HP ProLiant ML350 Generation 4 Server Maintenance and Service Guide

August 2005 (Third Edition)
Part Number 356698-003

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Audience assumptions

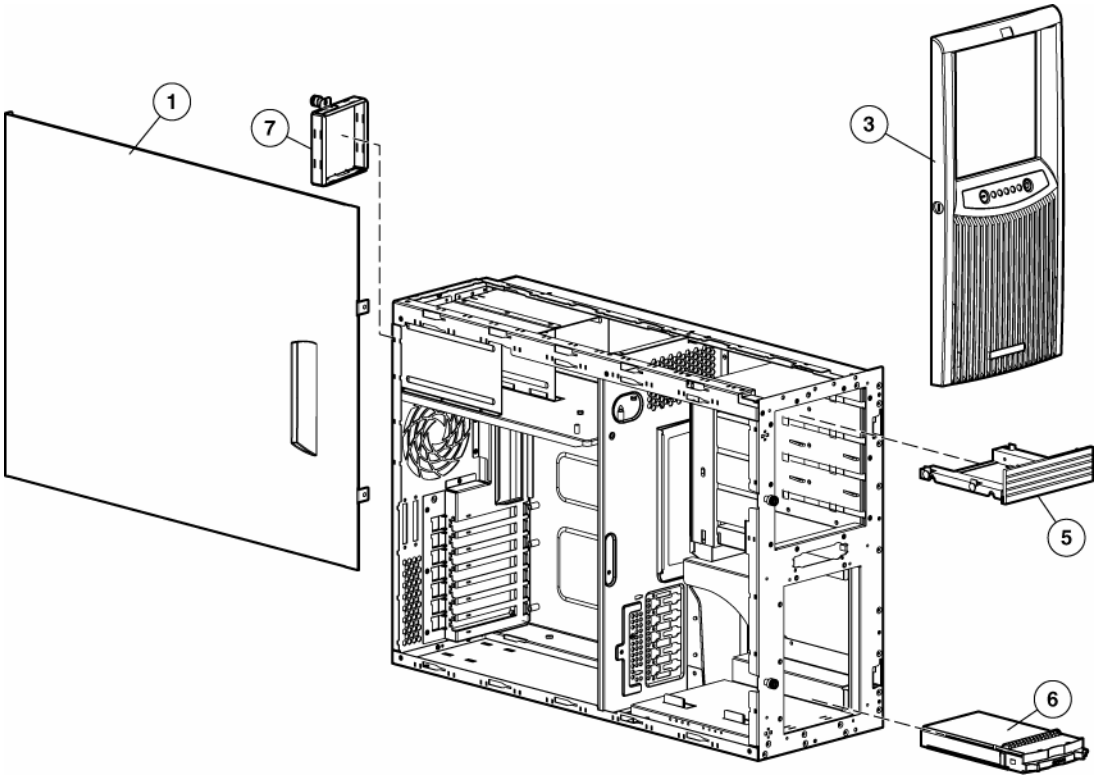
This guide is for an experienced service technician. HP assumes you are qualified in the servicing of computer equipment and trained in recognizing hazards in products with hazardous energy levels and are familiar with weight and stability precautions for rack installations.

Contents

Illustrated parts catalog

In this section

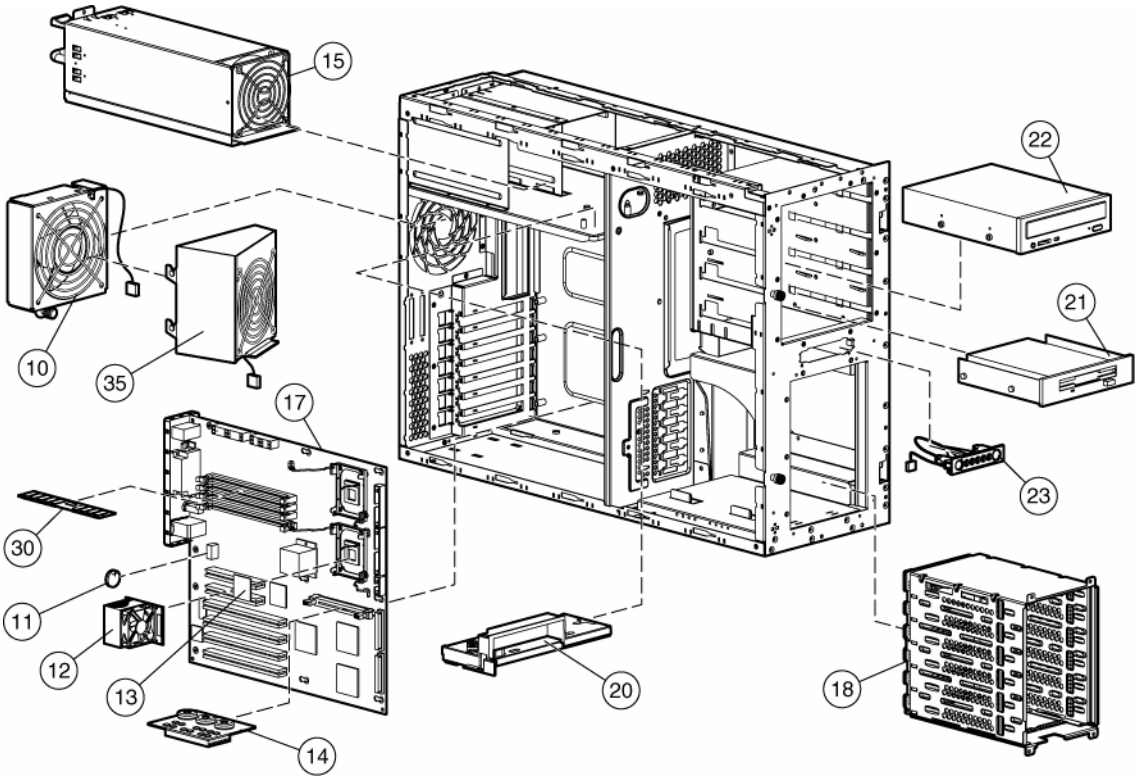
Mechanical Components



Item	Description	Spare Part Number
1	Access panel, tower	365058-001
2	Access panel, rack*	371714-001
3	Tower bezel	365064-001
4	Rack bezel*	371752-001
5	Removable media blank	231212-001
6	SCSI Hard drive blank	319602-001
7	Hot-plug power supply blank	365059-001
8	Return kit (tower model)*	365060-001
9	Return kit (rack model)*	250189-001

*Not shown

System Components



Item	Description	Spare Part Number
	System Components	
10	Fan assembly, 120 mm	367637-001
11	3.0-V lithium battery	234556-001
12	Heatsink	366866-001
13	Processor	
13a	Intel® Xeon™ 3.00-GHz with 800-MHz system bus*	366864-001
13b	Intel® Xeon™ 3.20-GHz with 800-MHz system bus*	373521-001
13c	Intel® Xeon™ 3.40-GHz with 800-MHz system bus*	376069-001
14	Processor power module (PPM)	347884-001
15	Hot-plug power supply, 725-watt, 12-V	365063-001
16	Non hot-plug power supply with tray*	365220-001
	Boards	
17	System board with processor cage	365062-001
18	Hard drive cage with SCSI simplex backplane	366862-001
19	Non-hot-plug hard drive cage*	370782-001
20	Power supply backplane	365065-001
	Mass Storage Devices	
21	Diskette drive, 3-mode, 1.44-MB with USB	372058-001
22	CD-ROM drive, IDE, 48X	288894-001
	Miscellaneous	

Item	Description	Spare Part Number
23	Power switch	292236-001
24	Plastics kit*	250843-001
25	Country kit*	366859-001
	Cables	
26	Miscellaneous signal cable kit*	163353-001
27	AC power cable, 12 ft, 120-V*	187335-001
28	SCSI cable*	367168-001
29	SCSI point-to-point cable*	292232-001
	Memory	
30	512-MB DDR DIMM PC2700	370780-001
31	1-GB DDR DIMM PC2700*	367167-001
32	2-GB DDR DIMM PC2700*	367553-001
	Options	
33	Two-bay, hot-plug drive cage*	253761-001
34	Tower-to-rack conversion kit*	366861-001
35	Redundant system fan assembly	372213-001
36	Duplex SCSI backplane*	371722-001
37	Second Serial Port*	372657-001
38	Keyboard*	355630-001
39	Mouse*	344704-001

*Not shown

Removal and replacement procedures

In this section

Required Tools

You need the following items for some procedures:

- Torx T-15 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.

Symbols on equipment

The following symbols may be placed on equipment to indicate the presence of potentially hazardous conditions.

This symbol indicates the presence of hazardous energy circuits or electric shock hazards. Refer all servicing to qualified personnel.

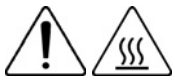
WARNING: To reduce the risk of injury from electric shock hazards, do not open this enclosure. Refer all maintenance, upgrades, and servicing to qualified personnel.

This symbol indicates the presence of electric shock hazards. The area contains no user or field serviceable parts. Do not open for any reason.

WARNING: To reduce the risk of injury from electric shock hazards, do not open this enclosure.

This symbol on an RJ-45 receptacle indicates a network interface connection.

WARNING: To reduce the risk of electric shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.



This symbol indicates the presence of a hot surface or hot component. If this surface is contacted, the potential for injury exists.

WARNING: To reduce the risk of injury from a hot component, allow the surface to cool before touching.

27.22 kg

60 lb

This symbol indicates that the component exceeds the recommended weight for one individual to handle safely.

WARNING: To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manual material handling.

These symbols, on power supplies or systems, indicate that the equipment is supplied by multiple sources of power.

WARNING: To reduce the risk of injury from electric shock, remove all power cords to completely disconnect power from the system.

Rack warnings and cautions

⚠ **WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:**

- **The leveling jacks are extended to the floor.**
- **The full weight of the rack rests on the leveling jacks.**
- **The stabilizing feet are attached to the rack if it is a single-rack installation.**
- **The racks are coupled together in multiple-rack installations.**
- **Only one component is extended at a time. A rack may become unstable if more than one component is extended for any reason.**

⚠ **WARNING: To reduce the risk of personal injury or equipment damage when unloading a rack:**

- **At least two people are needed to safely unload the rack from the pallet. An empty 42U rack can weigh as much as 115 kg (253 lb), can stand more than 2.1 m (7 ft) tall, and may become unstable when being moved on its casters.**
- **Never stand in front of the rack when it is rolling down the ramp from the pallet. Always handle the rack from both sides.**

⚠ **WARNING: To reduce the risk of personal injury or damage to the equipment, adequately stabilize the rack before extending a component outside the rack. Extend only one component at a time. A rack may become unstable if more than one component is extended.**

⚠ **WARNING: When installing a server in a telco rack, be sure that the rack frame is adequately secured to the top and bottom of the building structure.**

Preparation procedures

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

- Extend the server from the rack ("Extending the server from the rack" on page 11).

  If you are performing service procedures in a Compaq branded rack, telco rack, 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 ("Powering down the server" on page 11).

  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 ("Removing the server from the rack" on page 12).

  If the rack environment, cabling configuration, or the server location in the rack creates awkward conditions, remove the server from the rack.

Powering 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 operating system as directed by the operating system documentation.
2. Press the Power On/Standby button to place the server in standby mode. When the server activates standby power mode, the system power LED changes to amber.
3. Disconnect the power cords.

The system is now without power.

CAUTION: Due to the high capacitance in the power supply, please wait 30 seconds after removing the power cable before opening the access panel.

Extending the server from the rack

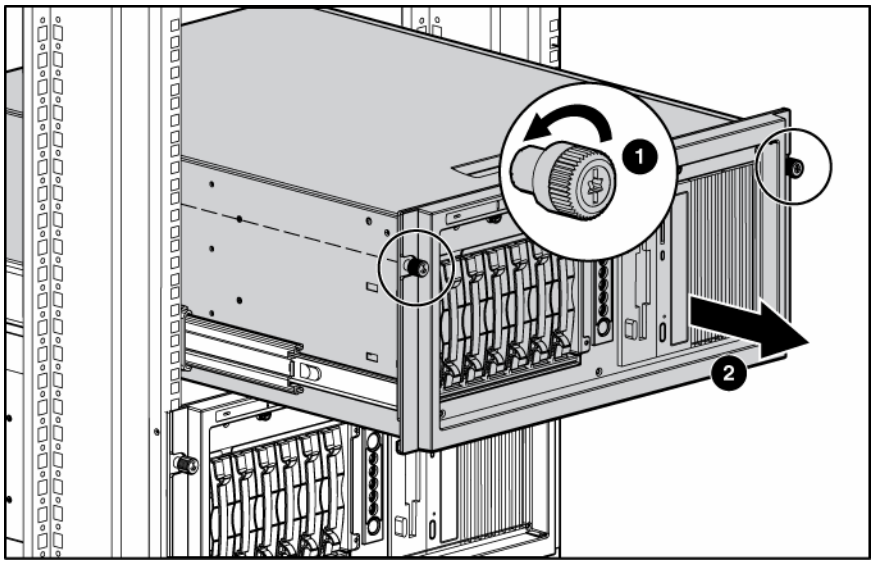
1. Loosen the thumbscrews that secure the server faceplate to the front of the rack.

