

# HP ProLiant DL580 Generation 3 Server Maintenance and Service Guide



May 2006 (Sixth Edition)  
Part Number 379041-006



© Copyright 2005, 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.

Microsoft, Windows, and Windows NT are U.S. registered trademarks of Microsoft Corporation. Windows Server 2003 is a trademark of Microsoft Corporation. Intel and Xeon 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.

May 2006 (Sixth Edition)

Part Number 379041-006

#### Audience assumptions

This document is for the person who installs, administers, and troubleshoots servers and storage systems. HP assumes you are qualified in the servicing of computer equipment and trained in recognizing hazards in products with hazardous energy levels.

---

# Contents

Illustrated parts catalog .....	6
Customer self repair.....	6
Mechanical components.....	6
System components .....	8
Removal and replacement procedures .....	13
Required tools.....	13
Safety considerations.....	14
Preventing electrostatic discharge .....	14
Server warnings and cautions .....	14
Preparation procedures.....	14
Extending the server from the rack.....	15
Power down the server.....	16
Remove the server from the rack.....	16
Removing the access panel.....	17
Removing the system cage.....	17
Removing the front bezel.....	18
Removing a media drive blank.....	19
Removing a media drive .....	19
Removing the processor module.....	20
Removing a processor.....	22
Removing a PPM.....	25
Removing a PCI latch.....	26
Removing a PCI retaining clip.....	27
Removing the PCI-X Hot Plug basket.....	28
Removing a non-hot-plug expansion board.....	28
Removing the PCI-X Hot Plug mezzanine option.....	29
Removing the PCI Express mezzanine option .....	30
Recovering data from the BBWC.....	30
Removing the BBWC battery pack.....	31
Removing the BBWC cache module.....	32
Removing the system board .....	32
Re-entering the server serial number and product ID.....	34
Removing the system battery.....	35
Removing the media board.....	37
Removing the SCSI backplane .....	37
Removing the power backplane .....	39
Removing the memory backplane.....	39
Removing a hard drive blank.....	40
Removing a hot-plug SCSI hard drive.....	40
Removing a hot-plug SAS hard drive.....	41
Removing the SAS-SATA hard drive cage.....	42
Removing the SAS-SATA backplane.....	46
Removing a PCI-X Hot Plug expansion board .....	47
Removing a power supply blank.....	48
Removing a redundant hot-plug power supply.....	48
Replacing hot-plug fans.....	49
Memory overview .....	50
General memory configuration requirements.....	50
Single- and dual-rank DIMMs.....	51

Advanced ECC memory .....	51
Online spare memory .....	52
Hot-plug mirrored memory .....	53
Hot-plug RAID memory .....	54
Configuring the memory .....	55
Memory boards and DIMMs .....	56
<b>Diagnostic tools .....</b>	<b>60</b>
SmartStart software .....	60
SmartStart Scripting Toolkit .....	60
HP Instant Support Enterprise Edition .....	61
Option ROM Configuration for Arrays .....	61
HP ROM-Based Setup Utility .....	61
ROMPaq utility .....	62
System Online ROM flash component utility .....	62
Integrated Management Log .....	62
Integrated Lights-Out technology .....	63
Automatic Server Recovery .....	63
HP Systems Insight Manager .....	63
HP Insight Diagnostics .....	63
USB support .....	64
Troubleshooting the system using port 85 codes .....	64
Processor-related port 85 codes .....	64
Expansion board-related port 85 codes .....	65
Memory-related port 85 codes .....	66
Miscellaneous port 85 codes .....	66
<b>Server component identification .....</b>	<b>68</b>
Front panel components .....	68
Front panel LEDs and buttons .....	69
Memory board components and LEDs .....	70
Processor module LEDs .....	72
Rear panel components .....	73
Rear panel LEDs and buttons .....	74
Power supply LEDs .....	75
System board components .....	76
System maintenance switch .....	77
Boot device selector switch .....	77
QuickFind diagnostic display LEDs .....	78
Setting the switch to view port 85 codes .....	80
DIMM slot locations .....	80
SCSI IDs .....	80
Hot-plug SCSI hard drive LEDs .....	82
Hot-plug SCSI hard drive LED combinations .....	82
SATA or SAS IDs .....	83
SATA or SAS hard drive LEDs .....	84
SAS and SATA hard drive LED combinations .....	84
Fan locations .....	85
Hot-plug fan LEDs .....	87
BBWC LEDs .....	87
<b>Server cabling .....</b>	<b>89</b>
Storage device cabling guidelines .....	89
PCI-X Hot Plug mezzanine cabling .....	89
BBWC cabling .....	90

RILOE II cabling .....	90
Hot-plug SCSI drive cabling .....	91
SCSI simplex mode .....	92
SCSI duplex mode .....	92
Hot-plug SAS hard drive cabling .....	92
USB cable assembly .....	93
Power switch cable assembly .....	94
<b>Specifications .....</b>	<b>96</b>
Server specifications .....	96
Environmental specifications .....	96
Hot-plug power supply calculations .....	97
<b>Acronyms and abbreviations .....</b>	<b>98</b>
<b>Index .....</b>	<b>102</b>

# Illustrated parts catalog

## In this section

Customer self repair .....	6
Mechanical components .....	6
System components .....	8

## Customer self repair

What is customer self repair?

HP's customer self-repair program offers you the fastest service under either warranty or contract. It enables HP to ship replacement parts directly to you so that you can replace them. Using this program, you can replace parts at your own convenience.

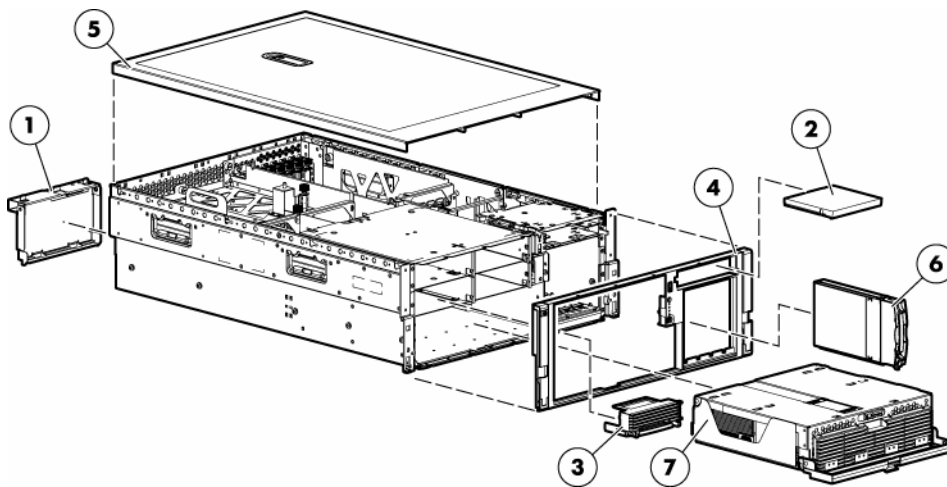
A convenient, easy-to-use program:

- An HP support specialist will diagnose and assess whether a replacement part is required to address a system problem. The specialist will also determine whether you can replace the part.
- Replacement parts are express-shipped. Most in-stock parts are shipped the very same day you contact HP. You may be required to send the defective part back to HP, unless otherwise instructed.
- Available for most HP products currently under warranty or contract. For information on the warranty service, refer to the HP website (<http://h18004.www1.hp.com/products/servers/platforms/warranty/index.html>).

For more information about HP's customer self-repair program, contact your local service provider. For the North American program, refer to the HP website (<http://www.hp.com/go/selfrepair>).

Customer replaceable parts are identified in the following tables.

## Mechanical components



Item	Description	Original assembly part number	Modified assembly part number	Original spare part number	Modified spare part number	Customer self repair
—	Hardware kit, ProLiant DL580 G3 Server *	—	—	385642-001	—	Yes
1	a) Blank, power supply	366450-002	—	—	—	Yes
2	b) Blank, CD/DVD/diskette	377569-001	—	—	—	Yes
3	c) Blank, memory board	374278-001	—	—	—	Yes
4	Bezel, ProLiant DL580 G3 Server	367600-001	—	376481-001	—	Yes
5	Cover, top, ProLiant DL580 G3 Server	367572-001	—	376480-001	—	Yes
6	Blank, hard drive	302531-002	—	122759-001	—	Yes
7	Plastics kit	—	—	376479-001	—	Yes
8	a) Guide, PCA, short (2) *	367597-001	—	—	—	Yes
9	b) Guide, PCA, tall (2) *	367939-001	—	—	—	Yes
10	c) Latch, PCI, carbon (2) *	228194-001	—	—	—	Yes
11	d) Latch, PCA, blue (2) *	228194-002	—	—	—	Yes
12	e) Retainer, card guide, carbon (2) *	379046-001	—	—	—	Yes
13	f) Retainer, card guide, blue (2) *	379046-002	—	—	—	Yes
14	Return kit, ProLiant DL580 G3 Server *	—	—	378336-001	—	Yes
15	Tool, Torx, T-15*	107473-001	—	199630-001	—	Yes

\* not shown

‡**REQUIREMENT:**

**For Customers in the EU only.**

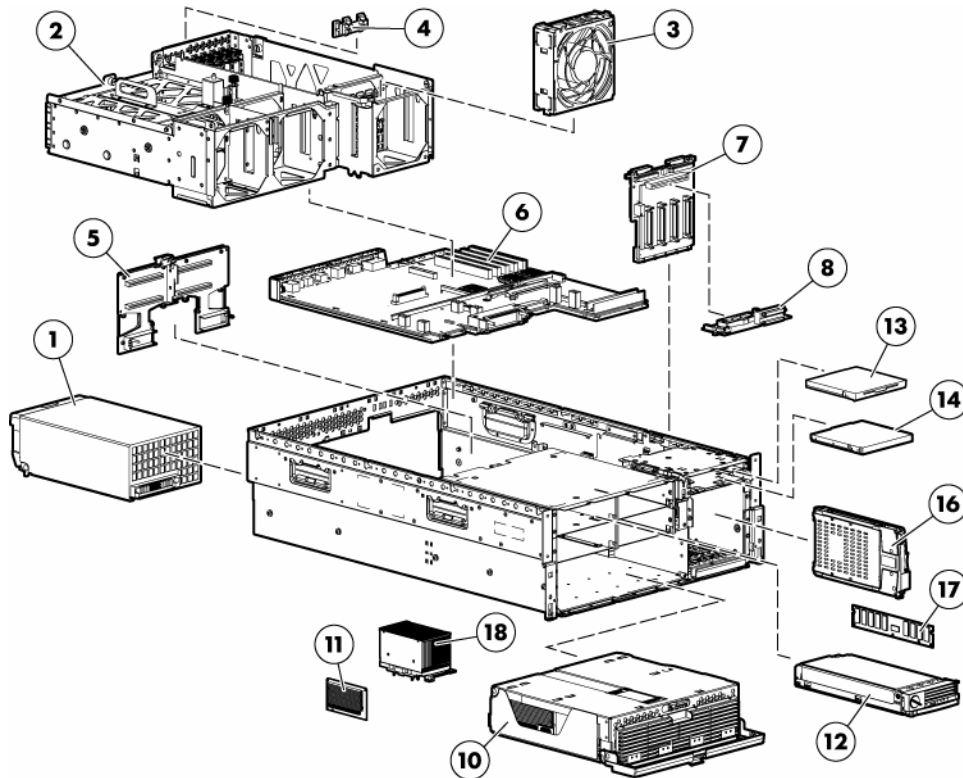
The use of the Original Spare part is regulated by RoHS legislation§.

If your unit contains a part that is labelled with the Modified Spare number, the Modified Spare must be ordered as the replacement part in the EU.

If your unit contains a part that is labelled with the Original Spare number, please order the Original Spare as the replacement part in the EU. In this case either the Original Spare or the Modified Spare may be shipped which will not affect performance or functionality of the unit.

§*Directive 2002/95/EC restricts the use of lead, mercury, cadmium, hexavalent chromium, PBBs and PBDEs in electronic products.*

# System components



Item	Description	Original assembly part number	Modified assembly part number	Original spare part number	Modified spare part number	Customer self repair
—	<b>System components</b>	—	—	—	—	—
1	Power supply, 910–1300 W	337867-001‡ See requirement	337867-501	364360-001‡ See requirement	406421-001	Yes
2	System cage	—	—	—	—	—
3	Fan 120 mm, hot-plug	364517-001	—	374552-001	—	Yes
—	<b>Boards</b>	—	—	—	—	—
4	PCI-X Hot Plug switch	011077-001‡ See requirement	011077-501	230981-001‡ See requirement	411796-001	Yes
5	Memory backplane, ProLiant DL580 G3 Server	012101-001‡ See requirement	012101-501	376471-001‡ See requirement	412327-001	Yes
6	System board, ProLiant DL580 G3 Server	012092-001‡ See requirement	012092-501	376468-001‡ See requirement	412324-001	No
7	SCSI backplane, ProLiant DL580 G3 Server	012104-001‡ See requirement	012104-501	376474-001‡ See requirement	412328-001	Yes



Item	Description	Original assembly part number	Modified assembly part number	Original spare part number	Modified spare part number	Customer self repair
8	Media board (CD/DVD/diskette)	012207-001‡ See requirement	012207-501	376477-001‡ See requirement	416422-001	Yes
9	Power backplane, ProLiant DL580 G3 Server *	012110-001‡ See requirement	012110-501	376476-001‡ See requirement	411795-001	No
10	Processor module assembly, ProLiant DL580 G3 Server	012095-001‡ See requirement	012095-501	376469-001‡ See requirement	412325-001	Yes
11	Processor Power Module	367240-001	—	370718-001‡ See requirement	—	Yes
12	Memory board, ProLiant DL580 G3 Server	012098-001‡ See requirement	012825-001	376470-001‡ See requirement	410188-001	Yes
—	<b>Media devices</b>	—	—	—	—	—
13	Diskette drive, 3.5 in	263394-001‡ See requirement	263394-002	263394-002‡ See requirement	399396-001	Yes
14	DVD drive, 8x	168003-9D1/935‡ See requirement	395910-001	395910-001‡ See requirement	397928-001	Yes
15	DVD/CD-RW drive *	294766-9D1/9D2‡ See requirement	383696-002	337273-001‡ See requirement	399959-001	Yes
—	<b>Hard drives</b>	—	—	—	—	—
16	SCSI Ultra320 universal hot-plug hard drive	—	—	—	—	—
—	a) 36.4 GB, 15,000 rpm *	271837-016‡ See requirement	404670-008	289241-001‡ See requirement	404714-001	Yes
—	b) 72.8 GB, 10,000 rpm *	271837-008‡ See requirement	404670-003	289042-001‡ See requirement	404709-001	Yes
—	c) 72.8 GB, 15,000 rpm *	271837-018‡ See requirement	404670-007	289243-001‡ See requirement	404713-001	Yes
—	d) 146.8 GB, 10,000 rpm *	271837-010‡ See requirement	404670-002	289044-001‡ See requirement	404708-001	Yes
—	e) 146.8 GB, 15,000 rpm *	281837-028‡ See requirement	404670-006	347779-001‡ See requirement	404712-001	Yes
—	f) 300 GB, 10,000 rpm *	271837-001‡ See requirement	404670-001	351126-001‡ See requirement	404701-001	Yes

Item	Description	Original assembly part number	Modified assembly part number	Original spare part number	Modified spare part number	Customer self repair
—	g) 72-GB SAS drive, 10,000 rpm *	375696-002	—	376597-001	—	Yes
—	h) 36-GB SAS drive, 10,000 rpm *	375696-001	—	376596-001	—	Yes
—	i) 60-GB SATA drive, 5,400 rpm *	390158-001	—	382264-001	—	Yes
—	<b>Memory</b>	—	—	—	—	—
17	DIMM, PC2-3200, DDR2	—	—	—	—	—
—	a) 512 MB *	345112-051‡ See requirement	345112-851	359241-001‡ See requirement	413384-001	Yes
—	b) 1 GB *	345113-051‡ See requirement	345113-851	359242-001‡ See requirement	413385-001	Yes
—	c) 2 GB (single-rank) *	345114-061‡ See requirement	345114-861	359243-001‡ See requirement	413386-001	Yes
—	d) 2 GB (dual-rank) *	345114-051‡ See requirement	345114-851	378021-001‡ See requirement	413387-001	Yes
—	e) 4 GB *	345115-061‡ See requirement	345115-861	379984-001‡ See requirement	413388-001	Yes
—	<b>Processor assemblies</b>	—	—	—	—	—
18	Processor assemblies	—	—	—	—	—
—	a) Intel® 3.33-GHz Xeon™ 8 MB *	376660-001	—	379982-001	—	Yes
—	b) Intel® 3.00-GHz Xeon™ 8 MB *	376660-002	—	379981-001	—	Yes
—	c) Intel® 2.83-GHz Xeon™ 4 MB *	376661-001	—	379980-001	—	Yes
—	d) Intel® 3.66-GHz Xeon™ 1 MB *	376659-002	—	389027-001	—	Yes
—	e) Intel® 3.16-GHz Xeon™ 1 MB *	376659-001	—	377840-001	—	Yes
—	f) Intel® 2.66-GHz Xeon™ 1 MBx2 dual core *	399752-001	—	399954-001	—	Yes

Item	Description	Original assembly part number	Modified assembly part number	Original spare part number	Modified spare part number	Customer self repair
—	g) Intel® 3.00-GHz Xeon™ 2 MBx2 dual core*	399755-001	—	399955-001	—	Yes
19	Processor blanks (two)	392523-001	—	406056-001	—	Yes
—	<b>Cables</b>	—	—	—	—	—
20	Cable kit, data, ProLiant DL580 G3 Server *	—	—	376478-001	—	Yes
—	a) Cable assembly, USB	346187-001	—	—	—	Yes
—	b) Cable assembly, power switch	367602-001	—	—	—	Yes
—	c) Cable assembly, PCI-X Hot Plug switch board	224999-003	—	—	—	Yes
21	SAS hard drive cable kit *	—	—	393535-001	—	Yes
—	a) SAS cable assembly	361316-002	—	—	—	Yes
—	b) SAS power cable	379196-001	—	—	—	Yes
—	<b>Options</b>	—	—	—	—	—
22	Battery-Backed Write Cache battery housing *	338173-001	—	349989-001	—	Yes
23	Battery-Backed Write Cache battery *	274779-001	—	307132-001	—	Yes
24	Cache board, 128 MB *	012304-001	—	351518-001	—	Yes
25	PCI Express x4 mezzanine board *	012450-001‡ See requirement	012450-501	376473-001‡ See requirement	411792-001	Yes
26	PCI Express x8 mezzanine board *	012743-001‡ See requirement	012743-501	390347-001‡ See requirement	411793-001	Yes
27	PCI-X Hot Plug mezzanine board *	012447-001‡ See requirement	012447-501	376472-001‡ See requirement	411791-001	Yes
28	PCI-X Hot Plug basket assembly *	375192-001	—	393784-001‡ See requirement	—	Yes
29	SAS backplane, ProLiant DL580 G3 Server *	012564-001‡ See requirement	012564-501	376475-001‡ See requirement	411794-001	Yes

Item	Description	Original assembly part number	Modified assembly part number	Original spare part number	Modified spare part number	Customer self repair
30	SAS array controller board *	012335-001	—	370855-001	—	Yes
31	SAS array cache board (with battery) *	011773-002	—	309522-001	—	Yes
32	SAS/SATA hard drive blank *	376383-001	—	392613-001	—	Yes
—	<b>Miscellaneous</b>	—	—	—	—	—
33	Battery, 3V, Lithium *	166899-001	—	153009-001	—	Yes
34	Power cord, AC line, C14-C19 *	287485-002	—	391097-001	—	Yes
35	Power cord, AC line, 5-15P *	178968-001	—	237457-001	—	Yes
36	Rack mount kit, universal *	374503-001	—	377839-001	—	Yes

\* not shown

**‡REQUIREMENT:**

**For Customers in the EU only.**

The use of the Original Spare part is regulated by RoHS legislation§.

If your unit contains a part that is labelled with the Modified Spare number, the Modified Spare must be ordered as the replacement part in the EU.

If your unit contains a part that is labelled with the Original Spare number, please order the Original Spare as the replacement part in the EU. In this case either the Original Spare or the Modified Spare may be shipped which will not affect performance or functionality of the unit.

§Directive 2002/95/EC restricts the use of lead, mercury, cadmium, hexavalent chromium, PBBs and PBDEs in electronic products.

---

# Removal and replacement procedures

## In this section

Required tools.....	13
Safety considerations.....	14
Preparation procedures.....	14
Removing the front bezel.....	18
Removing a media drive blank.....	19
Removing a media drive.....	19
Removing the processor module.....	20
Removing a processor.....	22
Removing a PPM.....	25
Removing a PCI latch.....	26
Removing a PCI retaining clip.....	27
Removing the PCI-X Hot Plug basket.....	28
Removing a non-hot-plug expansion board.....	28
Removing the PCI-X Hot Plug mezzanine option.....	29
Removing the PCI Express mezzanine option.....	30
Recovering data from the BBWC.....	30
Removing the BBWC battery pack.....	31
Removing the BBWC cache module.....	32
Removing the system board.....	32
Removing the system battery.....	35
Removing the media board.....	37
Removing the SCSI backplane.....	37
Removing the power backplane.....	39
Removing the memory backplane.....	39
Removing a hard drive blank.....	40
Removing a hot-plug SCSI hard drive.....	40
Removing a hot-plug SAS hard drive.....	41
Removing the SAS-SATA hard drive cage.....	42
Removing the SAS-SATA backplane.....	46
Removing a PCI-X Hot Plug expansion board.....	47
Removing a power supply blank.....	48
Removing a redundant hot-plug power supply.....	48
Replacing hot-plug fans.....	49
Memory overview.....	50

## Required tools

You need the following items for some procedures:

- Torx T-15 screwdriver (provided with the server ("[Rear panel components](#)" on page 73))
- Phillips screwdriver

- Flathead screwdriver
- Diagnostics Utility

## Safety considerations

Before performing service procedures, review all the safety information.

### Preventing electrostatic discharge

To prevent damaging the system, be aware of the precautions you need to follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

To prevent electrostatic damage:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always be properly grounded when touching a static-sensitive component or assembly.

### Server warnings and cautions

Before installing a server, be sure that you understand the following warnings and cautions.

- ⚠ WARNING: To reduce the risk of electric shock or damage to the equipment:**
- **Do not disable the power cord grounding plug. The grounding plug is an important safety feature.**
  - **Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.**
  - **Unplug the power cord from the power supply to disconnect power to the equipment.**
  - **Do not route the power cord where it can be walked on or pinched by items placed against it. Pay particular attention to the plug, electrical outlet, and the point where the cord extends from the server.**

- ⚠ WARNING: To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.**

- ⚠ CAUTION:** Do not operate the server for long periods with the access panel open or removed. Operating the server in this manner results in improper airflow and improper cooling that can lead to thermal damage.

## Preparation procedures

To access some components and perform certain service procedures, perform one or more of the following procedures:

- Extend the server from the rack ("[Extending the server from the rack](#)" on page 15).

If you are performing service procedures in an HP, Compaq branded, telco, or third-party rack cabinet, you can use the locking feature of the rack rails to support the server and gain access to internal components.

For more information about telco rack solutions, refer to the RackSolutions.com website (<http://www.racksolutions.com/hp>).

- Power down the server (on page 16).  
If you must remove a server from a rack or a non-hot-plug component from a server, power down the server.
- Remove the server from the rack (on page 16).  
If the rack environment, cabling configuration, or the server location in the rack makes it difficult to service the unit, remove the server from the rack.
- Remove the access panel ("Removing the access panel" on page 17).  
If you are servicing internal components, remove the access panel.
- Remove the system cage ("Removing the system cage" on page 17).  
If you must remove the system board, power backplane, or the BBWC, remove the system cage.

## Extending the server from the rack

The design of the server enables you to access several components through the front of the server. Installing or accessing the following components will not require extending the server from the rack:

- Processors
- PPMs
- Memory boards
- DIMMs
- Media drive
- Diskette drive
- Hard drives

To extend the server from the rack:

1. Release the two levers on the lower outside corners of the rack.

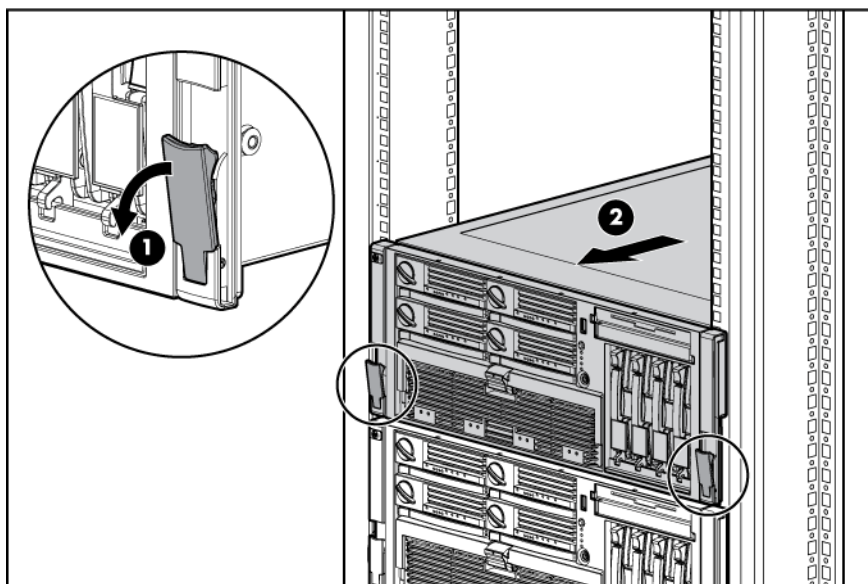


**NOTE:** If the server is in a rack and in the shipping configuration, remove the two shipping screws directly behind the levers and the two shipping screws on the rails in the rear of the server.



**IMPORTANT:** If the server is installed in a telco rack, remove the server from the rack to access internal components.

2. Extend the server on the rack rails until the server rail-release latches engage.

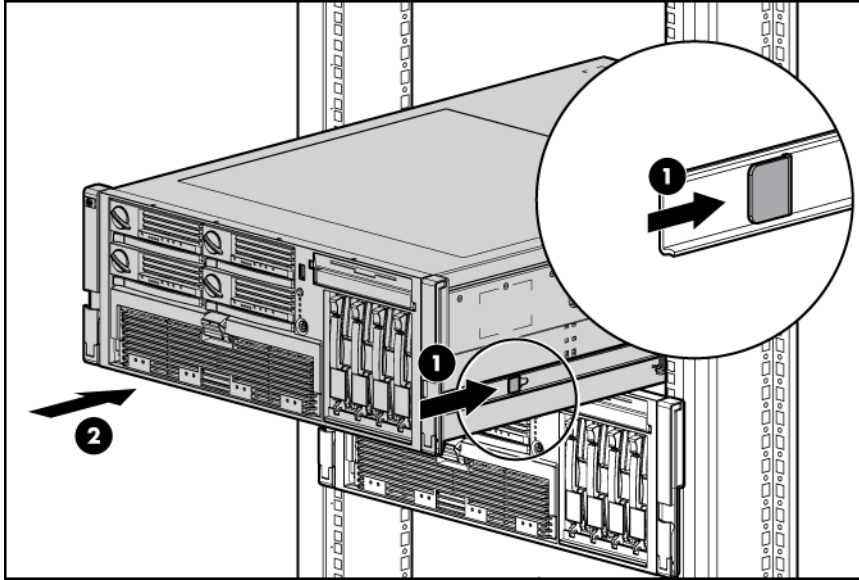


**⚠ WARNING:** To reduce the risk of personal injury or equipment damage, be sure that the rack is adequately stabilized before extending a component from the rack.

**⚠ WARNING:** To reduce the risk of personal injury, be careful when pressing the server rail-release latches and sliding the server into the rack. The sliding rails could pinch your fingers.

3. After performing the installation or maintenance procedure, slide the server back into the rack by pressing the server rail-release latches.

**📝 NOTE:** The release latches will lock into place when the rails are fully extended.



## Power down the server

**⚠ WARNING:** To reduce the risk of personal injury, electric shock, or damage to the equipment, remove the power cord to remove power from the server. The front panel Power On/Standby button does not completely shut off system power. Portions of the power supply and some internal circuitry remain active until AC power is removed.

**📝 IMPORTANT:** If installing a hot-plug device, it is not necessary to power down the server.

1. Shut down the OS as directed by the OS documentation.
2. Press the Power On/Standby button to place the server in standby mode. When the server enters standby power mode, the system power LED changes to amber.
3. Disconnect the power cords.

The system is now without power.

## Remove the server from the rack

To remove the server from an HP, Compaq branded, telco, or third-party rack:

1. Power down the server (on page 16).
2. Extend the server from the rack ("[Extending the server from the rack](#)" on page 15).
3. Disconnect the cabling and remove the server from the rack. For more information, refer to the documentation that ships with the rack mounting option.
4. Place the server on a sturdy, level surface.



## Removing the access panel

**⚠ WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

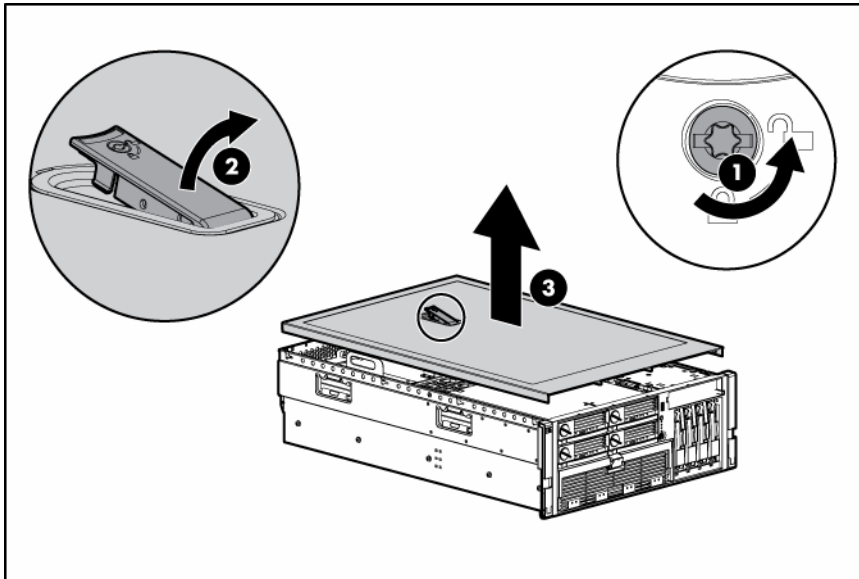
**⚠ CAUTION:** Do not operate the server for long periods with the access panel open or removed. Operating the server in this manner results in improper airflow and improper cooling that can lead to thermal damage.

**📋 IMPORTANT:** When removing the access panel to view QuickFind diagnostic LEDs ("QuickFind diagnostic display LEDs" on page 78), leave the server powered on. The QuickFind diagnostic LEDs are cleared when the server is powered off.

1. Extend the server from the rack, if applicable ("Extending the server from the rack" on page 15).
2. If the locking latch is locked, use a Torx T-15 screwdriver to unlock the latch.

**📋 NOTE:** The T-15 Torx screwdriver is shipped with the server and can be located on the rear panel ("Rear panel components" on page 73).

3. Lift up on the hood latch, and remove the access panel.



4. After installing hardware options, replace the access panel. Be sure that the panel is securely locked into place before powering up the server.

## Removing the system cage

Installing or accessing some options in the server may require removing the system cage. Refer to the instructions for each individual option to determine if removing the system cage is necessary.

