

# **HP Integrity rx6600**

## **Installation Guide**



**Manufacturing Part Number: AB464-9001A**

**Edition 1**

**September 2006**

Printed in the US

© Copyright 2006 Hewlett-Packard Development Company, L.P.

---

## Legal Notices

©Copyright 2006 Hewlett-Packard Development Company, L.P.

The information contained herein is subject to change without notice. The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.

Intel, Pentium, Intel Inside, Itanium, and the Intel Inside logo are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

Linux is a U.S. registered trademark of Linus Torvalds.

Microsoft and Windows are U.S. registered trademarks of Microsoft Corporation.

UNIX is a registered trademark of The Open Group.

---

## Localized Documentation

**This Installation Guide has been translated to:**

日本語 <http://www.docs.hp.com/ja/index.html>

한글 <http://www.docs.hp.com/ko/index.html>

简体中文 [http://www.docs.hp.com/zh\\_cn/index.html](http://www.docs.hp.com/zh_cn/index.html)

繁體中文 [http://www.docs.hp.com/zh\\_tw/index.html](http://www.docs.hp.com/zh_tw/index.html)

**1. Introduction**

I/O .....	16
Processor.....	17
Memory.....	18
Cooling .....	18
Power .....	19
Front Display Panel, DVD, and Diagnostic Panel .....	20
Mass Storage (SAS) .....	20
Firmware .....	21
User Interface .....	21
Event IDs for Errors and Events .....	22
Dimensions and Values .....	22
Server Specifications .....	23
Safety Information .....	24
Installation Sequence and Checklist.....	25

**2. Unpacking and Inspecting the Server**

Verifying Site Preparation.....	28
Inspecting the Shipping Containers for Damage.....	28
Unpacking the Server .....	28
Checking the Inventory .....	29
Returning Damaged Equipment.....	29
Unloading the Server with a Lifter.....	29

**3. Installing Additional Components**

Removing and Replacing the Top Cover.....	32
Removing the Top Cover.....	32
Replacing the Top Cover.....	33
Removing and Replacing the Memory Carrier Assembly Cover.....	34
Removing the Memory Carrier Assembly Cover.....	34
Replacing the Memory Carrier Assembly Cover.....	35
Installing a Hot-Swappable Power Supply.....	35
Power Supply Loading Guidelines.....	35
Installing a Power Supply .....	36
Removing and Replacing Hot-Swappable Disk Drive Fillers .....	37
Removing a Hot-Swappable Disk Drive Filler .....	37
Replacing a Hot-Swappable Disk Drive Filler .....	37
Installing a Hot-Pluggable Disk Drive .....	38
Installing a Hot-Pluggable Disk Drive .....	38
Installing a PCI/PCI-X Card .....	40
PCI/PCI-X Configurations .....	41
Offline Installation of a PCI Card .....	44
Removing and Replacing the Memory Carrier Assembly .....	45
Removing the Memory Carrier Assembly .....	45
Replacing the Memory Carrier Assembly .....	47
Installing System Memory DIMMs.....	47

---

# Contents

Memory Installation Conventions . . . . .	49
Installing Memory . . . . .	53
Removing and Replacing the Processor Board Assembly . . . . .	55
Removing the Processor Board Assembly . . . . .	55
Replacing the Processor Board Assembly . . . . .	56
Installing a Dual-Core Processor . . . . .	57
Processor Load Order . . . . .	57
Required Tools . . . . .	58
Installing a Dual-Core Processor . . . . .	58
<b>4. Connecting the Cables</b>	
AC Input Power . . . . .	66
Power States . . . . .	66
Applying Standby Power to the Server . . . . .	67
LAN . . . . .	68
<b>5. Installing the Server into a Rack or Pedestal Mount</b>	
Installing the Server into a Rack . . . . .	70
HP Rack . . . . .	70
Non-HP Rack . . . . .	70
Installing the Server into a Pedestal Mount . . . . .	70
<b>6. Console Setup</b>	
Overview . . . . .	72
Setup Checklist . . . . .	73
Setup Flowchart . . . . .	74
Preparation . . . . .	75
Determining the Physical iLO 2 MP Access Method . . . . .	75
Determining the iLO 2 MP LAN Configuration Method . . . . .	76
Configuring the iLO 2 MP LAN Using DHCP and DNS . . . . .	77
Configuring the iLO 2 MP LAN Using ARP Ping . . . . .	78
Configuring the iLO 2 MP LAN Using the RS-232 Serial Port . . . . .	80
Logging In to the iLO 2 MP . . . . .	81
Additional Setup . . . . .	82
Modifying User Accounts and Default Password . . . . .	82
Setting Up Security . . . . .	82
<b>7. Accessing the Host Console</b>	
Accessing the iLO 2 MP With the Web Browser . . . . .	86
Help . . . . .	87
Accessing the Host Console With the TUI - CO Command . . . . .	88
Accessing the Host Console With vKVM - Integrated Remote Console . . . . .	88
Accessing the Host Console with the SMASH SM CLP . . . . .	88
Accessing the Graphic Console Using VGA . . . . .	89

**8. Powering On the Server**

Powering On the Server . . . . .	92
Powering On the Server Using the iLO 2 MP . . . . .	92
Powering On the Server Manually . . . . .	92

**9. Core I/O Card Configuration**

Integrated RAID . . . . .	94
Integrated Mirror . . . . .	94
Global Hot Spare . . . . .	94
HP 8 Internal Port SAS HBA (SAS Controller) . . . . .	95
MPTUtil Utility . . . . .	95
DRVCFG Utility . . . . .	98
CFGGEN Utility . . . . .	108
Smart Array P600 Controller . . . . .	111
Quick Installation Procedure . . . . .	111
Connecting External Storage . . . . .	111
SAS Cable Part Numbers . . . . .	112
Configuring the Array . . . . .	112
Comparing the Utilities . . . . .	113
SAUpdate Utility . . . . .	114
EBSU Utility . . . . .	118
ORCA Utility . . . . .	121
Creating a Logical Drive Using ORCA . . . . .	121
ACU Utility . . . . .	122

**10. Booting and Shutting Down the Operating System**

Configuring System Boot Options . . . . .	124
Boot Options List . . . . .	124
Autoboot Setting . . . . .	125
Booting and Shutting Down HP-UX . . . . .	125
Adding HP-UX to the Boot Options List . . . . .	125
Booting HP-UX in Standard Mode . . . . .	126
HP-UX Booting in Single-User Mode . . . . .	128
HP-UX Booting in LVM Maintenance Mode . . . . .	129
Shutting Down HP-UX . . . . .	130
Booting and Shutting Down HP OpenVMS . . . . .	130
Adding HP OpenVMS to the Boot Options List . . . . .	130
Booting HP OpenVMS . . . . .	131
Shutting Down HP OpenVMS . . . . .	133
Booting and Shutting Down Microsoft Windows . . . . .	133
Adding Microsoft Windows to the Boot Options List . . . . .	134
Booting the Microsoft Windows Operating System . . . . .	135
Shutting Down Microsoft Windows . . . . .	136
Booting and Shutting Down Linux . . . . .	137
Adding Linux to the Boot Options List . . . . .	137
Booting the Red Hat Enterprise Linux Operating System . . . . .	138

---

# Contents

Booting the SuSE Linux Enterprise Server Operating System . . . . .	139
Shutting Down Linux . . . . .	140
<b>11. Troubleshooting</b>	
Troubleshooting Methodology . . . . .	142
Troubleshooting Using the Server Power Button . . . . .	142
Server Does Not Power On . . . . .	143
EFI Menu is Not Available . . . . .	144
Operating System Does Not Boot . . . . .	144
Operating System Boots with Problems . . . . .	144
Intermittent Server Problems . . . . .	145
DVD Problems . . . . .	145
Hard Drive Problems . . . . .	145
Console Problems . . . . .	146
Downloading and Installing the Latest Version of the Firmware . . . . .	146
Downloading the Latest Version of the Firmware . . . . .	146
Installing the Latest Version of the Firmware on the Server . . . . .	146
<b>A. Enabling the Trusted Platform Module</b>	
Introduction . . . . .	148
Enabling the TPM . . . . .	149
<b>Index . . . . .</b>	<b>151</b>

Figure 1-1. I/O Subsystem Block Diagram . . . . .	16
Figure 1-2. Power Subsystem Block Diagram . . . . .	19
Figure 3-1. Removing and Replacing the Top Cover . . . . .	33
Figure 3-2. Removing and Replacing the Memory Carrier Assembly Cover . . . . .	34
Figure 3-3. Removing and Replacing a Hot-Swappable Power Supply . . . . .	36
Figure 3-4. Removing and Replacing a Hot-Swappable Disk Drive Filler . . . . .	37
Figure 3-5. Removing and Replacing a Hot-Pluggable Disk Drive . . . . .	39
Figure 3-6. Disk Drive Slot IDs . . . . .	39
Figure 3-7. PCI/PCI-X Slot Identification and Card Divider Locations . . . . .	40
Figure 3-8. Removing and Replacing the Memory Carrier Assembly . . . . .	46
Figure 3-9. Memory Carrier Assembly . . . . .	48
Figure 3-10. Memory Carrier Assembly with Side Cover Open . . . . .	49
Figure 3-11. 48-DIMM Memory Carrier Board Slot IDs . . . . .	51
Figure 3-12. Inserting a DIMM into the Memory Board Connector . . . . .	54
Figure 3-13. Removing the Processor Board Assembly . . . . .	56
Figure 3-14. Installing a Dual-Core Processor on the Processor Board . . . . .	60
Figure 3-15. Processor Power Cable . . . . .	61
Figure 3-16. Processor Alignment Posts and Lock/Unlock Mechanism . . . . .	62
Figure 3-17. Processor Alignment Holes and Lock/Unlock Mechanism . . . . .	63
Figure 4-1. Rear Panel LAN Ports . . . . .	68
Figure 6-1. Setup Flowchart . . . . .	74
Figure 6-2. Server Rear Ports . . . . .	75
Figure 7-1. Web Login Page . . . . .	86
Figure 7-2. Status Summary Page . . . . .	87
Figure 9-1. Accessed Screens in the DRVCFG Utility . . . . .	99
Figure 9-2. Adapter Properties Screen . . . . .	100
Figure 9-3. Select New Array Type Screen . . . . .	103
Figure 9-4. EBSU Welcome Screen . . . . .	118
Figure 9-5. EBSU Main Menu . . . . .	119
Figure 9-6. EBSU Maintain Firmware Screen . . . . .	119
Figure 9-7. EBSU Maintain Firmware Update Screen . . . . .	120
Figure 9-8. ORCA Main Menu . . . . .	121





Table 1. Publishing History Details . . . . .	11
Table 1-1. Memory Carrier Configurations. . . . .	18
Table 1-2. SAS Configurations. . . . .	21
Table 1-3. Physical Dimensions in Standalone, Vertical Orientation . . . . .	22
Table 1-4. Server Specifications. . . . .	23
Table 1-5. Installation Sequence Checklist. . . . .	25
Table 3-1. PCI/PCI-X Card Slot Frequency and Bus Mode Compatibility for Shared Slots . . . . .	42
Table 3-2. PCI/PCI-X I/O Paths . . . . .	43
Table 3-3. Supported Memory Carrier Assembly Configurations . . . . .	45
Table 3-4. Memory Configuration Requirements . . . . .	50
Table 3-5. 48-DIMM Memory Carrier Loading Examples . . . . .	52
Table 3-6. Processor Load Order . . . . .	58
Table 4-1. Power States . . . . .	66
Table 6-1. Elements Required to Start a Console Session . . . . .	72
Table 6-2. Setup Checklist . . . . .	73
Table 6-3. Physical Connection Matrix . . . . .	76
Table 6-4. LAN Configuration Methods . . . . .	76
Table 6-5. ARP Ping Commands . . . . .	78
Table 9-1. MPTUtil Commands and Functions . . . . .	96
Table 9-2. SAS Cable Part Numbers . . . . .	112
Table 9-3. ACU and ORCA Supported Features and Procedures . . . . .	113
Table 11-1. Server Power Button Functions . . . . .	142



---

## About This Document

This document describes how to unpack the HP Integrity rx6600 server, install additional components, start a server console session, power on the server, and boot the operating system.

The document printing date and part number indicate the document's current edition. The printing date will change when a new edition is printed. Minor changes may be made at reprint without changing the printing date. The document part number will change when extensive changes are made.

Document updates may be issued between editions to correct errors or document product changes. To ensure that you receive the updated or new editions, subscribe to the appropriate product support service. See your HP sales representative for details.

The latest version of this document can be found online at:

<http://www.docs.hp.com>

## Intended Audience

This document is intended to provide technical product and support information for authorized service providers, customer system administrators, and HP support personnel.

## New and Changed Information in This Edition

This is a new document to support the HP Integrity rx6600 server release.

## Publishing History

Table 1 lists the publishing history details for this document.

**Table 1** Publishing History Details

Document Manufacturing Part Number	Publication Date
AB464-9001A	September 2006

## Document Organization

The *HP Integrity rx6600 Installation Guide* is divided into several chapters, and each contains information about installing the HP Integrity rx6600. The appendixes contain supplemental information.

- Chapter 1     **Introduction** Use this chapter to develop a high-level understanding of the major server subsystems. Also included are the server dimensions and weight, and an installation checklist.
- Chapter 2     **Unpacking and Inspecting the Server** Use this chapter to assist with unpacking the server.
- Chapter 3     **Installing Additional Components** Use this chapter for instructions on installing additional server components that are not factory integrated.
- Chapter 4     **Installing the Server into a Rack or Pedestal Mount** Use this chapter to assist with installing the server in a rack or pedestal mount.

Chapter 5	<b>Connecting the Cables</b> Use this chapter for instructions on connecting power and LAN cables.
Chapter 6	<b>Console Setup</b> Use this chapter to assist with setting up the console.
Chapter 7	<b>Accessing the Host Console</b> Use this chapter to learn about the methods to access the host console.
Chapter 8	<b>Powering On the Server</b> Use this chapter to learn about powering on the server.
Chapter 9	<b>Core I/O Card Configuration</b> Use this chapter for instructions on how to configure core I/O cards.
Chapter 10	<b>Booting and Shutting down the Operating System</b> Use this chapter for instructions on booting and shutting down the operating system.
Chapter 11	<b>Troubleshooting</b> Use this chapter as a high-level aid in troubleshooting and diagnosing server installation problems.
Appendix A	<b>Enabling the Trusted Platform Module</b> Use this appendix for instructions on how to enable the trusted platform module.

## Typographic Conventions

This document uses the following conventions:

<i>audit</i> (5)	An HP-UX manpage. In this example, <i>audit</i> is the name and <i>5</i> is the section in the <i>HP-UX Reference</i> . On the web and on the Instant Information CD, it may be a hot link to the manpage itself. From the HP-UX command line, you can enter “man <i>audit</i> ” or “man 5 <i>audit</i> ” to view the manpage. See <i>man</i> (1).
<i>Book Title</i>	The title of a book. On the web and on the Instant Information CD, it may be a hot link to the book itself.
<b>KeyCap</b>	The name of a keyboard key. <b>Return</b> and <b>Enter</b> both refer to the same key.
<i>Emphasis</i>	Text that is emphasized.
<b>Bold</b>	Text that is strongly emphasized.
<b>Bold</b>	The defined use of an important word or phrase.
ComputerOut	Text displayed by the computer.
<b>UserInput</b>	Commands and other text that you type.
Command	A command name or qualified command phrase.
<i>Variable</i>	The name of a variable that you can replace in a command or function or information in a display that represents several possible values.
[ ]	The contents are optional in formats and command descriptions. If the contents are a list separated by a pipe ( ), you must choose one of the items.
{ }	The contents are required in formats and command descriptions. If the contents are a list separated by a pipe ( ), you must choose one of the items.
...	The preceding element may be repeated an arbitrary number of times.
	Separates items in a list of choices.

## Related Documents

The HP Server Documentation CD has been provided with the server. It contains a complete documentation set for the server, including localized versions of key documents.

Other documents in this collection include:

HP Integrity rx6600 Site Preparation Guide

HP Integrity rx6600 User Service Guide

HP Integrity rx6600 Safety and Regulatory Information

HP Integrity rx3600 and rx6600 Console Quick Start

The latest versions of these documents, including any updates, are posted in the *Enterprise Servers, Workstations and Systems Hardware* collection under *HP Integrity rx6600* at:

<http://www.docs.hp.com>

## HP Encourages Your Comments

HP encourages your comments concerning this document. We are truly committed to providing documentation that meets your needs.

Send comments to:

[netinfo\\_feedback@cup.hp.com](mailto:netinfo_feedback@cup.hp.com)

Include document title, manufacturing part number, and any comments, errors found, or suggestions for improvement you have concerning this document. Also, please include what we did right so we can incorporate it into other documents.



---

# 1 Introduction

The HP Integrity rx6600 server is a 7U, rack- or pedestal-installed server. The server's internal peripherals include serial attached SCSI (SAS) disks and a DVD or DVD+RW drive. Its high availability features include N+1 hot-swappable fans, 1+1 hot-swappable power supplies, and hot-pluggable PCI-X cards and SAS disks. It can contain one, two, three, or four dual-core Itanium® processors and up to 96 GB of memory.

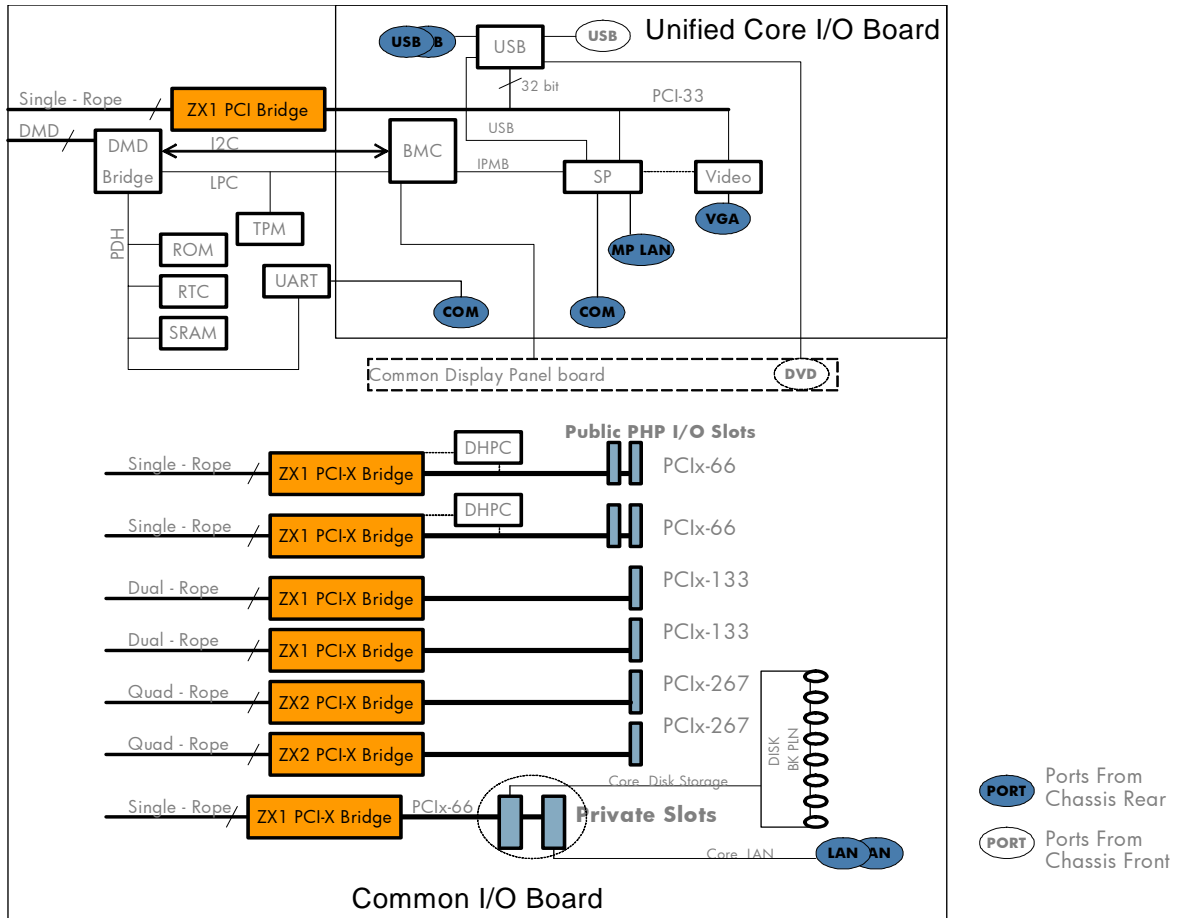
This chapter addresses the following topics:

- “I/O” on page 16
- “Processor” on page 17
- “Memory” on page 18
- “Cooling” on page 18
- “Power” on page 19
- “Front Display Panel, DVD, and Diagnostic Panel” on page 20
- “Mass Storage (SAS)” on page 20
- “Firmware” on page 21
- “Dimensions and Values” on page 22
- “Server Specifications” on page 23
- “Safety Information” on page 24
- “Installation Sequence and Checklist” on page 25

## I/O

The I/O subsystem is composed of an I/O board assembly and a core I/O board. Figure 1-1 is a block diagram of the I/O subsystem.

**Figure 1-1 I/O Subsystem Block Diagram**



The I/O board assembly is serviced from the rear of the chassis and connects through the midplane board to the processor board. It is mounted on a removable carrier tray that contains six full-length and two short-length PCI/PCI-X hot-pluggable public slots and two standard PCI/PCI-X private slots. The private slots are used for the LAN core I/O and SAS core I/O cards. The I/O board assembly also contains processor-dependent hardware (PDH) functionality.

The server supports PCI/PCI-X hot-pluggable operations in all the public I/O slots. PCI/PCI-X hot-pluggable operations enable you to add or remove a PCI/PCI-X card while the server is powered on. Each slot is physically separated with a divider that contains a card extraction mechanism and a mechanical retention latch (MRL).

There are four shared PCI/PCI-X slots in the server. The four 66 MHz PCI/PCI-X slots are shared in groups of two. Shared slots have many speed and mode change restrictions during online add or remove operations. For more information on PCI/PCI-X card configuration and restrictions, see “PCI/PCI-X Configurations” on page 41.



Four of the server PCI/PCI-X slots are not shared. Two of the nonshared slots are PCI/PCI-X 133 MHz, and two of the slots are PCI/PCI-X 266 MHz.

Attention LEDs, doorbell buttons, and power LEDs for each hot-pluggable PCI/PCI-X slot are located on the PCI bulkhead at the rear of the server chassis.

Wake on LAN, a hardware feature that enables the remote power on of computers through special network packets, is enabled in core PCI/PCI-X slots one and two.

The core I/O board contains the server VGA (optional) and USB features, and the majority of the manageability functions, such as the baseboard management controller (BMC), and the integrated lights-out 2 management processor (iLO 2 MP). The core I/O board connects through an internal cable to the display panel board. The display panel board includes the front panel LEDs, diagnostic LED panel, DVD, and front panel USB port functions.

---

## Processor

The server processor subsystem accommodates one, two, three, or four dual-core Itanium processor modules. The processor subsystem consists of the following elements:

- zx2 CEC front side bus, memory, and I/O controller
- System clock generation and distribution
- Circuitry for manageability and fault detection

The zx2 CEC and the processor modules are located on the processor board assembly. Each processor connects to the processor board through a zero insertion force (ZIF) socket. The processor board is mounted on a removable carrier tray that is attached to the processor board access door. The assembly is accessed through the front of the server after the memory carrier is removed.

## Memory

The server DIMMs are seated on memory boards that are enclosed in an extractable memory carrier assembly. The memory boards plug directly into sockets on the processor board when the memory carrier assembly is fully seated.

Table 1-1 lists the memory carrier configurations and the maximum memory for each configuration.

**Table 1-1 Memory Carrier Configurations**

Memory Carrier	Memory Boards	Maximum Configuration
24-DIMM	One 24-DIMM memory multiplexer (mux)-based board	48 GB (24 X 2 GB DIMMs)
48-DIMM	Two 24-DIMM memory multiplexer (mux)-based boards	96 GB (48 X 2 GB DIMMs)

The server supports the following DIMM sizes:

- 512 MB
- 1 GB
- 2 GB

---

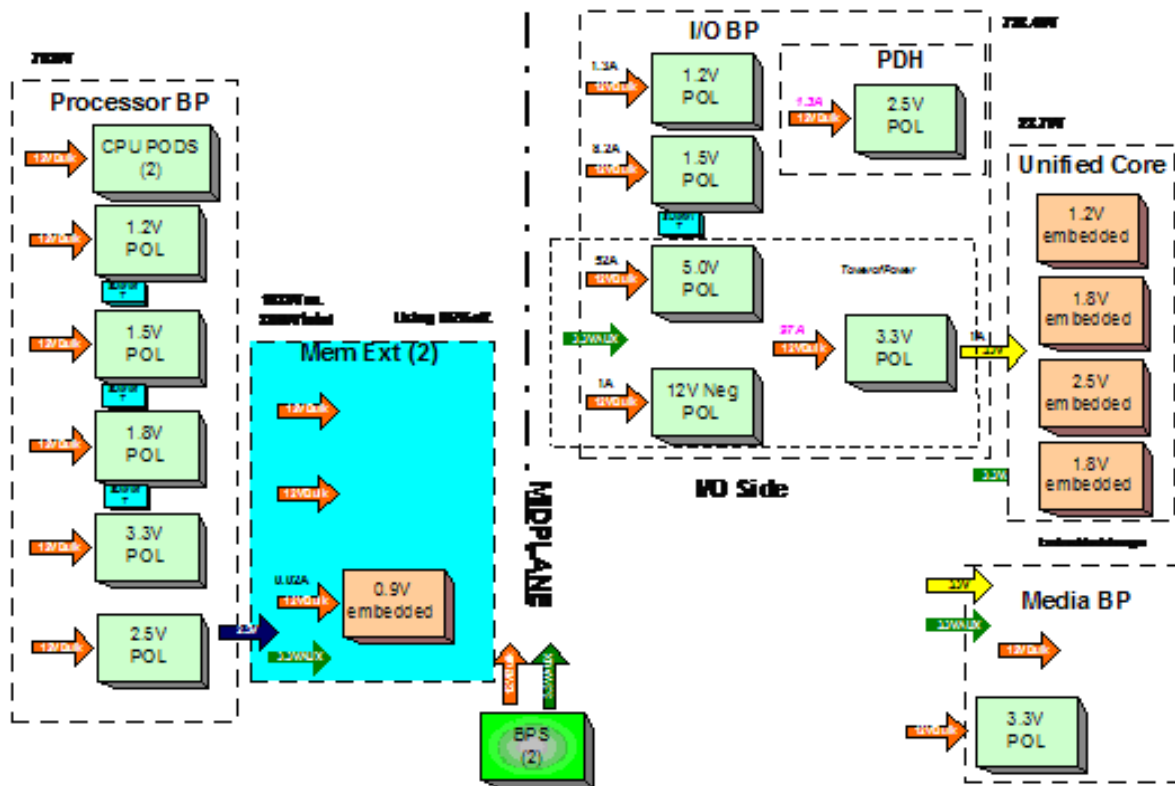
## Cooling

Six system fan assemblies cool the server. The fans are redundant, hot-swappable, and interchangeable. You can service them through the top and rear of the chassis. The fans are N+1, meaning that the server has six fans, but can operate for a very limited time with five fans running. If the time threshold is reached, the server automatically shuts down to prevent an overtemperature condition.

## Power

The server power subsystem is designed to provide high availability with 1+1 power supply redundancy. Figure 1-2 is a block diagram of the power subsystem, including voltage labels for each main server subsystem that requires power.

**Figure 1-2 Power Subsystem Block Diagram**



Two hot-swappable ac/dc power supplies generate main system power, along with a standby power voltage. One active power supply is sufficient to operate the system at the maximum load. Each power supply receives ac power through the integrated ac inlet. The system can operate at 180-264 VAC and achieve 1+1 redundancy. The power supplies are power-factor corrected; the maximum dc power output of the power system is 1600 watts. Service the hot-swappable power supplies by sliding them out the rear of the chassis.

## Front Display Panel, DVD, and Diagnostic Panel

The front display panel, DVD, and diagnostic panel are supported on a single board, called the display board, located in the front of the chassis. Service the display board from the top of the chassis.

The front display panel consists of the system status LEDs and a power switch. Use the front display panel to determine the power status of the server, monitor the server as it progresses through the boot cycle, and use the various LED states to assist with troubleshooting system problems.

A slimline DVD drive or optional DVD+RW drive, is located above the hard disk drives.

A USB 2.0 port is positioned between the DVD drive and the front display panel.

Each customer replaceable unit (CRU), with the exception of the power supplies, has a unique set of status indicators located on a diagnostic panel that you view through the top cover. CRUs include components such as individual memory DIMMs, processors, and fans. LEDs that correspond to each CRU illuminate when there is a problem.

---

## Mass Storage (SAS)

The server mass storage subsystem contains multiple elements:

- SAS disk drives
- SAS cables
- SAS backplane board
- SAS core I/O card

The server can contain up to 16 SAS disk drives. The drives have LEDs that indicate activity and device status, and an LED used to locate a particular drive. Additionally, there is a set of slot availability LEDs positioned in the middle of the disk drive bays on the front of the chassis. The LEDs indicate which slots are available for use.

The disk drives plug directly into the SAS backplane board. The server ships standard with two SAS backplane boards and one SAS core I/O card. Two cables connect from the SAS backplane board to the SAS core I/O card located in PCI/PCI-X slot 1. An optional second SAS core I/O card is available. Service the SAS backplane board and SAS core I/O card from the top of the chassis.

---

**IMPORTANT** The number of SAS core I/O cards determines the SAS configuration. The SAS configuration affects the location of the LAN core I/O card. In a single SAS core I/O card configuration, the secondary set of SAS cables connect to the secondary SAS backplane and are captured with cable retention clamps.

---

Table 1-2 lists the available SAS configurations.

**Table 1-2 SAS Configurations**

SAS Core I/O Cards	SAS Core I/O Card Location	LAN Core I/O Card Location	SAS Backplane Boards	SAS Cables Shipped	SAS Cables Connected
1	Slot 1	Slot 2	2	4	2
2	Slot 2	Slot 10	2	4	4

---

## Firmware

Firmware consists of many individually linked binary images that are bound together by a single framework at run time. Internally, the firmware employs a software database called a device tree to represent the structure of the hardware platform and to provide a means of associating software elements with hardware functionality.

The firmware incorporates the following main interfaces:

- **Processor Abstraction Layer (PAL).**  
PAL provides a seamless firmware abstraction between the processor and system software and platform firmware.
- **System Abstraction Layer (SAL).**  
SAL provides a uniform firmware interface, and initializes and configures the platform.
- **Extensible Firmware Interface (EFI).**  
EFI provides an interface between the operating system and the platform firmware. EFI uses data tables that contain platform-related information, and boot and run-time service calls that are available to the operating system and its loader to provide a standard environment for booting.
- **Advanced Configuration and Power Interface (ACPI).**  
ACPI provides a standard environment for configuring and managing server systems. ACPI moves system power configuration and management from the system firmware to the operating system, and abstracts the interface between the platform hardware and the operating system software. This enables each to evolve independently of the other.

The firmware supports HP-UX 11i version 2, June 2006 release, Linux®, Windows®, and OpenVMS 8.3 operating systems through the Itanium processor family standards and extensions, and has no operating system-specific functionality included. All operating systems are presented with the same interface to system firmware, and all features are available to the operating system.

## User Interface

The Itanium processor family firmware employs a user interface defined by an HP standard called Pre-OS System Startup Environment (POSSE). The POSSE shell is based on the EFI standard shell. Several commands were added to the standard EFI Shell to support HP value-added functionality.

## Event IDs for Errors and Events

The system firmware generates event IDs for errors, events, and forward progress to the iLO 2 MP through common shared memory. The iLO 2 MP interprets and stores event IDs. Reviewing these events helps you diagnose and troubleshoot problems with the server. For more information, see Chapter 11, “Troubleshooting,” on page 141.

---

## Dimensions and Values

Table 1-3 lists the physical dimensions and values of the HP Integrity rx6600 for a rack- or pedestal-installed configuration.

**Table 1-3 Physical Dimensions in Standalone, Vertical Orientation**

Dimension	Value
Server weight (loaded product weight range estimate)	120-150 lbs.
<b>Rack</b>	
Rack dimensions (depth x width x height)	69.6 cm (27.4 in) x 44 cm (17.32 in) x 30.58 cm (12.04 in)
Rack weight	Max: 68.04 kg (150 lbs)
Rack unit	Server takes up 7U in the rack
<b>Pedestal</b>	
Pedestal dimensions (depth x width x height)	69.3 cm (27.3 in) x 48.9 cm (19.3 in) x 42.2 cm (16.7 in)
Pedestal weight	Max: 15.5 kg. (34 lbs.)
Minimum standalone configuration	69.9 kg. (154 lbs.)
Maximum standalone configuration	83.5 kg. (184 lbs.)

---

## Server Specifications

Table 1-4 lists the server specifications for the HP Integrity rx6600.

**Table 1-4 Server Specifications**

Component	Specification
Processors	One, two, three, or four Itanium dual-core processors: 1.4 GHz/12 MB cache 1.6 GHz/18 MB cache 1.6 GHz/24 MB cache
Memory	24-DIMM memory carrier 48-DIMM memory carrier  Supported DDR2 DIMM sizes: 512 MB, 1 GB, and 2 GB.
Disk drives	One to 16 hot-pluggable SAS hard drives
PCI slots	Two private PCI-X 66 MHz slots.  Eight public PCI-X slots: Four PCI-X slots, 66 MHz Two PCI-X slots, 133 MHz Two PCI-X2 slots, 266 MHz
SAS core I/O	One or two eight port SAS core I/O cards, or eight port SAS core I/O cards with RAID
LAN core I/O	Two GigE LAN ports
Management core I/O	Two serial ports, two USB 2.0 ports, one 10 Base-T/100 Base-T LAN port, and one optional VGA port
Optical device	One DVD or DVD+RW drive
Power supply	One 1600 watt power supply, 1+1 redundancy with second power supply

## Safety Information

Use care to prevent injury and equipment damage when performing removal and replacement procedures. Voltages can be present within the server even when it is powered off. Many assemblies are sensitive to damage by electrostatic discharge (ESD).

Follow the safety precautions listed below to ensure safe handling of components, to prevent injury, and to prevent damage to the server:

- When removing or installing any server component, follow the instructions provided in this guide.
- If installing a hot-swappable or hot-pluggable component when power is applied (fans are running), reinstall the server cover immediately to prevent overheating.
- If installing a hot-pluggable component, complete the required software intervention prior to removing the component.
- If installing an assembly that is neither hot-swappable nor hot-pluggable, disconnect the power cable from the external server power receptacle.

---

**WARNING**    **Ensure that the system is powered off and all power sources are disconnected from the server prior to removing or installing server hardware unless you are removing or installing a hot-swappable or hot-pluggable component.**

**Voltages are present at various locations within the server whenever an ac power source is connected. This voltage is present even when the main power switch is turned off.**

**Failure to observe this warning can result in personal injury or damage to equipment.**

---

- Do not wear loose clothing that can snag or catch on the server or on other items.
- Do not wear clothing subject to static charge buildup, such as wool or synthetic materials.
- If installing an internal assembly, wear an antistatic wrist strap and use a grounding mat, such as those included in the Electrically Conductive Field Service Grounding Kit (HP 9300-1155).
- Handle accessory boards and components by the edges only. Do not touch any metal-edge connectors or any electrical components on accessory boards.



## Installation Sequence and Checklist

Table 1-5 lists the server installation steps. Follow these steps in sequence to install the server.