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:
   a. Press the server rail-release latches and slide the server fully into rack.
   b. Secure the server by tightening the thumbscrews.

Access Panel

To remove the component from a rack server:

1. Power down the server ("Powering down the server" on page 11).
2. Remove the server from the rack ("Removing the server from the rack" on page 12).
3. Loosen the two thumbscrews on the front panel of the server near the access panel.
4. Slide the access panel back about 1.5 cm (0.5 in).
5. Lift and remove the access panel.

To remove the component from a tower server:

1. Power down the server ("Powering down the server" on page 11).
2. Remove the front bezel, if necessary ("Removing the front bezel (tower model)" on page 13).
3. Loosen the two thumbscrews on the front panel of the server near the access panel.
4. Slide the access panel back about 1.5 cm (0.5 in).
5. Lift and remove the access panel.

NOTE: Turn the access panel over to locate the System Configuration and Options hood labels. These labels will provide information on installing various options, flexible memory configurations, LED status indicators, and switch settings.

To replace the component, reverse the removal procedure.

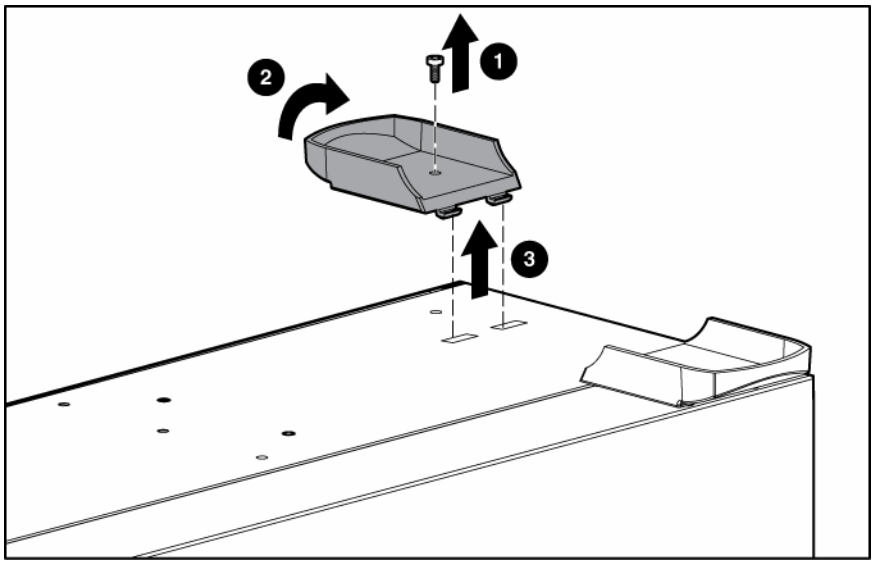
Removing the server from the rack

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

1. Power down the server ("Powering down the server" on page 11).
2. Loosen the front panel thumbscrews that secure the server faceplate to the front of the rack.
3. Disconnect the cabling and remove the server from the rack. Reverse the server installation steps in the documentation that ships with the rack-mounting option.
4. Place the server on a sturdy, level surface.

Removing tower feet

Remove the feet.

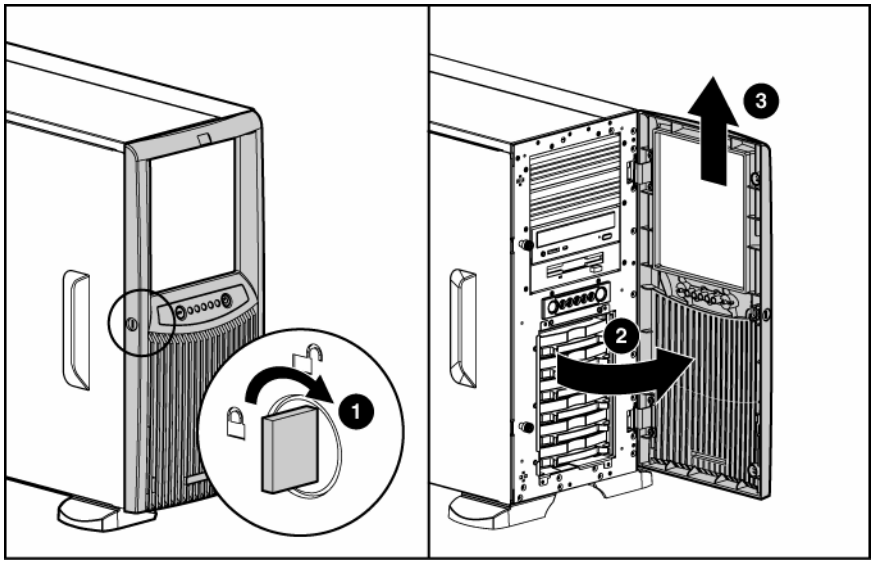


Removing the front bezel (tower model)

This server has a removable front bezel that must be unlocked and opened before accessing the hard drive cage or removing the access panel. The door should be kept closed during normal server operations.

Use the key provided with the server to unlock the bezel with a clockwise turn.

If necessary, remove the front bezel.

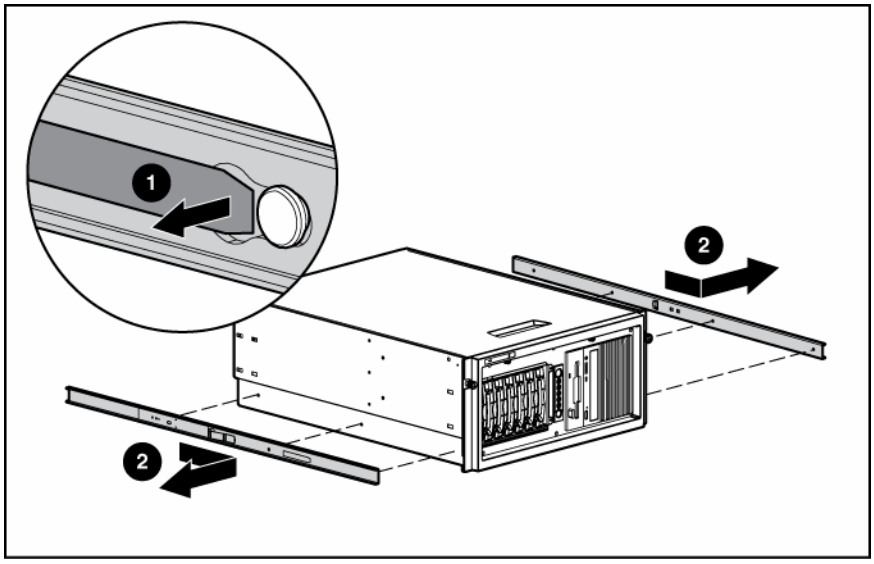


Rack rails

NOTE: This procedure applies to rack servers only.

To remove the component:

1. Use a flat-head screwdriver to lift the spring tab.
2. Slide the rail forward and remove it from the server.



3. Repeat steps 1 and 2 to remove other rail.

To replace the component, reverse the removal procedure.

Removing the power supply blank

Remove the thumbscrew that secures the redundant power supply blank, and then pull the blank from the back of the server.

Hot-plug power supply

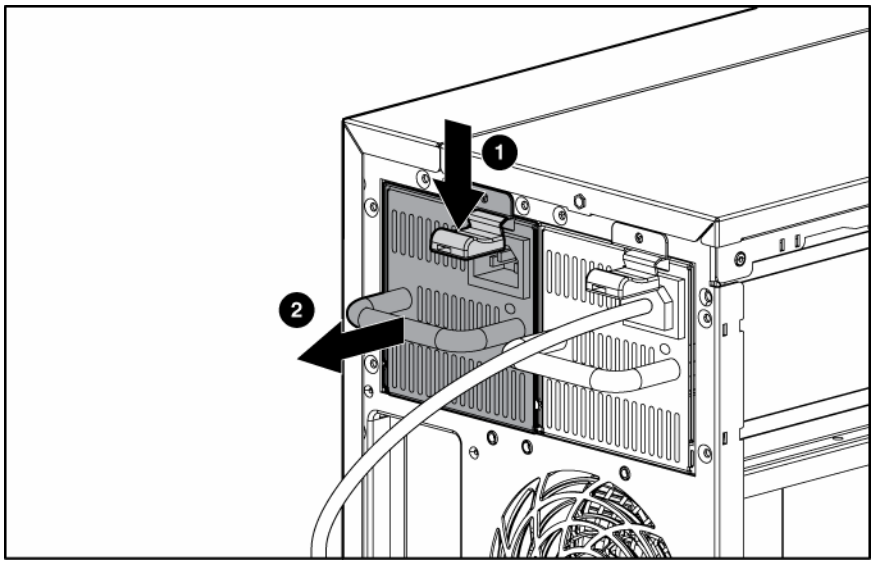
⚠ **WARNING: To reduce the risk of electric shock, do not disassemble the power supply or attempt to repair it. Replace it only with the specified spare part.**

⚠ **CAUTION:** Do not attempt to remove and replace a power supply as a hot-plug procedure unless both bays are populated with power supplies.

To remove the component:

1. Remove the power cord from the unit to be removed.

2. Push down on the power supply release latch, and remove the 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.

Non-hot-plug power supply

WARNING: To reduce the risk of personal injury or damage to the equipment, the installation of power supplies should be performed only by individuals who are qualified in servicing server equipment and trained to deal with products capable of producing hazardous energy levels.

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.

WARNING: To reduce the risk of personal injury from hot surfaces, observe the thermal labels on each power supply or module.

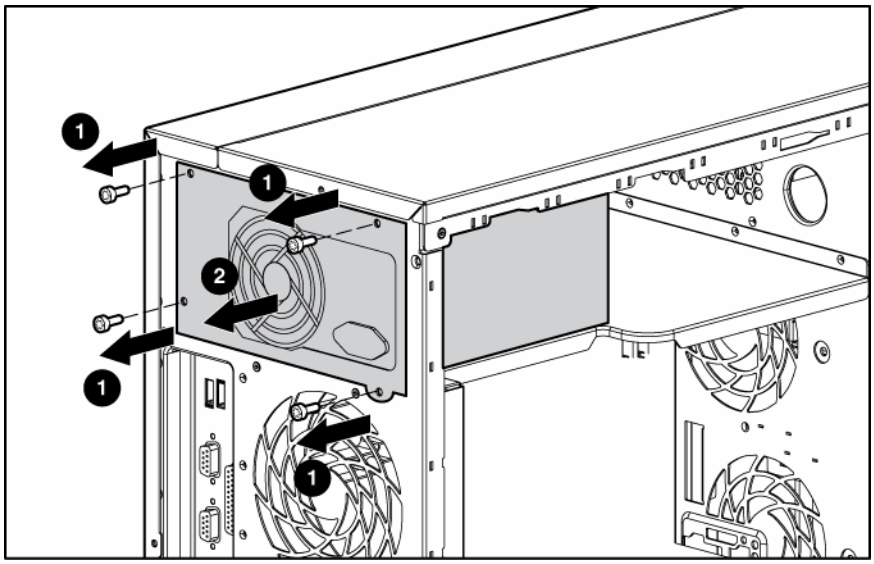
WARNING: To reduce the risk of injury from electric shock hazards, do not open power supplies. Refer all maintenance, upgrades, and servicing to qualified personnel.

CAUTION: Electrostatic discharge (ESD) can damage electronic components. Be sure that you are properly grounded (earthed) before beginning any installation procedure.

To remove the component:

1. Remove the access panel ("Access Panel" on page 12).
2. Remove the power cord from the unit to be removed.

3. Remove the four screws from the chassis, and remove the power supply from the server.



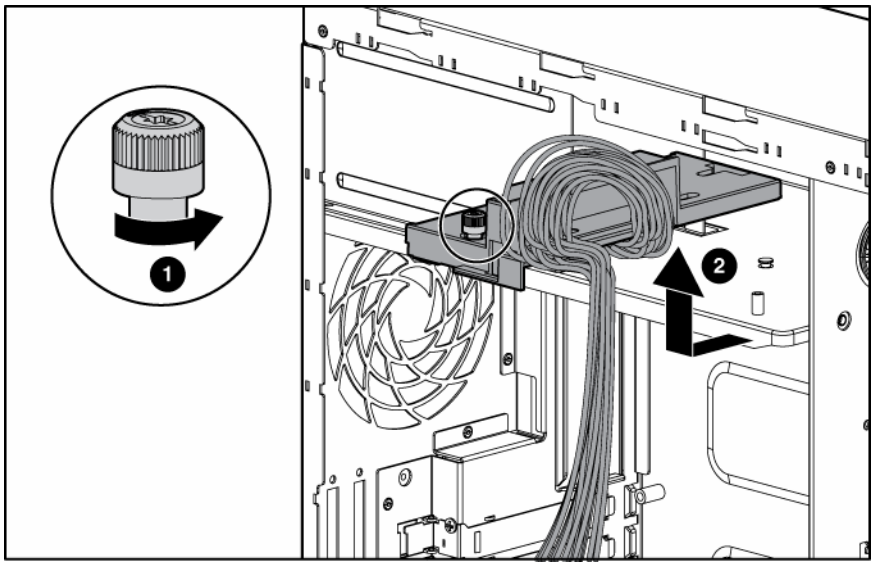
CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

To replace the component, reverse the removal procedure.

