loop topology.

D.1 Booting on a Fibre Channel Storage Device on OpenVMS Alpha Systems

This section describes how to use the AlphaServer console for configuring Fibre Channel, how to view the Fibre Channel configuration from the console, and how to set up disks for Fibre Channel booting and dumping on OpenVMS Alpha systems.

D.1.1 Using the AlphaServer Console for Configuring Fibre Channel (Alpha Only)

The AlphaServer console can be used to view the status of an FC interconnect. This allows you to confirm that the interconnect is set up properly before booting. If you plan to use an FC disk device for booting or dumping, you must perform some additional steps to set up those FC disk devices at the console. These topics are discussed in the following subsections.

D.1.1.1 Viewing the FC Configuration from the Console

Console SHOW commands can be used to display information about the devices that the console detected when it last probed the system's I/O adapters. Unlike other interconnects, however, FC disk devices are not automatically included in the SHOW DEVICE output. This is because FC devices are identified by their WWIDs, and WWIDs are too large to be included in the SHOW DEVICE output. Instead, the console provides a command for managing WWIDs, named the `wwidmgr` command. This command enables you to display information about FC devices and to define appropriate device names for the FC devices that will be used for booting and dumping.

Note the following points about using the `wwidmgr` command:

- To use the `wwidmgr` command, if your system is an Alpha Server model 8*x*00, 4*x*00, or 1200, you must first enter diagnostic mode. On all other platforms, you can enter the `wwidmgr` command at any time.
- The changes made by the `wwidmgr` command do not take effect until after the next system initialization. After using the `wwidmgr` command, you must enter the `initialize` command.

For a complete description of the `wwidmgr` command, see the *Wwidmgr User's Manual*. This manual is available in the [.DOC] directory of the Alpha Systems Firmware Update CD.

The following examples, produced on an AlphaServer 4100 system, show some typical uses of the `wwidmgr` command. Other environments might require additional steps, and the output on other systems might vary slightly.

Note the following about Example D-1:

- The `wwidmgr -show wwid` command displays a summary of the FC devices on the system. This command does not display information about device connectivity.
- There are two FC adapters and five disks. (All the disks are listed at the end, independent of the adapters to which they are connected.) In this example, each of the disks was assigned a device identifier at the HSG80 console. The console refers to this identifier as a user-assigned device identifier (UDID).

Example D-1 Using wwidmgr -show wwid

```
P00>>>set mode diag
Console is in diagnostic mode
P00>>>wwidmgr -show wwid
polling kgpsa0 (KGPSA-B) slot 2, bus 0 PCI, hose 1
kgpsaa0.0.0.2.1            PGA0        WWN 1000-0000-c920-a7db
polling kgpsa1 (KGPSA-B) slot 3, bus 0 PCI, hose 1
kgpsab0.0.0.3.1            PGB0        WWN 1000-0000-c920-a694
[0] UDID:10 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0016 (ev:none)
[1] UDID:50 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0026 (ev:none)
[2] UDID:51 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0027 (ev:none)
[3] UDID:60 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0021 (ev:none)
[4] UDID:61 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0022 (ev:none)
```

Example D-2 shows how the `wwidmgr show wwid -full` command displays information about FC devices and how they are connected. The display has two parts:

- The first part lists each path from an adapter to an FC port. Adapters are identified by console device names, such as KGPSAA. FC ports are identified by their WWID, such as 5000-1FE1-0000-0D14. If any FC disks are found on a path, they are listed after that path. FC disks are identified by their current console device name, followed by their WWID.
- The second part of the display lists all the FC disks and the paths through which they are reachable. In this part, which begins with `[0] UDID:10...`, you see four paths to each disk with two paths through each adapter, KGPSAA and KGPSAB. Each path through an adapter goes to a different port on the HSG or HSV. The column titled `Con` indicates whether the FC disk unit is currently online to the HSG or HSV controller that this path uses.

Example D-2 Using wwidmgr -show wwid -full

```
P00>>>wwidmgr -show wwid -full

kgpsaa0.0.0.2.1
- Port: 1000-0000-c920-a7db

kgpsaa0.0.0.2.1
- Port: 2007-0060-6900-075b

kgpsaa0.0.0.2.1
- Port: 20fc-0060-6900-075b
```

```
kgpsaa0.0.0.2.1
- Port: 5000-1fe1-0000-0d14
 - dga12274.13.0.2.1 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0016
 - dga15346.13.0.2.1 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0026
 - dga31539.13.0.2.1 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0027
 - dga31155.13.0.2.1 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0021
 - dga30963.13.0.2.1 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0022

kgpsaa0.0.0.2.1
- Port: 5000-1fe1-0000-0d11
 - dga12274.14.0.2.1 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0016
 - dga15346.14.0.2.1 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0026
 - dga31539.14.0.2.1 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0027
 - dga31155.14.0.2.1 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0021
 - dga30963.14.0.2.1 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0022

kgpsab0.0.0.3.1
- Port: 1000-0000-c920-a694

kgpsab0.0.0.3.1
- Port: 2007-0060-6900-09b8

kgpsab0.0.0.3.1
- Port: 20fc-0060-6900-09b8

kgpsab0.0.0.3.1
- Port: 5000-1fe1-0000-0d13
 - dgb12274.13.0.3.1 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0016
 - dgb15346.13.0.3.1 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0026
 - dgb31539.13.0.3.1 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0027
 - dgb31155.13.0.3.1 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0021
 - dgb30963.13.0.3.1 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0022

kgpsab0.0.0.3.1
- Port: 5000-1fe1-0000-0d12
 - dgb12274.14.0.3.1 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0016
 - dgb15346.14.0.3.1 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0026
 - dgb31539.14.0.3.1 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0027
 - dgb31155.14.0.3.1 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0021
 - dgb30963.14.0.3.1 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0022


[0] UDID:10 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0016 (ev:none)
 - current_unit:12274 current_col: 0 default_unit:12274
          via adapter       via fc_nport       Con     DID     Lun
 -      kgpsaa0.0.0.2.1  5000-1fe1-0000-0d14   Yes   210013     10
 -      kgpsaa0.0.0.2.1  5000-1fe1-0000-0d11   No    210213     10
 -      kgpsab0.0.0.3.1  5000-1fe1-0000-0d13   Yes   210013     10
 -      kgpsab0.0.0.3.1  5000-1fe1-0000-0d12   No    210213     10

[1] UDID:50 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0026 (ev:none)
 - current_unit:15346 current_col: 0 default_unit:15346
          via adapter       via fc_nport       Con     DID     Lun
 -      kgpsaa0.0.0.2.1  5000-1fe1-0000-0d14   Yes   210013     50
 -      kgpsaa0.0.0.2.1  5000-1fe1-0000-0d11   No    210213     50
 -      kgpsab0.0.0.3.1  5000-1fe1-0000-0d13   Yes   210013     50
 -      kgpsab0.0.0.3.1  5000-1fe1-0000-0d12   No    210213     50
```

```
[2] UDID:51 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0027 (ev:none)
 - current_unit:31539 current_col: 0 default_unit:31539
          via adapter       via fc_nport       Con     DID     Lun
 -      kgpsaa0.0.0.2.1  5000-1fe1-0000-0d14   Yes   210013     51
 -      kgpsaa0.0.0.2.1  5000-1fe1-0000-0d11   No    210213     51
 -      kgpsab0.0.0.3.1  5000-1fe1-0000-0d13   Yes   210013     51
 -      kgpsab0.0.0.3.1  5000-1fe1-0000-0d12   No    210213     51

[3] UDID:60 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0021 (ev:none)
 - current_unit:31155 current_col: 0 default_unit:31155
          via adapter       via fc_nport       Con     DID     Lun
 -      kgpsaa0.0.0.2.1  5000-1fe1-0000-0d14   Yes   210013     60
 -      kgpsaa0.0.0.2.1  5000-1fe1-0000-0d11   No    210213     60
 -      kgpsab0.0.0.3.1  5000-1fe1-0000-0d13   Yes   210013     60
 -      kgpsab0.0.0.3.1  5000-1fe1-0000-0d12   No    210213     60

[4] UDID:61 WWID:01000010:6000-1fe1-0000-0d10-0009-8090-0677-0022 (ev:none)
 - current_unit:30963 current_col: 0 default_unit:30963
          via adapter       via fc_nport       Con     DID     Lun
 -      kgpsaa0.0.0.2.1  5000-1fe1-0000-0d14   Yes   210013     61
 -      kgpsaa0.0.0.2.1  5000-1fe1-0000-0d11   No    210213     61
 -      kgpsab0.0.0.3.1  5000-1fe1-0000-0d13   Yes   210013     61
 -      kgpsab0.0.0.3.1  5000-1fe1-0000-0d12    No   210213     61
```

D.1.1.2 Setting Up FC Disks for Booting and Dumping

You must use the `wwidmgr` command to set up each device that you will use for booting or dumping. Once a device is set up, the console retains the information it requires to access the device in nonvolatile memory. You only have to rerun the `wwidmgr` command if the system configuration changes and the nonvolatile information is no longer valid.

The console provides a simplified setup command, called `wwidmgr -quickset`. This command can be used in either of the following cases:

- You are setting up just one device.
- All the devices you are setting up are accessed through the same ports on the HSG or HSV.

If neither description applies to your configuration, see the *Wwidmgr Users' Manual* for additional instructions.

Example D-3 illustrates the `wwidmgr -quickset` command. Note the following:

- The command `wwidmgr -quickset -udid 10` sets up the FC disk whose HSG or HSV device identifier is equal to 10.
- The console device names are path dependent. Each path used to access an FC disk has a different name. In this example, the `wwidmgr -quickset` command establishes four console device names corresponding to the four paths from the host to the FC disk:
  - `dga10.1001.0.2.1`
  - `dga10.1002.0.2.1`
  - `dgb10.1003.0.3.1`
  - `dgb10.1004.0.3.1`
- The second command, `wwidmgr -quickset -udid 50`, sets up the FC disk whose HSG or HSV identifier is equal to 50.

- The changes made by the `wwidmgr` command do not take effect until after the next system initialization, so the next step is to use the `initialize` command.
- After initialization, the console `show device` command displays each FC adapter, followed by the paths through that adapter to each of the defined FC disks. The path-independent OpenVMS device name for each FC disk is displayed in the second column.

Example D-3 Using widmgr -quickset

```
P00>>>wwidmgr -quickset -udid 10

Disk assignment and reachability after next initialization:


6000-1fe1-0000-0d10-0009-8090-0677-0016
                          via adapter:          via fc nport:        connected:
dga10.1001.0.2.1          kgpsaa0.0.0.2.1       5000-1fe1-0000-0d14      Yes
dga10.1002.0.2.1          kgpsaa0.0.0.2.1       5000-1fe1-0000-0d11      No
dgb10.1003.0.3.1          kgpsab0.0.0.3.1       5000-1fe1-0000-0d13      Yes
dgb10.1004.0.3.1          kgpsab0.0.0.3.1       5000-1fe1-0000-0d12      No
P00>>>wwidmgr -quickset -udid 50

Disk assignment and reachability after next initialization:


6000-1fe1-0000-0d10-0009-8090-0677-0016
                          via adapter:          via fc nport:        connected:
dga10.1001.0.2.1          kgpsaa0.0.0.2.1       5000-1fe1-0000-0d14      Yes
dga10.1002.0.2.1          kgpsaa0.0.0.2.1       5000-1fe1-0000-0d11      No
dgb10.1003.0.3.1          kgpsab0.0.0.3.1       5000-1fe1-0000-0d13      Yes
dgb10.1004.0.3.1          kgpsab0.0.0.3.1       5000-1fe1-0000-0d12      No

6000-1fe1-0000-0d10-0009-8090-0677-0026
                          via adapter:          via fc nport:        connected:
dga50.1001.0.2.1          kgpsaa0.0.0.2.1       5000-1fe1-0000-0d14      Yes
dga50.1002.0.2.1          kgpsaa0.0.0.2.1       5000-1fe1-0000-0d11      No
dgb50.1003.0.3.1          kgpsab0.0.0.3.1       5000-1fe1-0000-0d13      Yes
dgb50.1004.0.3.1          kgpsab0.0.0.3.1       5000-1fe1-0000-0d12      No
P00>>>initialize
Initializing...
P00>>>show device
polling ncr0 (NCR 53C810) slot 1, bus 0 PCI, hose 1   SCSI Bus ID 7
dka500.5.0.1.1     DKA500                    RRD45  1645
polling kgpsa0 (KGPSA-B) slot 2, bus 0 PCI, hose 1
kgpsaa0.0.0.2.1            PGA0        WWN 1000-0000-c920-a7db
dga10.1001.0.2.1   $1$DGA10                  HSG80  R024
dga50.1001.0.2.1   $1$DGA50                  HSG80  R024
dga10.1002.0.2.1   $1$DGA10                  HSG80  R024
dga50.1002.0.2.1   $1$DGA50                  HSG80  R024
polling kgpsa1 (KGPSA-B) slot 3, bus 0 PCI, hose 1
kgpsab0.0.0.3.1            PGB0        WWN 1000-0000-c920-a694
dgb10.1003.0.3.1   $1$DGA10                  HSG80  R024
dgb50.1003.0.3.1   $1$DGA50                  HSG80  R024
dgb10.1004.0.3.1   $1$DGA10                  HSG80  R024
dgb50.1004.0.3.1   $1$DGA50                  HSG80  R024
polling isp0 (QLogic ISP1020) slot 4, bus 0 PCI, hose 1   SCSI Bus ID 15
dkb0.0.0.4.1       DKB0                      RZ1CB-CS  0844
```

```
dkb100.1.0.4.1     DKB100                    RZ1CB-CS  0844
polling floppy0 (FLOPPY) PCEB - XBUS hose 0
dva0.0.0.1000.0    DVA0                       RX23
polling ncr1 (NCR 53C810) slot 4, bus 0 PCI, hose 0   SCSI Bus ID 7
dkc0.0.0.4.0       DKC0                      RZ29B  0007
polling tulip0 (DECchip 21040-AA) slot 3, bus 0 PCI, hose 0
ewa0.0.0.3.0       00-00-F8-21-09-74Auto-Sensing
```

