HP ProLiant ML350e Gen8 Server User Guide

Abstract

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.

Part Number: 679349-003
January 2013
Edition: 3

© Copyright 2012-2013 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® and Windows® are U.S. registered trademarks of Microsoft Corporation.

Contents

Component identification 7
Front panel components 7
Front panel LEDs and buttons 8
Rear panel components 9
Rear panel LEDs 10
System board components 11
System maintenance switch 12
System board LEDs 13
NMI header 13
DIMM slot locations 14
Smart Array SAS RAID controller card components 14
SAS and SATA device numbers 15
SAS and SATA drive LED combinations 16
FBWC module LED definitions 17
P222, P420, P421, and P822 modules 17
B120i module 18
Drive LED definitions 19
Fan locations 20
Redundant power supply backplane connectors 20
T-10/T-15 Torx screwdriver 21
Operations 22
Power up the server 22
Power down the server 22
Remove the tower bezel 22
Install the tower bezel 23
Remove the security bezel 24
Remove the rack bezel 24
Install the rack bezel 25
Remove the access panel 25
Install the access panel 26
Extend the server from the rack 27
Remove the PCI air baffle 28
Install the PCI air baffle 29
Remove the system air baffle 30
Install the system air baffle 30
Remove the fan cage 31
Remove a fan 33
Remove the FBWC capacitor pack 33
Remove the DVD drive 35
Remove a component drive cage blank 36
Remove a full-length expansion board 37
Setup 39
Optional installation services 39
Rack planning resources 39
Optimum environment 39

Space and airflow requirements 40
Temperature requirements 40
Power requirements 41
Electrical grounding requirements 41
Rack warnings 41
Server warnings and cautions 42
Identifying tower server shipping carton contents 43
Installing hardware options 43
Setting up a tower server 43
Installing the server into the rack 44
Powering up and configuring the server 45
Installing the operating system 45
Registering the server 46
Hardware options installation 47
Introduction 47
Security bezel option 47
Second processor option 47
Memory options 54
HP SmartMemory 54
Memory subsystem architecture 55
Single-rank, dual-rank, and quad-rank DIMMs 55
DIMM identification 56
Memory configurations 57
General DIMM slot population guidelines 57
Advanced ECC memory configuration 58
Online Spare memory configuration 58
Lockstep memory configuration 58
Advanced ECC population guidelines 58
Online spare population 58
Lockstep Memory population guidelines 59
Population order 59
Installing a DIMM 59
SAS drive options 60
Installing a hot-plug drive option 60
Installing a non-hot-plug drive 61
Optical drive cage option 64
Optical drive option 66
Installing a storage controller 70
FBWC options 72
Installing the FBWC module (P222, P420, P421, and P822) 73
Installing the B120i cache module 75
Installing an expansion board 77
Eight-bay SFF drive cage option 78
Installing the optional SFF hot-plug drive cage 78
Six-bay LFF drive cage 81
Installing the optional LFF hot-plug drive cage 82
Redundant Enablement Option 85
Preparing the server for installation 85
Installing the RPS Enablement Kit 87
Redundant power supply module 92
Installing the LFF 5/6 drive cable option 93
Tower-to-rack conversion option 97
HP Trusted Platform Module option 102

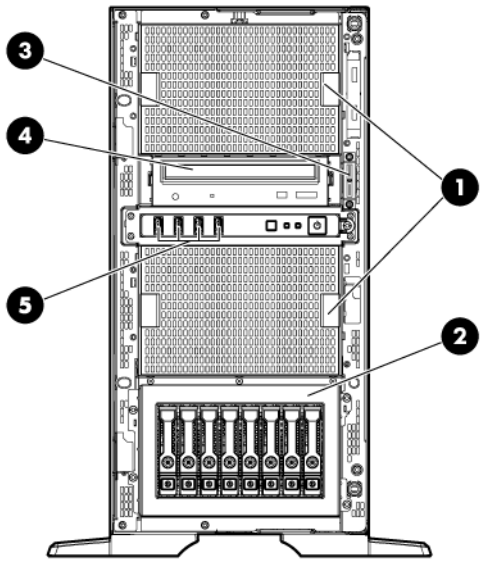
Installing the Trusted Platform Module board ... 103
Retaining the recovery key/password ... 105
Enabling the Trusted Platform Module ... 105
Cabling ... 106
Storage cabling ... 106
Non-hot-plug four LFF drive cabling ... 106
Hot-plug four LFF drive cabling ... 107
Hot-plug eight SFF drive cabling ... 107
Smart Array controller card cabling ... 108
5/6 LFF Smart Array controller card cabling ... 108
Power cabling ... 109
ATX power cabling ... 109
RPS power cabling ... 110
Media device data cabling ... 111
DVD-ROM and DVD-RW drive power cabling ... 111
Software and configuration utilities ... 112
Server mode ... 112
HP product QuickSpecs ... 112
HP iLO Management Engine ... 112
HP iLO ... 112
Intelligent Provisioning ... 114
HP Insight Remote Support software ... 116
Scripting Toolkit ... 116
HP Service Pack for ProLiant ... 116
HP Smart Update Manager ... 117
HP ROM-Based Setup Utility ... 117
Using RBSU ... 118
Auto-configuration process ... 118
Boot options ... 119
Configuring AMP modes ... 119
Re-entering the server serial number and product ID ... 119
Utilities and features ... 120
Array Configuration Utility ... 120
Option ROM Configuration for Arrays ... 121
ROMPaq utility ... 121
Automatic Server Recovery ... 121
USB support ... 121
Redundant ROM support ... 122
Keeping the system current ... 122
Drivers ... 122
Software and firmware ... 123
Version control ... 123
HP operating systems and virtualization software support for ProLiant servers ... 123
Change control and proactive notification ... 123
Troubleshooting ... 124
Troubleshooting resources ... 124
Battery replacement ... 125
Regulatory information ... 127
Safety and regulatory compliance ... 127
Turkey RoHS material content declaration ... 127

Ukraine RoHS material content declaration 127
Warranty information 127
Electrostatic discharge 128
Preventing electrostatic discharge 128
Grounding methods to prevent electrostatic discharge 128
Specifications 129
Environmental specifications 129
Server specifications 129
Power supply specifications 129
Hot-plug power supply calculations 132
Support and other resources 133
Before you contact HP 133
HP contact information 133
Customer Self Repair 133
Acronyms and abbreviations 141
Documentation feedback 144
Index 145

Component identification

Front panel components

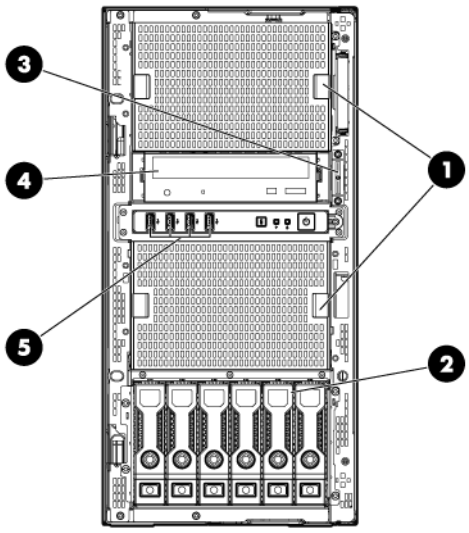
- SFF



Item	Description
1	Media/drive cage bay (boxes 2 and 3)
2	SAS/SATA drives (8)
3	Serial number/iLO information pull tab*
4	Optical drive
5	USB connectors (4)

*The serial number/iLO information pull tab is double-sided. The top side shows the server serial number, and the reverse shows the default iLO account information. The same information is printed on a label attached to the chassis.

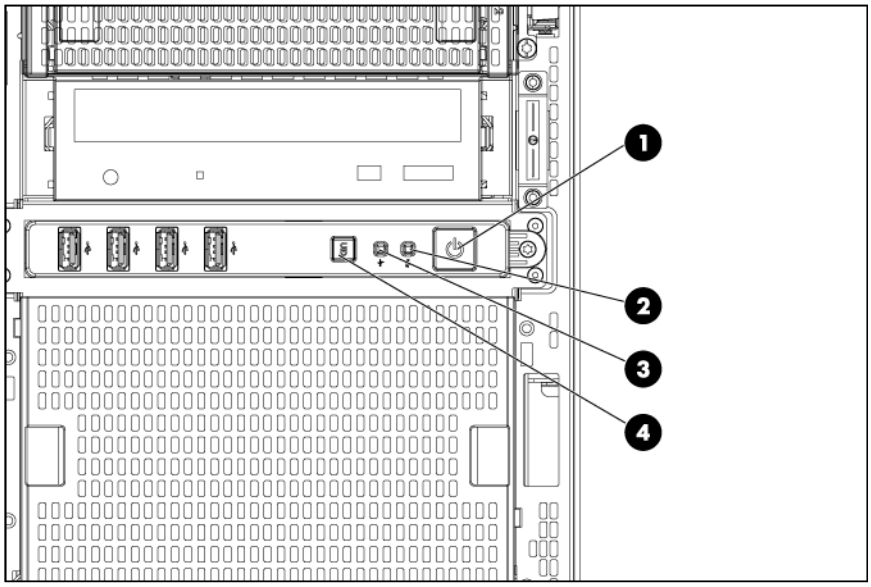
- LFF



Item	Description
1	Media/drive cage bay (boxes 2 and 3)
2	SAS/SATA drives (6)
3	Serial number/iLO information pull tab*
4	Optical drive
5	USB connectors (4)

*The serial number/iLO information pull tab is double-sided. The top side shows the server serial number, and the reverse shows the default iLO account information. The same information is printed on a label attached to the chassis.