Hot-Plug Power Supply Backplane

To remove the component:

1. Remove the power supplies from the server.
2. Remove the access panel ("Access Panel" on page 12).
3. Remove cables from the components connected to the power supply backplane.
4. Remove the power supply backplane.



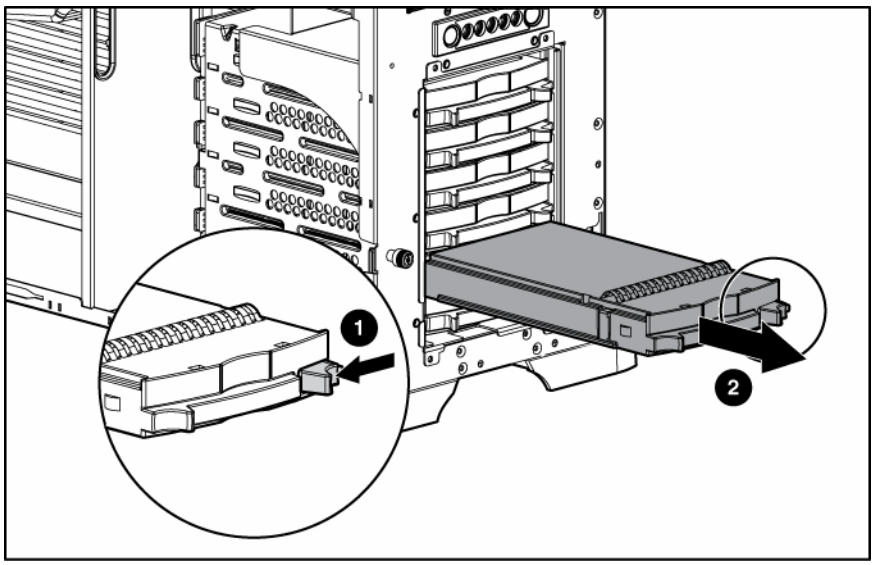
To replace the component, reverse the removal procedure.

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.

Removing a hard drive blank

To remove a hard drive blank, push the lever to release the blank and pull out.

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.



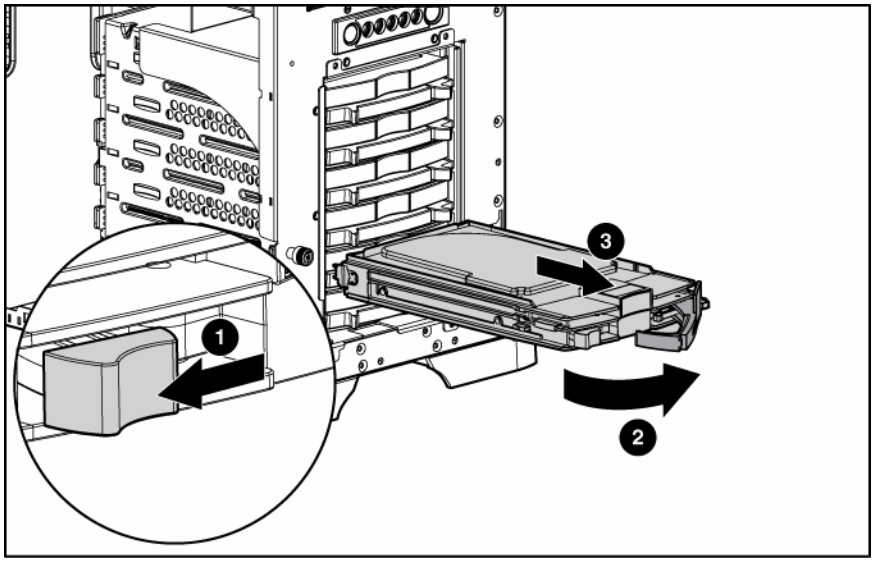
NOTE: Depending on model purchased, the server may look slightly different than shown.

Hot-Plug SCSI Hard Drive

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 remove the component:

1. Back up all server data on the hard drive.
2. Open the front bezel ("Removing the front bezel (tower model)" on page 13).
3. Remove the hard drive.



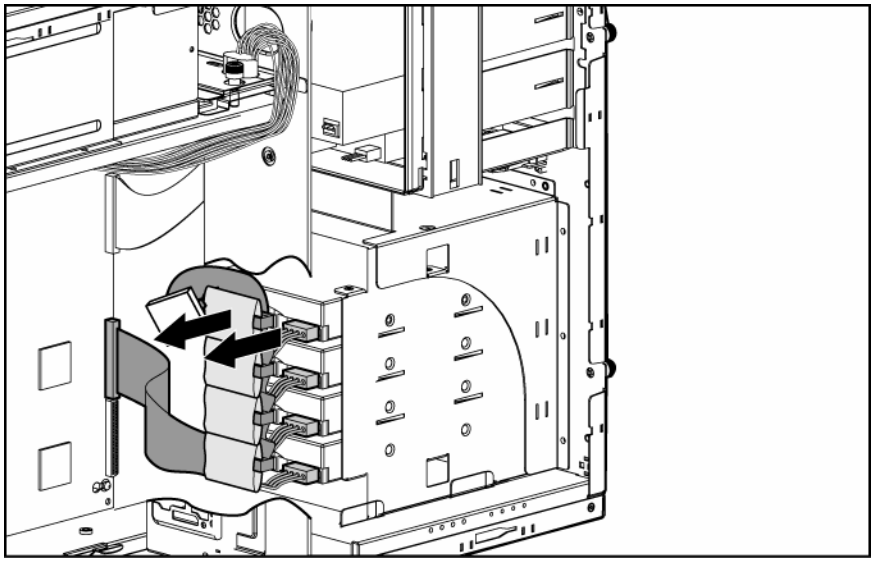
To replace the component, reverse the procedure.

Non-hot-plug SCSI hard drive

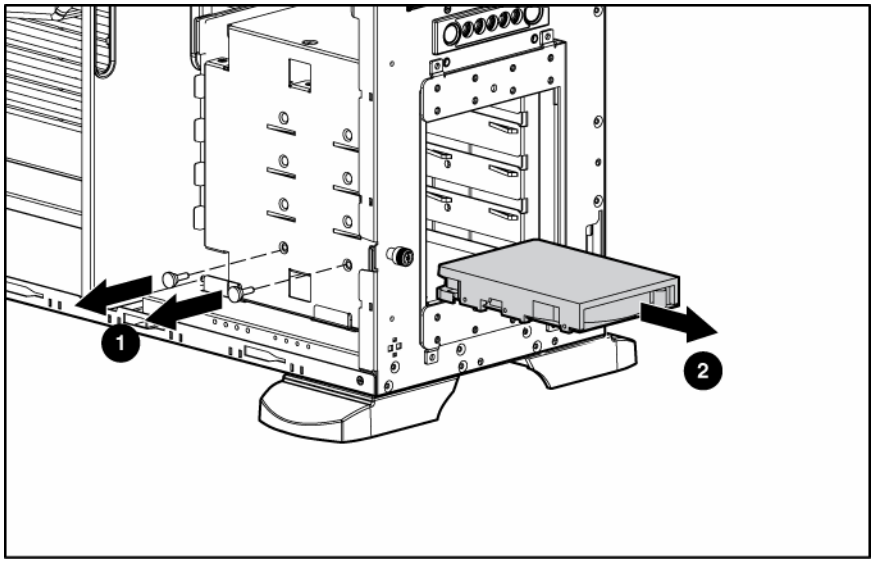
CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

To remove the component:

1. Back up all server data on the hard drive.
2. Remove the access panel ("Access Panel" on page 12).
3. Disconnect the power cable and the four-device SCSI cable from the hard drive.



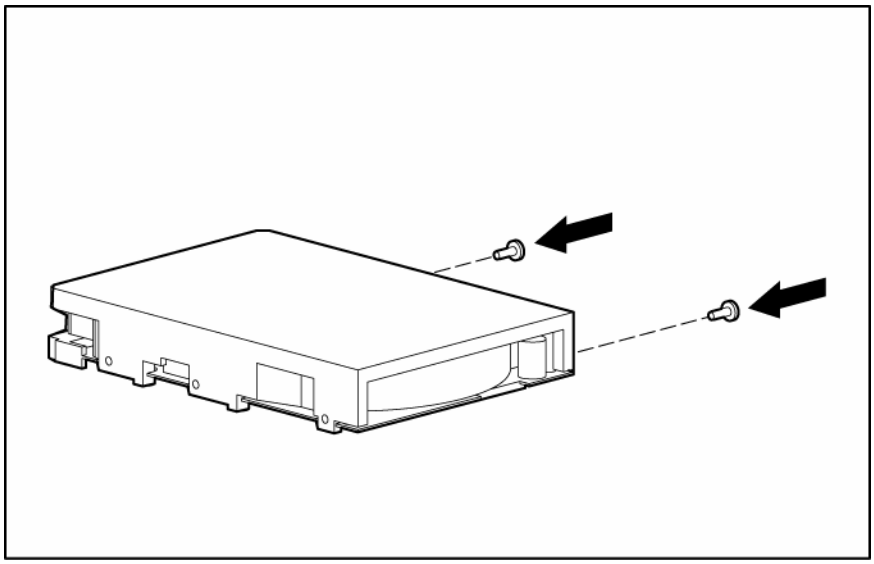
4. Remove screws from the hard drive bay, and remove the hard drive.



To replace the component:

1. Set the SCSI ID for the non-hot-plug SCSI hard drive. Refer to the documentation that ships with the hard drive.

2. Install two screws on the side of the hard drive to ensure proper alignment inside the bay.



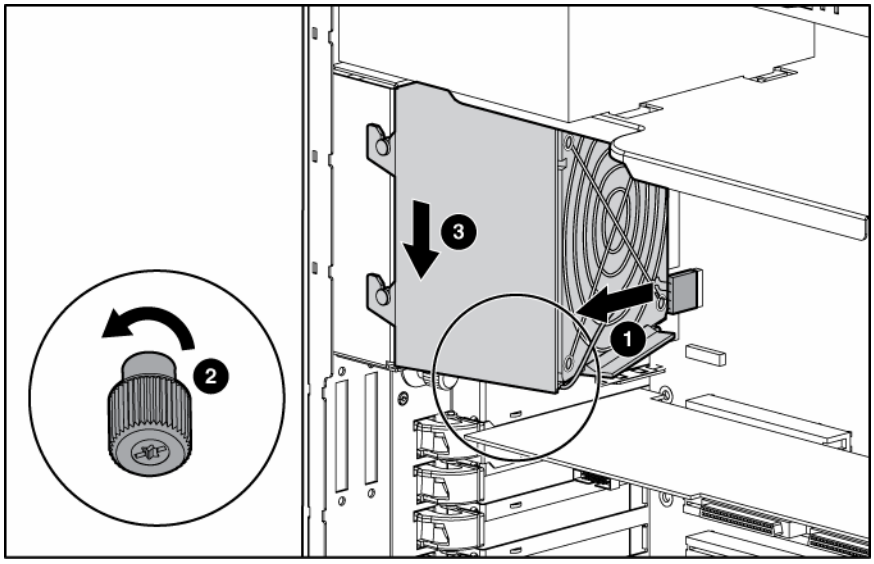
3. Replace the hard drive into the hard drive bay, and reinstall the screws.
4. Reconnect the power cable and the four-device SCSI cable to the hard drive.
5. Replace the access panel ("Access Panel" on page 12).

Redundant system fan

CAUTION: The redundant system fan is not hot-pluggable.

To remove the redundant system fan:

1. Remove the access panel ("Access Panel" on page 12).
2. Remove the redundant system fan cable from the redundant system fan header on the system board.
3. Remove the fan.

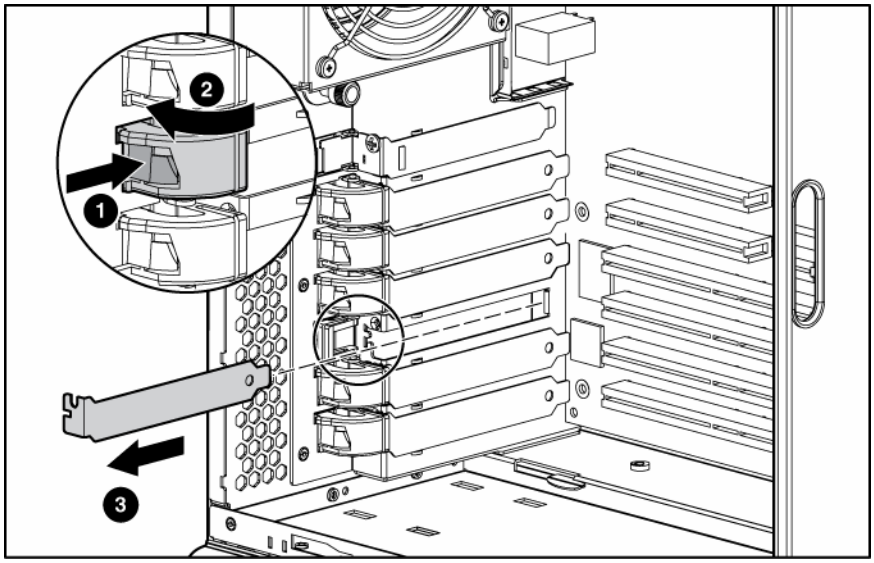


To replace the component, reverse the removal procedure.