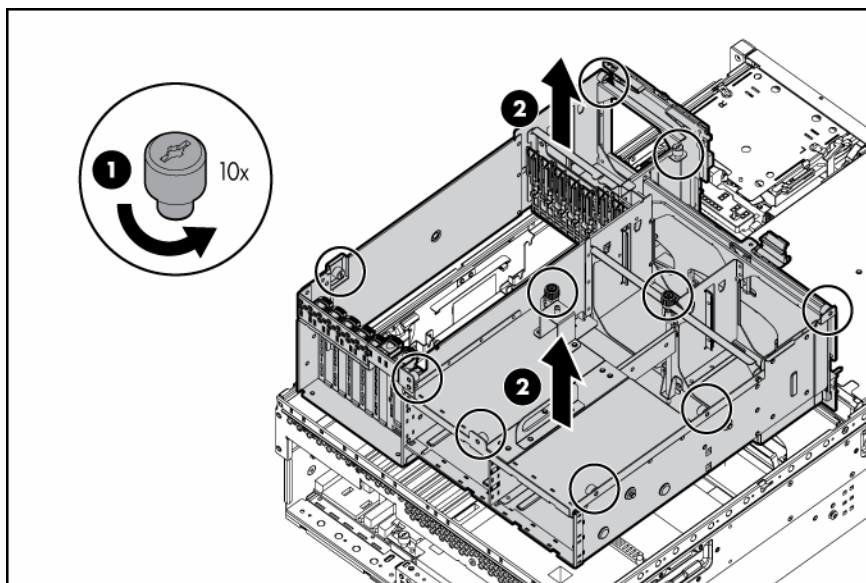
To remove the system cage:

1. Power down the server, if applicable ("Power down the server" on page 16).
2. Extend the server from the rack, if applicable ("Extending the server from the rack" on page 15).
3. Remove the access panel ("Removing the access panel" on page 17).
4. Remove all expansion boards and expansion slot covers.
5. Remove the PCI-X Hot Plug basket, if applicable.
6. Disconnect the hot-plug board cable from the PCI-X Hot Plug mezzanine board, if applicable.
7. Remove all system fans ("Replacing hot-plug fans" on page 49).

8. Remove all power supplies ("[Removing a redundant hot-plug power supply](#)" on page 48).
9. Loosen the thumbscrews, and lift the system cage from the server.



**NOTE:** The T-15 Torx screwdriver can be used to loosen the thumbscrews. The T-15 Torx screwdriver is shipped with the server and can be located on the rear panel ("[Rear panel components](#)" on page 73).

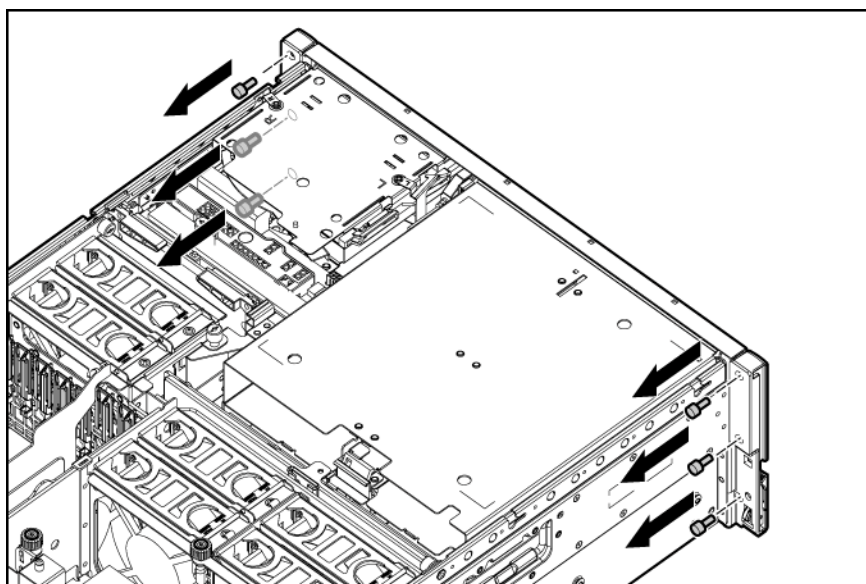


## Removing the front bezel

1. Power down the server (on page 16).
2. Extend the server from the rack ("[Extending the server from the rack](#)" on page 15).
3. Remove the access panel ("[Removing the access panel](#)" on page 17).
4. Using the T-15 Torx screwdriver, remove the three screws on each side of the front bezel.

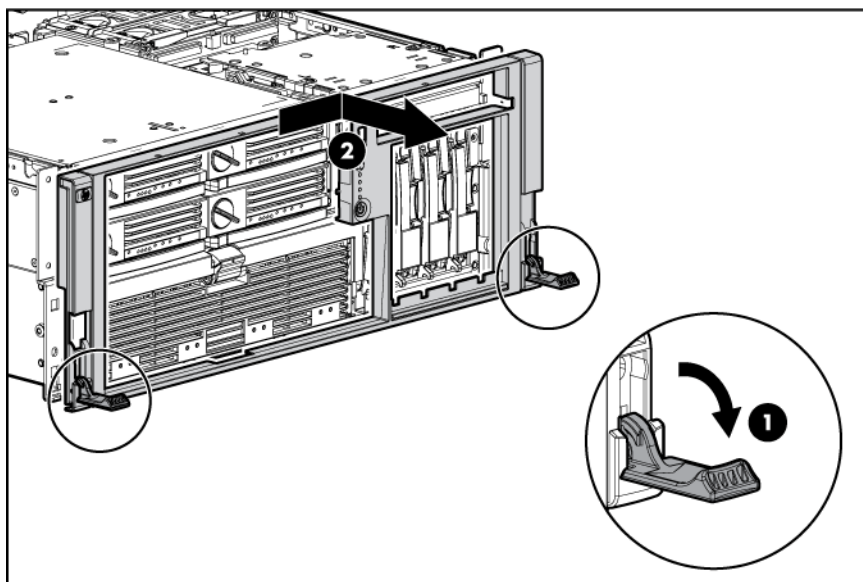


**NOTE:** The T-15 Torx screwdriver is shipped with the server and can be located on the rear panel ("[Rear panel components](#)" on page 73).



5. Release the two levers on the lower outside corners of the rack.


6. Slide the bezel to the right, and detach the bezel from the server.

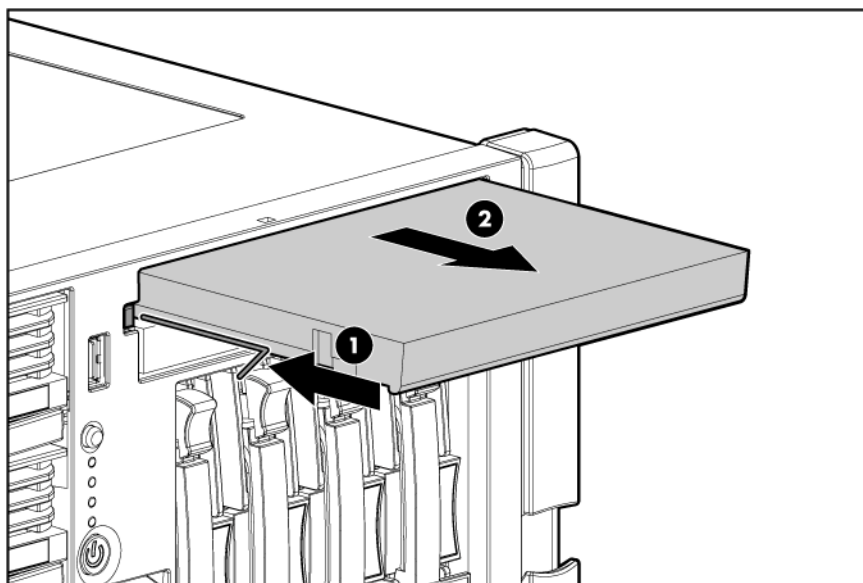


To replace the component, reverse the removal procedure.

## Removing a media drive blank

1. Power down the server (on page 16).
2. Use the T-15 Torx screwdriver to eject the drive blank, and pull the drive blank out of the server.

 **NOTE:** The T-15 Torx screwdriver is shipped with the server and can be located on the rear panel ("[Rear panel components](#)" on page 73).



To replace the component, reverse the removal procedure.

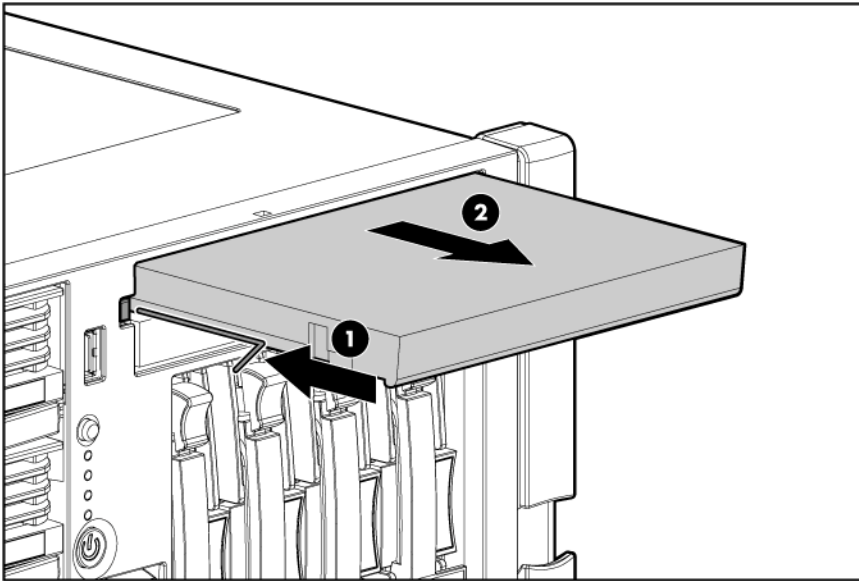
## Removing a media drive

To remove the DVD drive, optional diskette drive, or optional CD-RW drive:

1. Power down the server (on page 16).
2. Use the T-15 Torx screwdriver to eject the drive, and pull the drive out of the server.



**NOTE:** The T-15 Torx screwdriver is shipped with the server and can be located on the rear panel ("Rear panel components" on page 73).



To replace the component, reverse the removal procedure.

## Removing the processor module



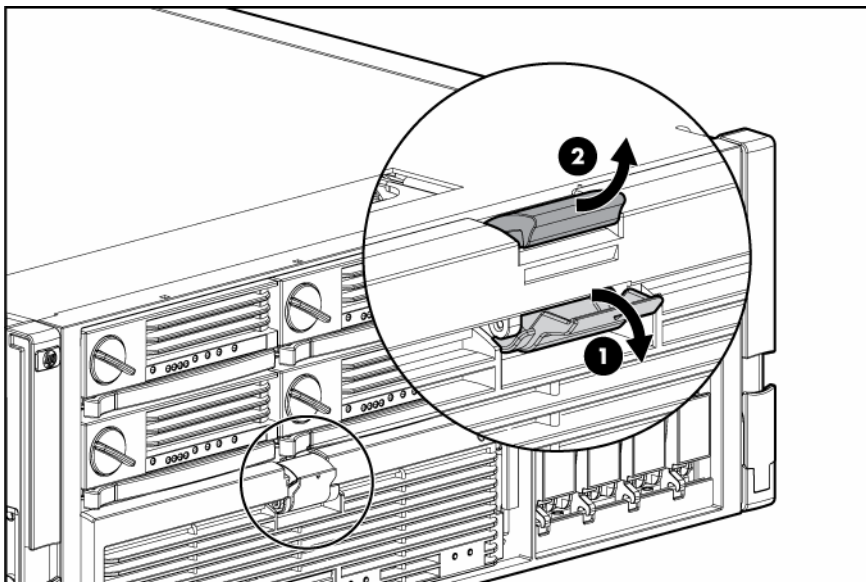
**NOTE:** Refer the section "Processor module LEDs (on page 72)" for information on the current processor and PPM status.

1. Power down the server (on page 16).
2. Remove the shipping bracket, if applicable.

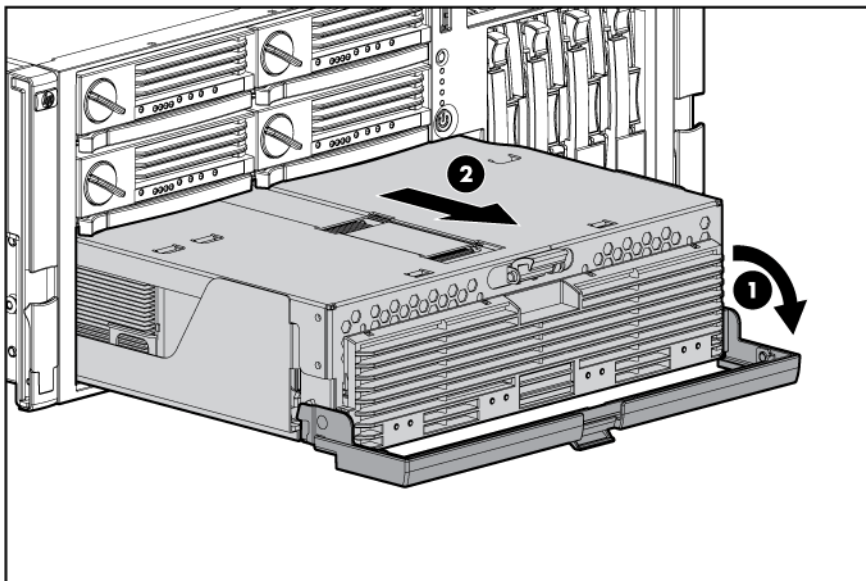


**NOTE:** The shipping bracket is located near the processor module lever, and is marked with an orange tab for easy identification.

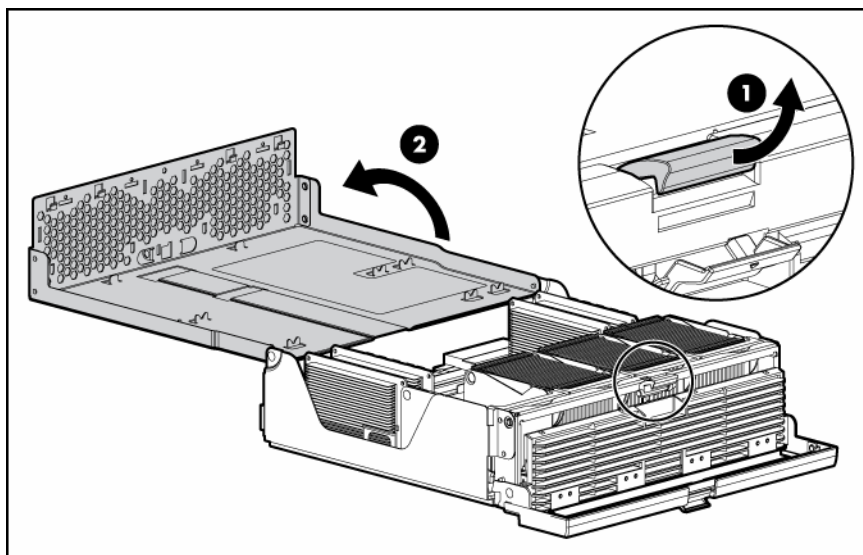
3. Release the latches to unlock the processor module.




4. Lower the processor module lever, and pull the module out of the server.




5. Release the latch, and open the cover to expose the processors.





 **NOTE:** To install a new processor module, remove all processors and PPMs from the processor module. Reinstall the processors and PPMs into the replacement processor module.


To replace the component, reverse the removal procedure.


## Removing a processor

 **CAUTION:** To prevent thermal instability and damage to the server, do not separate the processor from the heatsink. The processor, heatsink, and retaining clip make up a single assembly.

 **CAUTION:** To prevent possible server malfunction and damage to the equipment, do not mix single- and dual-core processors or processors with different speeds or cache sizes.

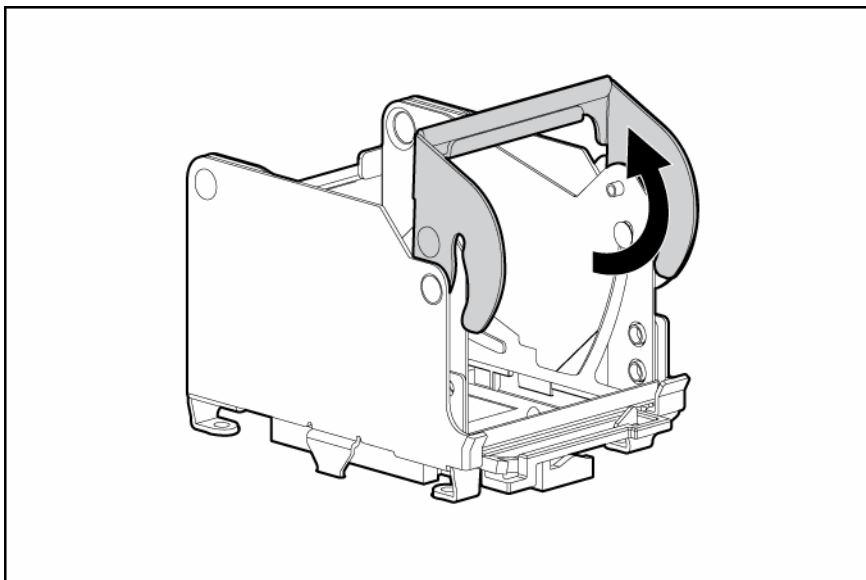
 **IMPORTANT:** If upgrading processor speed or adding additional processors, update the system ROM before installing the processor.

 **IMPORTANT:** Processor socket 1 and PPM slot 1 must be populated at all times or the server does not function properly.

 **IMPORTANT:** Always install a PPM when you install a processor. The system fails to boot if the PPM is missing.

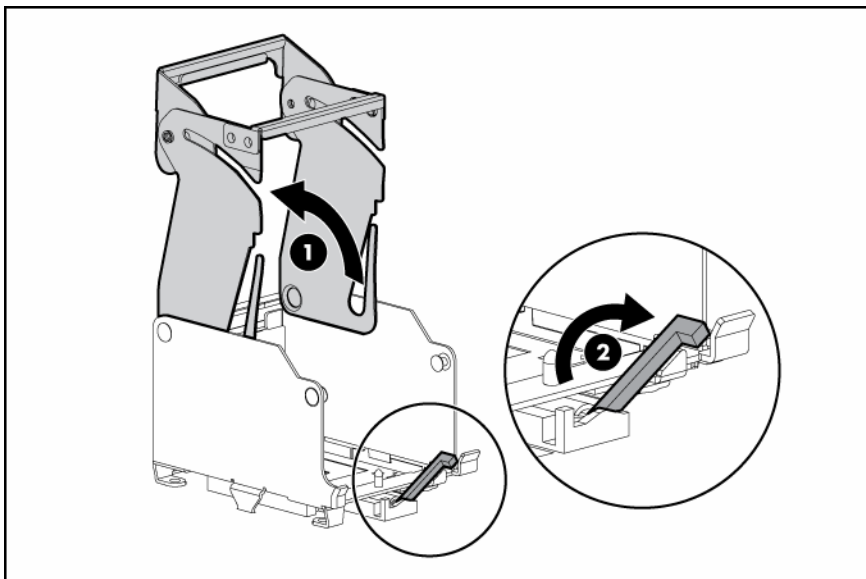
1. Power down the server (on page 16).
2. Remove the processor module ("[Removing the processor module](#)" on page 20).

3. Unlock the processor retaining bracket.



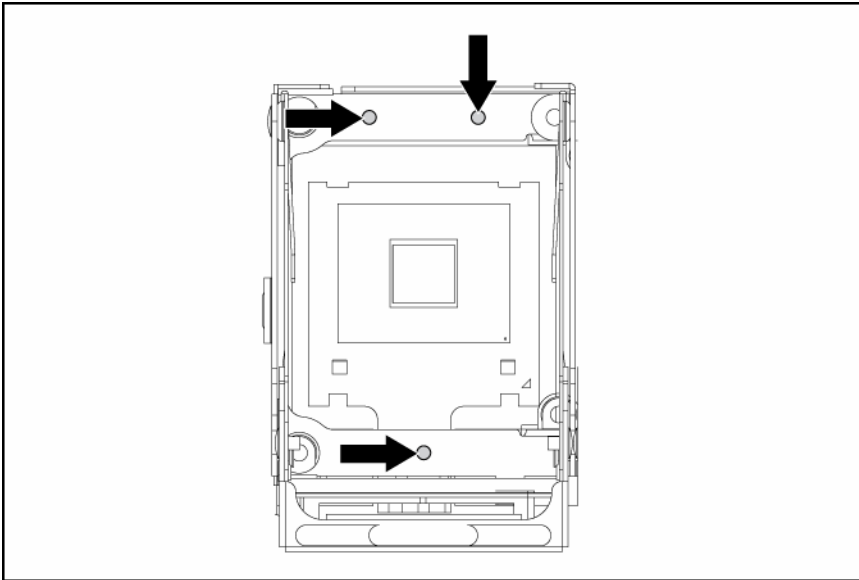
4. Open the processor retaining bracket, and open the processor locking lever.

**⚠ CAUTION:** Failure to completely open the processor locking lever prevents the processor from seating during installation, leading to hardware damage.



5. Remove the processor.

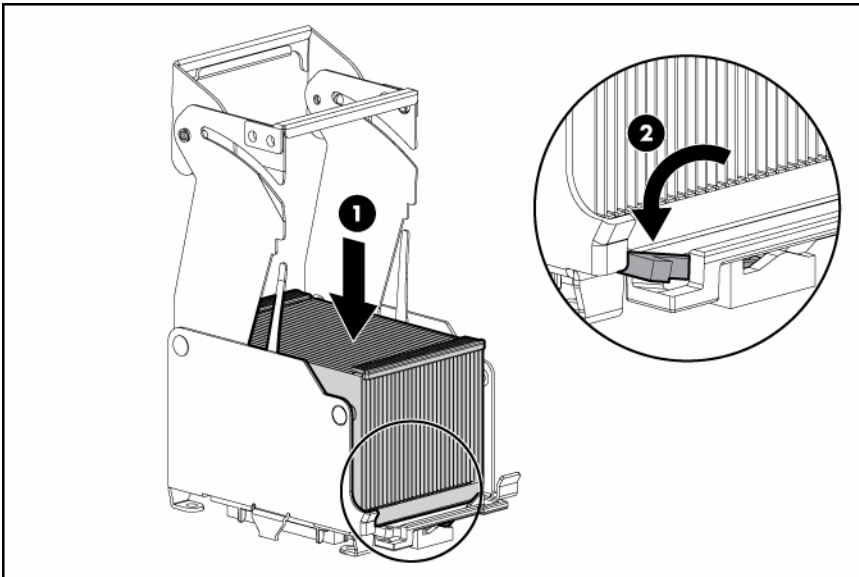
6. Install the replacement processor assembly, if applicable.



**IMPORTANT:** Determine the correct processor orientation by observing the guide pins on the base of the processor retaining bracket and the three corresponding guide slots on the processor assembly.

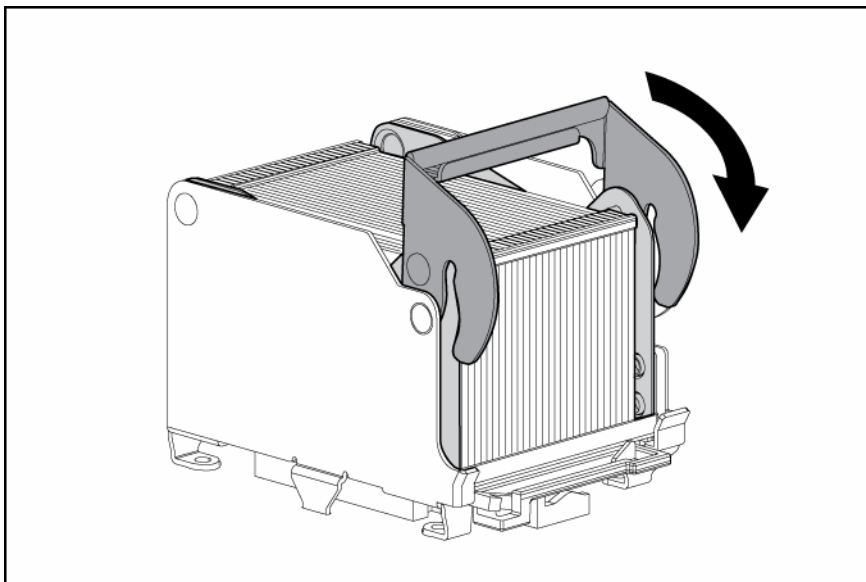
7. Insert the processor assembly into the processor socket, and close the locking lever.

**CAUTION:** To prevent possible server malfunction or damage to the equipment, be sure to completely close the processor locking lever.





8. Close and lock the processor retaining bracket.



9. Close the cover, and replace the processor module.

## Removing a PPM

The server PPMs provide the proper power to each processor. Each PPM must be installed in the correct slot for the processor.



**IMPORTANT:** Processor socket 1 and PPM slot 1 must be populated at all times or the server does not function properly.

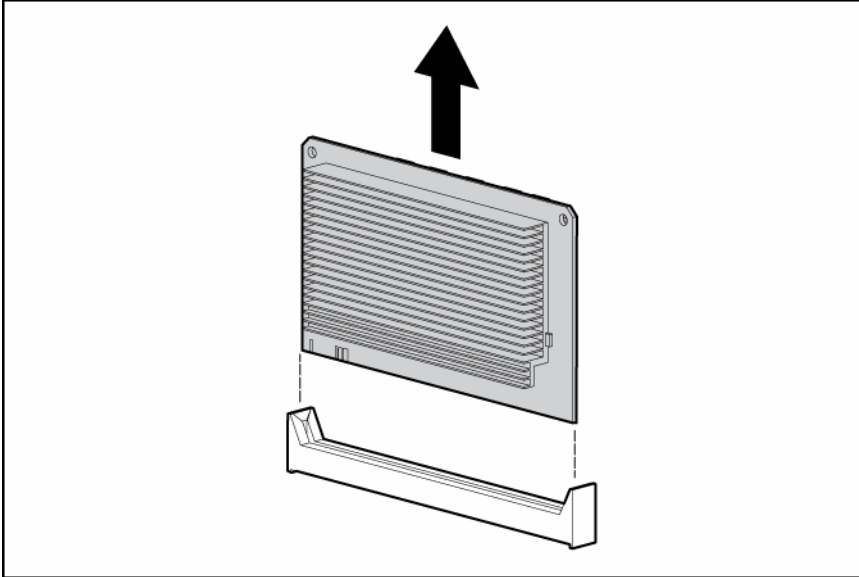


**IMPORTANT:** Always install a PPM when you install a processor. The system fails to boot if the PPM is missing.

To remove a PPM:

1. Power down the server (on page [16](#)).
2. Remove the processor module ("[Removing the processor module](#)" on page [20](#)).

3. Remove the PPM.



**IMPORTANT:** Always install a PPM when you install a processor. The system fails to boot if the corresponding PPM is missing.

To replace the component, reverse the removal procedure.

## Removing a PCI latch

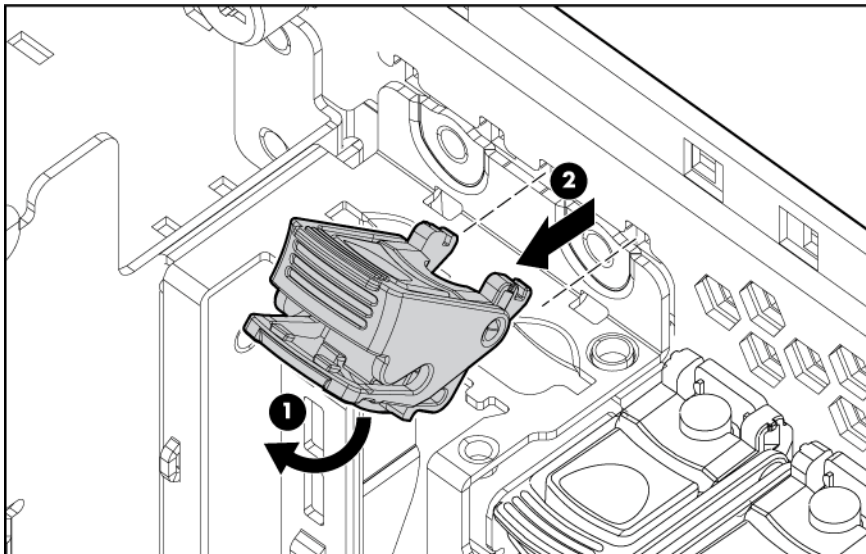
1. Power down the server (on page 16).
2. Extend or remove the server from the rack ("[Remove the server from the rack](#)" on page 16).
3. Remove the access panel ("[Removing the access panel](#)" on page 17).



**CAUTION:** To prevent improper cooling and thermal damage, do not operate the server unless all expansion slots have either an expansion slot cover or an expansion board installed.

4. Open the latch.
5. Remove the expansion board from the slot, if installed ("[Removing a PCI-X Hot Plug expansion board](#)" on page 47).
6. Remove the expansion slot cover from the slot, if installed.

7. Remove the PCI latch by pushing up on the clear plastic piece of the PCI latch that extends below the chassis under the latch.



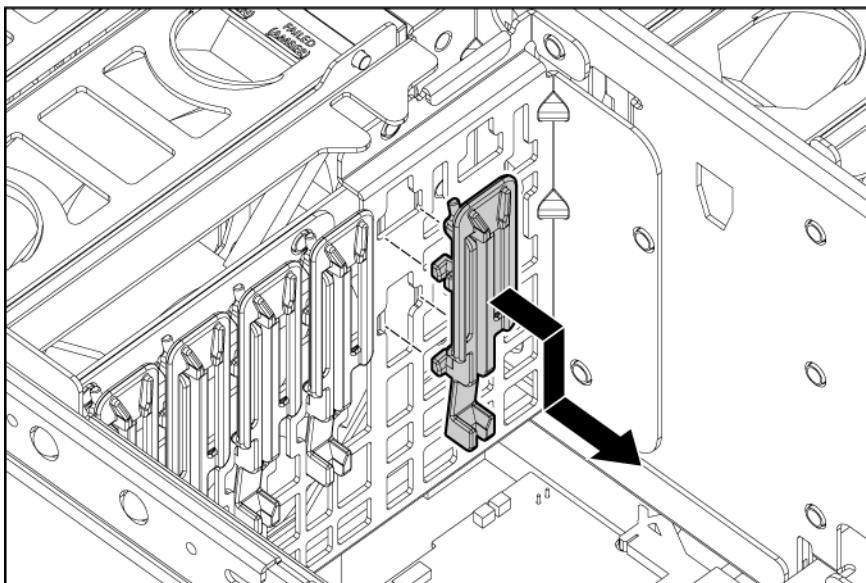
To replace the component, reverse the removal procedure.

## Removing a PCI retaining clip

1. Power down the server (on page 16).
2. Extend or remove the server from the rack ("[Remove the server from the rack](#)" on page 16).
3. Remove the access panel ("[Removing the access panel](#)" on page 17).

**CAUTION:** To prevent improper cooling and thermal damage, do not operate the server unless all expansion slots have either an expansion slot cover or an expansion board installed.

4. Open the PCI latch, and unlock the PCI retaining clip.
5. Remove the expansion board from the slot, if installed ("[Removing a PCI-X Hot Plug expansion board](#)" on page 47).
6. Remove the PCI retaining clip.