**Table 1-5 Installation Sequence Checklist**

Step	Description	Completed
1	Unpack and inspect the server shipping container. Inventory the contents using the packing slip.	
2	Install additional components shipped with the server.	
3	Install the server into a rack or pedestal mount.	
4	Connect cables to the server.	
	a: Connect ac input power cable.	
	b: Connect LAN core I/O cable.	
5	Set up the console.	
6	Access the host console.	
7	Power on the server.	
8	Configure core I/O cards.	
9	Boot the operating system.	
10	Verify the server configuration.	



---

## 2 Unpacking and Inspecting the Server

This chapter describes procedures you perform before installation. Ensure that you have adequately prepared your environment for the new server and received all the components you ordered. Verify that the server and its containers are in good condition after shipment.

This chapter addresses the following topics:

- “Verifying Site Preparation” on page 28
- “Inspecting the Shipping Containers for Damage” on page 28
- “Unpacking the Server” on page 28
- “Checking the Inventory” on page 29
- “Returning Damaged Equipment” on page 29
- “Unloading the Server with a Lifter” on page 29

## Verifying Site Preparation

Verifying site preparation is an essential part of a successful server installation. It includes the following tasks:

- Gather LAN information. Determine the IP addresses for the iLO MP LAN and the system LAN.
- Determine a method to physically connect to the server console.
- Verify electrical requirements. Ensure that grounding specifications and power requirements have been met.
- Validate server physical space requirements.
- Confirm environmental requirements.

For more information on server electrical, physical space, and environmental requirements, see the *HP Integrity rx6600 Site Preparation Guide*.

---

## Inspecting the Shipping Containers for Damage

HP shipping containers protect their contents under normal shipping conditions. After the equipment arrives, carefully inspect each carton for signs of shipping damage. Shipping damage constitutes moderate to severe damage, such as punctures in the corrugated carton, crushed boxes, or large dents. Normal wear or slight damage to the carton is not considered shipping damage. If you find shipping damage to a carton, contact your HP customer service representative immediately.

---

## Unpacking the Server

To unpack a server, follow these steps:

- Step 1.** Read the instructions printed on the outside top flap of the carton; remove the banding and the outer carton from the server pallet.
- Step 2.** Remove all inner accessory cartons and the top foam cushions, leaving only the server.

---

**IMPORTANT** Inspect each carton for shipping damage as you unpack the server.

---

---

## Checking the Inventory

The sales order packing slip lists all the equipment shipped from HP. Use this packing slip to verify that all the equipment has arrived.

---

**NOTE** To identify each item by part number, refer to the sales order packing slip.

---

---

## Returning Damaged Equipment

If the equipment is damaged, contact your HP customer service representative immediately. The service representative initiates appropriate action through the transport carrier or the factory and assists you in returning the equipment.

---

## Unloading the Server with a Lifter

---

**WARNING** Use caution when using a lifter. Because of the weight of the HP Integrity rx6600 server, you must center the server on the lifter forks before lifting it off the pallet to avoid injury.

---

---

**NOTE** HP recommends that you follow local guidelines when lifting equipment.

---

To unload the server from the pallet using a lifter, follow these steps:

- Step 1.** Unpack the server.
- Step 2.** Unroll the bottom corrugated tray on the side where you will place the lifter, and slide the server as close to that edge of the pallet as possible.
- Step 3.** Break off any foam packaging that can prevent you from fully inserting the lifter under the server.

---

**IMPORTANT** Do not remove the foam packaging from the corners of the server. This foam is required to elevate the server and enable the forks of the lifter to be inserted under the server.

---

- Step 4.** Insert the lifter forks under the server.
- Step 5.** Roll the lifter forward carefully until it is positioned against the side of the server.
- Step 6.** Raise the server slowly off the pallet until it clears the pallet cushions.
- Step 7.** Roll the lifter and server away from the pallet. Do not raise the server any higher than necessary when moving it to the rack.



---

# 3 Installing Additional Components

This chapter describes how to install components into the server that are not factory integrated. Most servers are preconfigured with all components installed prior to shipping from the HP factory. If you do not have additional components to install, you can skip this chapter and install the server.

This chapter addresses the following topics:

- “Removing and Replacing the Top Cover” on page 32
- “Removing and Replacing the Memory Carrier Assembly Cover” on page 34
- “Installing a Hot-Swappable Power Supply” on page 35
- “Removing and Replacing Hot-Swappable Disk Drive Fillers” on page 37
- “Installing a Hot-Pluggable Disk Drive” on page 38
- “Installing a PCI/PCI-X Card” on page 40
- “Removing and Replacing the Memory Carrier Assembly” on page 45
- “Installing System Memory DIMMs” on page 47
- “Removing and Replacing the Processor Board Assembly” on page 55
- “Installing a Dual-Core Processor” on page 57

## Removing and Replacing the Top Cover

---

**NOTE** When the top cover is open or removed, the chassis fan units increase to high speed to assist cooling. When the top cover is replaced at the end of the operation, the chassis fans return to normal speed.

---

### Removing the Top Cover

To remove the top cover, follow these steps:

- Step 1.** Unlock the cover release lever (Figure 3-1). Turn the cam 90 degrees counterclockwise.
  - Step 2.** Pull up on the cover release lever to disengage the top cover from the chassis (Figure 3-1).
- 

**NOTE** The cover release lever also disengages the memory carrier assembly cover. The memory carrier assembly cover can remain in place while servicing any components except for the memory carrier assembly and the processor board assembly.

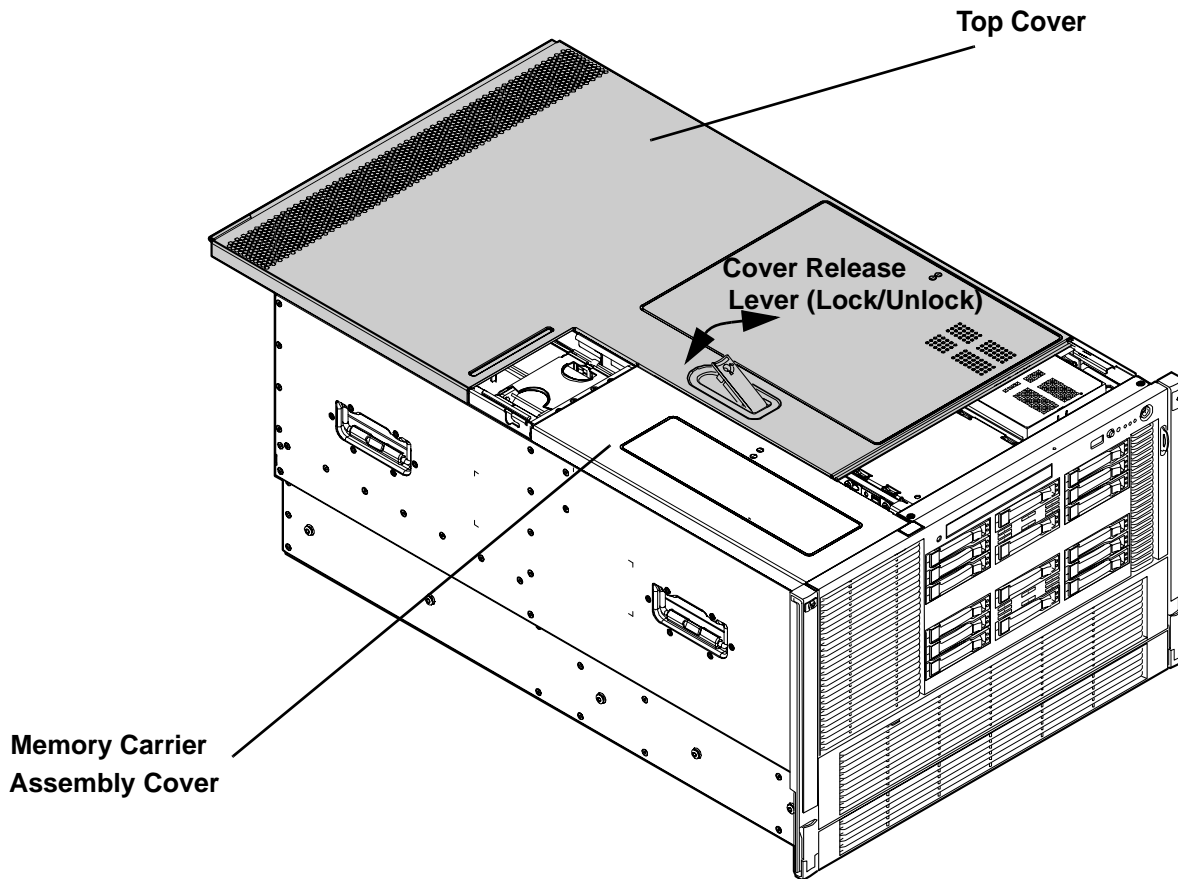
---

- Step 3.** Slide the cover toward the rear of the server until the tabs release from the slots in the chassis.



**Step 4.** Lift the cover off the chassis.

**Figure 3-1** Removing and Replacing the Top Cover



## Replacing the Top Cover

---

**NOTE** Always replace the memory carrier assembly cover before replacing the top cover.

---

To replace the top cover, follow these steps:

- Step 1.** Ensure the memory carrier assembly cover is in place.
- Step 2.** Ensure the cover release lever is in the unlocked position (Figure 3-1).
- Step 3.** Align the tabs of the top cover with the corresponding slots in the chassis. Insert the tabs into the slots.
- Step 4.** Slide the cover forward until it is flush with the front of the chassis.
- Step 5.** Push the cover release lever down into the latched position (Figure 3-1).
- Step 6.** Lock the cover release lever. Turn the cam 90 degrees clockwise.

---

## Removing and Replacing the Memory Carrier Assembly Cover

---

**NOTE** When the memory carrier assembly cover is open or removed, the chassis fan units increase to high speed to assist cooling. When the top cover is replaced at the end of the operation, the chassis fans return to normal speed.

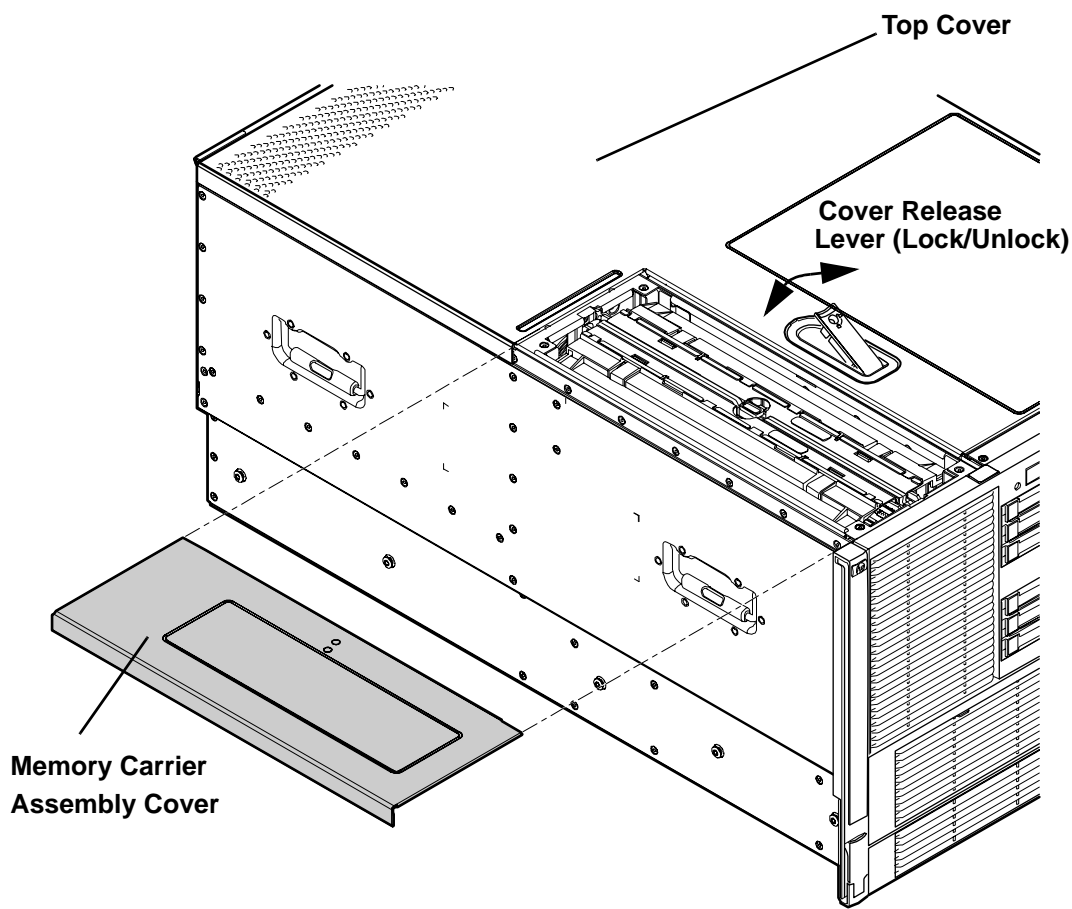
---

### Removing the Memory Carrier Assembly Cover

To remove the memory carrier assembly cover, follow these steps:

- Step 1.** Unlock the cover release lever. Turn the cam 90 degrees counterclockwise.
- Step 2.** Pull up on the cover release lever to disengage the top cover and memory carrier assembly cover from the chassis (Figure 3-1).
- Step 3.** Slide the memory carrier assembly cover toward the left side of the server to free it from the center of the chassis. Lift the cover off the chassis (Figure 3-2).

**Figure 3-2** Removing and Replacing the Memory Carrier Assembly Cover



## Replacing the Memory Carrier Assembly Cover

To replace the memory carrier assembly cover, follow these steps:

- Step 1.** Position the cover onto the opening above the memory carrier assembly.
- Step 2.** Slide the cover toward the right side of the server until it is flush with the center chassis wall.
- Step 3.** Slide the top cover forward until it is flush with the front of the chassis.
- Step 4.** Push the cover release lever down into the latched position (Figure 3-1).
- Step 5.** Lock the cover release lever. Turn the cam 90 degrees clockwise.

---

## Installing a Hot-Swappable Power Supply

The server can have one or two hot-swappable power supplies. These power supplies are located at the rear of the server. The supported configuration of the server requires a minimum of one power supply. You can install or replace a hot-swappable power supply using the procedures in this section when power is on or off.

---

**CAUTION** Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

---

**NOTE** A hot-swappable device does not require interaction with the operating system before the device is removed from or installed into the server.

The dc power to the server does not have to be off to install or replace a hot-swappable power supply.

---

## Power Supply Loading Guidelines

The supported configuration of the server requires a minimum of one power supply installed in either slot P0 or slot P1. You can install a second, optional hot-swappable power supply to provide 1+1 capability. The left side (viewed from the rear of the chassis) hot-swappable power supply is identified as P0, and the second hot-swappable power supply is identified as P1 (Figure 3-3).

---

**CAUTION** When a second power supply is not used, the empty power supply slot must remain covered with the supplied metal filler panel. Failure to observe this caution can result in damage due to overheating

---

## Installing a Power Supply

---

**CAUTION** Install the hot-swappable power supply into the server before attaching the new power cord. Failure to observe this caution can result in damage to the server

---

To install a hot-swappable power supply, follow these steps:

- Step 1.** Remove the metal filler panel if necessary.
- Step 2.** Support the power supply with both hands, and slide it into the empty slot until it clicks into place (Figure 3-3).

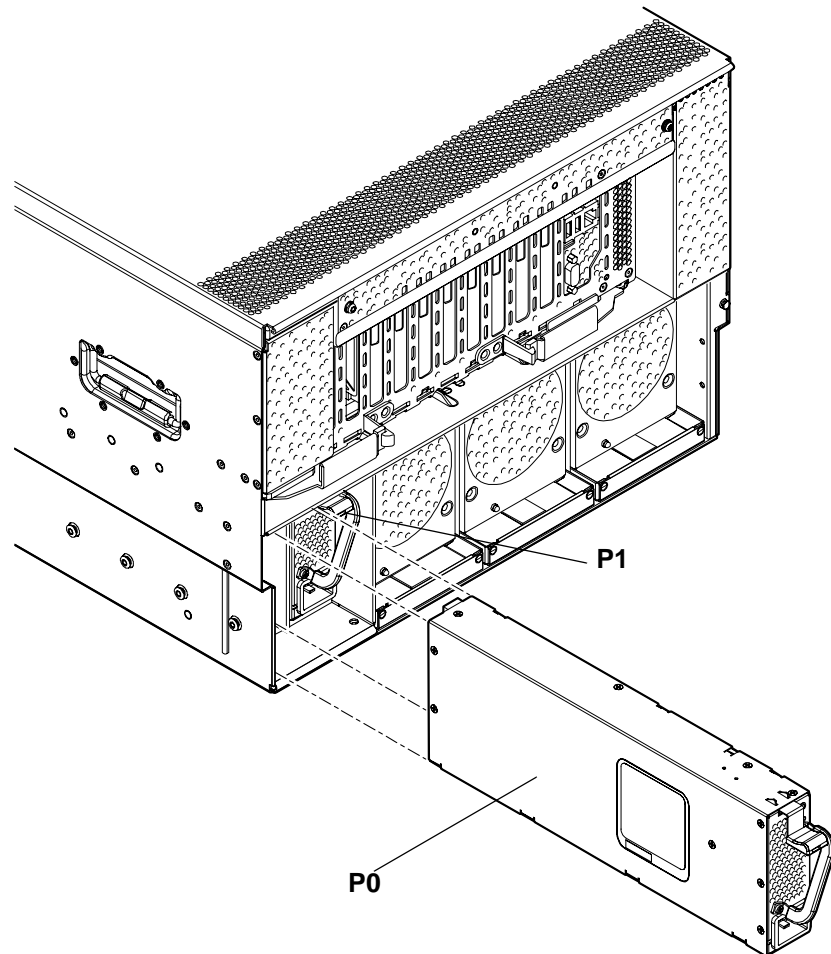
---

**IMPORTANT** Ensure the power supply is flush with the adjacent power supply or metal filler panel.

---

**Figure 3-3** Removing and Replacing a Hot-Swappable Power Supply

Rear Chassis View



---

## Removing and Replacing Hot-Swappable Disk Drive Fillers

There are disk drive fillers installed for all slots that do not contain a disk drive.

---

**IMPORTANT** For cooling purposes, always leave disk drive fillers in slots that do not contain a disk drive.

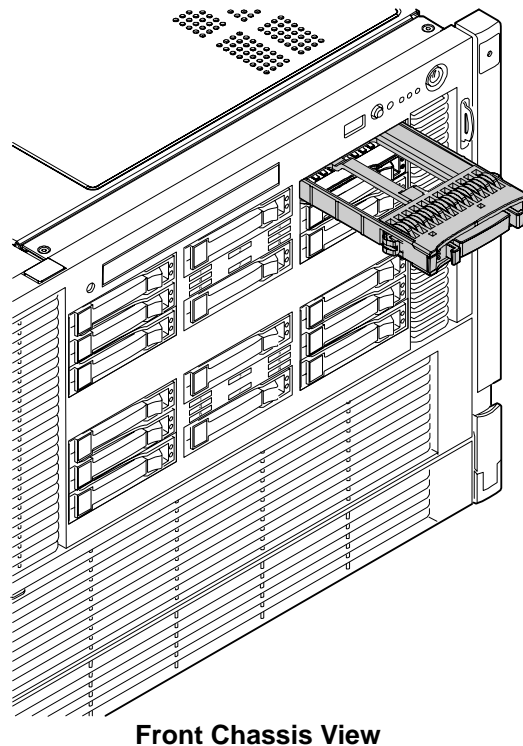
---

### Removing a Hot-Swappable Disk Drive Filler

To remove a hot-swappable disk drive filler, follow these steps:

- Step 1.** Squeeze the tabs on the front of the filler to release it from the slot in the drive bay.
- Step 2.** Pull gently until the filler slides out of the chassis.

**Figure 3-4** Removing and Replacing a Hot-Swappable Disk Drive Filler



### Replacing a Hot-Swappable Disk Drive Filler

To replace a hot-swappable disk drive filler, perform the following:

- Step 1.** Orient the disk drive filler so that the release tab is on the left side of the filler, and the airflow holes are on the right side of the filler.
- Step 2.** Insert the filler into the slot guides, and slide the filler into the slot until it clicks into place and is fully seated.

## Installing a Hot-Pluggable Disk Drive

There are 16 hot-pluggable disk drives located in the front of the server. You can replace the hot-pluggable disk drives using the procedures in this section when the server power is on or off.

---

**CAUTION** A hot-pluggable device may require interaction with the operating system before you can safely remove it from or install it into the server. Verify that the operating system supports removing and replacing disk drives while the operating system is running. If the operating system does not support this feature, shut down the operating system before attempting this procedure. Failure to observe this caution can result in system failure.

---

---

**NOTE** The replacement disk drive must have the same product number as the disk drive that you replace.

---

## Installing a Hot-Pluggable Disk Drive

To install a hot-pluggable disk drive, follow these steps:

**Step 1.** Use Figure 3-6 to determine the next available disk drive installation slot.

---

**NOTE** Drives are loaded in order, starting with number 1, working from left to right and top to bottom.

---

**Step 2.** Remove the disk drive filler if required. See “Removing and Replacing Hot-Swappable Disk Drive Fillers” on page 37.

---

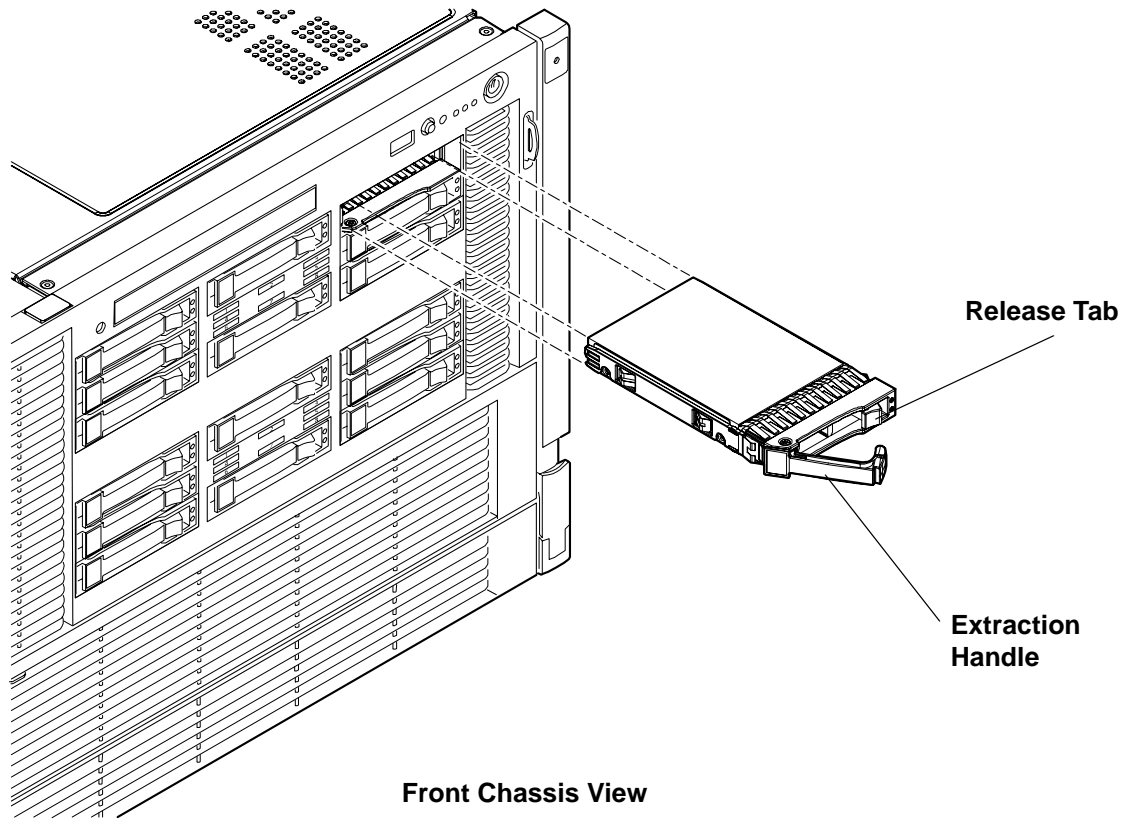
**NOTE** Save the disk drive filler for future use. For cooling purposes, always place disk drive fillers in slots that do not contain a disk drive.

---

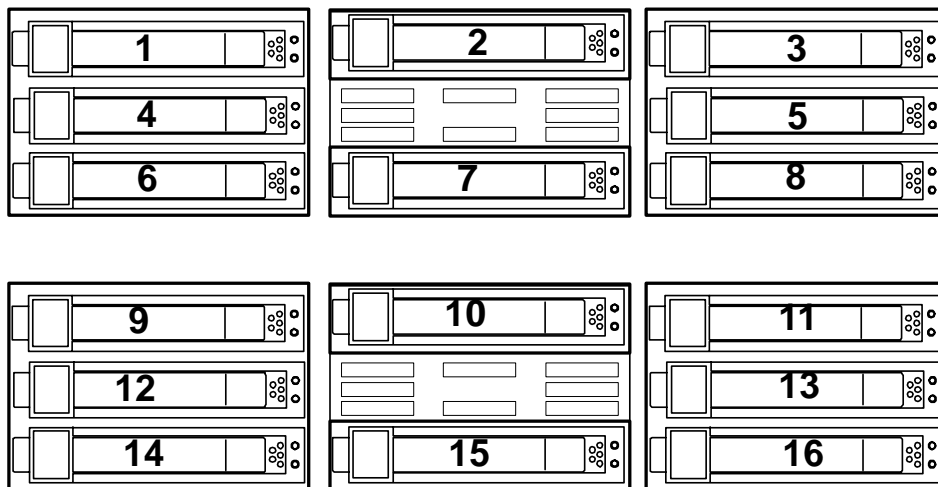
**Step 3.** Insert the hot-pluggable disk drive into the slot guides, and slide the drive into the slot until it seats into the socket on the disk backplane.

**Step 4.** Close the drive ejector handle by pushing it inward until it clicks into place.

**Figure 3-5** Removing and Replacing a Hot-Pluggable Disk Drive



**Figure 3-6** Disk Drive Slot IDs



---

## Installing a PCI/PCI-X Card

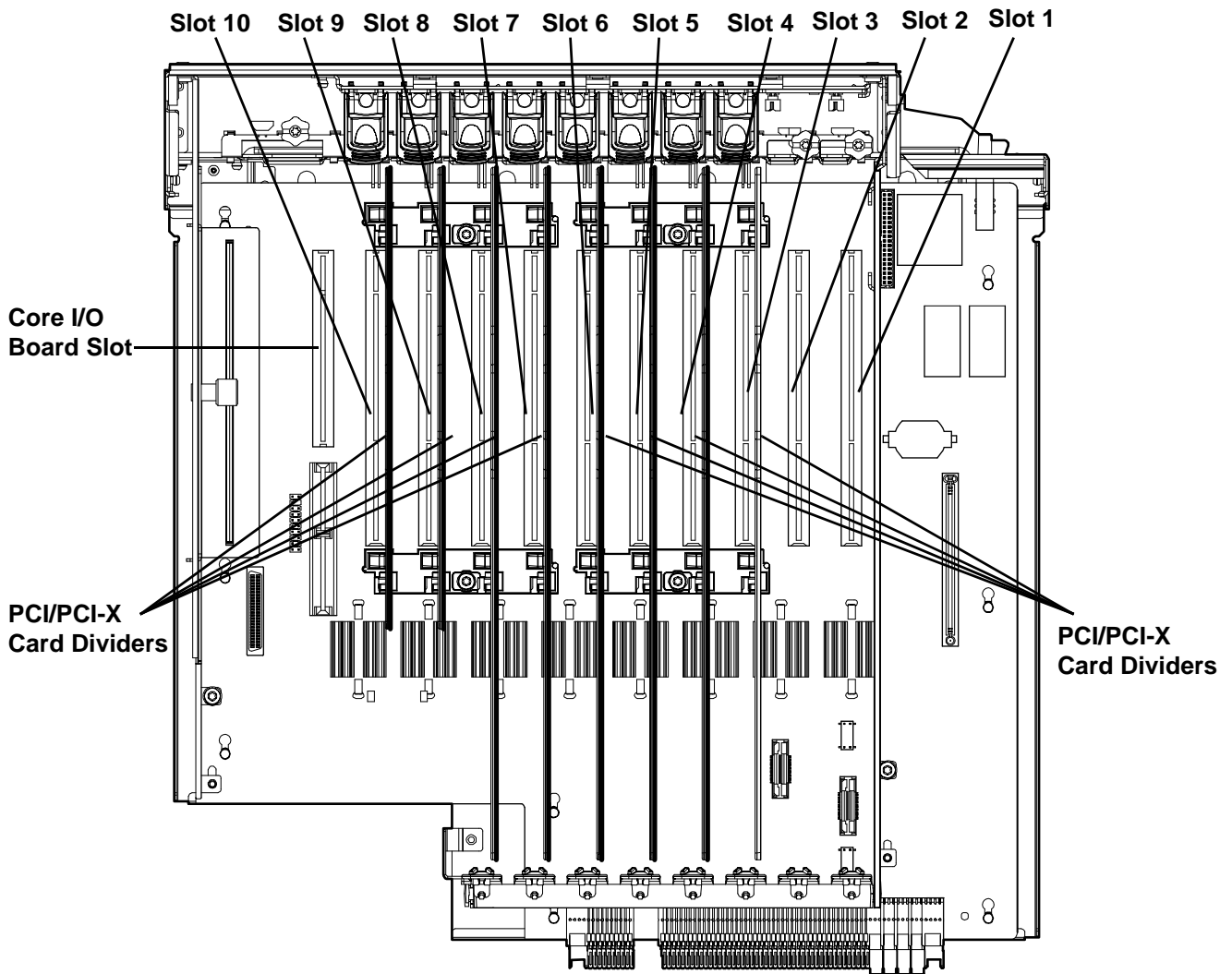
Figure 3-7 shows the PCI/PCI-X slot identification and card divider locations.

---

**NOTE** Slots 1 through 8 are full-length; slots 9 and 10 are short-length.

---

**Figure 3-7** PCI/PCI-X Slot Identification and Card Divider Locations





## PCI/PCI-X Configurations

PCI/PCI-X slots are numbered 1 through 10 in the server (Figure 3-7).

The following describes configuration requirements for slots 1 through 10:

- PCI-X slots 1 and 2 are reserved for use by the core I/O cards, SAS core I/O card in slot 1 and Gigabit Ethernet LAN core I/O card in slot 2. Slots 1 and 2 are not hot-pluggable. Install only the supported SAS and LAN core I/O cards in slots 1 and 2.

---

**IMPORTANT** If there are two SAS core I/O cards, they are installed in slots 1 and 2. In this case, the LAN core I/O card is installed in slot 10.

---

- Slots 3 and 4 are nonshared slots. The maximum speed for cards in slots 3 and 4 is PCI-X 266 MHz.
- Slots 5 and 6 are nonshared slots. The maximum speed for cards in slots 5 and 6 is PCI-X 133 MHz.
- Slots 7, 8, 9 and 10 are shared slots. These four slots are limited by bus mode or frequency related incompatibilities. The maximum capability of each slot is PCI-X 66 MHz.

---

**NOTE** Shared slots have card compatibility restrictions. If one of the shared slots is occupied, the card added to the second slot is limited by the configuration of the occupied slot. If the new card has a slower capability than the current bus configuration, it fails. If the new card has a faster capability than the current bus configuration, it only runs at the slower bus mode and frequency of the current bus configuration.

---

The following are common configuration scenarios for cards that use shared slots. These examples also apply to slots 9 and 10 because they are shared (both use a common bus).

- If there is a PCI-X 66 MHz card in slot 7, and you hot-plug a PCI 33 MHz card into slot 8, the operation fails. The new PCI 33 MHz card does not initialize and the slot powers down because you cannot change bus speed during hot-plug operations. The new card has a slower bus speed than the current card.

---

**NOTE** If the server is rebooted in the new configuration, both cards initialize to run at PCI 33 MHz. System firmware changes the bus capability down to the lowest common value.

---

- If there is a PCI 33 MHz card in slot 7, and you hot-plug insert a PCI-X 66 MHz card into slot 8, the new card works but it runs at PCI 33 MHz.
- If the server is powered off, and you insert a PCI 33 MHz card into slot 7 and a PCI-X 66 MHz card is installed in slot 8, both cards run at PCI 33 MHz when the server powers up.
- Do not exceed the following power consumption restrictions:
  - 3.3v only: nine cards at 25 watts each and one card at 15 watts
  - 5v only: five cards at 25 watts each and five cards at 15 watts each

Table 3-1 lists the PCI/PCI-X card slot frequency and bus mode compatibility for shared slots.

**Table 3-1 PCI/PCI-X Card Slot Frequency and Bus Mode Compatibility for Shared Slots<sup>a</sup>**

Current PCI Bus Mode and Frequency for the Current Card in a Shared Slot	Cards to be Installed				
	PCI 33	PCI 66	PCI-X 66	PCI-X 133	PCI-X 266
<b>PCI 33 MHz</b>	Compatible <sup>b</sup>	Compatible <sup>b</sup> New card running at PCI 33	Compatible <sup>b</sup> New card running at PCI 33	Compatible <sup>b</sup> New card running at PCI 33	Compatible <sup>b</sup> New card running at PCI 33
<b>PCI 66 MHz</b>	Incompatible-frequency <sup>c</sup>	Compatible <sup>b</sup> New card running at PCI 66	Compatible <sup>b</sup> New card running at PCI 66	Compatible <sup>b</sup> New card running at PCI 66	Compatible <sup>b</sup> New card running at PCI 66
<b>PCI-X 66 MHz</b>	Incompatible-frequency <sup>c</sup>	Incompatible-bus <sup>d</sup>	Compatible <sup>b</sup> New card running at PCI-X 66	Compatible <sup>b</sup> New card running at PCI-X 66	Compatible <sup>b</sup> New card running at PCI-X 66

- a. The conditions described in this table apply only to shared slots 7, 8, 9, and 10. Slots 1, 2, 3, 4, 5, and 6 are not shared slots.
- b. Compatible: Card is accepted and runs at the frequency shown.
- c. Incompatible frequency: Card does not work. The new card does not initialize and powers down due to frequency mismatch.
- d. Incompatible bus: Card does not work. The new card does not initialize and powers down due to bus mode mismatch.

### PCI/PCI-X Card Path Logging

Some PCI/PCI-X failures result in I/O path logging. These paths help to indicate the source of the error and can be included in the error message or logged into console or event logs.

Table 3-2 describes the PCI/PCI-X I/O paths for the server.