Expansion Slot Cover

To remove the component:

1. Remove the access panel ("Access Panel" on page 12).
2. Remove the expansion slot cover.



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

To replace the component, reverse the removal procedure.

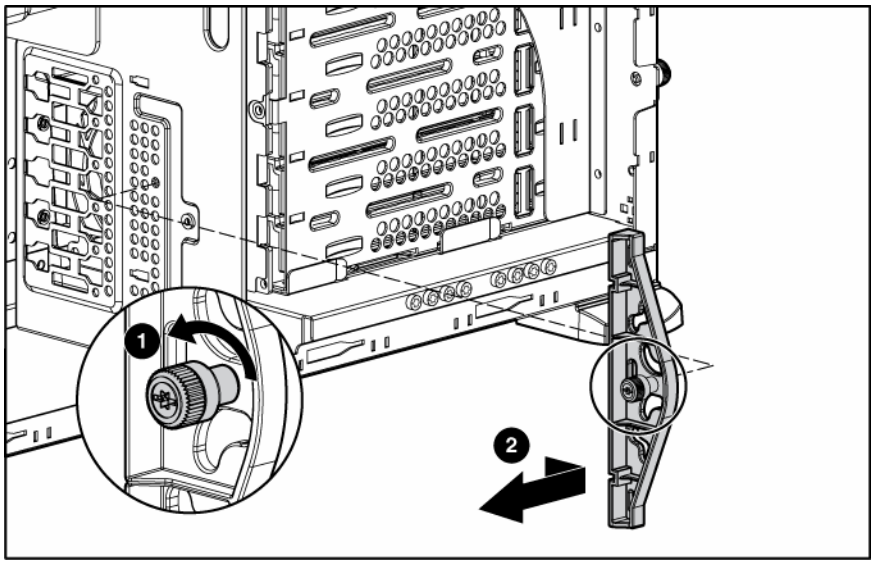
Expansion board

CAUTION: To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the expansion boards.

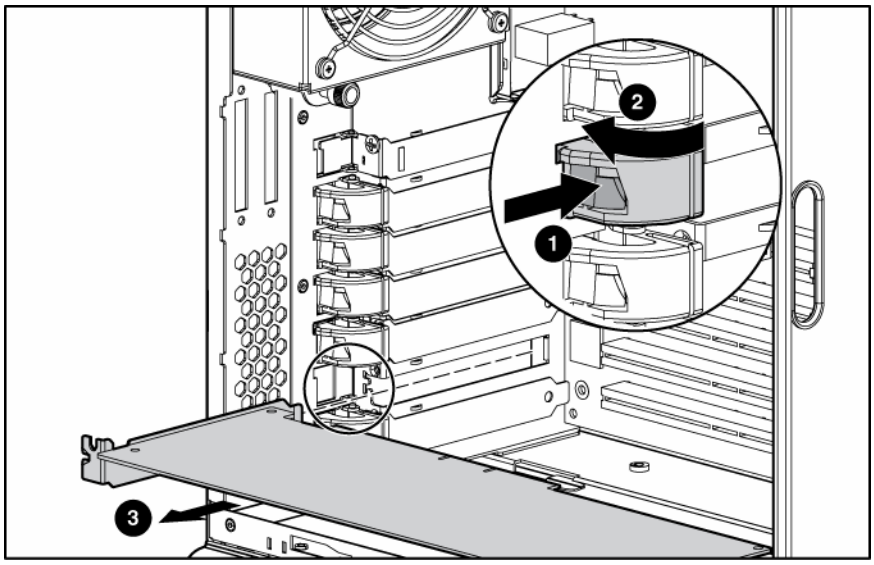
To remove the component:

1. Remove the access panel ("Access Panel" on page 12).

2. Remove the expansion board retainer.



3. Disconnect any internal or external cables from the expansion board.
4. Remove the expansion board.



5. Reinstall the expansion board retainer, then tighten the thumbscrew.

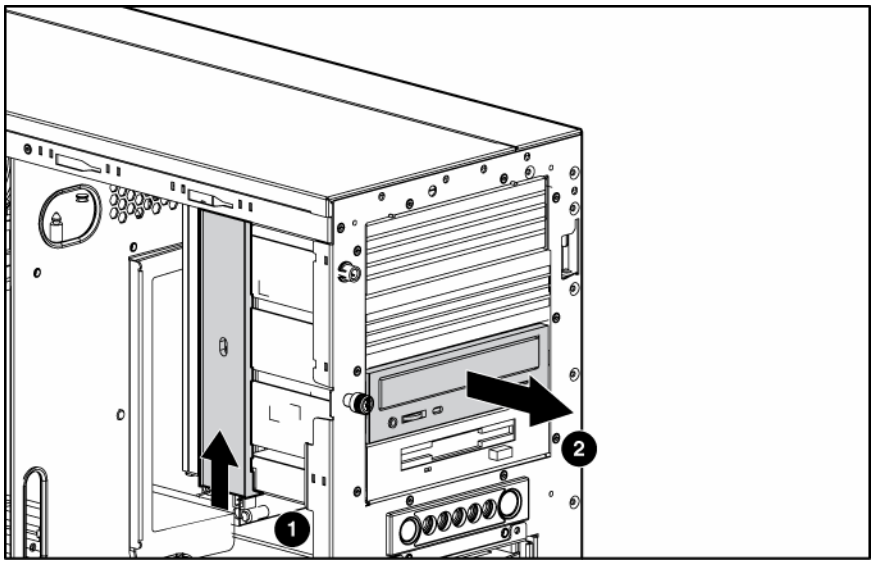
To replace the component, reverse the removal procedure.

CD-ROM drive

To remove the component:

1. Remove the access panel ("Access Panel" on page 12).
2. Disconnect the cables from the rear of the CD-ROM drive.

3. Push up on the release lever and push the drive partially out through the front of the server.



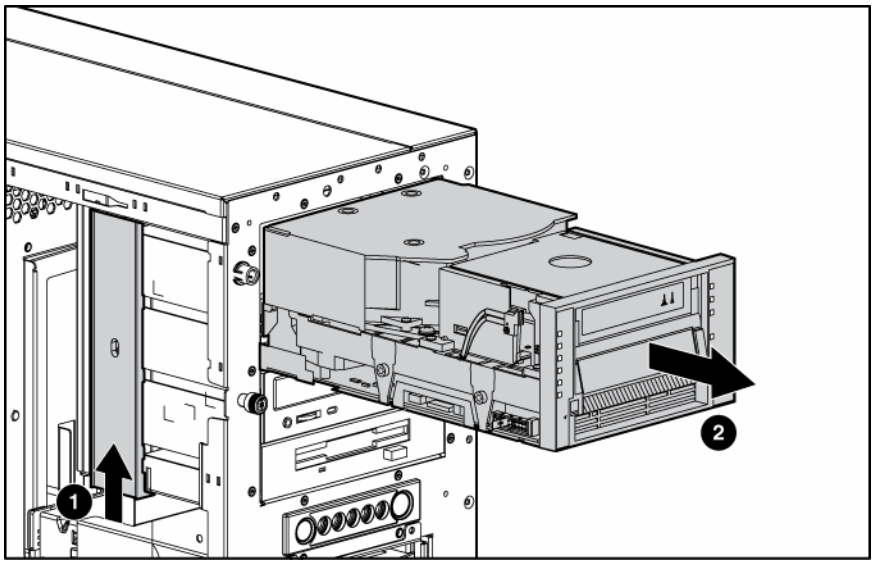
4. Remove the CD-ROM drive.

To replace the component, reverse the removal procedure.

Tape drive

To remove the component:

1. Remove the access panel ("Access Panel" on page 12).
2. Disconnect the data and power cables from the rear of the tape drive.
3. Push up on the release lever and push the drive partially out through the front of the server.



4. Remove the tape drive.

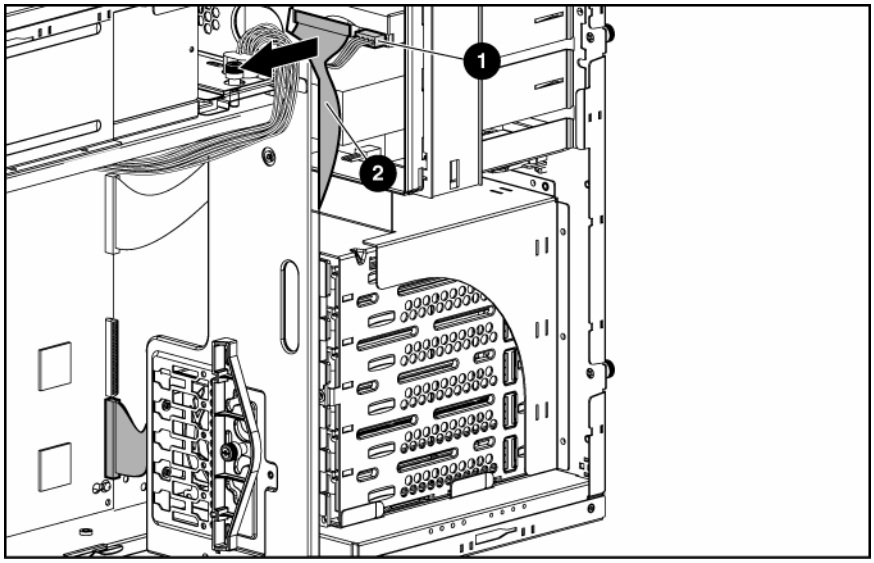
To replace the component, reverse the removal procedure.

IMPORTANT: HP recommends installing the tape drive on a separate SCSI cable to avoid a decrease in performance on other SCSI devices.

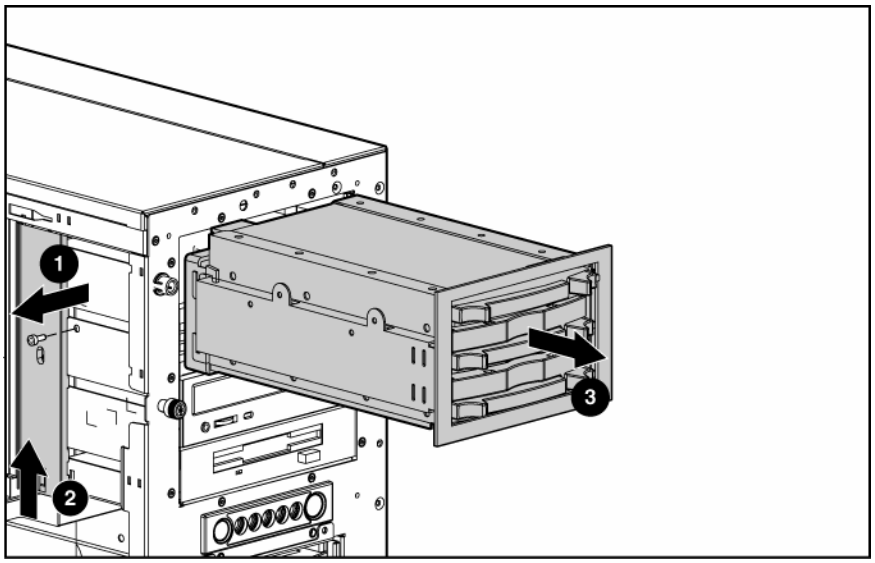
Internal two-bay hot-plug SCSI drive cage

To remove the component:

1. Remove the access panel ("Access Panel" on page 12).
2. Access the removable media cage.
3. Disconnect the SCSI and power cables.



4. Remove the drive cage from the chassis.



To replace the component, reverse the removal procedure.

IMPORTANT: Be sure that the unit identification numbers (0 and 1) appear on the right side of the drive cage front panel.

Refer to the *HP Internal Two-Bay Hot-Plug SCSI Drive Cage Installation Instructions* for additional information.

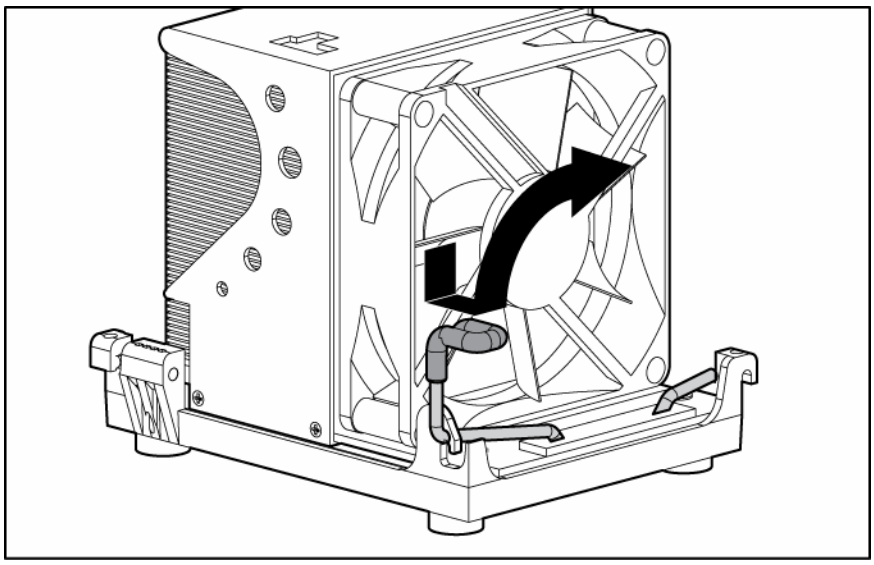
Processor and Heatsink

IMPORTANT: If upgrading processor speed, update the system ROM before installing the processor.