Example D-4 shows a boot sequence from an FC system disk. Note the following:

- The boot device is 1DGA50. The user has elected to enter all four paths to the device in the bootdef_dev string. This ensures that the system will be able to boot even if a path has failed.
- The first path on the boot command string, dga50.1002.0.2.1, is not currently connected (that is, the disk is not on line to the HSG80 on that path). The console indicates this fact, retries a few times, then moves on to the next path in the bootdef_dev string. This path is currently connected, and the boot succeeds.
- After booting, the OpenVMS SHOW DEVICE command confirms that OpenVMS has configured all five of the FC devices that were displayed by the wwidmgr -show wwid command, not only the two FC disks that were set up using the console wwidmgr -quickset command. The OpenVMS SHOW DEV/MULTIPATH command confirms that OpenVMS has configured all four paths to each disk.

Example D-4 Boot Sequence from an FC System Disk

```
P00>>>set bootdef_dev dga50.1002.0.2.1,dga50.1001.0.2.1,dgb50.1003.0.3.1,dgb50.1004.0.3.1
P00>>>b
 (boot dga50.1002.0.2.1 -flags 0,0)
dga50.1002.0.2.1 is not connected
dga50.1002.0.2.1 is not connected
dga50.1002.0.2.1 is not connected
dga50.1002.0.2.1 is not connected
failed to open dga50.1002.0.2.1
(boot dga50.1001.0.2.1 -flags 0,0)
block 0 of dga50.1001.0.2.1 is a valid boot block
reading 919 blocks from dga50.1001.0.2.1
bootstrap code read in
Building FRU table
base = 200000, image_start = 0, image_bytes = 72e00
initializing HWRPB at 2000
initializing page table at 1f2000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code


    OpenVMS (TM) Alpha Operating System, Version V7.2
...
$ SHOW DEVICE

Device                  Device           Error    Volume         Free  Trans Mnt
 Name                   Status           Count     Label        Blocks Count Cnt
$1$DGA10:     (FCNOD1)  Online               0
$1$DGA50:     (FCNOD1)  Mounted              0  V72_SSB        4734189   303   1
$1$DGA51:     (FCNOD1)  Online               0
$1$DGA60:     (FCNOD1)  Online               0
$1$DGA61:     (FCNOD1)  Online               0
```

```
$ SHOW LOGICAL SYS$SYSDEVICE
   "SYS$SYSDEVICE" = "$1$DGA50:" (LNM$SYSTEM_TABLE)
$ SHO DEV/MULTI

Device                  Device           Error         Current
 Name                   Status           Count  Paths    path
$1$DGA10:     (FCNOD1)  Online               0   4/ 4  PGB0.5000-1FE1-0000-0D11
$1$DGA50:     (FCNOD1)  Mounted              0   4/ 4  PGA0.5000-1FE1-0000-0D12
$1$DGA51:     (FCNOD1)  Online               0   4/ 4  PGA0.5000-1FE1-0000-0D13
$1$DGA60:     (FCNOD1)  Online               0   4/ 4  PGB0.5000-1FE1-0000-0D14
$1$DGA61:     (FCNOD1)  Online               0   4/ 4  PGB0.5000-1FE1-0000-0D11
Device                  Device           Error         Current
 Name                   Status           Count  Paths    path
$1$GGA42:               Online               0   4/ 4  PGB0.5000-1FE1-0000-0D11
```

D.2 Booting on a Fibre Channel Storage Device on OpenVMS I64 Systems

This section describes how to check the firmware version of the flash memory of the FC storage device, how to obtain the latest copy of the IPF Offline Diagnostics and Utilities CD, and how to configure the boot device paths for the storage device.

D.2.1 Checking the Firmware Version

Before you can boot on a FC device on OpenVMS I64 systems, the EFI bootable firmware of the flash memory of the FC HBA must be the latest supported revision.

IMPORTANT If you have an entry-class Integrity server, you can update the firmware yourself. If you have a cell-based Integrity server, you must contact HP Customer Support to update the firmware for you.

To flash the memory of the FC HBA on an entry-class server, update the EFI driver and RISC firmware to the latest versions available. In addition, to enable the HBA factory default settings, update the NVRAM resident in the FLASH ROM on the HBA, if necessary.

To determine the most current supported versions of the RISC firmware and EFI driver, see the appropriate README text file provided on the latest, supported HP IPF Offline Diagnostics and Utilities CD. For a 2-GB FC device, locate this file by navigating to the `\efi\hp\tools\io_cards\fc2` directory. To update the driver and firmware, you can use a script on the CD that updates the driver and firmware automatically. Use the following command in the directory previously mentioned:

```
fcd_update2.nsh
```

For a 4-GB FC device, navigate to the `fc4` directory (`\efi\hp\tools\io_cards\fc4`) to locate the README text file. To update the driver and firmware, use the following command (located in the `fc4` directory:

```
fcd_update4.nsh
```

You can also use the `efiutil.efi` utility located in either directory.

For instructions on obtaining the Offline Diagnostics and Utilities CD, see Section D.2.2. For additional information about updating the bootable firmware of the FC device, see the *Guidelines for OpenVMS Cluster Configurations*.

You can determine the versions of the driver and RISC firmware currently in place on your Integrity server in two ways: from the console during system initialization or by using the `efiutil` utility.

- The driver and RISC firmware versions are shown in the booting console message that is displayed during system initialization, as in the following example. The RISC firmware version is indicated in the format `n.nn.nnn`.

  ```
  HP 2 Port 2Gb Fibre Channel Adapter (driver n.nn, firmware n.nn.nnn)
  ```

- The driver and RISC firmware versions are also shown in the display of the efiutil `info` command:

  ```
  fs0:\efi\hp\tools\io_cards\fc2\efiutil> info

  Fibre Channel Card Efi Utility  n.nn  (11/1/2004)

   2 Fibre Channel Adapters found:

  Adapter        Path                    WWN           Driver (Firmware)
   A0  Acpi(000222F0,200)/Pci(1|0)  50060B00001CF2DC  n.nn  (n.nn.nnn)
   A1  Acpi(000222F0,200)/Pci(1|1)  50060B00001CF2DE  n.nn  (n.nn.nnn)
  ```

D.2.2 Obtaining the IPF Offline Diagnostics and Utilities

Obtain the latest copy of the IPF Offline Diagnostics and Utilities CD by either of the following methods:

- Order the CD free of charge from the HP Software Depot site main page at:

  `http://www.hp.com/go/softwaredepot`

  Type `ipf offline` in the Search bar and select the latest version listed (dates are indicated in the listed product names).

- Burn your own CD locally after downloading a master ISO image of the IPF Offline Diagnostics and Utilities CD from the following Web site:

  `http://www.hp.com/support/itaniumservers`

Step 1. Select your server product from the list provided.

Step 2. From the HP Support page, select "Download drivers and software".

Step 3. From the "Download drivers and software page", select "Cross operating system (BIOS, Firmware, Diagnostics, etc)".

Step 4. Download the Offline Diagnostics and Utilities software. Note that previous versions of the software might be listed along with the current (latest) version. Be sure to select the latest version.

Alternatively, you can select the appropriate Offline Diagnostics and Utilities link under the Description heading on this Web page. Then you can access the installation instructions and release notes as well as download the software. The README text file on the CD also includes information about how to install the software and update the firmware.

Step 5. Burn the full ISO image onto a blank CD, using a CD burner and any major CD burning software. To complete the recording process, see the operating instructions provided by your CD burner software. Note that the downloaded CD data is a single ISO image file. This image file must be burned directly to a CD exactly as is. This creates a dual-partition, bootable CD.

D.2.3 Configuring and Booting FC Boot Device

For OpenVMS I64 Version 8.2, the process of setting up an FC boot device required using the OpenVMS I64 Boot Manager utility (SYS$MANAGER:BOOT_OPTIONS.COM) to specify values to the EFI Boot Manager. Starting with OpenVMS I64 Version 8.2-1, this process is automated by the OpenVMS I64 installation and upgrade procedures.

The OpenVMS I64 installation/upgrade procedure displays the name of an FC disk as a boot device and prompts you to add the Boot Option. HP recommends that you accept this default. Alternatively, after the installation or upgrade completes, you can run the OpenVMS I64 Boot Manager to set up or modify an FC boot device, as described in the following steps. Always use the OpenVMS I64 installation/upgrade procedure or the OpenVMS I64 Boot Manager to set up or modify an FC boot device; do not use EFI for this purpose.

NOTE On certain entry-level servers, if no FC boot device is listed in the EFI boot menu, you might experience a delay in EFI initialization because the entire SAN is scanned. Depending on the size of the SAN, this delay might range from several seconds to several minutes. Cell-based systems (such as rx7620, rx8620, and the Superdome) are not affected by this delay.

When booting OpenVMS from the installation DVD for the first time on any OpenVMS I64 system, you might also experience a similar delay in EFI initialization.

If you did not allow the OpenVMS I64 installation or upgrade procedure to automatically set up your FC boot device, or if you want to modify the boot option that was set up for that device, use the OpenVMS I64 Boot Manager utility, by following these steps:

Step 1. If your operating system is not running, access the OpenVMS DCL triple dollar sign prompt ($$$) from the OpenVMS operating system main menu by choosing option 8 (Execute DCL commands and procedures). Otherwise, skip to the next step.

Step 2. At the DCL prompt, enter the following command to start the OpenVMS I64 Boot Manager utility:

```
$$$ @SYS$MANAGER:BOOT_OPTIONS
```

Step 3. When the utility is launched, the main menu is displayed. To add your FC system disk as a boot option, enter 1 at the prompt, as in the following example:

```
OpenVMS I64 Boot Manager Boot Options List Management Utility

(1) ADD an entry to the Boot Options list
(2) DISPLAY the Boot Options list
(3) REMOVE an entry from the Boot Options list
(4) MOVE the position of an entry in the Boot Options list
(5) VALIDATE boot options and fix them as necessary
(6) Modify Boot Options TIMEOUT setting

(B) Set to operate on the Boot Device Options list
(D) Set to operate on the Dump Device Options list
(G) Set to operate on the Debug Device Options list
```

```
(E) EXIT from the Boot Manager utility

You can also enter Ctrl-Y at any time to abort this utility
Enter your choice: 1
```

NOTE While using this utility, you can change a response made to an earlier prompt by entering the caret (^) character as many times as needed. To end and return to the DCL prompt, press **Ctrl/Y**.

Step 4. The utility prompts you for the device name. Enter the FC system disk device you are using for this installation. In the following example, the device is a multipath FC device named 1DGA1:. This ensures that the system will be able to boot even if a path has failed.

```
Enter the device name (enter "?" for a list of devices): $1$DGA1:
```

Step 5. The utility prompts you for the position you want your entry to take in the EFI boot option list. Enter 1 to enable automatic reboot, as in the following example:

```
Enter the desired position number (1,2,3,,,) of the entry.
To display the Boot Options list, enter "?" and press Return.
Position [1]: 1
```

Step 6. The utility prompts you for OpenVMS boot flags. By default, no flags are set. Enter the OpenVMS flags (for example, 0,1), or accept the default (NONE) to set no flags, as in the following example:

```
Enter the value for VMS_FLAGS in the form n,n.
   VMS_FLAGS [NONE]:
```

Step 7. The utility prompts you for a description to include with your boot option entry. By default, the device name is used as the description. You can enter more descriptive information. In the following example, the default is taken:

```
Enter a short description (do not include quotation marks).
Description ["$1$DGA1"]:

efi$bcfg: $1$dga1 (Boot0001) Option successfully added
efi$bcfg: $1$dga1 (Boot0002) Option successfully added
efi$bcfg: $1$dga1 (Boot0003) Option successfully added
efi$bcfg: $1$dga1 (Boot0004) Option successfully added
```

This display example shows four different FC boot paths were configured for your FC system disk.