**Table 3-2 PCI/PCI-X I/O Paths**

Slot	Location as Viewed from Rear of Chassis	HP-UX Device Path	EFI Device Path	Function Associated with Path
Slot 1	Left-most slot nearest to power supply	0/4/1/*	Acpi(HWP0002,400)/Pci(1   *)	SAS core I/O card
Slot 2	2nd from left	0/4/2/*	Acpi(HWP0002,400)/Pci(2   *)	Dual port Gigabit LAN (reserved)
Slot 3	3rd from left	0/7/1/*	Acpi(HWP0002,700)/Pci(1   *)	I/O with 266 MHz/ 64-bit PCI-X card
Slot 4	4th from left	0/3/1/*	Acpi(HWP0002,300)/Pci(1   *)	I/O with 266 MHz/ 64-bit PCI-X card
Slot 5	5th from left	0/6/1/*	Acpi(HWP0002,600)/Pci(1   *)	I/O with 133 MHz/ 64-bit PCI-X card
Slot 6	6th from left	0/2/1/*	Acpi(HWP0002,200)/Pci(1   *)	I/O with 133 MHz/ 64-bit PCI-X card
Slot 7	7th from left	0/5/1/*	Acpi(HWP0002,500)/Pci(1   *)	I/O with 66 MHz/ 64-bit PCI-X card (shared with slot 8)
Slot 8	8th from left	0/5/2/*	Acpi(HWP0002,500)/Pci(2   *)	I/O with 66 MHz/ 64-bit PCI-X card (shared with slot 7)
Slot 9	9th from left	0/1/1/*	Acpi(HWP0002,100)/Pci(1   *)	I/O with 66 MHz/ 64-bit PCI-X card (shared with slot 10)
Slot 10	10th from left nearest to core I/O board	0/1/2/*	Acpi(HWP0002,100)/Pci(2   *)	I/O with 66 MHz/ 64-bit PCI-X card (shared with slot 9)
Core I/O board	Right most special slot	0/0/1/*	Acpi(HWP0002,0)/Pci(1   *)	Core I/O MP
Core I/O board	Right most special slot	0/0/2/*	Acpi(HWP0002,0)/Pci(2   *)	Core I/O USB
Core I/O board	Right most special slot	0/0/4/*	Acpi(HWP0002,0)/Pci(4   *)	Core I/O VGA (optional)

## Offline Installation of a PCI Card

Ensure that you install the proper drivers for PCI/PCI-X cards after you complete the server installation and power on the server.

To install a PCI/PCI-X card with the power off, follow these steps:

- Step 1.** Remove the top cover from the chassis. See “Removing the Top Cover” on page 32.
- Step 2.** Select an empty slot that is appropriate for the card you are installing. To locate an appropriate slot, see “PCI/PCI-X Configurations” on page 41 and Figure 3-7.
- Step 3.** Open the MRL.
  - a.** Press the indentation on the MRL to release it from the chassis wall.
  - b.** Lift the edge of the MRL and rotate it upward 90 degrees until it rests against the chassis wall and the PCI/PCI-X card bulkhead filler is fully exposed.
- Step 4.** Remove the PCI/PCI-X bulkhead filler.
- Step 5.** Insert the PCI/PCI-X card into the empty slot and exert firm, even pressure to seat the card in the slot.

---

**CAUTION** Ensure that you fully seat the card into the slot or the card can fail after power is reapplied to the slot.

---

- Step 6.** Connect all internal and external cables to the PCI/PCI-X card.
- Step 7.** Close the MRL.
  - a.** Rotate the MRL downward 90 degrees.
  - b.** Push the edge of the MRL down until it clicks into place on the PCI/PCI-X card bulkhead.
- Step 8.** Close the gate latch to secure the end of the card if it is full length.
- Step 9.** Replace the top cover. See “Replacing the Top Cover” on page 33.

---

## Removing and Replacing the Memory Carrier Assembly

The memory carrier assembly encloses the system DIMMs. There is one memory carrier assembly that is available for the server, the 48-DIMM memory carrier assembly.

The memory carrier assembly has two sides, 0 and 1, each of which contain a 24-DIMM memory board. System DIMMs seat onto the memory boards.

Table 3-3 lists the supported memory carrier assembly configurations.

**Table 3-3 Supported Memory Carrier Assembly Configurations**

Memory Carrier Configuration	Memory Boards Installed
24-DIMM memory carrier (configuration 1)	1 X 24-DIMM memory board
48-DIMM memory carrier (configuration 2)	2 X 24-DIMM memory boards

---

**CAUTION** Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

---

### Removing the Memory Carrier Assembly

---

**WARNING** Ensure that the system is powered off and all power sources have been disconnected from the server prior to performing this procedure.

**Voltages are present at various locations within the server whenever an ac power source is connected. This voltage is present even when the main power switch is in the off position.**

**Failure to observe this warning can result in personal injury or damage to equipment.**

---

To remove the memory carrier assembly, follow these steps:

**Step 1.** Unlatch the cover release lever on the top cover and remove the memory carrier assembly cover. See “Removing the Memory Carrier Assembly Cover” on page 34.

---

**NOTE** You do not need to fully remove the top cover to service this component; however, the top cover release lever must be open.

---

**Step 2.** Press the button located in the center of the memory carrier assembly to release the extraction handles (Figure 3-8).

---

**CAUTION** Manipulate the extraction handles with care. Failure to observe this caution can result in damage to the extraction handles.

---

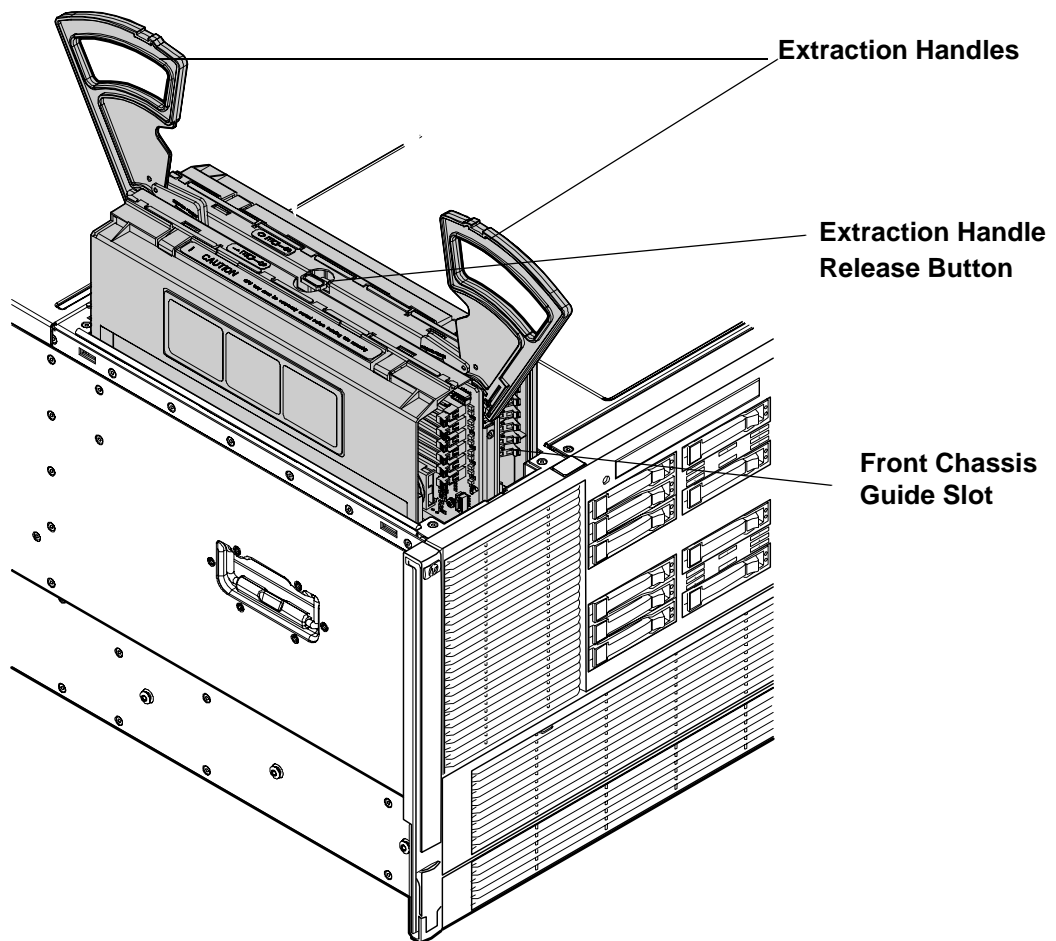
- Step 3.** Pull up on the extraction handles and rotate them outward 90 degrees (Figure 3-8) until they click open.
- Step 4.** Lift the memory carrier assembly out of the chassis (Figure 3-8).

---

**NOTE** To avoid damage to the handles, HP recommends rotating the handles inward and snapping them into place when servicing the system DIMMs or any time the carrier is out of the chassis. Before replacing the memory carrier, press the button to release the extraction handles. Use the handles to replace the memory carrier into the chassis.

---

**Figure 3-8** Removing and Replacing the Memory Carrier Assembly



## Replacing the Memory Carrier Assembly

---

**CAUTION** Ensure the processor board assembly is fully seated before you replace the memory carrier assembly. The processor board assembly access door must be flush with the front bezel.

---

To replace the memory carrier assembly, follow these steps:

**Step 1.** Ensure that the extraction handles are positioned in the outward, unlocked position.

**Step 2.** Align the memory carrier assembly with the front and rear chassis guide slots.

---

**NOTE** Assembly side 0 is on the left, and assembly side 1 is on the right as viewed from the front of the chassis.

---

**Step 3.** Slide the memory carrier assembly into the chassis until it begins to seat into the socket located on the processor board.

---

**CAUTION** Do not apply excessive force when closing the extraction handles and seating the memory carrier assembly into the socket on the processor board. Manipulate the extraction handles with care; failure to observe these cautions can result in damage to the extraction handles and other server components.

---

**Step 4.** Rotate the extraction handles inward and press the handles straight down until they snap into the locked position.

**Step 5.** Replace the memory carrier assembly cover and latch the top cover release lever. See “Replacing the Memory Carrier Assembly Cover” on page 35.

---

---

## Installing System Memory DIMMs

System memory DIMMs are located on a pair of memory boards inside the memory carrier assembly.

---

**WARNING** Ensure that the system is powered off and all power sources have been disconnected from the server prior to performing this procedure.

**Voltages are present at various locations within the server whenever an ac power source is connected. This voltage is present even when the main power switch is in the off position.**

**Failure to observe this warning can result in personal injury or damage to equipment.**

---

**CAUTION** Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

---

Figure 3-9 shows the memory carrier assembly removed from the chassis.

**Figure 3-9** Memory Carrier Assembly

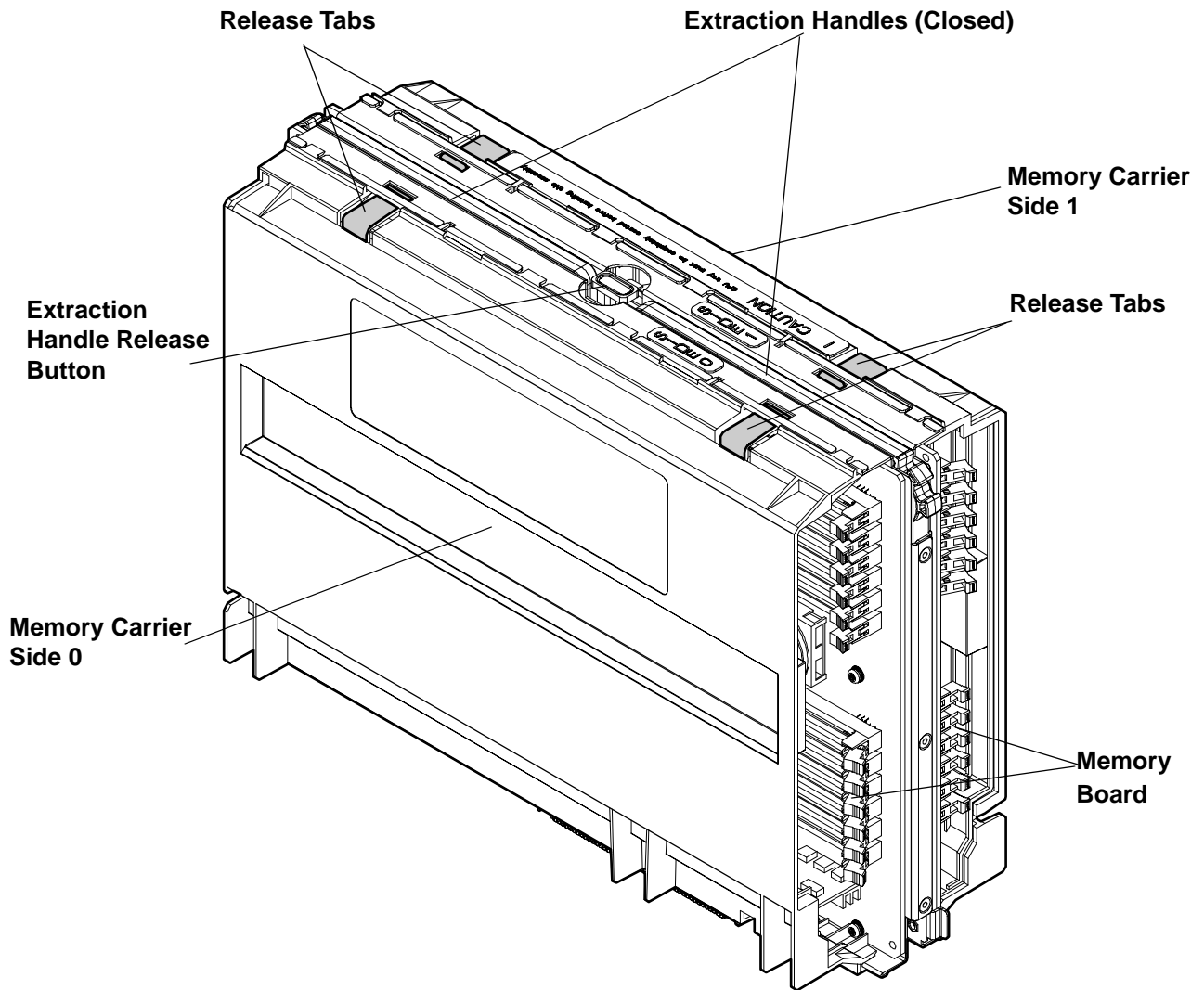
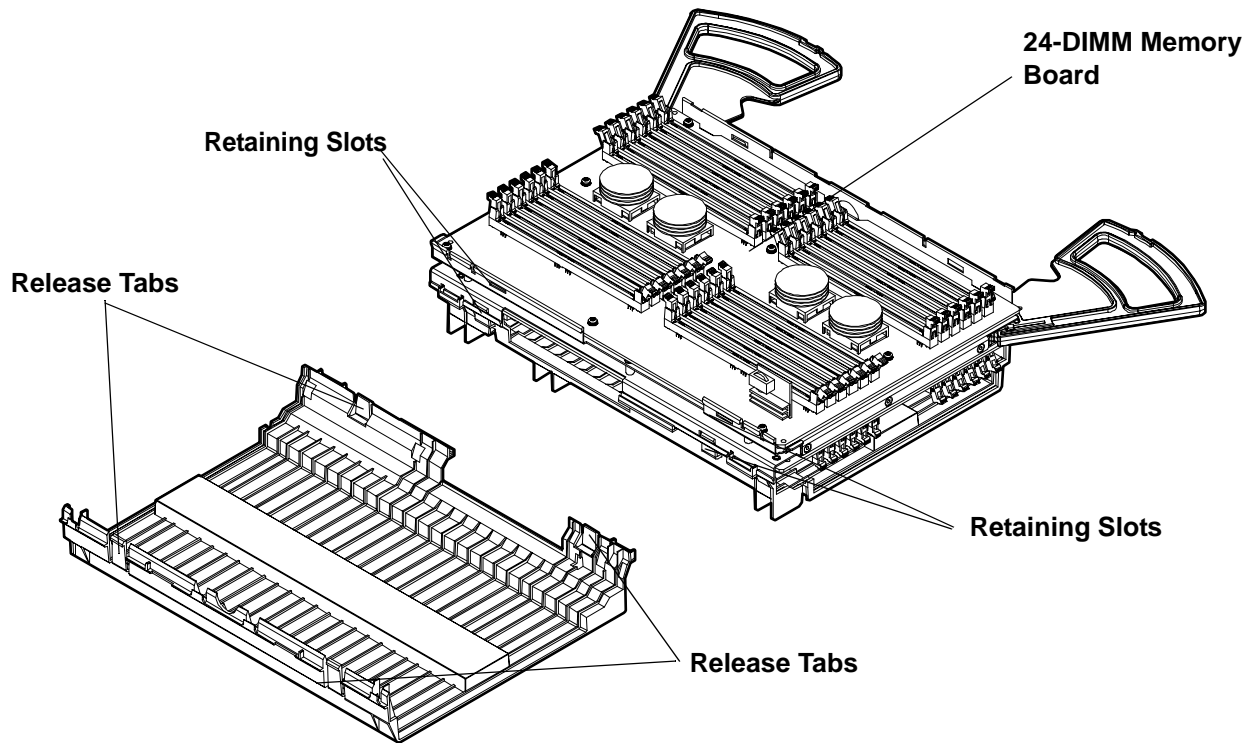




Figure 3-10 shows the memory carrier with the side cover open.

**Figure 3-10** Memory Carrier Assembly with Side Cover Open



## Memory Installation Conventions

Before installing memory, read and understand the following memory installation conventions:

- Supported DIMM sizes and memory configurations
- DIMM load order
- DIMM slot IDs

### Supported DIMM Sizes and Memory Configurations

The standard server configuration includes a 48-DIMM memory carrier, which contains one or two 24-DIMM memory boards.

System DIMMs seat onto the memory boards. The minimum server configuration requires at least one memory quad, or group of four DIMMs.

The following are the supported DIMM sizes for the server:

- 512 MB
- 1 GB
- 2 GB

Table 3-4 lists the supported memory configurations for the server.

**Table 3-4 Memory Configuration Requirements**

Memory Carrier Type	Memory Boards Installed	Minimum Memory Configuration	Maximum Memory Configuration
24-DIMM memory carrier (configuration 1)	1 X 24-DIMM memory board	2 GB (one quad: four 512 MB DIMMs)	48 GB (six quads: 24 X 2 GB DIMMs)
48-DIMM memory carrier (configuration 2)	2 X 24-DIMM memory boards	2 GB (one quad: four 512 MB DIMMs)	96 GB (12 quads: 48 X 2 GB DIMMs)

### Memory Load Order

When installing memory, use a minimum of one quad of like-sized DIMMs. Insert additional DIMMs into the 48-DIMM memory carrier in the next available quad, in order of capacity from largest to smallest.

Install DIMMs into the appropriate slots on the 48-DIMM memory carrier boards; each slot has a unique ID. Use Figure 3-11 to determine where to install DIMMs on the memory carrier board.

---

**CAUTION** Failure to observe these cautions results in system degradation or failure.

- Do not mix DIMM sizes or types within a quad.
  - Load DIMM quads in order of size from largest to smallest. For example, if you have a quad of 2 GB DIMMs and a quad of 1 GB DIMMs, install the quad of 2 GB DIMMs first.
- 

### 24-DIMM Memory Carrier Load Order

For a single 24-DIMM memory board configuration, load DIMMs in order from quad 0 to quad 5.

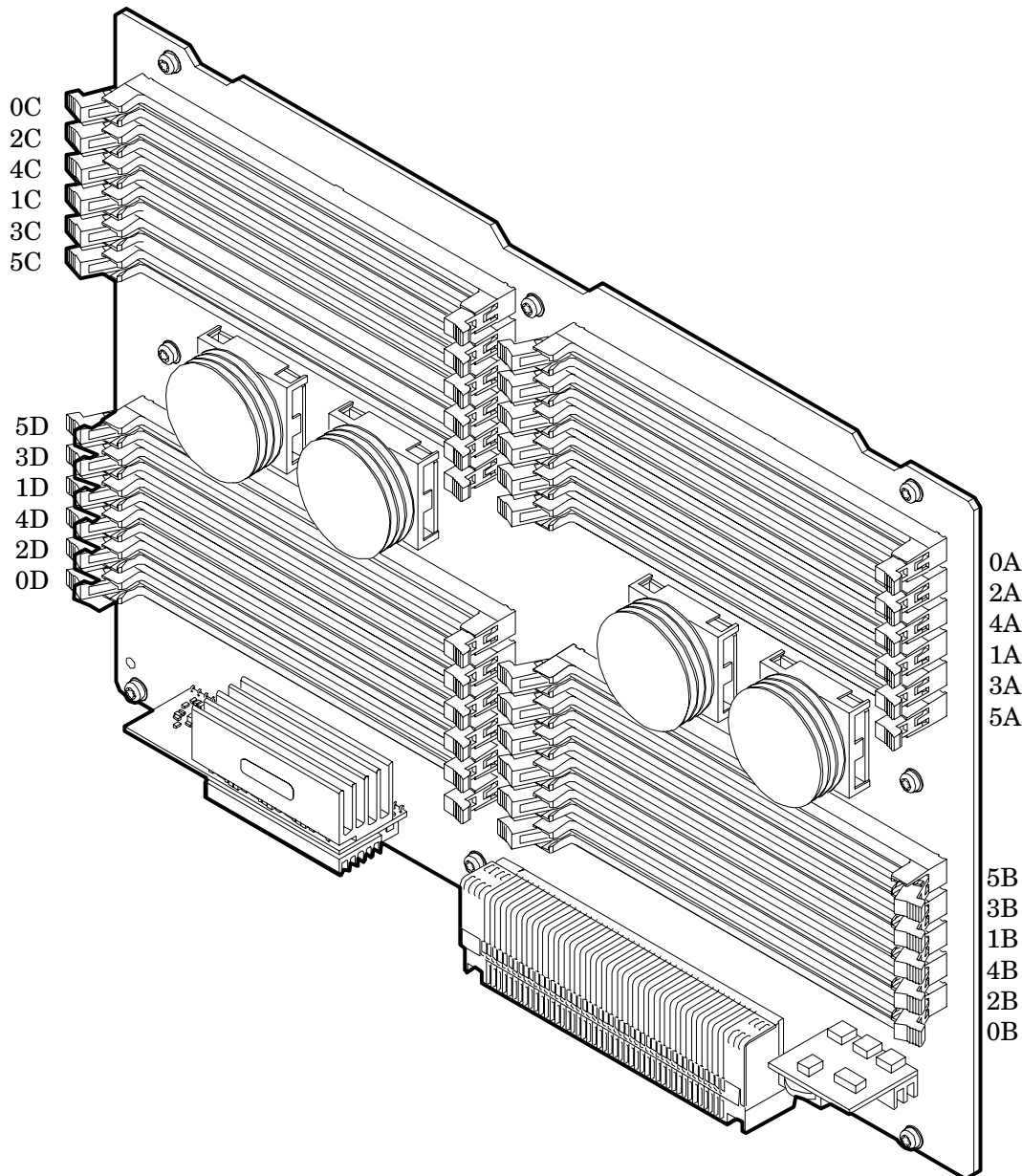
### 48-DIMM Memory Carrier Load Order

The 48-DIMM memory carrier has two sides, labeled side 0 and side 1, each of which can contain a memory carrier board. The 48-DIMM memory carrier can contain up to 12 quads of memory. DIMM quads are loaded in order of capacity from largest to smallest.

The DIMM slot IDs are the same for both 24-DIMM memory carrier boards. Unique slots are identified within the carrier by the side in which they reside. For example, slot 0A is identified as slot 0A, side 0; or slot 0A, side 1.

Figure 3-11 shows the DIMM slot IDs for the 48-DIMM memory carrier board.

**Figure 3-11** 48-DIMM Memory Carrier Board Slot IDs



### Memory Loading Rules and Guidelines

Use the following rules and guidelines when installing memory:

- Install DIMMs in quads.
- Ensure that all DIMMs within a quad are identical.
- Install quads in order of capacity from largest to smallest. For example, install all 2 GB quads before 1 GB or smaller quads, and install all 1 GB quads before 512 MB quads.
- Side 0 must have equal or greater memory capacity than side 1.

- Install DIMM quads based on the following rules:
  1. Load quads into either side of the memory carrier in order, starting with quad 0 and ending with quad 5.
  2. Install the first quad in side 0, quad 0.
  3. Install the second quad in side 1, quad 0.
  4. For the remaining quads:
    - a. If both sides of the memory carrier contain the same capacity of memory, install the next quad in side 0.
    - b. If side 0 contains more memory capacity than side 1, install the next quad in side 1.
    - c. If side 1 is full, install the remaining quads in side 0.

Table 3-5 shows several examples of proper memory carrier loading order.

---

**IMPORTANT** The number in parenthesis indicates the order in which the quads are loaded.

---

**Table 3-5 48-DIMM Memory Carrier Loading Examples**

	Quad Number	Quad Slot IDs	Memory Carrier Side 0	Memory Carrier Side 1
<b>Example 1</b>				
	0	0A; 0B; 0C; 0D	2 GB DIMMs (1)	2 GB DIMMs (2)
	1	1A; 1B; 1C; 1D	2 GB DIMMs (3)	2 GB DIMMs (4)
	2	2A; 2B; 2C; 2D	1 GB DIMMs (5)	1 GB DIMMs (6)
	3	3A; 3B; 3C; 3D	1 GB DIMMs (7)	1 GB DIMMs (8)
	4	4A; 4B; 4C; 4D	512 MB (9)	512 MB (10)
	5	5A; 5B; 5C; 5D	512 MB (11)	512 MB (12)
<b>Example 2</b>				
	0	0A; 0B; 0C; 0D	2 GB DIMMs (1)	1 GB DIMMs (2)
	1	1A; 1B; 1C; 1D	1 GB DIMMs (4)	1 GB DIMMs (3)
	2	2A; 2B; 2C; 2D	512 MB (7)	512 MB (5)
	3	3A; 3B; 3C; 3D	512 MB (9)	512 MB (6)
	4	4A; 4B; 4C; 4D		512 MB (8)
	5	5A; 5B; 5C; 5D		512 MB (10)
<b>Example 3</b>				
	0	0A; 0B; 0C; 0D	2 GB DIMMs (1)	512 MB (2)
	1	1A; 1B; 1C; 1D	512 MB (6)	512 MB (3)

**Table 3-5 48-DIMM Memory Carrier Loading Examples (Continued)**

	Quad Number	Quad Slot IDs	Memory Carrier Side 0	Memory Carrier Side 1
	2	2A; 2B; 2C; 2D	512 MB (8)	512 MB (4)
	3	3A; 3B; 3C; 3D		512 MB (5)
	4	4A; 4B; 4C; 4D		512 MB (7)
	5	5A; 5B; 5C; 5D		512 MB (9)

## Installing Memory

---

**IMPORTANT** You must pull the ac power plugs on the server every time you modify the DIMMs. If you do not pull the ac power plugs, the system does not display the correct DIMM information.

---

To install memory, follow these steps:

**Step 1.** Unlatch the cover release lever on the top cover and remove the memory carrier assembly cover. See “Removing the Memory Carrier Assembly Cover” on page 34.

---

**NOTE** You do not need to fully remove the top cover to service this component. However, the top cover release lever must be open.

---

**Step 2.** Remove the memory carrier assembly. See “Removing the Memory Carrier Assembly” on page 45.

---

**NOTE** To avoid damage to the handles, HP recommends rotating the handles inward and snapping them into place when servicing the system DIMMs or any time the carrier is out of the chassis. Before replacing the memory carrier, press the button to release the extraction handles. Use the handles to replace the memory carrier into the chassis.

---

**Step 3.** Complete the following memory installation prerequisite tasks before installing the memory:

- a. Determine the DIMM load order for the 48-DIMM memory carrier. For more information, see “Memory Load Order” on page 50.
- b. Use Figure 3-11 to determine the DIMM slots to populate.
- c. Read, understand, and follow the general guidelines to install memory in the server. See “Memory Loading Rules and Guidelines” on page 51.

**Step 4.** Lay the memory carrier assembly on side 0 or side 1 so that the memory carrier side that contains the DIMM slots that you will install DIMMs into faces upward (Figure 3-9).

**Step 5.** Remove the memory carrier assembly side cover.

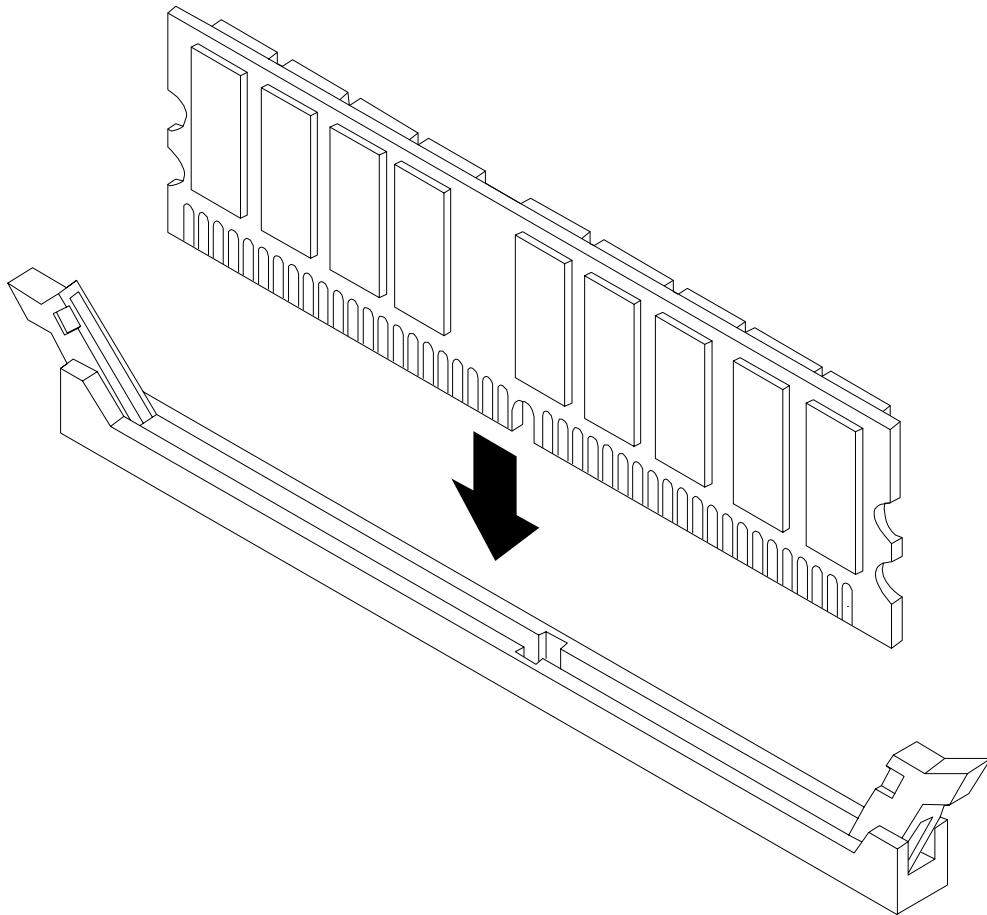
- a. Press the release tabs (Figure 3-9) on both sides of the extraction handle release button until the side cover releases from the top center of the assembly.

- b. Rotate the side cover slightly to free the tabs from the retaining slots at the base of the assembly (Figure 3-10).
- c. Lift the side cover off the assembly.

**Step 6.** Install the DIMMs (Figure 3-12).

- a. Align the DIMM with the slot located on the memory board, and align the key in the connector with the notch in the DIMM.
- b. Push on each end of the DIMM firmly and evenly until it seats into the slot.
- c. Ensure that the extraction levers are in the fully closed position.

**Figure 3-12**      **Inserting a DIMM into the Memory Board Connector**



**Step 7.** Replace the memory carrier assembly side cover.

- a. Insert the side cover tabs into the retaining slots at the base of the assembly (Figure 3-10).
- b. Insert the tabs (Figure 3-9) into the slots on both sides of the extraction handle release button until the side cover snaps into place.

---

**NOTE**      To install DIMMs into slots on the other side of the memory carrier, turn the carrier over to the opposite side (side 0 or side 1) and repeat the installation procedure.

---

- Step 8.** Replace the memory carrier assembly and latch the top cover release lever. See “Replacing the Memory Carrier Assembly” on page 47.

---

## Removing and Replacing the Processor Board Assembly

The processor board assembly holds one, two, three, or four dual-core Itanium processors and is located beneath the disk drives and memory carrier assembly in the bottom service bay. The processor board is mounted onto a removable carrier tray, which is retained in the service bay by a hinged access door.

---

**WARNING** Ensure that the system is powered off and all power sources have been disconnected from the server prior to performing this procedure.

Voltages are present at various locations within the server whenever an ac power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

---

**CAUTION** Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

---

### Removing the Processor Board Assembly

To remove the processor board assembly, follow these steps:

- Step 1.** Unlatch the cover release lever on the top cover and remove the memory carrier assembly cover. See “Removing the Memory Carrier Assembly Cover” on page 34. You do not need to fully remove the top cover to service this component; however, the top cover release lever must be open.
- Step 2.** Remove the memory carrier assembly. See “Removing the Memory Carrier Assembly” on page 45.

---

**NOTE** You must remove the memory carrier because it attaches directly to the processor board.

---

- Step 3.** Press the button located on top of the bezel, directly in front of the memory carrier assembly to release the processor board access door (Figure 3-13).

---

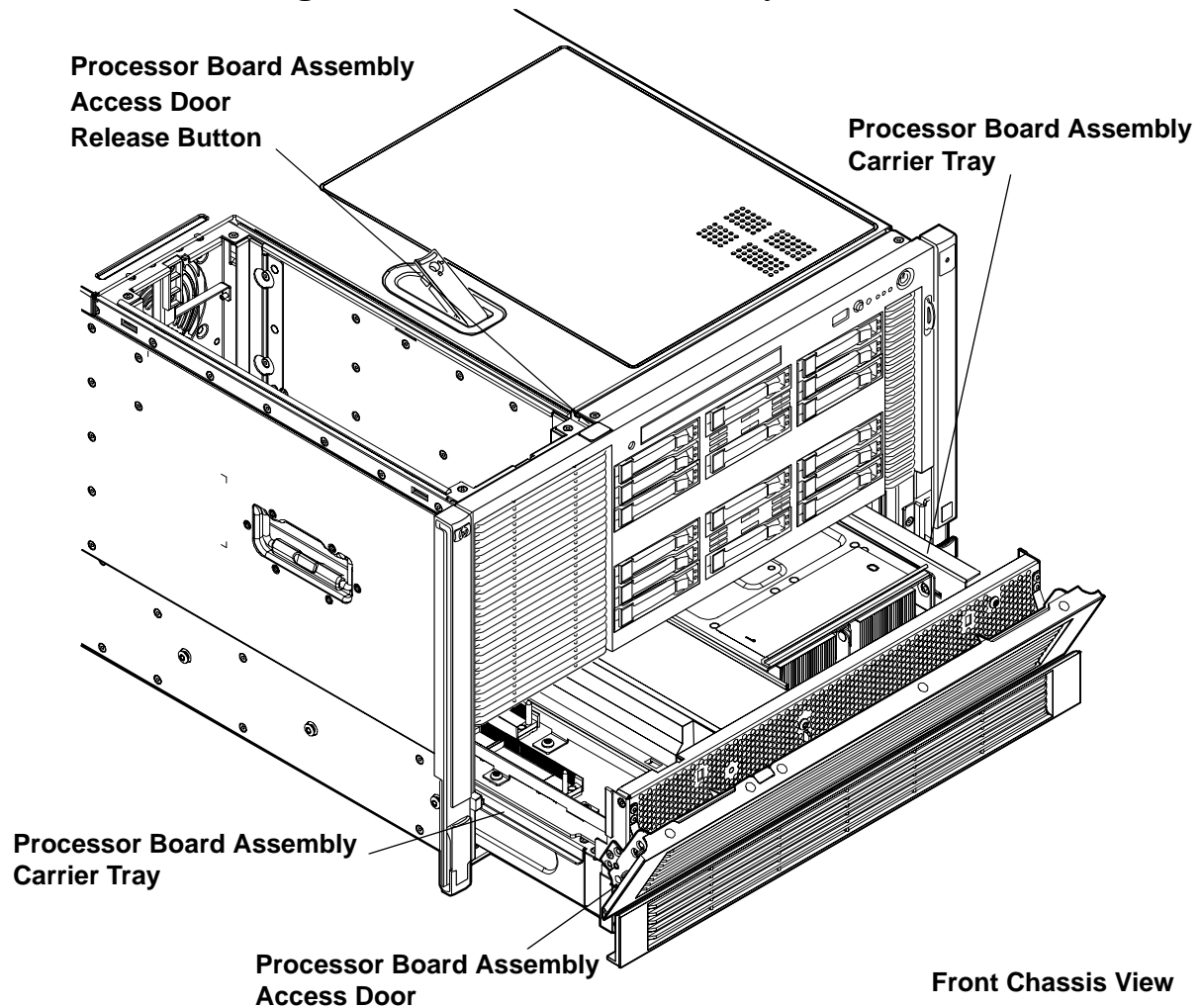
**CAUTION** The processor board access door opens at a 30 degree angle. Do not force the door to open to a greater angle. Failure to observe this warning results in damage to server components.