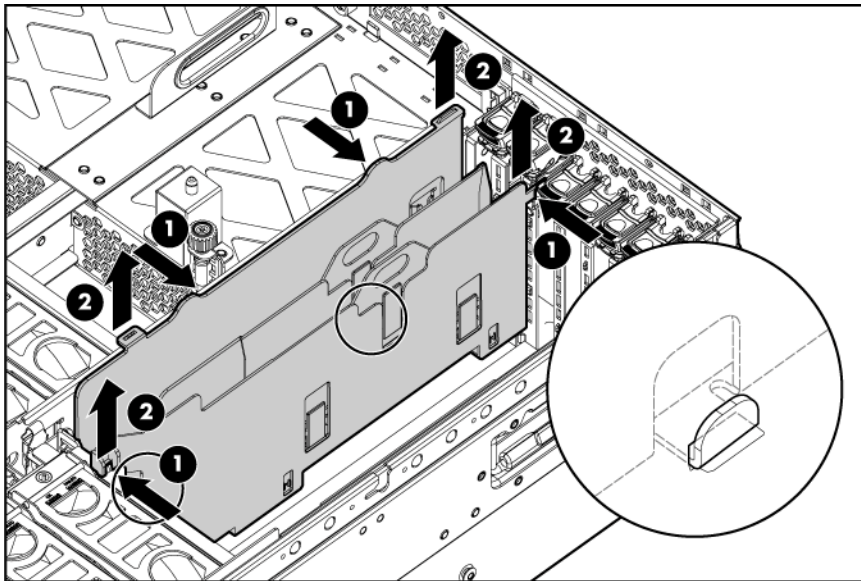
To replace the component, reverse the removal procedure.

## Removing the PCI-X Hot Plug basket

1. Power down the server (on page 16).
2. Extend or remove the server from the rack ("Remove the server from the rack" on page 16).
3. Remove the access panel ("Removing the access panel" on page 17).

**△ CAUTION:** To prevent improper cooling and thermal damage, do not operate the server unless all expansion slots have either an expansion slot cover or an expansion board installed.

4. Remove the expansion board from the slot, if installed ("Removing a PCI-X Hot Plug expansion board" on page 47).
5. Remove the PCI-X Hot Plug basket ("Removing the PCI-X Hot Plug basket" on page 28).

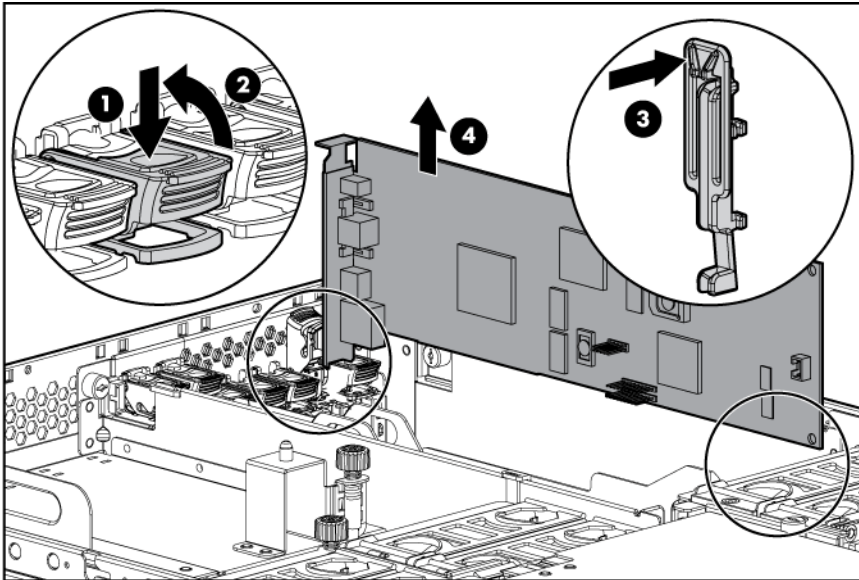


To replace the component, reverse the removal procedure.

## Removing a non-hot-plug expansion board

1. Power down the server (on page 16).
2. Extend or remove the server from the rack ("Remove the server from the rack" on page 16).
3. Remove the access panel ("Removing the access panel" on page 17).
4. Disconnect any required internal or external cables from the expansion board.
5. Open the PCI latch.
6. Unlock the retaining clip.

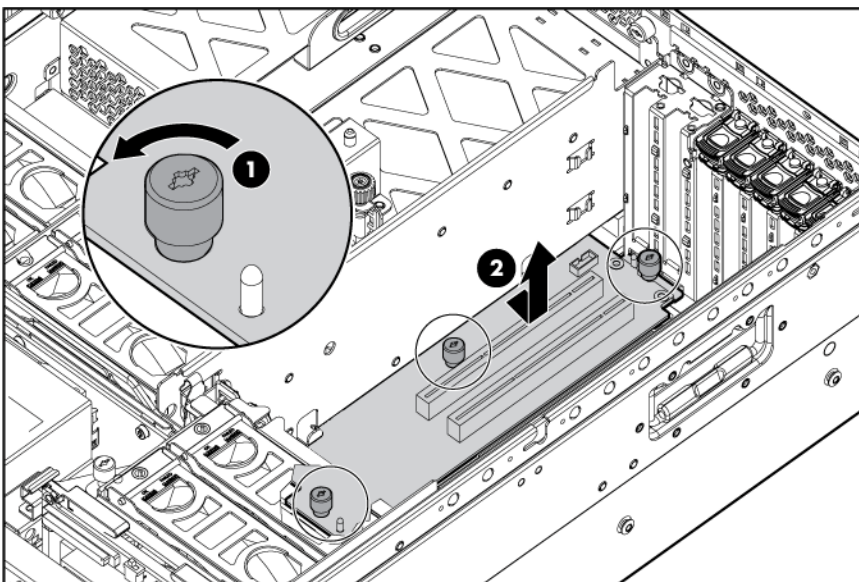
7. Remove the expansion board.



To replace the component, reverse the removal procedure.

## Removing the PCI-X Hot Plug mezzanine option

1. Power down the server (on page 16).
2. Extend or remove the server from the rack ("[Remove the server from the rack](#)" on page 16).
3. Remove the access panel ("[Removing the access panel](#)" on page 17).
4. Remove the expansion boards from slots 1 and 2.
5. Remove the expansion boards from slots 3 and 4, if installed, to gain access to the mezzanine board.
6. Remove the PCI-X Hot Plug basket ("[Removing the PCI-X Hot Plug basket](#)" on page 28).
7. Disconnect the cable from the PCI-X Hot Plug mezzanine board.
8. Loosen the thumbscrews, and lift the mezzanine board from the server.

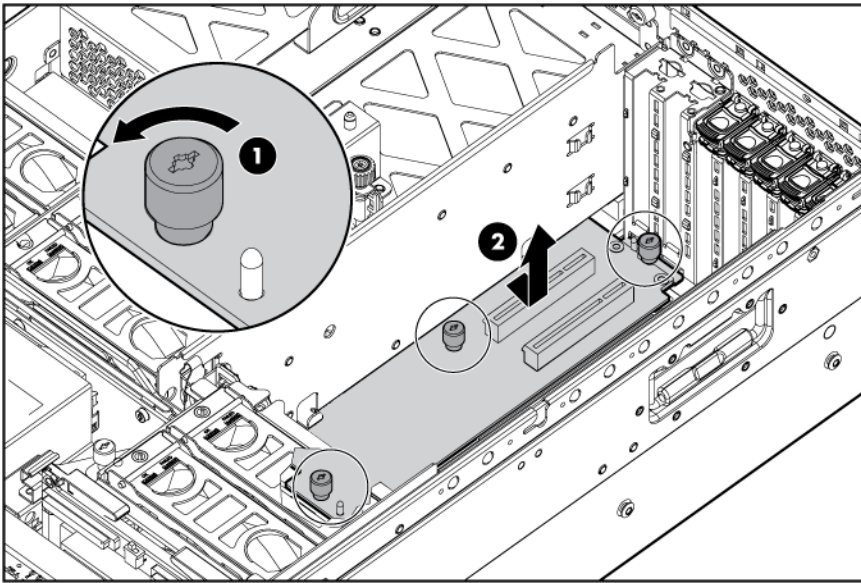


**△ CAUTION:** To prevent improper cooling and thermal damage, do not operate the server unless all expansion slots have either an expansion slot cover or an expansion board installed.

To replace the component, reverse the removal procedure.

## Removing the PCI Express mezzanine option

1. Power down the server (on page 16).
2. Extend or remove the server from the rack ("Remove the server from the rack" on page 16).
3. Remove the access panel ("Removing the access panel" on page 17).
4. Remove the expansion boards from slots 1 and 2.
5. Remove the expansion boards from slots 3 and 4, if installed, to gain access to the mezzanine board.
6. Loosen the thumbscrews, and lift the mezzanine board from the server.



**△ CAUTION:** To prevent improper cooling and thermal damage, do not operate the server unless all expansion slots have either an expansion slot cover or an expansion board installed.

To replace the component, reverse the removal procedure.

## Recovering data from the BBWC

If the server fails, you can recover any data temporarily trapped in the BBWC by using the following procedure.

**△ CAUTION:** Before starting this procedure, read the information about protecting against electrostatic discharge ("Preventing electrostatic discharge" on page 14).

1. Perform one of the following:
  - Set up a recovery server station using an identical server model. Do not install any internal drives or BBWC in this server. (This option is preferred.)
  - Find a server that has enough empty drive bays to accommodate all the drives from the failed server and that meets all the other requirements for drive and array migration.

2. Power down the failed server ("[Power down the server](#)" on page 16). If any data is trapped in the cache module, the amber LED on the module ("[BBWC LEDs](#)" on page 87) blinks every 15 seconds.

**CAUTION:** Do not detach the cable that connects the battery pack to the cache module. Detaching the cable causes any unsaved data in the cache module to be lost.

3. Transfer the hard drives from the failed server to the recovery server station.
4. Remove the BBWC cache module and battery pack from the failed server.
5. Perform one of the following:
  - Install the BBWC into an empty BBWC DIMM socket on the system board of the recovery server.
  - Install the BBWC into an empty BBWC DIMM socket on any Smart Array 641 or 642 controller in the recovery server.
6. Power up the recovery server. A 1759 POST message appears, stating that valid data was flushed from the cache. This data is now stored on the drives in the recovery server. You can now transfer the drives (and controller, if one was used) to another server.

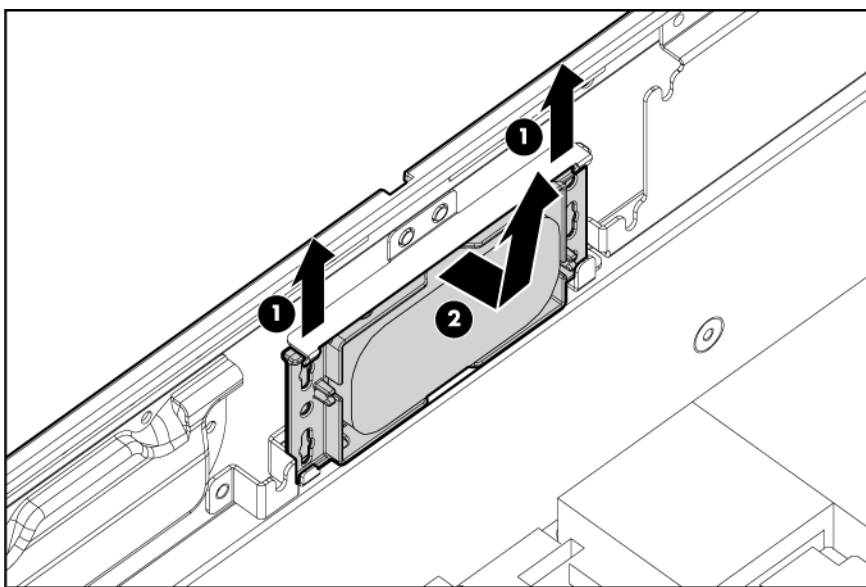
## Removing the BBWC battery pack

1. Power down the server (on page 16).
2. Extend or remove the server from the rack ("[Remove the server from the rack](#)" on page 16).
3. Remove the access panel ("[Removing the access panel](#)" on page 17).
4. Remove the system cage ("[Removing the system cage](#)" on page 17).

**CAUTION:** To prevent a server malfunction or damage to the equipment, do not add or remove the battery pack while an array capacity expansion, RAID level migration, or stripe size migration is in progress.

**CAUTION:** After the server is powered down, wait 15 seconds and then check the amber LED before unplugging the cable from the cache module. If the amber LED blinks after 15 seconds, do not remove the cable from the cache module. The cache module is backing up data, and data is lost if the cable is detached.

5. Remove the BBWC battery pack.



To replace the component, reverse the removal procedure.

**IMPORTANT:** The battery pack might have a low charge when installed. In this case, a POST error message is displayed when the server is powered up, indicating that the battery pack is temporarily disabled. No action is necessary on your part. The internal circuitry automatically recharges the batteries and enables the battery pack. This process might take up to four hours. During this time, the cache module functions properly, but without the performance advantage of the battery pack.

**NOTE:** The data protection and the time limit also apply if a power outage occurs. When power is restored to the system, an initialization process writes the preserved data to the hard drives.

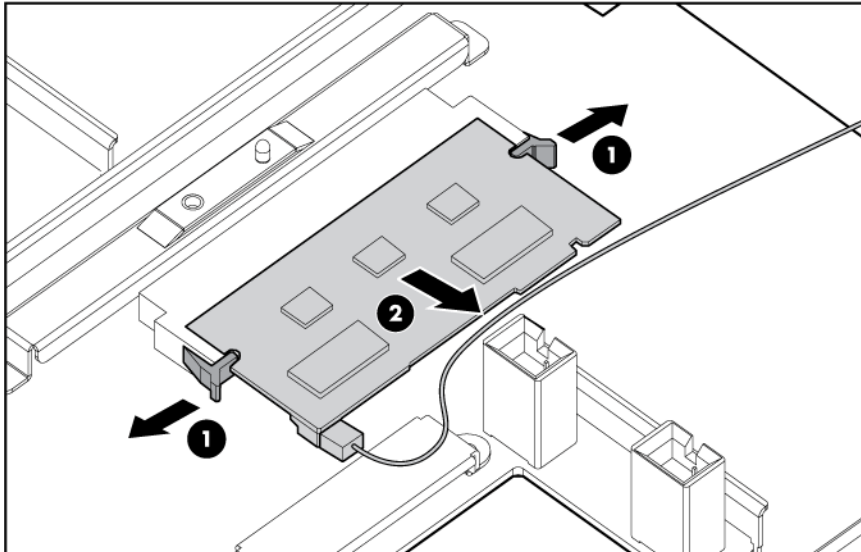
## Removing the BBWC cache module

1. Power down the server (on page 16).
2. Extend or remove the server from the rack ("Remove the server from the rack" on page 16).
3. Remove the access panel ("Removing the access panel" on page 17).
4. Remove the system cage ("Removing the system cage" on page 17).

**CAUTION:** To prevent a server malfunction or damage to the equipment, do not add or remove the battery pack while an array capacity expansion, RAID level migration, or stripe size migration is in progress.

**CAUTION:** After the server is powered down, wait 15 seconds and then check the amber LED before unplugging the cable from the cache module. If the amber LED blinks after 15 seconds, do not remove the cable from the cache module. The cache module is backing up data, and data is lost if the cable is detached.

5. Open the latches, and remove the BBWC cache module.



6. Disconnect the cable from the cache module.

To replace the component, reverse the removal procedure.

## Removing the system board

**CAUTION:** Only authorized technicians trained by HP should attempt to remove the system board. If you believe the system board requires replacement, contact HP Technical Support before proceeding.

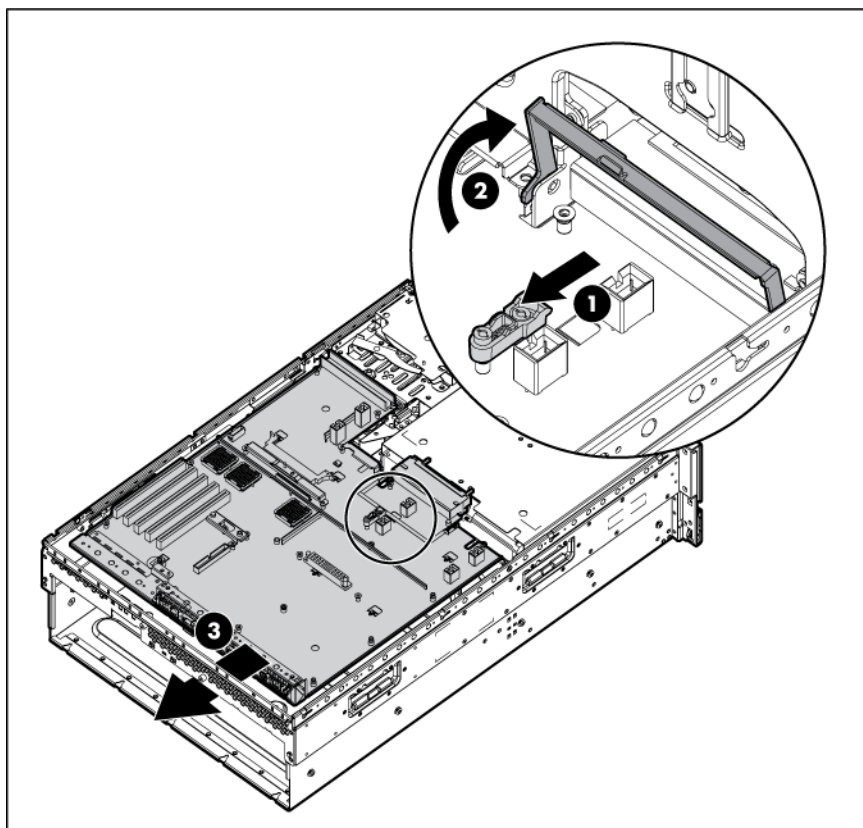





**IMPORTANT:** HP recommends troubleshooting the system using port 85 codes before replacing the system board. Refer to "Troubleshooting the system using port 85 codes (on page 64)" for a list of codes and troubleshooting procedures.

1. Power down the server (on page 16).
2. Remove all media drives ("[Removing a media drive](#)" on page 19) and media drive blanks ("[Removing a media drive blank](#)" on page 19).
3. Remove all hard drives ("[Removing a hot-plug SCSI hard drive](#)" on page 40, "[Removing a hot-plug SAS hard drive](#)" on page 41) and hard drive blanks ("[Removing a hard drive blank](#)" on page 40).
4. Remove all memory boards ("[Removing a memory board](#)" on page 58, "[Removing a memory board \(non-hot-plug\)](#)" on page 57) and memory board blanks.
5. Remove the processor module ("[Removing the processor module](#)" on page 20).
6. Extend or remove the server from the rack ("[Remove the server from the rack](#)" on page 16).
7. Remove the access panel ("[Removing the access panel](#)" on page 17).
8. Remove the media board ("[Removing the media board](#)" on page 37).
9. Remove the SCSI backplane ("[Removing the SCSI backplane](#)" on page 37).
10. Remove all system fans ("[Replacing hot-plug fans](#)" on page 49).
11. Remove all expansion boards ("[Removing a non-hot-plug expansion board](#)" on page 28, "[Removing a PCI-X Hot Plug expansion board](#)" on page 47).
12. Remove the PCI-X Hot Plug basket ("[Removing the PCI-X Hot Plug basket](#)" on page 28), if installed.
13. Disconnect the cable from the PCI-X Hot Plug mezzanine board, if installed.
14. Remove the system cage ("[Removing the system cage](#)" on page 17).
15. Unlock the latch and open the lever.

- Using the lever, lift the system board slightly, and slide the system board out through the back of the server.



 **IMPORTANT:** If replacing the system board or clearing NVRAM, you must re-enter the server serial number through RBSU ("Re-entering the server serial number and product ID" on page 34).

To replace the component, reverse the removal procedure.

## Re-entering the server serial number and product ID

After you replace the system board, you must re-enter the server serial number and the product ID.

- During the server startup sequence, press the **F9** key to access RBSU.
- Select the **Advanced Options** menu.
- Select **Serial Number**. The following warning is displayed:  
Warning: The serial number should **ONLY** be modified by qualified service personnel. This value should always match the serial number located on the chassis.
- Press the **Enter** key to clear the warning.
- Enter the serial number.
- Select **Product ID**. The following warning is displayed.  
Warning: The Product ID should **ONLY** be modified by qualified service personnel. This value should always match the Product ID located on the chassis.
- Enter the product ID and press the **Enter** key.
- Press the **Escape** key to close the menu.
- Press the **Escape** key to exit RBSU.

10. Press the **F10** key to confirm exiting RBSU. The server will automatically reboot.

## Removing the system battery

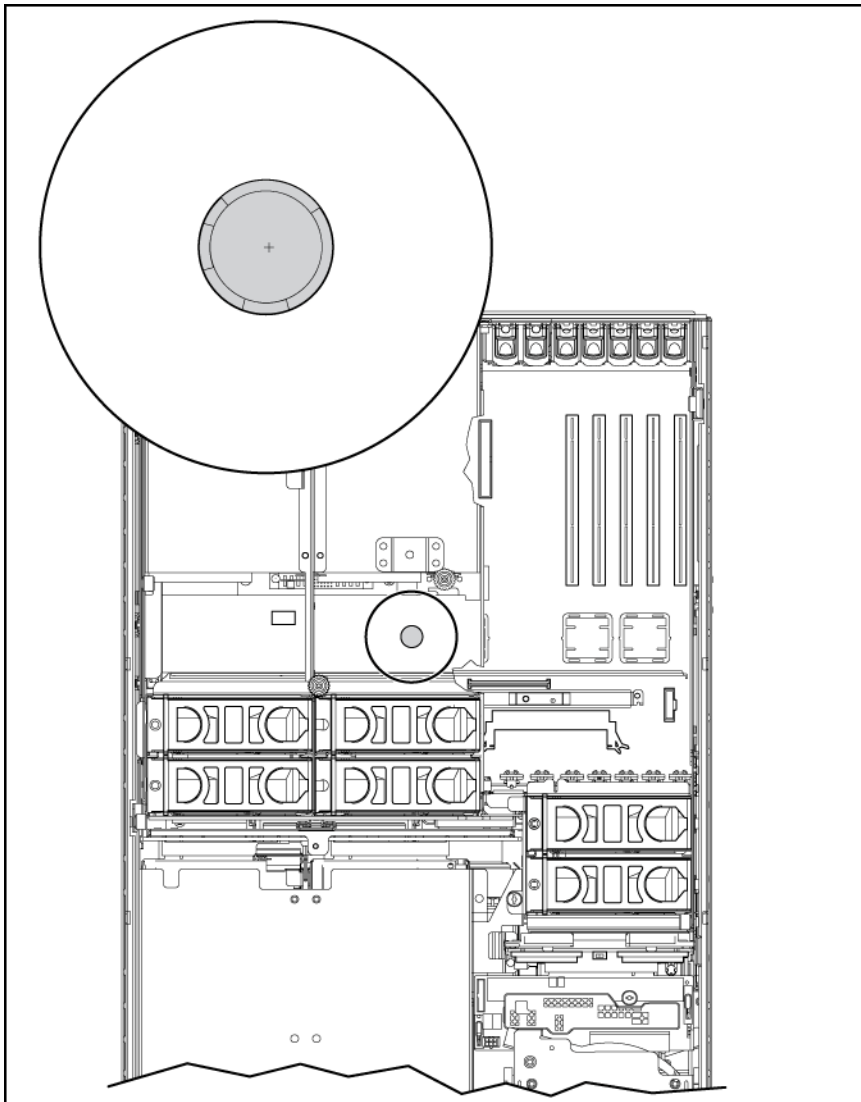
If the server no longer automatically displays the correct date and time, you might need to replace the battery that provides power to the real-time clock. Under normal use, battery life is five to 10 years.

**⚠ WARNING: The computer contains an internal lithium manganese dioxide, a vanadium pentoxide, or an alkaline battery pack. A risk of fire and burns exists if the battery pack is not properly handled. To reduce the risk of personal injury:**

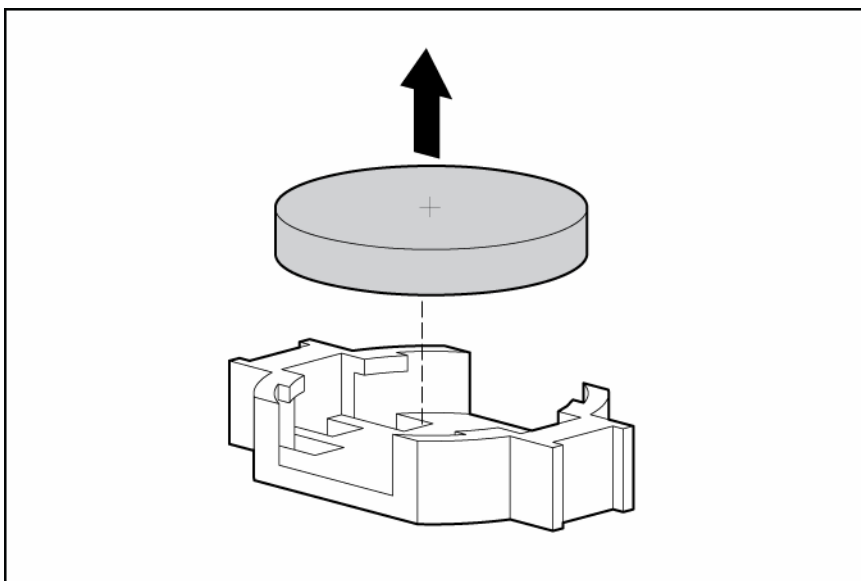
- **Do not attempt to recharge the battery.**
- **Do not expose the battery to temperatures higher than 60°C (140°F).**
- **Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.**
- **Replace only with the spare designated for this product.**

1. Power down the server (on page 16).
2. Extend or remove the server from the rack ("[Remove the server from the rack](#)" on page 16).
3. Remove the access panel ("[Removing the access panel](#)" on page 17).

4. Locate the battery.



5. Remove the battery.

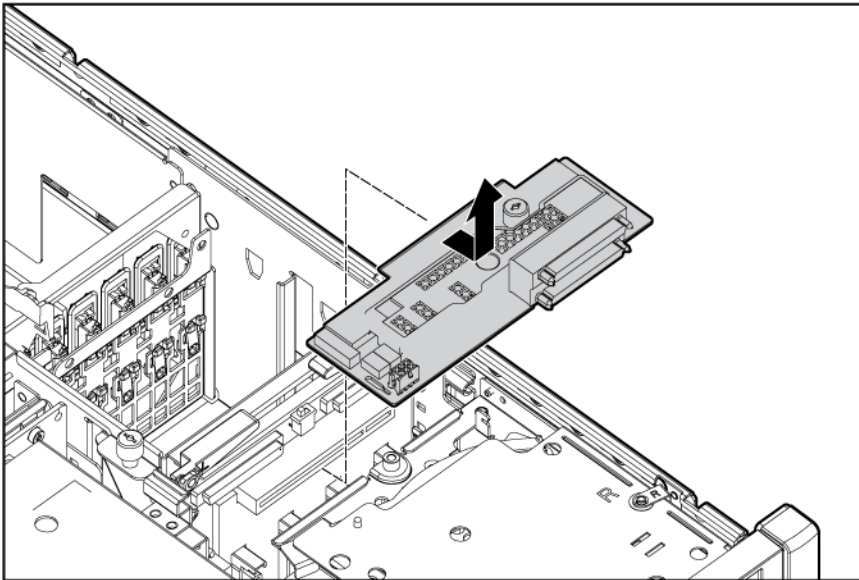


To replace the component, reverse the removal procedure.

Run RBSU to configure the server after replacing the battery. Refer to the *HP ROM-Based Setup Utility User Guide* on the Documentation CD for more detailed information.

## Removing the media board

1. Power down the server (on page 16).
2. Extend the server from the rack, if applicable ("[Extending the server from the rack](#)" on page 15).
3. Remove the access panel ("[Removing the access panel](#)" on page 17).
4. Remove all media drives ("[Removing a media drive](#)" on page 19) and media drive blanks ("[Removing a media drive blank](#)" on page 19).
5. Disconnect all cabling from the media board.
6. Loosen the thumbscrew, and slide the media board toward the front of the server to disconnect it from the SCSI backplane.
7. Remove the media board.

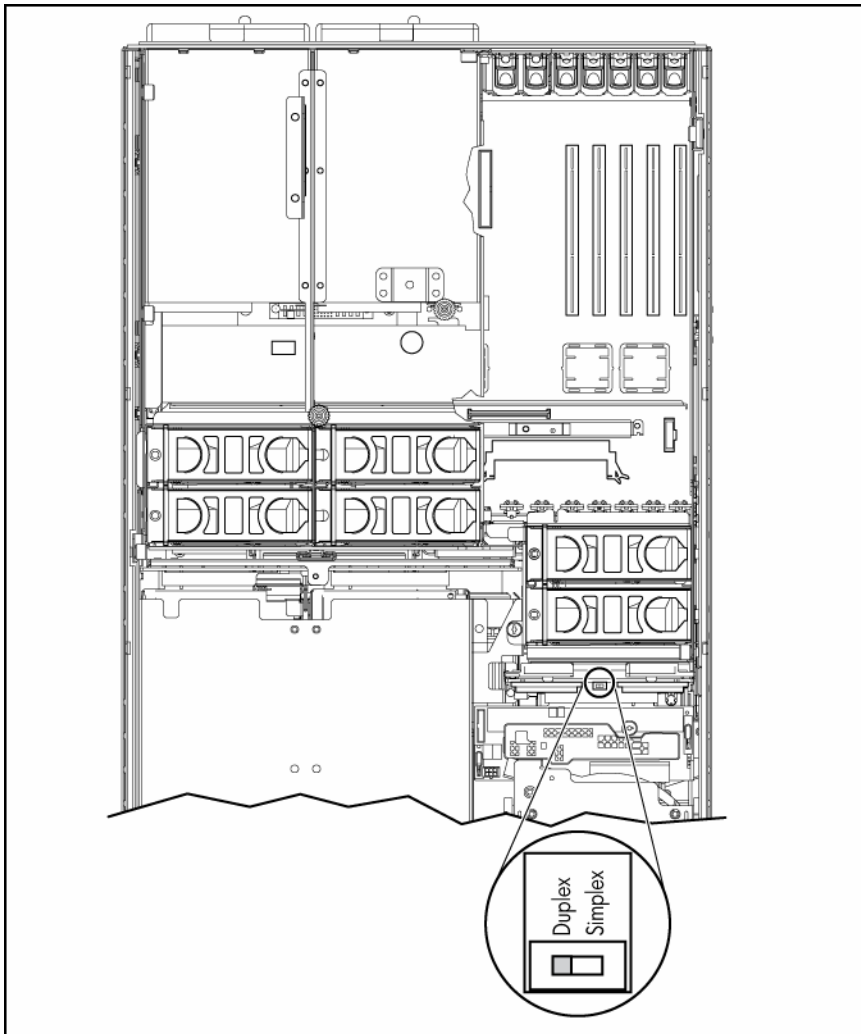


To replace the component, reverse the removal procedure.

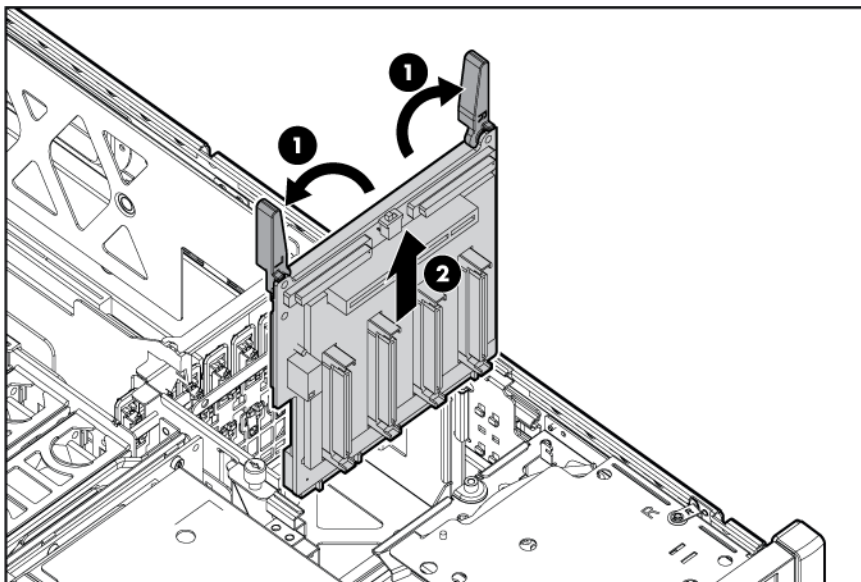
## Removing the SCSI backplane


1. Power down the server (on page 16).
2. Remove all media drives ("[Removing a media drive](#)" on page 19) and media drive blanks ("[Removing a media drive blank](#)" on page 19).
3. Remove all hard drives ("[Removing a hot-plug SCSI hard drive](#)" on page 40, "[Removing a hot-plug SAS hard drive](#)" on page 41) and hard drive blanks ("[Removing a hard drive blank](#)" on page 40).
4. Extend the server from the rack, if applicable ("[Extending the server from the rack](#)" on page 15).
5. Remove the access panel ("[Removing the access panel](#)" on page 17).
6. Disconnect all cables from the SCSI backplane.
7. Remove the media board ("[Removing the media board](#)" on page 37).