Step 8. After you successfully add your boot option, exit the utility by entering E at the prompt.

```
Enter your choice: E
```

Step 9. Log out from the DCL level and shut down the I64 system.

Step 10. When you next see the boot option list displayed at your console by EFI, it should look similar to the following (assuming you took the default in step 7). In this example, the device is 1DGA1 for two dual-ported EVA5000 storage arrays (the four separate boot paths are identified in the display). Figure D-1 illustrates the host FC ports (FGA0 and FGB0) on the Integrity server and the corresponding FC SAN/EVA5000 storage controller configuration.

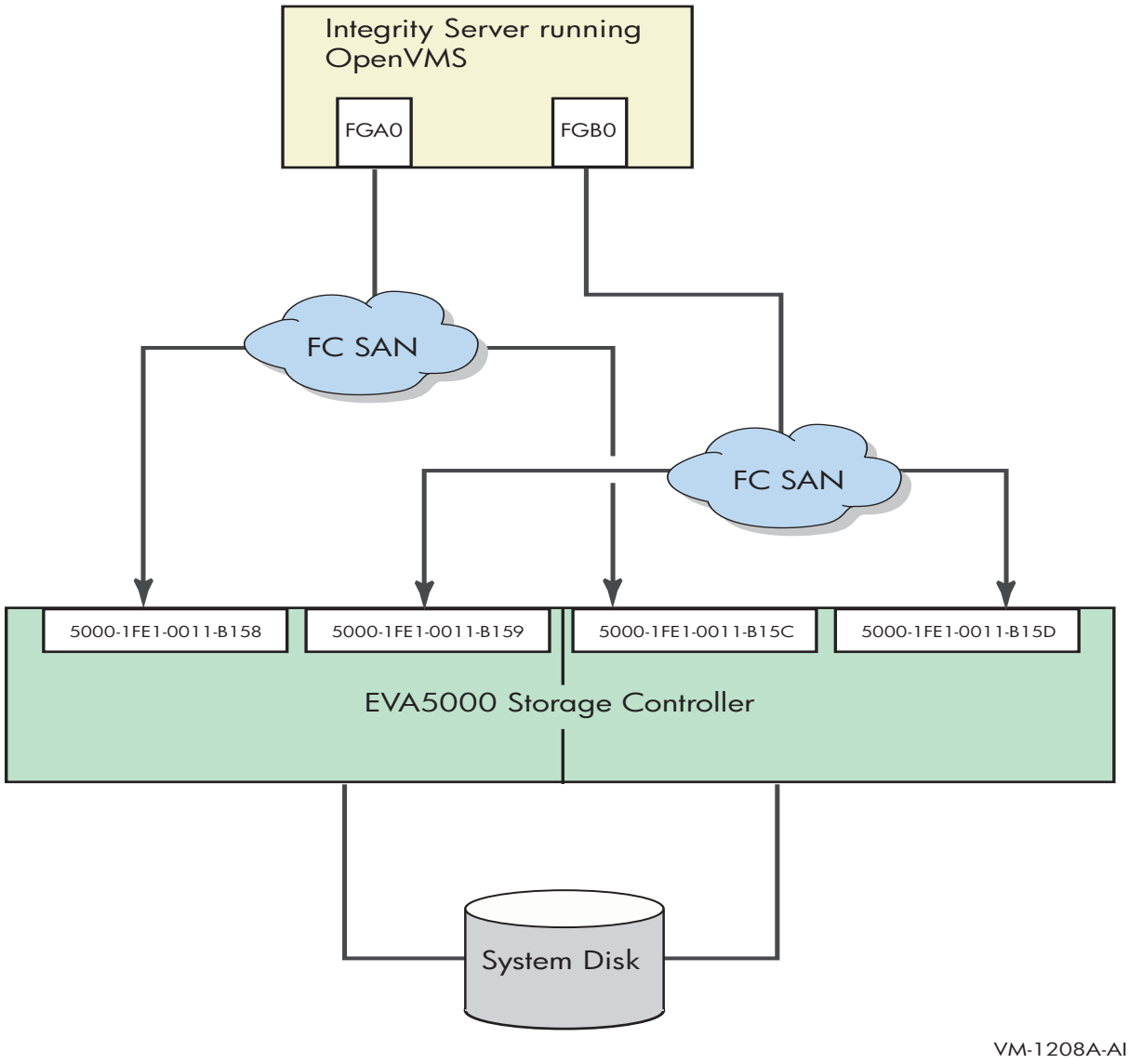
```
Please select a boot option

$1$dga1  FGA0.5000-1FE1-0011-B15C
$1$dga1  FGA0.5000-1FE1-0011-B158
$1$dga1  FGB0.5000-1FE1-0011-B15D
$1$dga1  FGB0.5000-1FE1-0011-B159
EFI Shell [Built-in]
```

The text to the right of 1dga1 identifies the boot path from the host adapter to the storage controller, where:

- FGA0 or FGB0 are the FC ports (also known as host adapters).
- Each 5000-1FE1-0011-B15*n number (ending in C, 8, D, or 9, respectively) is the factory-assigned FC storage port 64-bit worldwide identifier (WWID), otherwise known as the FC port name.*

If you get confused, simply boot the OpenVMS I64 OE DVD and use the OpenVMS I64 Boot Manager utility to remove the current boot options (option 3) and then to add your boot options again.

Figure D-1 Fibre Channel Host and SAN Storage Controller Configuration



For more information about this utility, see the *HP OpenVMS System Manager's Manual, Volume 1: Essentials*.

Boot the FC system disk by selecting the appropriate boot option from the EFI Boot Manager menu and pressing **Enter**. If your FC boot path is the first option in the menu, it might boot automatically afetr the 10-second countdown.

D.2.4 Configuring Additional Nodes to Boot into a Cluster Using a Shared Disk

If you have booted the OpenVMS I64 OE DVD and installed the operating system onto an FC (SAN) disk and configured the system to operate in an OpenVMS Cluster environment, you can configure additional Integrity server systems to boot into the OpenVMS Cluster by following these steps:

Step 1. Run the cluster configuration utility on the initial cluster sytem to add the new node to the cluster. Run the utility by entering the following command:

```
$ @SYS$MANAGER:CLUSTER_CONFIG
```

Step 2. Boot the HP OpenVMS I64 system disk on the target node (the new node).

Step 3. Select option 8 from the operating system menu to access OpenVMS DCL.

Step 4. Start the OpenVMS I64 Boot Manager utility by entering the following command at the DCL prompt:

NOTE The OpenVMS I64 Boot Manager utility requires the shared FC disk be mounted. If the shared FC disk is not mounted clusterwide, the utility tries to mount the disk with a /NOWRITE option. If the shared FC disk is already mounted clusterwide, user intervention is required.

```
$$$ @SYS$MANAGER:BOOT_OPTIONS
```

Step 5. Use the utility to add a new entry for the shared cluster system disk. Follow the instructions provided in Section D.2.3.

Step 6. Boot the new system into the cluster.

E Backing Up and Restoring the System Disk

This appendix describes how to perform backup and restore operations on the system disk. You perform these tasks by entering commands from a specialized backup environment. You access this environment through the menu that is displayed when you boot the OpenVMS Alpha CD or the OpenVMS I64 OE DVD, or through an alternative method that does not require the CD or DVD.

This specialized backup environment is required because it allows you to create an exact copy of the system disk. You cannot create an exact copy in a standard operating system environment because the OpenVMS Backup utility saves only what is on the disk at the moment the BACKUP command is executing, excluding portions of open files contained in memory or data about files not yet written back to the disk (cache).

For more information about backup operations, including procedures for backing up and restoring files and directories, see the *HP OpenVMS System Manager's Manual, Volume 1: Essentials*.

E.1 Reasons for Backing Up the System Disk

The primary reason for having a backup copy of the system disk is so you can fully restore your system in case any hardware or software problem affects the integrity of your original system disk or your ability to access it. For example, use the backup copy to restore your system under the following conditions:

- When a problem occurs during an OpenVMS upgrade or update, or during the installation of other software products. If you back up the system disk before you attempt any of those procedures, you can restore the system disk and attempt the procedure again.
- When a system file that is accidentally deleted renders the system disk nonoperational. If you back up the system disk after you installed or upgraded the OpenVMS operating system and any other software products, you can restore the system disk.
- When the drive that holds the system disk malfunctions. If you have a backup copy of the system disk, you can restore it to a functioning disk and continue to use the system.

Another reason for backing up the system disk is to eliminate disk fragmentation, which occurs when files are stored noncontiguously on the disk. The BACKUP/IMAGE command creates a copy on which files are stored contiguously.

E.2 Suggested Procedures

HP recommends the following:

- The preferred method for performing system disk backup and restore operations is to boot the operating system media, choose the DCL option from menu, and then enter the appropriate backup commands. The detailed procedures are described in Section E.4 and Section E.5.

However, if you do not have access to the CD or if you want to back up a shadowed system disk without disabling the shadow set, you can use a different procedure, which is described in Section E.6.

- Store the backup media in a safe place.
- If you have an OpenVMS Cluster environment with more than one system disk, be sure the volume labels on each system disk and on backup copies of system disks are unique. Use the SET VOLUME/LABEL command to change a volume label, if necessary.

E.3 OpenVMS Cluster Caution

If any nodes except the node used to run BACKUP are booted during the backup operations described in this appendix, your cluster will become partitioned, where nodes in the existing cluster divide into two or more independent clusters. This condition can cause data file corruption.

In addition, these backup environments do not restrict your use of DCL commands to the BACKUP command only, which further increases your risk of accidentally destroying or corrupting data on a disk. Therefore, to avoid jeopardizing the integrity of your data in any way, HP recommends that you shut down the entire OpenVMS Cluster system before you back up your system disk.

E.4 Backing Up the System Disk

The following sections describe how to back up the system disk.

E.4.1 Getting Started

Before you back up the system disk, do the following:

Step 1. In an OpenVMS Cluster environment, dismount the system disk from all systems in the cluster that have the disk mounted as a data disk (rather than as the system disk).

Step 2. Shut down all systems booted from that disk.

Step 3. Boot the operating system media. (For booting the OpenVMS I64 OE DVD, see Section B.6. For booting the OpenVMS Alpha CD, see Section A.1.)

Step 4. Choose the DCL option (8) on the menu. For example:

```
**************************************************************

You can install or upgrade the OpenVMS I64 operating system
or you can install or upgrade layered products that are included
on the OpenVMS I64 distribution media (CD/DVD).

You can also execute DCL commands and procedures to perform
"standalone" tasks, such as backing up the system disk.

Please choose one of the following:
```

```
     1)  Upgrade, install or reconfigure OpenVMS I64 Version 8.3
     2)  Display layered products that this procedure can install
     3)  Install or upgrade layered products
     4)  Show installed products
     5)  Reconfigure installed products
     6)  Remove installed products
     7)  Find, Install, or Undo patches; Show or Delete recovery data
     8)  Execute DCL commands and procedures
     9)  Shut down this system

   Enter CHOICE or ? for help: (1/2/3/4/5/6/7/8/9/?) 8
```

Step 5. At the triple dollar sign prompt ($$$), enter the SHOW DEVICES command.

Step 6. Examine the list of devices to determine which device is the source drive (the system disk you want to back up) and which device is the target drive (the supported disk or tape device that will hold the backed up files).

E.4.2 Mounting Devices

After you determine the source drive and target drive, mount those devices (and any other output devices you plan to use) before you perform any backup operations. Enter the MOUNT commands in the following format:

```
$$$ MOUNT/OVERRIDE=IDENTIFICATION source-drive
$$$ MOUNT/FOREIGN target-drive
```

In these commands:

- *source-drive* is the name of the drive holding the system disk.
- *target-drive* is the name of the drive that will hold the backup files.