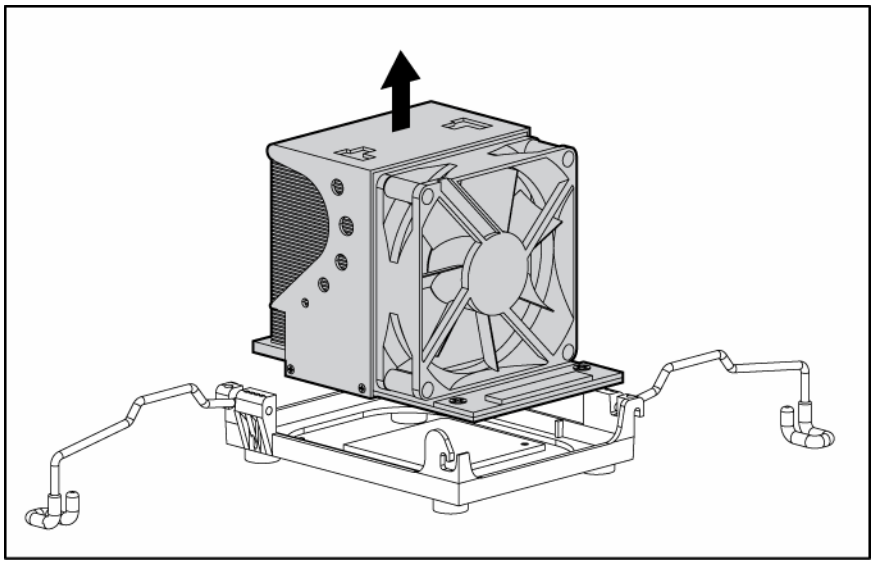
IMPORTANT: PPM 2 must be installed when processor 2 is installed. The system fails to boot if the PPM is missing.

To remove a processor and heatsink:

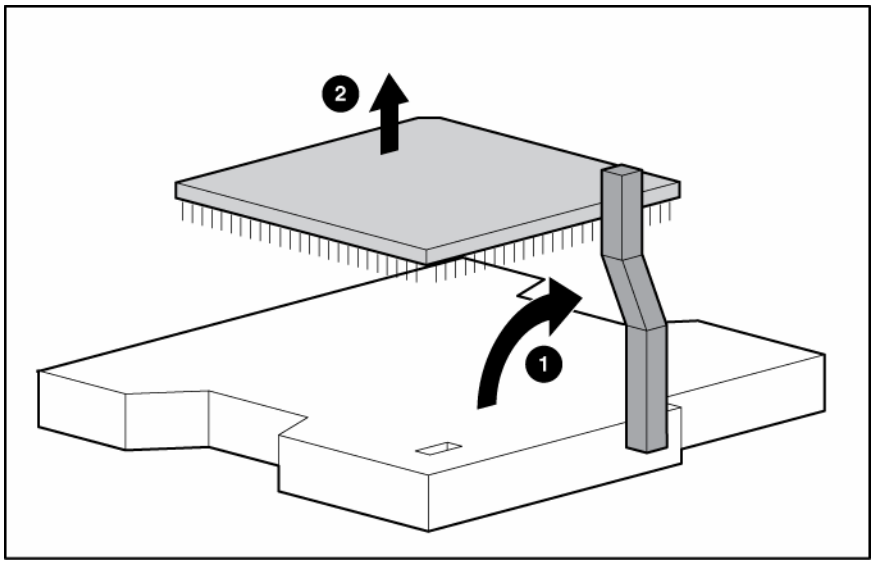
1. Remove the access panel ("Access Panel" on page 12).
2. Disconnect the heatsink connectors from the headers on the system board ("System Board Components" on page 40).
3. Open the heatsink retaining levers.



4. Remove the heatsink.



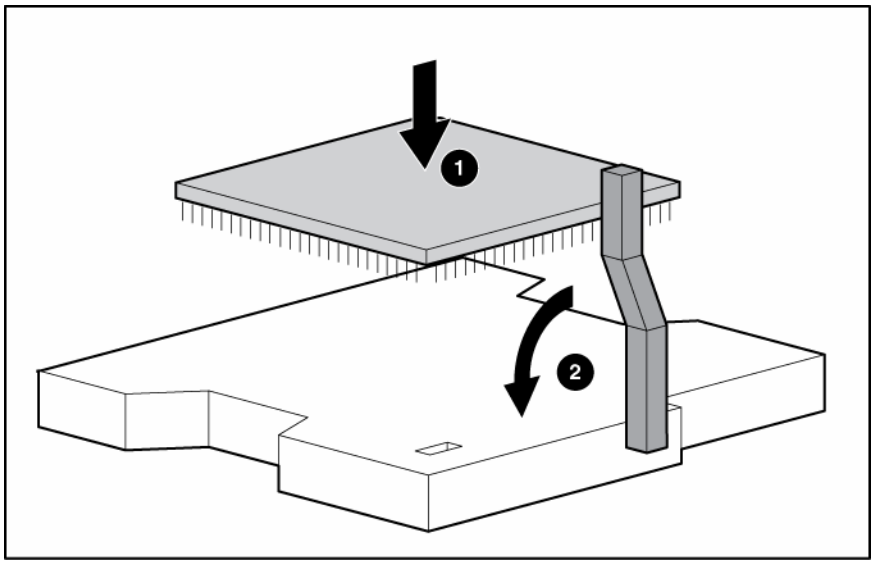
5. Open the processor locking lever and remove the processor.



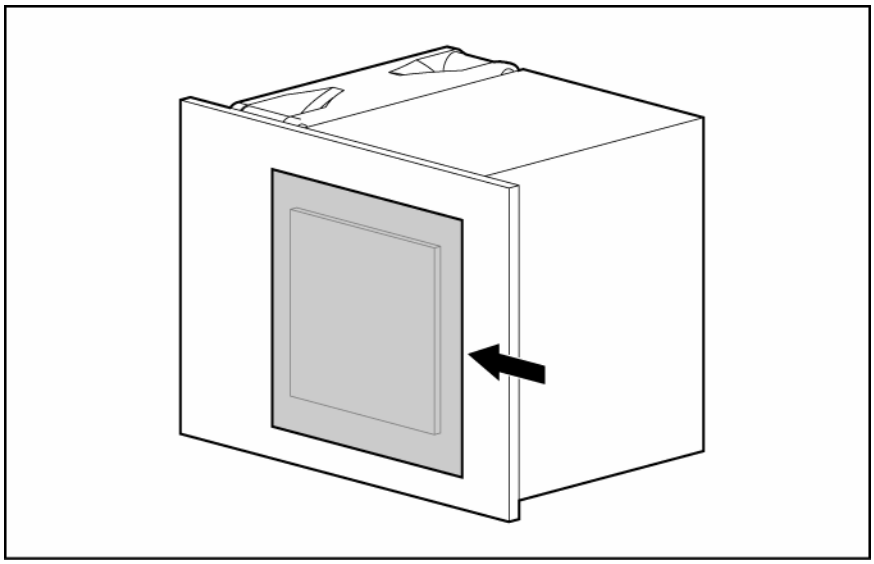
To replace the processor and heatsink:

1. Open the processor locking lever, if necessary.
2. Install the processor and close the processor locking lever.

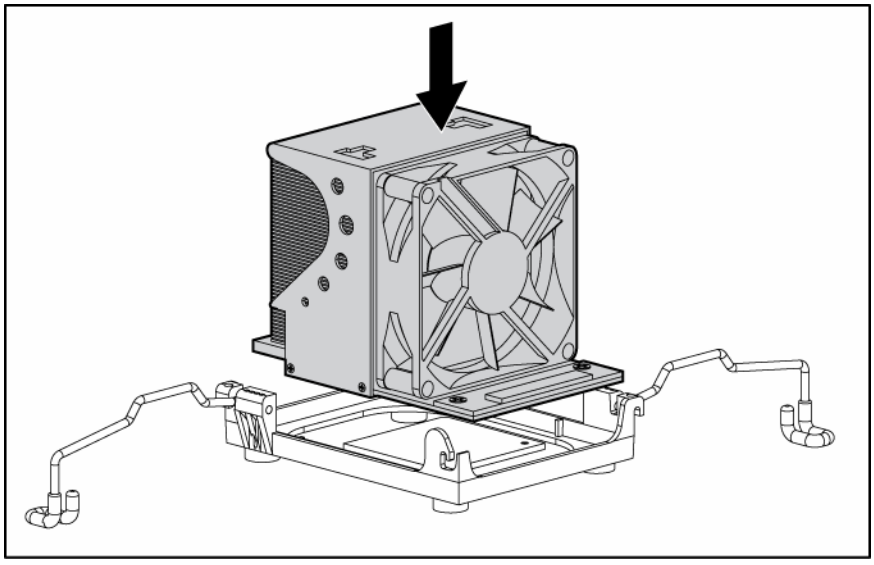
△ **CAUTION:** Forcing the processor locking lever could lead to hardware damage.



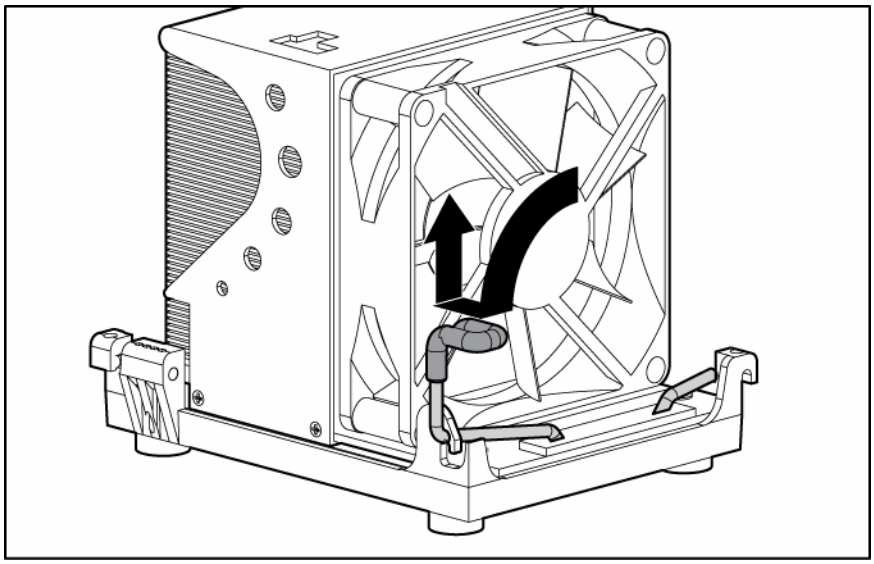
IMPORTANT: Do not remove the thermal tape from the bottom of the heatsink. Removing the tape will affect the thermal solution and prevent the system from working properly.



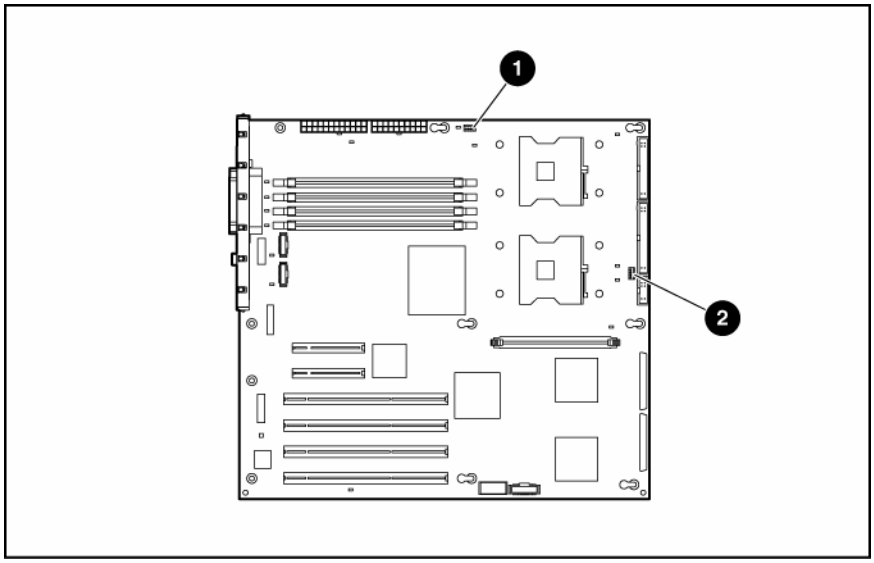
3. Install the heatsink.