---

- Step 4.** Use the processor board assembly access door as a handle and gently slide the assembly out of the chassis approximately six inches.

**Step 5.** Grasp the handholds on the assembly carrier tray with both hands and carefully slide the assembly out of the chassis (Figure 3-13).

**Figure 3-13 Removing the Processor Board Assembly**



## Replacing the Processor Board Assembly

To replace the processor board assembly, follow these steps:

- Step 1.** Remove the processor board assembly.
- Step 2.** Align the edges of the processor board assembly with the assembly guides in the chassis.
- Step 3.** Slide the processor board assembly into the chassis until it begins to seat into the socket located on the midplane board.
- Step 4.** Push the processor board access door upward until it locks into position.
- Step 5.** Replace the memory carrier assembly. See “Replacing the Memory Carrier Assembly” on page 47.
- Step 6.** Replace the memory carrier assembly cover and latch the top cover release lever closed. See “Replacing the Memory Carrier Assembly Cover” on page 35.



---

## Installing a Dual-Core Processor

The server uses dual-core processors. Each processor contains two cores that function as separate processors. Dual-core processors double the processing power of the server while maintaining the physical dimensions of a single processor.

The server can contain one, two, three, or four dual-core processors that provide the following configuration options:

- 1P/2C (One processor/two cores)
- 2P/4C (Two processors/four cores)
- 3P/6C (Three processors/six cores)
- 4P/8C (Four processors/eight cores)

If the server has fewer than the maximum number of dual-core processors installed, install the processors in the appropriate slot.

---

**WARNING** Ensure that the system is powered off and all power sources have been disconnected from the server prior to performing this procedure.

**Voltages are present at various locations within the server whenever an ac power source is connected. This voltage is present even when the main power switch is in the off position.**

**Failure to observe this warning can result in personal injury or damage to equipment.**

---

---

**CAUTION** Ensure that processor speed and cache size are identical for all processors. Failure to observe this caution results in performance degradation or system failure.

To ensure compatibility, HP recommends that you use dual-core processors with identical part numbers.

---

---

**CAUTION** Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

---

### Processor Load Order

You can install up to four dual-core processors on the processor board. If fewer than the maximum number of dual-core processors are installed (one, two, or three in the HP Integrity rx6600 server), install them in the designated locations on the processor board.

The slots on the processor board are labeled Module 0, Module 1, Module 2, and Module 3. The Module 0 and Module 1 slots are located on the top of the processor board assembly, and the Module 2 and Module 3 slots are located on the underside of the processor board assembly.

---

**IMPORTANT** Use the supplied handholds to turn the processor board assembly over if you are servicing the Module 2 or Module 3 slots.

---

Install the first processor in the Module 0 slot. Install the second dual-core processor in the Module 1 socket, and so on. The load sequence is described in Table 3-6.

**Table 3-6 Processor Load Order**

Dual-Core Processor	Slot
1	Module 0
2	Module 1
3	Module 2
4	Module 3

## Required Tools

To install and remove processors, use the processor install tool fastened to the processor board.

## Installing a Dual-Core Processor

Prior to installing a dual-core processor into the server, read the following instructions carefully and refer to the figures in this chapter for a complete understanding of this process. To install a dual-core processor, follow these steps:

- Step 1.** Remove the memory carrier assembly cover. See “Removing the Memory Carrier Assembly Cover” on page 34. You do not need to fully remove the top cover to service this component; however, the top cover release lever must be open.
- Step 2.** Remove the memory carrier assembly. See “Removing the Memory Carrier Assembly” on page 45.

---

**NOTE** You must remove the memory carrier assembly because it attaches directly to the processor board.

---

- Step 3.** Remove the processor board assembly. See “Removing the Processor Board Assembly” on page 55.
- Step 4.** Open the processor cage (Figure 3-14).
- a. Grasp the processor cage handle and rotate the handle upward.
  - b. Use the handle to rotate the cage closure 90 degrees toward the front of the assembly until it stops.

---

**IMPORTANT** Ensure the processor slot is entirely exposed. The processor must clear the cage closure for proper installation.

---

- Step 5.** Locate the appropriate processor slot (Module 0 or Module 1) to install the processor into (Figure 3-14).

**Step 6.** Remove the plastic airflow blocker covering the processor slot if required.

**Step 7.** Remove the protective dust cover from the processor socket if required.

**Step 8.** Ensure that the cam on the processor socket lock is in the unlocked, counterclockwise position (Figure 3-16). The zero insertion force (ZIF) socket for the processor is locked and unlocked by half a turn of the processor install tool. Rotate the cam counterclockwise 180 degrees (half turn) to unlock the socket.

---

**CAUTION** Attempting to turn the locking mechanism more than 180 degrees can severely damage the socket.

---

**Step 9.** Remove any protective packaging from the processor.

---

**NOTE** Protective covers are installed to protect connector pins. Save the covers for future use.

---

**Step 10.** Inspect the processor pins and verify that the pins are not bent.

**Step 11.** Align the alignment holes on the processor with the alignment posts on the processor cage, and carefully lower the processor onto the processor socket (Figure 3-16 and Figure 3-17).

---

**CAUTION** Do not press the processor into the socket. When properly aligned, the processor pins seat into the socket. No additional pressure is required. You can damage the pins if you apply too much pressure.

---

**Step 12.** Lock the processor into the socket on the processor board (Figure 3-17).

- a. Unfasten the processor install tool (2.5-mm driver) from the tool holder on the processor board.
- b. Insert the processor tool into the hole that runs down the side of the heatsink.
- c. Rotate the processor tool clockwise 180 degrees.

---

**CAUTION** Attempting to turn the locking mechanism more than 180 degrees can severely damage the socket.

---

- d. Refasten the processor install tool to the tool holder on the processor board.

**Step 13.** Reconnect the processor power cable into the connector cable that attaches directly to the processor board (Figure 3-15).

**Step 14.** Close the processor cage (Figure 3-14).

- a. Grasp the processor cage handle and rotate the cage closure inward toward the rear of the assembly until it is completely closed.
- b. Push the handle down until it is flush with the cage.

**Step 15.** Replace the processor board assembly. See “Replacing the Processor Board Assembly” on page 56.

**Step 16.** Replace the memory carrier assembly. See “Replacing the Memory Carrier Assembly” on page 47.

**Step 17.** Replace the memory carrier assembly cover and latch the top cover release lever closed. See “Replacing the Memory Carrier Assembly Cover” on page 35.

**Figure 3-14** Installing a Dual-Core Processor on the Processor Board

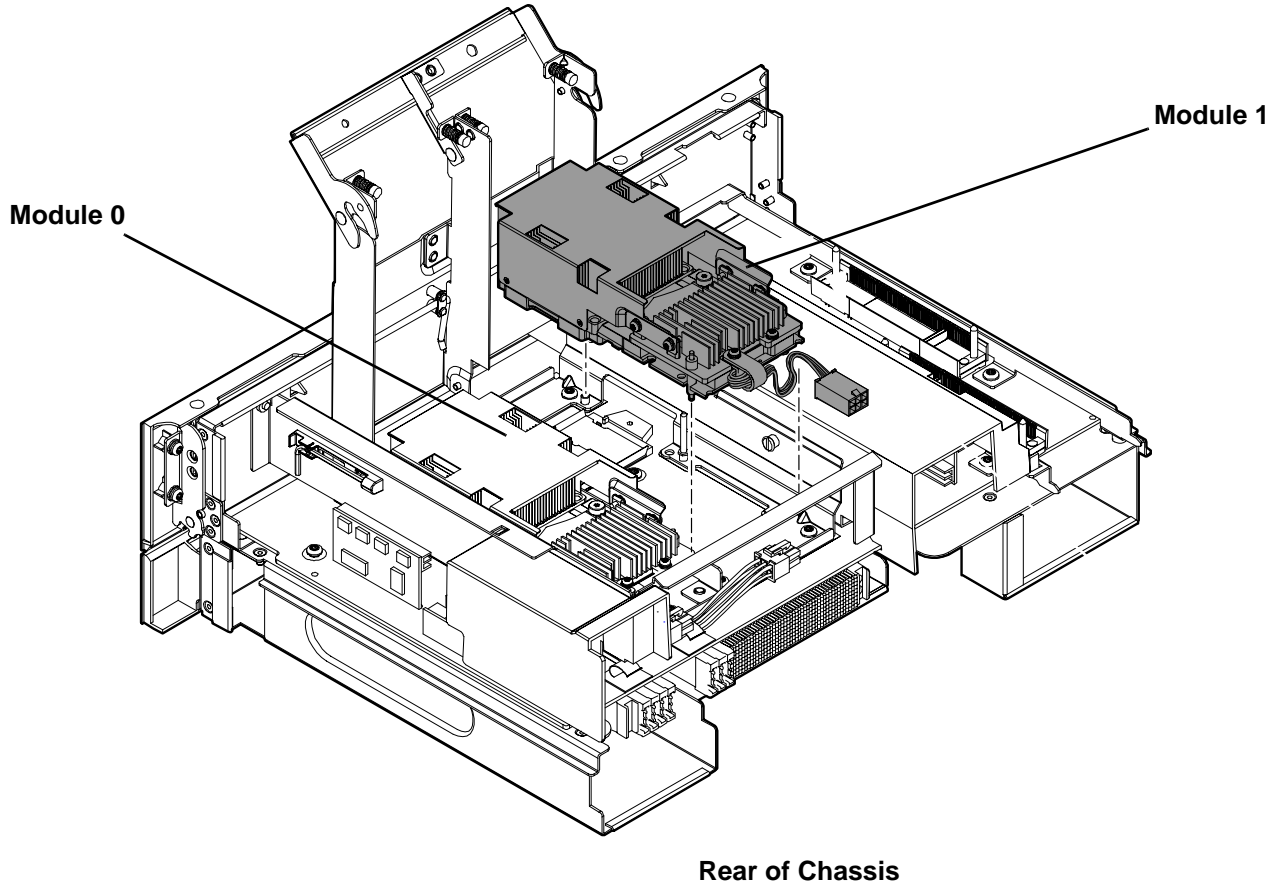


Figure 3-15 shows the power connector and cable for the processor.

**Figure 3-15 Processor Power Cable**

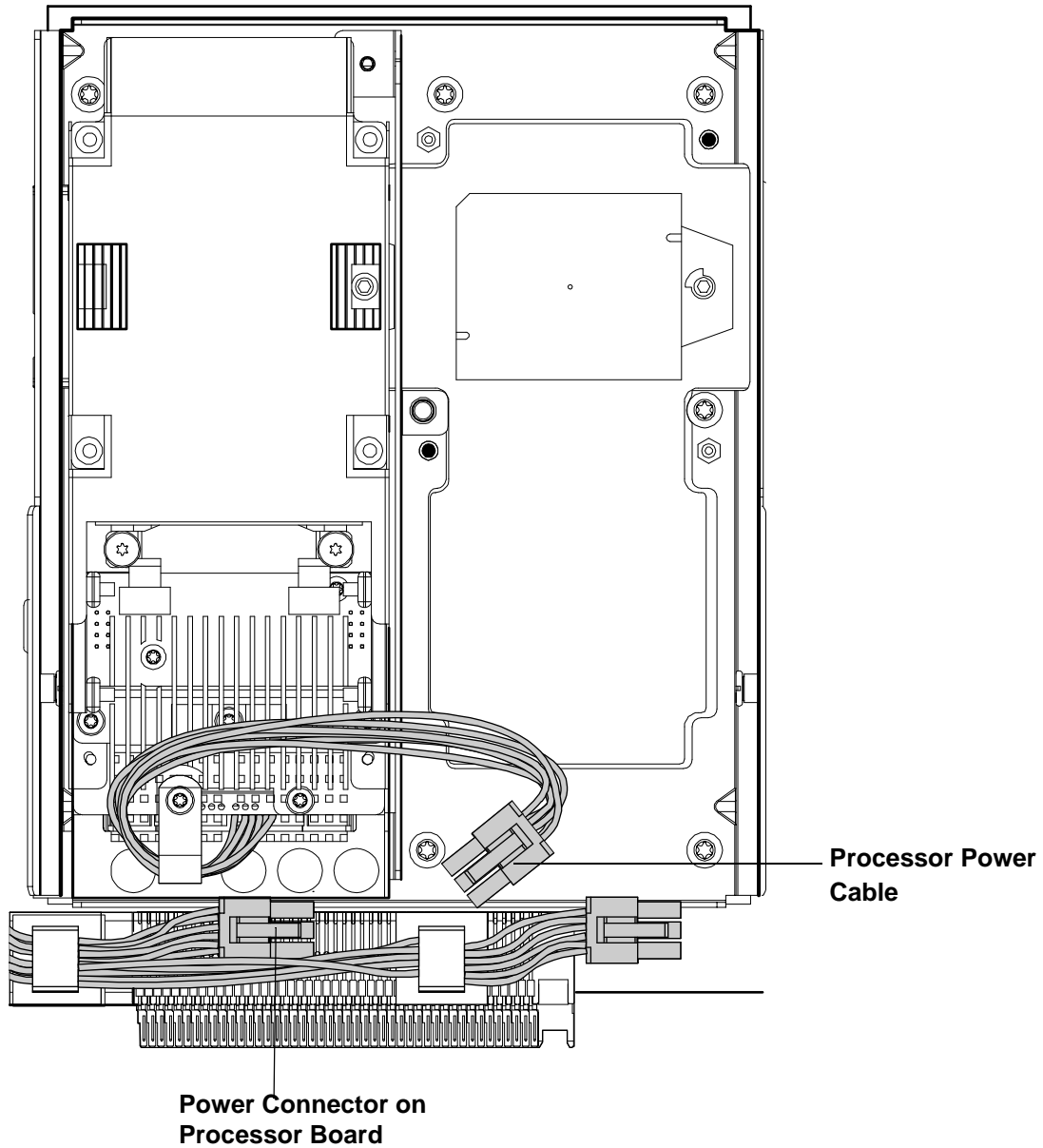


Figure 3-16 shows the processor socket lock/unlock mechanism and alignment post locations without a processor installed.

**Figure 3-16 Processor Alignment Posts and Lock/Unlock Mechanism**

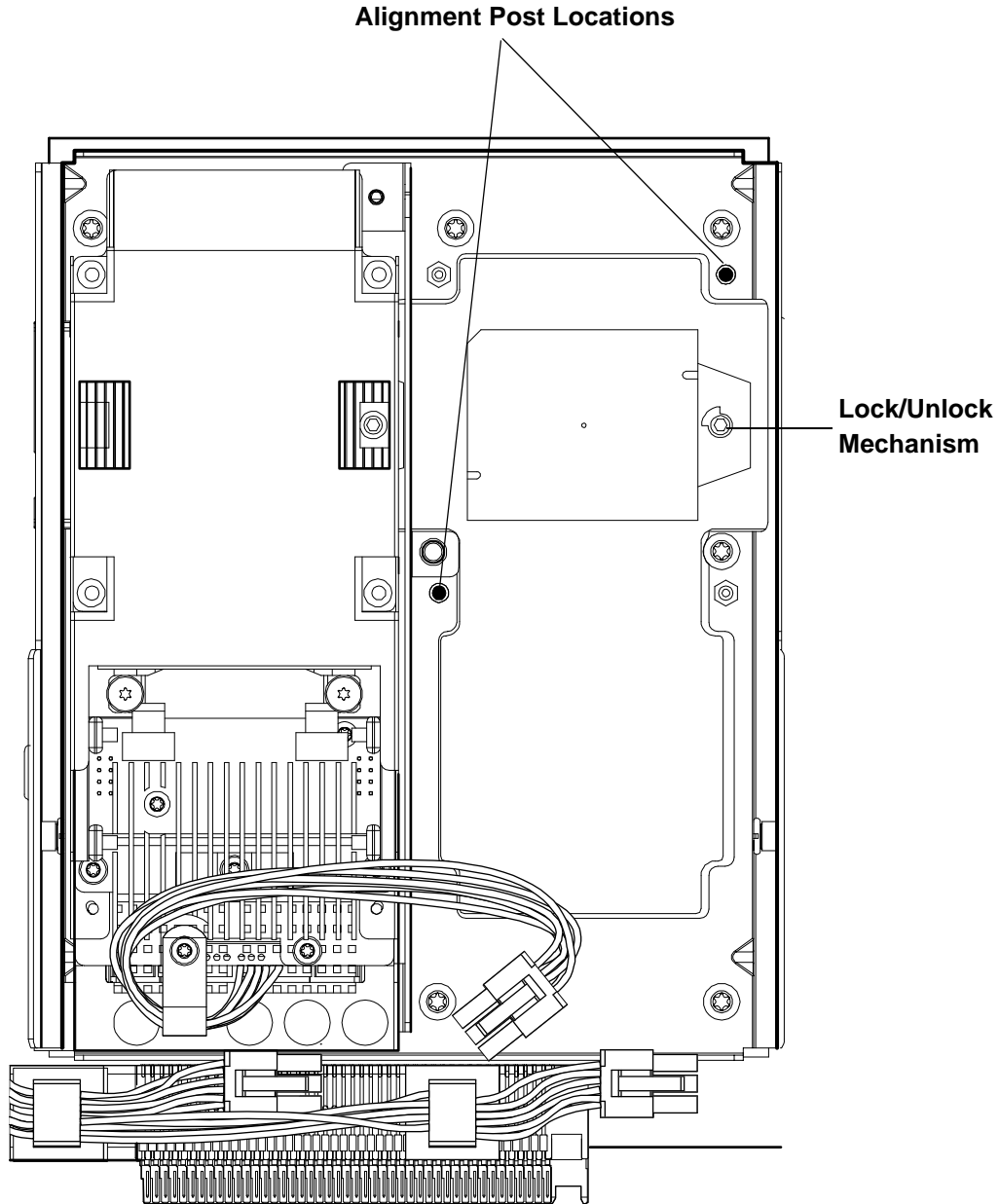
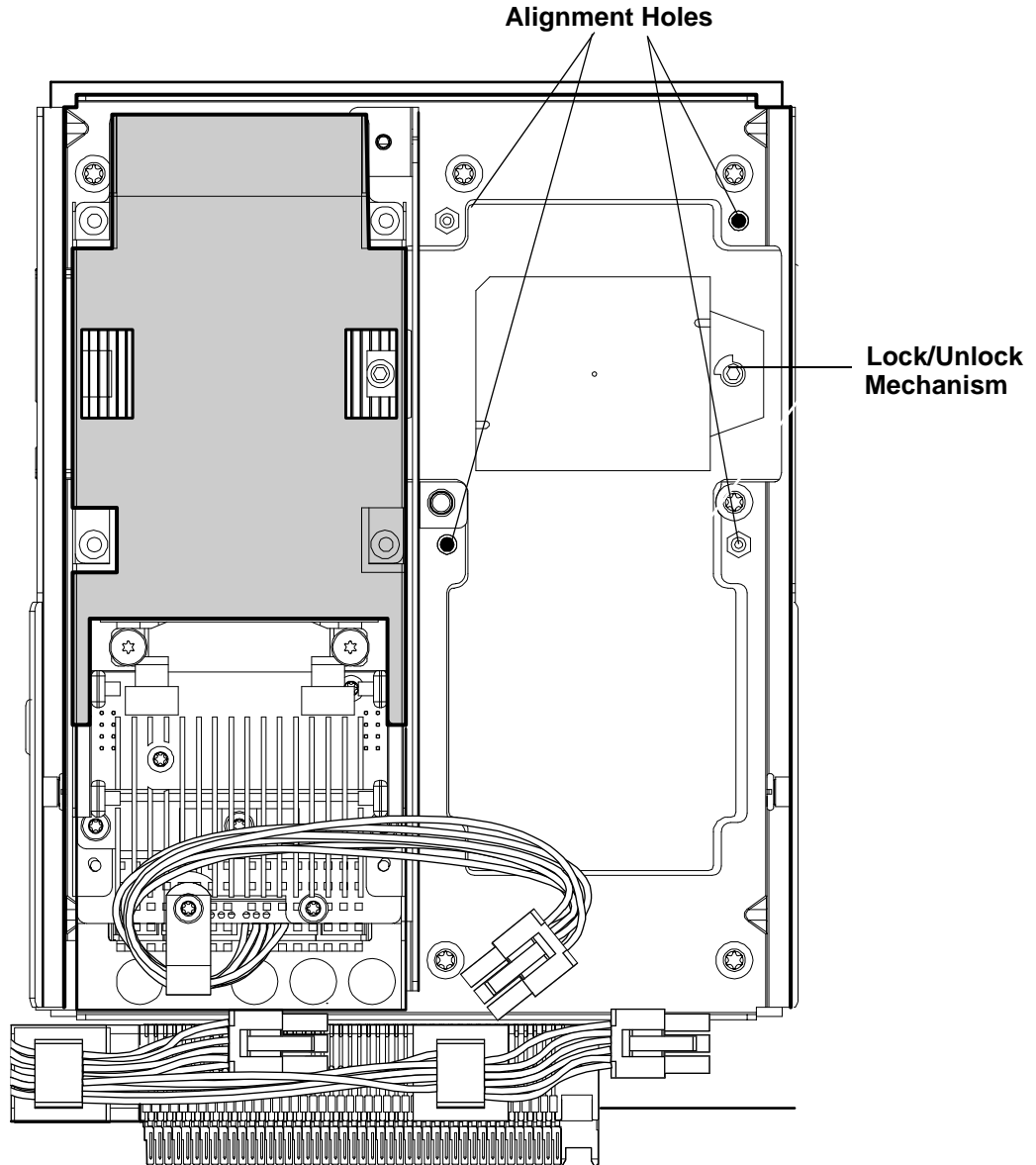


Figure 3-17 shows the processor lock/unlock mechanism location and the alignment holes with the processor installed.

**Figure 3-17 Processor Alignment Holes and Lock/Unlock Mechanism**







---

## 4 Connecting the Cables

This chapter provides information on the cables that power the server and provide LAN connectivity for the server.

This chapter addresses the following topics:

- “AC Input Power” on page 66
- “LAN” on page 68

---

## AC Input Power

The server can receive ac input from two different ac power sources. If two separate power sources are available, you can plug the server into the separate power sources, increasing system reliability if one power source fails. The power receptacles are located at the rear of the chassis. They are labeled PWR 0 and PWR 1.

You can install a maximum of two bulk power supplies (BPS) in the server. Installing two BPSs in the server provides 1+1 redundancy, meaning that if one BPS fails, there is still enough power supplied to the server for it to remain operational. You must promptly replace the failed BPS to restore 1+1 functionality.

A minimum of one BPS is required to power the server. There is no 1+1 capability if only one BPS is present.

### Power States

The server has three power states:

- Standby power
- Full power
- Off

Plug the power cord into the appropriate receptacle on the rear of the chassis to achieve the standby power state; the front panel power button is not turned on. Full power occurs when the power cord is plugged into the appropriate receptacle, and either the power is activated through the iLO 2 MP PC command, or the power button is activated. In the off state, the power cords are not plugged in.

Table 4-1 lists the server power states.

**Table 4-1** Power States

Power States	Power Cable Plugged Into Receptacle	Power Activated through the iLO 2 MP PC Command or Front Panel Power Button Activated	AC Voltage Applied	DC Voltage Applied
Standby power	Yes	No	Yes	No
Full power	Yes	Yes	Yes	Yes
Off	No	No	No	No

---

**NOTE** If the power restore feature is set to **Always On** through the iLO 2 MP PR command, the server can automatically power on to the full power state.

---

## Applying Standby Power to the Server

To apply standby power to the server, follow these steps:

**Step 1.** Locate the appropriate receptacle on the rear of the chassis. Plug the power cord into the receptacle.

---

**IMPORTANT** If the server has one BPS, plug the power cable into the receptacle labeled **PWR 1**.

---

**Step 2.** Observe the following LEDs at two different intervals to ensure the server is in the standby power state:

### INTERVAL ONE

After you plug the power cord into the server, the BPS flashes amber and an amber light is present on the hard disk drives.

### INTERVAL TWO

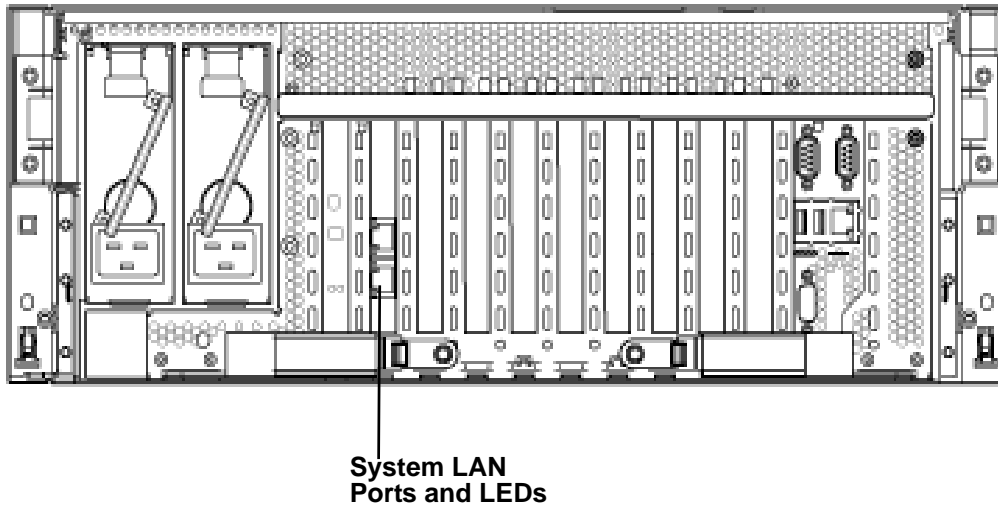
Approximately 30 seconds later, the BPS flashes green and the amber light is still present on the hard disk drives. Standby power is now on.

---

## LAN

The server has two LAN ports that can provide network connectivity. Figure 4-1 shows the available LAN ports for the server.

**Figure 4-1**      **Rear Panel LAN Ports**



To enable general network connectivity for the server, follow these steps:

- Step 1.** Obtain valid IP addresses for each LAN port you plan to activate.
- Step 2.** Connect the LAN cable from an available LAN port to a live connection on the network.

---

# 5 Installing the Server into a Rack or Pedestal Mount

This chapter provides instructions on how to install the server into a rack or pedestal mount.

This chapter addresses the following topics:

- “Installing the Server into a Rack” on page 70
- “Installing the Server into a Pedestal Mount” on page 70

## Installing the Server into a Rack

The following information describes how to install the server into an HP rack or an approved non-HP rack.

### HP Rack

HP servers that are installed into racks are shipped with equipment mounting slides. An installation guide comes with each set of slides: *HP 3-7U Quick Deploy Rail System Installation Instructions for HP Products*. Follow the steps in this installation guide to determine where and how to install the server into the rack.

The following are additional instructions for installing the HP Integrity rx6600 server into the rack:

1. The cable management arm (CMA) is factory configured to mount on the left side of the server as viewed from the rear of the chassis. You must switch the CMA to a right-mount configuration. Mount the CMA on the right side of the server to ensure easy removal of the power supplies.
2. Remove two T25 screws from the server bezel; one screw from the same location on each side of the server. The screws are located behind the pull handles.

### Non-HP Rack

The *Guide for Evaluating the Installation of HP Equipment in Non-HP Racks* enables you to evaluate the installation of HP equipment into non-HP racks. Use this guide when you need to qualify whether you can install, maintain, and service any HP equipment in a non-HP rack.

The *Guide for Evaluating the Installation of HP Equipment in Non-HP Racks* is located on the Web at:

<http://www.hp.com/racksolutions>

Select **mounting information** from the menu, then select *Mounting in non-HP racks*.

---

## Installing the Server into a Pedestal Mount

The server ships with a pedestal mount if you order the rackless configuration option. The pedestal mount is packaged in a separate carton that is attached to the server carton.

To change the server from a rack mount to a rackless configuration, you need a Server Rackless Mount Kit. The rackless mount kit comes with the *Converting Your Rack Server to a Rackless Mount, A6979-96001* installation guide. Follow the steps in the *Converting Your Rack Server to a Rackless Mount, A6979-96001* installation guide to attach the pedestal mount to the server.

---

# 6 Console Setup

Setting up the console involves the following:

1. Determining the physical access method to connect cables. There are two physical connections to the Integrity iLO 2 MP:
  - RS-232 serial port
  - iLO 2 MP LAN port
2. Configuring the Integrity iLO 2 MP and assigning an IP address if necessary. Though there are several methods to configuring the LAN, DHCP with DNS is the preferred one. DHCP with DNS comes preconfigured with default factory settings, including a default user account and password. Other options include:
  - ARP-Ping
  - RS-232 serial port

This chapter addresses the following topics:

- “Overview” on page 72
- “Setup Checklist” on page 73
- “Setup Flowchart” on page 74
- “Preparation” on page 75
- “Configuring the iLO 2 MP LAN Using DHCP and DNS” on page 77
- “Configuring the iLO 2 MP LAN Using ARP Ping” on page 78
- “Configuring the iLO 2 MP LAN Using the RS-232 Serial Port” on page 80
- “Logging In to the iLO 2 MP” on page 81
- “Additional Setup” on page 82

---

## Overview

A console is a tool consisting of display and input devices used to locally and remotely monitor and control the server. The console enables interaction with the following manageability, configuration, and diagnostic tools:

- Integrated Lights-Out 2 Management processor (iLO 2 MP). Provides a way to connect to the server and perform administration or monitoring tasks for the server hardware. It controls power, reset, and Transfer of Control (TOC) capabilities; provides console access; displays and records system events; and displays detailed information about internal subsystems. The iLO 2 MP is available whenever the system is connected to a power source, even if the server main power switch is turned off.

---

**NOTE** For more information on the integrated lights-out management processor, see the *HP Integrity rx3600 and HP Integrity rx6600 Integrated Lights-Out 2 Management Processor Operations Guide*.

---

- Extensible Firmware Interface (EFI). Provides an interface between the operating system and the firmware. Use the EFI to configure options, such as the server boot order, before the server loads an operating system.

Table 6-1 lists the elements required to start a console session.

**Table 6-1 Elements Required to Start a Console Session**

Console Element	Description
ac power (standby power)	The server must have ac power to provide console functionality. See “Applying Standby Power to the Server” on page 67.
Server hardware components	Includes the iLO 2 MP and console cable connectors.
Console cable	Links the server console to the console device.
Console device	Provides display and input functionality using components such as monitors, keyboards, and mouse devices.
Console emulation software	Emulates the output from the server console and displays the output on the console device screen.



## Setup Checklist

Use the checklist in Table 6-2 to assist you with the console setup process.

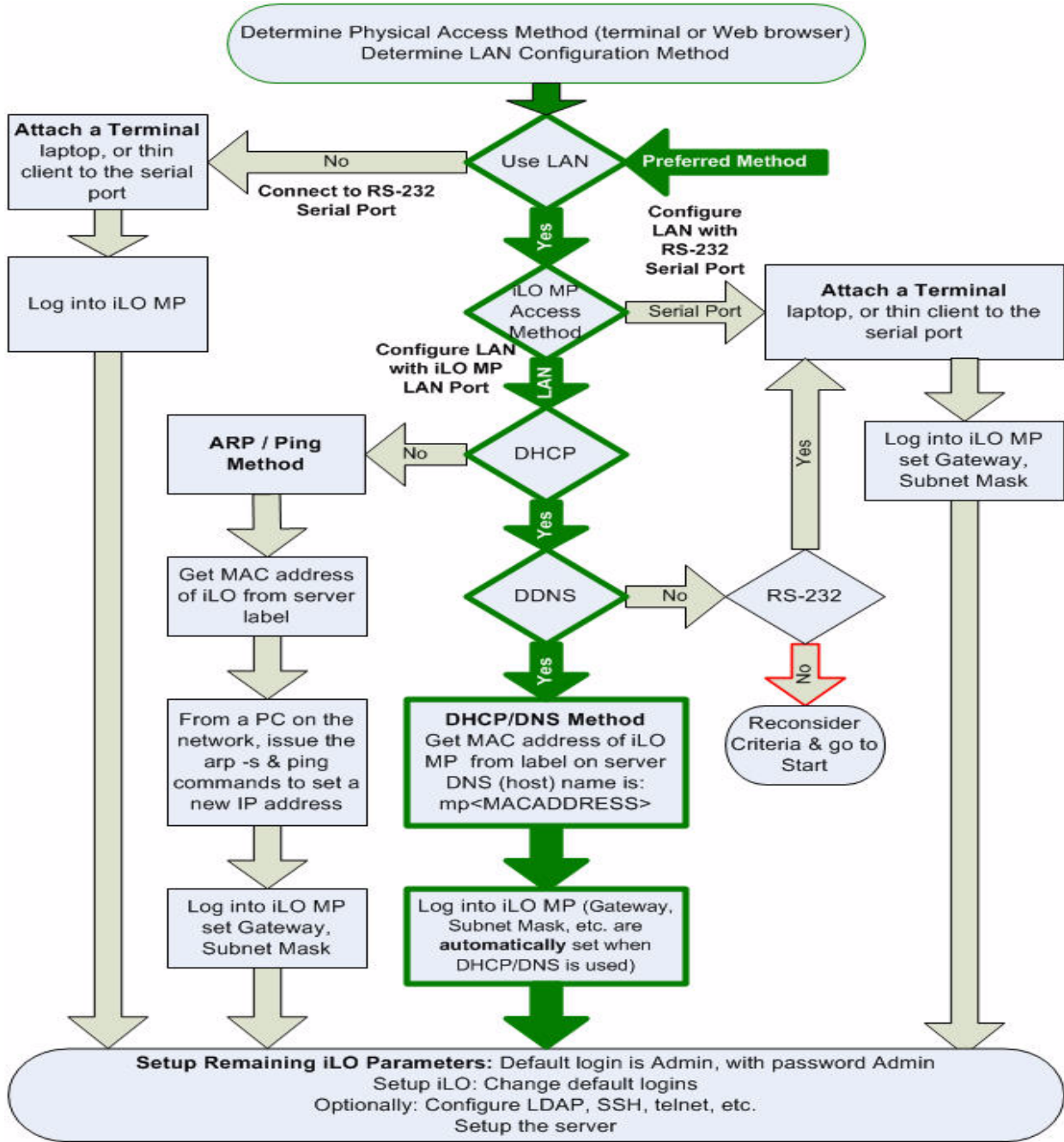
**Table 6-2 Setup Checklist**

	<b>Step</b>	<b>Action</b>	<b>X</b>
	<i>Standard and Advanced</i>		
1	Preparation	<ol style="list-style-type: none"> <li>1. Determine access method to select and connect cables.</li> <li>2. Determine LAN configuration method and assign IP address if necessary.</li> </ol>	
2	Configure the iLO 2 MP LAN	<p>There are three methods to configure the LAN for iLO 2 MP access:</p> <ul style="list-style-type: none"> <li>• DHCP with DNS</li> <li>• ARP Ping</li> <li>• RS-232 serial port</li> </ul>	
3	Log on to the iLO 2 MP	Log in to the iLO 2 MP from a supported Web browser or command line using the default user name and password.	
4	Change default user name and password	Change the default user name and password on the administrator account to your predefined selections.	
5	Set up user accounts	Set up the user accounts if using the local accounts feature.	
6	Set up security access	Set up the security access settings.	
7	Access the host console	Access the host console using method of choice.	
	<i>Advanced</i>		
	Activate Advanced Pack Features	Activate advanced features by entering a license key.	