E.4.3 Performing the System Disk Backup

When the system disk and output devices are mounted, back up the system disk by entering the BACKUP command in the following format:

```
$$$ BACKUP/IMAGE/VERIFY source-drive: target-drive:
```

Example 1

In this example, the system disk and a target disk are mounted so the BACKUP command can create a backup disk. (You can use a backup disk as a system disk.)

```
$$$ MOUNT/OVERRIDE=IDENTIFICATION DKA200
$$$ MOUNT/FOREIGN DKA300
$$$ BACKUP/IMAGE/VERIFY DKA200: DKA300:
```

Example 2

In this example, the system disk and a target tape device are mounted so the BACKUP command can create a backup tape.

```
$$$ INITIALIZE MKA300: label
$$$ MOUNT/OVERRIDE=IDENTIFICATION DKA200
$$$ MOUNT/FOREIGN MKA300
$$$ BACKUP/IMAGE/VERIFY DKA200: MKA300:APR_06_BACKUP.BCK/SAVE_SET/REWIND
```

E.4.4 Changing the Disk Volume Cluster Size

The BACKUP/IMAGE command maintains a set of disk volume parameters from the input volume, altering attributes such as the disk volume cluster size as appropriate for the target device. (Cluster size refers to the basic unit of space allocation on the disk, *not* to OpenVMS Cluster environments.)

To change the disk volume cluster size, you must restore the disk contents to a disk that has been previously initialized with the desired cluster size (using BACKUP/IMAGE/NOINITIALIZE). For more information about initializing a disk and using the BACKUP command, see the *HP OpenVMS System Manager's Manual, Volume 1: Essentials* and the *HP OpenVMS System Management Utilities Reference Manual: A-L*, and see the description of the INITIALIZE and BACKUP commands in the *HP OpenVMS DCL Dictionary*.

E.4.5 Logging Out, Shutting Down, and Rebooting

After you complete the backup operation:

Step 1. Enter the LOGOUT command to exit the DCL environment and return to the menu.

Step 2. Choose the shutdown option (9).

Step 3. After the shutdown completes, boot from the system disk.

E.5 Restoring the System Disk

The following sections describe how to restore the system disk. Note that restoring a system disk also serves to defragment the disk. In addition, it validates the backup, ensuring that the backed up system disk is usable.

E.5.1 Getting Started

Before you can restore the system disk, follow these steps:

Step 1. Shut down the system.

Step 2. Boot the operating system media. (For booting the OpenVMS I64 OE DVD, see Section B.6. For booting the OpenVMS Alpha CD, see Section A.1.)

Step 3. Choose the DCL option (8) on the menu. For example:

```
You can install or upgrade the OpenVMS I64 operating system
or you can install or upgrade layered products that are included
on the OpenVMS I64 distribution (CD/DVD).

You can also execute DCL commands and procedures to perform
"standalone" tasks, such as backing up the system disk.
```

```
Please choose one of the following:

   1)  Upgrade, install or reconfigure OpenVMS I64 Version 8.3
   2)  Display layered products that this procedure can install
   3)  Install or upgrade layered products
   4)  Show installed products
   5)  Reconfigure installed products
   6)  Remove installed products
   7)  Find, Install, or Undo patches; Show or Delete recovery data
   8)  Execute DCL commands and procedures
   9)  Shut down this system

Enter CHOICE or ? for help: (1/2/3/4/5/6/7/8/9/?) 8
```

Step 4. At the triple dollar sign prompt ($$$), enter the SHOW DEVICES command.

Step 5. Examine the list of devices to determine which device is the source drive (the drive holding the backed up files you want to restore) and which device is the target drive (the disk on which you want the files restored).

E.5.2 Mounting Devices

After you determine the source drive and target drive, mount those devices (and any other output devices you plan to use) before you perform any restore operations. Enter the MOUNT commands in the following format:

```
$$$ MOUNT/OVERRIDE=IDENTIFICATION  source-drive
$$$ MOUNT/FOREIGN target-drive
```

In these commands:

- *source-drive* is the device holding the files you want to restore

  (Note, however, that you must use the MOUNT/FOREIGN command if the source drive is a tape device.)

- *target-drive* is the destination

E.5.3 Performing the System Disk Restore

Enter the BACKUP command in the following format to restore the system disk:

```
$$$ BACKUP/IMAGE/VERIFY source-drive: target-drive:
```

Example 1

In this example, a backup disk and a target disk are mounted so the BACKUP command can restore the system disk from the backup disk:

```
$$$ MOUNT/OVERRIDE=IDENTIFICATION DKA300
$$$ MOUNT/FOREIGN DKA200
$$$ BACKUP/IMAGE/VERIFY DKA300: DKA200:
```

Example 2

In this example, a backup tape and a target disk are mounted so the BACKUP command can restore the system disk from the backup tape:

```
$$$ MOUNT/FOREIGN MKA300
$$$ MOUNT/FOREIGN DKA200
$$$ BACKUP/IMAGE/VERIFY MKA300:APR_06_BACKUP.BCK/SAVE_SET DKA200:
```

E.5.4 Logging Out, Shutting Down, and Rebooting

After you complete the restore operation, follow these steps:

Step 1. Enter the LOGOUT command to exit the DCL environment and return to the menu.

Step 2. Choose the shutdown option (9).

Step 3. After the shutdown completes, boot from the system disk.

E.6 Alternative Backup and Restore Procedure (Minimum OpenVMS Environment)

This section describes an alternative method of performing backup and restore operations. This method is similar to creating a Standalone Backup directory on a disk, as supported by OpenVMS VAX systems and certain earlier versions of OpenVMS Alpha (using SYS$UPDATE.STABACKIT.COM). Supported by both OpenVMS Alpha and I64 systems, this method installs a Minimum OpenVMS Environment (install with no options) on another disk from which you can perform your backup and restore operations on the system disk. The Minimum OpenVMS Environment is created in the SYSE root ([SYSE]) on the disk, which runs a subset of OpenVMS and is indicated by the triple dollar sign ($$$) system prompt. Use this method under the following conditions:

- If you do not have access to the operating system media and its menu system
- If you want to back up a shadowed system disk without disabling the shadow set

NOTE You can back up your running system disk by using the /IGNORE=INTERLOCK qualifier with the BACKUP command and ignoring warning messages. However, that method requires that all other use of the system be suspended, including disabling logins, stopping print and batch queues, and turning off networking software. In addition, you cannot use this method to restore files to the running system disk. Because of these limitations, HP recommends that, if you must use an alternative backup or restore method, you use the method described in this section.

E.6.1 Preparing an Alternate System Disk

Prepare an alternate system disk as follows:

Step 1. Log in to a privileged account on your running OpenVMS system.

Step 2. Using the SHOW DEVICE command, identify a data disk on which you can install the operating system, with no options. This is your target disk during that installation. To install the operating system with no options on your target disk, you need the following amount of free disk space:

- OpenVMS Alpha: approximately 5,389,000 blocks (10.78 GB)

- OpenVMS I64: approximately 4,748,000 blocks (9.5 GB)

Existing data remains on the disk.

Step 3. The target disk must be mounted privately to your process. (This prevents other users from accessing this disk during the installation and backup procedures.) Therefore, if the target disk was mounted with the /SYSTEM, /CLUSTER, /GROUP, or /SHARE qualifier, dismount that disk and mount it without those qualifiers or the /FOREIGN qualifier. For example:

```
$ MOUNT/OVERRIDE=IDENTIFICATION DKA200
```

Step 4. For OpenVMS I64, enter the following command:

```
$ @SYS$SYSTEM:I64VMS$PCSI_INSTALL_MIN.COM [target-disk]
```

For OpenVMS Alpha, enter the following command:

```
$ @SYS$SYSTEM:AXPVMS$PCSI_INSTALL_MIN.COM [target-disk]
```

(The procedure prompts you for a device name if you do not specify it on the command line.)

Step 5. As the procedure completes the installation, the display is similar to the following:

```
HP I64VMS OPENVMS V8.3: OpenVMS and related products platform

    COPYRIGHT (c) 5-JUN-2006
    Hewlett-Packard Development Company, L.P.

Execution phase starting ...

The following product will be installed:
    HP I64VMS VMS V8.3

Portion Done: 0%..10%..20%..30%..40%..50%..60%..70%..80%..90%..100%

The following product has been installed:
    HP I64VMS VMS V8.3
    .
    .
    .
    The installation of minimum OpenVMS I64 is now complete.

    Use EFI or the boot option you just created or validated (if any)
    to boot minimum OpenVMS.  If you use EFI remember to set VMS_FLAGS
    to E,0 before booting, and to reset VMS_FLAGS to 0,0 (or as
    required by your system).

        BOOT -FLAGS E,O device-name

    (Some configurations may require a boot option to boot.)
```

CAUTION If your system is a cluster member, HP recommends that you shut down the entire OpenVMS Cluster system before you back up your system disk. This will prevent you from creating a partitioned cluster and from jeopardizing the integrity of your data in any other way.

E.6.2 Using the Alternate System Disk

Use the alternate system disk (on which you installed the operating system with no options) to perform backup and restore operations as follows:

Step 1. Shut down your system.

Step 2. Boot the alternate system disk from the SYSE root. For example, from an OpenVMS Alpha system, enter the following command:

```
>>> BOOT -FLAGS E,0 DKA 200
```

For OpenVMS I64 systems, you can add the alternate system disk as a boot option in the EFI Boot Manager menu by using the OpenVMS I64 Boot Manager utility (SYS$MANAGER:BOOT_OPTIONS.COM), as described in Section B.5.2. When prompted, set the flags as e,0. Alternatively, boot the alternate system disk manually by entering the following command at the EFI Shell prompt, where fs*n*: (such as fs1:) is the device associated with the system disk:

```
Shell>fsn:\efi\vms\vms_loader.efi -flags e,0
```

The system automatically logs you in to the SYSTEM account and then displays a triple dollar sign prompt ($$$).

NOTE During the boot and login operations on this minimum version of the operating system, you can ignore license messages that are similar to the following:

```
%LICENSE-I-NOLICENSE, no license is active for this software
product
```

Step 3. If your system disk is shadowed, install and load a Volume Shadowing for OpenVMS license on this data disk. Then you can back up the shadowed system disk from this data disk without disabling the shadow set.

NOTE HP recommends that you do *not* install any other licenses, including OpenVMS licenses, on this alternate system. You can use the system only from the console.

Step 4. Mount the system disk and any output devices you plan to use during the backup or restore operations. See Section E.5.2 for more information.

Step 5. Perform the necessary backup or restore operations by entering the appropriate BACKUP commands. For examples of using the BACKUP command to back up the system disk, see Section E.4.3; for examples of using the BACKUP command to restore the system disk, see Section E.5.3.

Step 6. Shut down the system.

Step 7. Boot from your original system disk.

F Installing the OpenVMS Internationalization Data Kit

The OpenVMS internationalization data kit (VMSI18N kit) provides locale data and iconv code converters for international software, utilities, and HP C international run-time routines.

The HP C RTL provides capabilities to allow application developers to create international software. The HP C RTL obtains information about a language and a culture by reading this information from locale files. This kit contains all of the supported locale files.

The kit also contains a set of Unicode codeset converters that allows conversion between any supported codeset (including DEC Multinational Character Set and Microsoft Code Page 437) to any Unicode encoding (UCS-2, UCS-4, or UTF-8).

If you are using these C RTL capabilities, you must install the VMSI18N kit on your system. This kit is provided on the OpenVMS media set as your OpenVMS kit. For the location of this kit, see the *HP OpenVMS Version 8.3 Release Notes*.

Prior to installation, review the release notes for the VMSI18N kit.

To install this save set, follow the standard OpenVMS installation procedures. Use VMSI18N as the name of the kit. In the following example, *dev* is the device name and *dir* is the directory location of the kit.

```
$ PRODUCT INSTALL VMSI18N /SOURCE=dev:[dir]
```

Note that you can install any of the following categories of locales:

- European and U.S.
- Japanese
- Korean
- Thai
- Chinese
- Unicode

In the following installation example, the European and U.S., Japanese, and Unicode support options are selected.

```
$ PRODUCT INSTALL VMSI18N /SOURCE=DKB200:[VMSI18N_I64083.KIT]

The following product has been selected:
    HP I64VMS VMSI18N V8.3 Layered Product

Do you want to continue? [YES] YES

Configuration phase starting ...

You will be asked to choose options, if any, for each selected product and for
any products that may be installed to satisfy software dependency requirements.

HP I64VMS VMSI18N V8.3

Do you want the defaults for all options? [YES] NO
```

```
    European and U.S. support [YES] YES
    Japanese support [YES] YES
    Korean support [YES] NO
    Thai support [YES] NO
    Chinese support [YES] NO
    Unicode support [YES] YES
Do you want to review the options? [NO] NO
Execution phase starting ...

The following product will be installed to destination:
    HP I64VMS VMSI18N V8.3 DISK$I64SYS:[VMS$COMMON.]

Portion done: 0%...10%...20%...30%...40%...50%...60%...70%...80%...90%...100%

The following product has been installed:
    HP I64VMS VMSI18N V8.3 Layered Product

$
```

G Preparing to Use OpenVMS Management Station

This appendix explains how to prepare your OpenVMS system to run the OpenVMS Management Station server software and how to prepare your PC to run the OpenVMS Management Station client software. This appendix also includes other related information.