4. Close the processor retaining brackets.



5. Connect the heatsink connector to the correct header on the system board.



Item	Description
1	CPU 1 heatsink header
2	CPU 2 heatsink header

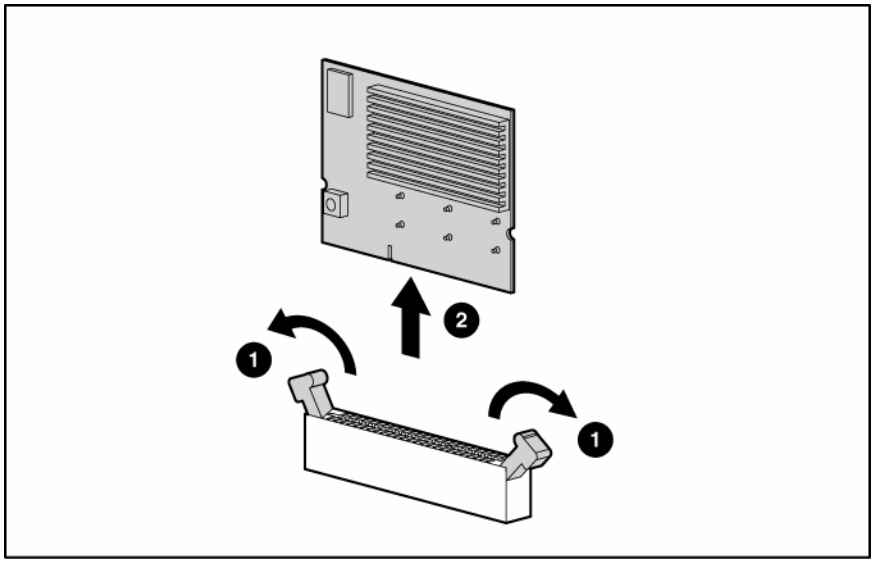
6. Replace the access panel ("Access Panel" on page 12).

PPM

To remove the component:

1. Remove the access panel ("Access Panel" on page 12).
2. Open the latches on the PPM slot.
3. Install the PPM for processor 2 (if installing a second processor).

NOTE: PPM 1 is embedded onto the system board.



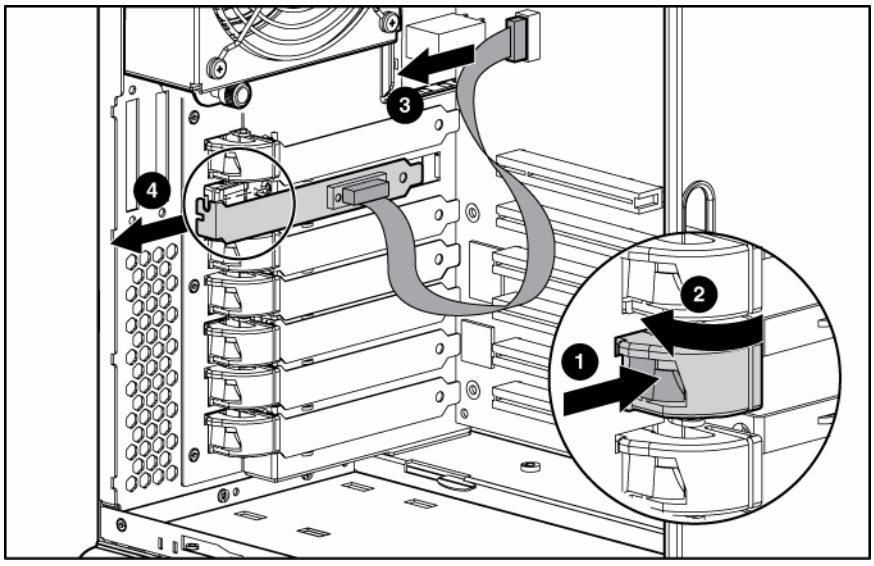
NOTE: The appearance of compatible PPMs may vary.

To replace the component, reverse the removal procedure.

Second serial port

To remove the component:

1. Remove the access panel ("Access Panel" on page 12).
2. Open the retention clip securing the second serial port.
3. Remove the serial port cable from the serial port header on the system board.
4. Remove the second serial port option.

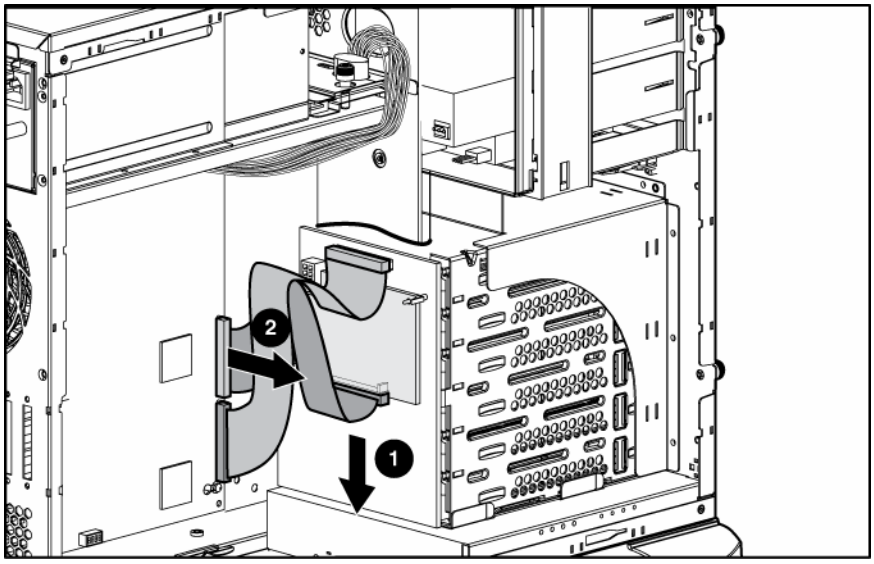


To replace the component, reverse the removal procedure.

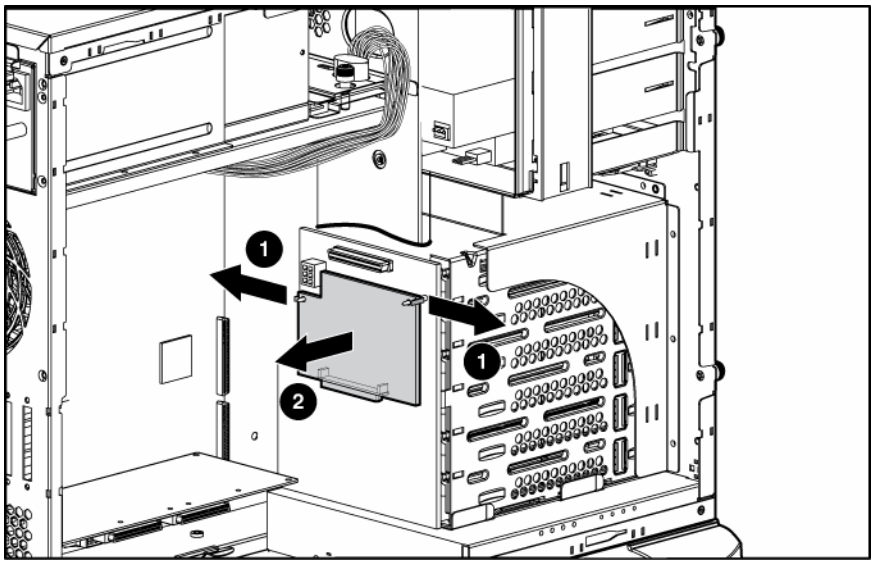
Duplex SCSI backplane

To remove the component:

1. Remove the access panel ("Access Panel" on page 12).
2. Remove the SCSI cable from the duplex SCSI backplane and from either the array controller or the system board.



3. Remove the duplex SCSI backplane.



To replace the component, reverse the removal procedure.

Battery

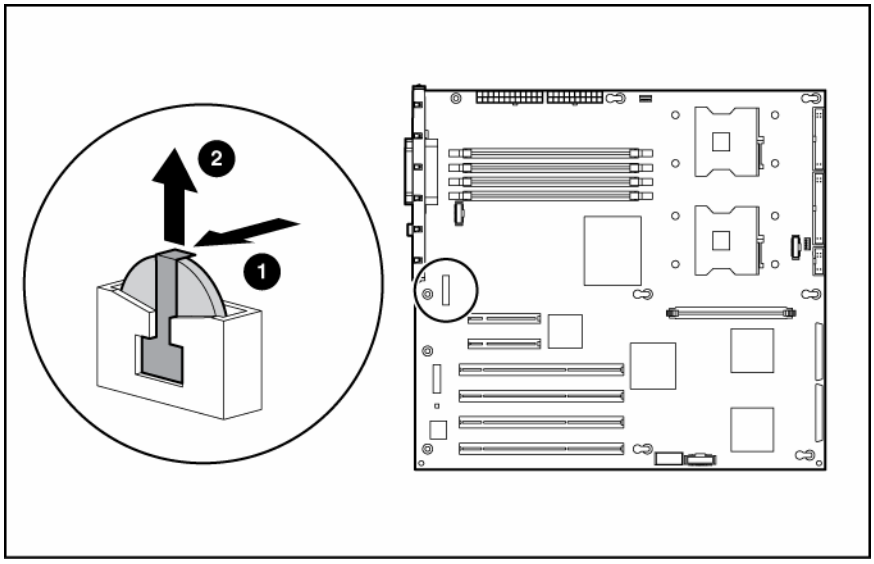
If the server no longer automatically displays the correct date and time, you may need to replace the battery that provides power to the real-time clock. Under normal use, battery life is 5 to 10 years.

⚠ **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.**

To remove the component:

1. Remove the access panel ("Access Panel" on page 12).
2. Remove the battery.



IMPORTANT: Replacing the system board battery resets the system ROM to its default configuration. After replacing the battery, reconfigure the system through RBSU.

To replace the component, reverse the removal procedure.

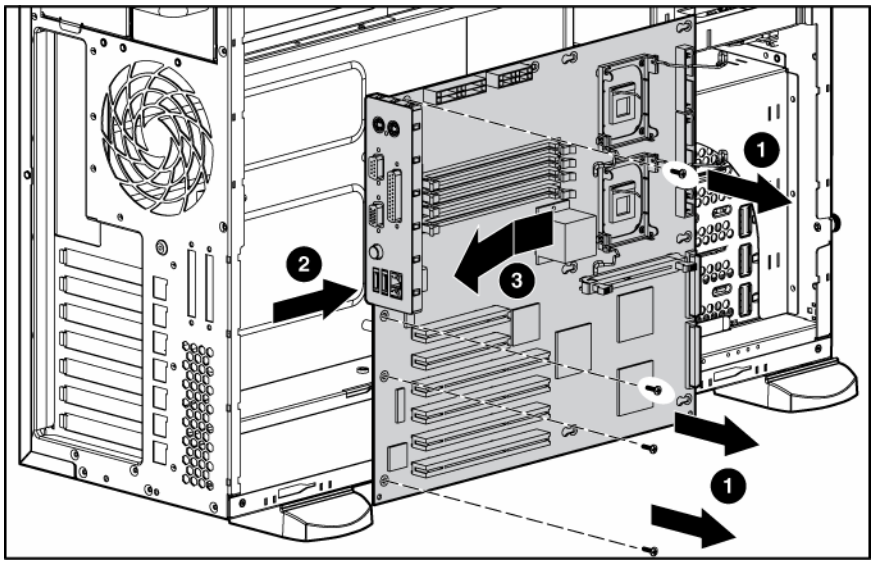
For more information about battery replacement or proper disposal, contact an authorized reseller or an authorized service provider.

System Board

To remove the component:

1. Remove the access panel ("Access Panel" on page 12).
2. Remove the system fans ("Redundant system fan" on page 19).
3. Remove the processors and heatsinks ("Processor and Heatsink" on page 24).
4. Disconnect all cables connected to the system board.

5. Remove the four system board screws, and remove the system board.



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.

1. During the server startup sequence, press the **F9** key to access RBSU.
2. Select the **Advanced Options** menu.
3. 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.
```

4. Press the **Enter** key to clear the warning.
5. Enter the serial number.
6. 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.
```

7. Enter the product ID and press the **Enter** key.
8. Press the **Escape** key to close the menu.
9. Press the **Escape** key to exit RBSU.
10. Press the **F10** key to confirm exiting RBSU. The server will automatically reboot.

Diagnostic tools

In this section

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, 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).

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 32)

- 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 HP Insight Diagnostics (on page 35)

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

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).

To download HP ISEE, visit the HP website (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).

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 ProLiant Essentials Rapid Deployment Pack

The RDP software is the preferred method for rapid, high-volume server deployments. The RDP software integrates two powerful products: Altiris Deployment Solution and the HP ProLiant Integration Module.

The intuitive graphical user interface of the Altiris Deployment Solution console provides simplified point-and-click and drag-and-drop operations that enable you to deploy target servers, including server blades, remotely. It enables you to perform imaging or scripting functions and maintain software images.

For more information about the RDP, refer to the HP ProLiant Essentials Rapid Deployment Pack CD or refer to the HP website (http://www.hp.com/servers/rdp).

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

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® 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).

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 35)
- 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).

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).