## Setup Flowchart

Use this console setup flowchart as a guide to assist in the console setup process.

Figure 6-1 Setup Flowchart



## Preparation

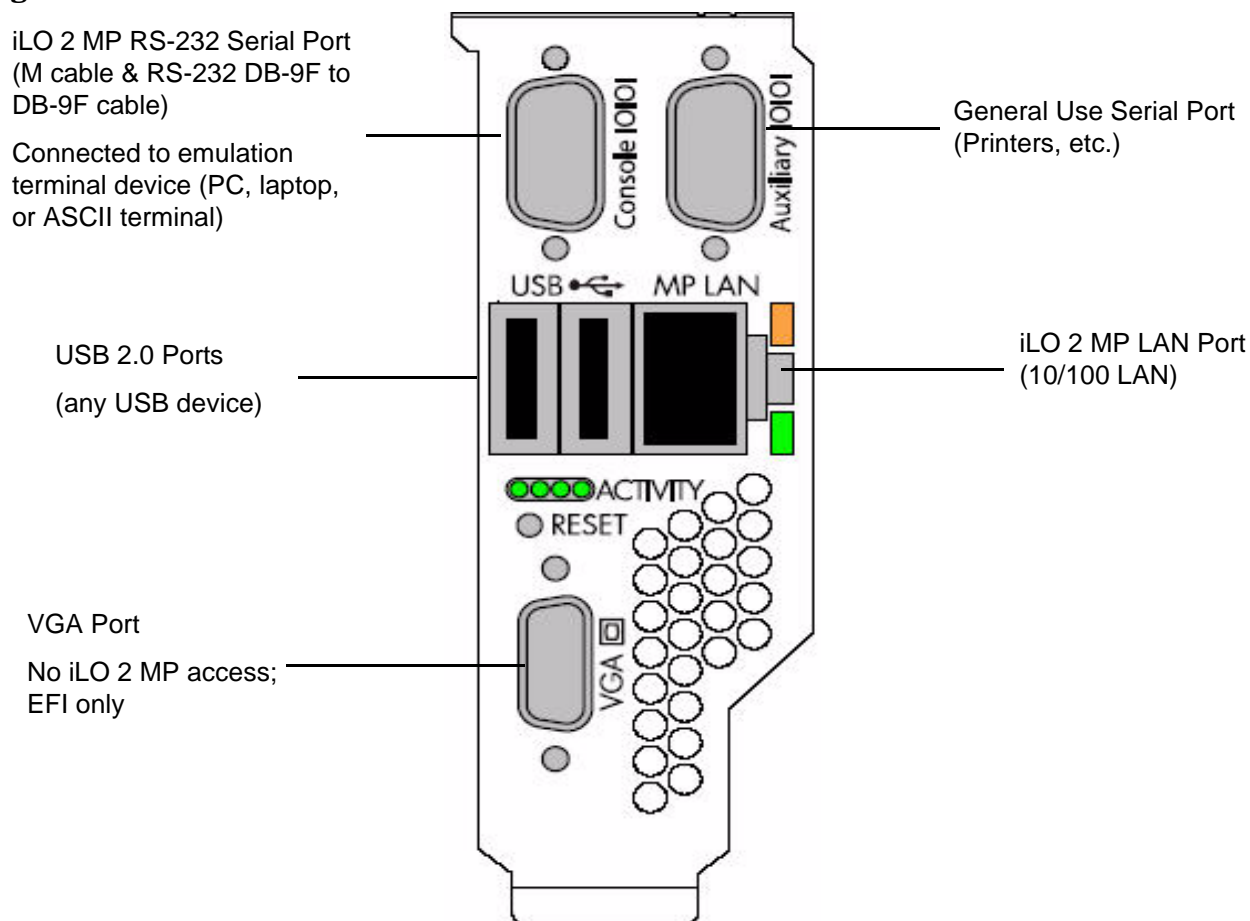
There are several tasks to perform before you can configure the iLO 2 MP LAN.

- Determine the physical access method to select and connect cables.
- Determine the iLO 2 MP LAN configuration method and assign an IP address if necessary.

### Determining the Physical iLO 2 MP Access Method

Before you can access the iLO 2 MP, you must first determine the correct physical connection method. The iLO 2 MP has a separate LAN port from the system LAN port. It requires a separate LAN drop, IP address, and networking information from that of the port used by the operating system (Figure 6-2).

**Figure 6-2 Server Rear Ports**



Use Table 6-3 to determine your physical connection method. Table 6-3 lists the appropriate connection method, required connection components, and connectors to the host console.

**Table 6-3 Physical Connection Matrix**

Connection Method	Required Connection Components
RS-232 serial port	<ol style="list-style-type: none"> <li>1. Host console</li> <li>2. RS-232 serial port DB-9F to DB-9F cable</li> <li>3. Emulation terminal device (for example, a PC, laptop, or ASCII terminal)</li> </ol>
LAN port	10/100 LAN cable

### Determining the iLO 2 MP LAN Configuration Method

To access the iLO 2 MP through the iLO 2 MP LAN, the iLO 2 MP must acquire an IP address. The way the iLO 2 MP acquires an IP address is dependent upon whether DHCP is enabled or disabled on the server, and if DHCP and DNS services are available to the server. (See Table 6-4 for possible scenarios.)

Once you have determined the iLO 2 MP access, you must determine how you will configure the iLO 2 MP LAN in order to acquire an IP address. There are three methods available.

- DHCP/DNS
- ARP Ping
- RS-232 serial port

Table 6-4 provides all the possible scenarios to consider. Use this table to help you select the appropriate LAN configuration method to obtain an IP address.

**Table 6-4 LAN Configuration Methods**

DHCP	DNS	RS-232 Serial Port (MP LC command)	LAN Configuration Method
Yes	Yes	No	DHCP
Yes	Yes	Yes	DHCP or RS-232 serial port
No	No	No	ARP Ping
No	Yes	No	ARP Ping
No	Yes	Yes	ARP Ping or RS-232
Yes	No	Yes	RS-232 serial port
No	No	Yes	RS-232 serial port or ARP Ping
Yes	No	No	Cannot set up the LAN. Reconsider your criteria.

Once you have determined how you will configure the iLO 2 MP LAN in order to acquire an IP address, you must configure the iLO 2 MP LAN using the selected method.

---

## Configuring the iLO 2 MP LAN Using DHCP and DNS

DHCP automatically configures all DHCP-enabled servers with IP addresses, subnet masks, and gateway addresses. All HP Integrity entry class servers with the iLO 2 MP are shipped from the factory with DHCP enabled.

HP recommends using the DHCP and DNS method to simplify access to the iLO 2 MP.

---

**NOTE** You can use ARP Ping regardless of the status of DHCP unless an IP address has ever been acquired using DHCP. Once an IP address is assigned using DHCP, ARP Ping is permanently disabled.

---

When you use DHCP and DNS, you can connect to the iLO 2 MP by typing the default host name in your browser rather than an IP address only if the following applies:

- DHCP must be enabled (DHCP is enabled by default).
- You are using a DHCP server that provides the domain name.
- The primary DNS server accepts dynamic DNS (DDNS) updates.
- The primary DNS server IP address has been configured through the DHCP server.

---

**IMPORTANT** You must know the DNS domain name, which is served out by the DHCP server, unless it's domain is local or the same domain.

---

To configure the iLO 2 MP using DHCP and DNS, follow these steps:

**Step 1.** Obtain the factory-set host name from the iLO 2 MP Media Access Protocol (MAC) address label on the server. The default host name is 14 characters long, consisting of the letters **mp** followed by the 12 characters of the MAC address (example: mp0014c29c064f). This address is assigned to the iLO 2 MP core IO board. The core IO board has a unique MAC address that identifies the hardware on the network.

---

**IMPORTANT** Make sure you obtain the MAC address to the core IO board and not the MAC address to the server core LAN card.

---

**Step 2.** Connect the LAN cable from the server to an active network port.

**Step 3.** Apply ac power to the server.

**Step 4.** Open a browser, telnet, or SSH client and enter the default host name. The default host name is the letters **mp** followed by the 12 characters of the MAC address. The **iLO 2 MP Log In** window opens.

**Step 5.** Log in using the default user name and password.

---

**CAUTION** When DHCP is enabled, the system is vulnerable to security risks because anyone can access the iLO 2 MP until you change the default user name and password.

HP strongly recommends you assign user groups and rights before proceeding.

---

## Configuring the iLO 2 MP LAN Using ARP Ping

**NOTE** You can use ARP Ping regardless of the status of DHCP unless an IP address has ever been acquired using DHCP. Once an IP address is assigned using DHCP, ARP Ping is permanently disabled. Some DHCP server options can cause the apparent issuance of ARP Ping to the iLO 2 MP which will negate the DHCP/DDNS method.

The Address Resolution Protocol (ARP) and Packet Internet Grouper (Ping) utility uses ARP packets to ping, or discover, a device on the local network segment. The IP address you assign to the server must use the same network segment, or subnet, as the computer assigning the address. ARP does not work across routed or switched networks.

Use the ARP Ping utility to assign a static IP address when you do not have access to the RS-232 serial port or when DHCP is not available.

**NOTE** ARP Ping operational issues:

- The PC and the server must be on the same physical subnet.
- When a new server is first booted, DHCP is automatically available (factory-set default); but ARP Ping does not start for three minutes after the iLO 2 MP is booted. This applies to every subsequent boot of the iLO 2 MP until an IP address is obtained by DHCP or has been assigned by using the LC command.
- Upon successfully assigning an IP address using ARP Ping, DHCP is automatically disabled.

There are two methods to use the ARP Ping utility:

1. Connect a PC to the network that is on the same physical subnet as the server and run the ARP Ping commands from the PC.
2. Locate an existing server on the network, log into it, and run the ARP Ping commands from the server.

Table 6-5 lists the ARP Ping commands.

**Table 6-5 ARP Ping Commands**

ARP Command	Description
arp -s	This command assign the IP address to the iLO 2 MP MAC address. This ARP table entry maps the MAC address of the iLO 2 MP LAN interface to the static IP address designated for that interface.
ping	This command tests network connections. It verifies the iLO 2 MP LAN port is configured with the appropriate IP address.

The following procedure explains how to use the ARP Ping utility using a PC that is connected to the network that is on the same physical subnet as the server.

To configure a static IP address using the ARP Ping utility, follow these steps:

- Step 1.** Obtain the iLO 2 MP MAC address. To set the IP address using ARP, you must know the MAC address of the iLO 2 MP LAN. You can find the MAC address of the iLO 2 MP LAN on a label on the server.

---

**IMPORTANT** Make sure you obtain the MAC address to the iLO 2 MP LAN and not the MAC address to the server core LAN.

---

- Step 2.** Verify that an active LAN cable on the local subnet is connected to the iLO 2 MP LAN port on the server.
- Step 3.** Access a PC on the same physical subnet as the server.
- Step 4.** Open a DOS window on the PC.
- Step 5.** At the DOS prompt, enter **arp -s** to assign the IP address to the iLO MAC address.

Syntax

```
arp -s <IP address you want to assign to the iLO MAC address> <iLO 2 MAC address>
```

Example from Windows

```
arp -s 192.0.2.1 00-00-0c-07-ac-00
```

- Step 6.** At the DOS prompt, enter **ping** followed by the IP address to verify that the iLO 2 MP LAN port is configured with the appropriate IP address. The destination address is the IP address that is mapped to the iLO MAC address. Perform this task from the PC that has the ARP table entry.

Syntax

```
ping <IP address just assigned to the iLO MAC address>
```

Example from Windows

```
ping 192.0.2.1
```

- Step 7.** Use the IP address to connect to the iLO 2 MP LAN.
- Step 8.** Use Web or telnet access to connect to the iLO 2 MP from a host on the local subnet and complete the rest of the LAN parameter (gateway, subnet).

---

## Configuring the iLO 2 MP LAN Using the RS-232 Serial Port

To configure the iLO 2 MP LAN using the RS-232 serial port, follow these steps:

---

**IMPORTANT** Do not configure duplicate IP addresses on different servers within the same network. The duplicate server IP addresses conflict and the servers cannot connect to the network.

---

The `LC` command enables you to configure an IP address, host name, subnet mask, and gateway address.

---

**IMPORTANT** Ensure you have a console connection through the RS-232 serial port or a network connection through the LAN to access the iLO 2 MP and use the `LC` command.

---

To assign a static IP address using the `LC` command, follow these steps:

- Step 1.** Ensure the emulation software device is properly configured. The terminal emulation device runs software that interfaces with the server. The software emulates console output as it would appear on an ASCII terminal screen and displays it on a console device screen. To ensure the emulation software is correctly configured, follow these steps:
- a. Verify that the communication settings are configured as follows:
    - 8/none (parity)
    - 9600 baud
    - None (receive)
    - None (transmit)
  - b. Verify that the terminal type is configured appropriately. Supported terminal types are:
    - hpterm
    - vt100
    - vt100+
    - vt-utf8

---

**IMPORTANT** Do not mix hpterm and vt100 terminal types at the same time.

---

There are many different emulation software applications. Consult the help section of the emulation software application for instructions on how to configure the software options.

**Step 2.** Determine the required connection components, and the ports used to connect the server to the console device.

**Step 3.** Connect the cables from the appropriate ports to the server.

**Step 4.** Start the emulation software on the console device.

**Step 5.** Log in to the iLO 2 MP. See “Logging In to the iLO 2 MP” on page 81.

**Step 6.** At the **MP Main Menu**, enter **CM** and press **Enter** to select command mode.



- Step 7.** At the command mode prompt, enter **LS** and press **Enter**. The screen displays the default LAN configuration values. Write down the default values, or log the information to a file. You may need the information for future troubleshooting.
- Step 8.** Use the **LC** command to disable DHCP.
- From the **LC** command menu, type **D** and press **Enter**.
  - Follow the instructions on the screen to change the DHCP status from Enabled to Disabled.
  - Enter **XD -R** to reset the iLO 2 MP.
- Step 9.** Use the **LC** command to enter information for the IP address, host, subnet mask, gateway parameters, and so on.
- Step 10.** Enter **XD -R** to reset the iLO 2 MP.
- Step 11.** After the iLO 2 MP resets, log in to the iLO 2 MP again and enter **CM** at the **MP:>** prompt.
- Step 12.** Enter **LS** to confirm that DHCP is disabled and display a list of updated LAN configuration settings.

---

## Logging In to the iLO 2 MP

To log in to the iLO 2 MP, follow these steps:

- Step 1.** Access the iLO 2 MP using the LAN, RS-232 serial port, telnet, SSH, or Web method. The iLO 2 MP login prompt displays.
- Step 2.** Log in using the default the iLO 2 MP user name and password (Admin/Admin).

---

**TIP** For security reasons, HP strongly recommends you modify the default settings during the initial login session. See “Modifying User Accounts and Default Password” on page 82.

---

Following is the **MP Main Menu**:

```
iLO MP MAIN MENU:
CO:      Console
VFP:     Virtual Front Panel
CM:      Command Menu
CL:      Console Logs
SL:      Show Event Logs
SMCLP:   Server Management Command Line Protocol
HE:      Main Menu Help
X:       Exit Connection
```

See the *HP Integrity rx3600 and HP Integrity rx6600 Integrated Lights-Out 2 Management Processor Operations Guide* for information on the iLO 2 MP menus and commands.

When logging in using the local or remote RS-232 serial ports, the login prompt may not display if another user is logged in through these ports. Use **Ctrl-B** to access the **MP Main Menu** and the iLO 2 MP prompt (**MP>**).

## Additional Setup

This section provides additional information to setup the iLO 2 MP.

### Modifying User Accounts and Default Password

The iLO 2 MP comes preconfigured with default factory settings, including a default user account and password. The two default user accounts on initial login are:

- All Rights (Administrator) level user:  
login = **Admin**  
password = **Admin**
- Console Rights (Operator) level user:  
login = **Oper**  
password = **Oper**

Login and password are case sensitive.

---

**TIP** For security reasons, HP strongly recommends you modify the default settings during the initial login session.

---

Make the following changes using any of the iLO 2 MP user interfaces.

To modify default account configuration settings, follow these steps:

**Step 1.** Log in as the administrator. You must log in as the administrator in order to modify default user configuration settings

**Step 2.** To modify default passwords:

- a. Access the **MP Main Menu**.
- b. Enter **CM** at the MP> prompt.
- c. Enter **UC** at the MP:CM> prompt and follow the prompts to modify default passwords.

**Step 3.** To setup user accounts:

- a. Access the **MP Main Menu**.
- b. Enter **CM** at the MP> prompt.
- c. Enter **UC** at the MP:CM> prompt and follow the prompts to modify user accounts.

### Setting Up Security

For greater security and reliability, HP generally recommends that iLO 2 MP management traffic be on a separate dedicated management network and that only administrators be granted access to that network. This not only improves performance by reducing traffic load across the main network, it also acts as the first line of defense against security attacks. A separate network allows administrators to physically control which workstations are connected to the network.

HP also strongly recommends you modify the default settings during the initial logon session and determine the security access required and what user accounts and privileges are needed. Create local accounts or use directory services to control user access. See “Modifying User Accounts and Default Password” on page 82.

### Security Access Settings

Determine the security access required and what user accounts and privileges are needed. The iLO 2 MP provides options to control user access. Select one of the following options to prevent unauthorized access to the iLO 2 MP:

- Change the default user name and password. See “Modifying User Accounts and Default Password” on page 82).

---

**CAUTION** When DHCP is enabled, the system is vulnerable to security risks because anyone can access the iLO 2 MP until you change the default user name and password.

HP strongly recommends you assign user groups and rights before proceeding.

---

- Create local accounts. You can store up to 19 user names and passwords to manage iLO 2 MP access. This is ideal for small environments such as labs and small-to-medium sized businesses.
- Use directory services. Use the corporate directory to manage iLO 2 MP user access. This is ideal for environments with a large number of frequently changing users. If you plan to use directory services, HP recommends leaving at least one local account enabled as an alternate method of access.



---

# 7 Accessing the Host Console

This chapter provides information on the different methods of accessing the host console of an HP Integrity server.

This chapter addresses the following topics:

- “Accessing the iLO 2 MP With the Web Browser” on page 86
- “Accessing the Host Console With the TUI - CO Command” on page 88
- “Accessing the Host Console With vKVM - Integrated Remote Console” on page 88
- “Accessing the Host Console with the SMASH SM CLP” on page 88
- “Accessing the Graphic Console Using VGA” on page 89

---

## Accessing the iLO 2 MP With the Web Browser

Web browser access is an embedded feature of the iLO 2 MP.

The iLO 2 MP has a separate LAN port from the system LAN port. It requires a separate LAN drop, IP address, and networking information from that of the port used by the operating system.

---

**IMPORTANT** Make sure you use the MAC address to the iLO 2 MP LAN and not the MAC address to the server core LAN.

---

Before starting this procedure, you must have the following information:

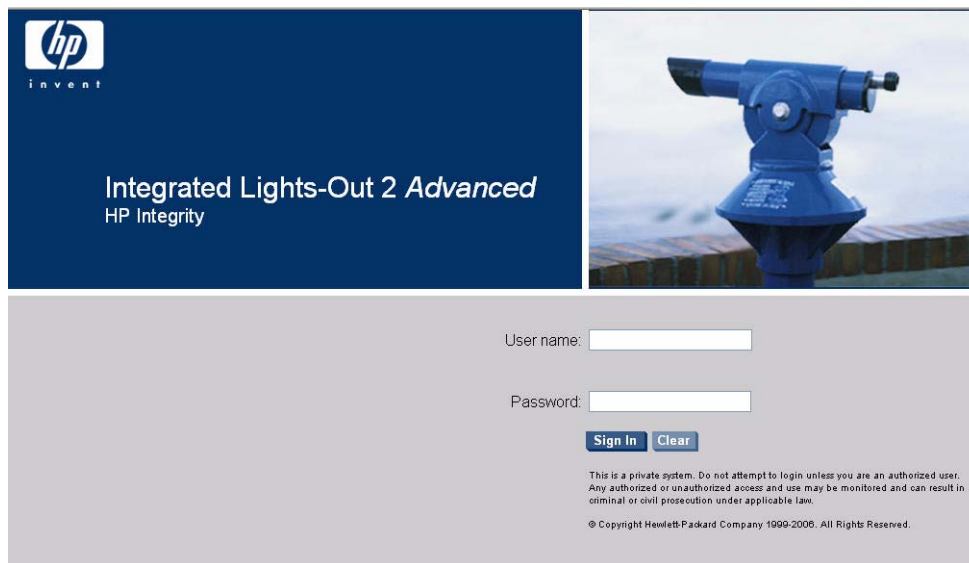
- IP address for the iLO 2 MP LAN
- Host name (this is used when messages are logged or printed)

To interact with the iLO 2 MP through the Web GUI, follow these steps:

**Step 1.** Open a Web browser and enter the host name or the IP address for the iLO 2 MP.

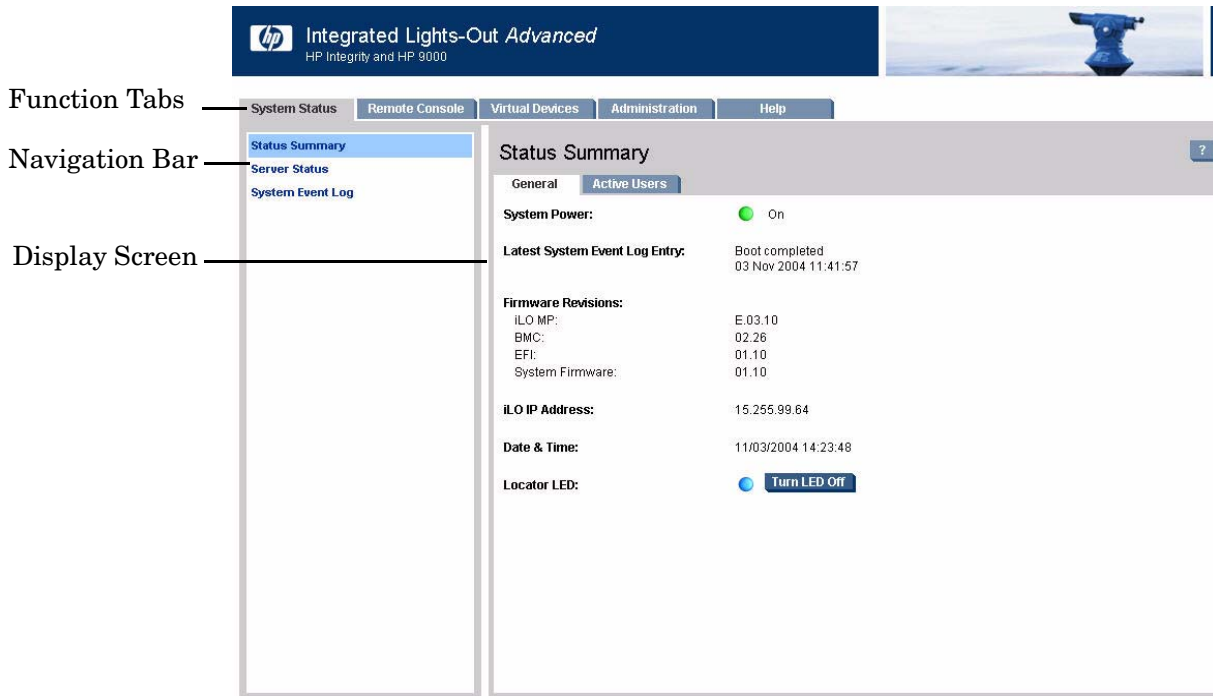
**Step 2.** Log in using your user account name and password at the login page. (Figure 7-1).

**Figure 7-1 Web Login Page**



**Step 3.** Click **Sign In**. The **Status Summary** page (Figure 7-2) displays after login.

**Figure 7-2 Status Summary Page**



- Step 1.** Select the Web interface functions by clicking the **Function** tabs at the top of the page. Each function lists options in the **Navigation Bar** on the left side of the page.
- Step 2.** Click an option link to display data in the **Display** screen; and click **Refresh** to update the display.
- Step 3.** Click the **Remote Console** tab. The remote console provides the following options to access the console:
  - A serial console that behaves similarly to the TUI of the following section
  - The virtual KVM console

## Help

The iLO 2 MP Web interface has a robust help system. To launch iLO 2 MP help, click the **Help** tab in the **Display** screen or click the ? at the top right corner of each page to display help about that page.

## Accessing the Host Console With the TUI - CO Command

This section provides the steps to access the host console using the text user interface (TUI).

To access the host console through the iLO 2 MP, follow these steps:

- Step 1.** Log in using your user account name and password at the login page.
- Step 2.** At the iLO 2 MP login prompt (MP>), enter the **CO** command to switch the console terminal from the **MP Main Menu** to mirrored/redirected console mode. All mirrored data is displayed.
- Step 3.** To return to the iLO 2 MP command interface, type **Ctrl-B**, or **Esc** and **+**.

---

## Accessing the Host Console With vKVM - Integrated Remote Console

For information on how to access the host console using the vKVM feature through the Integrated Remote Console (IRC), see the *HP Integrity rx3600 and HP Integrity rx6600 Integrated Lights-Out 2 Management Processor Operations Guide*.

---

## Accessing the Host Console with the SMASH SM CLP

For information on how to access the host console using the SMASH SM CLP, see the *HP Integrity rx3600 and HP Integrity rx6600 Integrated Lights-Out 2 Management Processor Operations Guide*.



---

## Accessing the Graphic Console Using VGA

VGA is a method you can use to access the graphic console.

---

**NOTE** You cannot access the iLO 2 MP using VGA.

---

This method requires three elements:

- Monitor (VGA connector)
- Keyboard (USB connector)
- Mouse (USB connector)

The graphic console output displays on the monitor screen.

---

**IMPORTANT** The server console output does not display on the console device screen until the server boots to the EFI Shell. Start a console session using the RS-232 serial port method to view console output prior to booting to the EFI Shell or to access the iLO 2 MP. See “Configuring the iLO 2 MP LAN Using the RS-232 Serial Port” on page 80.

---

To access the graphic console with VGA, follow these steps:

- Step 1.** Perform preparation tasks.
- Step 2.** Connect the cables. See your user service guide for specific port information.
- a. Connect the monitor VGA cable to the appropriate VGA port on your server.
  - b. Connect the keyboard USB cable to the appropriate USB port on your server.
  - c. Connect the mouse USB cable to the appropriate USB port on your server.
- Step 3.** Power on the server. The EFI Shell prompt displays.

Accessing the Host Console

**Accessing the Graphic Console Using VGA**

---

## 8 Powering On the Server

This chapter provides information and procedures for powering on the server to full power.

This chapter addresses the following topics:

- “Powering On the Server” on page 92
- “Powering On the Server Using the iLO 2 MP” on page 92
- “Powering On the Server Manually” on page 92

## Powering On the Server

Power on the server to full power using the following methods if the server is in the standby power state:

- iLO 2 MP `PC` command
- Manually, using the power button

### Powering On the Server Using the iLO 2 MP

---

**NOTE** If the power restore feature is set to **Always On** through the iLO 2 MP `PR` command, the server can automatically power on to the full power state.

---

To power on the server through the iLO 2 MP, follow these steps:

- Step 1.** Plug all power cables into the receptacles on the rear panel of the server.
- Step 2.** Initiate a console session, and access the **MP Main Menu**.
- Step 3.** Enter **CM** to enter command mode.
- Step 4.** Enter **PC** to use the remote power control command.
- Step 5.** Enter **ON** to power on the server. Enter **YES** when prompted to confirm the action.
- Step 6.** Start the operating system. For more information, see Chapter 10, “Bootting and Shutting Down the Operating System,” on page 123, or the operating system documentation.)

### Powering On the Server Manually

---

**NOTE** If the power restore feature is set to **Always On** through the iLO 2 MP `PR` command, the server can automatically power on to the full power state.

---

To manually power on the server, follow these steps:

- Step 1.** Plug all power cables into the receptacles on the rear panel of the server.
- Step 2.** Press the power button to start the server.
- Step 3.** Start the operating system. For more information, see Chapter 10, “Bootting and Shutting Down the Operating System,” on page 123, or the operating system documentation.

---

# 9 Core I/O Card Configuration

This chapter provides information on core I/O cards that need to be configured during installation.

This chapter addresses the following topics:

- “Integrated RAID” on page 94
- “HP 8 Internal Port SAS HBA (SAS Controller)” on page 95
- “MPTUtil Utility” on page 95
- “DRVCFG Utility” on page 98
- “CFGGEN Utility” on page 108
- “Smart Array P600 Controller” on page 111
- “SAUpdate Utility” on page 114
- “EBSU Utility” on page 118
- “ORCA Utility” on page 121
- “ACU Utility” on page 122

## Integrated RAID

Use Integrated RAID (IR) where either storage capacity, redundancy, or both of a RAID configuration are required. Two components of IR are:

- Integrated Mirror (IM)
- Global Hot Spare

To flash firmware, use the `MPTUTIL` command. To configure and maintain the IR functionality of the SAS controller on the HP Integrity server, use the `DRVCFG` and `CFGGEN EFI` commands. If you are scripting multiple devices, use the `CFGGEN` command.

### Integrated Mirror

The advantage of an IM is there is always a mirrored copy of the data. An IM provides data protection for the system boot volume to safeguard critical information such as the operating system on servers and high performance workstations. An IM supports two simultaneous mirrored volumes, making an array, providing fault-tolerant protection for critical data. Typically, one of these volumes is the boot volume. If a disk in an IM fails, the hot swap capability enables the volume to be easily restored by replacing the failed disk. The firmware then automatically re-mirrors to the replaced disk.

### Global Hot Spare

Each SAS controller can have one global hot spare disk available to automatically replace a failed disk in the one or two IM volumes configured on the controller. The hot spare makes the IM array more fault tolerant. Up to two IM volumes are supported per SAS controller plus the hot spare.

---

## HP 8 Internal Port SAS HBA (SAS Controller)

The following information is provided to assist you in configuring the 8 Internal Port SAS HBA controller during installation.

### MPTUtil Utility

The MPTUtil utility enables you to update the adapter flash memory with the EFI driver and HBA firmware. New versions of these images are released periodically.

---

**IMPORTANT** Do not store the files in this package on a SAS device. If you store these files on a SAS device and the update fails, these files will not be accessible.

---

To update firmware, follow these steps:

**Step 1.** Insert the *HP IPF Offline Diagnostics and Utilities CD* in the drive and boot to the EFI Shell.

---

**NOTE** You can also download the firmware image file and update utility from the HP Web site at: <http://www.hp.com> in the **Driver Downloads** section.

---

---

**IMPORTANT** When you boot the EFI enabled systems, the CD containing the utility must be in the drive to allow device mapping. The EFI utility and firmware image files are located in the root directory or in a subdirectory on the CD.

---

**Step 2.** The CD drive displays in the list of mapped devices as **fs0**. To change to this device, enter **fs0**:

```
shell> fs0:  
fs0:\>
```

**Step 3.** To determine the current version of the firmware, follow these steps.

**a.** At the EFI Shell, enter **mptutil** from the directory that contains `mptutil.efi`. The following example indicates that the EFI Serial Attached SCSI card utility version is 1.01.12.00:

```
fs0:\EFI\HP\TOOLS\NETWORK> mptutil  
MPTUTIL-1.01.12.00  
  
Vendor Device  
Choice ID ID Bus Device  
-----  
0 1000h 0054h 14h 01h LSI Logic SAS1068 Host Adapter  
1 - Refresh
```

**b.** Press **Enter**.

**Step 4.** To update the firmware, use the MPTUtil command.

**Step 5.** Reset the controller.

```
fs0:\> reset
```

The MPTUtil commands and functions are listed in Table 9-1 and described in the following sections.

**Table 9-1 MPTUtil Commands and Functions**

Command	Function
mptutil -f <firmware_file>	Updating HBA RISC firmware on the controller
mptutil -o -g <x86_file> <fcode_file>	Updating EFI driver on first controller
mptutil -o -vpd -c 0	Viewing VPD information
Parameters in < > are optional. A space is required between command line options and their parameters.	

The following sections describe the MPTUtil commands and functions.

### Flashing Firmware on First Controller

To update the HBA RISC firmware on the first controller, follow these steps:

**Step 1.** At the fs0:\> prompt, enter `mptutil -f <firmware_file> -c 0`.

**Step 2.** At the fs0:\> prompt, enter `reset`.

The filename is optional and you are prompted for a filename if omitted.

Another way for the firmware to be flashed is done without your knowledge. When MPTUtil is executed, and a SAS HBA is in any state other than ready or operational, MPTUtil immediately performs a firmware download boot. The firmware provided by you to do the firmware download boot is immediately flashed after the firmware download boot has completed. MPTUtil does this because the firmware only moves to the operational state if it is running from flash and not memory. Operational state is needed to do everything else provided in the utility.

### Flashing BIOS and EFI Driver on the First Controller

To update the EFI driver on the first controller, follow these steps:

**Step 1.** At the fs0:\> prompt, enter `mptutil -o -g <Bios_File> <EFI_driver_file> -c 0`.

**Step 2.** At the fs0:\> prompt, enter `reset`.

The filename is optional and you are prompted for a filename if omitted.

### Common Questions About Flashing Firmware

**Question** After I update firmware on my SAS HBA, why doesn't the version string change in the menu?

**Answer** The firmware you just flashed on the HBA does not run until a diagnostic reset occurs. If you exit the utility and reenter it, the version string is updated.

**Question** This image does not contain a valid nvdata when I try to flash the firmware, why?

**Answer** You are expected to concatenate a proper nvdata image on to the firmware. MPTUtil keeps you from flashing an image without one. To concatenate nvdata and firmware you need to run the `mptutil -o -d 64it__l.fw,sas106x.dat,output.fw` command. .

- 64it\_\_l.fw is the firmware image without a nvdata image



- `sas106x.dat` is the `nvd` data image. This file depends on the type/rev of HBA on which the firmware is used
- `output.fw` is the name of the file created with the firmware and `nvd` data concatenated. This concatenated image can be used for all boards of this type or revision.

Question How do I program multiple cards in a system from the command line?

Answer `MPTUTIL` (EFI) does not support this.

Question Can I program a new flash and option ROM in the same command line argument?

Answer Yes. Run the `mptutil -f <firmware_name> -b <option_rom_name>` command.

### Viewing the VPD Information for EFI Driver and RISC Firmware

To view the VPD information for the EFI driver and RISC firmware, enter `mptutil -o -vpd -c 0` at the `fs0:\>` prompt.

## DRVCFG Utility

To configure an IM on the SAS controller, follow these steps:

### EFI Commands

To configure an Integrated Mirror (IM) Array on the SAS Controller, use the following EFI commands:

- DRVCFG (GUI interface)
- CFGGEN (command line interface)

---

**NOTE** If you are not using the IM functionality, do not follow these procedures.

---

### Starting the DRVCFG Utility

To start the DRVCFG configuration utility, follow these steps:

**Step 1.** Select the EFI Shell from the console menu.

**Step 2.** Type `drvcfg -s` and press **Enter**.

### Using the DRVCFG Utility

The configuration utility uses several input keys (**F1**, **F2**, **HOME**, **END**, and so on) that may not be supported by all terminal emulation programs. Each of these keys has an alternate key that performs the same function. Review the terminal emulation program documentation to verify which input keys are supported. If problems occur using any of the function keys or **HOME/END/PGUP/PGDN**, it is recommended that the alternate keys be used.