OpenVMS Management Station is a powerful Microsoft Windows based management tool for system managers and others who perform management tasks on OpenVMS systems. It allows system managers to organize the systems they need to manage in ways that are meaningful to them and their environment. OpenVMS Management Station provides a comprehensive user interface that allows system managers to manage OpenVMS user accounts, printers, and storage on those systems and across multiple systems. For example, if you have an account on three different OpenVMS Cluster systems, OpenVMS Management Station allows you to easily update a process quota, add a privilege, and so forth, for each instance of the account.

OpenVMS Management Station consists of the client software, which is installed on a PC from which all management operations are performed, and the server software, which is installed on any OpenVMS system that is to be managed.

During the OpenVMS installation or upgrade procedure, the OpenVMS Management Station server software is automatically installed on your OpenVMS system disk.

You can download the PC client file from the following Web site:

`http://www.hp.com/go/openvms/argus`

If the TNT$* server files have been deleted from SYS$SYSTEM, you can recover the server files by reinstalling the OpenVMS operating system or by downloading and installing the appropriate kit from this Web site.

After you ensure that OpenVMS Management Station software is installed on your system, perform the procedures described in this appendix.

G.1 Preparing Your OpenVMS System

You must prepare your OpenVMS system to run the server software so that your system can properly interact with the PC running the client software. The procedures include the following:

- Set up in a mixed-architecture cluster environment (if applicable).
- Start the server on other nodes.
- Update the printer and storage database.
- Edit the system files.
- Allow OpenVMS Management Station to control the printer and storage environment.
- Keep your printer environment up to date.
- Check if running third-party TCP/IP stacks.

- Determine and report problems.

G.1.1 Setting Up in a Mixed-Architecture Cluster Environment

The OpenVMS Management Station server creates several configuration files:

- TNT$UADB.DAT
- TNT$ACS.DAT
- TNT$JOURNAL.TNT$TRANSACTION_JOURNAL
- TNT$MONITOR.DAT
- TNT$MONITOR.TNT$MONITOR_JOURNAL
- TNT$EMERGENCY_MOUNT.COM

In a common-environment cluster with one common system disk, you use a common copy of each of these files located in the SYS$COMMON:[SYSEXE] directory on the common system disk, or on a disk that is mounted by all cluster nodes. No further action is required.

However, to prepare a common user environment for an OpenVMS Cluster system that includes more than one common system disk, you must coordinate the files on those disks.

The following rules apply:

- Disks holding common resources must be mounted early in the system startup procedure, such as in the SYLOGICALS.COM procedure.
- You must ensure that the disks are mounted with each cluster reboot.

Follow these steps to coordinate files:

Step 1. Decide where to locate the files. In a cluster with multiple system disks, system management is much easier if the common system files are located on a single disk that is not a system disk.

Step 2. Copy the following files from SYS$COMMON:[SYSEXE] to a directory on a disk other than the system disk: TNT$UADB.DAT, TNT$ACS.DAT, TNT$MONITOR.DAT, TNT$MONITOR.TNT$MONITOR_JOURNAL, TNT$EMERGENCY_MOUNT.COM, and TNT$JOURNAL.TNT$TRANSACTION_JOURNAL.

Step 3. Edit the file SYS$COMMON:[SYSMGR]SYLOGICALS.COM *on each system disk* and define logical names that specify the location of the cluster common files.

Example

To place the files on 1DJA15, define logical names as follows:

```
$ DEFINE/SYSTEM/EXEC TNT$ACS -
_$ $1$DJA15:[VMS$COMMON.SYSEXE]TNT$ACS.DAT
```

TNT$EMERGENCY_MOUNT.COM is created in SYS$SYSTEM or in the directory pointed to by the TNT$ACS logical, if the logical exists.

```
$ DEFINE/SYSTEM/EXEC TNT$UADB -
_$ $1$DJA15:[VMS$COMMON.SYSEXE]TNT$UADB.DAT

$ DEFINE/SYSTEM/EXEC TNT$JOURNAL -
_$ $1$DJA15:[VMS$COMMON.SYSEXE]TNT$JOURNAL.TNT$TRANSACTION_JOURNAL
```

```
$ DEFINE/SYSTEM/EXEC TNT$MONITOR -
_$ $1$DJA15:[VMS$COMMON.SYSEXE]TNT$MONITOR.DAT

$ DEFINE/SYSTEM/EXEC TNT$MONITORJOURNAL -
_$ $1$DJA15:[VMS$COMMON.SYSEXE]TNT$MONITOR.TNT$MONITOR_JOURNAL
```

Step 4. To ensure that the system disks are mounted correctly with each reboot, follow these steps:

a. Copy the SYS$EXAMPLES:CLU_MOUNT_DISK.COM file to the [VMS$COMMON.SYSMGR] directory, and edit the file for your configuration.

b. Edit SYLOGICALS.COM and include commands to mount, with the appropriate volume label, the system disk containing the shared files.

Example

If the system disk is 1DJA16, include the following command:

```
$  @SYS$SYSDEVICE:[VMS$COMMON.SYSMGR]CLU_MOUNT_DISK.COM -
_$ $1$DJA16: volume-label
```

G.1.2 Starting the Server on Other Nodes

If you plan to run OpenVMS Management Station on more than one node in an OpenVMS Cluster without rebooting, you need to start the software on those nodes.

Use SYSMAN to start the server as follows:

```
$ @SYS$STARTUP:TNT$STARTUP.COM
```

Or you can log in to each node that shares the SYS$COMMON: directory and enter the following command:

```
$ @SYS$STARTUP:TNT$STARTUP.COM
```

If you are performing an upgrade or a reinstallation and OpenVMS Management Station is already running on the node, add the RESTART parameter to the startup command, as follows:

```
$ @SYS$STARTUP:TNT$STARTUP.COM RESTART
```

G.1.3 Error Log Information

OpenVMS Management Station writes error log information to the file TNT$SERVER_ERROR.LOG. This error log is created in the SYS$SPECIFIC:[SYSEXE] directory. If you start the OpenVMS Management Station server on multiple nodes in a cluster, which is recommended, multiple server error logs are generated.

G.1.4 Updating the Printer and Storage Database

When you install OpenVMS Management Station, the installation starts the OpenVMS Management Station server on the installation node. If this installation is an upgrade, the server converts the existing OpenVMS Management Station database to the latest V3.* format. If this is a new installation, the server creates an initial version of the database file TNT$ACS.DAT and starts the update functions automatically.

To complete the database, start the OpenVMS Management Station server on each node in your cluster. The instances of the server communicate with each other to determine device, queue, and volume information, and the server must be running on each node for this communication to take place.

G.1.5 Editing the System Files

To start the OpenVMS Management Station server from your system startup files, insert one of the following commands into your system startup procedures (probably SYS$MANAGER:SYSTARTUP_VMS.COM) after both the Queue Manager and network are started but immediately before the ENABLE AUTOSTART/QUEUES command.

NOTE Remove any other invocations of TNT$STARTUP you might have added in previous releases of the OpenVMS Management Station.

OpenVMS Management Station cannot start until the network has started. If you start your network using a batch process, OpenVMS Management Station might start before the batch process completes and the network is started.

Command	Parameter 1	Parameter 2	Description
@TNT$STARTUP	blank	n/a	Starts the server. Does not start printer queues or mount volumes.
@TNT$STARTUP	RESTART	n/a	Shuts down a running server, then starts the server. Does not start printer queues or mount volumes.
@TNT$STARTUP	BOOT	blank	Starts the server. Starts any printer queues that are not yet started and are managed by OpenVMS Management Station. Does not mount volumes managed by OpenVMS Management Station.
@TNT$STARTUP	BOOT	ALL	Starts the server. Starts any printer queues that are not yet started and are managed by OpenVMS Management Station. Mounts any volumes that are not yet mounted and are managed by OpenVMS Management Station.
@TNT$STARTUP	BOOT	PRINTERS	Starts the server. Starts any printer queues that are not yet started and are managed by OpenVMS Management Station. Does not mount volumes managed by OpenVMS Management Station.
@TNT$STARTUP	BOOT	STORAGE	Starts the server. Mounts any volumes that are not yet mounted and are managed by OpenVMS Management Station. Does not start any printer queues.

Note that the effect of TNT$STARTUP BOOT, with no second parameter, has not changed from earlier releases. This command starts any printer queues that are not yet started and are managed by OpenVMS Management Station, but it does not mount any volumes.

Add the following command line to the system shutdown file, SYS$MANAGER:SYSHUTDWN.COM:

```
$ @SYS$STARTUP:TNT$SHUTDOWN.COM
```

G.1.6 Controlling the Printer and Storage Environment

It is not necessary to remove your existing queue startup and volume mount DCL procedures immediately. The OpenVMS Management Station server recognizes that you started a queue or mounted a volume with your command procedures and assumes that you want it that way.

As you become familiar with the server's management ability, you can remove or comment out the DCL commands and procedures that perform these tasks and allow OpenVMS Management Station to control your printer and storage environment.

In addition, the OpenVMS Management Station server periodically (every 24 hours) generates a DCL command procedure that includes the commands to mount all of the volumes managed by OpenVMS Management Station. If you are familiar with DCL, you can look at this command procedure to see what actions OpenVMS Management Station performs for you. In the event of an unforeseen system problem or a corrupt server database (SYS$SYSTEM:TNT$ACS.DAT), you can use this command procedure to mount the volumes.

The name of the generated file is TNT$EMERGENCY_MOUNT.COM. TNT$EMERGENCY_MOUNT.COM is created in SYS$SYSTEM or in the directory pointed to by the TNT$ACS logical, if that logical name exists.

The OpenVMS Management Station server limits TNT$EMERGENCY_MOUNT.COM to seven versions.

G.1.7 Keeping Your Printer Environment Up to Date

The OpenVMS Management Station server installation creates a file named SYS$STARTUP:TNT$UTILITY.COM. This command procedure scans the OpenVMS system and updates the database of known printers, queues, and related devices.

G.1.7.1 When Is the Database Updated?

The database is updated:

- As part of the OpenVMS Management Station installation.
- When you specifically start TNT$UTILITY.COM.
- At periodic intervals as a server background thread. Two logical names control how often this server thread runs:

Logical Name	Description
TNT$PRINTER_RECON_INTERVAL	How often the thread should run, in minutes, from when the server was last started on this node. If you do not define this logical, the default value is 1440 minutes (24 hours).
TNT$PRINTER_RECON_INTERVAL_MIN	The minimum number of minutes that must elapse before the thread should run again, starting from when the database was last updated. If you do not define this logical, the default value is 60 minutes (1 hour).

You can think of these logicals as meaning “run the thread this often (TNT$PRINTER_RECON_INTERVAL), but make sure this much time has elapsed since the database was last updated (TNT$PRINTER_RECON_INTERVAL_MIN).”

Because you can run TNT$UTILITY.COM yourself, and because the OpenVMS Management Station server also updates the database, the TNT$PRINTER_RECON_INTERVAL_MIN logical prevents the database from being updated more frequently than is actually needed.

If you want to change the defaults for one of these logicals, define the logical on all nodes on which the OpenVMS Management Station server is running.

G.1.7.2 Do You Need to Run TNT$UTILITY.COM Manually?

If you use OpenVMS Management Station to make all of the changes to your printer configuration, the configuration files are immediately modified to reflect the changes and you probably do not need to specifically run the TNT$UTILITY.COM procedure.

However, if you or someone else uses DCL to make a change—for example, if you use the DELETE /QUEUE command to delete a queue—the configuration files are not synchronized. In this case, the OpenVMS Management Station client advises you to run the TNT$UTILITY.COM procedure to resynchronize the database.

Run the following procedure on one node in the cluster to make the database match your system:

```
$ @SYS$STARTUP:TNT$UTILITY.COM UPDATE PRINTERS
```

For example, if you or someone else uses DCL to delete a queue, you need to delete that queue from the database. The TNT$UTILITY.COM procedure assumes that your system is set up and running the way that you want it to, so you should fix any problems before you run TNT$UTILITY.COM.

G.1.7.3 What Are the Requirements for Running TNT$UTILITY.COM?

You need the SYSNAM privilege to run TNT$UTILITY.COM.

The TNT$UTILITY.COM procedure connects to the OpenVMS Management Station server on the current OpenVMS system to determine device and queue information. Therefore, the OpenVMS Management Station server must be running on the node where you run TNT$UTILITY.COM.

The OpenVMS Management Station server then connects to the other OpenVMS Management Station servers in the OpenVMS Cluster to determine device and queue information. It is generally a good idea to keep the OpenVMS Management Station server running on the other nodes in an OpenVMS Cluster to keep the database up to the minute.