Front panel LEDs and buttons



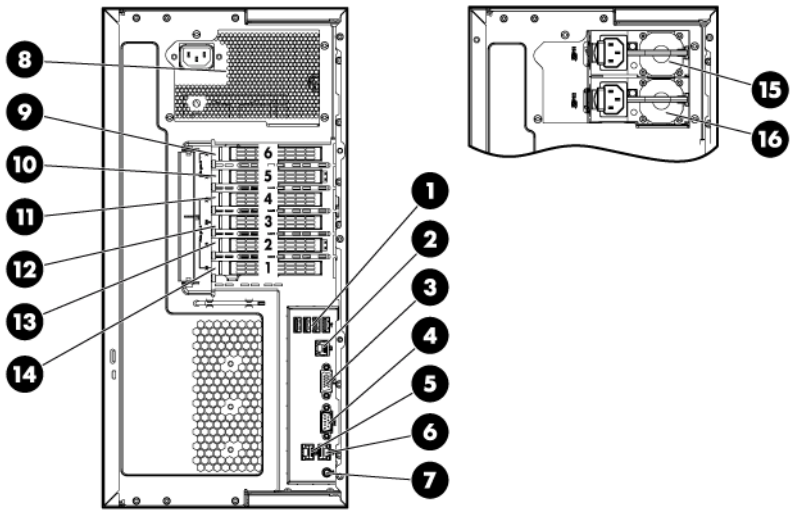
Item	Description	Status
1	Power On/Standby button	Solid green = System on

Item	Description	Status
	and system power LED	Flashing green (1 Hz/cycle per sec) = Performing power on sequence Solid amber = System in standby Off = No power present*
2	NIC status LED	Solid green = Link to network Flashing green (1 Hz/cycle per sec) = Network active Off = No network activity
3	Health LED	Solid green = Normal Flashing amber = System degraded Flashing red (1 Hz/cycle per sec) = System critical Fast-flashing red (4 Hz/cycles per sec) = Power fault**
4	UID button/LED	Solid blue = Activated Flashing blue (1 Hz/cycle per sec) = Remote management or firmware upgrade in progress Off = Deactivated

*Facility power is not present, power cord is not attached, no power supplies are installed, power supply failure has occurred, or the power button cable is disconnected.

**To identify components in a degraded or critical state, see the Systems Insight Display LEDs, check iLO/BIOS logs, and reference the server troubleshooting guide.

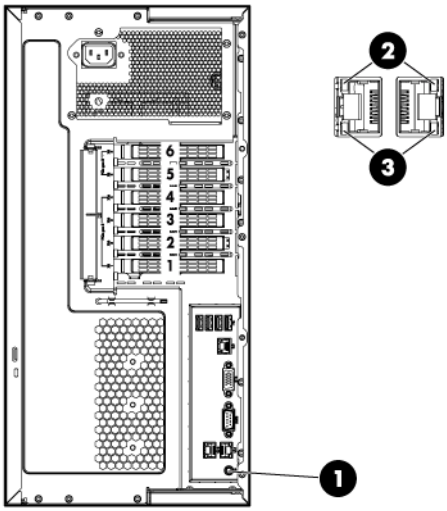
Rear panel components



Item	Description
1	USB connectors (4)
2	iLO connector
3	Video connector
4	Serial connector
5	NIC connector 2
6	NIC connector 1
7	UID button/LED
8	ATX power supply

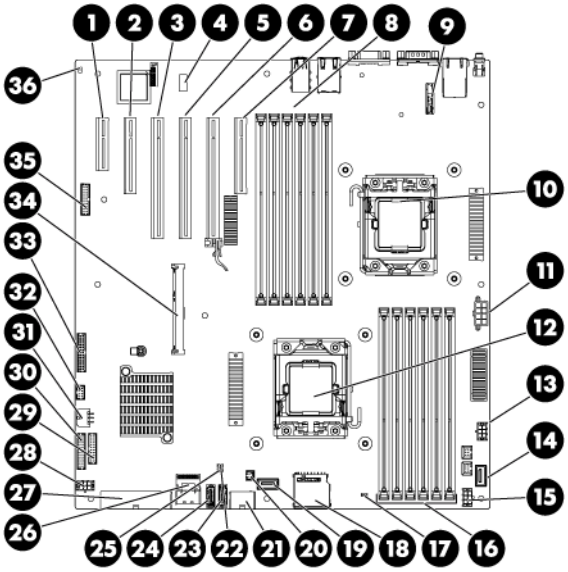
Item	Description
9	PCIe slot 6 (Processor 1)
10	PCIe slot 5 (Processor 1)
11	PCIe slot 4 (Processor 2)
12	PCIe slot 3 (Processor 2)
13	PCIe slot 2 (Processor 1)
14	PCIe slot 1 (Processor 1)
15	Redundant power supply 1
16	Redundant power supply 2

Rear panel LEDs



Item	Description	Status
1	UID LED button	Blue = Activated Flashing blue = System is being managed remotely Off = Deactivated
2	NIC link LED	Green = Network link Off = No network link
3	NIC activity LED	Green = Network activity Flashing green = Network activity Off = No network activity

System board components



Item	Description
1	Slot 6 PCIe2 x4 (1)
2	Slot 5 PCIe2 x8 (4,1)
3	Slot 4 PCIe3 x16 (8,4,1)
4	System maintenance switch
5	Slot 3 PCIe3 x16 (16,8,4,1)
6	Slot 2 PCIe3 x16 (16,8,4,1)
7	Slot 1 PCIe3 x8 (4,1)
8	Processor 2 DIMM slots
9	System battery
10	Processor socket 2
11	Power connector
12	Processor socket 1 (populated)
13	Fan connector 4
14	Internal USB connector
15	Fan connector 3
16	Processor 1 DIMM slots
17	Box 3 power good connector
18	SD card connector
19	Internal USB tape drive connector
20	Discovery service cable connector
21	Power connector
22	Box 2 power good connector
23	SATA connector 2
24	SATA connector 1
25	Box 1 power good connector
26	Mini-SAS connector
27	Power connector

Item	Description
28	Fan connector 2
29	Front panel connector
30	Front panel connector
31	Fan connector 1
32	External thermal cable connector
33	Redundant power supply connector
34	Cache module connector
35	TPM connector
36	NMI header

System maintenance switch

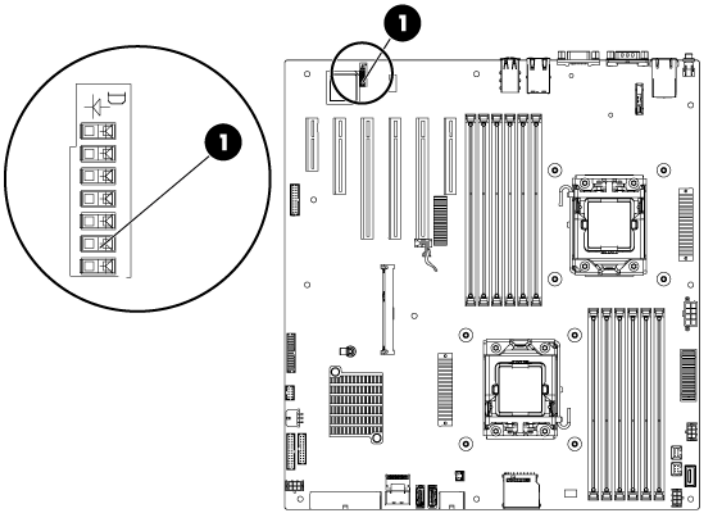
The system maintenance switch (SW2) is a twelve-position switch that is used for system configuration.

Position	Description	Function
S1	iLO security override	Off = No function. On = Override enabled.
S2	Configuration lock	Off = System configuration can be changed. On = System configuration is locked.
S5	Password disable	Off = Power-on password enabled. On = Power-on password disabled.
S6	Reset configuration	Off = No function On = ROM reads the system configuration as invalid.
S3, S4, S7-S12	—	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 board LEDs



Item	LED description	Status
1	Power supply failure	Red = Power supply failed Off = Normal

NMI header

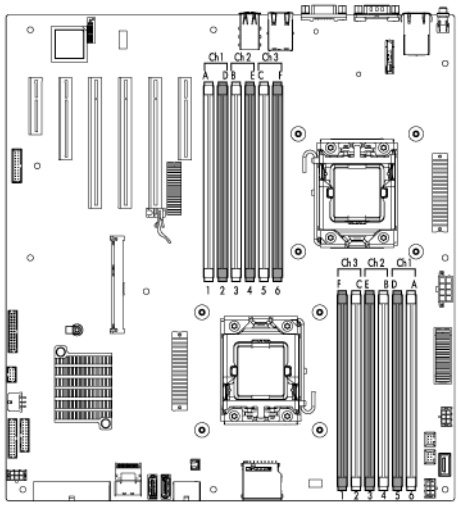
The NMI header enables administrators to perform a memory dump before performing a hard reset. Crash dump analysis is an essential part of eliminating reliability issues, such as hangs or crashes in operating systems, device drivers, and applications. Many crashes can freeze a system, requiring you to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

When a Windows® operating system crashes, a blue-screen trap appears. When this trap appears, Microsoft® recommends that system administrators perform an NMI event by temporarily shorting the NMI header with a jumper. The NMI event enables a hung system to become responsive again.