There are general key inputs throughout the configuration utility that apply on all screens:

F1 Help	Context sensitive help for the cursor-resident field.
Arrow Keys	Select Item - Up, down, left, right movement to position the cursor.
Home/End	Select Item - Up, down, left, right movement to position the cursor.
+/-	Change Item - Items with values in [ ] brackets are modifiable. Numeric keypad + and numeric keypad - (minus) update a modifiable field to its next relative value.
Esc	Abort/Exit - Escape aborts the current context operation and/or exits the current screen. User confirmation is solicited as required if changes have been made by user. If you are using a serial console, pressing <b>Esc</b> causes a delay of several seconds before it takes effect. This is normal system behavior and is not an error.
Enter	Execute <item> - Executable items are indicated by highlighted text and a different background color. Press <b>Enter</b> to execute the field's associated function.

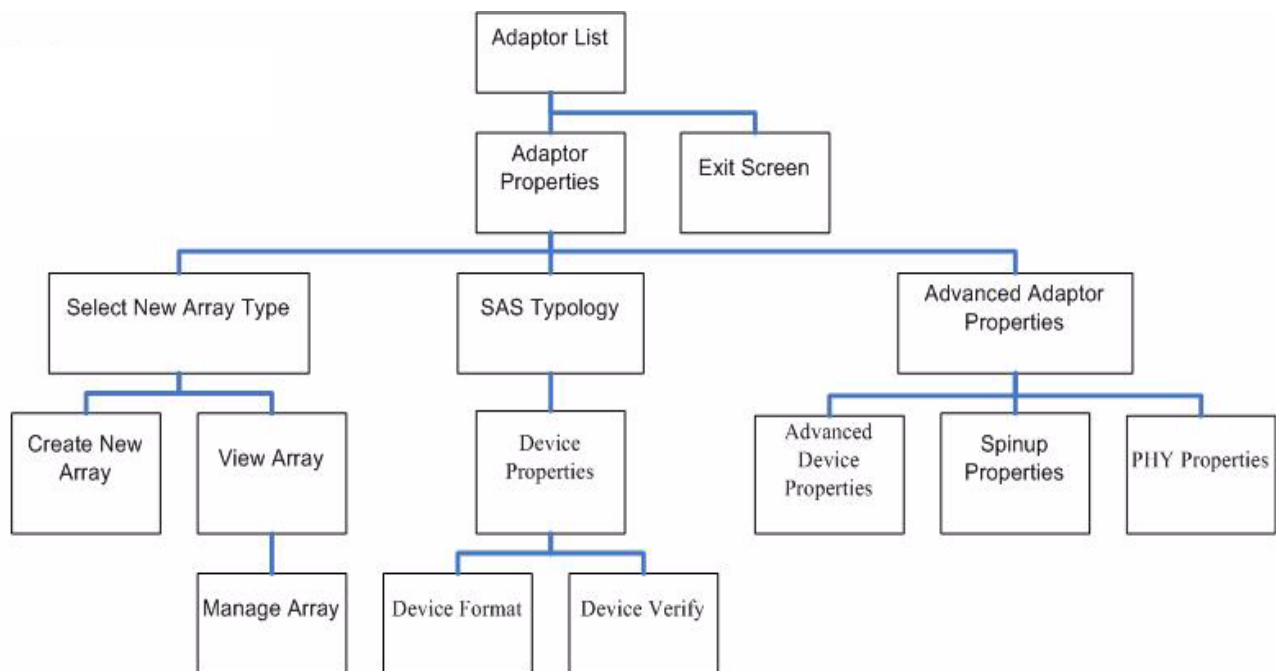
## Configuration Utility Screens

All SAS BIOS configuration utility screens contain the following areas, starting at the top of the screen:

- Header area      Identifies the utility and version number.
- Menu area        Gives the title of the current screen, and on screens other than the **Adapter List** screen also identifies the adapter.
- Main area        The main area for presenting data. This area has a cursor for item selection, and horizontal and vertical scroll bars if necessary.
- Footer area      Provides general help information text.

Figure 9-1 provides a map of how screens are accessed in the DRVCFG utility.

**Figure 9-1      Accessed Screens in the DRVCFG Utility**



## DRVCFG Screens

### Adapter List Screen

The **Adapter List** screen displays when the configuration utility is first started. This screen displays a scrolling list of up to 256 SAS controllers in the system, and information about each of them. Use the arrow keys to select a SAS controller, and press **Enter** to view and modify the selected SAS controller's properties.

You can view and modify the SAS controller whether it is enabled or disabled. You can use the **Boot Support** setting in the **Adapter Properties** menu to change the status of this setting. You must reconnect the EFI Driver in order for a new **Boot Support** setting to take effect.

The following are the descriptions for the **Adapter List** screen.

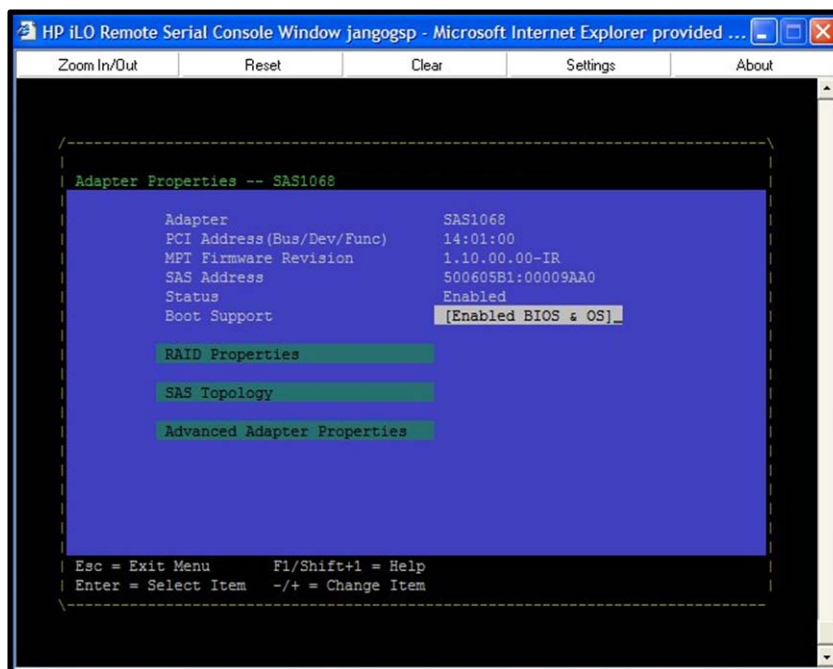
- Adapter            Indicates the specific SAS Controller type.
- PCI Bus           Indicates the PCI Bus number assigned by the system BIOS to an adapter (0x00 - 0xFF, 0 - 255 decimal)

PCI Dev	Indicates the PCI Device assigned by the system BIOS to an adapter (range 0x00 - 0x1F, 0 - 31 decimal)	
PCI Fnc	Indicates the PCI Function assigned by the system BIOS to an adapter (range 0x00 - 0x7, 0 - 7 decimal)	
FW Revision	Displays the Fusion MPT firmware version and type (IR or IT)	
Status	Indicates whether the adapter is or is not eligible for software control (enabled, disabled or error)	
	Enabled	Indicates the EFI Driver is either currently controlling the adapter, or will attempt to control the adapter upon reload.
	Disabled	Indicates the EFI Driver is either not controlling the adapter, or will discontinue control of the adapter upon reload.
	Error	Indicates that the EFI Driver encountered a problem with the adapter. Viewing and modifying settings for the adapter is allowed but the information and functionality available may be limited.

### Adapter Properties Screen

The **Adapter Properties** screen enables you to view and modify adapter settings. To scan the SAS controller's devices, select a SAS controller and press **Enter**. The **Adapter Properties** screen displays.

**Figure 9-2 Adapter Properties Screen**



Use the arrow keys to select **RAID Properties**, and press **Enter** to view the **Select New Array Type** screen.

To access the following screens, use the arrow keys to select the screen, and press **Enter** on the appropriate field:

- RAID Properties
- SAS Topology

- Advanced Adapter Properties

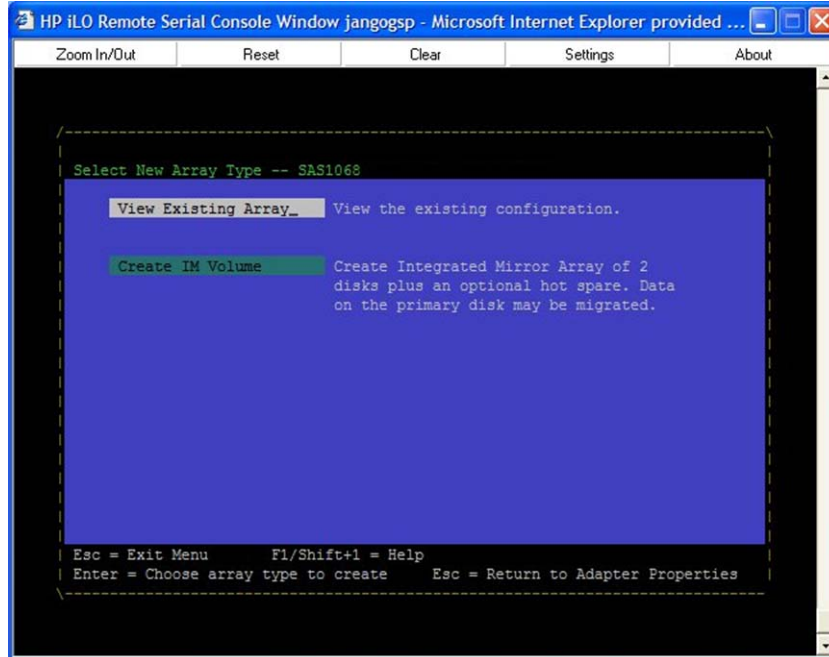
The following are the descriptions for the **Adapter Properties** screen.

Adapter	Indicates the specific SAS Controller type.
PCI Address	Displays the PCI Address assigned by the system BIOS to the adapter. <ul style="list-style-type: none"><li>• Bus value range 0x00 - 0xFF, 0 - 255 decimal</li><li>• Device value range 0x00 - 0x1F, 0 - 31 decimal</li><li>• Function range 0x00 - 0x7, 0 - 7 decimal</li></ul>
FW Revision	Displays the MPT firmware version and type in the format (x.xx.xx.yy), where <b>x.xx.xx.xx</b> refers to the FW version and <b>yy</b> refers to the type. The currently supported type is IR.l).
SAS Address	Displays the SAS Address assigned to this adapter.
FW Revision	Displays the Fusion MPT firmware version and type (IR or IT)
Status	Indicates whether an adapter is eligible for configuration utility software control or is reserved for control by other software (Enabled, Disabled or Error).  Enabled            Indicates the EFI Driver is either currently controlling the adapter, or will attempt to control the adapter upon reload.  Disabled           Indicates the EFI Driver is either not controlling the adapter, or will discontinue control of the adapter upon reload.  Error                Indicates that the EFI Driver encountered a problem with the adapter. Viewing and modifying settings for the adapter is allowed but the information and functionality available may be limited.
Boot Support	Specifies whether an adapter is eligible for configuration utility software control or is reserved for control by other software (Enabled BIOS & OS, Enabled BIOS Only, Enabled OS Only or Disabled). <ul style="list-style-type: none"><li>• Enabled BIOS &amp; OS - SAS controller is controlled by both the BIOS and OS driver.</li><li>• Enabled BIOS Only - SAS controller is controlled only by the BIOS. This setting may not be supported by all OS drivers. For example, it is not possible to disable an adapter in a Windows driver.</li><li>• Enabled OS Only - SAS controller is controlled only by the OS driver.</li><li>• Disabled - SAS controller is not controlled by the BIOS when the SAS controller is loaded. However, the adapter is still visible through the configuration protocol.</li></ul> Changes to the <b>Boot Support</b> setting are reflected in the <b>Status</b> field of the <b>Adapter List</b> menu. The new setting will do not take effect until the BIOS is reloaded (system reboot).

## RAID Properties Screens

There are four screens within RAID properties. To access the screens, select RAID Properties from the **Adapter Properties** screen. The **Select New Array Type** screen displays.

**Figure 9-3** Select New Array Type Screen



### Select New Array Type Screen

The **Select New Array Type** screen enables you to view an existing array or create an Integrated Mirror array of two disks, plus an optional hot spare.

- To go to the **Create New Array** screen, select Create IM Volume.
- To go to the **View Array** screen, select View an Existing Array.

### Create New Array Screen

The **Create New Array** screen enables you to create a new array. To access the **Create New Array** screen, press **Enter** on the **Create IM Volume** field from the **Select New Array Type** screen.

To create a new array, follow these steps:

**Step 1.** Select one of the following options:

To migrate to an IM array, press **m**. This keeps the existing data, and the disk is synchronized.

To delete all data on all the disks in the array, press **d**. This overwrites existing data when creating a new IM array, and the disk is not synchronized

**Step 2.** To create the array after the volume is configured, press **c**. The system prompts you to save changes, which creates the array. During the creation process, the utility pauses. You are then taken back to the **Adapter Properties** screen.

The following are the descriptions for the **Create New Array** screen.

Array Type	Indicates the type of array being created.																														
Array Size	Indicates the size of the array in MegaBytes.																														
Bay	Displays the bay in which devices are located.																														
Device Identifier	Displays the device identifier.																														
RAID Disk	<p>Specifies the devices (disks) that make up an IM array. If RAID Disk is <b>Yes</b>, the device is part of an IM array; if <b>No</b>, the device is not part of an IM array. This field is grayed out under the following conditions:</p> <ul style="list-style-type: none"> <li>• The device does not meet the minimum requirements for use in an IM array.</li> <li>• The device is not large enough to mirror existing data on the primary drive.</li> <li>• This disk has been selected as the hot spare for the IM array.</li> </ul>																														
Hot Spr	<p>Specifies whether a device is the hot spare for an IM array. If hot spare is Yes the device is used as a hot spare for the IM array; if No, the device is not used as a hot spare for the IM array. Only one hot spare per IM array is permitted. A hot spare is not required in an IM. You can specify a hot spare at array creation, or any time after creation, provided the array is made up of five disks or fewer. This field is grayed out under the following conditions:</p> <ul style="list-style-type: none"> <li>• The device does not meet the minimum requirements for use in an IM array.</li> <li>• The array already has a hot spare.</li> <li>• The array is made up of the maximum number of devices (six).</li> <li>• The device isn't large enough to mirror existing data on the primary. The hot spare drive must be greater than or equal to the size of any drive in any IM volume.</li> </ul>																														
Drive Status	<p>xxxx</p> <table border="0"> <tr> <td>OK</td> <td>Disk is online and fully functional.</td> </tr> <tr> <td>Missing</td> <td>Disk is not responding.</td> </tr> <tr> <td>Failed</td> <td>Disk has failed.</td> </tr> <tr> <td>Initalizing</td> <td>Disk is initializing.</td> </tr> <tr> <td>CfgOffln</td> <td>Disk is offline at host's request.</td> </tr> <tr> <td>User Fail</td> <td>Disk is marked failed at host's request.</td> </tr> <tr> <td>Offline</td> <td>Disk is offline for some other reason.</td> </tr> <tr> <td>Inactive</td> <td>Disk has been set inactive.</td> </tr> <tr> <td>Not Syncd</td> <td>Data on disk is not synchronized with the rest of the array.</td> </tr> <tr> <td>Primary</td> <td>Disk is the primary disk for a 2 disk mirror and is OK.</td> </tr> <tr> <td>Secondary</td> <td>Disk is the secondary disk for a 2 disk mirror and is OK.</td> </tr> <tr> <td>Wrg Type</td> <td>Device is not compatible for use as part of an IM array.</td> </tr> <tr> <td>Too Small</td> <td>Disk is too small to mirror existing data.</td> </tr> <tr> <td>Max Dsks</td> <td>Maximum # of disks allowed for this type of Array reached and/or Maximum # of total IM disks on a controller reached.</td> </tr> <tr> <td>No SMART</td> <td>Disk doesn't support SMART, cannot be used in an RAID array.</td> </tr> </table>	OK	Disk is online and fully functional.	Missing	Disk is not responding.	Failed	Disk has failed.	Initalizing	Disk is initializing.	CfgOffln	Disk is offline at host's request.	User Fail	Disk is marked failed at host's request.	Offline	Disk is offline for some other reason.	Inactive	Disk has been set inactive.	Not Syncd	Data on disk is not synchronized with the rest of the array.	Primary	Disk is the primary disk for a 2 disk mirror and is OK.	Secondary	Disk is the secondary disk for a 2 disk mirror and is OK.	Wrg Type	Device is not compatible for use as part of an IM array.	Too Small	Disk is too small to mirror existing data.	Max Dsks	Maximum # of disks allowed for this type of Array reached and/or Maximum # of total IM disks on a controller reached.	No SMART	Disk doesn't support SMART, cannot be used in an RAID array.
OK	Disk is online and fully functional.																														
Missing	Disk is not responding.																														
Failed	Disk has failed.																														
Initalizing	Disk is initializing.																														
CfgOffln	Disk is offline at host's request.																														
User Fail	Disk is marked failed at host's request.																														
Offline	Disk is offline for some other reason.																														
Inactive	Disk has been set inactive.																														
Not Syncd	Data on disk is not synchronized with the rest of the array.																														
Primary	Disk is the primary disk for a 2 disk mirror and is OK.																														
Secondary	Disk is the secondary disk for a 2 disk mirror and is OK.																														
Wrg Type	Device is not compatible for use as part of an IM array.																														
Too Small	Disk is too small to mirror existing data.																														
Max Dsks	Maximum # of disks allowed for this type of Array reached and/or Maximum # of total IM disks on a controller reached.																														
No SMART	Disk doesn't support SMART, cannot be used in an RAID array.																														



Wrg Intfc	Device interface (SAS) differs from existing IM disks.
Pred Fail	Indicates whether device SMART is predicting device failure (Yes, No).
Size(MB)	Indicates the size of the device in megabytes (megabyte = 1024 x 1024 = 1,048,576). If the device is part of a two-disk array, this field reflects the size of the array, not the size of the individual disk. If the device is part of a three or more disk array, this field is the size that the disk makes up within the array.  When creating a striped array, the usable size of the array is determined by the number of drives times the size of the smallest drive in the array. In arrays consisting of different sized drives, excess space on larger drives are unusable.

### View Array Screen

The **View Array** screen enables you to view the current array configuration. To access the **View Array** screen, press **Enter** on the **View Existing Array** field from the **Select New Array Type** screen.

You can perform the following actions on the **View Array** screen:

- To view the next array, press **N**.
- To create a new array, press **C**.

Array	Displays the number of this array.
Identifier	Displays the identifier of this array.
Type	Displays the RAID type.
Scan Order	Displays the scan order of the array.
Size (MB)	Displays the size of the array.
Status	Displays the status of the array.
Bay	Displays the bay in which devices are located.
Device Identifier	Displays the device identifier.
RAID Disk	Specifies the devices (disks) that make up an IM array. If RAID Disk is <b>Yes</b> , the device is part of an IM array, if <b>No</b> , the device is not part of an IM array. This field is grayed out under the following conditions: <ul style="list-style-type: none"> <li>• The device does not meet the minimum requirements for use in an IM array.</li> <li>• The device is not large enough to mirror existing data on the primary drive.</li> <li>• This disk has been selected as the hot spare for the IM array.</li> </ul>
Hot Spr	Specifies whether a device is the hot spare for an IM array. If hot spare is <b>Yes</b> , the device is used as a hot spare for the IM array, if <b>No</b> , the device is not used as a hot spare for the IM array. Only one hot spare per IM array is permitted. A hot spare is not required in an IM. A hot spare can be specified at array creation, or any time after creation, provided the array is made up of 5 disks or fewer. This field is grayed out under the following conditions: <ul style="list-style-type: none"> <li>• The device does not meet the minimum requirements for use in an IM array.</li> <li>• The array already has a hot spare.</li> <li>• The array is made up of the maximum number of devices (6).</li> <li>• The device isn't large enough to mirror existing data on the primary. The hot spare drive must be greater than or equal to the size of any drive in any IM volume.</li> </ul>

Drive Status	xxxx
	OK Disk is online and fully functional.
	Missing Disk is not responding.
	Failed Disk has failed.
	Initializing Disk is initializing.
	CfgOffln Disk is offline at host's request.
	User Fail Disk is marked failed at host's request.
	Offline Disk is offline for some other reason.
	Inactive Disk has been set inactive.
	Not Syncd Data on disk is not synchronized with the rest of the array.
	Primary Disk is the primary disk for a 2 disk mirror and is OK.
	Secondary Disk is the secondary disk for a 2 disk mirror and is OK.
	Wrg Type Device is not compatible for use as part of an IM array.
	Too Small Disk is too small to mirror existing data.
	Max Dsks Maximum # of disks allowed for this type of Array reached and/or Maximum # of total IM disks on a controller reached.
	No SMART Disk doesn't support SMART, cannot be used in an RAID array.
	Wrg Intfc Device interface (SAS) differs from existing IM disks.
Pred Fail	Indicates whether device SMART is predicting device failure (Yes, No).
Size(MB)	Indicates the size of the device in megabytes (megabyte = 1024 x 1024 = 1,048,576). If the device is part of a two-disk array, this field reflects the size of the array, not the size of the individual disk. If the device is part of a three or more disk array, this field is the size that the disk makes up within the array.  When creating a striped array, the usable size of the array is determined by the number of drives times the size of the smallest drive in the array. In arrays consisting of different sized drives, excess space on larger drives are unusable.

### Manage Array Screen

The **Manage Array** screen enables you to manage the current array. To access the **Manage Array** screen, select the appropriate field and press **Enter** on the **Manage Array** field from the **View Array** screen.

The **Manage Array** screen enables you to perform the following actions:

#### Manage Hot Spare

To display a **Hot Spare Management** screen that has the same layout as the **Create New Array** screen, press **Enter** on Manage Hot Spare. This field is grayed out under the following conditions:

- The array is inactive.
- The array is at its maximum number of devices.
- Non-IR firmware is used.
- IR is disabled. The array is inactive.

#### Synchronize Array

To perform a synchronization of the IM array, press **Enter** on Synchronize Array. The screen prompts you to ask if you want to perform this action. Press **Y** for yes or **N** for no. This field is grayed out under the following conditions:

- The array is inactive.
- The array does not need to be resynchronized.
- The adapter's MPT firmware does not support the feature
- Non-IR firmware is used.
- IR is disabled. The array is inactive.

### Activate Array

To perform an activation of an IM array, press **Enter** on Activate Array. The screen prompts you to ask if you want to perform this action. Press **Y** for yes or **N** for no.

### Delete Array

To perform the deletion of the currently displayed IM array, press **Enter** on Delete Array. The screen prompts you to ask if you want to perform this action. Press **Y** for yes and **N** for no.

Identifier	Displays the identifier of this array.
Type	Displays the RAID type.
Scan Order	Displays the scan order of the array.
Size (MB)	Displays the size of this array.
Status	Displays the status of this array.

### Exit the SAS Configuration Utility Screen

As some changes only take effect when you exit the utility, it is important to always exit the utility properly. To exit the utility, follow these steps:

**Step 1.** To return to the Adapter List from Adapter Properties, press **ESC**.

**Step 2.** To exit the utility from the Adapter List, press **ESC**.

---

**NOTE** A similar exit screen is used when exiting most other screens, and can be used to save settings.

---

The exit screen shows some options that are grey, indicating that they are not available. You can only select the available options. The exit choices are as follows:

- Are you sure you want to exit?
- Cancel Exit
- Save changes and reboot
- Discard changes and reboot
- Exit the Configuration Utility and Reboot

## CFGGEN Utility

The CFGGEN utility is a command line utility that runs in the Linux, EFI, and Windows Pre-Installation (WinPE) environments. It is a minimally interactive program that you execute from a command line prompt, or a shell script. The results from invoking this utility are communicated through the program status value that is returned when the program exits. Use the CFGGEN utility to create IM storage configurations on SAS controllers. Some CFGGEN commands work only with SAS adaptors in the EFI environment.

### Starting CFGGEN

The CFGGEN utility is located on the *HP IPF Offline Diagnostic and Utilities CD*. To use CFGGEN, follow these steps:

**Step 1.** Insert the CD into the drive.

**Step 2.** Boot the system to the EFI Shell prompt.

**Step 3.** From the EFI Shell prompt, change to the CD drive.

```
shell> fs0: Enter  
fs0:\>
```

**Step 4.** Change to the directory that contains `cfggen.efi`.

```
fs0:\> cd EFI\HP\TOOLS\NETWORK Enter  
fs0: EFI\HP\TOOLS\NETWORK>
```

From this directory use CFGGEN.

### CFGGEN Operation

CFGGEN is not case sensitive. You can enter CFGGEN commands and parameters in uppercase, lowercase, or a mixture of the two. Use the following conventions in the command descriptions:

- Text in italics must be entered exactly as shown on the command line
- Text surrounded by <> must be replaced with a required parameter
- Text surrounded by [ ] may be replaced by an optional parameter
- Parameters surrounded by {} must be entered one or more times, as appropriate for the executed command
- Do not enter the command line definition characters (<>, [ ], and {}) on the command line.

CFGGEN uses a command line interface.

Syntax: `cfggen <controller #> <command> <parameters>`

---

**NOTE** The program name, controller number, command, and parameters fields must be separated by the ASCII space character. The format of the parameters is command specific.

---

The program return value is returned to the user when the program exits. A value of 0 is returned if the command is successful. Otherwise, a value of 1 is returned.

### Rules for creating IM volumes and hot spare disks

The following rules apply when creating IM volumes and hot spare disks:

- All disks that are part of an IM volume or a hot spare for an IM volume must be on the same SAS controller.
- IM volumes are supported.
- Only two IM volumes (plus a global hot spare) per controller can be created.
- An IM array must have exactly two disks.
- A hot spare disk cannot be created without at least one IM volume already created.
- The utility does not allow adding a hot spare disk of type different from disk types in any of the volume.
- With the `AUTO` command all drives used are the same type as the first available disk found, and the size is limited to the size of the smallest disk.

## CFGGEN Commands

### Using the CREATE Command

The `CREATE` command creates IM volumes on the SAS controller. Firmware and hardware limitations for this family of cards limit the number of configurations that are possible.

**Syntax** `cfggen <controller #> create <volume type> <size> [qsync] [noprompt]`

#### Parameters

<code>&lt;volume type&gt;</code>	Volume type for the volume to be created. Valid value is IM.
<code>&lt;size&gt;</code>	Size of the IM volume in Mbytes or “MAX” for the maximum size available.
<code>[qsync]</code>	Quick synchronization of the volume created.
<code>[noprompt]</code>	Eliminates warnings and prompts.

#### Operation

Once a disk has been added to an IM volume, all of its storage capacity may or may not be used depending on drive capacity and volume capacity. For example, if you add a 36 GB disk drive to a volume that only uses 9 GB of capacity on each disk drive, the remaining 27 GB of capacity on the disk drive is unusable.

The disk identified by the first SCSI ID on the command line is assigned as the primary disk drive when creating an IM volume. If the SAS controller is allowed to resync the disk drives, the data on the primary disk drive is available by accessing the newly created volume.

### Using the AUTO Command

The `AUTO` command automatically creates an IM volume on the SAS controllers. The volume is created with the maximum number of disks available for use in the specified volume type. The main difference from the `CREATE` command is that with `AUTO` command user does not specify SCSI ID values for disks to use in the volume. The `CFGGEN` utility automatically uses the first disks it finds that are usable in the IM volume. Firmware and hardware limitations for the family of controllers limit the number of configurations that are possible.

**Syntax** `cfggen <controller #> auto <volume type> <size> [qsync] [noprompt]`

#### Parameters

<code>&lt;volume type&gt;</code>	Volume type for the volume to be created. Valid value is IM.
<code>&lt;size&gt;</code>	Size of the RAID volume in Mbytes or “MAX” for the maximum size available.
<code>[qsync]</code>	Quick synchronization of the volume created.
<code>[noprompt]</code>	Eliminates warnings and prompts.

### Operation

When `AUTO` creates an IM volume, the first disk found is assigned as the primary disk drive. If the controller is allowed to resync the disk drives, the data on the primary disk drive is available by accessing the newly created volume. Reply **Yes** if you want to complete the creation.

### HOTSPARE

The `HOTSPARE` command creates a hot spare disk drive. The hot spare drive is added to hot spare pool 0.

**Syntax** `cfggen <controller #> HOTSPARE [DELETE] <Encl:Bay>`

### Parameters

- `<controller #>` A SAS controller number between 0 and 255.
- `[DELETE]` Specifies that the hot-spare is to be deleted (Omit the `DELETE` keyword to specify hot-spare creation).
- `<Encl>:<Bay>` Enclosure number and Bay number that identifying the disk drive that will become the hot spare.

### Operation

The number of disk drives in an IM array plus the hot spare disk cannot exceed three. You can create only one hot spare disk. You must make sure the capacity of the hot spare disk is greater than or equal to the capacity of the smallest disk in the logical drive. An easy way to verify this is to use the `DISPLAY` command.

---

**CAUTION** See rules for creating IM volumes and hot spare disks.

---

## Smart Array P600 Controller

The following information is provided to assist you in configuring the Smart Array P600 controller during installation.

### Quick Installation Procedure

To install the controller, follow these steps:

- Step 1.** Power off the server.
- Step 2.** Install additional physical drives if necessary (see “Connecting External Storage” on page 111). The number of drives in the server determines the RAID level that is auto configured when the server is powered on.
- Step 3.** Power on the server.
- Step 4.** Update the controller firmware (see “SAUpdate Utility” on page 114). When the firmware update process is complete, the server reboots and runs through a POST procedure. This POST procedure halts briefly during controller initialization and prompts you to open ORCA (Option ROM Configuration for Arrays).
- Step 5.** Open ORCA. See “Configuring the Array” on page 112.
  - If using a headless console, press **Esc+8**.
  - Otherwise, press **F8**.
- Step 6.** Configure the logical boot drive, and exit from ORCA.

Depending on the OS, additional device drivers and management agents must be installed. See the *HP Smart Array P600 Controller for Integrity Servers User Guide* at:

<http://h20000.www2.hp.com/bizsupport/TechSupport/Home.jsp> under HP Smart Array P600 product for installation procedures.

The latest firmware, drivers, utilities, software, and documentation for HP Integrity servers are available on the support page of the HP Web site at:

<http://www.hp.com/support/itaniumservers>

### Connecting External Storage

To connect external storage, follow these steps:

- Step 1.** Power off the server.
- Step 2.** Connect an external SAS cable to the external port of the controller.

---

<b>NOTE</b>	You do not have to disconnect any internal drives on shared internal port 1I because the controller preferentially discovers devices attached to port 1E. However, drives on the shared internal port are unavailable until you disconnect the external storage device.
-------------	---

---

- Step 3.** Tighten the lock screws on the cable connector.

**Step 4.** Attach the other end of the cable to the SAS input connector of the external storage enclosure.

---

**IMPORTANT** Drives that are to be used in the same array must be of the same type, either all SAS or all SATA. (Parallel SCSI drives cannot be used with this controller.)

---

**Step 5.** Tighten the lock screws on the cable connector.

**Step 6.** Power on the enclosure.

**Step 7.** Power on the server.

## SAS Cable Part Numbers

If you require additional cables, order them by the option kit number listed in Table 9-2.

**Table 9-2 SAS Cable Part Numbers**

Cable Length	Option Kit Number	Cable Assembly Number
1.0 m (3.3 ft.)	389664-B21	361317-001
2.0 m (6.6 ft.)	389668-B21	361317-002
4.0 m (13 ft.)	389671-B21	361317-004
6.0 m (20 ft.)	389674-B21	361317-006

## Configuring the Array

HP provides two utilities for manually configuring an array on a Smart Array controller:

- ORCA, a simple ROM-based configuration utility.
- Array Configuration Utility (ACU), a versatile, browser-based utility that provides maximum control over configuration parameters

---

**NOTE** To copy a particular array configuration to several other servers on the same network, use the Array Configuration Replicator (ACR) or the scripting capability of ACU. ACR is provided in the SmartStart Scripting Toolkit, available on the HP Web site at:  
<http://www.hp.com/servers/sstoolkit>.

---

Whichever utility you use, the following limitations apply:

- For the most efficient use of drive space, do not mix drives of different capacities within the same array. The configuration utility treats all physical drives in an array as if they have the same capacity as the smallest drive in the array. The excess capacity of any larger drives is wasted because it is unavailable for data storage.
- The probability that an array will experience a drive failure increases with the number of physical drives in the array. If you configure a logical drive with RAID 5, keep the probability of failure low by using no more than 14 physical drives in the array.



For conceptual information about arrays, logical drives, and fault-tolerance methods, and for information about default array configuration settings, see the *HP Array Configuration Utility User Guide* at I/O Cards and Networking Software at:

<http://docs.hp.com/en/netcom.html>

## Comparing the Utilities

Table 9-3 lists the supported features and procedures for the ACU and ORCA utilities.

---

**NOTE** A + in the appropriate column indicates that the feature or procedure is supported, while -- indicates that the feature or procedure is not supported.

---

**Table 9-3 ACU and ORCA Supported Features and Procedures**

	<b>ACU</b>	<b>ORCA</b>
<b>Supported Features</b>		
Uses a graphical interface	Yes	No
Available in languages other than English	Yes	No
Available on CE	Yes	No
Uses a wizard to suggest the optimum configuration for an unconfigured controller	Yes	No
Describes configuration errors	Yes	No
Suitable for configuration while online	Yes	No
Suitable for configuration while offline	No	Yes
<b>Supported Procedures</b>		
Creation and deletion of arrays and logical drives	Yes	Yes
Assignment of RAID level	Yes	Yes
Sharing of spare drives among several arrays	Yes	No
Assignment of multiple spare drives per array	Yes	No
Setting of stripe size	Yes	No
Migration of RAID level or stripe size	Yes	No
Configuration of controller settings	Yes	No
Expansion of an array	Yes	No
Creation of multiple logical drives per array	Yes	No

## SAUpdate Utility

Use `saupdate` from the EFI Shell to update the firmware image on the HP Smart Array P600. Command line options are described below. Follow one of these two procedures to run `saupdate`:

- If you are using `saupdate` from the Offline Diagnostic CD:

**Step 1.** Download the firmware and copy it to the EFI partition.

**Step 2.** The CD containing `saupdate.efi` must be in the drive before booting the system to allow device mapping.

**Step 3.** Boot the system to the EFI Shell prompt. The CD drive should appear in the list of mapped devices as **fs0**.

**Step 4.** Change to this device by typing `fs0:` under EFI Shell prompt.

**Step 5.** If the EFI utility and firmware image files are not located in the root directory, move to the directory in which these files are located, for example:

```
fs0:\>cd \EFI\HP\TOOLS\IO_CARDS\SmartArray
```

---

**IMPORTANT** Both `saupdate.efi` and the firmware image file must be located in the same directory. If they are not, copy them both to the EFI partition. Run the `saupdate.efi` using the `fs0:\> saupdate` command.

---

- If you are not using the Offline Diagnostic CD:

**Step 1.** Download the SA EFI update utility `saupdate.efi` and copy it to the EFI partition.

**Step 2.** Download the firmware and copy it to the EFI partition.

**Step 3.** Boot the system to the EFI Shell and change directories to the EFI partition.

**Step 4.** Run the `saupdate.efi` using the using the `fs0:\> saupdate.efi` command.

The following screen displays. The version of the utility displays on the second line:

```
*****  
Smart Array Offline Firmware Update Utility  
Version: 1.04.12.00  
  
(C) Copyright 2004 Hewlett Packard Development Company L.P.  
*****
```

### Syntax

`saupdate <operation> <parameters>`

### Commands

You can use the following operations with `saupdate`:

- LIST
- UPDATE

- UPDATE all
- HELP or?