However, if the OpenVMS Management Server is not able to connect to the OpenVMS Management Station server on a given node, it uses the known information about that OpenVMS node from the database. That is, in the absence of a valid connection to that OpenVMS node, the information in the database is assumed to be correct.

G.1.8 Keeping Your Storage Environment Up to Date

The TNT$UTILITY.COM utility accepts parameters (UPDATE STORAGE) to update the storage database. However, the storage database is updated dynamically every time you use the OpenVMS Management Station client to perform a storage management operation. Therefore, you do not need to run TNT$UTILITY.COM to update the storage database.

G.1.9 Enabling Disk Quotas

Before installing OpenVMS Management Station, you might have disabled disk quotas on the SYSTEM disk. If so, reenable the quotas and then rebuild to update quota information by entering the following commands:

```
$ RUN SYS$SYSTEM:DISKQUOTA
DISKQUOTA>ENABLE
DISKQUOTA>REBUILD
DISKQUOTA>EXIT
```

G.1.10 Caching Storage Configuration Data

OpenVMS Management Station uses two logical names to determine how often to refresh cached (in-memory) storage configuration data.

- TNT$PURGE_CYCLE_LATENCY—Determines how often (in seconds) to wait after purging stale device reports before purging again. This value affects how frequently the clusterwide data (maintained by a master server) is updated in memory.

```
min = 180
default =  1800    (30 minutes)
max = 18000        (5 hours)
```

- TNT$LOCAL_SURVEY_LATENCY—Determines the delay (in seconds) from one node-specific device survey to the next. This value is independent of clusterwide surveys requested by the master server when performing a purge.

```
min = 6
default =  60   (1 minute)
max = 600       (10 minutes)
```

For both logical names, smaller values result in the OpenVMS Management Station server consuming more CPU cycles in periodic purges or surveys.

If you do not accept the defaults, you might find that larger OpenVMS Cluster systems perform better with values on the high end of the allowed range.

If you do not define these logicals, the OpenVMS Management Station server uses the default values. If you do define these logical names, the values are used only if they are within the accepted range.

G.1.11 Running Third-Party TCP/IP Stacks

TCP/IP Services for OpenVMS Version is the only supported TCP/IP stack. Additional stacks have not been tested. However, TCP/IP stacks that are 100 percent compliant with the QIO interface for TCP/IP Services for OpenVMS should also work. (Contact your TCP/IP vendor for additional information and support issues.)

For the best chance of success, check the following:

- Make sure that the QIO service (for example, UCXQIO) is enabled.
- For TCPware (from Process Software Corporation), also make sure that the TCPware UCX$IPC_SHR.EXE is an installed image.
- Also for TCPware, make sure you are running a version of TCPware that correctly implements a DEC C-compatible socket interface.

G.1.12 Determining and Reporting Problems

If you encounter a problem while using OpenVMS Management Station, please report it to HP. Depending on the nature of the problem and the type of support contract you have, you can take one of the following actions:

- If your software contract or warranty agreement entitles you to telephone support, call HP.
- If the problem is related to OpenVMS Management Station documentation, use the Internet address listed in the preface of this manual to send us your comments.

G.1.13 Removing the OpenVMS Management Station Server

When you execute the OpenVMS installation or upgrade procedure, the OpenVMS Management Station server software is automatically installed on your OpenVMS system disk. If this server software is later reinstalled using another kit (for example, a kit downloaded from the Web or a patch kit), you have the option to remove OpenVMS Management Station. If you use the PCSI utility to remove OpenVMS Management Station from the OpenVMS system, the following files are not removed:

- TNT$ACS.DAT
- TNT$JOURNAL.TNT$TRANSACTION_JOURNAL
- TNT$SERVER_ERROR.LOG
- TNT$UADB.DAT
- TNT$EMERGENCY_MOUNT.COM

Do not delete these files unless you have already removed OpenVMS Management Station.

G.2 Preparing Your PC

During the OpenVMS installation or upgrade procedure, you selected the OpenVMS Management Station client software files to be installed on your OpenVMS system disk (or you added them later using the DCL command PRODUCT INSTALL TNT). After you prepare your OpenVMS system to run the server software, you must prepare your PC to run the client software.

G.2.1 Required Memory and Disk Space

Your PC requires 20 MB of free disk space to install the OpenVMS Management Station client software.

G.2.2 Distribution Files

The OpenVMS Management Station client kit, TNT032-D.EXE for Intel systems (Microsoft Windows 2000 and Windows XP), can be downloaded from the following Web site:

`http://www.hp.com/go/openvms/argus`

G.2.3 Required Software

Microsoft Windows 2000 or Windows XP must be installed on each PC on which you want to install the OpenVMS Management Station client.

The version of the Microsoft Management Console (MMC) included in this baselevel requires files provided by Microsoft Internet Explorer, Version 3.02 or higher, which must be present on the system.

G.2.4 Time Required for Installation

The time required to install the OpenVMS Management Station client software is approximately 5 minutes.

G.2.5 Copying the Client File to the PC

The client file TNT032-D.EXE can be downloaded from the following Web site:

`http://www.hp.com/go/openvms/argus`

Copy the client file to a temporary directory on the PC using either of the following procedures:

- Create a file share to the OpenVMS system and copy the file.
- Use FTP on the PC to copy the file from the OpenVMS system.

G.2.6 Installation Directory

The installation procedure allows you to select the installation directory and suggests `\Program Files\OpenVMS Mgmt Station\` as the default.

G.2.7 Installation Procedure

Run the TNT032-D.EXE file from a temporary directory. This is a self-extracting executable file that automates the OpenVMS Management Station installation.

G.2.8 Recovering from Errors

If an error occurs during installation, you will receive an error message describing the problem. This information can help you determine the cause of the problem. An error can occur during the installation if one or more of the following conditions exist:

- The operating system version is incorrect.
- Disk space and memory necessary for successful installation are inadequate.

G.3 After Installing the Client Software on Your PC

When you create an OpenVMS Cluster or OpenVMS Node object in an OpenVMS Management Domain, you select the transport you want to use for all connections to that system. You can choose DECnet Phase IV for OpenVMS or TCP/IP.

OpenVMS Management Station uses this transport for all communications between the PC and this system, or between any other OpenVMS system that is running the OpenVMS Management Station server and this system.

NOTE For primary servers, the OpenVMS Management Station client supports only TCP/IP connections. That is, the connection between the PC and the OpenVMS system uses only TCP/IP. Therefore, at least one OpenVMS system *must* be running TCP/IP.

You do need to make sure that your PC can connect to the primary-server systems, as described in the following sections. OpenVMS Management Station connects your PC to the primary-server system and then routes management operations to the target systems.

G.4 Defining TCP/IP Nodes

Your hosts file or name server must be able to resolve the IP name or address of all primary-server systems. If you can successfully ping the primary-server systems from your PC, then this condition is met.

G.5 Removing Version 2.1 of the OpenVMS Management Station Client

Version 3.2 (or higher) of the OpenVMS Management Station client is not dependent on Version 2.1 and does not share any files with this earlier version. After installing the Version 3.2 (or higher) client, you can remove the Version 2.1 client software.

G.6 Removing OpenVMS Management Station

If you need to remove the OpenVMS Management Station client software, make sure you first exit OpenVMS Management Station. The removal process fails if OpenVMS Management Station is running.

If you run the OpenVMS Management Station Help, the following files might be created:

- VMSMGMT.FTS
- VMSMGMT.GID
- VMSPRINT.FTS
- VMSPRINT.GID
- VMSSCOPE.FTS
- VMSSCOPE.GID
- VMSSTORE.FTS
- VMSSTORE.GID
- VMSACNT.FTS
- VMSACNT.GID

The OpenVMS Management Station Uninstall program does not delete these files. To complete the removal:

Step 1. Delete these files.

Step 2. Delete the OpenVMS Management Station directory.

Note that the OpenVMS Management Station Uninstall program does not remove the MMC support files.

G.7 Getting Started with OpenVMS Management Station

All information about getting started, setting up, and using OpenVMS Management Station is contained in online help and the *HP OpenVMS Management Station Overview and Release Notes*.

H Removing the OpenVMS Operating System

This appendix explains how to remove the OpenVMS operating system from your disk.

You can remove the OpenVMS operating system from your disk in the following ways:

- If the disk contains a small number of user files, copy those user files elsewhere and then reinitialize the disk.
- If the disk contains many user files, use the PRODUCT REMOVE command to remove an obsolete or extra copy of the OpenVMS operating system without removing any of the user files. Note that you must also delete or archive certain operating system files that the PRODUCT REMOVE command cannot delete.

NOTE For systems supporting the Instant Capacity feature, CPU status (how many cores are available and how much time they have remaining) is not affected by removal of the operating system from your disk. Such information is stored in NVRAM on the Integrity server.

Follow these steps to remove OpenVMS operating system files:

Step 1. If your system disk has multiple system-specific roots, boot the system and execute SYS$MANAGER:CLUSTER_CONFIG.COM to remove all roots except the one from which you are booted.

Step 2. Shut down and boot from the distribution media or from a system disk other than the one from which OpenVMS is being removed. Then do one of the following:

- If OpenVMS is not running from the distribution media, log in to a privileged account.
- If OpenVMS is running from the distribution media, choose the option to execute DCL commands.

Step 3. Enter the following DCL commands:

```
$ DEFINE/NOLOG PCSI$SYSDEVICE target-disk
$ DEFINE/NOLOG PCSI$SPECIFIC target-disk:[SYSx.]
$ DEFINE/NOLOG PCSI$DESTINATION target-disk:[VMS$COMMON]
```

where:

- *target-disk* is the device name of the disk from which OpenVMS is being removed.
- SYS*x* is the root number that you did not remove in step 1.

Step 4. If the disk also contains layered products that were installed using the PCSI utility, HP recommends that you remove them as well. Remove any layered products *before* using the PRODUCT REMOVE VMS command.

Use the following command to remove all the products at once. Select the layered products you want to remove from the menu.

```
$ PRODUCT REMOVE * /REMOTE
```

Use the following commands to remove individual products:

```
$ PRODUCT SHOW PRODUCT/REMOTE
$ PRODUCT REMOVE product-name /REMOTE
```

Step 5. Enter the following DCL command:

```
$ PRODUCT REMOVE VMS /REMOTE
```

Step 6. Because the PRODUCT REMOVE command does not delete certain files, review the target disk to determine whether you want to delete, move, or archive the operating system files that still remain on the disk.

Following are lists of the files that the PRODUCT REMOVE command does not delete:

- In *target-disk*:[SYS*.SYSEXE], where * is the hexadecimal number of any additional OpenVMS Cluster root on the target disk:
  - IA64VMSSYS.PAR (OpenVMS I64 systems)
  - ALPHAVMSSYS.PAR (OpenVMS Alpha systems)
  - MODPARAMS.DAT
  - PAGEFILE.SYS
  - SWAPFILE.SYS
- In *target-disk*:[VMS$COMMON.SYSEXE]:
  - LMF$LICENSE.LDB
  - PCSI$FILE_SYSTEM.PCSI$DATABASE
  - PCSI$PROCESSOR.PCSI$DATABASE
  - PCSI$ROOT.PCSI$DATABASE
  - RIGHTSLIST.DAT
  - SYSUAF.DAT

As you examine the preceding lists of files, you might want to archive, rather than delete, the following files:

- IA64VMSSYS.PAR (OpenVMS I64 systems)
- ALPHAVMSSYS.PAR (OpenVMS Alpha systems)
- MODPARAMS.DAT
- LMF$LICENSE.LDB
- RIGHTSLIST.DAT
- SYSUAF.DAT

Also, if you previously removed layered products, those products might have created additional files that you might want to delete, move, or archive.

Step 7. Review the target disk for the directory structures [VMS$COMMON...] and [SYS*x*...] that remain after you remove the OpenVMS operating system. You might want to delete these directories.

Note that the directories [SYSx]SYSCOMMON.DIR (in all [SYS*x*]) are aliases for the file [000000]VMS$COMMON.DIR. Do not delete these SYSCOMMON.DIR files. Instead, use the SET FILE /REMOVE command as follows:

```
$ SET FILE /REMOVE [SYS*]SYSCOMMON.DIR
```

After you execute this command and delete, move or archive all the files in [VMS$COMMON...], you can delete [000000]VMS$COMMON.DIR. Then you can delete, move, or archive the files in each [SYS*x*] directory.

I Alternative Ways to Initialize the System Disk

The usual way to create a new OpenVMS system disk is to install OpenVMS with the INITIALIZE option. When you do this, the installation process responds as follows:

- The disk is initialized with volume expansion (INITIALIZE/LIMIT).