SmartStart software

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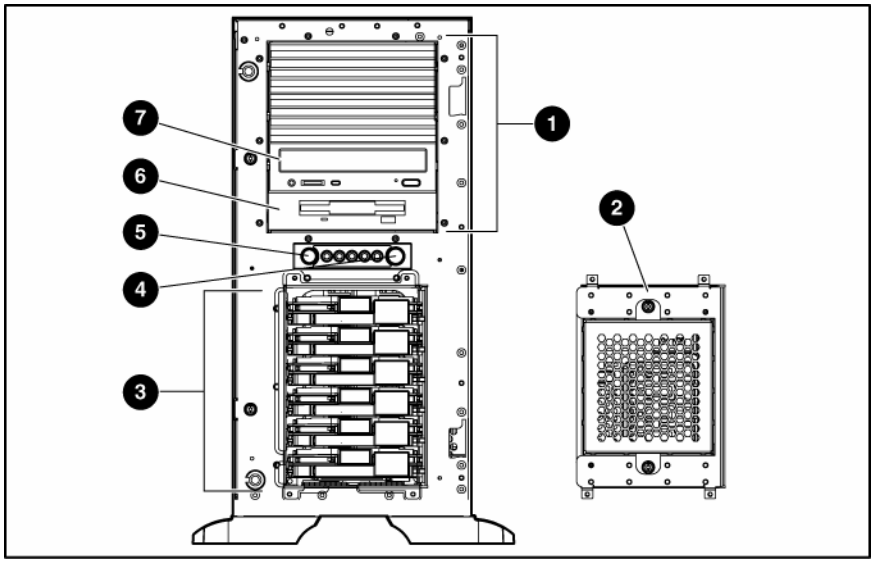
SmartStart is included in the HP ProLiant Essentials Foundation Pack. For more information about SmartStart software, refer to the HP ProLiant Essentials Foundation Pack or the HP website (http://www.hp.com/servers/smartstart).

Server component identification

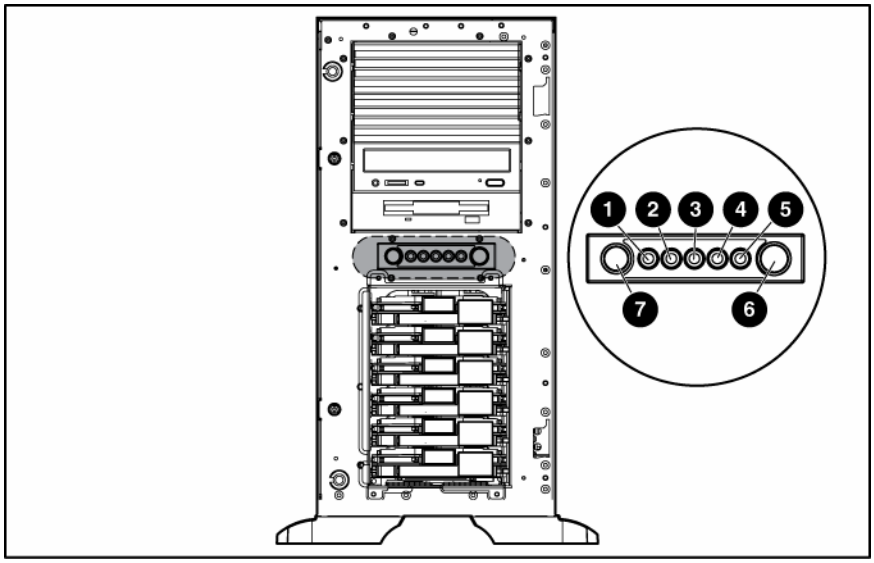
In this section

Front Panel Components



Item	Description
1	Removable media bays (4)
2	Non-hot-plug SCSI hard drive bays (4)
3	Hot-plug SCSI hard drive bays (6)
4	System power button
5	UID button
6	Diskette drive
7	CD-ROM drive

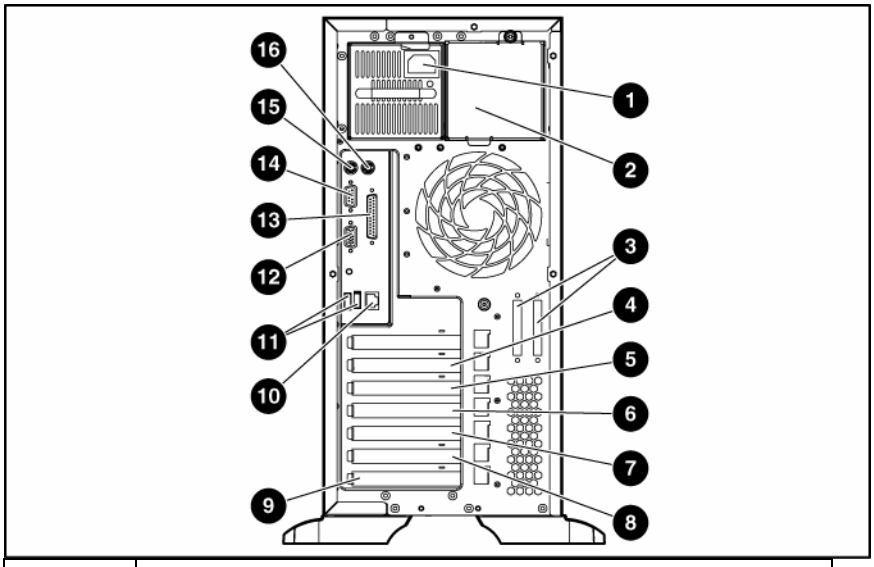
Front Panel LEDs and Buttons



Item	Description	Status
1	UID LED	Blue = Activated Flashing = System remotely managed Off = Deactivated
2	Internal health LED	Green = Normal Amber = System degraded. Refer to system board LEDs to identify component in degraded state. Red = System critical. Refer to system board LEDs to identify component in critical state. Off = Normal (when in standby mode)
3	External health LED (power supply)	Green = Normal Red = Power redundancy failure
4	NIC activity LED	Green = Network link Flashing = Network link and activity Off = No link to network. If power is off, view the rear panel RJ-45 LEDs for status.
5	Power LED	On = Power Amber = System off and power available Off = No power
6	System power button	
7	UID button	

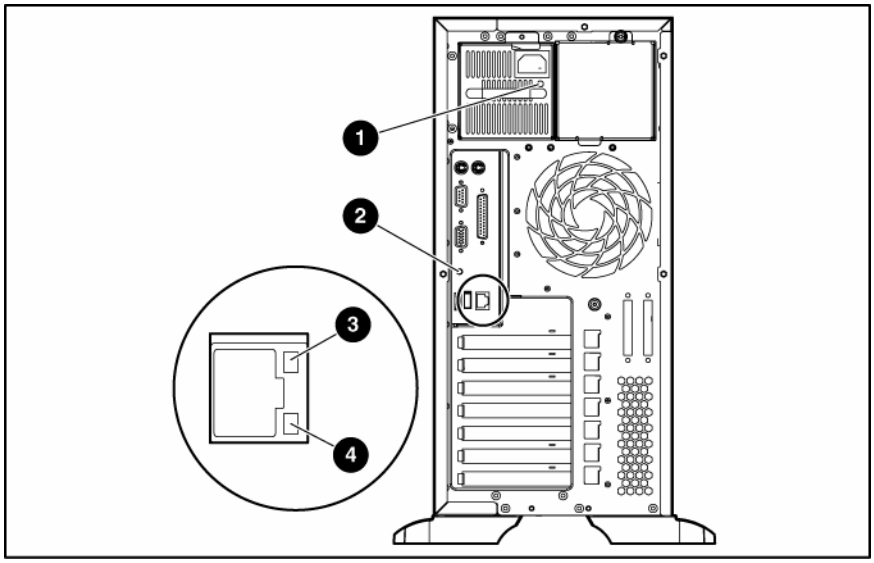
Rear Panel Components

NOTE: Hot-plug power supply model shown. For non-hot-plug models, the power supply will look different.



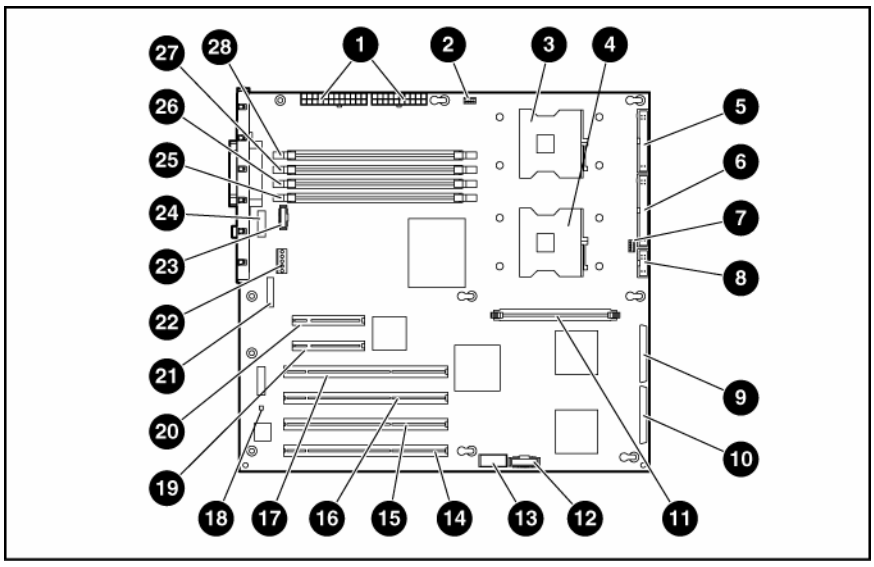
Item	Description
1	Power cord connector
2	Optional hot-plug redundant power supply bay
3	SCSI connector knockouts
4	PCI Express 4x (half length card), slot 1
5	PCI Express 8x (full length card), slot 2
6	64-bit 100-MHz PCI-X slot, bus 9, slot 3
7	64-bit 100-MHz PCI-X slot, bus 9, slot 4
8	64-bit 133-MHz PCI-X slot, bus 6, slot 5
9	64-bit 66-MHz PCI-X slot, bus 2, slot 6
10	RJ-45 Ethernet connector
11	USB 2.0 connectors (2)
12	Video connector
13	Parallel connector
14	Serial connector
15	Keyboard connector
16	Mouse connector

Rear Panel LEDs



Location	LED	Status
1	Power supply LED	Off = No power or inadequate power supply Green = Power supply is on and functioning
2	UID LED	Blue = Activated Off = Deactivated Flashing = Remote inquiry
3	10/100/1000 NIC link LED	On = Link Off = No Link
4	10/100/1000 NIC standby LED	On = Standby Off = Activity

System Board Components



NOTE: PPM 1 is embedded onto the system board.

Item	Description	Item	Description
1	Power supply connectors	15	64-bit 133-MHz PCI-X slot, bus 6
2	CPU 1 heatsink header	16	64-bit 100-MHz PCI-X slot, bus 9
3	Processor socket 1	17	64-bit 100-MHz PCI-X slot, bus 9
4	Processor socket 2	18	NMI jumper
5	Diskette drive connector	19	PCI Express x8 slot (full length card)
6	Primary IDE connector (ATAPI devices)	20	PCI Express x4 slot (half length card)
7	CPU 2 heatsink header	21	System battery
8	Power button/LED connector	22	Redundant system fan header
9	Primary SCSI connector*	23	Rear fan connector
10	Secondary SCSI connector*	24	Serial port header
11	PPM 2 socket	25	DIMM slot 4
12	RILOE II connector (30-pin)	26	DIMM slot 3
13	System maintenance switch	27	DIMM slot 2
14	64-bit 66-MHz PCI-X slot, bus 2	28	DIMM slot 1

*For SCSI models only

NMI jumper

The NMI jumper allows administrators to perform a memory dump before performing a hard reset. Crash dump analysis is an essential part of eliminating reliability problems, such as hangs or crashes in operating systems, device drivers, and applications. Many crashes freeze a system, requiring you to do a hard reset. Resetting the system erases any information that would support root cause analysis.

Systems running Microsoft® Windows® operating systems experience a blue screen trap when the operating system crashes. When this happens, Microsoft® recommends that system administrators perform an NMI event by pressing a dump switch. The NMI event enables a hung system to become responsive again.

System Maintenance Switch

Position	Default	Function
S1	Off	Reserved
S2	Off	Off = System configuration can be changed. On = System configuration is locked.
S3	Off	Reserved
S4	Off	Reserved
S5	Off	Off = Power-on password is enabled. On = Power-on password is disabled.
S6	Off	Off = No function On = Clear NVRAM
S7		Reserved
S8		Reserved

When the system maintenance switch position 6 is set to the On position, the system is prepared to erase all system configuration settings from both CMOS and NVRAM.

△ **CAUTION:** Clearing CMOS and/or NVRAM deletes configuration information. Be sure to properly configure the server or data loss could occur.

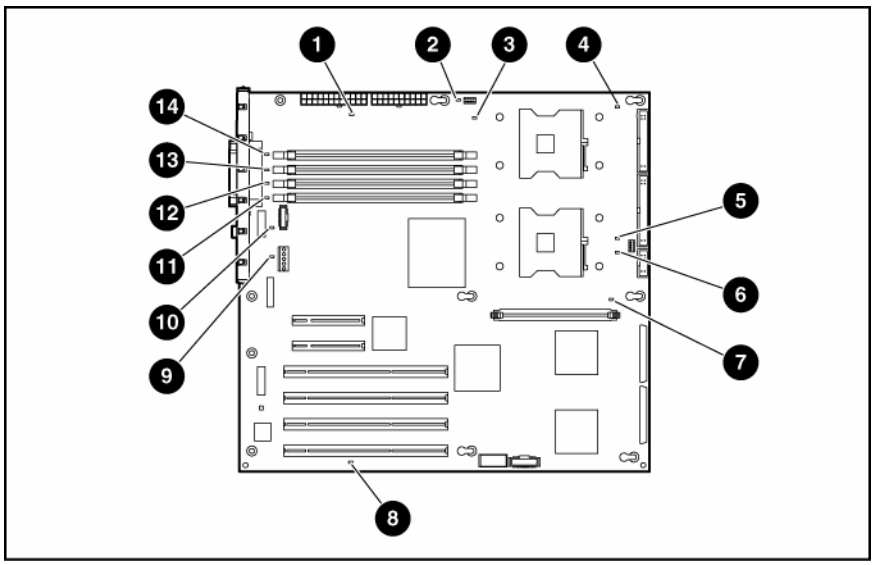
System LEDs and internal health LED combinations

When the internal health LED on the front panel illuminates either amber or red, the server is experiencing a health event. Combinations of illuminated system LEDs and the internal health LED indicate system status.