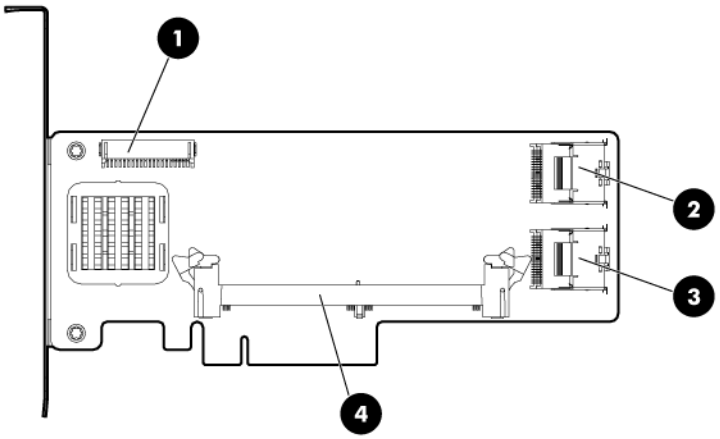
For additional information, see the HP website (http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00797875/c00797875.pdf).

DIMM slot locations

DIMM slots are numbered sequentially (1 through 6) for each processor. The supported AMP modes use the letter assignments for population guidelines.



Smart Array SAS RAID controller card components



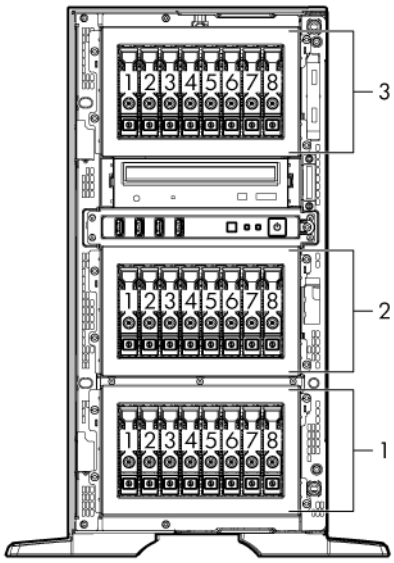
Item	Description
1	Expansion board connector
2	Mini-SAS cable connector
3	Mini-SAS cable connector
4	Cache module connector

SAS and SATA device numbers

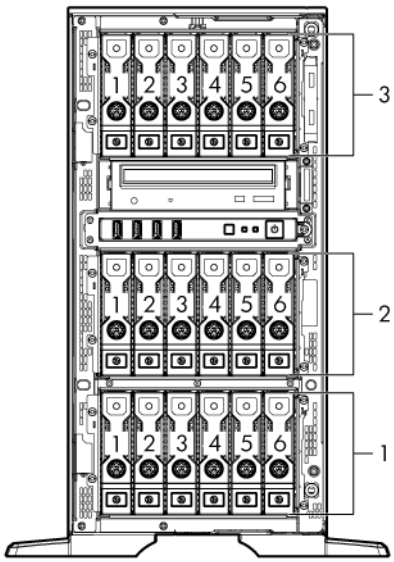
With optional drive cages installed, the server supports up to 24 SFF drives or up to 18 LFF drives. The server does not support mixing SFF and LFF drives.

HP recommends that you populate drive bays starting with the lowest SAS or SATA device number. Drives are numbered from left to right in each component box. Component boxes are numbered 1 through 3, from bottom to top.

- SFF drives



- LFF drives



SAS and SATA drive LED combinations

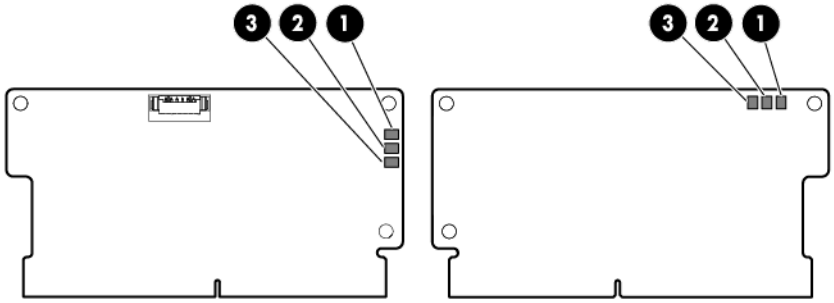
Online/activity LED (green)	Fault/UID LED (amber/blue)	Interpretation
On, off, or flashing	Alternating amber and blue	The drive has failed, or a predictive failure alert has been received for this drive. The drive also has been selected by a management application.
On, off, or flashing	Steadily blue	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.
On	Off	The drive is online, but it is not active currently.
Flashing regularly (1 Hz)	Amber, flashing regularly (1 Hz)	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	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.

* Do not remove the drive. Removing a drive might terminate the current operation and cause data loss.

FBWC module LED definitions

P222, P420, P421, and P822 modules

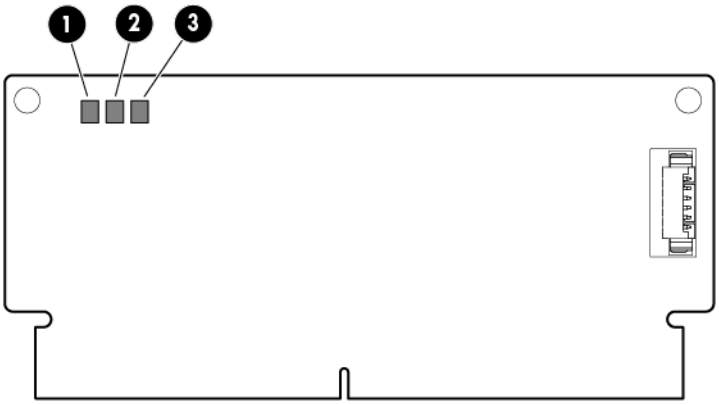
The FBWC module has three LEDs (one amber and two green). The LEDs are duplicated on the reverse side of the FBWC module to facilitate status viewing.



1 - Amber	2 - Green	3 - Green	Interpretation
Off	Off	Off	The FBWC module is not powered.
Off	Flashing 0.5 Hz	Flashing 0.5 Hz	The FBWC microcontroller is executing from within its boot loader and receiving new flash code from the host controller.
Off	Flashing 1 Hz	Flashing 1 Hz	The FBWC module is powering up, and the capacitor pack is charging.
Off	Off	Flashing 1 Hz	The FBWC module is idle, and the capacitor pack is charging.
Off	Off	On	The FBWC module is idle, and the capacitor pack is charged.
Off	On	On	The FBWC module is idle, the capacitor pack is charged, and the cache contains data that has not yet been written to the drives.
Off	Flashing 1 Hz	Off	A backup is in progress.
Off	On	Off	The current backup is complete with no errors.
Flashing 1 Hz	Flashing 1 Hz	Off	The current backup failed, and data has been lost.
Flashing 1 Hz	Flashing 1 Hz	On	A power error occurred during the previous or current boot. Data might be corrupt.
Flashing 1 Hz	On	Off	An overtemperature condition exists.
Flashing 2 Hz	Flashing 2 Hz	Off	The capacitor pack is not attached.
Flashing 2 Hz	Flashing 2 Hz	On	The capacitor has been charging for 10 minutes, but has not reached sufficient charge to perform a full backup.
On	On	Off	The current backup is complete, but power fluctuations occurred during the backup.
On	On	On	The cache module microcontroller has failed.

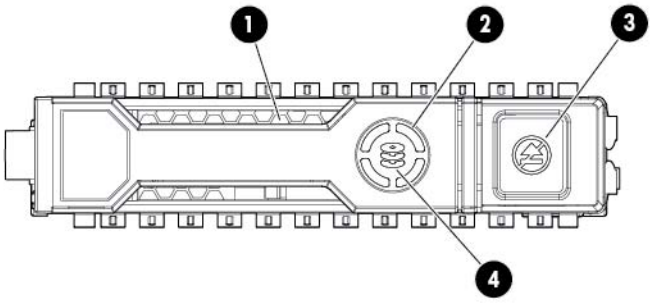
B120i module

The FBWC module has three LEDs (one amber and two green).