8. Record the position of the SCSI simplex/duplex switch.



9. Lift the levers, and pull the SCSI backplane out of the server.




 **IMPORTANT:** Be sure to set the SCSI simplex/duplex switch to the appropriate setting when replacing the SCSI backplane.

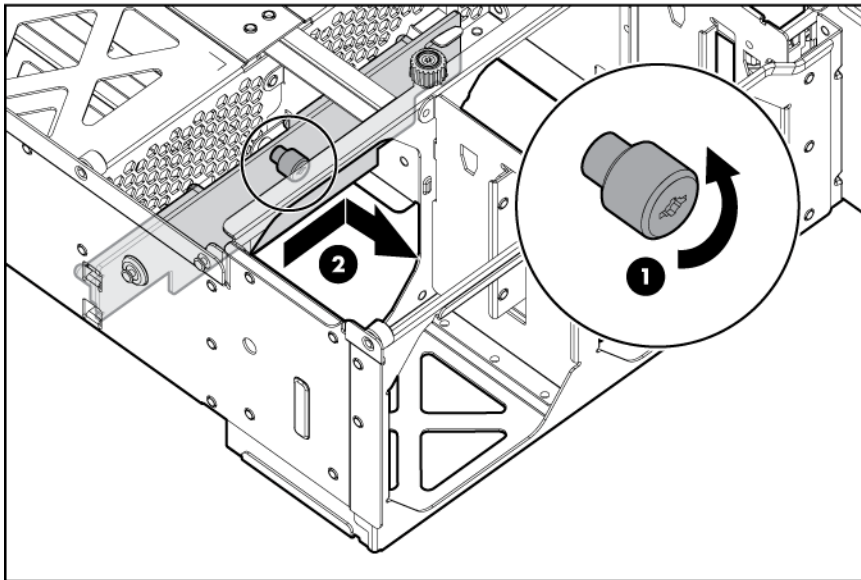
To replace the component, reverse the removal procedure.

## Removing the power backplane

1. Power down the server (on page 16).
2. Remove all power supplies ("Removing a redundant hot-plug power supply" on page 48) and power supply blanks ("Removing a power supply blank" on page 48).

 **NOTE:** If you remove or replace the primary hot-plug power supply, use the T-15 Torx screwdriver provided with the server to remove the shipping screw. It is located just under the port-colored plastic handle of the power supply unit.

3. Extend or remove the server from the rack ("Remove the server from the rack" on page 16).
4. Remove the access panel ("Removing the access panel" on page 17).
5. Remove the system cage ("Removing the system cage" on page 17).
6. Loosen the thumbscrew, and remove the power backplane from the server.

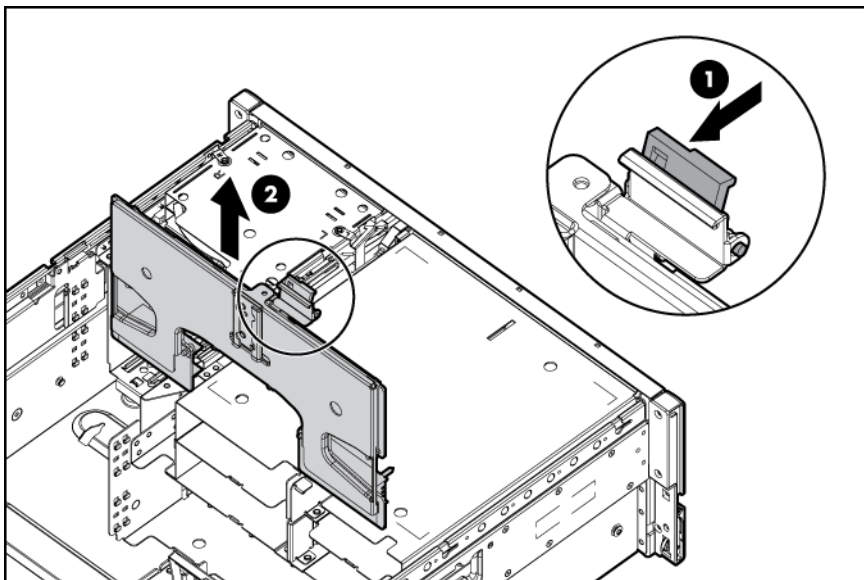


To replace the component, reverse the removal procedure.

## Removing the memory backplane

1. Power down the server (on page 16).
2. Remove all memory boards ("Removing a memory board" on page 58, "Removing a memory board (non-hot-plug)" on page 57).
3. Remove the processor module ("Removing the processor module" on page 20).
4. Extend or remove the server from the rack ("Remove the server from the rack" on page 16).
5. Remove the access panel ("Removing the access panel" on page 17).

6. Open the latch, and lift the memory backplane from the server.

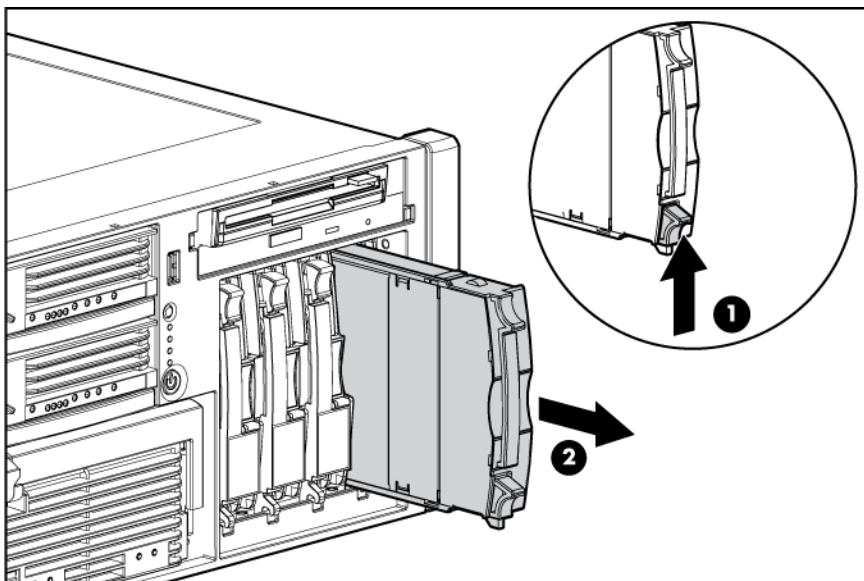


To replace the component, reverse the removal procedure.

## Removing a hard drive blank

- CAUTION:** To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

Remove the hard drive blank by squeezing the release buttons, and pulling the blank from the server.



To replace the component, reverse the removal procedure.

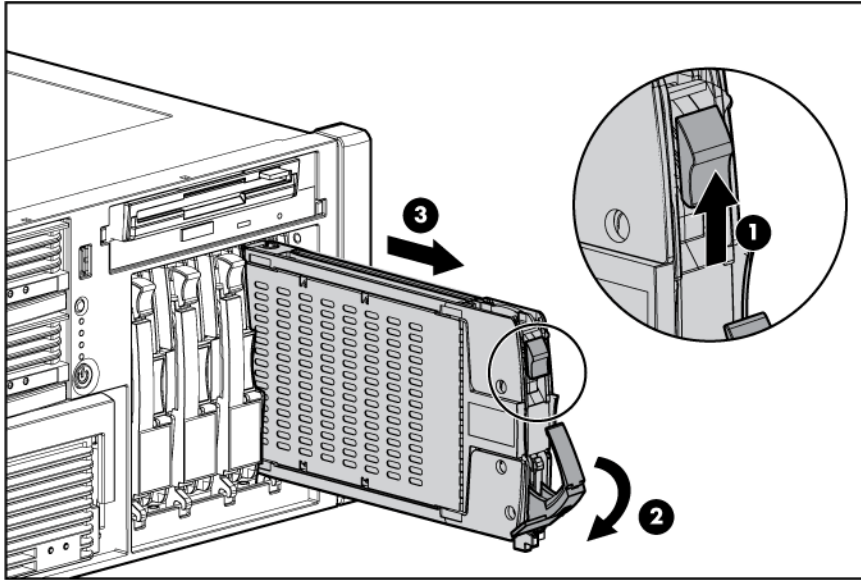
## Removing a hot-plug SCSI hard drive

- CAUTION:** Always power down the server if the boot partition resides on the drive you are replacing or if you are replacing the only drive in the server.



**△ CAUTION:** To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

1. Determine the status of the hard drive from the hot-plug hard drive LEDs ("Hot-plug SCSI hard drive LEDs" on page 82, "SATA or SAS hard drive LEDs" on page 84).
2. Back up all server data on the hard drive to be removed.
3. Remove the hard drive.



To replace the component, reverse the removal procedure.

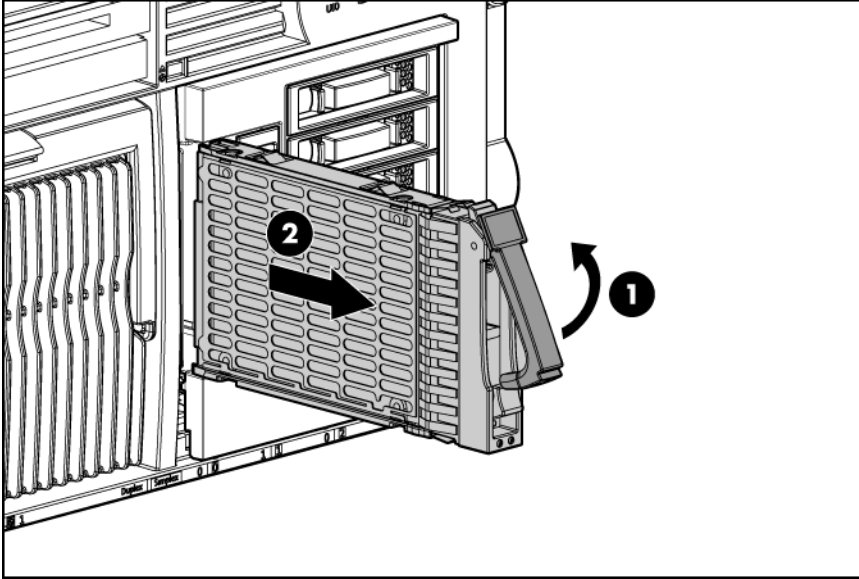
## Removing a hot-plug SAS hard drive

**△ CAUTION:** Always power down the server if the boot partition resides on the drive you are replacing or if you are replacing the only drive in the server.

**△ CAUTION:** To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

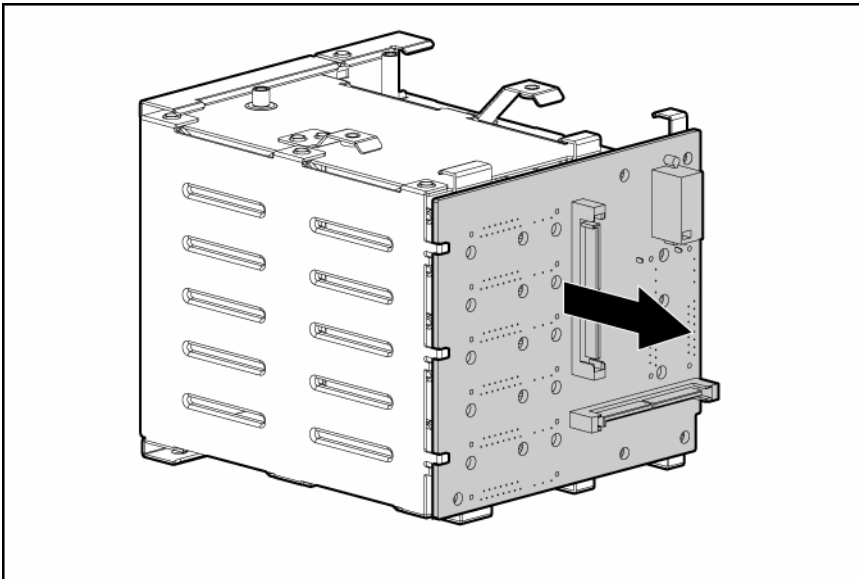
1. Determine the status of the hard drive from the hot-plug hard drive LEDs ("SAS and SATA hard drive LED combinations" on page 84).
2. Back up all server data on the hard drive to be removed.

3. Remove the hard drive.



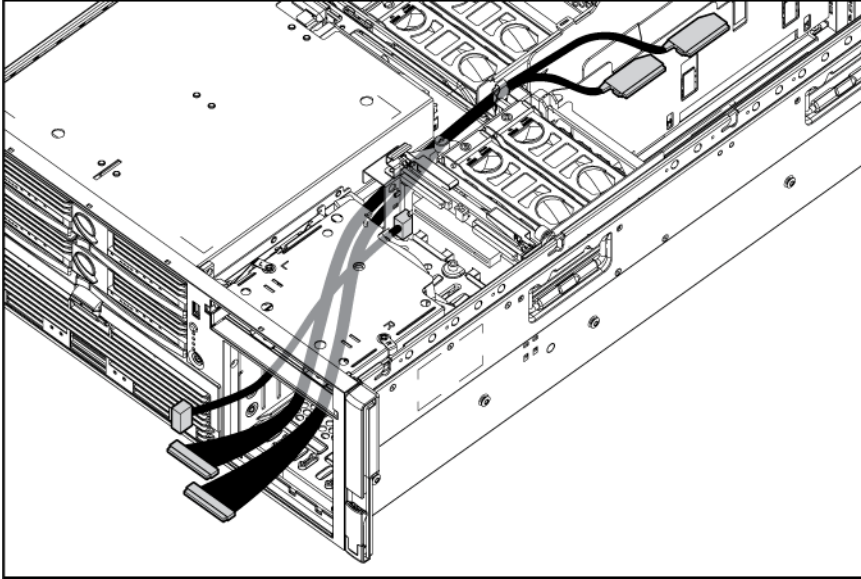
## Removing the SAS-SATA hard drive cage

1. Power down the server (on page 16).
2. Remove the access panel ("Removing the access panel" on page 17).
3. Remove all hard drives ("Removing a hot-plug SAS hard drive" on page 41) and hard drive blanks ("Removing a hard drive blank" on page 40).
4. Remove the screws securing the SAS hard drive cage.



5. Slowly pull the SAS hard drive cage out of the server until there is enough room to reach behind the SAS hard drive cage.
6. Disconnect all cables from the back of the SAS hard drive cage.

7. Disconnect and remove the power and SAS cables, if applicable.



To replace the SAS-SATA hard drive cage, perform the following procedures:

**CAUTION:** The power transfer board is only installed in the HP ProLiant DL585 Server. Installing the power transfer board in the HP ProLiant DL580 Generation 3 Server might damage the board and server components.

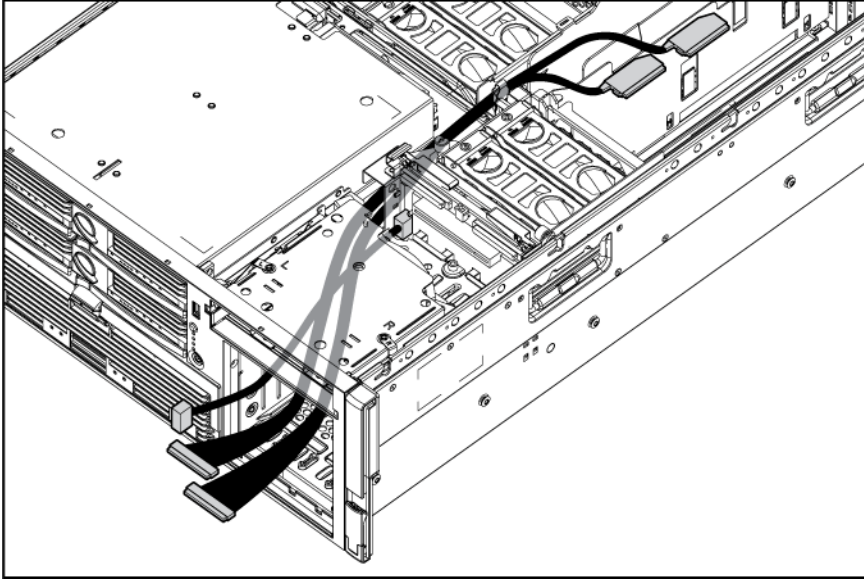


**NOTE:** You must provide a SAS controller before proceeding with the SAS hard drive cage installation.

1. Power down the server (on page 16).
2. Remove all hard drives ("[Removing a hot-plug SCSI hard drive](#)" on page 40, "[Removing a hot-plug SAS hard drive](#)" on page 41) and hard drive blanks ("[Removing a hard drive blank](#)" on page 40).
3. Extend the server from the rack ("[Extending the server from the rack](#)" on page 15).
4. Remove the access panel ("[Removing the access panel](#)" on page 17).
5. Install the SAS controller. Refer to the directions provided with the controller for installation instructions.
6. Route and connect the power cable to the power cable connector on the SCSI backplane.

**CAUTION:** When routing cables, always be sure that the cables are not in a position where they can be pinched or crimped.

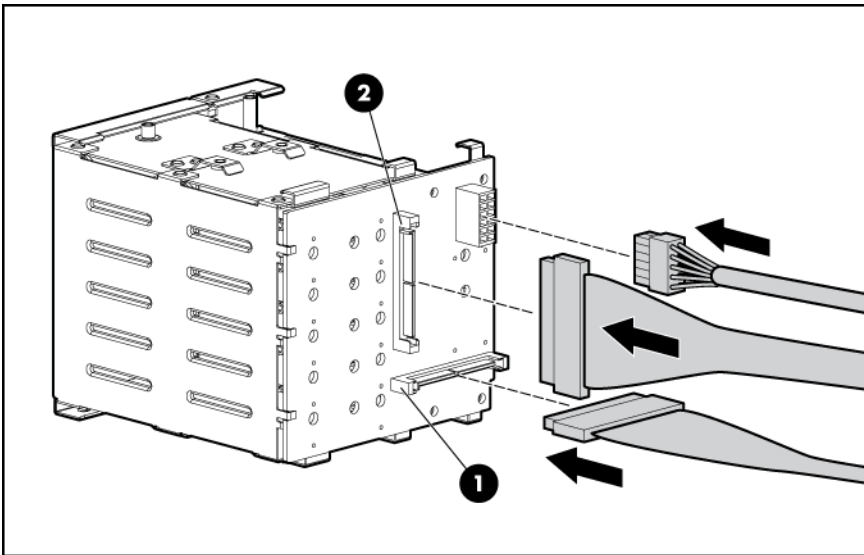
7. Route the SAS cables through the opening near the SCSI backplane and over the center wall.



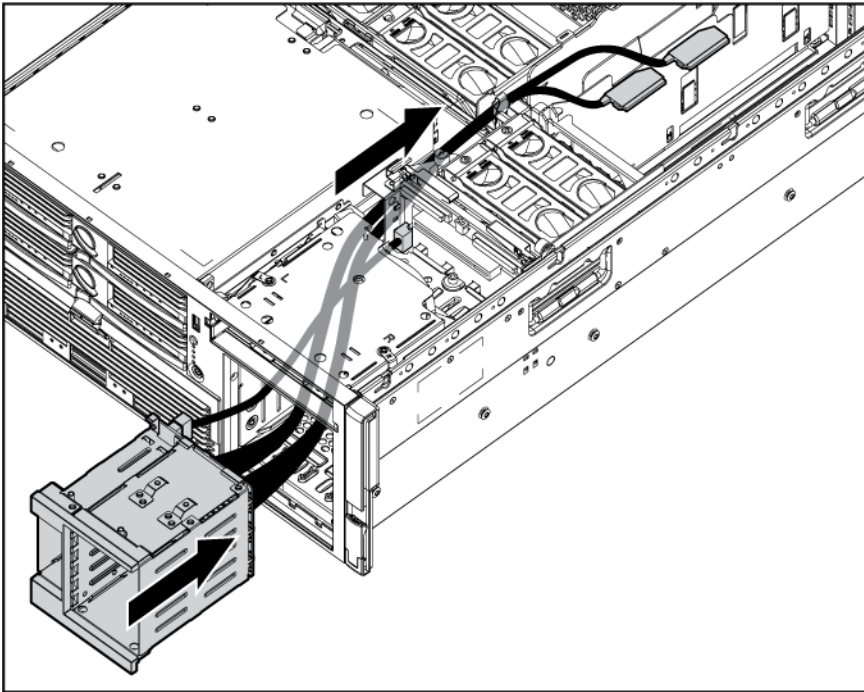
8. Connect the cables to the connectors on the back of the SAS hard drive cage.



**NOTE:** Port 1 supports hard drives 1 through 4. Port 2 supports hard drives 5 through 8. If you are using a single channel SAS controller, connect the cable to port 1.

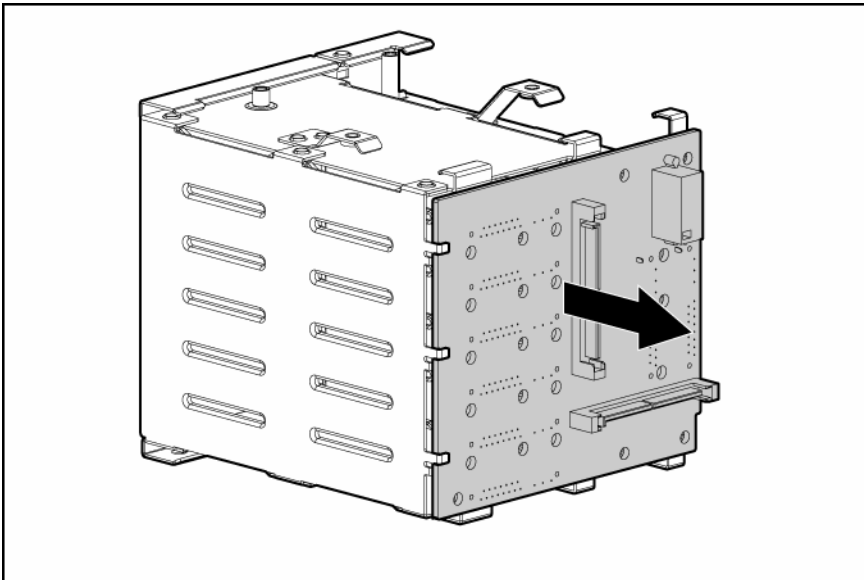


9. Install the SAS hard drive cage, pulling the slack in the SAS cables over the center wall.



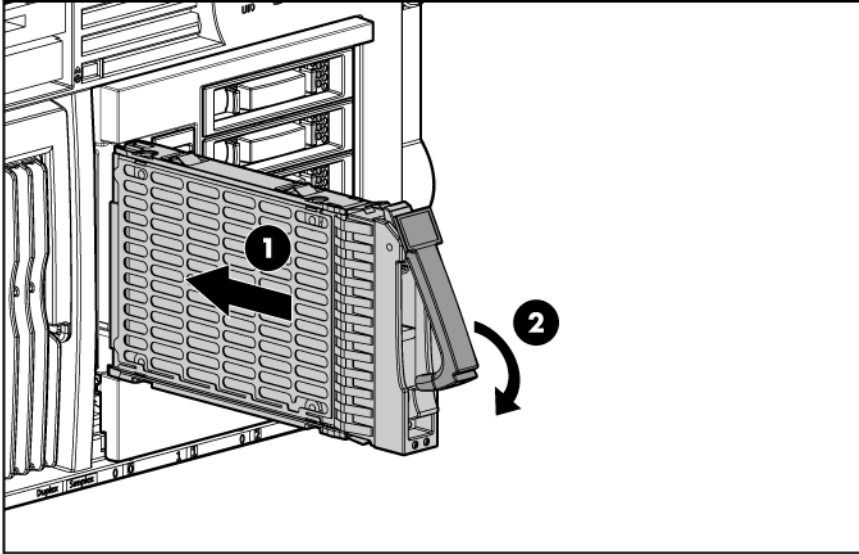
10. Connect the SAS cables to the controller.

11. Secure the SAS hard drive cage with the screws provided in the option kit.



12. Install the hot-plug hard drives or hard drive blanks into the SAS hard drive cage.

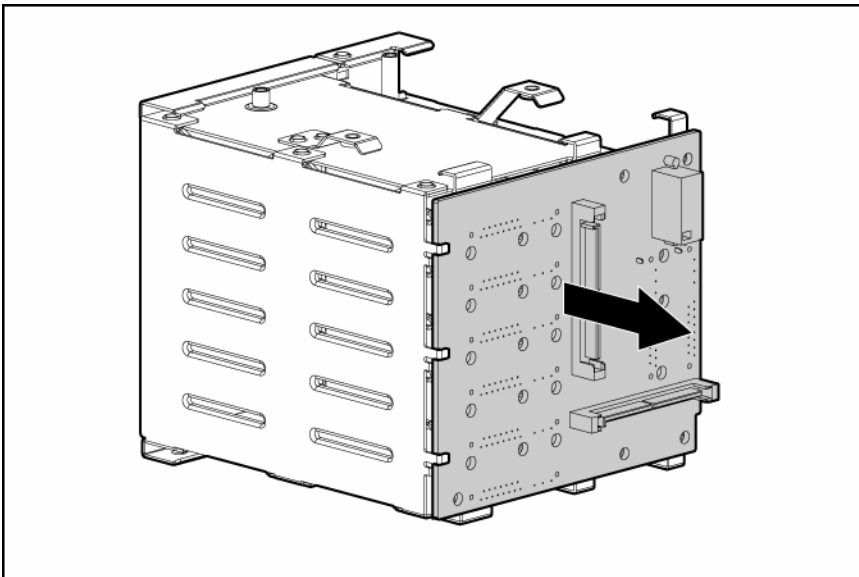
- △ CAUTION:** To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.



The installation is complete.

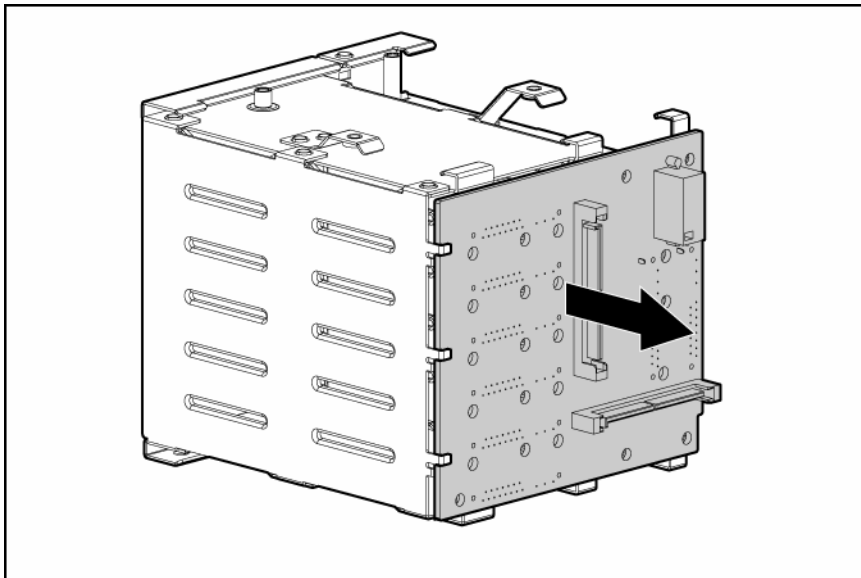
## Removing the SAS-SATA backplane

1. Power down the server (on page 16).
2. Remove the access panel ("[Removing the access panel](#)" on page 17).
3. Remove all hard drives ("[Removing a hot-plug SAS hard drive](#)" on page 41) and hard drive blanks ("[Removing a hard drive blank](#)" on page 40).
4. Remove the screws securing the SAS hard drive cage.



5. Slowly pull the SAS hard drive cage out of the server until there is enough room to reach behind the SAS hard drive cage.
6. Disconnect all cables from the back of the SAS hard drive cage.

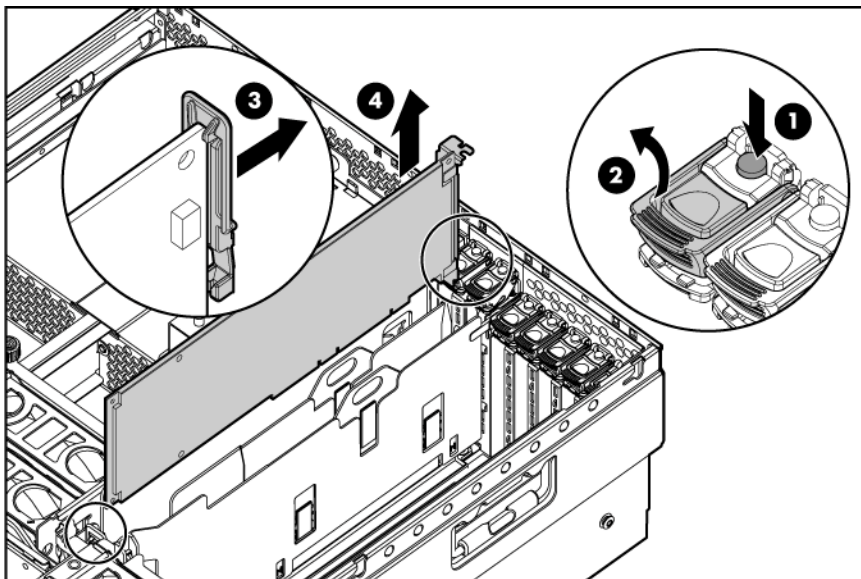
7. Remove the SAS backplane from the rear of the cage.



To replace the component, reverse the removal procedure.

## Removing a PCI-X Hot Plug expansion board


1. Extend or remove the server from the rack ("Remove the server from the rack" on page 16).
2. Remove the access panel ("Removing the access panel" on page 17).
3. Press the PCI-X Hot Plug button to remove power from the slot. When the green power LED on the slot stops flashing, power has been removed from the slot.
4. Unlock the retaining clip (for full-length expansion boards).
5. Lift the latch, and remove the board from the server.



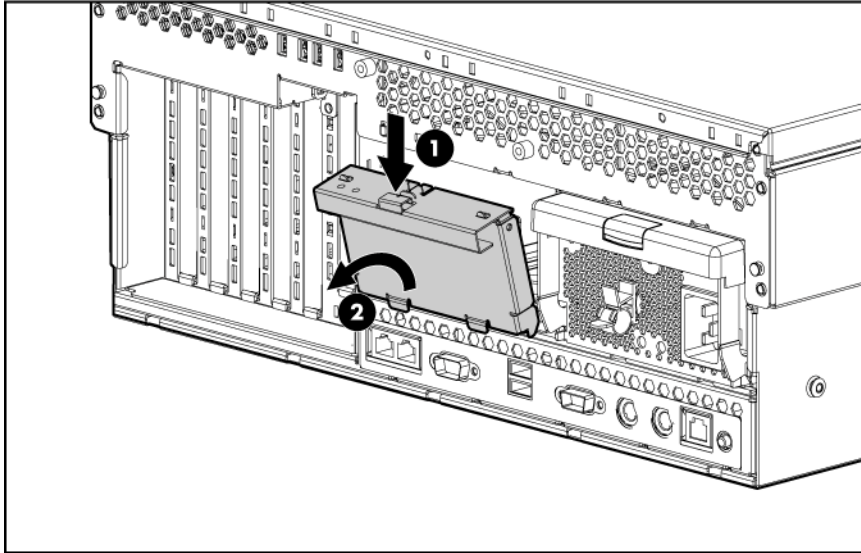
**CAUTION:** To prevent improper cooling and thermal damage, do not operate the server unless all expansion slots have either an expansion slot cover or an expansion board installed.