## List

Use LIST to display all detected Smart Array controllers along with the active firmware versions.

```
fs0:\> saupdate LIST
*****
Smart Array Offline Firmware Update Utility
Version: 1.04.12.00

(C) Copyright 2004 Hewlett Packard Development Company L.P.
*****

Seg  Bus  Dev  Func      Description          Version

1   51   4    0        HP Smart Array 6400   1.92

1   20   1    0        HP Smart Array 5300   3.54
```

The identification information from this list is used to designate which controller is to be updated.

## UPDATE

---

**NOTE** The saupdate utility program file (saupdate.efi) must be located in the same file system as the firmware files.

---

```
saupdate UPDATE [ <seg:bus:dev:func> ] [smartarray_firmware_file]
```

For example, to update the controller at segment 1, bus 51, device 4, function 0 from the example output above, enter a command at the EFI Shell prompt as in this following example:

```
fs0:\> saupdate UPDATE 1:51:4:0 CYBORG234.BIN
```

Replace CYBORG234.BIN with the name of your firmware file.

The following screen displays:

```
*****
Smart Array Offline Firmware Update Utility
Version: 1.04.12.00

(C) Copyright 2004 Hewlett Packard Development Company L.P.
*****

Updating controller in Seg: 1, Bus: 51, Dev: 4, Func: 0
Current firmware version 1.92
Percentage completed: 100%
Activating firmware now, this may take several minutes.
```

Resetting and reinitializing controller.

Retrieving firmware version, this may take several minutes.

Current controller firmware version is 2.34.

The UPDATE command will not prevent downgrade to a lower firmware version.

After updating the firmware, cycle the power on the system and on any external JBODS connected to the Smart Array HBAs.

Exit status codes0: Success

## UPDATE all

When “all” is specified, the utility downloads the firmware image to all the controllers to which the firmware image applies and updates the remaining controllers. If an update operation fails for a controller, the utility still updates the remaining controllers.

The example below shows the command to update all controllers for which the firmware image file applies. The controllers for which the firmware image is not applicable are skipped. In this example, the Smart Array 6400 controller is updated, and the Smart Array 5300 is skipped:

```
fs0:\> saupdate UPDATE all CYBORG234.BIN
```

Replace CYBORG234.BIN with the name of your firmware file.

The following screen displays, showing the controllers that are updated and skipped:

```
*****  
Smart Array Offline Firmware Update Utility  
Version: 1.04.12.00  
(C) Copyright 2004 Hewlett Packard Development Company L.P.  
*****  
Updating controller in Seg: 1, Bus: 51, Dev: 4, Func: 0  
Current firmware version 1.92  
Percentage completed: 100%  
Activating firmware now, this may take several minutes.  
Resetting and reinitializing controller.  
Retrieving firmware version, this may take several minutes.  
Current controller firmware version is 2.34.  
*****  
Smart Array Offline Firmware Update Utility  
Version: 1.04.12.00  
(C) Copyright 2004 Hewlett Packard Development Company L.P.  
*****  
Firmware Image is not suitable for HP Smart Array  
5300 Controller at Seg: 1, Bus 20, Dev: 1, Func:0
```

After updating the firmware, cycle the power on the system and on any external JBODS connected to the Smart Array HBAs.

## HELP or ?

Use HELP or ? to display usage text, program version number, and build date:

Enter: saupdate HELP

or

saupdate ?

### **Error Messages**

The following is a list of error messages under various situations:

- When keyword LIST or UPDATE is misspelled or extra parameters are specified:

Error: Syntax Error

Usage: saupdate LIST or saupdate UPDATE [ | all ]

- When the controller ID in the saupdate UPDATE command is not correct:

No matching controller found

- When a firmware file does not exist in the saupdate UPDATE command, the example shows:  
CYBORG101.BIN does not exist.

File CYBORG101.BIN: Not Found

- When an invalid firmware or corrupted file is specified in the saupdate UPDATE command, the example shows:  
CYBORG101.BIN does not exist.

File CYBORG101.BIN: invalid or corrupted

## EBSU Utility

The EFI-based Setup Utility (EBSU) provides an easy-to-use interface for flashing firmware, partitioning the hard disk, installing diagnostic tools, configuring storage controllers, and running other EFI utilities.

---

**NOTE** You can use EBSU to update firmware for many different devices in the system. Smart Array P600 is shown as an example.

---

To update the Smart Array P600 firmware:

- Step 1.** Power on the server. The server boots to EFI. The EFI Boot Manager may be used from the enhanced interface (grey background) or the legacy interface (black background).
- Step 2.** Load the HP Smart Setup media into the server DVD drive.
- Step 3.** From the EFI Boot Menu, select **Internal Bootable DVD** and press **Enter**. EBSU starts and displays the **Welcome** screen.

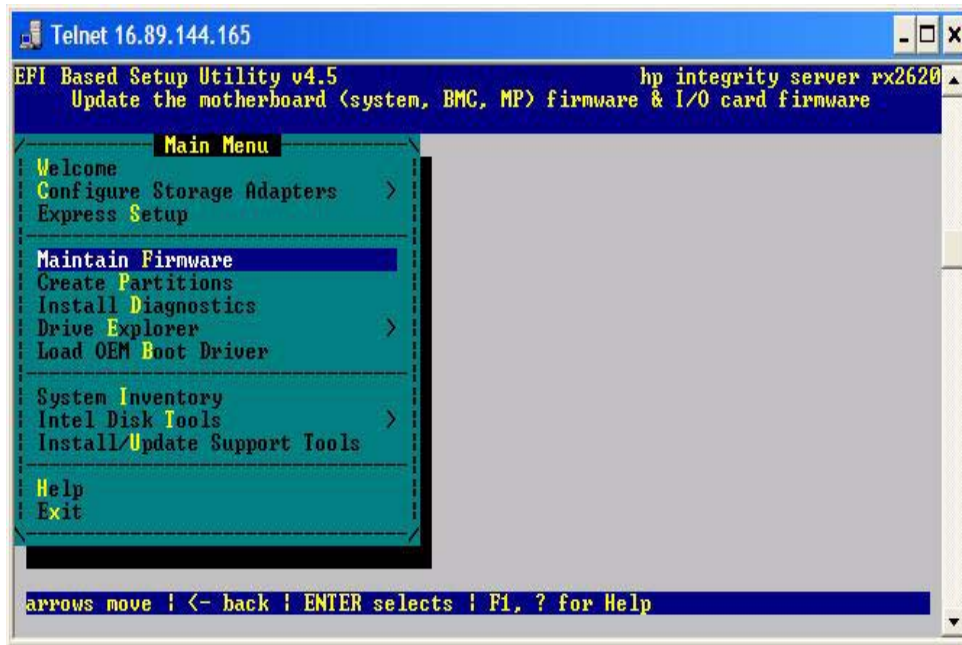
**Figure 9-4 EBSU Welcome Screen**



- Step 4.** Select **OK** and press **Enter** to continue.

**Step 5.** From the main menu, select **Maintain Firmware** and press **Enter**.

**Figure 9-5 EBSU Main Menu**

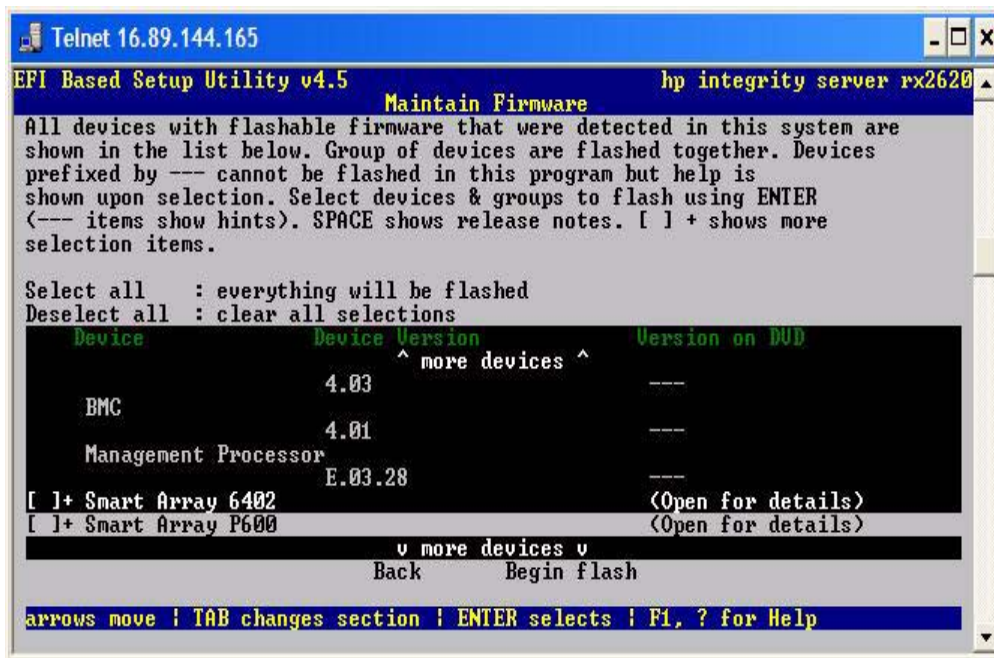


**Step 6.** In the **Maintain Firmware** screen, use the tab key to scroll down to the **Device** section.

**Step 7.** Use the down arrow key to scroll down to the **Smart Array P600** item in the list.

**Step 8.** Press **Enter** to display detailed information about the device.

**Figure 9-6 EBSU Maintain Firmware Screen**

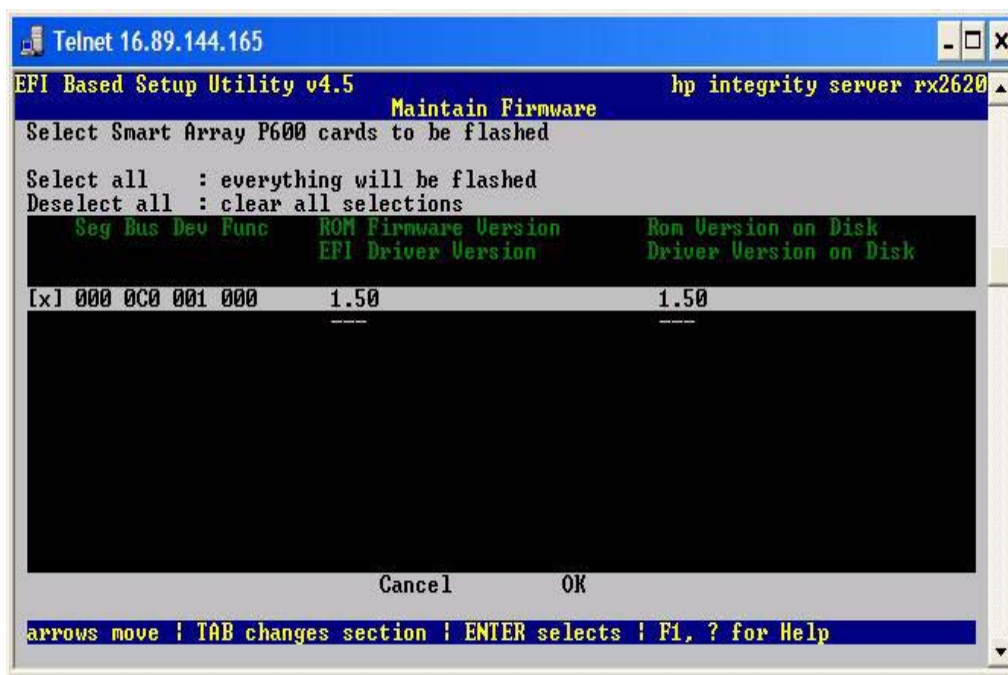




EBSU displays the firmware update screen for the selected device.

- The version number in the first column (ROM Firmware Version) is the one currently installed on your system.
- The version number in the second column (ROM Version on Disk) is the one available on your Smart Setup media.

**Figure 9-7 EBSU Maintain Firmware Update Screen**



**Step 9.** Compare the two version numbers and perform one of the following options:

- If the number in the first column is the same or higher than the number in the second column, your installed firmware is current. You do not need to update the firmware for this device! You can exit EBSU and quit this procedure.
- If the number in the first column is less than the number in the second column, your installed firmware is older than the version on your Smart Setup media. You must update the firmware for this device! Proceed to Step 9 and continue from there.

---

**NOTE** The utility does not allow you to flash the firmware if the installed version is the same or higher than the version on the Smart Setup media.

---

**Step 10.** Use the tab key to scroll down into the **Device** section and highlight the device name.

**Step 11.** Press **Enter** to select the device (this puts an “X” inside the box on the left side of the device name).

**Step 12.** Use the tab key to move to the **OK** selection and press **Enter**.

The firmware update begins and proceeds automatically to completion.

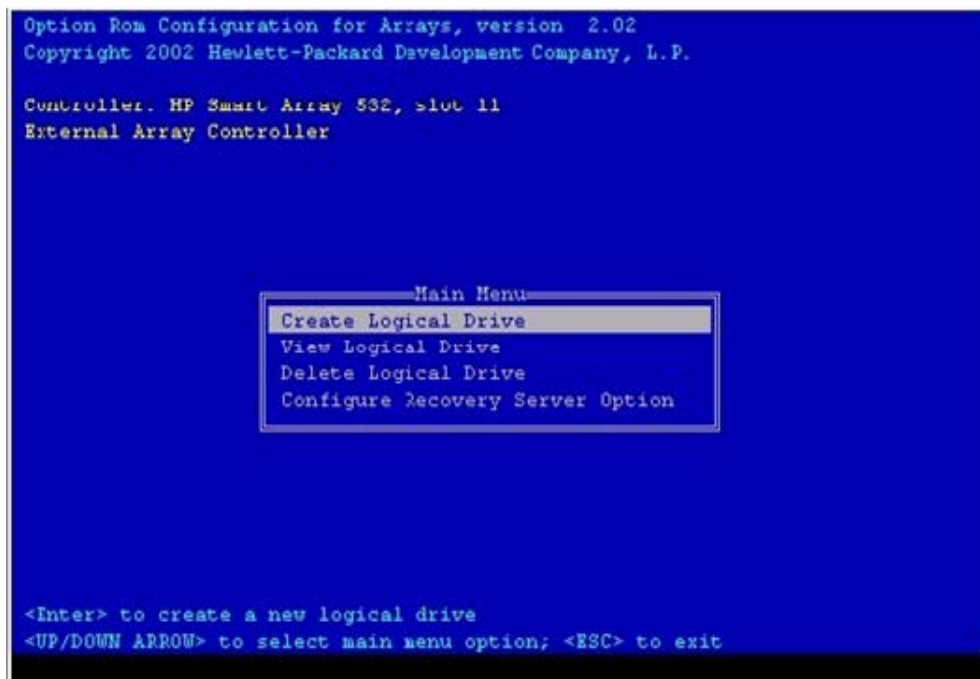


## ORCA Utility

To use ORCA, follow these steps:

- Step 1.** Power on the server. POST runs, and any array controllers that are in the server are initialized one at a time. During each controller initialization process, POST halts for several seconds while an ORCA prompt message displays.
- Step 2.** At the ORCA prompt:
  - If you are connected using a headless console, press the **Esc+8** combination.
  - Otherwise, press **F8**. The **ORCA Main Menu** displays, enabling you to create, view, or delete a logical drive.

**Figure 9-8 ORCA Main Menu**



## Creating a Logical Drive Using ORCA

To create a logical drive using ORCA, follow these steps:

- Step 1.** Select **Create Logical Drive**. The screen displays a list of all available (unconfigured) physical drives and the valid RAID options for the system.
- Step 2.** Use the **Arrow** keys, **Spacebar**, and **Tab** to navigate around the screen and set up the logical drive, including an online spare drive if one is required.

---

**NOTE** You cannot use ORCA to configure one spare drive to be shared among several arrays. Only ACU enables you to configure shared spare drives.

---

- Step 3.** Press **Enter** to accept the settings.

**Step 4.** Press **F8** to confirm the settings and save the new configuration. After several seconds, the **Configuration Saved** screen displays.

**Step 5.** Press **Enter** to continue. You can now create another logical drive by repeating the previous steps.

---

**NOTE** Newly created logical drives are invisible to the operating system. To make the new logical drives available for data storage, format them using the instructions given in the operating system documentation.

---

## ACU Utility

For detailed information about using ACU, see the *HP Array Configuration Utility User Guide* at I/O Cards and Networking Software at:

<http://docs.hp.com/en/netcom.html>

---

# 10 Booting and Shutting Down the Operating System

This chapter covers procedures for booting and shutting down operating systems on entry class HP Integrity servers. HP supports the following operating systems:

- HP-UX 11i Version 2 (B.11.23)
- HP Open VMS I64
- Microsoft Windows Server 2003
- Red Hat Enterprise Linux 4
- SuSE Linux Enterprise Server 9

This chapter addresses the following topics:

- “Configuring System Boot Options” on page 124
- “Booting and Shutting Down HP-UX” on page 125
- “Booting and Shutting Down HP OpenVMS” on page 130
- “Booting and Shutting Down Microsoft Windows” on page 133
- “Booting and Shutting Down Linux” on page 137

---

## Configuring System Boot Options

---

**NOTE** To better follow the instructions in this chapter, you should be familiar with the boot paths. See Table 3-2 on page 43.

---

This section discusses the system boot options you can configure on entry class HP Integrity servers, including the boot options list and the autoboot setting for the server.

### Boot Options List

The boot options list is a list of loadable items available for you to select from the **EFI Boot Manager** menu. The boot options list includes the EFI Shell and one or more operating system loaders.

The following example includes boot options for HP OpenVMS, Microsoft Windows, HP-UX, and the EFI Shell. The final item in the **EFI Boot Manager** menu, the **Boot Configuration** menu, is not a boot option. The **Boot Configuration** menu enables system configuration through a maintenance menu.

```
EFI Boot Manager ver 1.10 [14.61] Please select a boot option

  HP OpenVMS 8.2-1
  EFI Shell [Built-in]
  Windows Server 2003, Enterprise
  HP-UX Primary Boot: 4/0/1/1/0.2.0
  Boot Option Maintenance Menu

Use ^ and v to change option(s). Use Enter to select an option
```

---

**NOTE** In some versions of EFI, the **Boot Configuration** menu is listed as the **Boot Option Maintenance** menu.

---

To manage the boot options list for each system, use the EFI Shell, the EFI **Boot Configuration** menu, or operating system utilities.

At the EFI Shell, the `bcfg` command supports listing and managing the boot options list for all operating systems except Microsoft Windows. On HP Integrity systems with Windows installed, the `\MSUtil\nvrboot.efi` utility is provided for managing Windows boot options from the EFI Shell. For HP Integrity systems with OpenVMS installed, the `\efi\vms\vms_bcfg.efi` and `\efi\vms\vms_show` utilities are provided for managing OpenVMS boot options.

The EFI **Boot Configuration** menu provides the **Add a Boot Option**, **Delete Boot Option(s)**, and **Change Boot Order** menu items. Use this menu if you must add an EFI Shell entry to the boot options list.

Operating system utilities for managing the boot options list include the HP-UX `setboot` command and the HP OpenVMS `@SYS$MANAGER:BOOT_OPTIONS.COM` command.

For details, see the following sections:

- To set HP-UX boot options, see “Adding HP-UX to the Boot Options List” on page 125.
- To set OpenVMS boot options, see “Adding HP OpenVMS to the Boot Options List” on page 130.
- To set Windows boot options, see “Adding Microsoft Windows to the Boot Options List” on page 134.
- To set Linux boot options, see “Adding Linux to the Boot Options List” on page 137.

## Autoboot Setting

At startup, the `autoboot` setting determines whether a system automatically loads the first item in the boot options list, or remains at the **EFI Boot Manager** menu. When autoboot is enabled, EFI loads the first item in the boot options list after a designated timeout period.

Configure the autoboot setting for an HP Integrity system using either the `autoboot` EFI Shell command, or the **Set Auto Boot TimeOut** menu item from the **EFI Boot Configuration** menu.

To disable autoboot from the EFI Shell, issue the `autoboot off` command.

To enable autoboot with the default timeout value, issue the `autoboot on` command.

To enable autoboot with a timeout of 60 seconds, issue the `autoboot time 60` command.

To set autoboot from HP-UX, issue the `setboot` command.

To enable autoboot from HP-UX, issue the `setboot -b on` command.

To disable autoboot, issue the `setboot -b off` command.

---

## Booting and Shutting Down HP-UX

This section covers booting and shutting down HP-UX on entry class HP Integrity servers.

- To add an HP-UX entry to the boot options list, see “Adding HP-UX to the Boot Options List” on page 125.
- To boot HP-UX, use the following procedures:
  - “Booting HP-UX in Standard Mode” on page 126 describes the standard ways to boot HP-UX. Typically this results in booting HP-UX in multi-user mode.
  - “HP-UX Booting in Single-User Mode” on page 128 describes how to boot HP-UX in single-user mode.
  - “HP-UX Booting in LVM Maintenance Mode” on page 129 describes how to boot HP-UX in LVM maintenance mode.
- To shut down the HP-UX operating system, see “Shutting Down HP-UX” on page 130.

### Adding HP-UX to the Boot Options List

This section describes how to add an HP-UX entry to the system boot options list.

You can add the `\EFI\HPUX\HPUX.EFI` loader to the boot options list from the EFI Shell or **EFI Boot Configuration** menu (or in some versions of EFI, the **Boot Option Maintenance** menu). The operating system installer automatically adds an entry to the boot options list.

#### Adding an HP-UX Boot Option

To add an HP-UX boot option when logged in to HP-UX, use the `setboot` command. For more information, see the `setboot` (1M) manpage.

To add an HP-UX item to the boot options list from the EFI Shell, follow these steps:

**Step 1.** Access the EFI Shell environment.

Log in to the iLO 2 MP and enter `CO` to access the system console.

Confirm that you are at the **EFI Boot Manager** menu. If you are at another EFI menu, select **Exit** from the submenus until you return to the screen labeled **EFI Boot Manager**.

From the **EFI Boot Manager** menu, select **EFI Shell** to access the EFI Shell environment.

**Step 2.** Access the EFI System Partition (*fsX*: where *X* is the file system number) for the device from which you want to boot HP-UX.

For example, enter *fs2*: to access the EFI System Partition for the bootable file system number 2. The EFI Shell prompt changes to reflect the file system currently accessed.

The full path for the HP-UX loader is `\EFI\HPUX\HPUX.EFI` on the device you are accessing.

**Step 3.** At the EFI Shell environment, use the `bcfg` command to manage the boot options list.

The `bcfg` command includes the following options for managing the boot options list:

- `bcfg boot dump` — Displays all items in the boot options list for the system.
- `bcfg boot rm #` — Removes the item number specified by `#` from the boot options list.
- `bcfg boot mv #a #b` — Moves the item number specified by `#a` to the position specified by `#b` in the boot options list.
- `bcfg boot add # file.efi "Description"` — Adds a new boot option to the position in the boot options list specified by `#`. The new boot option references `file.efi` and is listed with the title specified by `Description`.

For example, `bcfg boot add 1 \EFI\HPUX\HPUX.EFI "HP-UX 11i"` adds an HP-UX 11i item as the first entry in the boot options list.

See the `help bcfg` command for details.

**Step 4.** Exit the console and iLO 2 MP interfaces if you are finished using them.

Press **Control+B** to exit the system console and return to the **MP Main Menu**.

To exit the iLO 2 MP, enter `x` at the main menu.

## Booting HP-UX in Standard Mode

Use either of the following procedures to boot HP-UX:

- “Booting HP-UX from the EFI Boot Manager” on page 126
- “Booting HP-UX from the EFI Shell” on page 127

### Booting HP-UX from the EFI Boot Manager

From the **EFI Boot Manager** menu, select an item from the boot options list to boot HP-UX.

**Step 1.** Access the **EFI Boot Manager** menu for the system on which you want to boot HP-UX.

Log in to the iLO 2 MP and enter `CO` to select the system console.

Confirm that you are at the **EFI Boot Manager** menu. If you are at another EFI menu, select **Exit** from the submenus until you return to the screen labeled **EFI Boot Manager**.

**Step 2.** At the **EFI Boot Manager** menu, select an item from the boot options list.

Each item in the boot options list references a specific boot device and provides a specific set of boot options or arguments you use when booting the device.

**Step 3.** Press **Enter** to initiate booting using the selected boot option.

**Step 4.** Exit the console and iLO 2 MP interfaces when finished using them.

Press **Control+B** to exit the system console and return to the **MP Main Menu**.

To exit the iLO 2 MP, enter **x** at the main menu.

### Booting HP-UX from the EFI Shell

From the EFI Shell environment, to boot HP-UX on a device, follow these steps:

**Step 1.** Access the EFI Shell environment for the system on which you want to boot HP-UX.

Log in to the iLO 2 MP and enter **CO** to select the system console.

Confirm that you are at the **EFI Boot Manager** menu. If you are at another EFI menu, select **Exit** from the submenus until you return to the screen labeled **EFI Boot Manager**.

From the **EFI Boot Manager** menu, select **EFI Shell** to access the EFI Shell environment.

**Step 2.** At the EFI Shell environment, issue the **map** command to list all currently mapped bootable devices.

The bootable file systems you need are typically listed as **fs0:**, **fs1:**, and so on.

**Step 3.** Access the EFI System Partition (**fsX:** where **X** is the file system number) for the device from which you want to boot HP-UX.

For example, enter **fs2:** to access the EFI System Partition for the bootable file system number 2. The EFI Shell prompt changes to reflect the file system currently accessed.

The file system number can change each time it is mapped; for example, when the system boots or when the **map -r** command is issued.

**Step 4.** When accessing the EFI System Partition for the desired boot device, issue the **HPUX** command to initiate the HP-UX EFI loader on the device you are accessing.

The full path for the loader is **\EFI\HPUX\HPUX.EFI**. When initiated, the loader references the **\EFI\HPUX\AUTO** file and proceeds to boot HP-UX using the default boot behavior specified in the **AUTO** file.

You have 10 seconds to interrupt the automatic booting of the default boot behavior. Press any key during this 10-second period to stop the HP-UX boot process and interact with the HP-UX EFI loader.

To exit the loader (the **HPUX>** prompt), enter **exit** to return you to the EFI Shell.

To boot the HP-UX operating system, do not type anything during the 10-second period given for stopping at the HP-UX EFI loader. For example:

```
Shell> map
Device mapping table
fs0  : Acpi(000222F0,269)/Pci(0|0)/Scsi(Pun8,Lun0)/HD(Part1,Sig72550000)
blk0 : Acpi(000222F0,269)/Pci(0|0)/Scsi(Pun8,Lun0)
blk1 : Acpi(000222F0,269)/Pci(0|0)/Scsi(Pun8,Lun0)/HD(Part1,Sig72550000)
blk2 : Acpi(000222F0,269)/Pci(0|0)/Scsi(Pun8,Lun0)/HD(Part2,Sig72550000)
blk3 : Acpi(000222F0,2A8)/Pci(0|0)/Scsi(Pun8,Lun0)
blk4 : Acpi(000222F0,2A8)/Pci(0|1)/Scsi(Pun2,Lun0)

Shell> fs0:
```

```
fs0:\> hpux

(c) Copyright 1990-2002, Hewlett Packard Company.
All rights reserved

HP-UX Boot Loader for IA64  Revision 1.723

Press Any Key to interrupt Autoboot
\efi\hpux\AUTO ==> boot vmunix
Seconds left till autoboot - 9
```

**Step 5.** Exit the console and iLO 2 MP interfaces when finished using them.

Press **Control+B** to exit the system console and return to the **MP Main Menu**. To exit the iLO 2 MP, enter X at the main menu.

## HP-UX Booting in Single-User Mode

To boot HP-UX in single-user mode, follow these steps:

**Step 1.** Access the EFI Shell environment for the system on which you want to boot HP-UX in single-user mode.

Log in to the iLO 2 MP and enter CO to select the system console.

Confirm that you are at the **EFI Boot Manager** menu. If you are at another EFI menu, select **Exit** from the submenus until you return to the screen labeled **EFI Boot Manager**.

From the **EFI Boot Manager** menu, select **EFI Shell** to access the EFI Shell environment.

**Step 2.** Access the EFI System Partition (fsX: where X is the file system number) for the device from which you want to boot HP-UX.

**Step 3.** To issue the **HPUX** command to initiate the \EFI\HPUX\HPUX.EFI loader on the device you are accessing.

**Step 4.** Boot to the HP-UX Boot Loader prompt (HPUX>) by pressing any key within the 10 seconds given for interrupting the HP-UX boot process.

After you press a key, the HPUX.EFI interface (HPUX>) launches. For help using the HPUX.EFI loader, enter the help command. To return to the EFI Shell, enter exit.

```
fs0:\> hpux

(c) Copyright 1990-2002, Hewlett Packard Company.
All rights reserved

HP-UX Boot Loader for IA64  Revision 1.723

Press Any Key to interrupt Autoboot
\efi\hpux\AUTO ==> boot vmunix
Seconds left till autoboot - 9

[User Types A Key to Stop the HP-UX Boot Process and Access the HPUX.EFI Loader ]

Type 'help' for help

HPUX>
```

**Step 5.** At the HPUX.EFI interface (HPUX>) enter the boot -is vmunix command to boot HP-UX in single-user mode.



```
HPUX> boot -is vmunix
> System Memory = 4063 MB
loading section 0
..... (complete)
loading section 1
..... (complete)
loading symbol table
loading System Directory(boot.sys) to MFS
....
loading MFSFILES Directory(bootfs) to MFS
.....
Launching /stand/vmunix
SIZE: Text:25953K + Data:3715K + BSS:3637K = Total:33306K

Console is on a Serial Device
Booting kernel...
```

**Step 6.** Exit the console and iLO 2 MP interfaces when finished using them.

Press **Control+B** to exit the system console and return to the **MP Main Menu**.

To exit the iLO 2 MP, enter **x** at the main menu.

## HP-UX Booting in LVM Maintenance Mode

To boot HP-UX in LVM-maintenance mode, follow these steps:

**Step 1.** Access the EFI Shell environment for the system on which you want to boot HP-UX in LVM-maintenance mode.

Log in to the iLO 2 MP and enter **CO** to select the system console.

Confirm that you are at the **EFI Boot Manager** menu. If you are at another EFI menu, select **Exit** from the submenus until you return to the screen labeled **EFI Boot Manager**.

From the **EFI Boot Manager** menu, select **EFI Shell** to access the EFI Shell environment.

**Step 2.** Access the EFI System Partition (**fsX**: where **X** is the file system number) for the device from which you want to boot HP-UX.

**Step 3.** Issue the **HPUX** command to initiate the **\EFI\HPUX\HPUX.EFI** loader on the device you are accessing.

**Step 4.** Type any key within the 10 seconds given for interrupting the HP-UX boot process. This stops the boot process at the **HPUX.EFI** interface (**HPUX>** prompt).

**Step 5.** At the **HPUX>** prompt, enter the **boot -lm vmunix** command to boot HP-UX in LVM-maintenance mode.

**Step 6.** Exit the console and iLO 2 MP interfaces when finished using them.

Press **Control+B** to exit the system console and return to the **MP Main Menu**.

To exit the iLO 2 MP, enter **x** at the main menu.

## Shutting Down HP-UX

Use the `shutdown` command to shut down HP-UX running on a system. For more information, see the *shutdown* (1M) manpage.

To shut down the HP-UX operating system, follow these steps:

**Step 1.** Log in to HP-UX running on the system that you want to shut down.

Log in to the iLO 2 MP for the server and use the Console menu to access the system console. Accessing the console through the iLO 2 MP enables you to maintain console access to the system after HP-UX has shut down.

**Step 2.** Issue the `shutdown` command with the appropriate command-line options.

The command-line options you specify dictate the way in which HP-UX shuts down, and whether the system is rebooted.

- To shut down HP-UX and halt (power off) the system, issue the `shutdown -h` command.  
To reboot a halted system, you must power on the system using the PC command at the iLO 2 MP Command menu.
- To shut down HP-UX and reboot the system, issue the `shutdown -r` command.

---

## Booting and Shutting Down HP OpenVMS

This section describes the procedures for booting and shutting down HP OpenVMS on entry class HP Integrity servers, and procedures for adding HP OpenVMS to the boot options list.

- To add an HP OpenVMS entry to the boot options list, see “Adding HP OpenVMS to the Boot Options List” on page 130.
- To boot HP OpenVMS on an entry class HP Integrity server, see “Booting HP OpenVMS” on page 131.
- To shut down HP OpenVMS, see “Shutting Down HP OpenVMS” on page 133.

### Adding HP OpenVMS to the Boot Options List

On HP Integrity servers, you can use the following procedures to manage boot options list entries for HP OpenVMS.

You can add the `\efi\vms\vms_loader.efi` loader to the boot options list from the EFI Shell or the **EFI Boot Configuration** menu, or in some versions of EFI, the **EFI Boot Option Maintenance** menu. The operating system installer automatically adds an entry to the boot options list.

To add an HP OpenVMS item to the boot options list from the EFI Shell, follow these steps:

**Step 1.** Access the EFI Shell environment.

Log in to the iLO 2 MP and enter `CO` to access the system console.

Confirm that you are at the **EFI Boot Manager** menu. If you are at another EFI menu, select **Exit** from the submenus until you return to the screen labeled **EFI Boot Manager**.

From the **EFI Boot Manager** menu, select **EFI Shell** to access the EFI Shell environment.

**Step 2.** Access the EFI System Partition (`fsX`: where *X* is the file system number) for the device from which you want to boot HP OpenVMS.

For example, enter `fs2:` to access the EFI System Partition for the bootable file system number 2. The EFI Shell prompt changes to reflect the file system currently accessed.

The full path for the HP OpenVMS loader is `\efi\vms\vms_loader.efi`. It is on the device you are accessing.

**Step 3.** At the EFI Shell environment, use the `bcfg` command to manage the boot options list.

The `bcfg` command includes the following options for managing the boot options list:

- `bcfg boot dump` — Displays all items in the boot options list for the system.
- `bcfg boot rm #` — Removes the item number specified by *#* from the boot options list.
- `bcfg boot mv #a #b` — Moves the item number specified by *#a* to the position specified by *#b* in the boot options list.
- `bcfg boot add # file.efi "Description"` — Adds a new boot option to the position in the boot options list specified by *#*. The new boot option references *file.efi* and is listed with the title specified by *Description*.

For example, `bcfg boot add 1 \efi\vms\vms_loader.efi "HP OpenVMS"` adds an HP OpenVMS item as the first entry in the boot options list.

See the `help bcfg` command for details.

---

**NOTE** You can also accomplish this step by using the `\efi\vms\vms_bcfg.efi` and `\efi\vms\vms_show.efi` utilities, which are available on the EFI System Partition for HP OpenVMS. Both `vms_bcfg` and `vms_show` are unique utilities for OpenVMS I64. The `vms_bcfg` utility differs from the `bcfg` EFI command in that `vms_bcfg` enables you to specify boot devices using VMS-style device names.

---

**Step 4.** Exit the console and iLO 2 MP interfaces if you are finished using them.

Press **Control+B** to exit the system console and return to the **MP Main Menu**.

To exit the iLO 2 MP, enter `x` at the main menu.

## Booting HP OpenVMS

To boot HP OpenVMS on an entry class HP Integrity server, use one of the following procedures:

### Booting HP OpenVMS from the EFI Boot Manager

To boot HP OpenVMS from the **EFI Boot Manager**, follow these steps:

**Step 1.** Access the **EFI Boot Manager** menu for the system on which you want to boot HP OpenVMS.

Log in to the iLO 2 MP and enter `CO` to select the system console.