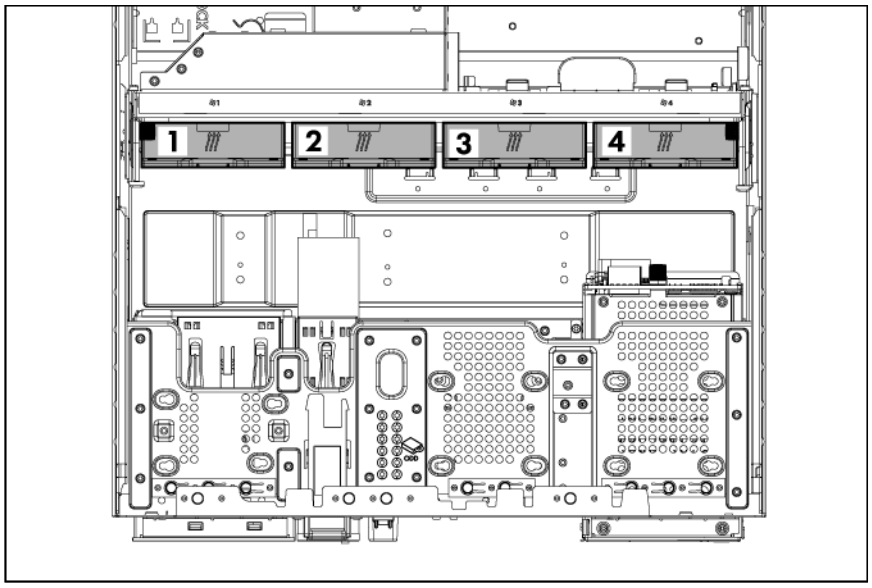
1 - Amber	2 - Green	3 - Green	Interpretation
Off	Off	Off	The FBWC module is not powered.
Off	Flashing 0.5 Hz	Flashing 0.5 Hz	The FBWC microcontroller is executing from within its boot loader and receiving new flash code from the host controller.
Off	Flashing 1 Hz	Flashing 1 Hz	The FBWC module is powering up, and the capacitor pack is charging.
Off	Off	Flashing 1 Hz	The FBWC module is idle, and the capacitor pack is charging.
Off	Off	On	The FBWC module is idle, and the capacitor pack is charged.
Off	On	On	The FBWC module is idle, the capacitor pack is charged, and the cache contains data that has not yet been written to the drives.
Off	Flashing 1 Hz	Off	A backup is in progress.
Off	On	Off	The current backup is complete with no errors.
Flashing 1 Hz	Flashing 1 Hz	Off	The current backup failed, and data has been lost.
Flashing 1 Hz	Flashing 1 Hz	On	A power error occurred during the previous or current boot. Data might be corrupt.
Flashing 1 Hz	On	Off	An overtemperature condition exists.
Flashing 2 Hz	Flashing 2 Hz	Off	The capacitor pack is not attached.
Flashing 2 Hz	Flashing 2 Hz	On	The capacitor has been charging for 10 minutes, but has not reached sufficient charge to perform a full backup.
On	On	Off	The current backup is complete, but power fluctuations occurred during the backup.
On	On	On	The FBWC module microcontroller has failed.

Drive LED definitions



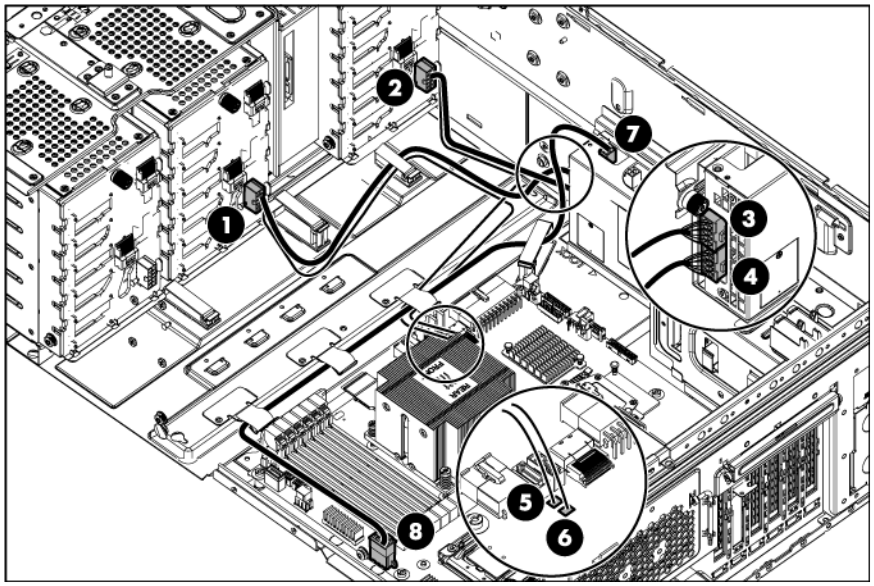
Item	LED	Status	Definition
1	Locate	Solid blue	The drive is being identified by a host application.
		Flashing blue	The drive carrier firmware is being updated or requires an update.
2	Activity ring	Rotating green	Drive activity
		Off	No drive activity
3	Do not remove	Solid white	Do not remove the drive. Removing the drive causes one or more of the logical drives to fail.
		Off	Removing the drive does not cause a logical drive to fail.
4	Drive status	Solid green	The drive is a member of one or more logical drives.
		Flashing green	The drive is rebuilding or performing a RAID migration, stripe size migration, capacity expansion, or logical drive extension, or is erasing.
		Flashing amber/green	The drive is a member of one or more logical drives and predicts the drive will fail.
		Flashing amber	The drive is not configured and predicts the drive will fail.
		Solid amber	The drive has failed.
		Off	The drive is not configured by a RAID controller.

Fan locations



Item	Description	Configuration
1	Fan 1	Optional
2	Fan 2	Primary
3	Fan 3	Primary
4	Fan 4	Optional

Redundant power supply backplane connectors

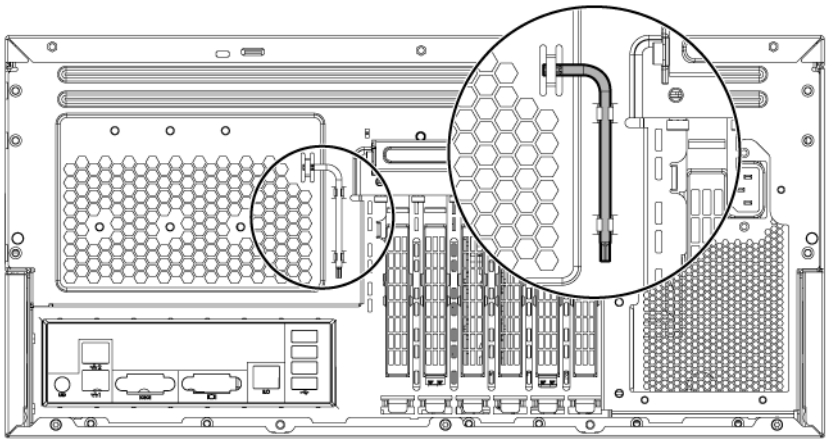


Item	Description	Connector identifier
1	Drive bay 2 drive backplane connector	P5H

Item	Description	Connector identifier
2	Drive bay 3 drive backplane connector	P5H
3	Drive bay 2 RPS backplane connector	P5
4	Drive bay 3 RPS backplane connector	P5
5	Power good connector	J11
6	Power good connector	J11
7	Processor 2 RPS backplane connector	P3
8	Processor 2 connector	P3M

T-10/T-15 Torx screwdriver

The server includes a T-10/T-15 Torx screwdriver located on the rear panel. Use the screwdriver to loosen screws or thumbscrews, as needed, during procedures.



Operations

Power up the server

1. Connect each power cord to the server.
2. Connect each power cord to the power source.
3. Press the Power On/Standby button.

   The server exits standby mode and applies full power to the system. The system power LED changes from amber to green.

Power down the server

Before powering down the server for any upgrade or maintenance procedures, perform a backup of critical server data and programs.

IMPORTANT: When the server is in standby mode, auxiliary power is still being provided to the system.

To power down the server, use one of the following methods:

- Press and release the Power On/Standby button.

  This method initiates a controlled shutdown of applications and the OS before the server enters standby mode.
- Press and hold the Power On/Standby button for more than 4 seconds to force the server to enter standby mode.

  This method forces the server to enter standby mode without properly exiting applications and the OS. If an application stops responding, you can use this method to force a shutdown.
- Use a virtual power button selection through iLO 4.

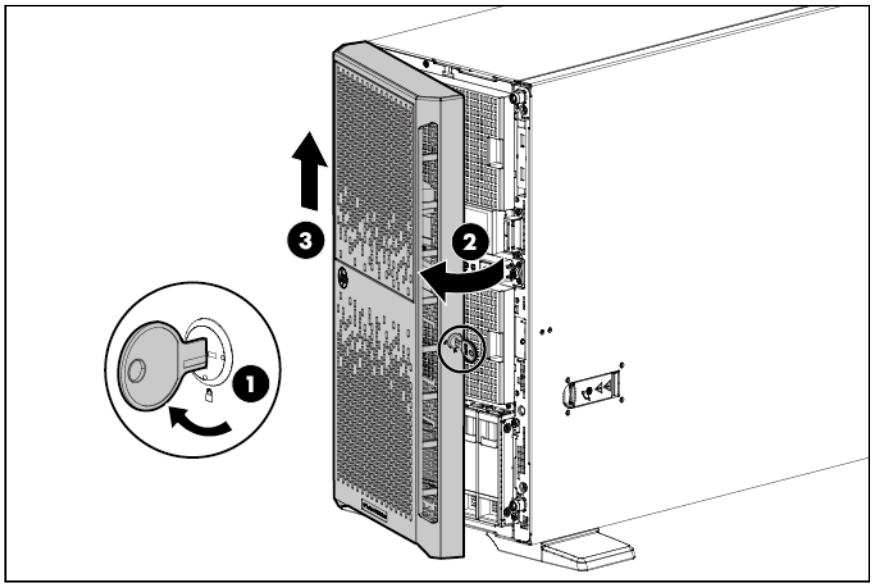
  This method initiates a controlled remote shutdown of applications and the OS before the server enters standby mode.

Before proceeding, verify the server is in standby mode by observing that the system power LED is amber.