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

System LED and Color	Internal Health LED Color	Status
Processor failure, socket *X* (Amber)	Red	One or more of the following conditions may exist: • Processor in socket *X* has failed. • Processor in socket *X* failed over to the second processor. • Processor *X* is not installed in the socket. • Processor *X* is not supported. • Processor heatsink is not attached properly.
	Amber	Processor in socket *X* is in a pre-failure condition.
Processor failure, both sockets (Amber)	Red	Processor types are mismatched.
PPM failure (Amber)	Red	• PPM has failed. • PPM is not installed, but the corresponding processor is installed.
DIMM failure, slot *X* (Amber)	Red	• DIMM in slot *X* has failed. • DIMM in slot *X* is an unsupported type, and no valid memory exists in another bank.
	Amber	• DIMM in slot *X* has reached single-bit correctable error threshold. • DIMM in slot *X* is in a pre-failure condition. • DIMM in slot *X* is an unsupported type, but valid memory exists in another bank.
Overtemperature (Amber)	Red	• The Health Driver has detected a cautionary temperature level. • The server has detected a hardware critical temperature level.
Fan (Amber)	Red	The minimum fan requirements are not being met. Fan has failed.
	Amber	A fan has failed but still meets the minimum fan requirements (with redundant system fan option only).

System Board LEDs



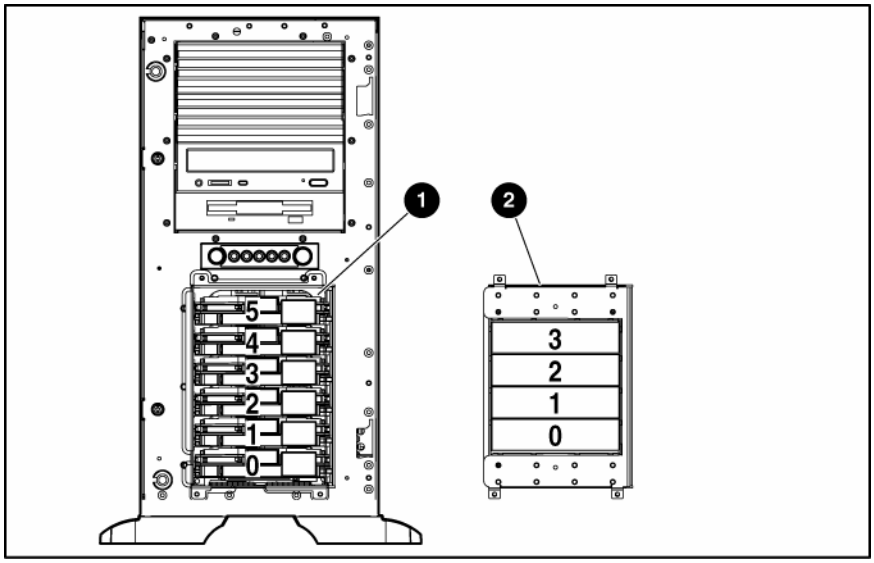
Item	LED Description	Status
1	AC power	Off = No AC power or failed power supply Green = Power supply is on and functioning
2	Processor 1 fan status	Off = Processor fan is functioning Amber = Fan is not installed or has failed
3	Processor 1 status	Off = Processor 1 functioning Amber = Processor 1 failed
4	PPM 1 (embedded) status	Off = PPM 1 functioning Amber = PPM 1 failed
5	Processor 2 fan status	Off = Processor fan is functioning Amber = Fan is not installed or has failed
6	Processor 2 status	Off = Processor 1 functioning Amber = Processor 1 failed
7	PPM 2 status	Off = PPM 2 functioning Amber = PPM 2 failed
8	Temperature threshold	Off = Normal Amber = System temperature threshold exceeded
9	Redundant system fan status	Off = Fan is functioning Amber = Redundant system fan has failed
10	Rear fan status	Off = Processor fan is functioning Amber = Fan is not installed or has failed
11	DIMM 4 status	Off = DIMM 4 functioning Amber = DIMM 4 failed
12	DIMM 3 status	Off = DIMM 3 functioning Amber = DIMM 3 failed
13	DIMM 2 status	Off = DIMM 2 functioning Amber = DIMM 2 failed

Item	LED Description	Status
14	DIMM 1 status	Off = DIMM 1 functioning Amber = DIMM 1 failed

Hot-Plug SCSI IDs

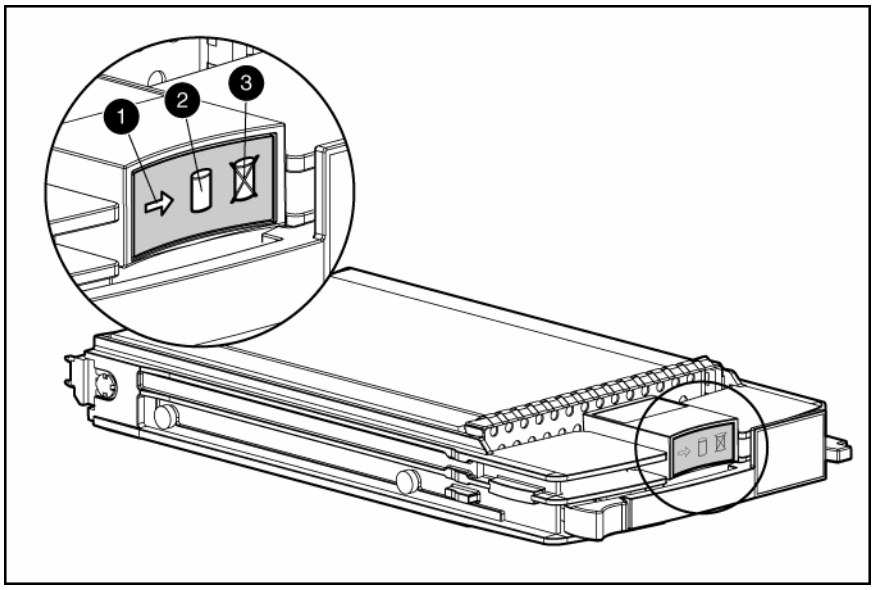
The server supports single- or dual-channel SCSI hard drive configurations. The single-channel configuration (simplex) supports up to six SCSI hard drives on one channel. The dual-channel configuration (duplex) supports two SCSI hard drives on one channel (SCSI IDs 4 and 5) and up to four SCSI hard drives on the other channel (SCSI IDs 0 through 3) with the duplex option.

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



Item	Description
1	Hot-plug SCSI hard drive cage
2	Non-hot-plug SCSI hard drive cage

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

Specifications

In this section

Server Specifications

Specification	Value
Dimensions	
Height (with feet)	46.8 cm (18.43 in)
Depth (with bezel)	64 cm (25.2in)
Width	22 cm (8.66 in)
Weight (no drives installed)	27.22 kg (60 lb)
Models with a redundant power supply	
Input requirements	
Rated input voltage	100 VAC to 240 VAC
Rated input frequency	47 Hz to 63 Hz
Rated input current	10 A (110 V) to 5 A (220 V)
Rated input power	893 W
BTUs per hour	3049
Power supply output	
Rated steady-state power	725 W
Maximum peak power	725 W
Models with a Non-redundant power supply	
Input requirements	
Rated input voltage	100 VAC to 240 VAC
Rated input frequency	47 Hz to 63 Hz
Rated input current	7.8 A (110 V) to 3.9 A (220 V)
Rated input power	710 W
BTUs per hour	2425
Power supply output	

Specification	Value
Rated steady-state power	460 W
Maximum peak power	484 W
Acoustic Noise	
Idle	<6.5 and 48
Operating	<6.5 and 48

Environmental specifications

Specification	Value
Temperature range*	
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)
Relative humidity (noncondensing)**	
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.

Rack server specifications

Specification	Value
Height	21.87 cm (8.61 in)
Depth (with bezel)	60.96 cm (24 in)
Width	48.26 cm (19 in)
Weight (no drives installed)	27.24 kg (60 lb)
Models with a redundant power supply	
Input requirements	
Rated input voltage	100 VAC to 240 VAC
Rated input frequency	47 Hz to 63 Hz
Rated input current	10 A (110 V) to 5 A (220 V)
Rated input power	893 W
BTUs per hour	3049
Power supply output	
Rated steady-state power	725 W
Maximum peak power	725 W
Models with a Non-redundant power supply	

Specification	Value
Input requirements	
Rated input voltage	100 VAC to 240 VAC
Rated input frequency	47 Hz to 63 Hz
Rated input current	7.8 A (110 V) to 3.9 A (220 V)
Rated input power	710 W
BTUs per hour	2425
Power supply output	Specification
Rated steady-state power	460 W
Maximum peak power	484 W

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/).

DDR SDRAM DIMM specifications

NOTE: Use only 256-MB, 512-MB, 1-GB, 72-bit wide, 2.5-B, PC2100 Registered ECC DDR SDRAM. Use Compaq branded or HP DDR SDRAM only.

Item	Description
Size	256 MB, 512 MB, 1 GB, 2 GB
Width	72 bits
Upgrade requirement	Any combination of like-paired DDR SDRAM DIMMs that provide a minimum of 512 MB

1.44-MB diskette drive specifications

Specification	Value
Dimensions	
Height	12.7 mm (0.5 in)
Width	96 mm (3.8 in)
Depth	130 mm (5.1 in)
LEDs (front panel)	Green = On
Read/write capacity per diskette	
High density	1.44 MB
Low density	720 KB
Drives supported	1
Drive height	One-third height
Drive rotation	300 rpm
Transfer rate	

Specification	Value
High	500 Kb/s
Low	250 Kb/s
Bytes/sector	512
Sectors per track (high/low)	18/9
Tracks per side (high/low)	80/80
Access times	
Track-to-track (high/low)	3 ms/6 ms
Average (high/low)	169 ms/94 ms
Setting time	15 ms
Latency average	100 ms
Cylinders (high/low)	80/80
Read/write heads	2

CD-ROM drive specifications

Specification	Value
Disk formats	CD-ROM (modes 1 and 2); mixed mode (audio and data combined); CD-DA; Photo CD (single/multiple-session), CD-XA ready; CDi ready
Capacity	550 MB (mode 1, 12 cm)
	640 MB (mode 2, 12 cm)
Block size	2368, 2352 bytes (mode 0)
	2352, 2340, 2336, 2048 bytes (mode 1)
	2352, 2340, 2336, 2048 bytes (mode 2)
Dimensions	
Height	12.7 mm (0.50 in)
Depth	132.08 mm (5.20 in)
Width	132.08 mm (5.20 in)
Weight	0.34 kg (0.75 lb)
Data transfer rate	
Sustained	150 KB/s (sustained 1X), 1500/3600 KB/s (10X to 24X)
Burst	16.6 MB/s
Access times (typical)	
Full stroke	300 ms
Random	140 ms
Diameter	12 cm, 8 cm (4.70 in, 3.15 in)
Thickness	1.2 mm (0.05 in)
Track pitch	1.6 μm (6.3×10^{-7} in)
Cache/buffer	128 KB
Startup time	< 10 s
Stop time	< 5 s (single); < 30 s (multisession)

Specification	Value
Laser parameters	
Type	Semiconductor laser GaAs
Wave length	700 ± 25 nm
Divergence angle	53.5° ± 1.5°
Output power	0.14 mW
Operating conditions	
Temperature	5°C to 45°C (41°F to 118°F)
Humidity	5% to 90%

Acronyms and abbreviations

ABEND

abnormal end

ACU

Array Configuration Utility

ADU

Array Diagnostics Utility

ASR

Automatic Server Recovery

DDR

double data rate

DIMM

dual inline memory module

HD68

high density 68

IEC

International Electrotechnical Commission

iLO

Integrated Lights-Out

IML

Integrated Management Log

IPL

initial program load

IRQ

interrupt request

ISEE

Instant Support Enterprise Edition

MPS

multi-processor specification

NEMA

National Electrical Manufacturers Association

NFPA

National Fire Protection Association

NIC

network interface controller

NMI

non-maskable interrupt

NVRAM

non-volatile memory

ORCA

Option ROM Configuration for Arrays

PCI Express

peripheral component interconnect express

PCI-X

peripheral component interconnect extended

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

SCSI

small computer system interface

SDRAM

synchronous dynamic RAM

SIM

Systems Insight Manager

TMRA

recommended ambient operating temperature

UID

unit identification

VHDCI

very high density cable interconnect

WOL

Wake-on LAN

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