To replace the component, reverse the removal procedure.

## Removing a power supply blank

 **NOTE:** If you remove or replace the primary hot-plug power supply, use the T-15 Torx screwdriver provided with the server to remove the shipping screw. It is located just under the port-colored plastic handle of the power supply unit.


1. Remove the power supply blank.





To replace the component, reverse the removal procedure.

## Removing a redundant hot-plug power supply


 **WARNING:** To reduce the risk of electric shock, do not disassemble the power supply or attempt to repair it. Replace it only with the specified spare part.

 **CAUTION:** If only one power supply is installed, do not remove the power supply unless the server has been powered down. Removing the only operational power supply will cause an immediate power loss.

 **NOTE:** If you remove or replace the primary hot-plug power supply, use the T-15 Torx screwdriver provided with the server to remove the shipping screw. It is located just under the port-colored plastic handle of the power supply unit.

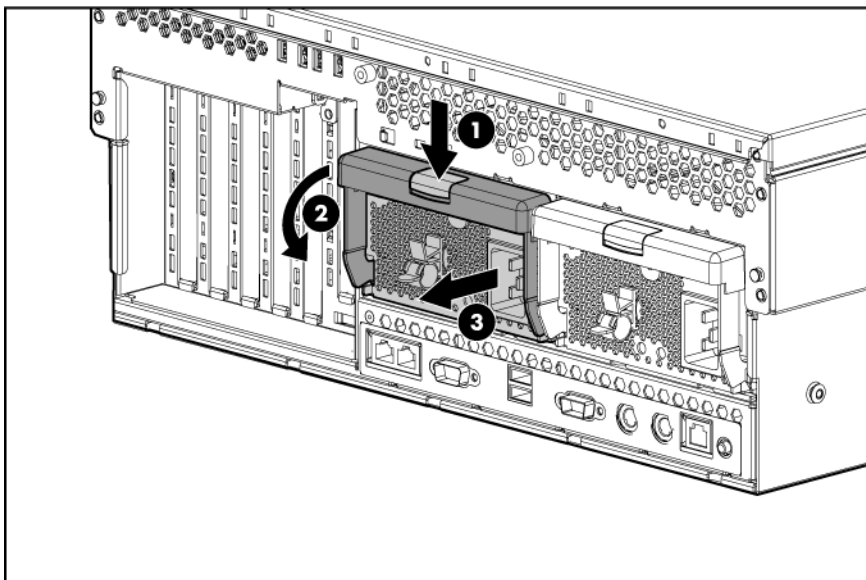
 **NOTE:** Refer to the section "Power supply LEDs (on page 75)" for information on the current status of the hot-plug power supply.

1. Disconnect the power cord from the power supply.
2. Remove the shipping screw, if applicable.

 **NOTE:** If you remove or replace the primary hot-plug power supply, use the T-15 Torx screwdriver provided with the server to remove the shipping screw. It is located just under the port-colored plastic handle of the power supply unit.



3. Remove the hot-plug power supply from the server.



**CAUTION:** To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

To replace the component, reverse the removal procedure.

## Replacing hot-plug fans

The server supports redundant hot-plug fans ("Fan locations" on page 85) to provide proper airflow to the server if a primary fan fails.

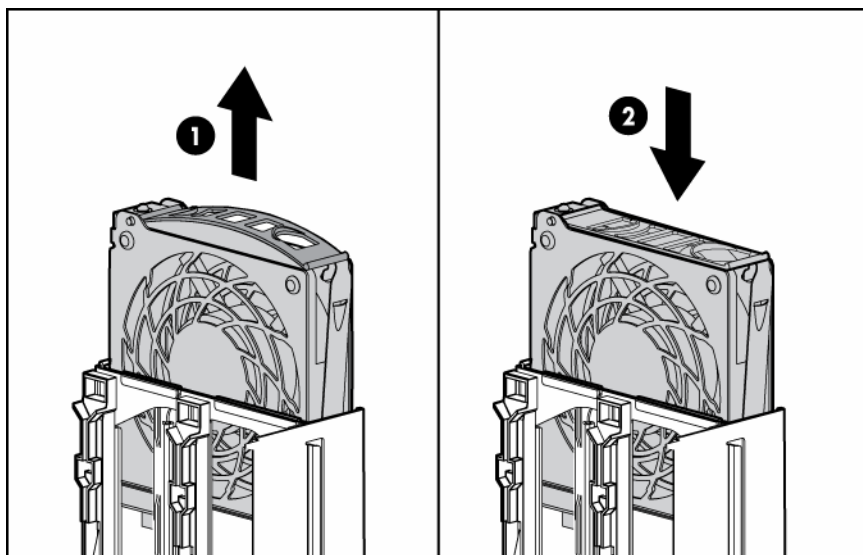
**WARNING:** To prevent personal injury from hazardous energy:

- Remove watches, rings, or other metal objects.
- Use tools with insulated handles.
- Do not place tools or metal parts on top of batteries.

**IMPORTANT:** Remove and replace one fan at a time. If the system detects two fan failures in the same zone, the server shuts down to avoid thermal damage.

1. Extend the server from the rack, if applicable ("Extending the server from the rack" on page 15).
2. Remove the access panel ("Removing the access panel" on page 17).
3. Remove the malfunctioning hot-plug fan from the server.

4. Install the replacement fan.



5. Repeat to replace additional fans as needed.
6. Observe the LED on each installed fan to be sure it is illuminated green ("[Hot-plug fan LEDs](#)" on page 87).
7. Observe the internal system health LED on the front panel to be sure it is illuminated green ("[Front panel LEDs and buttons](#)" on page 69).



**NOTE:** If the front panel internal system health LED is not green after you install hot-plug fans, reseal the hot-plug fan or refer to the troubleshooting section.

## Memory overview

This server supports up to four memory boards. Each memory board contains four DIMM slots for a total of 16 DIMM slots in the server. Memory can be expanded by installing PC2-3200R Registered DDR2 DRAM DIMMs.

The server supports a host of AMP options to optimize server availability:

- Advanced ECC ("[Advanced ECC memory](#)" on page 51)
- Online spare memory (on page 52)
- Hot-plug mirrored memory (dual- and quad-board) ("[Hot-plug mirrored memory](#)" on page 53)
- Hot-plug RAID memory (on page 54)

Hot-plug operations can be hot-add or hot-replace. Hot-add makes additional memory resources available to the operating system. Hot-replace allows failed or degraded DIMMs to be replaced while the server is running.

The maximum supported total memory for this server is 64 GB using four memory boards. The maximum supported memory per memory board is 16 GB using four 4-GB DIMMs.

For an overview of single- and dual-rank DIMMs, refer to "[Single- and dual-rank DIMMs](#) (on page 51)."

For DIMM slot locations and bank assignments, refer to "[DIMM slot locations](#) (on page 80)."

## General memory configuration requirements

The following configuration requirements apply regardless of the AMP mode.

- DIMMs must be installed in pairs.
- DIMM pairs within a memory bank must contain DIMMs with the same part number.
- Always populate the DIMMs in sequential order per bank: Bank A and then Bank B.
- Always populate the memory boards in sequential order: Board 1, Board 2, Board 3, and Board 4. Any deviation from this requirement results in the server defaulting to Advanced ECC ("[Advanced ECC memory](#)" on page 51) on the next reboot.
- Dual-rank DIMMs ("[Single- and dual-rank DIMMs](#)" on page 51) must be populated before single-rank DIMMs (dual-rank DIMMs must be in the lower bank).
- The following table lists all valid combinations of single- and dual-rank DIMM configurations for a memory board. "Single" indicates a bank of single-rank DIMMs. "Dual" indicates a bank of dual-rank DIMMs.



**NOTE:** A bank contains two DIMMs.

Configuration	Bank A	Bank B
1	Single	—
2	Single	Single
3	Dual	—
4	Dual	Single
5	Dual	Dual

- The server can be configured for any AMP mode in RBSU. RBSU displays a warning message if the selected AMP mode is not supported by the current DIMM configuration. However, if the DIMM configuration at POST does not match the AMP mode selected in RBSU, the server defaults to Advanced ECC ("[Advanced ECC memory](#)" on page 51). When this occurs, a message displays during POST and the status LED for the configured AMP mode flashes amber.
- Unpopulated memory boards (those without any installed DIMMs) can be installed in the server for storing extra memory boards.
- If your server contains more than 4 GB of memory, consult your operating system documentation for additional requirements.

## Single- and dual-rank DIMMs

PC2-3200 DIMMs can either be single- or dual-rank. While it is not normally important for you to differentiate between these two types of DIMMs, certain DIMM configuration requirements are based on these classifications.

Certain configuration requirements exist with single- and dual-rank DIMMs that allow the architecture to optimize performance. A dual-rank DIMM is similar to having two separate DIMMs on the same module. Although only a single DIMM module, a dual-rank DIMM acts as if it were two separate DIMMs. The primary reason for the existence of dual-rank DIMMs is to provide the largest capacity DIMM given the current DIMM technology. If the maximum DIMM technology allows for creating 2-GB single-rank DIMMs, a dual-rank DIMM using the same technology would be 4-GB.

## Advanced ECC memory

Advanced ECC is the default memory protection mode for this server. In Advanced ECC, the server is protected against correctable memory errors. The server will provide notification if the level of correctable errors exceeds a predefined threshold rate. The server does not fail because of correctable memory errors.

Advanced ECC provides additional protection over Standard ECC in that it is possible to correct certain memory errors that would otherwise be uncorrectable and result in a server failure. Whereas Standard

ECC can correct single-bit memory errors, Advanced ECC can correct single-bit memory errors and multi-bit memory errors if all failed bits are on the same DRAM device on the DIMM.

The following guidelines apply to Advanced ECC memory:

- All general memory requirements apply.
- Advanced ECC mode is supported with one to four memory boards.
- Board insertions do not convert the AMP mode while the server is running. A server cannot be converted from Advanced ECC to another AMP mode by inserting a board while the server is running. Board insertions in Advanced ECC are solely for making additional memory resources available to the operating system.
- Advanced ECC is the only mode in which hot-add operations are supported, and is the only mode in which the amount of memory available to the operating system can be increased without a reboot.
- If a memory board (which contains DIMMs) is unlocked while in Advanced ECC mode, audio alarms and visual alerts occur.

The following rules apply to hot-add operations. Hot-add is performed by adding a memory board while the server is running, and the additional memory is made available to the operating system without a reboot.

- Boards must be inserted sequentially.
- Multiple hot-add board insertions can be performed one at a time on the same server. For example, if a server has three empty memory board slots, three hot-add board insertions can be performed.
- If multiple hot-add operations are performed, allow one board insertion operation to complete (as indicated by the memory board LEDs ("[Memory board components and LEDs](#)" on page 70) and operating system logs) before inserting another memory board.

**△ CAUTION:** When the memory board locking switch is unlocked in a mode that does not support hot-add or hot-replace capabilities, audio alarms and visual alerts occur. Removing the memory board at this point causes server failure.

To end the audio alarms and visual alerts, move the memory board locking switch back to the locked position. This action does not result in data corruption or server failure.

If removal of a single memory board is required and it is the only memory board, power down the server and make the necessary memory changes.

## Online spare memory

Online spare memory provides a higher level of memory protection than Advanced ECC ("[Advanced ECC memory](#)" on page 51). With online spare memory, the probability of a server failing because of uncorrectable memory errors is reduced.

In this mode, degraded memory that is receiving a high rate of correctable memory errors is automatically disengaged and a replacement set of memory is used in its place. Because DIMMs that are receiving a high rate of correctable memory errors have an increased probability of receiving an uncorrectable memory error (which results in a server failure), the server experiences higher availability. The degraded memory can be replaced during scheduled downtime and poses no additional risk to the server.

Online spare memory is supported with one to four memory boards installed. On this server, each installed memory board is protected by its own spare memory. No operating system support is required.

The following guidelines apply to online spare memory:

- All general memory requirements apply.
- Online spare memory supports 1, 2, 3, or 4 memory boards.
- Each board must have a valid online spare configuration. No dependencies exist for the configuration between different memory boards.

- Each memory board includes its own online spare bank. All boards will operate in online spare memory mode independently. Each board can failover to its online spare bank independent of the other memory boards. Some boards can be in degraded online spare mode while others are still in operational online spare memory mode.
- The minimum valid online spare configuration for a memory board requires at least one bank of dual-rank DIMMs or two banks of single-rank DIMMs. If the server does not meet these requirements, an error message appears during POST and the server defaults to Advanced ECC ("[Advanced ECC memory](#)" on page 51).
- The server automatically configures the optimal online spare solution.
- Hot-plug operations are not supported.

HP recommends the following configurations. These configurations result in optimal use of memory. Other configurations are valid, but do not result in the maximum amount of installed memory being available to the operating system.

- If only single-rank DIMMs are used on a memory board, all DIMMs should be of the same size on that memory board.
- If only dual-rank DIMMs are used on a memory board, all DIMMs should be of the same size on that memory board.
- If a mixture of single- and dual-rank DIMMs are used on a memory board, the dual-rank DIMMs should be twice the size of any single-rank DIMM.

After installing DIMMs, use RBSU to configure the server ("[Configuring the memory](#)" on page 55) for online spare memory support.

## Hot-plug mirrored memory

Hot-plug mirrored memory provides a higher level of memory protection than either Advanced ECC ("[Advanced ECC memory](#)" on page 51) or online spare memory (on page 52). With hot-plug mirrored memory, the server is protected against uncorrectable memory errors that would otherwise result in server failure. Hot-plug mirrored memory allows the server to keep two copies of all memory data on separate memory boards.

If an uncorrectable error is encountered, the proper data is retrieved from the memory board that did not fail. In addition, hot-plug mirrored memory allows failed or degraded DIMMs to be replaced while the server is running without requiring server downtime. The memory board with the failed DIMMs can be removed, failed DIMMs replaced, and the board re-inserted into the server without any interruption to the operating system.

Hot-plug mirrored memory is supported with either two or four memory boards installed. No operating system support is required.

Hot-plug mirrored memory has two configurations: dual-board and quad-board. Single-board mirrored memory is not supported. For either mode, choose "Mirrored Memory with Advanced ECC" in RBSU.

The following guidelines apply to hot-plug mirrored memory:

- All general memory requirements apply.
- Hot-plug mirrored memory is supported with two or four memory boards.
- Memory boards 1 and 2 are populated for dual-board hot-plug mirrored memory. Boards 1, 2, 3, and 4 are populated for quad-board hot-plug mirrored memory. Any deviation from these guidelines results in the server defaulting to Advanced ECC ("[Advanced ECC memory](#)" on page 51).
- Memory boards 1 and 2 form a mirrored pair for dual-board hot-plug mirrored memory. For quad-board hot-plug mirrored memory, memory boards 3 and 4 also form a mirrored pair.
- Memory boards within a mirrored pair must have the same amount of total memory. However, each board of the mirrored pair may have different DIMM configurations as long as they have equal total

size. For example, memory boards 1 and 2 could each contain 2 GB of physical memory per board with board 1 containing two 1-GB DIMMs and board 2 containing four 512-MB DIMMs.

- The amount of memory between mirrored pairs can be different in quad-board Hot-Plug Mirrored Memory mode. For example, memory pair 1 (boards 1 and 2) can contain 2 GB each while memory pair 2 (boards 3 and 4) contain 4 GB each.
- In quad-board hot-plug mirrored memory, the two pairs of memory boards operate independently. One of the pairs of memory boards can be degraded while the other pair of memory boards can still be fully mirrored.
- Hot-add operations are not supported. Board removals and insertions in Hot-Plug Mirrored Memory mode are solely for the purpose of hot-replace operations.
- For hot-replace to function properly, the memory board must be re-inserted into the location from which it was removed. If the board is placed into the incorrect slot (for example, if board 2 is removed in dual-board mode and re-inserted into memory slots 3 or 4), a configuration error occurs. Attempting to insert a board into the improper position results in audio alarms and visual alerts.
- Replace only one board at a time. That is, if memory boards 2 and 4 both contain memory errors, remove board 2, correct the error, and replace board 2. Wait for the board status LED to stop flashing before proceeding to board 4.
- If a board is inserted into a valid memory slot but with an invalid DIMM configuration (including too much or too little memory), a DIMM configuration error occurs and a visual alert occurs (refer to Memory Board Components and LEDs (on page 70)).
- If you remove a board while the server is running and do not replace the board, the server defaults to Advanced ECC ("[Advanced ECC memory](#)" on page 51) on the next reboot.

## Hot-plug RAID memory

Hot-plug RAID memory provides a similar level of memory protection as hot-plug mirrored memory (on page 53) but obtains this protection using less total memory. Hot-plug RAID memory protects the server against uncorrectable memory errors that would otherwise result in a server failure.

Although hot-plug mirrored memory keeps two copies of all memory data, hot-plug RAID memory keeps only one copy of all memory data and additional parity information. If an uncorrectable memory error is encountered, the server can create the proper data using the parity information and the information from the other memory boards that contain no failures. In a hot-plug RAID memory configuration, 25% of the installed memory is not available to the operating system. In a hot-plug mirrored memory configuration, however, 50% of the installed memory is not available to the operating system.

As with hot-plug mirrored memory, hot-plug RAID memory allows failed or degraded DIMMs to be replaced while the server is running without requiring server downtime. The memory board with the failed DIMMs can be removed, failed DIMMs replaced, and the board re-inserted into the server without any interruption to the operating system.

Hot-plug RAID memory is only supported if all four memory boards are installed. No operating system support is required.

The following guidelines apply to hot-plug RAID memory:

- All general memory requirements apply.
- Hot-plug RAID memory is only supported with four memory boards.
- All four memory boards must have the same amount of total memory. However, each board can have different DIMM configurations as long as they have equal total size. Any deviation from this rule results in the server defaulting to Advanced ECC ("[Advanced ECC memory](#)" on page 51).
- Hot-replace operations are supported.
- If you remove a board while the server is running and do not replace it, the server defaults to Advanced ECC on the next reboot.

## Configuring the memory

Configuring the memory system of the server requires configuring both hardware and software.

To configure the memory:

1. Install the correct amount of memory for the desired AMP mode. For a list of AMP options, refer to "Memory options ("[Memory overview](#)" on page 50)." For more information, refer to "General memory configuration requirements (on page 50)."
2. Test the DIMMs for all AMP modes, except Advanced ECC, before configuring the AMP mode in RBSU. The two testing methods are:
  - POST memory test (on page 55)
  - ROM-Based Diagnostics test ("[ROM-based diagnostics](#)" on page 55)



**NOTE:** If the total amount of memory has changed, the POST memory test will run automatically. Additional memory testing is not necessary.

3. Select the AMP mode ("[Selecting the AMP mode](#)" on page 55).

### POST memory test

1. Power on the server.
2. Press the **F9** key, when prompted, to enter RBSU.
3. Select **Advanced Options**.
4. Change POST Speed Up to **Disable**.
5. Press any key to return to the RBSU main menu.
6. Press the **F10** key, when prompted, to exit RBSU. The server reboots and tests all memory in the system.
7. Once the memory has been tested, re-enable POST Speed Up for faster system boot, if desired.

### ROM-based diagnostics

1. Power up the server.
2. Press the **F10** key, when prompted, to enter the System Maintenance menu.
3. Select **Diagnostics**.
4. Run the **Memory Diagnostics**.
5. After the memory has been tested, exit the utility and reboot.
6. Select the AMP mode ("[Selecting the AMP mode](#)" on page 55).

### Selecting the AMP mode

1. Upon reboot, press the **F9** key, when prompted, to enter RBSU.
2. Select **System Options**.
3. Select **Advanced Memory Protection**.
4. Select the desired memory mode.
  - Advanced ECC (hot-add enabled)
  - Advanced ECC (hot-add disabled)
  - Online Spare Memory with Advanced ECC
  - Hot-Plug Mirrored Memory with Advanced ECC
  - Hot-Plug RAID Memory with Advanced ECC

5. Press the **Escape** key twice to go back to the main RBSU menu.
6. Press the **F10** key, when prompted, to exit RBSU. The server reboots and tests all memory in the system.



**IMPORTANT:** To reconfigure the memory mode after initial setup, you must reboot the system, enter RBSU, and select an AMP mode.

## Memory boards and DIMMs

Memory board and DIMM removal and replacement procedures can be either hot-replace or non-hot-plug, depending on how the server is configured. Hot-replace enables failed or degraded DIMMs to be replaced while the server is running, and has no operating system requirements.

When the server is configured for hot-plug mirrored memory or hot-plug RAID memory, you can perform a hot-replacement procedure without powering down the server or experiencing server downtime:

1. Remove a memory board ("[Removing a memory board](#)" on page 58, "[Removing a memory board \(non-hot-plug\)](#)" on page 57).
2. Replace failed or degraded DIMMs ("[Removing DIMMs](#)" on page 59).
3. Reinstall the memory board in the slot from which it was removed.

The replacement procedures in this section apply to both hot-replace and non-hot-plug memory procedures, except as noted.



**IMPORTANT:** Be sure to power down the server when performing board removal procedures in a server that is not configured for Advanced ECC, hot-plug mirrored memory, or hot-plug RAID memory.

Observe the following warnings when performing a hot-plug replacement procedure.



**WARNING:** Always comply with all electrostatic and thermal guidelines to prevent bodily injury and ensure a properly functioning system when performing hot-plug operations.



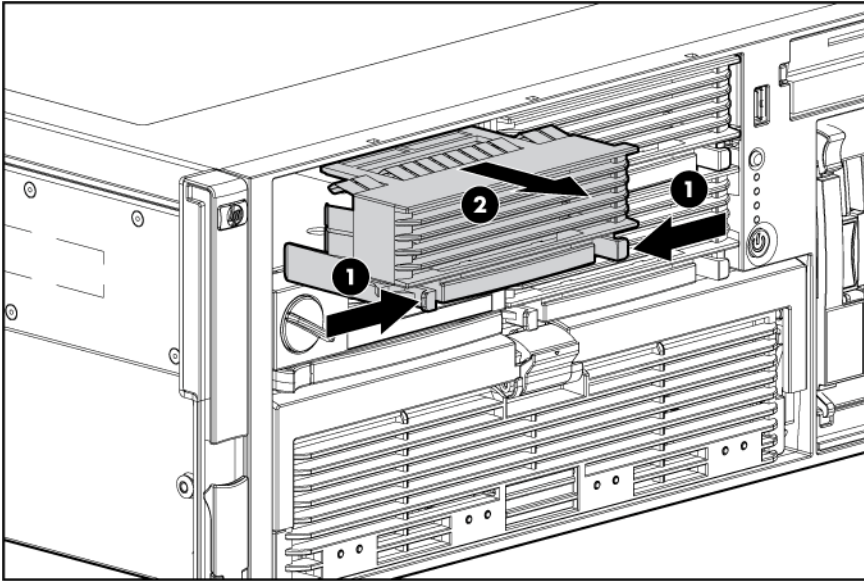
**WARNING:** To prevent personal injury from hazardous energy:

- Remove watches, rings, or other metal objects.
- Use tools with insulated handles.
- Do not place tools or metal parts on top of batteries.



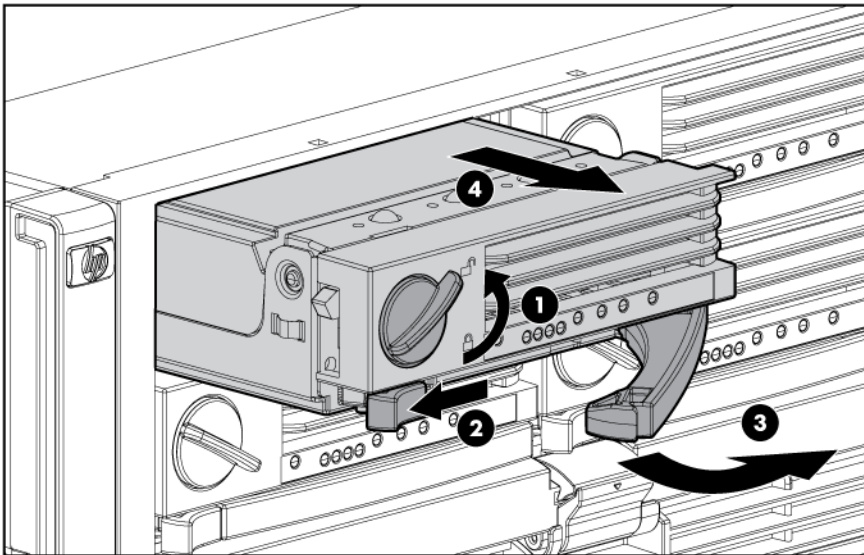
## Removing a memory board blank

To remove the memory board blank, squeeze the levers and pull the blank out of the server.

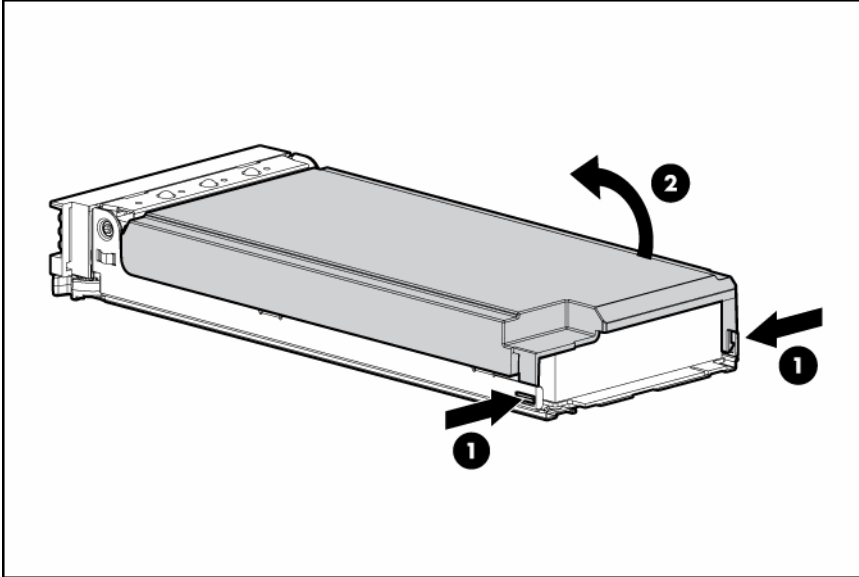


## Removing a memory board (non-hot-plug)

1. Power down the server (on page 16).
2. Unlock the locking switch, and open the release latch.
3. Use the ejector lever to pull the memory board out of the server.



4. Open the memory board.



5. Replace the DIMM ("Removing DIMMs" on page 59).



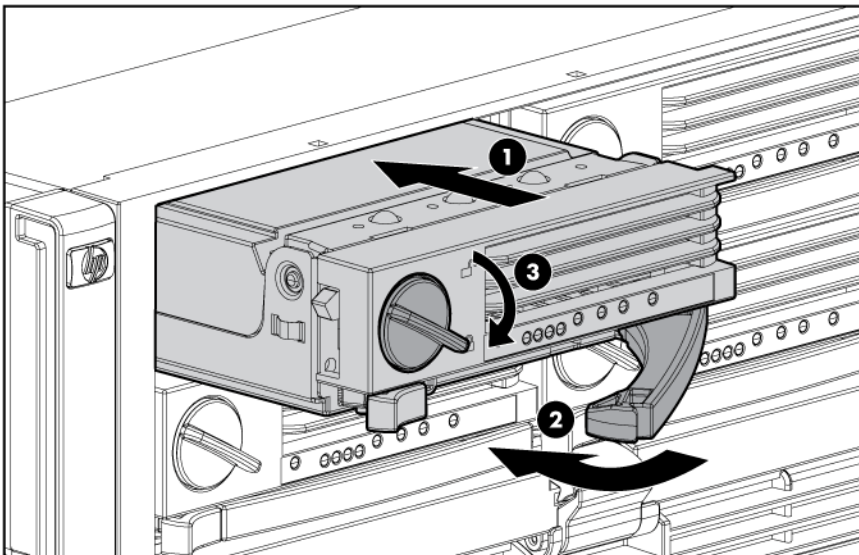
**IMPORTANT:** Be sure to observe all DIMM installation requirements for the desired memory mode.

6. Close the memory board.



**IMPORTANT:** Be sure that the locking switch is unlocked. The memory board will not seat in the server if the locking switch is locked.

7. Install the memory board.



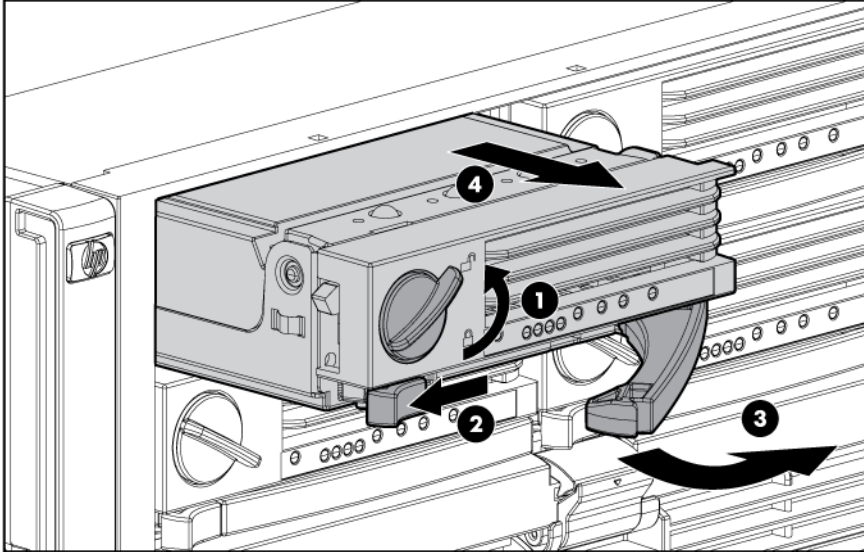
8. Close the ejector lever, and lock the locking switch.
9. Power up the server.
10. Reference the memory board LEDs ("Memory board components and LEDs" on page 70) to be sure that the memory board is functioning properly.

## Removing a memory board

1. Power down the server if the server is not configured for hot-plug RAID memory or hot-plug mirrored memory.

- △ **CAUTION:** Only memory boards with a green Removable LED can be removed. Do not attempt to remove any memory board with the Removable LED off.
- △ **CAUTION:** To prevent system failure, do not remove the memory board from the server until the board status LED stops flashing.