Remove the tower bezel

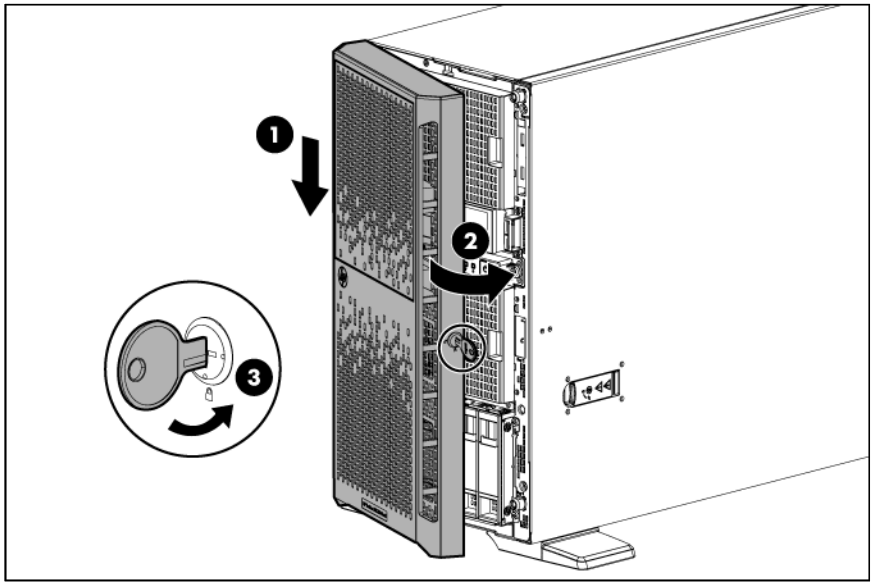
This server has a removable bezel that must be unlocked and opened before accessing the drives. The bezel must be kept closed during normal server operations.

To remove the component, unlock and remove the tower bezel.



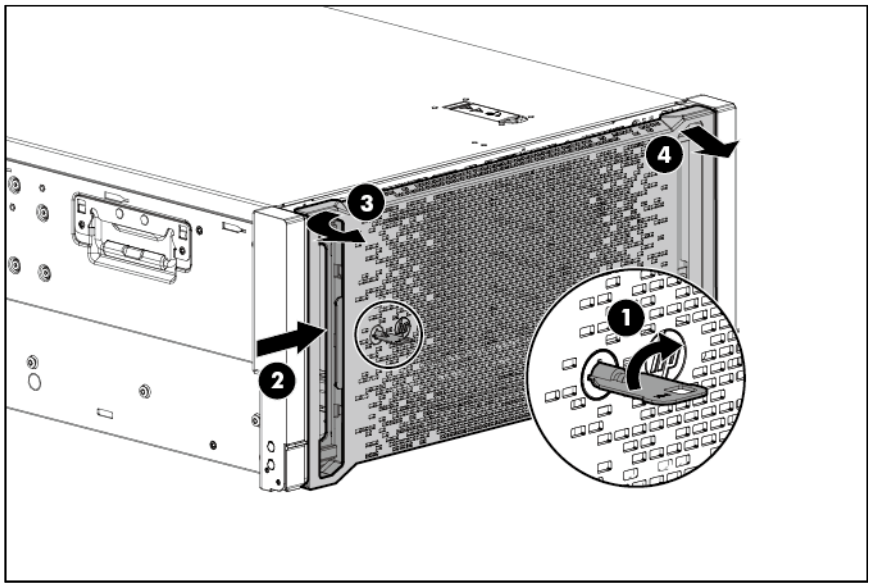
Install the tower bezel

1. Insert the bezel.
2. Close the bezel.
3. Using the key provided with the server, lock the bezel with a counterclockwise turn.



Remove the security bezel

Unlock the security bezel, press the latch on the security bezel, and then remove the security bezel.



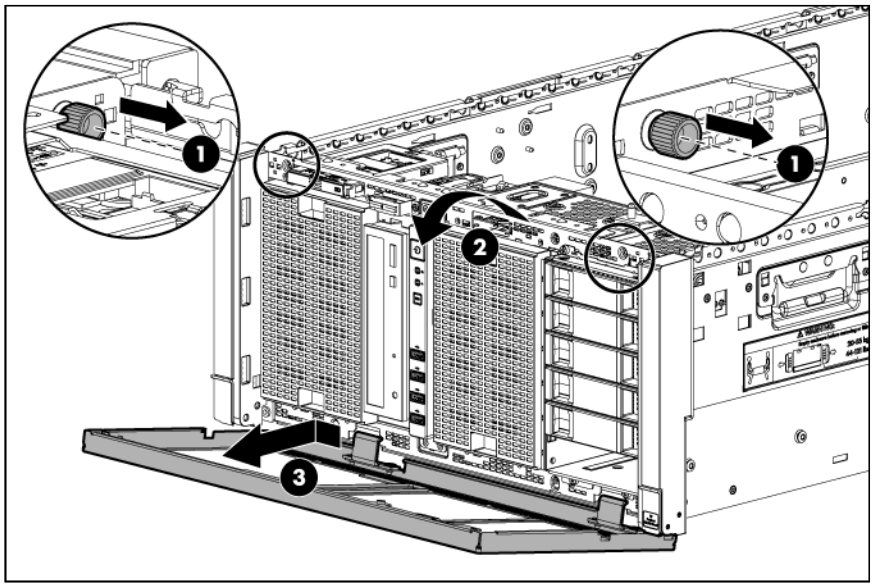
Remove the rack bezel

To remove the component:

1. If installed, remove the security bezel (on page 24).
2. Press the Power On/Standby button.

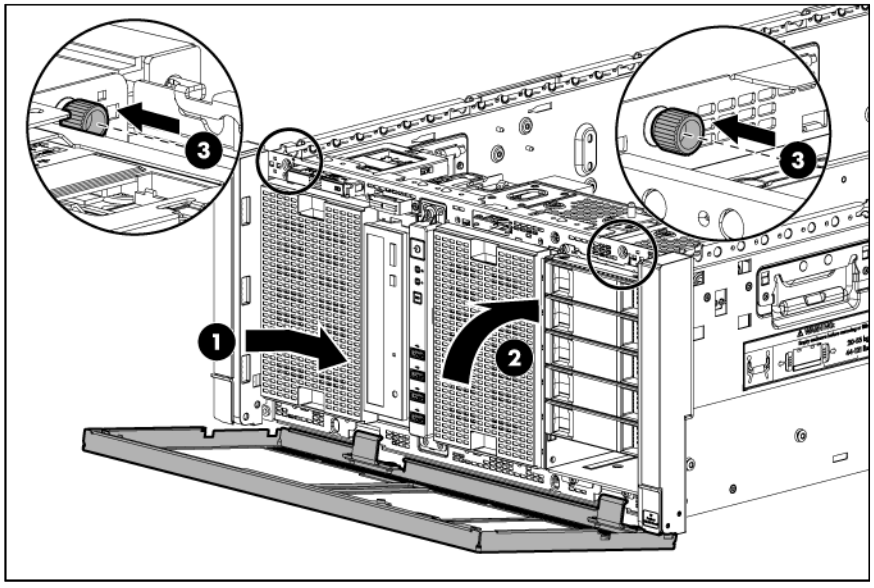
   The server powers down and enters standby mode. The system power LED changes from green to amber. Power is still applied to the server.
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Extend the server from the rack (on page 27).
5. Remove the access panel (on page 25).
6. Loosen the thumbscrews.

7. Remove the rack bezel.



Install the rack bezel

1. Install the rack bezel.
2. Tighten the rack bezel thumbscrews.



3. Install the access panel (on page 26).
4. Slide the server back into the rack.

Remove the access panel

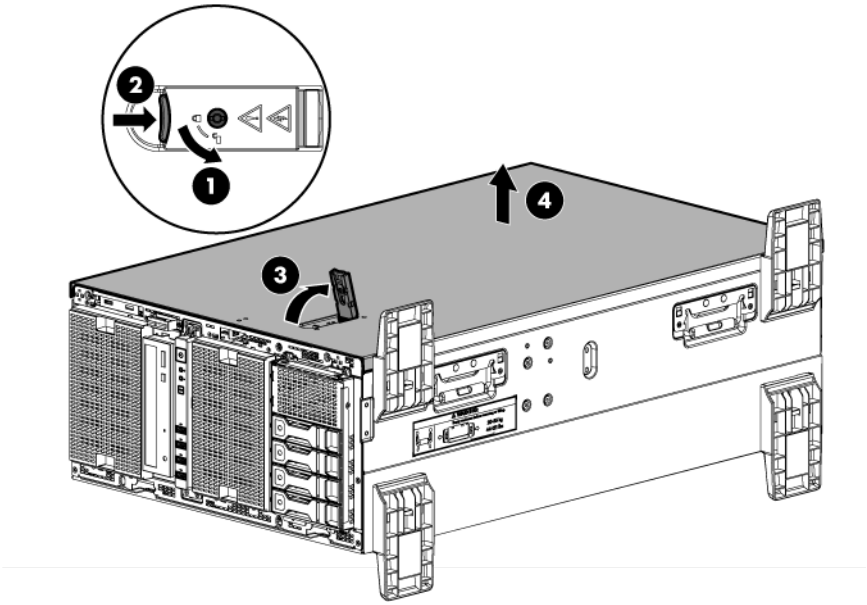
⚠ **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

CAUTION: For proper cooling do not operate the server without the access panel, baffles, expansion slot covers, or blanks installed.

To remove the component:

1. Do one of the following:
   - For tower models, open and remove the bezel ("Remove the tower bezel" on page 22).
   - For rack models, if installed, remove the security bezel (on page 24).
2. Power down the server (on page 22).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Do one of the following:
   - For tower models, place the server on a flat, level surface with the access panel facing up.
   - For rack models, extend the server from the rack (on page 27).
5. Remove the access panel:
   a. Open the locking latch.

      If the locking latch is engaged, use a T-15 Torx screwdriver to unlock it.
   b. Slide the access panel back.
   c. Lift and remove the access panel.



Install the access panel

NOTE: If the rack bezel was removed, install it before installing the access panel.