  This method of initialization (using the /LIMIT qualifier) may make your target system disk incompatible with versions of OpenVMS prior to 7.2. HP recommends that you create your system disk in the default manner unless you need to mount the disk on a version of OpenVMS prior to 7.2.

  You can avoid use of the /LIMIT qualifier by initializing your target system disk before you install OpenVMS, performing the steps described in Section I.1.

- On OpenVMS I64 systems only, a diagnostic partition is created.

  The diagnostic partition is visible only from the console; it corresponds to the contents of SYS$MAINTENANCE:SYS$DIAGNOSTICS.SYS on the system disk. The partition is intended and reserved for use by HP Services (it is used with the HP IPF Offline Diagnostics and Utilities CD provided with the purchase of your Integrity server). For more information about offline diagnostics, see your hardware documentation and the following Web site:

  `http://docs.hp.com/hpux/diag`

  HP recommends creating the system disk with this partition and not removing it. However, it is not required for operation of OpenVMS.

  If you do not want the diagnostic partition, you can prevent its creation by initializing the disk before installing OpenVMS, performing the steps described in Section I.1. Alternatively, if you have already created the system disk and the partition, you can remove it by performing the steps described in Section I.2.

I.1 Alternative Method of Initialization

Use the following initialization method to avoid use of the /LIMIT qualifier or, for OpenVMS I64, to prevent creation of the diagnostic partition.

NOTE When you initialize your target disk using the following method, you must use the PRESERVE option during the installation of OpenVMS on the disk. If you use the INITIALIZE option, the disk is reinitialized using the defaults.

Step 1. After booting the operating system media, and before installing the operating system, select option 8 (“Execute DCL commands and procedures”) on the main menu.

Step 2. Initialize the intended target disk with the following command:

```
$ INITIALIZE /SYSTEM /HEADERS=150000 /STRUCTURE=ods-level target-disk target-label
```

where:

- *ods-level* is 2 (for ODS-2) or 5 (for ODS-5).
- *target-disk* is the device for the target disk (such as DKA100:).
- *target-label* is the label for the target disk (you can change the label later).

If you specified ODS-5 and you want support for hard links, include the /VOLUME_CHARACTERISTICS=HARDLINKS qualifier with the INITIALIZE command.

If you are using this method of initialization to prevent creation of a diagnostic partition, and you do not intend to mount the disk on an OpenVMS system prior to version 7.2, include the /LIMIT qualifier with the INITIALIZE command. If you do not use the /LIMIT qualifier, your new system disk might be initialized with a relatively large minimum allocation size. This can cause small files to use more space than necessary.

Step 3. Exit DCL (log off), and then select option 1 ("Upgrade, install or reconfigure OpenVMS") on the main menu.

Step 4. When you are asked whether to initialize or preserve the target disk, choose PRESERVE (the default).

Step 5. Continue with the installation.

I.2 Removing the Diagnostic Partition File (I64 Only)

To remove the diagnostic partition on an OpenVMS I64 system disk and to recover the disk space occupied, delete the file SYS$MAINTENANCE:SYS$DIAGNOSTICS.SYS and then reset the boot block. This file can contain hardware diagnostics but is not essential for operations. To delete the file, enter the following command:

```
$ DELETE SYS$MAINTENANCE:SYS$DIAGNOSTICS.SYS
```

Reset the boot block by entering the SET BOOTBLOCK command at the DCL prompt, as in the following example, where *target-disk* is the device on which your target system disk is mounted:

```
$ SET BOOTBLOCK /PRESERVE=SIGNATURE target-disk:[VMS$COMMON.SYS$LDR]SYS$EFI.SYS
```

Glossary

This glossary defines key terms in the context of an OpenVMS computing environment.

Advanced Server for OpenVMS Supported on OpenVMS Alpha systems only, an OpenVMS-based network operating system compatible with Microsoft networking technology. Allows OpenVMS systems to be file and print servers for Windows desktop users. These users can use Microsoft products and utilities such as Windows Explorer to access file and print resources. Also provides a flexible system for network administration and security. This product supports OpenVMS ODS-5 disk volumes and Extended File Specifications. *See also PATHWORKS for Advanced Server (OpenVMS).*

Availability Manager A system management tool that enables the system manager to monitor one or more OpenVMS nodes on an extended LAN from an OpenVMS, Windows 2000, or Windows XP system. Availability Manager helps system managers and analysts target a specific node for analysis. The tool collects system and process data from multiple nodes simultaneously; it analyzes the data and displays the output. The Availability Manager (base) software installed with OpenVMS provides the data collection components that allow the system to be monitored by the Availability Manager and by DECamds.

Baseboard Management Controller (BMC) A utility provided with HP Integrity servers that allows you to control some management features built into the system board, such as diagnostics, configuration, and hardware management. It enables you to interact with the Extensible Firmware Interface (EFI) and to boot the OpenVMS operating system. *See also Extensible Firmware Interface (EFI), Management Processor (MP).*

BIB Boot-is-blocked. The state of a cell (on a cell-based Integrity server) that is powered on but not allowed to boot. When all cells assigned to an nPartition are at the BIB state, the nPartition is inactive and no software can run on the nPartition until it is manually booted past BIB. *See also cell, nPartition.*

boot, bootstrap The process of loading system software into a processor's main memory. This guide uses the term *boot* to refer to this process.

boot server A boot server downloads the system software required by a client system. A TCP boot server (TCP/IP Services for OpenVMS BOOTP server) is the host that centralizes configuration and management of an IP address database, such as is used for OpenVMS InfoServer client booting and satellite booting. For satellite booting, the boot server is part of an OpenVMS Cluster; it includes either a MOP server (for OpenVMS Alpha systems) or a BOOTP/TFTP server (for OpenVMS I64 systems), and a disk server for the satellite system disk. *See also InfoServer, satellite node.*

cell Also known as a cell board: a circuit board that is the basic building block of an nPartition in a server complex (such as any HP midrange and high-end Integrity servers). A cell consists of a symmetric multiprocessor and memory. *See also cell-based server, nPartition (node partition), server complex, virtual partition.*

cell-based server A hardware complex that can run one or more operating systems and that supports dividing hardware resources into nPartitions. All processors and memory are contained in cells, each of which can be assigned for exclusive use by an nPartition. *See also cell, nPartition (node partition), server complex, virtual partition.*

Common Data Security Architecture (CDSA) A multiplatform, Open Source security infrastructure. CDSA provides a stable, standards-based programming interface that enables applications to access operating system security services. With CDSA, you can create cross-platform, security-enabled applications. Beginning with Version 2.2, CDSA includes support of Secure Delivery and HRS (Human Recognition Service Standard). CDSA is automatically installed with the operating system. For more information about CDSA, see the *HP Open Source Security for OpenVMS, Volume 1: Common Data Security Architecture* manual. *See also Secure Delivery, HRS (Human Recognition Service Standard).*

complex *See server complex.*

CI-only cluster A computer system consisting of several computers attached to a computer interconnect (CI) through which it communicates with other computers in the cluster. These computers share a single file system. CI provides redundant paths. *See also DSSI-only cluster.*

computer interconnect (CI) A type of I/O subsystem. It links computers to each other and to HS*x* devices (for example, an HSJ or HSG).

concurrent upgrade The entire OpenVMS Cluster is shut down and unusable while upgrading each system disk. When the cluster reboots, all cluster members start up the upgraded version of the OpenVMS operating system.

core The actual data processing engine within a cell-based processor. A single processor can have multiple cores. Also referred to as a logical CPU.

core I/O Provides the base set of I/O functions required by every nPartition on a cell-based Integrity server. Includes the partition console interface and the network interface. *See also cell, cell-based server, nPartition.*

DECnet Phase IV Networking software that allows OpenVMS systems to participate in network task-to-task communications to transfer and copy files, print files, and run applications. DECnet Phase IV networking capabilities are defined in the DIGITAL Network Architecture (DNA) Phase IV. A system-integrated product (SIP), DECnet for OpenVMS I64 is a component of the Foundation Operating Environment (FOE) on the Integrity servers license bundle. *See also DECnet-Plus, TCP/IP Services for OpenVMS.*

DECnet-Plus Formerly known as DECnet/OSI, DECnet-Plus is the networking software that offers the capabilities defined in the DIGITAL Network Architecture (DNA) Phase V protocols. DECnet-Plus provides the newest DECnet features such as extended addressing and downline-load performance enhancements. DECnet-Plus integrates DECnet and OSI protocols and provides a linkage to TCP/IP. DECnet-Plus for OpenVMS I64 is a component of the Foundation Operating Environment (FOE) on the Integrity servers license bundle. *See also DECnet Phase IV, TCP/IP Services for OpenVMS.*

DECwindows Motif for OpenVMS A layered product that provides support for both OSF/Motif, a standards-based graphical user interface, and the X user interface (XUI) in a single, run-time and development environment. DECwindows Motif displays the OSF/Motif user interface, but applications written on either toolkit will run regardless of the environment selected by the user.

device name The name used to identify a device on the system. A device name indicates the device code, controller designation, and unit number, such as DKA0, where DK is the device code, A is the boot device controller designation, and 0 is the unit number on the boot device.

diagnostic partition When present on an OpenVMS I64 system disk, this partition corresponds to the contents of SYS$MAINTENANCE:SYS$DIAGNOSTICS.SYS on the disk. The diagnostic partition and its contents are intended and reserved for use by HP Services. Customer access and use is not supported.

disk server A computer within a local area cluster that provides an access path to CI, DSSI, and locally connected disks for other computers that do not have a direct connection.

DSSI-only cluster A computer system consisting of several computers attached to a Digital Storage System Interconnect (DSSI) through which it communicates with other computers in the cluster. These computers share a single file system. DSSI is a medium-bandwidth interconnect that OpenVMS Alpha nodes can use to access peripherals (such as disks and tapes). *See also CI-only cluster.*

encryption A process implemented for data confidentiality that converts sensitive or otherwise private data to an unintelligible form called cipher-text. Decryption reverses the process, taking the unintelligible cipher-text and converting the data back into its original form, called plaintext. Encryption and decryption are also known as encipher and decipher. Encryption for OpenVMS software is based on the Advanced Encryption Standard (AES) alogrithm and is integrated with the operating system. This allows OpenVMS users, system managers, security managers, or programmers to secure their files, save sets, or application data with AES Encryption.

Enterprise Operating Environment (EOE) The tier of the Operating Environment for OpenVMS for Integrity Servers that offers everything offered by the Foundation Operating Environment (FOE) plus system management capabilities and volume shadowing. *See also Operating Environments (OE) for OpenVMS for Integrity Servers, Foundation Operating Environment (FOE), and Mission Critical Operating Environment (MCOE).*

EOE *See Enterprise Operating Environment (EOE).*

Extensible Firmware Interface (EFI) The interface between HP Integrity server operating system and system firmware enabling you to perform such tasks as configuring the firmware and controlling the booting environment. EFI is the Intel specification of an interface between firmware and hardware. *See also Baseboard Management Controller (BMC), Management Processor (MP), Pre-OS System Environment (POSSE).*

FOE *See Foundation Operating Environment (FOE).*

Foundation Operating Environment (FOE)

The tier of the Operating Environment for OpenVMS for Integrity Servers that offers the base operating system and networking transport products. The contents of this tier are contained in each of the other, higher-level tiers. *See also Operating Environments (OE) for OpenVMS for Integrity Servers, Enterprise Operating Environment (EOE), and Mission Critical Operating Environment (MCOE).*

HRS (Human Recognition Service Standard)

HRS provides generic authentication service suitable for use with any form of human authentication (biometrics) for operation with CDSA. *See also Common Data Security Architecture (CDSA).*

HS*x* device A self-contained, intelligent, mass storage subsystem (for example, an HSJ or HSG) that lets computers in a cluster environment share disks.

HS*x* drive Any disk or tape drive connected to an HS*x* device (for example, an HSJ or HSG). A system disk on an HS*x* drive can be shared by several computers in an OpenVMS Cluster environment.

Hyper-Threading Supported on systems that have dual-core processors, this feature provides the ability for processors to create a second virtual core that allows additional efficiencies of processing. For example, a dual-core processor with Hyper-Threading active can run four threads.

InfoServer A general-purpose disk storage server (virtual device server). It can make devices available to client systems on the LAN. Client systems can connect to the virtual devices and use them as though they are locally attached devices. OpenVMS systems connected to the same LAN can boot from a virtual drive available from the InfoServer instead of from a local CD or DVD.

instance *See OpenVMS instance.*

Instant Capacity (iCAP) Supported on cell-based Integrity servers, an HP Utility Pricing Solutions product whose pricing model is based on purchasing components (processors, cell boards, and memory). Instant Capacity allows you to purchase and install additional components at a discount from the regular purchase price, as the usage rights are not included. These Instant Capacity components are inactive but installed and ready for use. When extra capacity is needed, you pay the remainder of the regular purchase price for the usage rights (through purchasing a Right to Use codeword) to activate the components. (If the regular price for the component is reduced by the time the usage rights are purchased, the remainder price is proportionally reduced, providing additional savings.) After obtaining usage rights, Instant Capacity processors can be turned on by the Instant Capacity software or during installation.