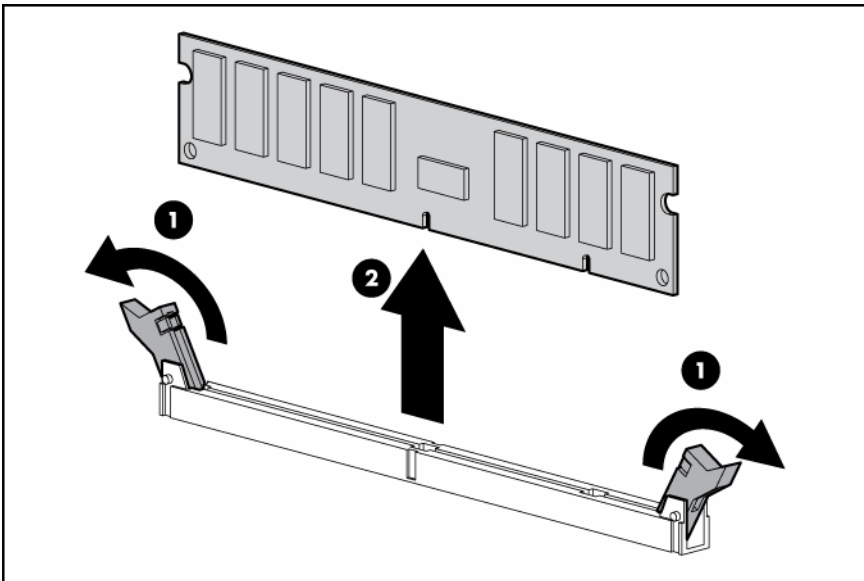
2. Unlock the locking switch, and open the release latch.
3. Use the ejector lever to pull the memory board out of the server.



**NOTE:** While the memory board with the failed or degraded DIMM is being replaced, the server continues to read and write from the operational memory board.

## Removing DIMMs

1. Remove the memory board using the appropriate hot-replace or non-hot-plug procedure ("[Removing a memory board \(non-hot-plug\)](#)" on page 57).
2. Remove the DIMM.



To replace the component, reverse the removal procedure.

---

# Diagnostic tools

## In this section

SmartStart software .....	60
SmartStart Scripting Toolkit.....	60
HP Instant Support Enterprise Edition .....	61
Option ROM Configuration for Arrays.....	61
HP ROM-Based Setup Utility .....	61
ROMPq utility.....	62
System Online ROM flash component utility.....	62
Integrated Management Log.....	62
Integrated Lights-Out technology .....	63
Automatic Server Recovery .....	63
HP Systems Insight Manager.....	63
HP Insight Diagnostics.....	63
USB support .....	64
Troubleshooting the system using port 85 codes.....	64

## SmartStart software

SmartStart is a collection of software that optimizes single-server setup, providing a simple and consistent way to deploy server configuration. SmartStart has been tested on many ProLiant server products, resulting in proven, reliable configurations.

SmartStart assists the deployment process by performing a wide range of configuration activities, including:

- Configuring hardware using embedded configuration utilities, such as RBSU and ORCA
- Preparing the system for installing "off-the-shelf" versions of leading operating system software
- Installing optimized server drivers, management agents, and utilities automatically with every assisted installation
- Testing server hardware using the Insight Diagnostics Utility ("[HP Insight Diagnostics](#)" on page [63](#))
- Installing software drivers directly from the CD. With systems that have internet connection, the SmartStart Autorun Menu provides access to a complete list of ProLiant system software.
- Enabling access to the Array Configuration Utility, Array Diagnostic Utility, and Erase Utility

SmartStart is included in the HP ProLiant Essentials Foundation Pack. For more information about SmartStart software, refer to the HP ProLiant Essentials Foundation Pack or the HP website (<http://www.hp.com/servers/smartstart>).

## SmartStart Scripting Toolkit

The SmartStart Scripting Toolkit is a server deployment product that delivers an unattended automated installation for high-volume server deployments. The SmartStart Scripting Toolkit is designed to support

ProLiant BL, ML, and DL servers. The toolkit includes a modular set of utilities and important documentation that describes how to apply these new tools to build an automated server deployment process.

Using SmartStart technology, the Scripting Toolkit provides a flexible way to create standard server configuration scripts. These scripts are used to automate many of the manual steps in the server configuration process. This automated server configuration process cuts time from each server deployed, making it possible to scale server deployments to high volumes in a rapid manner.

For more information, and to download the SmartStart Scripting Toolkit, refer to the HP website (<http://www.hp.com/servers/sstoolkit>).

## HP Instant Support Enterprise Edition

ISEE is a proactive remote monitoring and diagnostic tool to help manage your systems and devices, a feature of HP support. ISEE provides continuous hardware event monitoring and automated notification to identify and prevent potential critical problems. Through remote diagnostic scripts and vital system configuration information collected about your systems, ISEE enables fast restoration of your systems. Install ISEE on your systems to help mitigate risk and prevent potential critical problems.

For more information on ISEE, refer to the HP website ([http://www.hp.com/hps/hardware/hw\\_enterprise.html](http://www.hp.com/hps/hardware/hw_enterprise.html)).

To download HP ISEE, visit the HP website ([http://www.hp.com/hps/hardware/hw\\_downloads.html](http://www.hp.com/hps/hardware/hw_downloads.html)).

For installation information, refer to the HP ISEE Client Installation and Upgrade Guide ([ftp://ftp.hp.com/pub/services/hardware/info/isee\\_client.pdf](ftp://ftp.hp.com/pub/services/hardware/info/isee_client.pdf)).

## Option ROM Configuration for Arrays

Before installing an operating system, you can use the ORCA utility to create the first logical drive, assign RAID levels, and establish online spare configurations.

The utility also provides support for the following functions:

- Reconfiguring one or more logical drives
- Viewing the current logical drive configuration
- Deleting a logical drive configuration
- Setting the controller to be the boot controller

If you do not use the utility, ORCA will default to the standard configuration.

For more information regarding array controller configuration, refer to the controller user guide.

For more information regarding the default configurations that ORCA uses, refer to the *HP ROM-Based Setup Utility User Guide* on the Documentation CD.

## HP ROM-Based Setup Utility

RBSU, an embedded configuration utility, performs a wide range of configuration activities that may include:

- Configuring system devices and installed options
- Displaying system information
- Selecting the primary boot controller
- Configuring memory options
- Language selection

For more information on RBSU, refer to the *HP ROM-Based Setup Utility User Guide* on the Documentation CD or the HP website (<http://www.hp.com/servers/smartstart>).

## ROMPaq utility

Flash ROM enables you to upgrade the firmware (BIOS) with system or option ROMPaq utilities. To upgrade the BIOS, insert a ROMPaq diskette into the diskette drive and boot the system.

The ROMPaq utility checks the system and provides a choice (if more than one exists) of available ROM revisions. This procedure is the same for both system and option ROMPaq utilities.

For more information about the ROMPaq utility, refer to the HP website (<http://www.hp.com/servers/manage>).

## System Online ROM flash component utility

The Online ROM Flash Component Utility enables system administrators to efficiently upgrade system or controller ROM images across a wide range of servers and array controllers. This tool has the following features:

- Works offline and online
- Supports Microsoft® Windows NT®, Windows® 2000, Windows Server™ 2003, Novell Netware, and Linux operating systems



**IMPORTANT:** This utility supports operating systems that may not be supported by the server. For operating systems supported by the server, refer to the HP website (<http://www.hp.com/go/supportos>).

- Integrates with other software maintenance, deployment, and operating system tools
- Automatically checks for hardware, firmware, and operating system dependencies, and installs only the correct ROM upgrades required by each target server

To download the tool and for more information, refer to the HP website (<http://h18000.www1.hp.com/support/files/index.html>).

## Integrated Management Log

The IML records hundreds of events and stores them in an easy-to-view form. The IML timestamps each event with 1-minute granularity.

You can view recorded events in the IML in several ways, including the following:

- From within HP SIM ("HP Systems Insight Manager" on page 63)
- From within Survey Utility
- From within operating system-specific IML viewers
  - For NetWare: IML Viewer
  - For Windows®: IML Viewer
  - For Linux: IML Viewer Application
- From within the iLO user interface
- From within HP Insight Diagnostics (on page 63)

For more information, refer to the Management CD in the HP ProLiant Essentials Foundation Pack.

# Integrated Lights-Out technology

The iLO subsystem is a standard component of selected ProLiant servers that provides server health and remote server manageability. The iLO subsystem includes an intelligent microprocessor, secure memory, and a dedicated network interface. This design makes iLO independent of the host server and its operating system. The iLO subsystem provides remote access to any authorized network client, sends alerts, and provides other server management functions.

Using iLO, you can:

- Remotely power up, power down, or reboot the host server.
- Send alerts from iLO regardless of the state of the host server.
- Access advanced troubleshooting features through the iLO interface.
- Diagnose iLO using HP SIM through a web browser and SNMP alerting.

For more information about iLO features, refer to the iLO documentation on the Documentation CD or on the HP website (<http://www.hp.com/servers/lights-out>).

# Automatic Server Recovery

ASR is a feature that causes the system to restart when a catastrophic operating system error occurs, such as a blue screen, ABEND, or panic. A system fail-safe timer, the ASR timer, starts when the System Management driver, also known as the Health Driver, is loaded. When the operating system is functioning properly, the system periodically resets the timer. However, when the operating system fails, the timer expires and restarts the server.

ASR increases server availability by restarting the server within a specified time after a system hang or shutdown. At the same time, the HP SIM console notifies you by sending a message to a designated pager number that ASR has restarted the system. You can disable ASR from the HP SIM console or through RBSU.

# HP Systems Insight Manager

HP SIM is a web-based application that allows system administrators to accomplish normal administrative tasks from any remote location, using a web browser. HP SIM provides device management capabilities that consolidate and integrate management data from HP and third-party devices.



**IMPORTANT:** You must install and use HP SIM to benefit from the Pre-Failure Warranty for processors, SAS and SCSI hard drives, and memory modules.

For additional information, refer to the Management CD in the HP ProLiant Essentials Foundation Pack or the HP SIM website (<http://www.hp.com/go/hpsim>).

# HP Insight Diagnostics

HP Insight Diagnostics is a proactive server management tool, available in both offline and online versions, that provides diagnostics and troubleshooting capabilities to assist IT administrators who verify server installations, troubleshoot problems, and perform repair validation.

HP Insight Diagnostics Offline Edition performs various in-depth system and component testing while the OS is not running. To run this utility, launch the SmartStart CD.

HP Insight Diagnostics Online Edition is a web-based application that captures system configuration and other related data needed for effective server management. Available in Microsoft® Windows® and Linux versions, the utility helps to ensure proper system operation.

For more information or to download the utility, refer to the HP website (<http://www.hp.com/servers/diags>).

## USB support

HP provides both standard USB support and legacy USB support. Standard support is provided by the operating system through the appropriate USB device drivers. HP provides support for USB devices before the operating system loads through legacy USB support, which is enabled by default in the system ROM. HP hardware supports USB version 1.1 or 2.0, depending on the version of the hardware.

Legacy USB support provides USB functionality in environments where USB support is normally not available. Specifically, HP provides legacy USB functionality for:

- POST
- RBSU
- Diagnostics
- DOS
- Operating environments which do not provide native USB support

For more information on ProLiant USB support, refer to the HP website (<http://h18004.www1.hp.com/products/servers/platforms/usb-support.html>).

## Troubleshooting the system using port 85 codes

1. Locate the port 85 code display.



**IMPORTANT:** Be sure the port 84/85 switch is set to display port 85 codes.

2. Locate the code in the following table.

For example, if the port 85 code displays "31h," see "Processor-related port 85 codes (on page 64)" for more information.

Port 85 code	Description
3xh	Port 85 codes in this format indicate processor-related errors. See "Processor-related port 85 codes (on page 64)" for more information.
4xh	Port 85 codes in this format indicate memory-related errors. See "Memory-related port 85 codes (on page 66)" for more information.
6xh	Port 85 codes in this format indicate expansion board-related errors. See "Expansion board-related port 85 codes (on page 65)" for more information.
All other codes, including 00h, 01h, and 5xh	Port 85 codes in this range cover several areas. See the section "Miscellaneous port 85 codes (on page 66)" for more information.

3. Reference the designated section in this guide for the appropriate troubleshooting steps.

### Processor-related port 85 codes

Processor-related port 85 codes display in the format 3xh.



**IMPORTANT:** Reboot the server after completing each numbered step. If the error condition continues, proceed with the next step.

To troubleshoot processor-related error codes:



1. Bring the server to base configuration by removing all components that are not required by the server to complete POST. This process can include removing all:
  - Expansion boards ("[Removing a non-hot-plug expansion board](#)" on page 28, "[Removing a PCI-X Hot Plug expansion board](#)" on page 47)
  - Processors ("[Removing a processor](#)" on page 22), except the processor installed in socket 1



**IMPORTANT:** Processor socket 1 and PPM slot 1 must be populated at all times or the server does not function properly.

- PPMs ("[Removing a PPM](#)" on page 25), except the PPM installed in slot 1
  - DIMMs ("[Removing DIMMs](#)" on page 59), except the first bank
  - Hard drives ("[Removing a hot-plug SCSI hard drive](#)" on page 40, "[Removing a hot-plug SAS hard drive](#)" on page 41)
  - Peripheral devices
2. Reseat the processor in socket 1.
  3. Reseat the remaining processors, rebooting after each installation to identify any failed processors.



**IMPORTANT:** Populate the processors in the following order: 1, 2, 4, 3.



**IMPORTANT:** Always install a PPM when you install a processor. The system fails to boot if the PPM is missing.

4. Replace the processor in socket 1.
5. Replace the processor board, if applicable.
6. Replace the system board.



**IMPORTANT:** If replacing the system board or clearing NVRAM, you must re-enter the server serial number through RBSU ("[Re-entering the server serial number and product ID](#)" on page 34).

## Expansion board-related port 85 codes

Expansion board-related port 85 codes display in the format 6xh.



**IMPORTANT:** Reboot the server after completing each numbered step. If the error condition continues, proceed with the next step.

To troubleshoot expansion board-related error codes:

1. Reseat all expansion boards.
2. Bring the server to base configuration by removing all components that are not required by the server to complete POST. This process can include removing all:
  - Expansion boards ("[Removing a non-hot-plug expansion board](#)" on page 28, "[Removing a PCI-X Hot Plug expansion board](#)" on page 47)
  - Processors ("[Removing a processor](#)" on page 22), except the processor installed in socket 1



**IMPORTANT:** Processor socket 1 and PPM slot 1 must be populated at all times or the server does not function properly.

- PPMs ("[Removing a PPM](#)" on page 25), except the PPM installed in slot 1
- DIMMs ("[Removing DIMMs](#)" on page 59), except the first bank
- Hard drives ("[Removing a hot-plug SCSI hard drive](#)" on page 40, "[Removing a hot-plug SAS hard drive](#)" on page 41)
- Peripheral devices

3. Install the expansion boards one at a time, rebooting between each installation to isolate the failed expansion board.
4. Replace the failed expansion board, if applicable.
5. Replace the PCI riser board, if applicable.
6. Replace the system board.



**IMPORTANT:** If replacing the system board or clearing NVRAM, you must re-enter the server serial number through RBSU ("[Re-entering the server serial number and product ID](#)" on page 34).

## Memory-related port 85 codes

Memory-related port 85 codes display in the format 4xh.



**IMPORTANT:** Reboot the server after completing each numbered step. If the error condition continues, proceed with the next step.

To troubleshoot memory-related error codes:

1. Check the memory LEDs ("[Memory board components and LEDs](#)" on page 70) for any identified errors or failed DIMMs, and take corrective action.
2. Bring the server to base configuration by removing all components that are not required by the server to complete POST. This process can include removing all:
  - Expansion boards ("[Removing a non-hot-plug expansion board](#)" on page 28, "[Removing a PCI-X Hot Plug expansion board](#)" on page 47)
  - Processors ("[Removing a processor](#)" on page 22), except the processor installed in socket 1



**IMPORTANT:** Processor socket 1 and PPM slot 1 must be populated at all times or the server does not function properly.

- PPMs ("[Removing a PPM](#)" on page 25), except the PPM installed in slot 1
  - DIMMs ("[Removing DIMMs](#)" on page 59), except the first bank
  - Hard drives ("[Removing a hot-plug SCSI hard drive](#)" on page 40, "[Removing a hot-plug SAS hard drive](#)" on page 41)
  - Peripheral devices
3. Reseat the remaining memory boards, rebooting after each installation to isolate any failed memory boards, if applicable.
  4. Replace the DIMMs with a remaining bank of memory.
  5. Replace the memory board, if applicable.
  6. Replace the system board.



**IMPORTANT:** If replacing the system board or clearing NVRAM, you must re-enter the server serial number through RBSU ("[Re-entering the server serial number and product ID](#)" on page 34).

## Miscellaneous port 85 codes

To troubleshoot all other port 85 codes:



**IMPORTANT:** Reboot the server after completing each numbered step. If the error condition continues, proceed with the next step.

1. Bring the server to base configuration by removing all components that are not required by the server to complete POST. This process can include removing all:

- Expansion boards ("[Removing a non-hot-plug expansion board](#)" on page 28, "[Removing a PCI-X Hot Plug expansion board](#)" on page 47)
- Processors ("[Removing a processor](#)" on page 22), except the processor installed in socket 1



**IMPORTANT:** Processor socket 1 and PPM slot 1 must be populated at all times or the server does not function properly.

- PPMs ("[Removing a PPM](#)" on page 25), except the PPM installed in slot 1
  - DIMMs ("[Removing DIMMs](#)" on page 59), except the first bank
  - Hard drives ("[Removing a hot-plug SCSI hard drive](#)" on page 40, "[Removing a hot-plug SAS hard drive](#)" on page 41)
  - Peripheral devices
2. Install each remaining system component, rebooting between each installation to isolate any failed components.
  3. Clear the system NVRAM ("[System maintenance switch](#)" on page 77).
  4. Replace the system board.



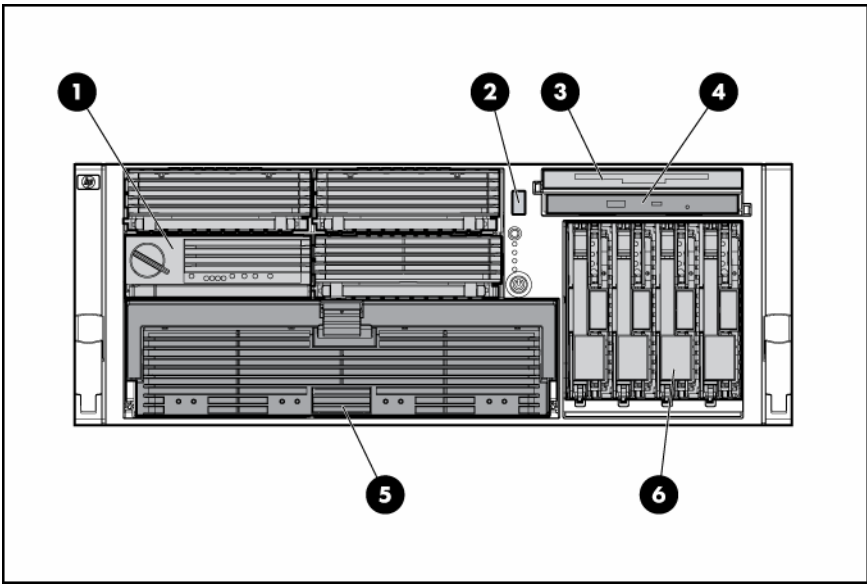
**IMPORTANT:** If replacing the system board or clearing NVRAM, you must re-enter the server serial number through RBSU ("[Re-entering the server serial number and product ID](#)" on page 34).

# Server component identification

## In this section

- Front panel components ..... 68
- Front panel LEDs and buttons ..... 69
- Memory board components and LEDs ..... 70
- Processor module LEDs ..... 72
- Rear panel components ..... 73
- Rear panel LEDs and buttons ..... 74
- Power supply LEDs ..... 75
- System board components ..... 76
- DIMM slot locations ..... 80
- SCSI IDs ..... 80
- Hot-plug SCSI hard drive LEDs ..... 82
- Hot-plug SCSI hard drive LED combinations ..... 82
- SATA or SAS IDs ..... 83
- SATA or SAS hard drive LEDs ..... 84
- SAS and SATA hard drive LED combinations ..... 84
- Fan locations ..... 85
- Hot-plug fan LEDs ..... 87
- BBWC LEDs ..... 87

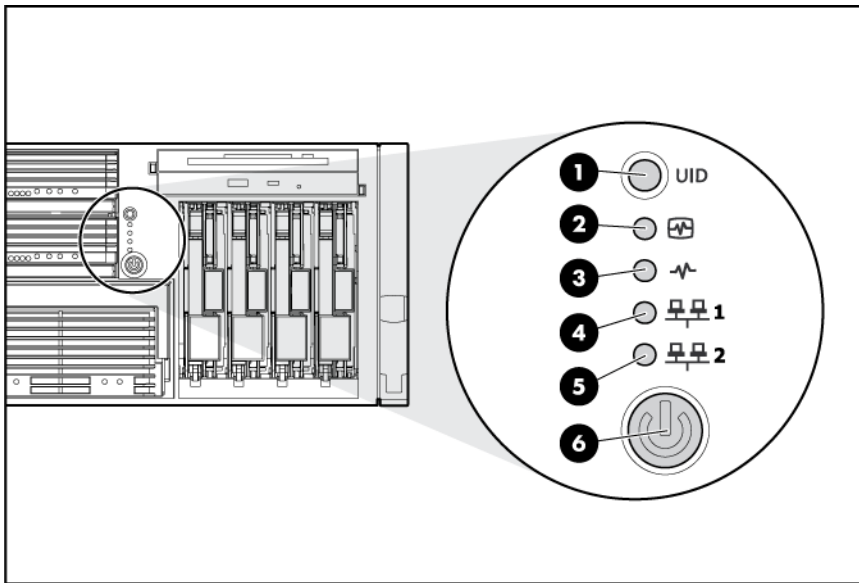
## Front panel components



Item	Description
1	Memory board or blank

Item	Description
2	USB port
3	Optional multibay drive or blank
4	DVD drive
5	Processor module
6	Hard drive bay

## Front panel LEDs and buttons



Item	Description	Status
1	UID switch and LED	Blue = Activated Flashing blue = Server being managed remotely Off = Deactivated
2	Internal system health LED	Green = Normal (system on) Flashing amber = System health is degraded Flashing red = System health is critical Off = Normal (system off)
3	External system health LED	Green = Normal (system on) Flashing amber = System health is degraded Flashing red = System health is critical Off = Normal (system off)
4	NIC 1 link/activity LED	Green = Linked to network Flashing green = Linked with activity on the network Off = No network connection
5	NIC 2 link/activity LED	Green = Linked to network Flashing green = Linked with activity on the network Off = No network connection

Item	Description	Status
6	Power on/Standby button and LED	Amber = System has AC power and is in standby mode Green = System has AC power and is turned on Off = System has no AC power

## Memory board components and LEDs

Error indicators remain illuminated when the system is powered off so that the status of the LEDs can still be seen. This behavior matches the behavior of all the other error indicators in the server.

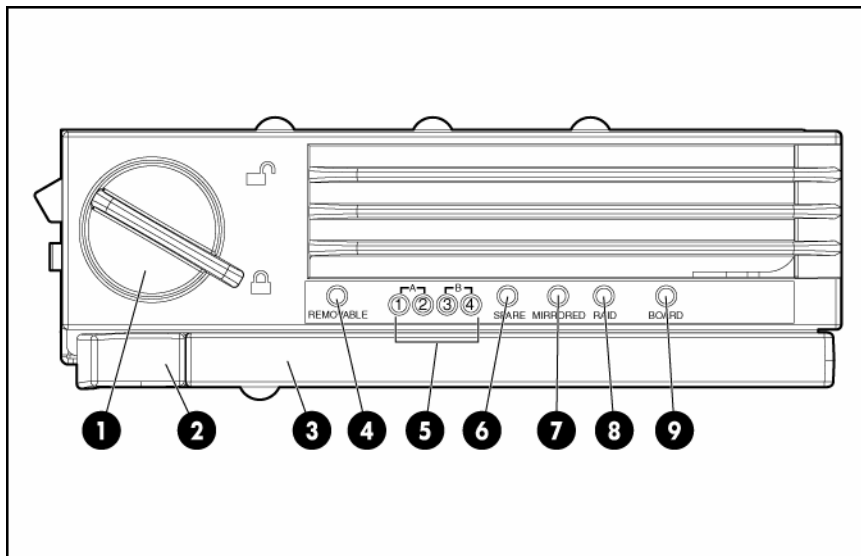
The indicators are only cleared in the following situations:

- If the locking switch is locked after the board is reinstalled
- If the server is rebooted
- If the board is removed from the server

**⚠ CAUTION:** When the memory board locking switch is unlocked in a mode that does not support hot-add or hot-replace capabilities, audio alarms and visual alerts occur. Removing the memory board at this point causes server failure.

To end the audio alarms and visual alerts, move the memory board locking switch back to the locked position. This action does not result in data corruption or server failure.

If removal of a single memory board is required and it is the only memory board, power down the server and make the necessary memory changes.



Item	Description	Status
1	Locking switch	N/A
2	Release latch	N/A
3	Ejector lever	N/A
4	Removable	Off = Do not remove memory board if server is powered on Green = Memory board can be safely removed

Item	Description	Status
5	DIMM LEDs (1–4)	Off = Normal or DIMM not installed Amber = Uncorrectable error detected or correctable error threshold reached Flashing amber = DIMM configuration error
6	Spare	Off = Board not online or board not configured for Online Spare Memory mode Amber = Correctable error threshold reached; server is in degraded Online Spare Memory mode Flashing amber = Memory configuration error* Green = Online Spare Memory mode
7	Mirrored	Off = Board not online or board not configured for Hot-Plug Mirrored Memory mode Amber = Server is in degraded Hot-Plug Mirrored Memory mode Flashing amber = Memory configuration error* Green = Hot-Plug Mirrored Memory mode
8	RAID	Off = Board not online or board not configured for Hot-Plug RAID Memory mode Amber = Server is in degraded Hot-Plug RAID Memory mode Flashing amber = Memory configuration error* Green = Hot-Plug RAID Memory mode
9	Board	Off = Power off or locking switch unlocked Amber = Memory error detected Flashing amber = Memory configuration error* Flashing green = Board is rebuilding Green = Normal

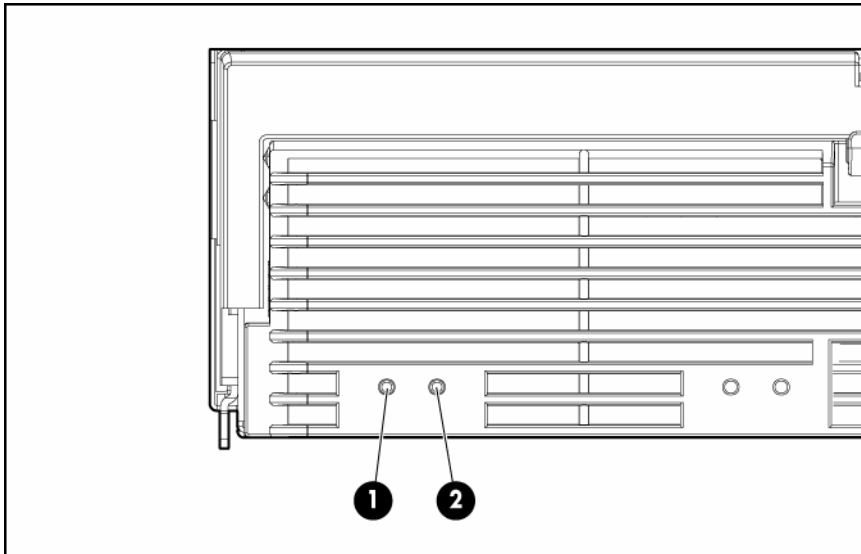
\* AMP configuration errors occur when the current memory configuration is not valid for the configured AMP mode:

- If the mode selected is the desired mode, modify the DIMM or board configuration to support the desired mode. For more information, refer to "Memory options ("[Memory overview](#)" on page 50)."
- If the mode selected is not the desired mode, run RBSU and change the AMP mode. For more information, refer to the section "HP ROM-Based Setup Utility (on page 61)."



**NOTE:** If the Spare, Mirrored, and RAID LEDs are off, the server is in Advanced ECC mode. Refer to "HP ROM-Based Setup Utility (on page 61)" for more information.