To install the component:

1. Place the access panel on top of the server with the hood latch open. Allow the panel to extend past the rear of the server approximately 1.25 cm (0.5 inch).
2. Push down on the hood latch. The access panel slides to a closed position.
3. Using the T-15 Torx screwdriver provided with the server, tighten the security screw on the hood latch.
4. Do one of the following:
   - For tower models, return the server to an upright position.
   - For rack models, slide the server back into the rack.
5. Power up the server (on page 22).
6. Do one of the following:
   - For tower models, install the tower bezel (on page 23).
   - For rack models, if removed, install the security bezel ("Security bezel option" on page 47).

Extend the server from the rack

IMPORTANT: The requirement of extending or removing the server from the rack when performing installation and maintenance procedures depends on the rail system used:

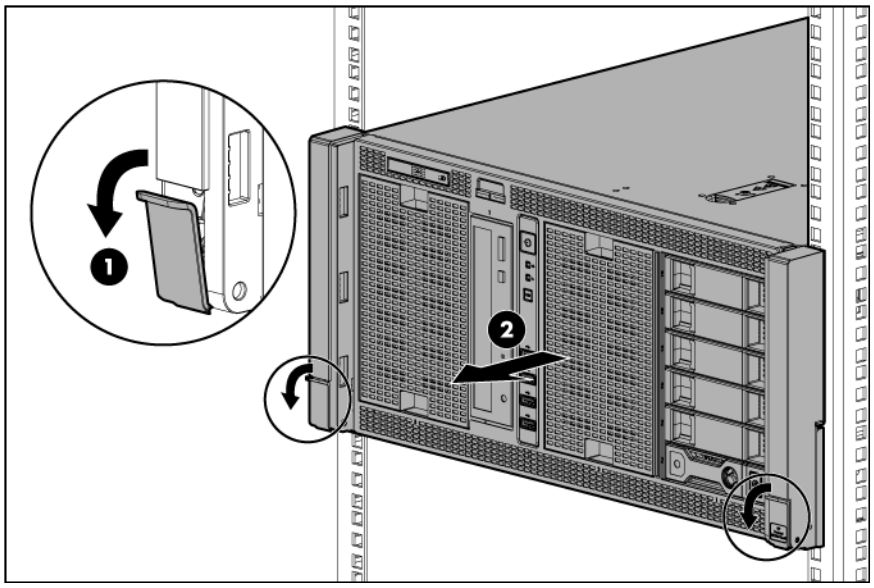
- If using a ball-bearing rail system, you can perform most installations and maintenance by simply extending the server from the rack.
- If using a friction rail system, to perform installations or maintenance that requires access panel removal, remove the server from the rack.

Release the latch on both side, and then 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.

NOTE: If the server does not extend from the rack, pull down each quick release lever and use a T-20 screwdriver to loosen the screws located within the lever housing.

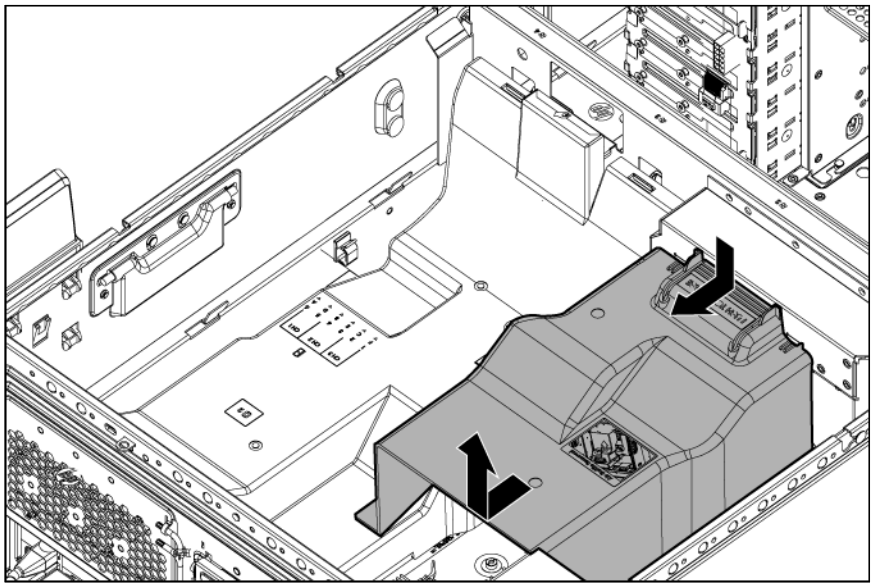


Remove the PCI air baffle

To remove the component:

1. Do one of the following:
   - For tower models, open and remove the bezel ("Remove the tower bezel" on page 22).
   - For rack models, if installed, remove the security bezel (on page 24).
2. Power down the server (on page 22).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Do one of the following:
   - For tower models, place the server on a flat, level surface with the access panel facing up.
   - For rack models, extend the server from the rack (on page 27).
5. Remove the access panel (on page 25).

6. Remove the PCI air baffle.

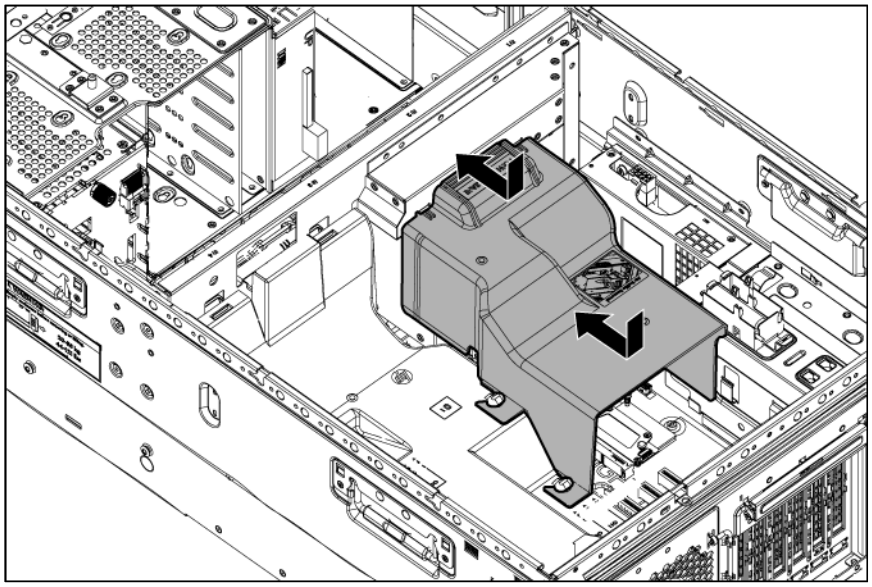


Install the PCI air baffle

CAUTION: For proper cooling do not operate the server without the access panel, baffles, expansion slot covers, or blanks installed.

To install the component:

1. Push the latch, and then insert the PCI air baffle.



2. For tower models, do the following:
   a. Install the access panel (on page 26).
   b. Return the server to an upright position.
3. For rack models, do the following:
   a. Install the access panel (on page 26).

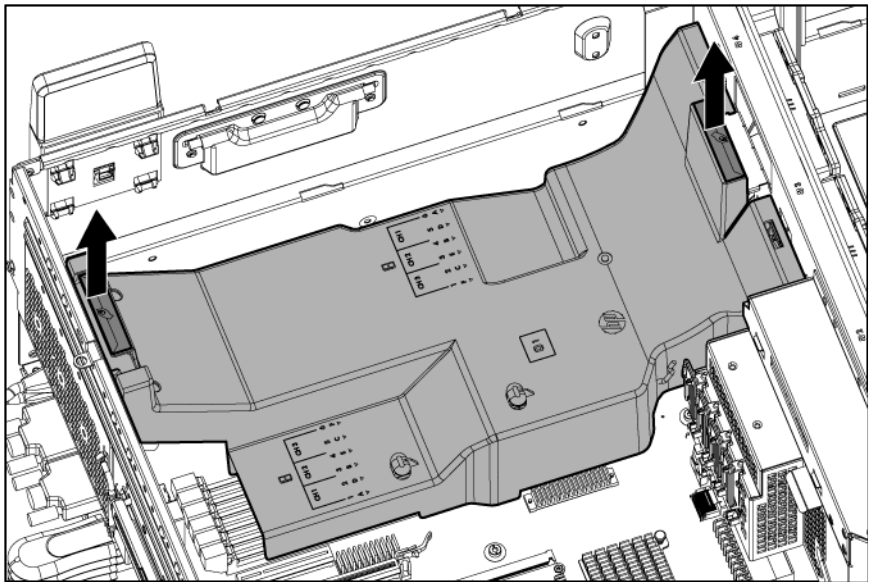
b. Slide the server back into the rack.

4. Power up the server (on page 22).
5. Do one of the following:
   - For tower models, install the bezel ("Install the tower bezel" on page 23).
   - For rack models, if removed, install the security bezel ("Security bezel option" on page 47).

Remove the system air baffle

To remove the component:

1. Do one of the following:
   - For tower models, open and remove the bezel ("Remove the tower bezel" on page 22).
   - For rack models, if installed, remove the security bezel (on page 24).
2. Power down the server (on page 22).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Do one of the following:
   - For tower models, place the server on a flat, level surface with the access panel facing up.
   - For rack models, extend the server from the rack (on page 27).
5. Remove the access panel (on page 25).
6. If installed, remove the PCI air baffle (on page 28).
7. Remove the system air baffle ("Remove the system air baffle" on page 30).