Confirm that you are at the **EFI Boot Manager** menu. If you are at another EFI menu, select **Exit** from the submenus until you return to the screen labeled **EFI Boot Manager**.

**Step 2.** At the **EFI Boot Manager** menu, select an item from the boot options list.

Each item in the boot options list references a specific boot device and provides a specific set of boot options or arguments to use when booting the device.

**Step 3.** Press **Enter** to initiate booting using the selected boot option.

**Step 4.** Exit the console and iLO 2 MP interfaces when finished using them.

Press **Control+B** to exit the system console and return to the **MP Main Menu**.

To exit the iLO 2 MP, enter **x** at the main menu.

### Booting HP OpenVMS from the EFI Shell

To boot HP OpenVMS from the EFI Shell environment, follow these steps:

**Step 1.** Access the EFI Shell environment for the system on which you want to boot HP OpenVMS.

Log in to the iLO 2 MP and enter **CO** to select the system console.

Confirm that you are at the **EFI Boot Manager** menu. If you are at another EFI menu, select **Exit** from the submenus until you return to the screen labeled **EFI Boot Manager**.

Select **EFI Shell** to access the EFI Shell environment.

**Step 2.** Issue the **map** command to list all currently mapped bootable devices.

The bootable file systems are typically listed as **fs0:**, **fs1:**, and so on.

**Step 3.** Access the EFI System Partition (**fsX:** where *X* is the file system number) for the device from which you want to boot HP OpenVMS.

For example, enter **fs2:** to access the EFI System Partition for the bootable file system number 2. The EFI Shell prompt changes to reflect the file system currently accessed.

Also, the file system number can change each time it is mapped; for example, when the system boots or when the **map -r** command is issued.

**Step 4.** When accessing the EFI System Partition for the desired boot device, issue the **\efi\vms\vms\_loader** command to initiate the **vms\_loader.efi** loader on the device you are accessing. For example:

```
fs5:> \efi\vms\vms_loader.efi
```

```
HP OpenVMS Industry Standard 64 Operating System, Version XAV1-D2Y  
Copyright 1976-2005 Hewlett-Packard Development Company, L.P.
```

```
%PKA0, Copyright (c) 1998 LSI Logic PKW V3.2.20 ROM 4.19  
%PKA0, SCSI Chip is SYM53C1010/66, Operating mode is LVD Ultra3 SCSI  
%SMP-I-CPUTRN, CPU #01 has joined the active set.  
%SMP-I-CPUTRN, CPU #02 has joined the active set.  
%STDRV-I-STARTUP, OpenVMS startup begun at 13-JUL-2005 14:54:36.25  
%EWA0, Auto-negotiation mode set by console
```

```
...
```

**Step 5.** Exit the console and iLO 2 MP interfaces when finished using them.

Press **Control+B** to exit the system console and return to the **MP Main Menu**.

To exit the iLO 2 MP, enter **x** at the main menu.

## Shutting Down HP OpenVMS

To shut down the HP OpenVMS operating system on entry class HP Integrity servers, follow these steps:

- Step 1.** Log in to HP OpenVMS running on the system that you want to shut down.
- Step 2.** Log in to the iLO 2 MP for the server and use the **Console** menu to access the system console. Accessing the console through the iLO 2 MP enables you to maintain console access to the system after HP OpenVMS has shut down.
- Step 3.** At the OpenVMS DCL prompt, issue the **@SYS\$SYSTEM:SHUTDOWN** command and specify the shutdown options in response to the prompts. For example:

```
>@SYS$SYSTEM:SHUTDOWN

SHUTDOWN -- Perform an Orderly System Shutdown
           on node RSNVMS

How many minutes until final shutdown [0]:
Reason for shutdown [Standalone]:
Do you want to spin down the disk volumes [NO]?
Do you want to invoke the site-specific shutdown procedure [YES]?
Should an automatic system reboot be performed [NO]? yes
When will the system be rebooted [shortly via automatic reboot]:
Shutdown options (enter as a comma-separated list):
  REBOOT_CHECK      Check existence of basic system files
  SAVE_FEEDBACK     Save AUTOGEN feedback information from this boot
  DISABLE_AUTOSTART Disable autostart queues
  POWER_OFF         Request console to power-off the system

Shutdown options [NONE]:

%SHUTDOWN-I-OPERATOR, this terminal is now an operator's console
%%%%%%%%%%%%% OPCOM 12-JUL-2005 18:47:51.01 %%%%%%%%%%%%%%
Operator status for operator _RSNVMS$OPA0:
CENTRAL, PRINTER, TAPES, DISKS, DEVICES, CARDS, NETWORK, CLUSTER, SECURITY,
...
```

---

**NOTE** HP OpenVMS I64 does not support the `POWER_OFF` shutdown option.

---

## Booting and Shutting Down Microsoft Windows

This section describes how to boot and shut down Microsoft Windows on entry class HP Integrity servers and how to add Windows entries to the system boot options list.

- “Adding Microsoft Windows to the Boot Options List” on page 134
- “Booting the Microsoft Windows Operating System” on page 135
- “Shutting Down Microsoft Windows” on page 136

## Adding Microsoft Windows to the Boot Options List

---

**NOTE** On HP Integrity servers, the operating system installer automatically adds an entry to the boot options list.

---

To add a Microsoft Windows entry to the system boot options list, follow these steps:

**Step 1.** Access the EFI Shell environment.

Log in to the iLO 2 MP and enter CO to access the system console.

Confirm that you are at the **EFI Boot Manager** menu. If you are at another EFI menu, select **Exit** from the submenus until you return to the screen labeled **EFI Boot Manager**.

From the **EFI Boot Manager** menu, select **EFI Shell** to access the EFI Shell environment.

**Step 2.** Access the EFI System Partition (fsX: where X is the file system number) for the device from which you want to boot Microsoft Windows.

For example, enter fs2: to access the EFI System Partition for the bootable file system number 2. The EFI Shell prompt changes to reflect the file system currently accessed.

The full path for the Microsoft Windows loader is \efi\microsoft\winnt50\ia64ldr.efi. It is on the device you are accessing.

---

**NOTE** You must only initiate this loader from the **EFI Boot Menu**, not from the EFI Shell.

---

**Step 3.** List the contents of the \EFI\Microsoft\WINNT50 directory to identify the name of the Windows boot option file (Boot00nn) that you want to import into the system boot options list. For example:

```
fs0:\> ls EFI\Microsoft\WINNT50
Directory of: fs0:\EFI\Microsoft\WINNT50

09/18/03  11:58a <DIR>          1,024  .
09/18/03  11:58a <DIR>          1,024  ..
12/18/03  08:16a                354   Boot0001
          1 File(s)            354 bytes
          2 Dir(s)
```

```
fs0:\>
```

**Step 4.** Issue the \MSUtil\nvrboot.efi command to launch the Microsoft Windows boot options utility. For example:

```
fs0:\> msutil\nvrboot

NVRBOOT: OS Boot Options Maintenance Tool [Version 5.2.3683]

1. SUSE SLES 9
2. HP-UX Primary Boot: 0/0/1/0/0.2.0
* 3. Windows Server 2003, Datacenter
4. EFI Shell [Built-in]

* = Windows OS boot option

(D)isplay (M)odify (C)opy E(x)port (I)mport (E)rase (P)ush (H)elp (Q)uit

Select>
```

**Step 5.** Use the **Import** command to import the Window boot option file. For example:

```
Select> i
Enter IMPORT file path: \EFI\Microsoft\WINNT50\Boot0001
Imported Boot Options from file: \EFI\Microsoft\WINNT50\Boot0001

Press enter to continue
```

**Step 6.** Type **Q** to quit the NVRBOOT utility.

**Step 7.** Exit the console and iLO 2 MP interfaces if you are finished using them.

Press **Control+B** to exit the system console and return to the **MP Main Menu**.

To exit the iLO 2 MP, enter **X** at the main menu.

## Booting the Microsoft Windows Operating System

To boot the Windows Server 2003 operating system on an HP Integrity server, follow these steps:

**Step 1.** Access the **EFI Boot Manager** menu for the system on which you want to boot Windows.

Log in to the iLO 2 MP and enter **CO** to select the system console.

Confirm that you are at the **EFI Boot Manager** menu. If you are at another EFI menu, select **Exit** from the submenus until you return to the screen labeled **EFI Boot Manager**.

**Step 2.** Select an item from the boot options list.

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.

**Step 3.** Press **Enter** to initiate booting using the selected boot option.

**Step 4.** Once Windows begins loading, wait for the Special Administration Console (SAC) to become available.

The SAC interface is a text-based administration tool that is available from the system console. For example:

```
Loading.: Windows Server 2003, Datacenter
Starting: Windows Server 2003, Datacenter
```

```
Starting Windows...
*****
Computer is booting, SAC started and initialized.

Use the "ch -?" command for information about using channels.
Use the "?" command for general help.

SAC>
```

For details, see the SAC online help (type **?** at the **SAC>** prompt).

**Step 5.** Exit the console and iLO 2 MP interfaces when finished using them.

Press **Control+B** to exit the console and return to the **MP Main Menu**.

To exit the iLO 2 MP, enter **X** at the main menu.

## Shutting Down Microsoft Windows

---

**CAUTION** Do not shut down Windows Server 2003 using SAC restart or shutdown commands under normal circumstances. Issuing restart or shutdown at the SAC> prompt causes the system to restart or shut down immediately and can result in the loss of data.

Use the Windows **Start** menu or the shutdown command to shut down gracefully.

---

To shut down Windows Server 2003, use one of the following methods.

- Select **Shut Down** from the **Start** menu and select **Restart** or **Shut down** from the pull-down menu.

The **Restart** menu item shuts down and restarts the system. The **Shut down** menu item shuts down the system.

You can use this method when using a graphical interface to the system.

- Issue the **shutdown** command from the Windows command line.

See “Shutting Down Windows from the Command Line” on page 136 for details.

You can issue this command from a command prompt through the SAC or from any other command line.

The Windows `shutdown` command includes the following options:

<code>/s</code>	Shuts down and powers off the system. This is the equivalent of <b>Start—&gt;Shut Down, Shut down</b> . To power on the system, use the iLO 2 MP PC command.
<code>/r</code>	Shuts down and restarts the system. This is the equivalent of <b>Start—&gt;Shut Down, Restart</b> .
<code>/a</code>	Aborts a system shutdown.
<code>/t xxx</code>	Sets the timeout period before shutdown to <code>xxx</code> seconds. The timeout period ranges from 0–600, with a default of 30.

See the `help shutdown` Windows command for details.

### Shutting Down Windows from the Command Line

To shut down Windows from the command line, follow these steps:

- Step 1.** Log in to Windows running on the system that you want to shut down.

For example, access the system console and use the SAC interface to start a command prompt, from which you can issue Windows commands to shut down the system.

- Step 2.** Check to see whether any users are logged in. Use the `query user` or `query session` command.

- Step 3.** Issue the **shutdown** command and the appropriate options to shut down the Windows Server 2003 on the system.

Use one of the following options:

- To shut down Windows and reboot, issue the following command:  
**shutdown /r**
- To shut down Windows and power off server hardware, issue the following command:  
**shutdown /s**



---

**NOTE** To reboot a powered off system, power on the system using the `PC` command at the iLO 2 MP Command menu.

---

- To abort a shutdown, issue the following command: `shutdown /a`

For example:

```
shutdown /r /t 60 /c "Shut down in one minute."
```

This command initiates a Windows system shutdown and reboot after a timeout period of 60 seconds. The `/c` option specifies a message that is broadcast to any other users of the system.

---

## Booting and Shutting Down Linux

This section covers booting and shutting down Linux on entry class HP servers. Procedures for Red Hat Enterprise Linux and SuSE Linux Enterprise Server are included in this section.

- To add a Linux entry to the boot options list, see “Adding Linux to the Boot Options List” on page 137.
- To boot Linux on entry class HP Integrity servers, use the following procedures:
  - See “Booting the Red Hat Enterprise Linux Operating System” on page 138
  - See “Booting the SuSE Linux Enterprise Server Operating System” on page 139
- To shut down either Red Hat Enterprise Linux or SuSE Linux Enterprise Server, see “Shutting Down Linux” on page 140.

### Adding Linux to the Boot Options List

This section describes how to add a Linux entry to the system boot options list. The processes for adding both Red Hat Enterprise Linux and SuSE Linux Enterprise Servers are included.

---

**NOTE** On HP Integrity servers, the operating system installer automatically adds an entry to the boot options list.

---

To add a Linux item to the boot options list, follow these steps:

**Step 1.** Access the EFI Shell environment.

Log in to the iLO 2 MP and enter `CO` to access the system console.

Confirm that you are at the **EFI Boot Manager** menu. If you are at another EFI menu, select **Exit** from the submenus until you return to the screen labeled **EFI Boot Manager**.

Select **EFI Shell** to access the EFI Shell environment.

**Step 2.** Access the EFI System Partition (`fsX`: where *X* is the file system number) for the device from which you want to boot Linux.

For example, enter `fs2`: to access the EFI System Partition for the bootable file system number 2. The EFI Shell prompt changes to reflect the file system currently accessed.

The full path for the Red Hat Enterprise Linux loader is `\EFI\redhat\elilo.efi`. It is on the device you are accessing.

The full path for the SuSE Linux Enterprise Server loader is `\efi\SuSE\elilo.efi`. It is on the device you are accessing.

**Step 3.** Use the `bcfg` command to manage the boot options list.

The `bcfg` command includes the following options for managing the boot options list:

- `bcfg boot dump` — Displays all items in the boot options list for the system.
- `bcfg boot rm #` — Removes the item number specified by `#` from the boot options list.
- `bcfg boot mv #a #b` — Moves the item number specified by `#a` to the position specified by `#b` in the boot options list.
- `bcfg boot add # file.efi "Description"` — Adds a new boot option to the position in the boot options list specified by `#`. The new boot option references `file.efi` and is listed with the title specified by `Description`.

For example, `bcfg boot add 1 \EFI\redhat\elilo.efi "Red Hat Enterprise Linux"` adds a Red Hat Enterprise Linux item as the first entry in the boot options list.

Likewise, `bcfg boot add 1 \efi\SuSE\elilo.efi "SLES 9"` adds a SuSE Linux item as the first entry in the boot options list.

See the `help bcfg` command for details.

**Step 4.** Exit the console and iLO 2 MP interfaces if you are finished using them.

Press **Control+B** to exit the system console and return to the **MP Main Menu**.

To exit the iLO 2 MP, enter `x` at the main menu.

## Booting the Red Hat Enterprise Linux Operating System

You can boot the Red Hat Enterprise Linux operating system on HP Integrity servers using one of the following methods:

**Step 1.** Select a Red Hat Enterprise Linux entry from the **EFI Boot Manager** menu.

**Step 2.** To load the Red Hat Enterprise Linux operating system at the **EFI Boot Manager** menu, select its entry from the list of boot options.

**Step 3.** Select a Linux entry from the boot options list boots the operating system using `ELILO.EFI` loader and the `elilo.conf` file

To boot Red Hat Enterprise Linux from the EFI Shell, follow these steps:

**Step 1.** Access the EFI Shell.

From the system console, select **EFI Shell** from the **EFI Boot Manager** menu to access the shell.

**Step 2.** Access the EFI System Partition for the Red Hat Enterprise Linux boot device.

Use the `map EFI Shell` command to list the file systems (`fs0`, `fs1`, and so on) that are known and mapped.

To select a file system to use, enter its mapped name followed by a colon (:). For example, to operate with the boot device that is mapped as `fs3`, enter **fs3:** at the EFI Shell prompt.

**Step 3.** Enter **ELILO** at the EFI Shell command prompt to launch the `ELILO.EFI` loader.

If needed, you can specify the loader's full path by entering `\EFI\redhat\elilo` at the EFI Shell command prompt.

**Step 4.** Allow the `ELILO.EFI` loader to proceed with booting the Red Hat Enterprise Linux kernel.

By default, the `ELILO.EFI` loader boots the kernel image and options specified by the default item in the `elilo.conf` file.

To interact with the `ELILO.EFI` loader, interrupt the boot process, for example, type a space at the `ELILO` boot prompt.

To exit the loader, use the `exit` command.

---

**NOTE** If Red Hat is booted from the iLO 2 MP, set `console=ttyS0` at the `elilo` prompt to redirect console output to the iLO 2 MP.

---

## Booting the SuSE Linux Enterprise Server Operating System

You can boot the SuSE Linux Enterprise Server 9 operating system on HP Integrity servers using one of these methods:

**Step 1.** Select a SuSE Linux Enterprise Server entry from the **EFI Boot Manager** menu.

**Step 2.** To load the SuSE Linux Enterprise Server operating system at the **EFI Boot Manager** menu, select its entry from the list of boot options.

**Step 3.** Select a Linux entry from the boot options list boots the operating system using `ELILO.EFI` loader and the `elilo.conf` file

To boot SuSE Linux Enterprise Server 9 from the EFI Shell, follow these steps:

**Step 1.** Access the EFI Shell.

From the system console, select **EFI Shell** from the **EFI Boot Manager** menu to access the EFI Shell.

**Step 2.** Access the EFI System Partition for the SuSE Linux Enterprise Server boot device.

Use the `map` EFI Shell command to list the file systems (`fs0`, `fs1`, and so on) that are known and mapped.

To select a file system to use, enter its mapped name followed by a colon (:). For example, to operate with the boot device that is mapped as `fs3`, enter **fs3:** at the EFI Shell prompt.

**Step 3.** Enter **ELILO** at the EFI Shell command prompt to launch the `ELILO.EFI` loader.

If needed, you can specify the loader's full path by entering `\efi\SuSE\elilo` at the EFI Shell command prompt.

**Step 4.** Allow the `ELILO.EFI` loader to proceed with booting the SuSE Linux kernel.

By default, the `ELILO.EFI` loader boots the kernel image and options specified by the default item in the `elilo.conf` file.

To interact with the `ELILO.EFI` loader, interrupt the boot process, for example, type a space at the `ELILO boot` prompt.

To exit the loader, use the `exit` command.

## Shutting Down Linux

Use the `shutdown` command to shut down Red Hat Enterprise Linux or SuSE Linux Enterprise Server.

The Red Hat Enterprise Linux and SuSE Linux Enterprise Server `shutdown` command has the following options:

- |                   |  |
|-------------------|--|
| <code>-h</code>   | Powers off the server after shutdown.  |
| <code>-r</code>   | Reboots after shutdown.  |
| <code>-c</code>   | Cancel a shutdown in progress.   |
| <code>time</code> | Required. Determines when to shut down. You can specify <code>time</code> in any of the following ways: <ul style="list-style-type: none"><li>• Absolute time in the format <code>hh:mm</code>, in which <code>hh</code> is the hour (one or two digits) and <code>mm</code> is the minute (two digits).</li><li>• Number of minutes to wait in the format <code>+m</code>, in which <code>m</code> is the number of minutes.</li><li>• <code>now</code> to immediately shut down; this is equivalent to using <code>+0</code> to wait zero minutes.</li></ul> |

For details, see the `shutdown(8)` Linux manpage. Also see the Linux manpage for the `poweroff` command.

To shut down Linux, follow these steps:

**Step 1.** Log in to Linux running on the system you want to shut down.

**Step 2.** Issue the `shutdown` command with the desired command-line options, and include the required `time` argument to specify when the operating system shutdown is to occur.

For example, `shutdown -r +20` shuts down and reboots the system in twenty minutes.

---

# 11 Troubleshooting

This chapter provides basic server troubleshooting information to help you diagnose common issues that can occur during server installation. For more advanced troubleshooting tools and procedures, see the *HP Integrity rx6600 User Service Guide*.

This chapter addresses the following topics:

- “Troubleshooting Methodology” on page 142
- “Server Does Not Power On” on page 143
- “Troubleshooting Using the Server Power Button” on page 142
- “EFI Menu is Not Available” on page 144
- “Operating System Does Not Boot” on page 144
- “Operating System Boots with Problems” on page 144
- “Intermittent Server Problems” on page 145
- “DVD Problems” on page 145
- “Hard Drive Problems” on page 145
- “Console Problems” on page 146
- “Downloading and Installing the Latest Version of the Firmware” on page 146

---

## Troubleshooting Methodology

The server was tested prior to shipping. Failures encountered during installation can be due to damage that occurred in transit. Reseating connectors can solve problems that result from rough handling. If you are installing components or assemblies, compatibility problems or incorrect installations can be the cause of the problems. If you are installing components or assemblies, check that items are correctly installed and that all connectors are fully engaged. If the unit does not power on, check the power source before proceeding.

If a problem is encountered during initial operation, remove any add-in or optional components and retest the server before continuing. Verify basic server operation before installing additional cards and configuring software and hardware for the server requirements.

Troubleshooting is based on observation of server status indications and error messages, and by checking system event logs. You can also observe the LED indicators on the front and rear of the server. Error messages are displayed on local and remote consoles. System history (console, event, and history logs) is available through the iLO 2 MP, and is accessed through the console. Additional information about troubleshooting is available in the *HP Integrity rx6600 User Service Guide* included on the CD provided with the server.

Offline troubleshooting programs are available on the resource CD that is shipped with the HP server. To troubleshoot the server, you must be familiar with the Offline Diagnostics Environment (ODE) which runs in the Extensible Firmware Interface (EFI).

Descriptions and user information about offline troubleshooting tools are available at:  
<http://www.docs.hp.com>.

The offline tools are available for download at:

<http://www.software.hp.com>

---

## Troubleshooting Using the Server Power Button

The server power button on the front panel operates differently depending on how long you press and hold the button, and on what the system is doing when the button is pressed. You must be aware of the power button's functionality to properly troubleshoot the system.

Table 11-1 describes what happens when you press the power button.

**Table 11-1 Server Power Button Functions**

Action	Reaction
<b>Server Power Button Function When Server is On and at EFI</b>	
Press and hold the power button for one to three seconds	System power turns off immediately (hard power off).
Press and hold the power button for five seconds or longer	System power turns off immediately (hard power off).
<b>Server Power Button Function When Server is On and OS is Running</b>	

**Table 11-1 Server Power Button Functions (Continued)**

Action	Reaction
Press and hold the power button for one to three seconds	System power turns off (software controlled power off).
Press and hold the power button for five seconds or longer	System power turns off immediately (hard power off).
<p>If the server is off, and power is not connected to server power supplies, pressing the power button has no effect.</p> <p>If the server is off, and power is connected to server power supplies, the front panel power LED blinks at a 1 Hz rate. In this state, standby power is available to server circuits, but main power is off.</p>	
<b>Server Power Button Function When Server is Off</b>	
Press and hold the power button for one to three seconds	System power turns on.

## Server Does Not Power On

The server power button on the front panel operates differently depending on how long you press and hold the button, and on what the system is doing when the button is pressed. You must be aware of the power button's functionality to properly troubleshoot the system.

---

**NOTE** If the server is off, and power is not connected to server power supplies, pressing the power button has no effect.

---

Power problems during installation are usually related to the installation process. If the server does not power on, check the LED indicators on the power supply rear panels and take one of the following actions:

- If the ac In indicators are lit, power is available to the server.
- If a fault indicator is lit, reseal the power supply. If the problem persists, remove and reseal boards within the server. If the problem persists, replace the power supply or the power supply interface board.
- If the ac Out indicators are lit, power is available to the server circuits. If the console shows that the server is powered on, but server LEDs indicate that power is off, remove and reseal connectors on the LED status board. If the problem persists, replace the LED status board.

If the console shows that the server is not powered on, remove and reseal connectors on the system board. If the problem persists, replace the power supply interface board, the iLO 2 MP board, or the system board.

See the *HP Integrity rx6600 User Service Guide* for more information.

## EFI Menu is Not Available

If you cannot access the EFI from either the main disk partition or the CD, use the following tools to help solve the problem:

- Front panel LEDs
- iLO 2 MP
  - Console messages
  - System event logs (SEL)

For a description of the front panel LEDs, see the *HP Integrity rx6600 User Service Guide*.

---

## Operating System Does Not Boot

If the operating system does not boot, but you are able to reach the EFI from either the main disk partition or the CD, use the following tools to help solve the problem:

- Using the EFI Shell, check the system logs and analyze any error messages.
- Offline Diagnostic Environment (ODE)

For more information, see the *HP Integrity rx6600 User Service Guide*.

---

## Operating System Boots with Problems

If the operating system is running and you are experiencing problems, use the following tools to help solve the problem:

- LEDs
- Error Messages and event logs

For more information, see the *HP Integrity rx6600 User Service Guide*.

---



## Intermittent Server Problems

You can usually trace intermittent problems that occur during installation to power source problems, a loose connector, or some other hardware problem. If you are experiencing intermittent problems, follow these steps:

- Step 1.** Check iLO 2 MP logs and analyze the problem. Determine if there is more than one symptom and if the problem is random.
- Step 2.** Verify that the ac power source is stable.
- Step 3.** Reseat all rear panel connectors.
- Step 4.** Reseat all hot-swappable fans and power supplies.
- Step 5.** Reseat all main memory DIMMs.
- Step 6.** Reseat all cable harnesses and board connectors.

For more information, see the *HP Integrity rx6600 User Service Guide*.

---

## DVD Problems

DVD problems that occur during installation are usually related to faulty connections. If you are experiencing DVD problems, follow these steps:

- Step 1.** Remove and reinsert the DVD.
  - Step 2.** Replace the DVD.
  - Step 3.** Remove and reinstall the DVD drive. Check that connectors are fully engaged.
  - Step 4.** Replace the DVD drive.
- 

## Hard Drive Problems

Hard drive problems that occur during installation are usually due to rough handling. The drive may not be correctly seated or may have been damaged in transit. If you are experiencing hard drive problems, follow these steps:

- Step 1.** Remove and reinsert the hard drive.
  - Step 2.** Swap the hard drive with one from another slot or with a known good spare.
  - Step 3.** Remove and reinstall the hard drive backplane. Check that connectors are fully engaged.
  - Step 4.** Replace the hard drive backplane.
  - Step 5.** Replace the SAS core I/O card.
-

## Console Problems

Console problems during installations can be caused by faulty interconnections. If you are experiencing monitor, keyboard, or mouse problems, follow these steps:

- Step 1.** Check the monitor controls. Adjust contrast and brightness as required.
- Step 2.** Inspect all power and interconnecting cables. Check that all console connectors are fully engaged.
- Step 3.** Check that all iLO 2 MP board connectors are fully engaged.
- Step 4.** Exercise the appropriate self-test features of the console software.

---

## Downloading and Installing the Latest Version of the Firmware

HP makes every effort to provide you with the most current version of firmware. However, there can be instances when your firmware is not up to date.

To ensure you have the latest version of the firmware running on the server, download the latest version of the firmware from the Web, and create a CD to install the firmware on the server.

### Downloading the Latest Version of the Firmware

To download the latest version of the firmware from the Web, follow these steps:

- Step 1.** Go to <http://www.hp.com/go/bizsupport>.
- Step 2.** Select **download drivers and software**.
- Step 3.** Select **Itanium-based servers** from the Server category.
- Step 4.** Select your server from the servers listed.
- Step 5.** Select your operating system.
- Step 6.** Select the firmware category you want to download.
- Step 7.** Download the firmware to a CD.

### Installing the Latest Version of the Firmware on the Server

To install the latest version of the firmware on the server, follow these steps:

- Step 1.** Start a server console session. See Chapter 6, “Console Setup,” on page 71.
- Step 2.** Insert the CD with the copy of the latest version of the firmware.
- Step 3.** Using the **EFI Boot Manager** menu, boot to the drive that contains the CD with the updated firmware.
- Step 4.** Follow the instructions to update the firmware.

---

# A Enabling the Trusted Platform Module

This appendix provides instructions on how to enable the trusted platform module.

This appendix addresses the following topics:

- “Introduction” on page 148
- “Enabling the TPM” on page 149

---

## Introduction

The Trusted Platform Module (TPM) is an optional security component which enhances security capabilities for the server if it is running the HP-UX operating system. The TPM is a security chip that is unique to the server. It performs key security processes independent of other hardware components. The TPM creates and stores additional encryption keys from the root key of the system. The encryption keys created by the TPM encapsulate system application encryption keys to provide an additional layer of security for sensitive system data.

The fundamental capabilities of the TPM include:

- Platform authentication
- Sensitive information protection
- Data integrity
- System privacy

---

**IMPORTANT** You must run the supported version of the HP-UX operating system to utilize the TPM security component.

---

**WARNING** **Ensure that the system is powered off and all power sources have been disconnected from the server prior to performing this procedure.**

**Voltages are present at various locations within the server whenever an ac power source is connected. This voltage is present even when the main power switch is in the off position.**

**Failure to observe this warning can result in personal injury or damage to equipment.**

---

**CAUTION** Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

---

## Enabling the TPM

To enable the TPM, follow these steps:

- Step 1.** Power on the server.
- Step 2.** Enable the TPM.
  - a.** Access the EFI Shell.
  - b.** Enter **info sec** to display the server security settings on the screen. The TPM is disabled by default.
  - c.** Enter **secconfig** to display a list of configurable security settings.
  - d.** Enter **secconfig tpm on** to enable the TPM.
- Step 3.** Reset the server.
- Step 4.** Boot the operating system.
- Step 5.** Restore the former TPM settings to the new TPM. See the HP-UX operating system documentation for more information.
- Step 6.** Back up the TPM security information. See the HP-UX operating system documentation for more information.



**Numerics**

48-DIMM memory carrier assembly *See* memory  
8 Internal Port SAS HBA controller, 95

**A**

AC power inputs

- A0, 66
- A1, 66
- B0, 66
- B1, 66

accessing the host console

- using SMASH SM CLP, 88
- using vKVM/IRC, 88
- with the TUI CO command, 88

accessing the iLO 2 MP using the Web browser, 86

acu utility, 122

advanced configuration and power interface (ACPI), 21

ARP ping

- commands, 78
- using to configure the iLO 2 MP LAN, 78
- using to set the IP address, 79

**B**

bulk power supplies (BPS), 66

**C**

cell board, 66

cfggen utility, 108

configuring iLO 2 MP LAN

- using ARP ping, 78
- using DHCP and DNS, 77
- using RS-232 serial port, 80

console

- accessing using the Web browser, 87
- accessing with SMASH SM CLP, 88
- accessing with the TUI, 88
- accessing with vKVM/IRC, 88

console problems, 146

console set up

- checklist, 73
- determining LAN configuration method, 76
- determining physical access method, 75
- flowchart, 74
- overview, 72

cooling, *See also* fans, 18

cover, memory carrier assembly, removing and replacing, 34

cover, top

- removing and replacing, 32–33
- thermal considerations, 32

CPU *See* processor

**D**

damaged equipment, returning, 29

default

- password, 82
- user accounts, 82

device paths, PCI/PCI-X, 43

DHCP and DNS

using to configure the iLO 2 MP LAN, 77

DHCP-enabled security risk, 77, 83

diagnostic panel *See also* display board

dimensions

server, 23

dimensions, server, 22

DIMM *See* memory

disk drive

- activity LED, location, 75
- load order, 38
- replacing, 38
- slot IDs, 39
- status LED, location, 75

disk drive filler, removing and replacing, 37

display board, 20

dual-core processing, 57

dual-core processor *See* processor

DVD

- drive, 20
- troubleshooting, 145

DVD *See also* display board

**E**

ebsu utility, 118

EFI

- device paths, PCI/PCI-X, 43
- troubleshooting, 144

EFI driver firmware update, 96

emulation device, configuring, 80

extender board, memory *See* memory carrier assembly, 45

extender board, processor *See* processor board assembly, 55

extensible firmware interface *See* EFI

**F**

fans

- introduction, 18
- N+1, 18

firmware

- introduction, 21
- operating system requirements, 21

front display panel *See also* display board, 20

**G**

graphic console, accessing using VGA, 89

**H**

hard drive problems, 145

HBA RISC firmware update, 96

host console *See* console

HP-UX device paths, PCI/PCI-X, 43

**I**

I/O backplane, 16

I/O board, 16

I/O paths, 43

I/O subsystem

- block diagram, 16

---

# Index

- introduction, 16
- iLO 2 MP
  - logging in, 81
  - main menu, 81
- input power, 72
- installing
  - a dual-core processor, 57
  - a hot-pluggable disk drive, 38
  - a hot-swappable power supply, 36
  - memory DIMMs, 47
  - pci/pci-x cards, 40
- intermittent server problems, 144, 145

**L**

- LC command, using to configure IP address, 80
- load order
  - disk drive, 38
  - memory, 50
  - power supply, 35
  - processor, 57
- logging in to the iLO 2 MP, 81

**M**

- mass storage, 20
- mass storage *See also* SAS
- mass storage subsystem *See* SAS
- memory
  - 24-DIMM memory board, 49
  - 24-DIMM memory board configuration, 50
  - 48-DIMM memory carrier assembly slot IDs, 51
  - installation conventions, 49
  - installing, 53
  - introduction, 18
  - load order, 50
  - load order, 24-DIMM memory carrier board, 50
  - load order, 48-DIMM memory carrier assembly, 50
  - supported DIMM sizes, 49
- memory carrier assembly
  - removing, 45
  - replacing, 47
- memory extender board *See* memory carrier assembly
- mptutil utility, 95

**N**

- N+1, 18

**O**

- operating system
  - booting and shutting down HP Open VMS, 130
  - booting and shutting down HP-UX, 125
  - booting and shutting down Linux, 137
  - booting and shutting down Windows, 133
  - boots with problems or does not boot, 144
  - configuring boot options, 124
- orca utility, 121

**P**

- PAL, 21
- password, modifying default, 82
- PCI/PCI-X cards
  - configurations, 41
  - EFI device path, 43
  - HP-UX device path, 43
  - I/O paths, 43
  - offline installation, 44
  - shared slots, bus mode compatibility, 42
  - shared slots, common configuration scenarios, 41
  - shared slots, frequency compatibility, 42
  - shared slots, restrictions, 41
- pedestal, converting from rack mount, 70
- power
  - apply standby, 67
  - button, 142
  - installing hot-swap power supply, 35
  - introduction, 19
  - powering on the server, 92
  - problems, 143
  - sources, 66
  - states, 66
  - supply load order, 35
  - supply replacing, 36
- power *See also* power supply
- power subsystem *See* power
- power supplies, removing and replacing, 72
- Pre-OS System Startup Environment (POSSE), 21
- processor
  - configuration options, 57
  - installing, 58
  - introduction, 17
  - load order, 57
  - required service tools, 58
  - restrictions, 57
- Processor Abstraction Layer *See* PAL
- processor board assembly
  - removing and replacing, 55
- processor board *See* processor board assembly, 55

**R**

- rack, installing, 70
- RS-232 serial port, using to configure the iLO 2 MP LAN, 80

**S**

- safety information, general, 24
- saupdate utility, 114
- security
  - access settings, 83
  - risk with DHCP enabled, 83
  - setting up, 82
- smart array P600 controller, 111
- static IP address
  - assigning with ARP Ping, 78
  - assigning with LC command, 80
- storage *See* mass storage
- system abstraction layer (SAL), 21
- system fans *See* fans



**T**

top cover *See* cover, top

troubleshooting

  console problems, 146

  hard drive problems, 145

  methodology, 142

  operating system, 144

trusted platform module (TPM)

  enabling, 149

  introduction, 148

**U**

unpacking, inspecting for damage, 28

user accounts, modifying default, 82

**V**

VGA, accessing graphic console, 89

VPD viewing EFI and RISC firmware information,  
  97

**W**

wake on LAN, restrictions, 17

Web browser

  accessing the console, 87

  accessing the iLO 2 MP, 86

Web interface, interacting with, 86

weight

  server, 23

weight, server, 22