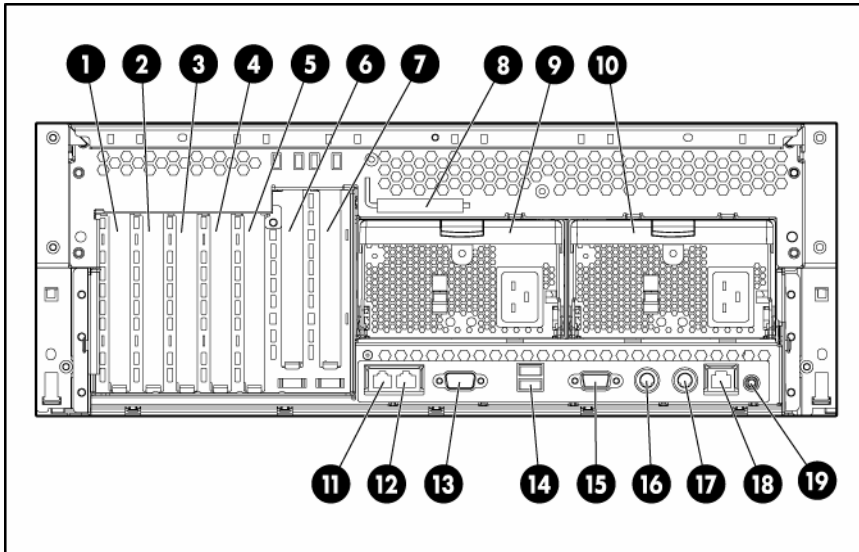
# Processor module LEDs



PPM LED (1)	Processor LED (2)	External health LED	Description
Off	Off	Off	One of the following conditions exist: <ul style="list-style-type: none"> <li>No AC power present</li> <li>Normal</li> </ul>
Off	Amber	Flashing amber	Pre-failure error threshold exceeded; LEDs will clear after the next reboot
Off	Amber	Flashing red	One or more of the following conditions exist: <ul style="list-style-type: none"> <li>The processor was replaced and the LEDs will clear after the next reboot</li> <li>Processor failed</li> </ul>
Off	Flashing amber	Flashing red	Processor configuration error detected
Amber	Off	Flashing red	PPM failed
Flashing amber	Off	Flashing red	One or more of the following conditions exist: <ul style="list-style-type: none"> <li>PPM not installed</li> <li>PPM configuration error detected</li> </ul>

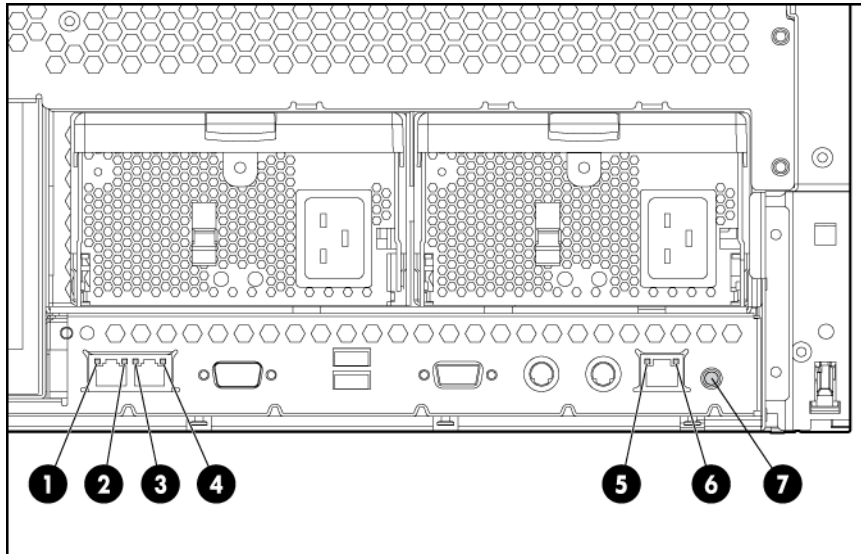


## Rear panel components



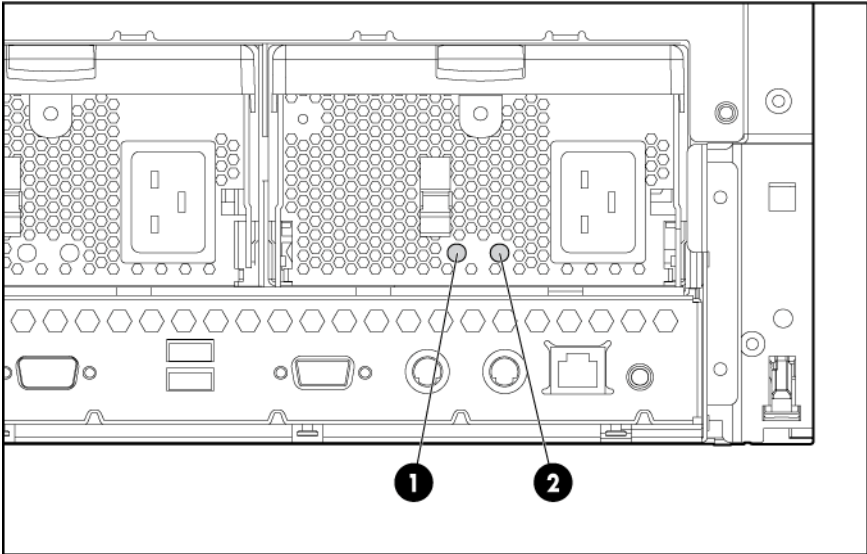
Item	Description	Item	Description
1	PCI-X non-hot-plug slot 7, 64-bit/100-MHz	11	NIC port 2
2	PCI-X non-hot-plug slot 6, 64-bit/100-MHz	12	NIC port 1
3	PCI-X non-hot-plug slot 5, 64-bit/133-MHz	13	Serial port
4	PCI-X non-hot-plug slot 4, 64-bit/133-MHz	14	USB ports
5	PCI-X non-hot-plug slot 3, 64-bit/133-MHz	15	Video port
6	Optional PCI-X Hot Plug or optional PCI Express non-hot-plug expansion slot 2	16	Keyboard port
7	Optional PCI-X Hot Plug or optional PCI Express non-hot-plug expansion slot 1	17	Mouse port
8	T-15 Torx screwdriver	18	iLO NIC
9	Optional power supply (redundant)	19	UID
10	Power supply (primary)		

## Rear panel LEDs and buttons



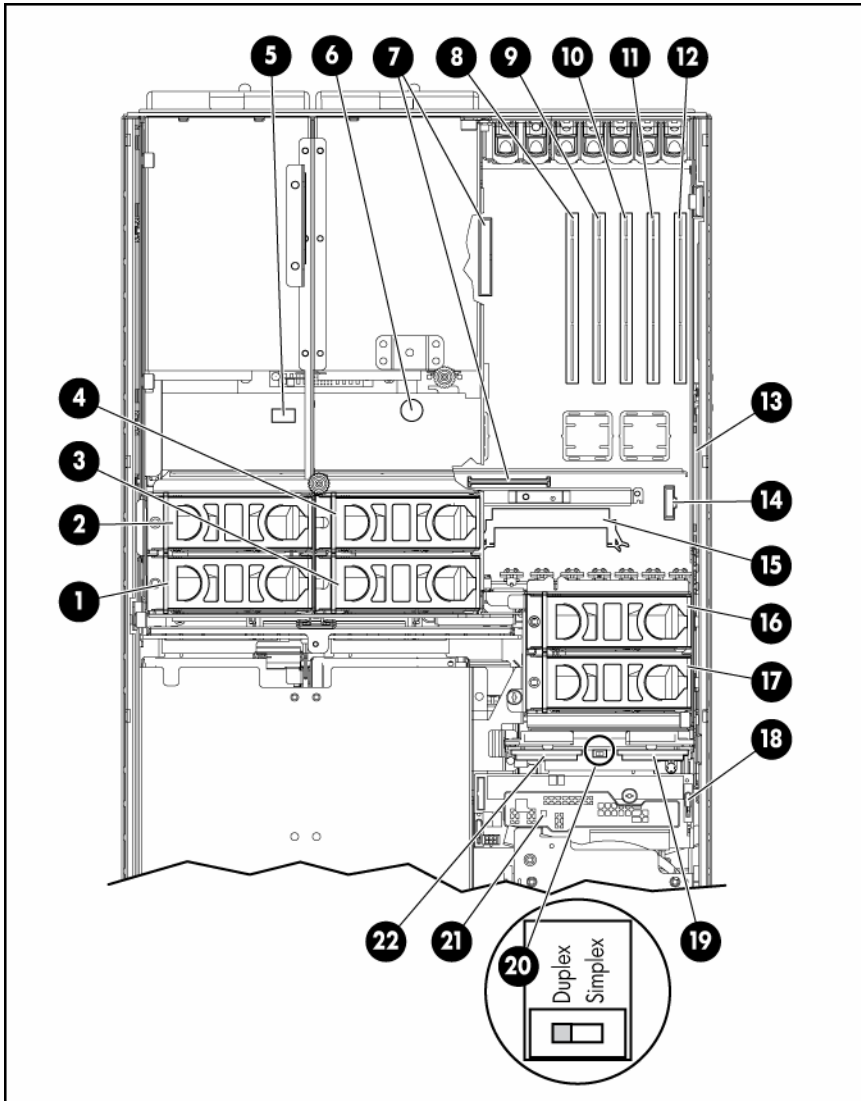
Item	Description	LED color	Status
1	NIC 1 Activity LED	Green	On or flashing = Network activity Off = No network activity
2	NIC 1 Link LED	Green	On = Linked to network Off = Not linked to network
3	NIC 2 Activity LED	Green	On or flashing = Network activity Off = No network activity
4	NIC 2 Link LED	Green	On = Linked to network Off = Not linked to network
5	iLO NIC Activity LED	Green	On or flashing = Network activity Off = No network activity
6	iLO NIC Link LED	Green	On = Linked to network Off = Not linked to network
7	UID LED	Blue	On = Activated Flashing = Server remotely managed Off = Deactivated

# Power supply LEDs



Fail LED 1 (amber)	Power LED 2 (green)	Description
Off	Off	No AC power to any power supply
Flashing	Off	Power supply failure (over current)
On	Off	No AC power to this power supply
Off	Flashing	<ul style="list-style-type: none"> <li>• AC power present</li> <li>• Standby mode</li> </ul>
Off	On	Normal

# System board components



Item	Description	Item	Description
1	Fan 1	12	PCI-X, non-hot-plug slot 7, 64-bit/100-MHz
2	Fan 2	13	BBWC battery pack
3	Fan 3	14	Remote management connector
4	Fan 4	15	BBWC cache module socket
5	System maintenance switch	16	Fan 6
6	System battery	17	Fan 5

Item	Description	Item	Description
7	Connectors for one of the following: <ul style="list-style-type: none"> <li>• PCI-X Hot Plug mezzanine option</li> <li>• PCI Express x4 mezzanine option</li> <li>• PCI Express x8 mezzanine option</li> </ul>	18	Boot device selector switch (default = FLP TOP)
8	PCI-X non-hot-plug slot 3, 64-bit/133-MHz	19	SCSI port A
9	PCI-X, non-hot-plug slot 4, 64-bit/133-MHz	20	SCSI simplex/duplex switch (default = duplex)
10	PCI-X, non-hot-plug slot 5, 64-bit/133-MHz	21	Port 84/85 code switch
11	PCI-X, non-hot-plug slot 6, 64-bit/100-MHz	22	SCSI port B

## System maintenance switch

The system maintenance switch (SW1) is an eight-position switch that is used for system configuration. The default position for all eight positions is Off.

Position	Description	Function
S1	iLO Security	Off = iLO security is enabled On = iLO security is disabled
S2	Configuration lock	Off = System configuration can be changed On = System configuration is locked
S3	Reserved	Reserved
S4	Reserved	Reserved
S5	Password protection override	Off = No function On = Clears power-on password and administrator password
S6	Invalidate configuration	Off = Normal On = Clears NVRAM
S7	Reserved	Reserved
S8	Reserved	Reserved

## Boot device selector switch

The boot device selector switch setting determines the device access order of the multibay drives in the server. The default setting for the boot device selector switch is FLP TOP.

When the boot device selector switch is set to FLP TOP, the optical drive in the bottom bay is designated as the primary optical drive. The diskette drive in the top bay is bootable. The server cannot boot from a diskette drive in the bottom bay when the boot device selector switch is set to FLP TOP.

When the boot device selector switch is set to FLP BOT, the optical drive in the top bay is designated as the primary optical drive. The diskette drive in the bottom bay is bootable. The server cannot boot from a diskette drive in the top bay when the boot device selector switch is set to FLP BOT.



**NOTE:** If two optical drives are installed in the server, the server will first attempt to boot from the primary optical drive ("[Boot device selector switch](#)" on page 77). The boot device selector switch setting determines which drive is the primary optical drive.

Switch setting	Description
FLP TOP (default)	Diskette drive in top bay is bootable Primary optical drive in bottom bay is bootable
FLP BOT	Primary optical drive in top bay is bootable Diskette drive in bottom bay is bootable

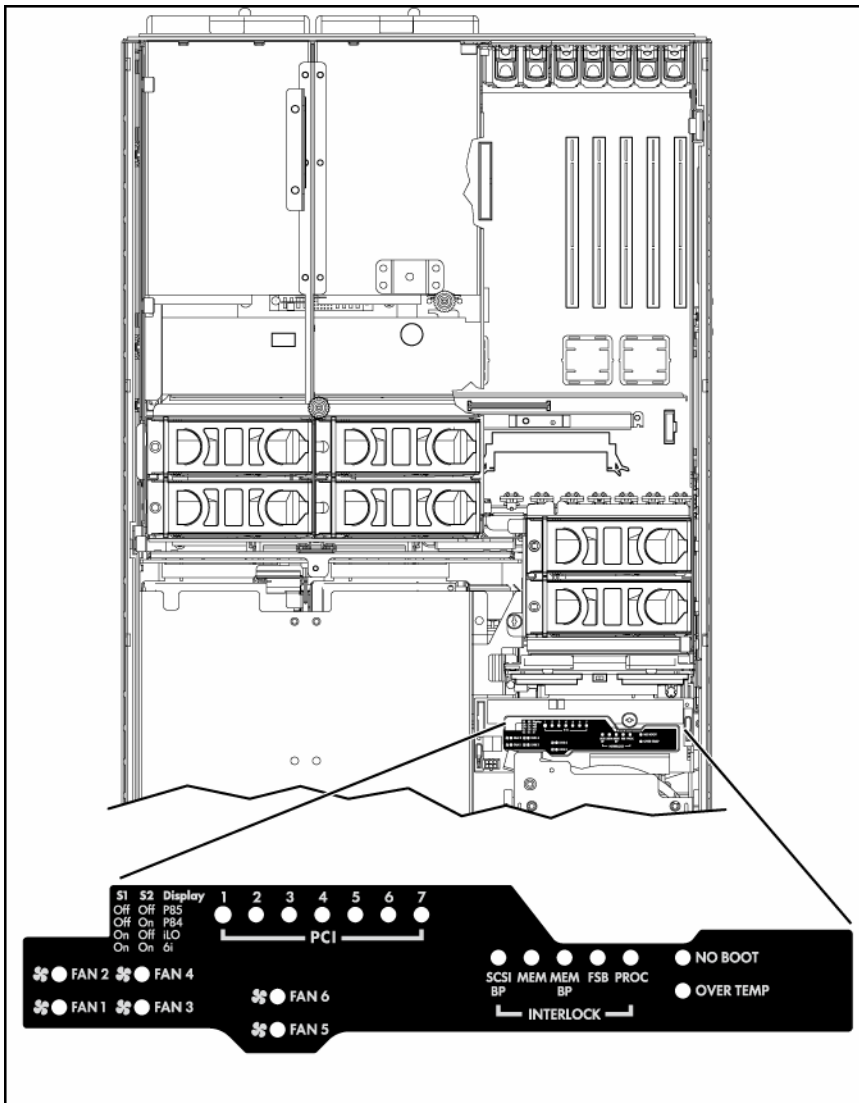
## QuickFind diagnostic display LEDs

The front panel health LEDs indicate only the current hardware status. In some situations, HP SIM might report server status differently than the health LEDs because the software tracks more system attributes.

The amber QuickFind diagnostic display LEDs are located on the media board. In normal operations, all of the LEDs are off unless one of the components fails.



**NOTE:** The system management driver must be installed for the internal health LED to provide pre-failure and warranty conditions.



LED	Description
Fan X	One or more of the following conditions exist: <ul style="list-style-type: none"> <li>• A fan is missing or not properly installed.</li> <li>• A fan failed.</li> </ul>
PCI X	One or more of the following conditions exist: <ul style="list-style-type: none"> <li>• A PCI address parity error was detected on the numbered PCI slot.</li> <li>• A PCI data parity error was detected on the numbered PCI slot.</li> </ul>
SCSI BP	The SCSI backplane is missing or not properly installed.
MEM	A memory board is not properly installed.
MEM BP	A memory backplane is missing or not properly installed.
FSB	One or more of the following conditions exist: <ul style="list-style-type: none"> <li>• A processor or PPM is missing or not properly installed.</li> <li>• An FSB configuration error was detected.</li> </ul>
PROC	A processor is missing or not properly installed.

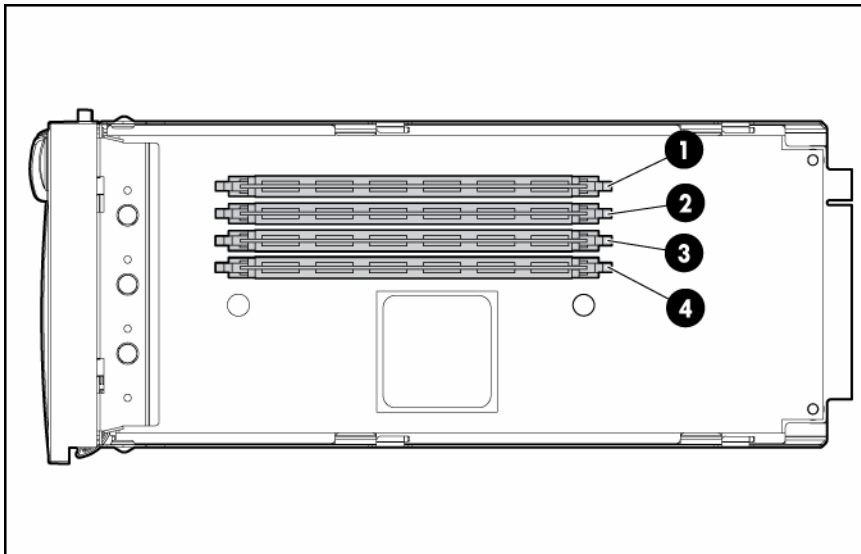
LED	Description
OVER TEMP	The internal temperature has exceeded operating levels.
NO BOOT	A "no boot" condition was detected.
P84	Switch set to display port 84 codes.
P85	Switch set to display port 85 codes (" <a href="#">Troubleshooting the system using port 85 codes</a> " on page 64).

## Setting the switch to view port 85 codes

To change the display on the QuickFind diagnostic panel to view port 84 and 85 codes ("[Troubleshooting the system using port 85 codes](#)" on page 64):

1. Extend the server from the rack ("[Extending the server from the rack](#)" on page 15).
2. Remove the access panel ("[Removing the access panel](#)" on page 17).
3. Locate the switch on the media board ("[System board components](#)" on page 76).
4. Set the switch to the P85 position to view port 85 codes.

## DIMM slot locations



Item	Description	Bank
1	DIMM slot 1	A
2	DIMM slot 2	A
3	DIMM slot 3	B
4	DIMM slot 4	B

## SCSI IDs

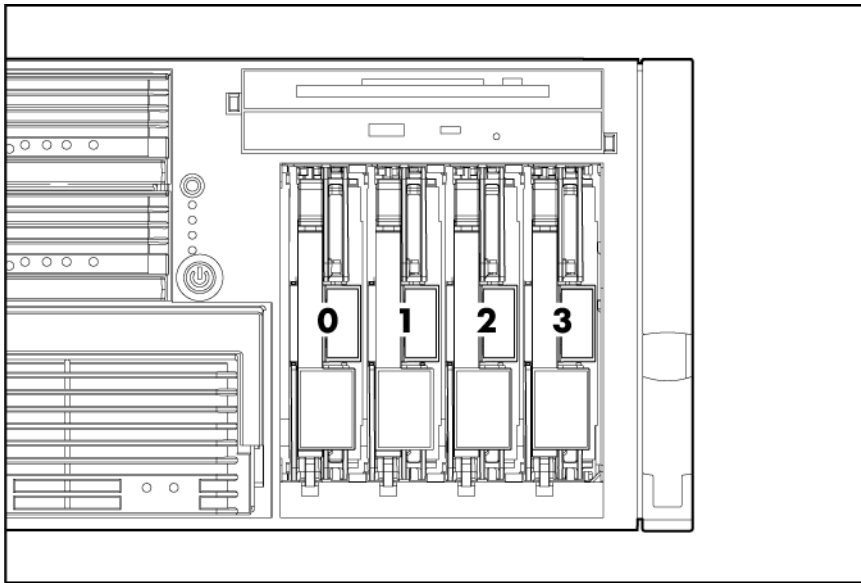
The server supports single- or dual-channel hard drive configurations. The single-channel configuration (simplex mode) supports up to four hard drives on one channel. The dual-channel configuration (duplex mode) supports two hard drives on each channel (SCSI IDs 0 and 1).



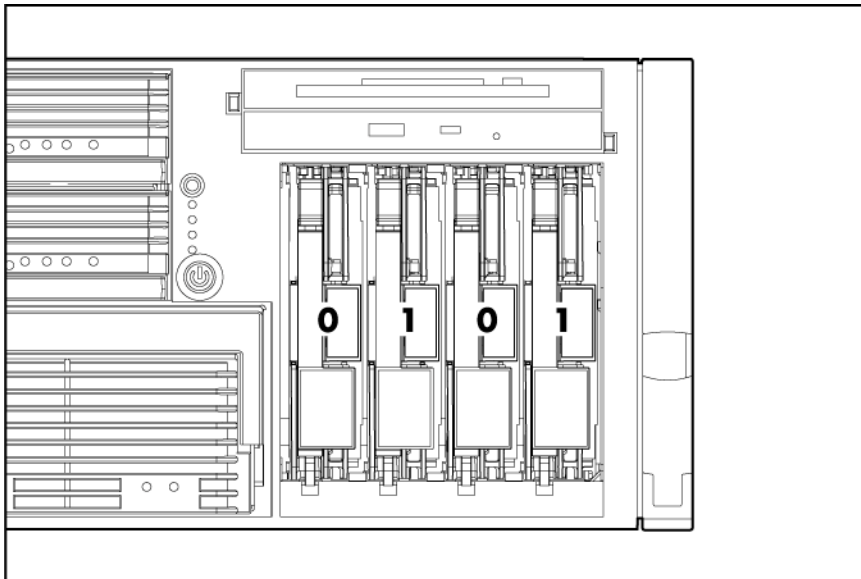
The SCSI IDs for both simplex mode and duplex mode are illustrated. Always populate hard drive bays starting with the lowest SCSI ID.

 **NOTE:** These SCSI ID designations apply regardless of the controller or the configuration used.

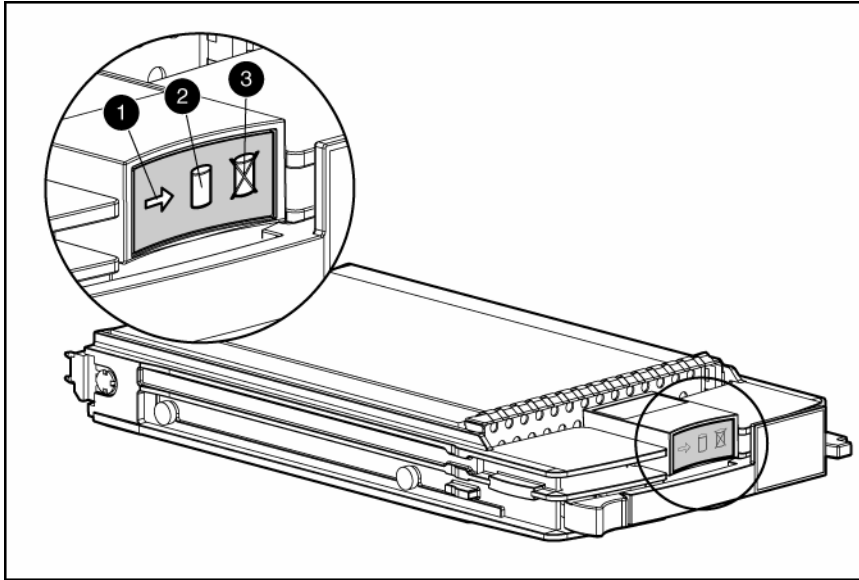
### Simplex mode



### Duplex mode



## Hot-plug SCSI hard drive LEDs



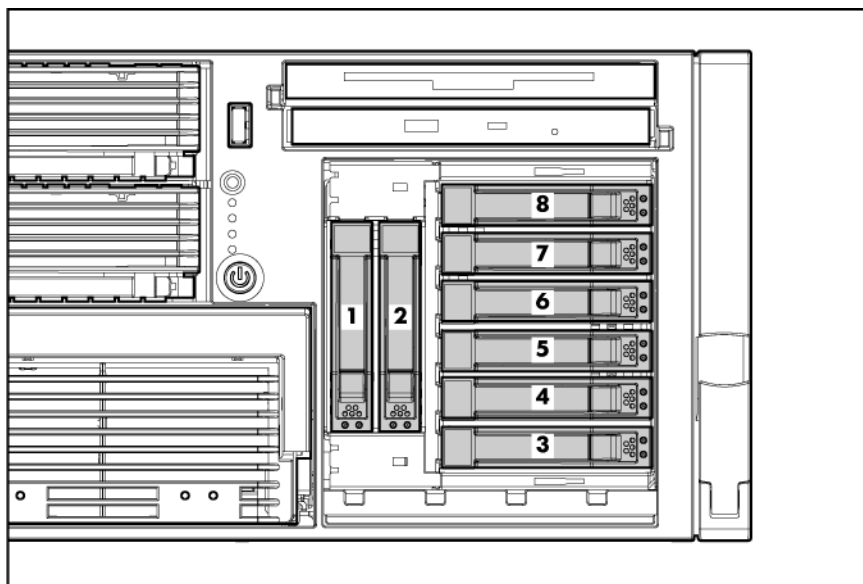
Item	LED description	Status
1	Activity status	On = Drive activity Flashing = High activity on the drive or drive is being configured as part of an array. Off = No drive activity
2	Online status	On = Drive is part of an array and is currently working. Flashing = Drive is actively online. Off = Drive is offline.
3	Fault status	On = Drive failure Flashing = Fault-process activity Off = No fault-process activity

## Hot-plug SCSI hard drive LED combinations

Activity LED (1)	Online LED (2)	Fault LED (3)	Interpretation
On, off, or flashing	On or off	Flashing	A predictive failure alert has been received for this drive. Replace the drive as soon as possible.
On, off, or flashing	On	Off	The drive is online and is configured as part of an array. If the array is configured for fault tolerance and all other drives in the array are online, and a predictive failure alert is received or a drive capacity upgrade is in progress, you may replace the drive online.
On or flashing	Flashing	Off	<b>Do not remove the drive. Removing a drive may terminate the current operation and cause data loss.</b> The drive is rebuilding or undergoing capacity expansion.

Activity LED (1)	Online LED (2)	Fault LED (3)	Interpretation
On	Off	Off	<p><b>Do not remove the drive.</b></p> <p>The drive is being accessed, but (1) it is not configured as part of an array; (2) it is a replacement drive and rebuild has not yet started; or (3) it is spinning up during the POST sequence.</p>
Flashing	Flashing	Flashing	<p><b>Do not remove the drive. Removing a drive may cause data loss in non-fault-tolerant configurations.</b></p> <p>One or more of the following conditions may exist:</p> <ul style="list-style-type: none"> <li>• The drive is part of an array being selected by an array configuration utility</li> <li>• Drive Identification has been selected in HP SIM</li> <li>• The drive firmware is being updated</li> </ul>
Off	Off	On	<p>The drive has been placed offline due to hard disk drive failure or subsystem communication failure.</p> <p>You may need to replace the drive.</p>
Off	Off	Off	<p>One or more of the following conditions may exist:</p> <ul style="list-style-type: none"> <li>• The drive is not configured as part of an array</li> <li>• The drive is configured as part of an array, but it is a replacement drive that is not being accessed or being rebuilt yet</li> <li>• The drive is configured as an online spare</li> </ul> <p>If the drive is connected to an array controller, you may replace the drive online.</p>

## SATA or SAS IDs



**NOTE:** The server may look different from that shown.

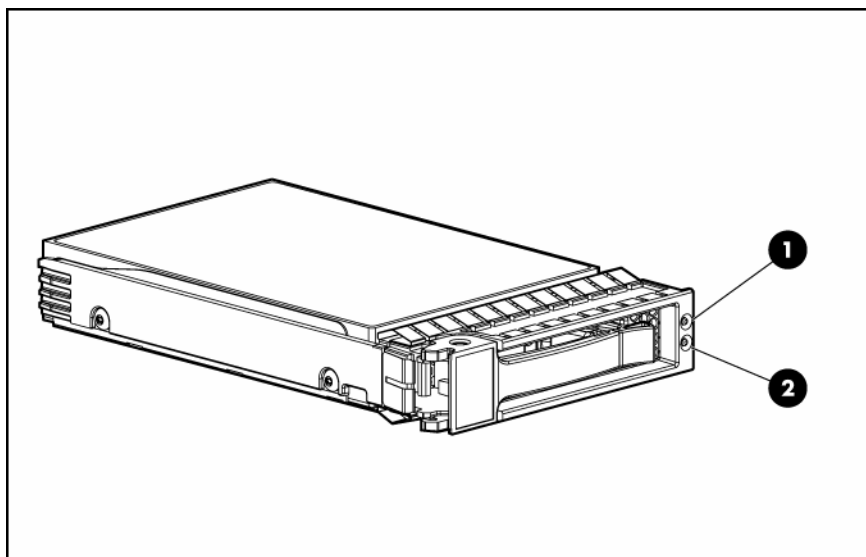
When adding SAS hard drives to the server, observe the following general guidelines:

- The server supports eight SAS or SATA hot-plug hard drives.
- The system automatically sets all drive numbers.

- If only one hard drive is used, install it in the bay with the lowest number.
- Hard drives must be SFF types.
- Drives must be the same capacity to provide the greatest storage space efficiency when drives are grouped together into the same drive array.

 **NOTE:** ACU does not support mixing SAS and SATA drives in the same logical volume.

## SATA or SAS hard drive LEDs



Item	LED description	Status
1	Fault/UID status	Amber = Drive failure Flashing amber = Fault-process activity Blue = Unit identification is active Off = No fault-process activity
2	Online/Activity status	Green = Drive activity Flashing green = High activity on the drive or drive is being configured as part of an array Off = No drive activity

## SAS and SATA hard drive LED combinations

Online/activity LED (green)	Fault/UID LED (amber/blue)	Interpretation
On, off, or flashing	Alternating amber and blue	The drive has failed, or a predictive failure alert has been received for this drive; it also has been selected by a management application.
On, off, or flashing	Steadily blue	The drive is operating normally, and it has been selected by a management application.
On	Amber, flashing regularly (1 Hz)	A predictive failure alert has been received for this drive. Replace the drive as soon as possible.

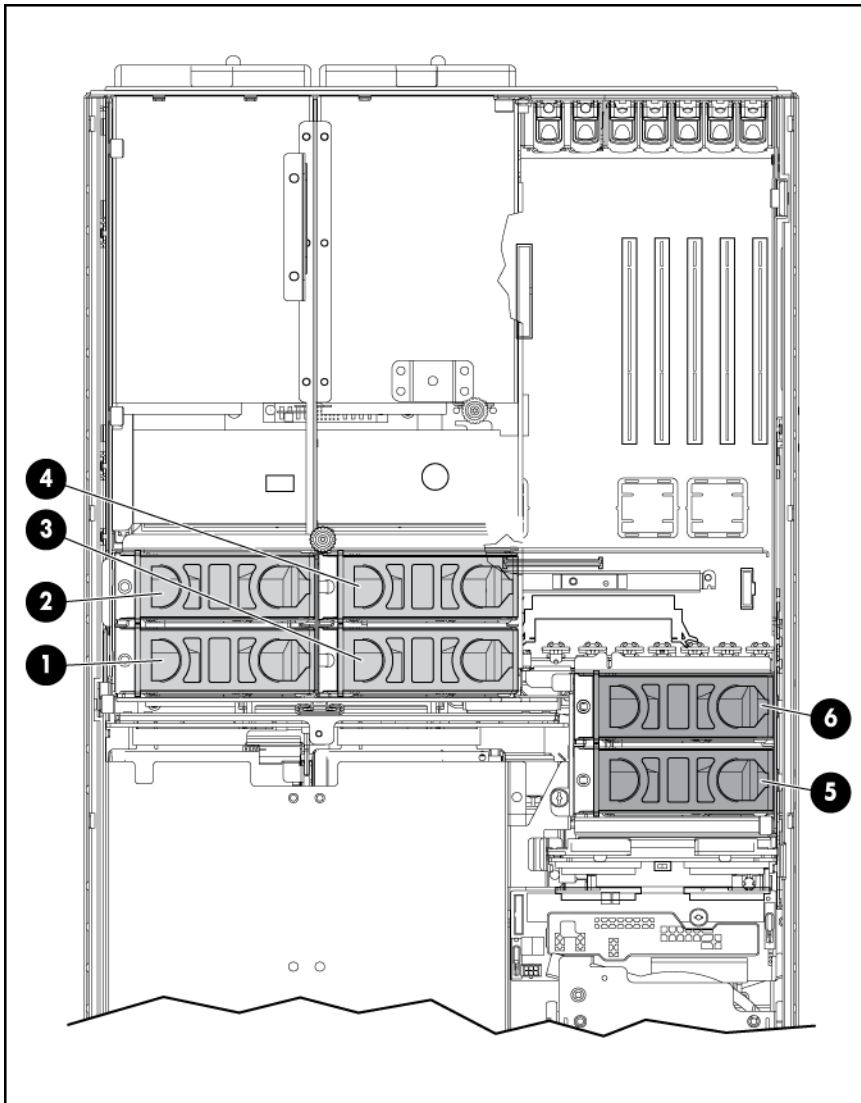
Online/activity LED (green)	Fault/UID LED (amber/blue)	Interpretation
On	Off	The drive is online, but it is not active currently.
Flashing regularly (1 Hz)	Amber, flashing regularly (1 Hz)	<b>Do not remove the drive. Removing a drive may terminate the current operation and cause data loss.</b> The drive is part of an array that is undergoing capacity expansion or stripe migration, but a predictive failure alert has been received for this drive. To minimize the risk of data loss, do not replace the drive until the expansion or migration is complete.
Flashing regularly (1 Hz)	Off	<b>Do not remove the drive. Removing a drive may terminate the current operation and cause data loss.</b> The drive is rebuilding, or it is part of an array that is undergoing capacity expansion or stripe migration.
Flashing irregularly	Amber, flashing regularly (1 Hz)	The drive is active, but a predictive failure alert has been received for this drive. Replace the drive as soon as possible.
Flashing irregularly	Off	The drive is active, and it is operating normally.
Off	Steadily amber	A critical fault condition has been identified for this drive, and the controller has placed it offline. Replace the drive as soon as possible.
Off	Amber, flashing regularly (1 Hz)	A predictive failure alert has been received for this drive. Replace the drive as soon as possible.
Off	Off	The drive is offline, a spare, or not configured as part of an array.

## Fan locations

The server is shipped with six system fans. Each fan is hot-swappable and independently controlled. The fans are distributed into two zones to control thermal conditions within the server.