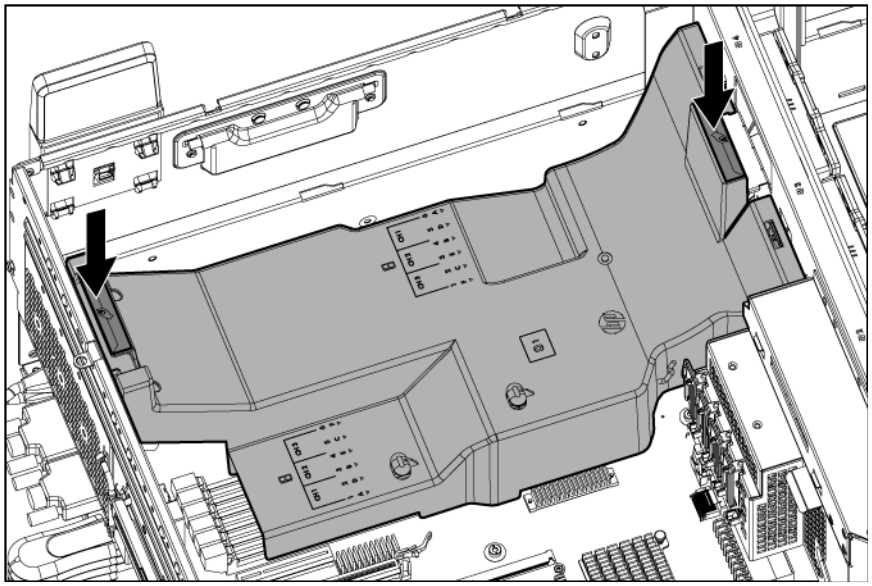


Install the system air baffle

CAUTION: For proper cooling do not operate the server without the access panel, baffles, expansion slot covers, or blanks installed.

To install the component:

1. Insert the system air baffle.



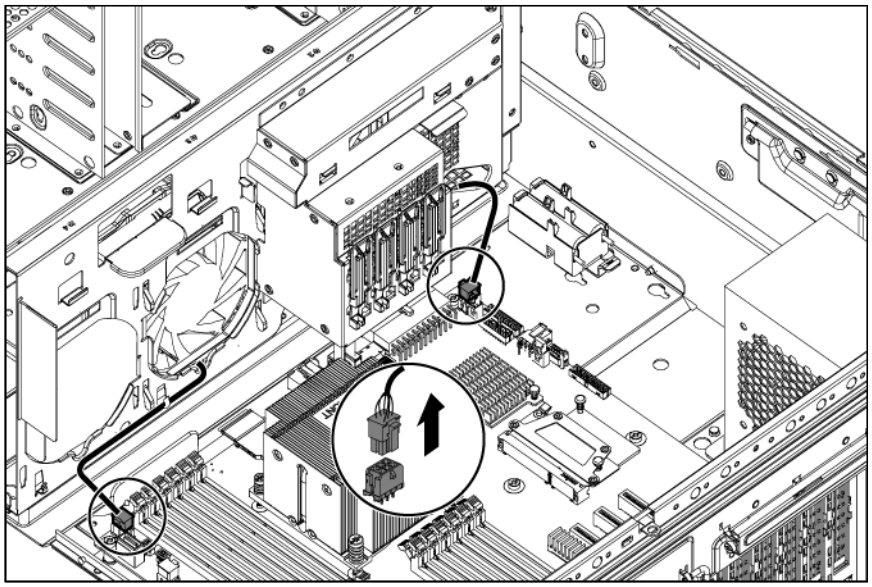
2. If removed, install the PCI air baffle (on page 29).
3. For tower models, do the following:
   a. Install the access panel (on page 26).
   b. Return the server to an upright position.
4. For rack models, do the following:
   a. Install the access panel (on page 26).
   b. Slide the server back into the rack.
5. Power up the server (on page 22).
6. Do one of the following:
   - For tower models, install the bezel ("Install the tower bezel" on page 23).
   - For rack models, if removed, install the security bezel ("Security bezel option" on page 47).

Remove the fan cage

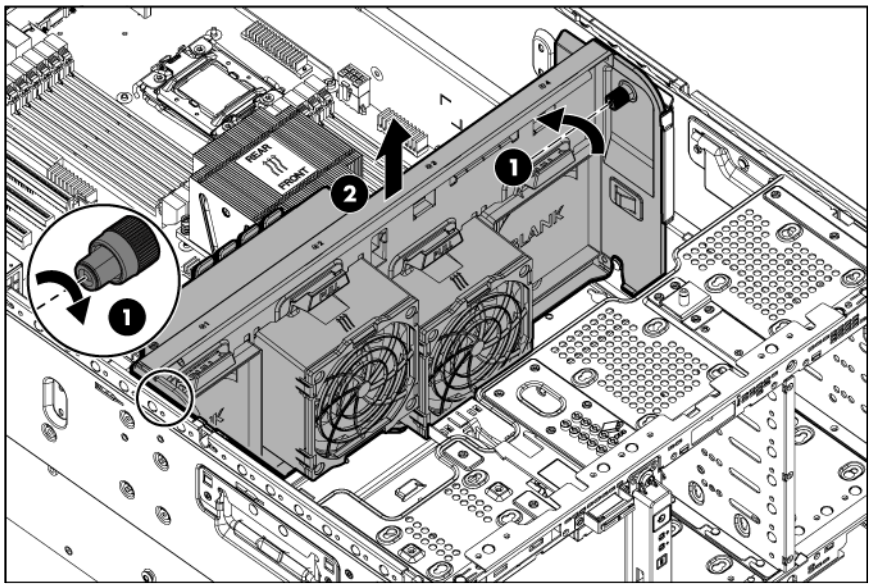
To remove the component:

1. Do one of the following:
   - For tower models, open and remove the bezel ("Remove the tower bezel" on page 22).
   - For rack models, if installed, remove the security bezel (on page 24).
2. Power down the server (on page 22).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.

4. Do one of the following:
   - For tower models, place the server on a flat, level surface with the access panel facing up.
   - For rack models, extend the server from the rack (on page 27).
5. Remove the access panel (on page 25).
6. If installed, remove the PCI air baffle (on page 28).
7. Remove any installed full-length PCI expansion cards ("Remove a full-length expansion board" on page 37).
8. Remove the system air baffle (on page 30).
9. Remove the fan cage:
   a. Disconnect all fan connectors from the system board.



   b. Loosen the thumbscrews on either side of the fan cage.
   c. Remove the fan cage from the server.

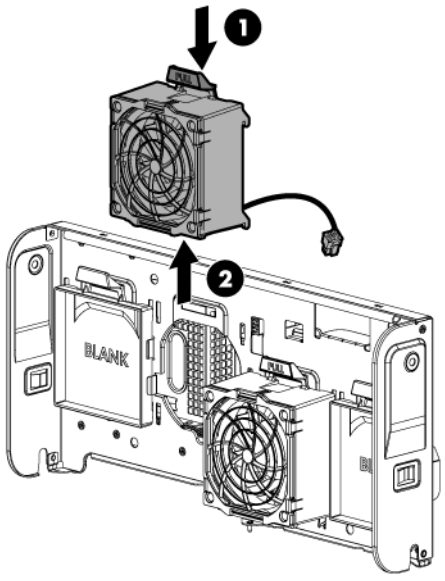


Remove a fan

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. Do one of the following:
   - For tower models, open and remove the bezel ("Remove the tower bezel" on page 22).
   - For rack models, if installed, remove the security bezel (on page 24).
2. Power down the server (on page 22).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Do one of the following:
   - For tower models, place the server on a flat, level surface with the access panel facing up.
   - For rack models, extend the server from the rack (on page 27).
5. Remove the access panel (on page 25).
6. If installed, remove the PCI air baffle (on page 28).
7. Remove any installed full-length PCI expansion cards ("Remove a full-length expansion board" on page 37).
8. Remove the system air baffle (on page 30).
9. Remove the fan cage (on page 31).
10. Remove the fan.