Previous versions of iCAP were referred to as Instant Capacity on Demand, or iCOD. *See also Pay per use (PPU), Temporary Instant Capacity (TiCAP).*

Integrated Lights-Out (iLO) *See Management Processor (MP).*

Kerberos A network authentication protocol that provides authentication for applications using secret-key crytpography. Kerberos is automatically installed with the OpenVMS operating system.

layered products Products (including system-integrated products) provided by HP and third parties that can installed on an OpenVMS system. *See also system-integrated product (SIP).*

local area OpenVMS Cluster system A configuration consisting of one or more computers that act as a MOP server and disk server, and a number of low-end computers that act as satellite nodes. The LAN connects all of the computers. These computers share a single file system.

local drive A drive, such as a CD, DVD, or disk drive, that is connected directly to a computer. If you have a standalone computer, it is likely that all drives connected to the system are local drives.

logical CPU An execution thread contained within a core on a cell-based integrity server. With Hyper-Threading enabled, each core can contain multiple logical CPUs. *See also core, Hyper-Threading.*

Maintenance Operations Protocol (MOP) A protocol used for operations such as downline loading and upline dumping. *See also MOP server.*

Management Processor (MP) A utility on HP Integrity servers that provides both local and remote access for controlling the system console, reset/power management, and transfer of control (TOC) capabilities. It also allows you interact with the Extensible Firmware Interface (EFI) and to monitor tasks and display detailed information about various internal subsystems. MP is available even when the server main power switch is in the off position. On entry-class Integrity servers, MP is known as the Integrated Lights-Out (iLO) Management Processor. *See also Baseboard Management Controller (BMC), Extensible Firmware Interface (EFI).*

MCOE *See Mission Critical Operating Environment (MCOE).*

media Any packaging agents capable of storing computer software (for example, compact discs, magnetic tapes, floppy disks, disk packs, and tape cartridges).

migration support In OpenVMS Clusters, migration support means that HP has qualified the versions for use together in configurations that are migrating in a staged fashion to a newer version of OpenVMS VAX, OpenVMS Alpha, or OpenVMS I64. Problem reports submitted against these configurations are answered by HP. However, in exceptional cases HP might request moving to a warranted configuration as part of the solution. Migration support helps customers move to warranted OpenVMS Cluster pairs. *See also warranted support.*

Mission Critical Operating Environment (MCOE) The tier of the Operating Environment for OpenVMS for Integrity Servers that offers everything offered by the Enterprise Operating Environment (EOE) plus clustering. *See also Operating Environments (OE) for OpenVMS for Integrity Servers, Foundation Operating Environment (FOE), and Enterprise Operating Environment (EOE).*

MOP server A computer system using either the LAN Auxiliary Control Process (LANACP) or DECnet software to downline-load systems using the Maintenance Operations Protocol (MOP). Systems loaded include OpenVMS systems, print servers, and LAT servers. *See also Maintenance Operations Protocol (MOP).*

nPartition (node partition) A hard partition within a cell-based server that provides both hardware and software isolation among different instances of the operating system running on a single server. Cell-based servers can be configured either as a single, large, symmetric multiprocessor or as several independent systems. An nPartition has exclusive use of the memory, processor, and I/O resources belonging to the cells that are assigned to that partition, and can execute its own operating system image. *See also cell, partition, server complex, virtual partition).*

OE *See Operating Environments (OEs) for OpenVMS for Integrity Servers.*

OpenVMS Cluster system A computer system consisting of two or more Alpha, VAX, or Integrity server computers running HP OpenVMS Cluster software. Many types of cluster interconnect devices can be used to create a cluster environment; for example, CI, DSSI, and LAN devices in a local area network, and Shared Memory CI (SMCI) for OpenVMS Galaxy instances. An OpenVMS Cluster can consist of a single interconnect or a mixed-interconnect cluster with any combination of cluster interconnects.

OpenVMS instance The OpenVMS operating system running in either a soft or hard partition of a hardware platform. To share memory in a hard partition, the GALAXY system parameter must be set.

OpenVMS Management Station A powerful Microsoft Windows based management tool for system managers and others who perform system management tasks on OpenVMS systems. Allows system managers to manage user accounts, printers, and storage across multiple systems, using an intuitive interface that eliminates the need to remember complex OpenVMS DCL syntax, command procedures, and device names. A server component is installed on OpenVMS (automatically if you select all the default values during the installation); a client component is installed on a PC.

Operating Environments (OEs) for OpenVMS for Integrity Servers The model for delivering the OpenVMS I64 operating system, layered products, and documentation. Each operating environment bundles a group of products offered together at a single price based on the number of active processor cores in the system. *For definitions of the three operating environments, see Foundation (FOE), Enterprise (EOE), and Mission Critical (MCOE).*

Operating Environment (OE) DVD The DVD containing the OpenVMS for Integrity Servers Operating Environment and operating system, and the installation and other procedures described in this manual.

operating system CD The CD containing the OpenVMS Alpha operating system and the installation and other procedures described in this manual. *See also operating system media, Operating Environment DVD.*

operating system media The operating system CD or the OE DVD included with your OpenVMS distribution kit. *See also operating system CD, Operating Environment DVD.*

partition A subset of the server hardware that includes processor, memory, and I/O resources on which an operating system can run. This type of partitioning allows a single server to run independently an operating system in each partition with isolation from other partitions. *See also cell, nPartition, server complex, virtual partition.*

PATHWORKS for OpenVMS (Advanced Server) Supported on OpenVMS Alpha and VAX systems only, an OpenVMS network operating system compatible with Microsoft networking technology. Allows OpenVMS systems to be file and print servers for Windows desktop users. Such users can use Microsoft products and utilities such as Windows Explorer to access file and print resources. Also provides a flexible system for network administration and security. *See also Advanced Server for OpenVMS.*

Pay per use (PPU) Supported on cell-based Integrity servers and part of the HP Utility Pricing Solutions program for customers who prefer leasing systems from HP Finance. Pay per use provides CPU capacity as needed, basing payment on actual metered or monitored use of that capacity. You acquire a particular hardware platform and number of processors, and are charged for usage of the processors based on demand. PPU is intended for customers who would rather lease the processors rather than purchasing them as would be done using Instant Capacity (iCAP). *See also Instant Capacity (iCAP), Temporary Instant Capacity (TiCAP).*

Performance Data Collector (TDC) The Performance Data Collector for HP OpenVMS (TDC) collects and manages configuration and performance data for analysis by other applications. TDC_RT Version 2.2 or higher is a run-time only (base) variant of the TDC software that is installed automatically with the OpenVMS operating system for use on specific operating system platforms. By default, data is collected in a file. Subsequently, user applications can retrieve the data from the file.

platform A PCSI utility concept in which the OpenVMS operating system is kitted with options for selected other products (for example, DECwindows Motif and networking products) so that the user can opt to install all at once. Generically, a platform is the combination of physical hardware and operating system on which a piece of management or application software runs.

Pre-OS System Environment (POSSE) The HP implementation of EFI that extends the EFI Shell and EFI Boot Manager to include additional features for managing hardware and system boot options.

See also Extensible Firmware Interface (EFI).

rolling upgrade Each system disk in an OpenVMS Cluster is upgraded individually, allowing old and new versions of the operating system to run together. Certain members of the cluster are available for use while others are being upgraded.

See also concurrent upgrade.

satellite node A computer that is part of a local area cluster. A satellite node is downline loaded from a boot server and then boots remotely from the system disk served by a disk server in the local area cluster. *See also disk server, boot server.*

scratch disk A blank disk or a disk with files you no longer need.

Secure Delivery Supported by CDSA, Secure Delivery uses public key and digital signature technology to implement a system that provides OpenVMS users the ability to validate files from OpenVMS and third-party OpenVMS vendors. The validation process involves authenticating the originator and verifying the contents of a file. Secure Delivery is integrated into PCSI to automatically ensure that software installed on OpenVMS was not tampered with prior to installation. Most kits included on the OpenVMS distribution media (as of Version 8.3) have been signed using Secure Delivery. *See also Common Data Security Architecture (CDSA).*

Secure Sockets Layer (SSL) The open-standard security protocol for secure transfer of sensitive information over the Internet. HP SSL offers a high degree of confidentiality by allowing server authentication, client authentication, and an encrypted connection that requires all information sent between client and server to be encrypted by the sending software and decrypted by the receiving software. HP SSL for OpenVMS is automatically installed with the OpenVMS operating system. For more information, see the *HP Open Source Security for OpenVMS, Volume 2: HP SSL for OpenVMS* manual.

server complex The hardware of a cell-based server that includes all cells, I/O expansion cabinets, cables, cabinet hardware, fans, and power and utilities components. The complex can support multiple instances of an operating system by means of nPartitions. *See also cell, nPartition (node partition), server complex.*

SIP *See system-integrated product (SIP).*

source drive The drive that holds the operating system distribution media during an upgrade or installation. This may be a local drive or an InfoServer. The drive contains either the operating system CD or DVD, or a copy of it.

standalone system A computer system consisting of a single computer that is not part of a network or OpenVMS Cluster.

system disk The disk from which OpenVMS is booted. During an installation or upgrade, this is the source drive. After installation, the target drive is booted and becomes the system disk.

system-integrated product (SIP) A product provided by HP that can be installed or upgraded as part of the OpenVMS installation or upgrade. SIPs include required products, such as CDSA, Kerberos, and the base kit for Availability Manager, and optional products such as DECwindows Motif, DECnet-Plus, DECnet Phase IV, TCP/IP Services for OpenVMS, and on OpenVMS I64 systems only, WBEM Services for OpenVMS. *See also layered products.*

target drive The drive that holds the system disk during an upgrade or installation, or the drive you designate when backing up the system disk.

TCP/IP Services for OpenVMS HP standard implementation of the TCP/IP and NFS networking protocols, integrated with the OpenVMS operating system installation. Provides interoperability and resource sharing among systems running OpenVMS, UNIX, Windows, and other operating systems that support TCP/IP. TCP/IP provides a comprehensive suite of functions and applications that support industry-standard protocols for heterogeneous network communications and resource sharing.

See also DECnet Phase IV, DECnet-Plus.

TDC *See Performance Data Collector.*

Temporary Instant Capacity (TiCAP) Supported on cell-based Integrity servers, an HP product option included with Instant Capacity (iCAP) that enables you to purchase prepaid processor activation rights for a specified (temporary) period of time. Temporary capacity is sold in increments such as

20-day or 30-day increments, where a day equals 24 hours for a core. TiCAP was formerly referred to as TiCOD. *See also Instant Capacity (iCAP), Pay per use (PPU).*

UETP (User Environment Test Package) A software package that tests all the standard peripheral devices on your system, various commands and operating system functions, the system's multiple-user capability, DECnet software, and the cluster environment.

virtual partition A soft partition within a cell-based server that can provide software isolation among different instances of the operating system running on a single server or nPartition. Cell-based servers can be configured either as a single large symmetric multiprocessor or as several independent systems. A virtual partition uses a subset of the system processor, memory, and I/O resources, and includes operating system and application-related software. The HP-UX operating system is the only operating system that can run in a virtual partition. *See also cell, partition, nPartition (node partition), server complex.*

volume shadowing The software that performs disk mirroring operations using a redundant array of independent disks (RAID) 1 storage strategy. Provides high data availability for disk devices by ensuring against data loss that results from media deterioration or controller or device failure. This prevents storage subsystem component failures from interrupting system or application tasks. Volume Shadowing for OpenVMS is available as both a separately licensed product on Integrity server systems and a component of the Enterprise Operating Environment (EOE) on Integrity servers.

warranted support In OpenVMS Clusters, warranted support means that HP has fully qualified the specified versions of OpenVMS coexisting in the cluster and addresses all problems identified by customers using the cluster configuration. *See also migration support.*

WBEM (Web-Based Enterprise Management) Services for OpenVMS An optional product available on OpenVMS I64 systems only that provides an industry-standard enterprise management framework and resource description. WBEM's structured framework is capable of being extended and uses Internet standards. Developers of management applications can take advantage of work previously done to expose resource information and operations; for example, developers can take code that was developed for a specific platform or application and use it with WBEM for the same purposes. WBEMCIM is the WBEM Services for OpenVMS file name used in the PCSI kit. CIM stands for the Common Information Model, which differentiates the current OpenVMS WBEM product from the original one that is based on the Simple Network Maintenance Protocol (SNMP).

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