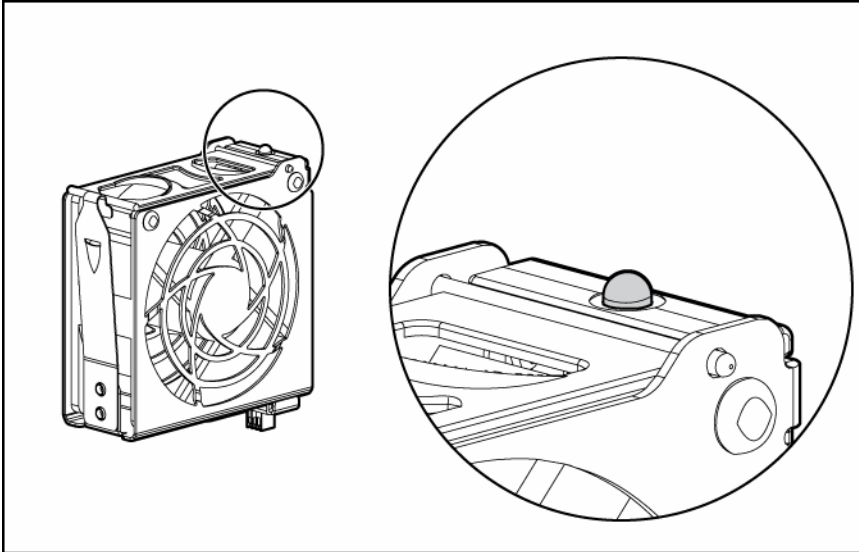
- Zone 1 contains four fans (three, plus one redundant) to control the temperature in the processor module area.
- Zone 2 contains two fans (one, plus one redundant) to control the temperature in the hard drive bay area.

This fan configuration allows the server to continue operating in non-redundant mode if a single fan fails in either zone. If the system detects two fan failures in the same zone, the server shuts down to avoid thermal damage.



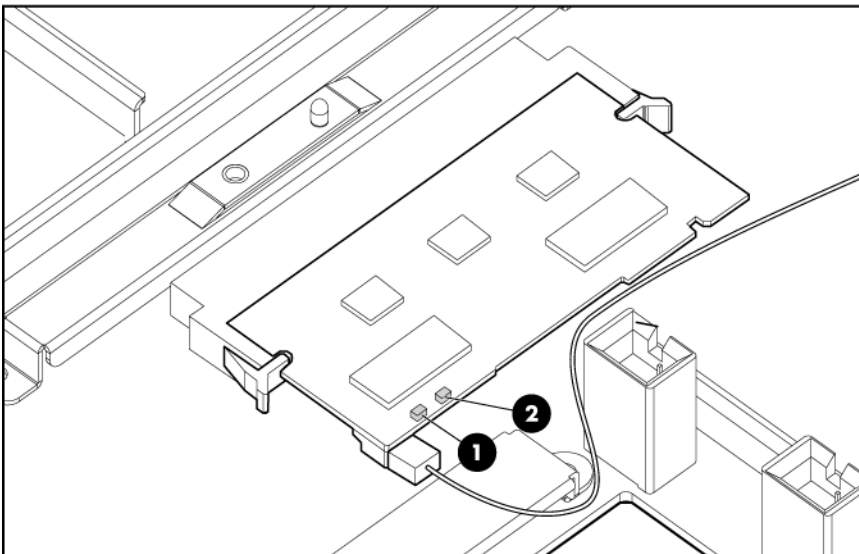
Item	Description	Zone
1	Fan 1	1
2	Fan 2	1
3	Fan 3	1
4	Fan 4	1
5	Fan 5	2
6	Fan 6	2

## Hot-plug fan LEDs



Status
Green = Operating normally
Amber = Failed
Off = No power

## BBWC LEDs



Server status	LED 1 (amber)	LED 2 (green)	Battery module status
Server is on and has normal run time	Off	On	Fast charging
	Off	Flashing	The microcontroller is waiting for communication from the host controller.
	Off	Off	The battery is fully charged.

<b>Server status</b>	<b>LED 1 (amber)</b>	<b>LED 2 (green)</b>	<b>Battery module status</b>
	On	Off	A short exists in the connection of one or more of the three button cells within the battery module.
	Flashing	Off	An opening exists in the circuit between the positive and negative terminals of the battery module.
	Off	Off	Normal
Server is off and is in data retention mode	Flashing every 15 seconds	Off	User data held in the write cache is being backed up.



---

# Server cabling

## In this section

Storage device cabling guidelines.....	89
PCI-X Hot Plug mezzanine cabling.....	89
BBWC cabling.....	90
RILOE II cabling .....	90
Hot-plug SCSI drive cabling.....	91
Hot-plug SAS hard drive cabling.....	92
USB cable assembly .....	93
Power switch cable assembly.....	94

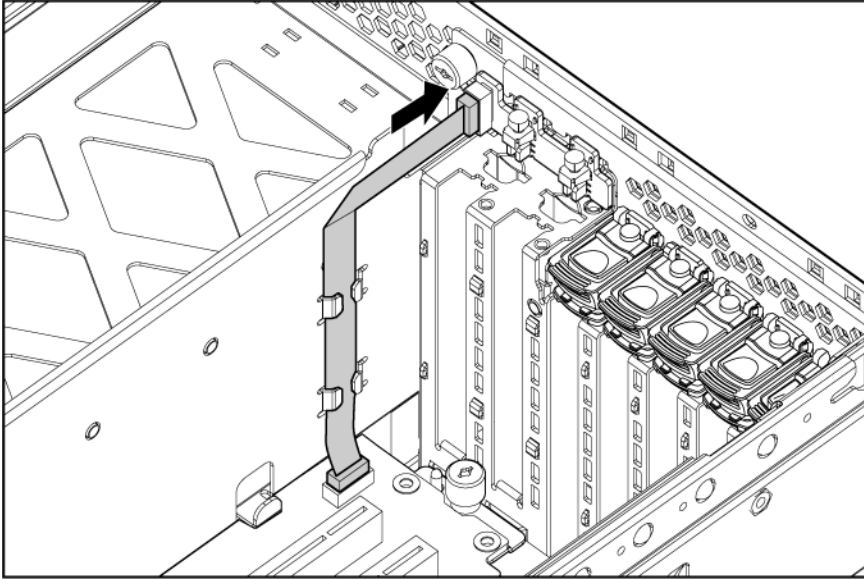
## Storage device cabling guidelines

- △ **CAUTION:** To prevent damage to the equipment, be sure that the server is powered down, all cables are disconnected from the back of the server, and the power cord is disconnected from the grounded (earthed) AC outlet before installing devices.
- △ **CAUTION:** To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause electrostatic discharge.

## PCI-X Hot Plug mezzanine cabling

The server supports an optional PCI-X Hot Plug mezzanine board that provides hot-plug capability for two expansion slots. A ribbon cable connects the PCI-X Hot Plug button to the PCI-X Hot Plug mezzanine board.

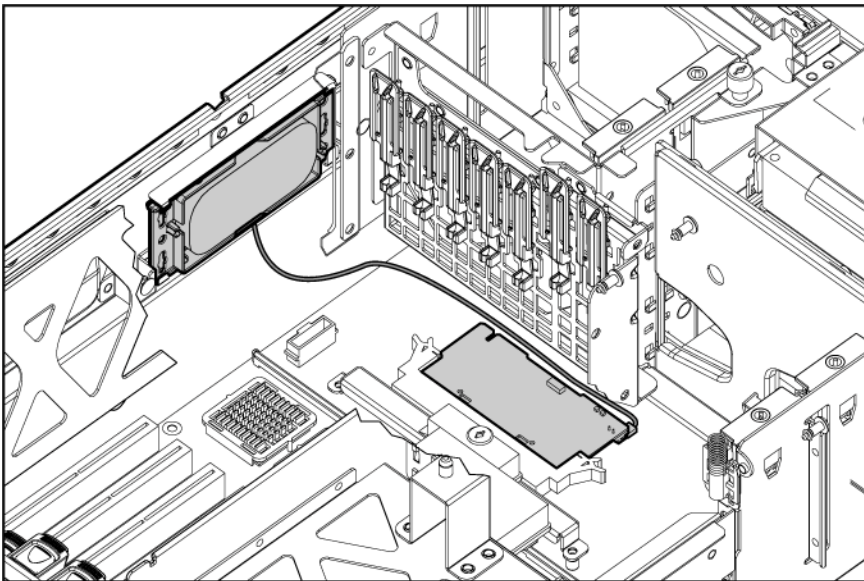
**CAUTION:** When routing cables, always be sure that the cables are not in a position where they can be pinched or crimped.



## BBWC cabling

**CAUTION:** When routing cables, always be sure that the cables are not in a position where they can be pinched or crimped.

**IMPORTANT:** The BBWC cable is wound around the battery pack. Unwind the cable to the appropriate length before installing the battery pack assembly into the server.

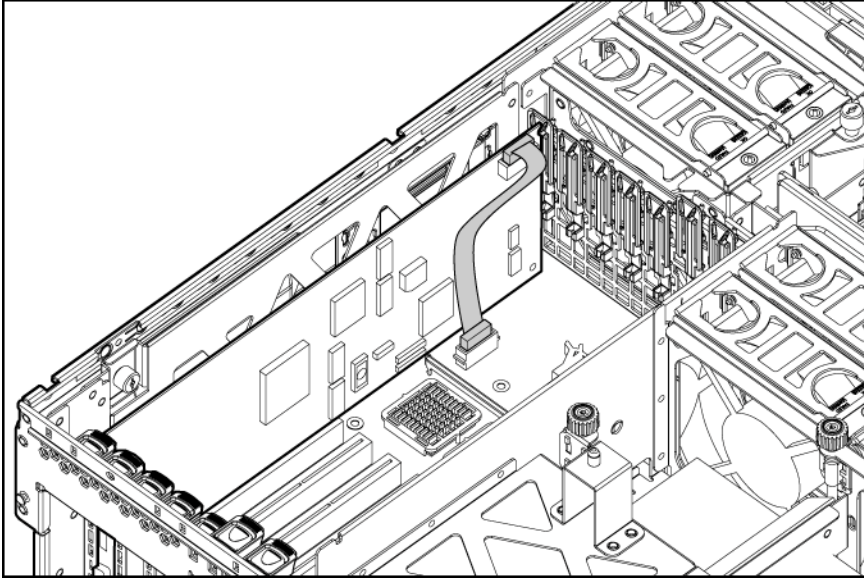


## RILOE II cabling

The 30-pin Remote Insight cable ships with the RILOE II cable kit.

**CAUTION:** When routing cables, always be sure that the cables are not in a position where they can be pinched or crimped.

**IMPORTANT:** Install the RILOE II board into slot 7 for ease of cabling.



## Hot-plug SCSI drive cabling

**CAUTION:** When routing cables, always be sure that the cables are not in a position where they can be pinched or crimped.

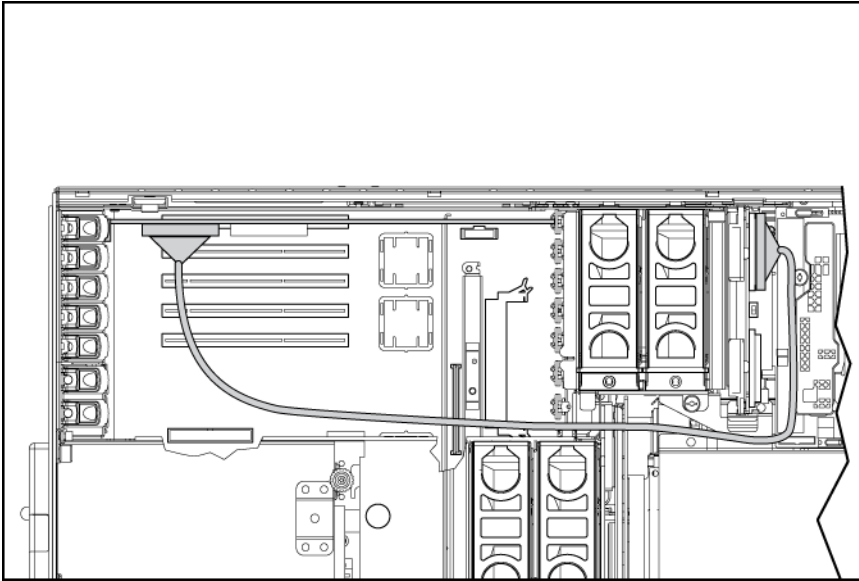
The following are the standard SCSI cabling configurations for this server:

- Single-channel (simplex mode) SCSI cabling to the SCSI ports
- Dual-channel (duplex mode) SCSI cabling to the SCSI ports
- Standard SCSI cabling to an expansion board

**NOTE:** The server ships with the required cables.

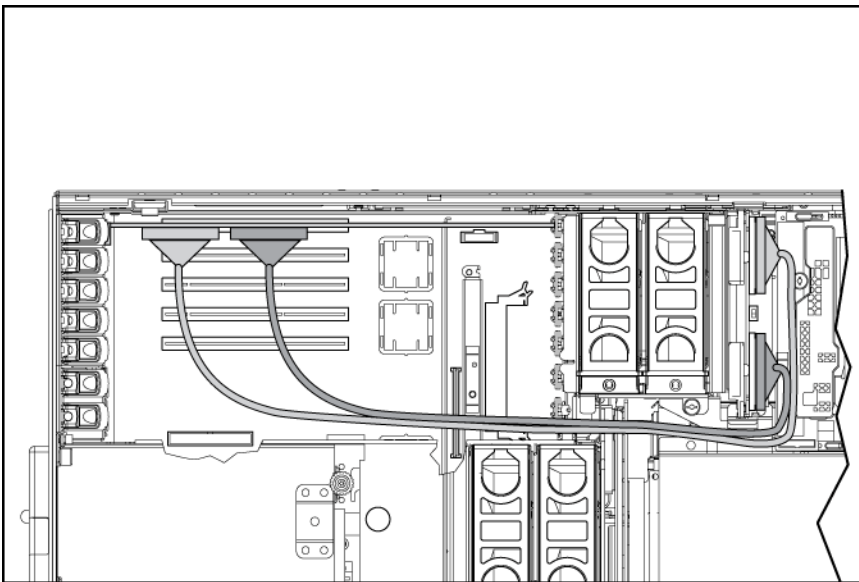
## SCSI simplex mode

In the PCI simplex cabling configuration, an optional PCI array controller controls up to four hard drives through one SCSI bus.



## SCSI duplex mode

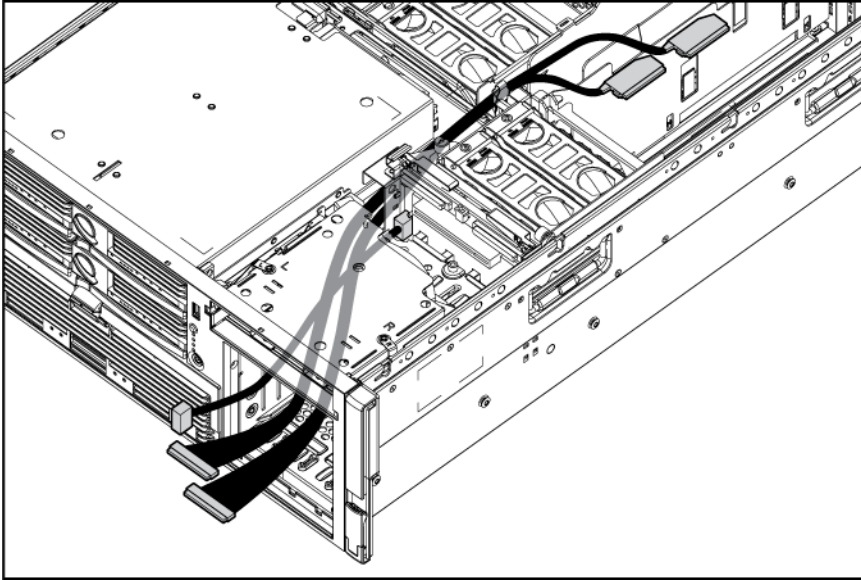
In the PCI duplex cabling configuration, an optional PCI array controller controls up to four hard drives through two SCSI buses. Each bus controls two hard drives.




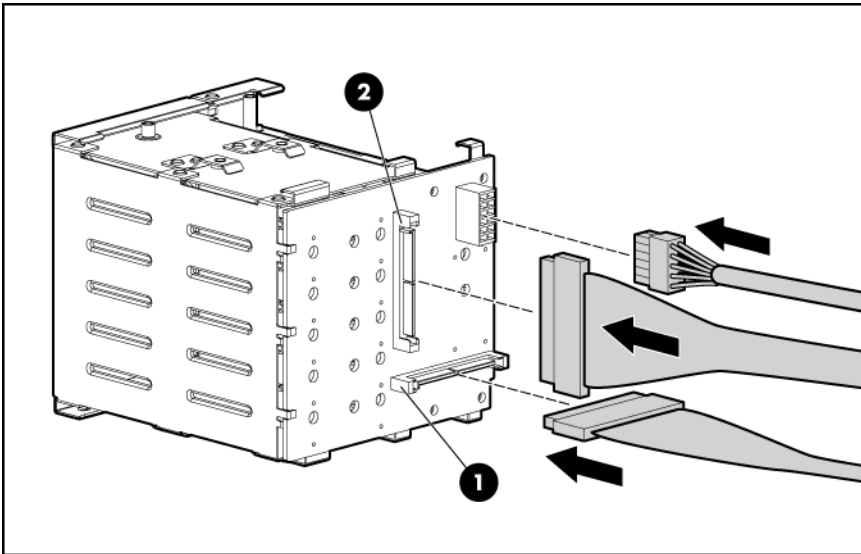
## Hot-plug SAS hard drive cabling

**⚠ CAUTION:** When routing cables, always be sure that the cables are not in a position where they can be pinched or crimped.

For ease of cabling, route the cables in the server before connecting the cables to the SAS hard drive cage.



 **NOTE:** Port 1 supports hard drives 1 through 4. Port 2 supports hard drives 5 through 8. If you are using a single channel SAS controller, connect the cable to port 1.



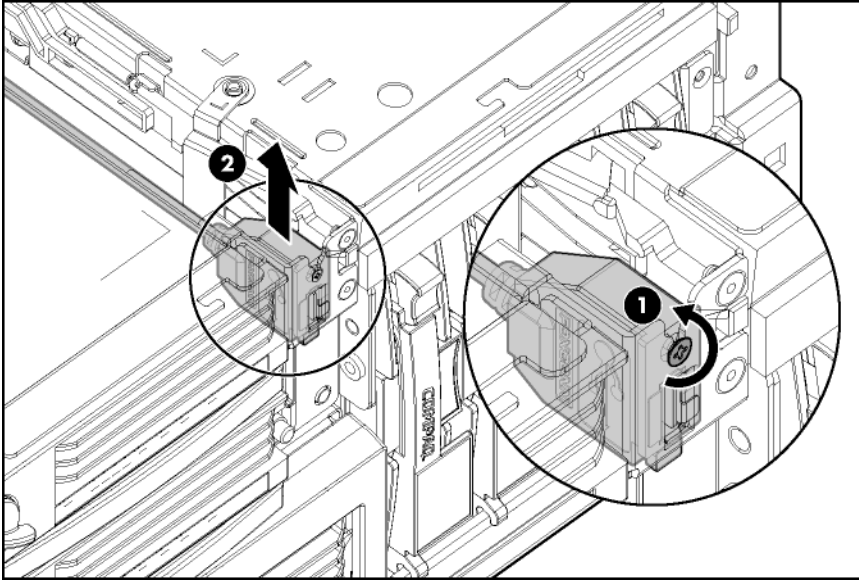
## USB cable assembly

The USB cable connects the front panel USB connector to the SCSI backplane.

To remove the component:

1. Power down the server (on page 16).
2. Extend the server from the rack ("[Extending the server from the rack](#)" on page 15).
3. Remove the access panel ("[Removing the access panel](#)" on page 17).
4. Remove the front bezel ("[Removing the front bezel](#)" on page 18).
5. Disconnect all cables from the media board.
6. Remove the media board ("[Removing the media board](#)" on page 37).

7. Loosen the screw, and slide the USB cable connector up to remove the cable assembly from the server.

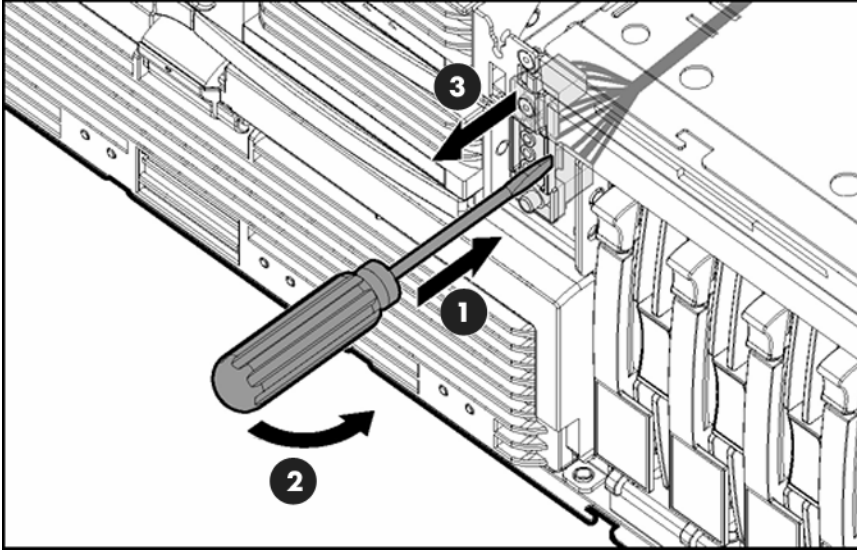


To replace the component, reverse the removal procedure.

## Power switch cable assembly

1. Power down the server (on page 16).
2. Extend the server from the rack ("[Extending the server from the rack](#)" on page 15).
3. Remove the access panel ("[Removing the access panel](#)" on page 17).
4. Remove the front bezel ("[Removing the front bezel](#)" on page 18).
5. Disconnect all cables from the media board.
6. Remove the media board ("[Removing the media board](#)" on page 37).
7. Remove the USB cable assembly.
8. Insert a flat screwdriver into the power switch cable housing next to the middle two LEDs and pry the housing from the chassis.

9. Remove the power switch cable assembly.



To replace the component, reverse the removal procedure.

---

# Specifications

## In this section

Server specifications .....	96
Environmental specifications .....	96
Hot-plug power supply calculations .....	97

## Server specifications

Specification	Value
<b>Dimension</b>	
Height	17.6 cm (6.94 in)
Depth	67.3 cm (26.5 in)
Width	46.3 cm (19.0 in)
Weight (maximum)	47.6 kg (105 lb)
Weight (no drives installed)	36.3 kg (80 lb)
<b>Input requirement</b>	
Rated input voltage	100-127 VAC 200-240 VAC
Rated input frequency	50-60 Hz
Rated input current	@ 100 VAC-12A @ 200 VAC-8A
Rated input power	@100 VAC-1161 W @200 VAC-1598 W
BTUs per hour	@100 VAC-3960 BTU @200 VAC-5450 BTU
<b>Power supply output</b>	
Power supply output	910 W (low line) 1300 W (high line)

## Environmental specifications

Specification	Value
<b>Temperature range*</b>	
Operating	10°C to 35°C (50°F to 95°F)
Shipping	-40°C to 70°C (-40°F to 158°F)
Maximum wet bulb temperature	28°C (82.4°F)



Specification	Value
<b>Relative humidity (noncondensing)**</b>	—
Operating	10% to 90%
Non-operating	5% to 95%

\* All temperature ratings shown are for sea level. An altitude derating of 1°C per 300 m (1.8°F per 1,000 ft) to 3048 m (10,000 ft) is applicable. No direct sunlight allowed.

\*\* Storage maximum humidity of 95% is based on a maximum temperature of 45°C (113°F). Altitude maximum for storage corresponds to a pressure minimum of 70 KPa.

## Hot-plug power supply calculations

For hot-plug power supply specifications and calculators to determine electrical and heat loading for the server, refer to the HP Enterprise Configurator website (<http://h30099.www3.hp.com/configurator/>).

---

# Acronyms and abbreviations

## ABEND

abnormal end

## AMP

Advanced Memory Protection

## ASR

Automatic Server Recovery

## BBWC

battery-backed write cache

## BP

backplane

## CSA

Canadian Standards Association

## DDR

double data rate

## DIMM

dual inline memory module

## ECC

error checking and correcting

## IEC

International Electrotechnical Commission

## iLO

Integrated Lights-Out

## IML

Integrated Management Log

## IPL

initial program load

## IRQ

interrupt request

## LED

light-emitting diode

## MPS

multi-processor specification

## NEMA

National Electrical Manufacturers Association

## NFPA

National Fire Protection Association

## NIC

network interface controller

## NVRAM

non-volatile memory

## ORCA

Option ROM Configuration for Arrays

## PCI

peripheral component interface

## PCI Express

peripheral component interconnect express

## PCI-X

peripheral component interconnect extended

## PCIe

peripheral component interconnect express

## PDU

power distribution unit

## POST

Power-On Self Test

## PPM

processor power module

## PSP

ProLiant Support Pack

## PXE

Preboot Execution Environment

## RBSU

ROM-Based Setup Utility

## RILOE II

Remote Insight Lights-Out Edition II

## SAS

serial attached SCSI

## SATA

serial ATA

## SCSI

small computer system interface

## SDRAM

synchronous dynamic RAM

## SIM

Systems Insight Manager

## SPM

system power module

## SSD

support software diskette

## TMRA

recommended ambient operating temperature

UID

unit identification

USB

universal serial bus

VCA

Version Control Agent

VHDCI

very high density cable interconnect

---

# Index

## A

access panel 6, 17  
ASR (Automatic Server Recovery) 63, 98  
Automatic Server Recovery (ASR) 63, 98  
Autorun menu 60

## B

batteries, replacing 35  
battery 8, 35  
battery pack LEDs 30, 31, 32, 87  
battery-backed write cache 30, 31, 32, 90  
battery-backed write cache battery pack 30, 31, 32, 90  
battery-backed write cache cabling 30, 31, 32, 90  
BIOS upgrade 62  
boot device selector switch 77  
buttons 68, 69, 94

## C

cabling 89, 92  
cabling, power switch 94  
cabling, SCSI hard drive 91  
cabling, USB 93  
CD-ROM drive 19  
CD-RW drive 8, 19  
component identification 6, 8, 68, 69, 70, 72, 73, 74, 75, 80, 82, 83, 84, 85, 87  
components 68, 69, 73, 74  
components, internal 76, 77, 78, 80, 85, 87  
connectors 68  
CSR (customer self repair) 6  
customer self repair (CSR) 6

## D

diagnostic tools 60, 62, 63  
diagnostics utility 63  
DIMM slot LEDs 70, 82  
DIMM slots 80  
DIMMs 51, 56, 59  
DIMMs, single- and dual-rank 51  
diskette drive 8, 19

drive LEDs 82, 84  
DVD±RW drive 19  
DVD-ROM drive 8, 19

## E

electrostatic discharge 14  
environmental specifications 96  
expansion board 28, 29, 30, 47  
expansion board-related port 85 codes 65

## F

fan LED 82, 87  
fan zones 82  
fans 49, 85, 87  
fans, replacing 49  
flash ROM 62  
front bezel 6, 18  
front panel buttons 69  
front panel components 68  
front panel LEDs 69

## H

hard drive blanks 6, 40  
hard drive LEDs 82, 84  
hard drive, replacing 40, 41  
hard drives 40, 41, 82, 84  
hard drives, determining status of 82, 84  
hard drives, types supported 83  
health driver 63, 82  
health LEDs 78, 82  
hot-plug power supply 48, 75  
HP Insight Diagnostics 63  
HP ProLiant Essentials Foundation Pack 63  
HP Systems Insight Manager, overview 63

## I

illustrated parts catalog 6  
iLO (Integrated Lights-Out) 63, 98  
IML (Integrated Management Log) 62  
Insight Diagnostics 63  
Instant Support Enterprise Edition 61  
Integrated Lights-Out (iLO) 63, 98

Integrated Management Log (IML) 62  
internal components 76, 77, 78, 80, 85, 87

## L

LED, power button 69  
LEDs 68, 69, 70, 72, 75, 82, 84, 87  
LEDs, cache module 87  
LEDs, hard drive 82, 84  
LEDs, memory board 70

## M

management tools 60  
mechanical components 6  
media board 37  
media drive 8, 19  
media drive blank 6, 19  
memory backplane 8, 39  
memory boards 50, 56, 57, 70  
memory overview 50  
memory, Advanced ECC 51  
memory, configuration requirements 50  
memory, configuring 50, 55  
memory, mirrored 53  
memory, online spare 52  
memory, RAID 50, 54  
memory, single- and dual-rank DIMMs 50, 51  
memory-related port 85 codes 66  
miscellaneous port 85 codes 66

## N

network interface controller (NIC) 99  
NIC (network interface controller) 99  
NIC connectors 73, 74

## O

Online ROM Flash Component Utility 62  
online spare memory 50, 52  
Option ROM Configuration for Arrays (ORCA) 61  
ORCA (Option ROM Configuration for Arrays) 61  
overtemperature LED 82

## P

PCI Express x4 mezzanine 30, 73, 74  
PCI retaining clip 27  
PCI slot release lever 26  
PCI slots 73, 74  
PCI-X basket 28  
PCI-X Hot Plug mezzanine 29, 73, 74

PCI-X Hot Plug mezzanine cabling 89  
plastics kit 8  
port 85 code, expansion board-related 65  
port 85 code, list 64  
port 85 code, memory-related 66  
port 85 code, miscellaneous 66  
port 85 code, processor-related 64  
port 85 code, troubleshooting 64  
port 85 code, viewing 64, 78, 80  
power backplane 8, 39  
power button cabling 94  
power button/LED board 94  
power requirements 97  
power supplies 48, 97  
power supply blank 6, 48  
power supply LEDs 75  
power supply output 97  
powering down 16  
PPM (Processor Power Module) 8, 25  
PPM failure LEDs 72, 78, 82  
preparation procedures 14  
processor failure LEDs 72, 78  
processor module 6, 20, 22, 25  
Processor Power Module (PPM) 8, 25  
processor zone fans 85  
processor-related port 85 codes 64  
processors 8, 22

## Q

QuickFind diagnostic LEDs 78

## R

RBSU (ROM-Based Setup Utility) 55, 61  
rear components 73, 74  
rear panel connectors 73, 74  
rear panel LEDs 75  
remote support and analysis tools 61  
removal and replacement procedures 13  
removing server from rack 16  
RILOE II cabling 90  
ROM, updating 62  
ROM-Based Setup Utility (RBSU) 55, 61  
ROMPaq utility 62

## S

safety considerations 14  
SAS backplane 46  
SAS hard drive LEDs 84  
SATA backplane 46

- SATA cabling 92
- SATA drives 83
- scripted installation 60
- SCSI backplane 37
- SCSI hard drive cabling 91
- SCSI hard drive cabling, duplex mode 92
- SCSI hard drive cabling, SCSI mode 92
- SCSI IDs 80
- serial number 34
- server asset text 34
- server warnings and cautions 14
- SmartStart autorun menu 60
- SmartStart Scripting Toolkit 60
- SmartStart, overview 60
- specifications 96
- specifications, environmental 96
- static electricity 14
- support packs 60
- system battery 8, 35
- system board 8, 32, 34, 75, 76
- system cage 17
- system components 8
- system maintenance switch 77
- Systems Insight Manager 63

## **T**

- temperature, overtemperature LED 82
- tools 13, 60, 73, 74

## **U**

- USB connectors 73, 74
- USB support 64
- utilities 60, 61, 62, 63
- utilities, deployment 60, 61