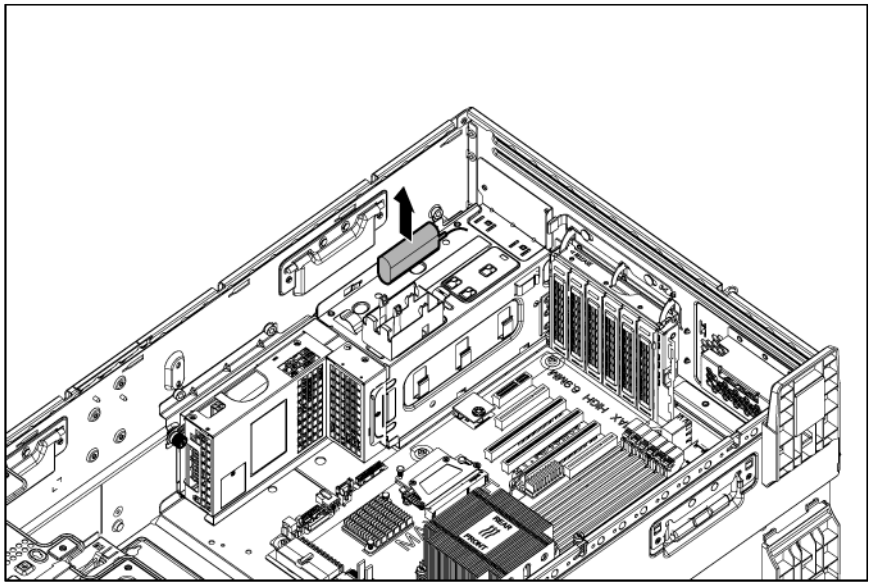
Remove the FBWC capacitor pack

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

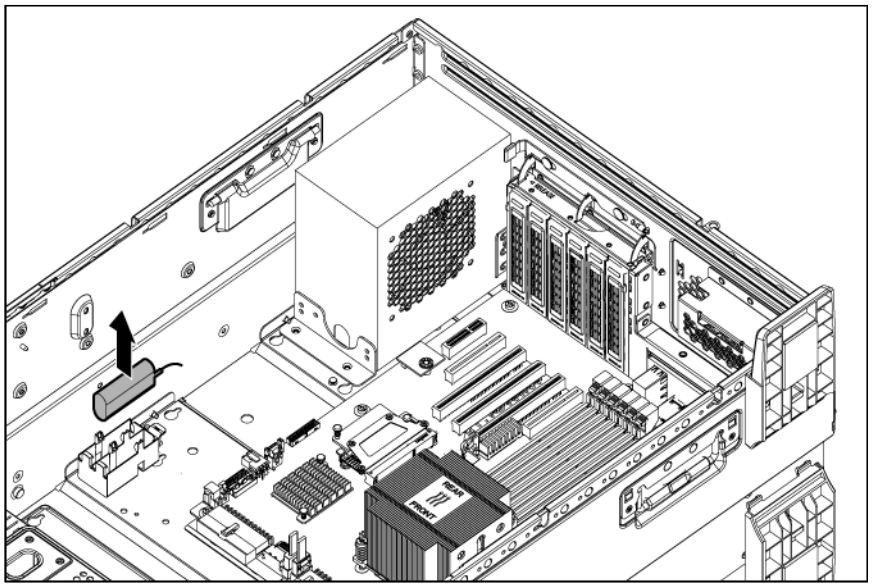
CAUTION: After the server is powered down, wait 15 seconds and then check the amber LED before unplugging the cable from the cache module. If the amber LED blinks after 15 seconds, do not remove the cable from the cache module. The cache module is backing up data, and data is lost if the cable is detached.

To remove the component:

1. Do one of the following:
   - For tower models, open and remove the bezel ("Remove the tower bezel" on page 22).
   - For rack models, if installed, remove the security bezel (on page 24).
2. Power down the server (on page 22).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Do one of the following:
   - For tower models, place the server on a flat, level surface with the access panel facing up.
   - For rack models, extend the server from the rack (on page 27).
5. Remove the access panel (on page 25).
6. If installed, remove the PCI air baffle (on page 28).
7. Remove the system air baffle (on page 30).
8. If you are removing a capacitor connected to a cache module installed in the system board cache module connector, first remove any installed PCI cards in slots 3, 4, 5 and 6.
9. Disconnect the cable from the FBWC module.
10. Remove the capacitor pack:
    - RPS



- ATX power supply



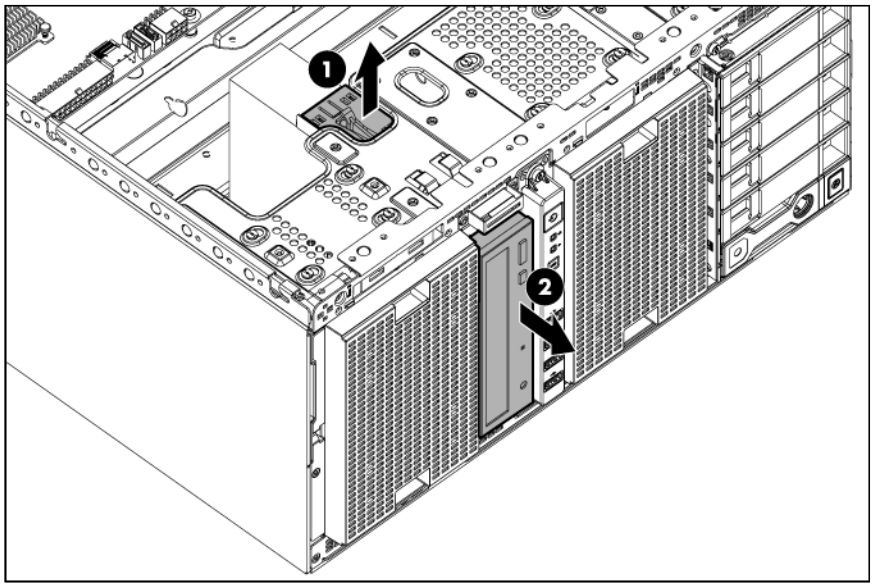
Remove the DVD drive

The server supports both DVD-ROM and DVD-RW drives.

To remove the component:

1. Do one of the following:
   - For tower models, open and remove the bezel ("Remove the tower bezel" on page 22).
   - For rack models, if installed, remove the security bezel (on page 24).
2. Power down the server (on page 22).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Do one of the following:
   a. For tower models, place the server on a flat, level surface with the access panel facing up.
   b. For rack models, extend the server from the rack (on page 27).
5. Remove the access panel (on page 25).
6. Disconnect and remove the DVD drive power and data cables.

7. Remove the DVD drive.

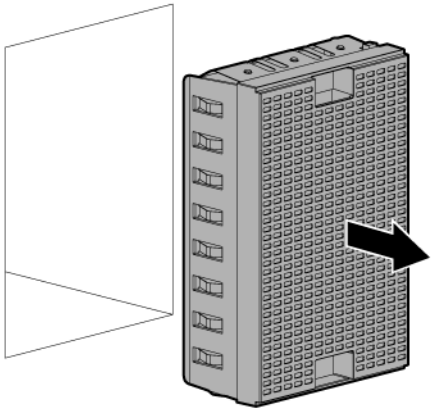


Remove a component drive cage blank

To remove the component:

1. Do one of the following:
   - For tower models, open and remove the bezel.
   - For rack models, do the following:
     i. If installed, remove the security bezel (on page 24).
     ii. Remove the access panel. ("Remove the access panel" on page 25)
     iii. Release thumbscrews and remove the rack bezel. ("Remove the rack bezel" on page 24)
2. Remove the component drive cage blank.

⚠ **WARNING:** To reduce the risk of personal injury from an electrical hazard, do not remove more than one drive cage at a time.

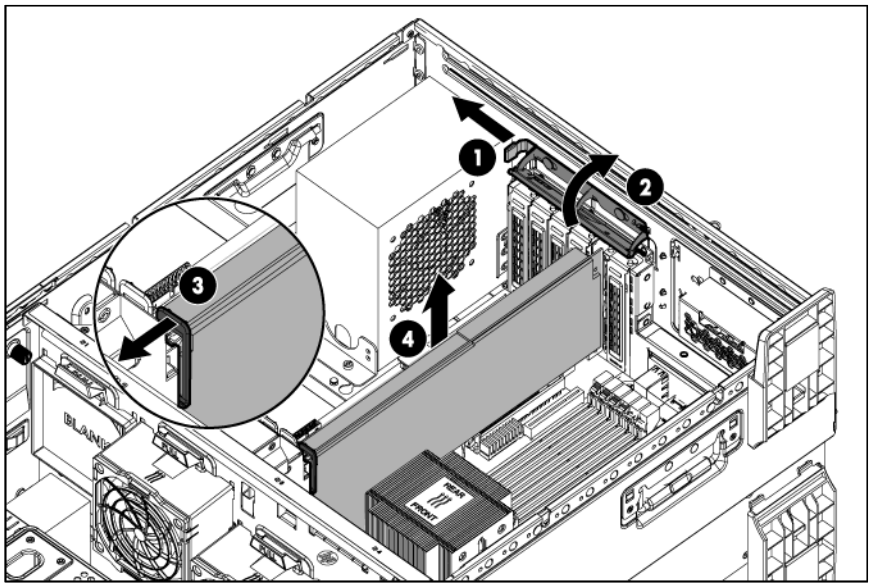


Remove a full-length expansion board

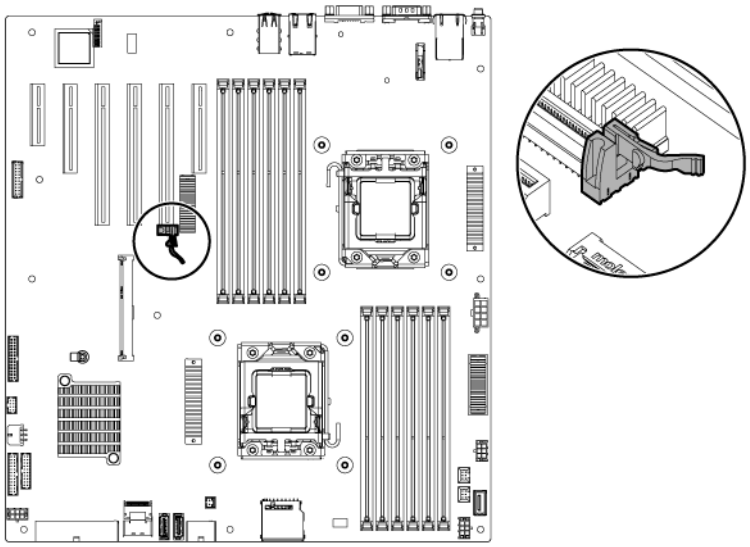
To remove the component:

1. Do one of the following:
   - For tower models, open and remove the bezel ("Remove the tower bezel" on page 22).
   - For rack models, if installed, remove the security bezel (on page 24).
2. Power down the server (on page 22).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. For tower models, do the following:
   a. Place the server on a flat, level surface with the access panel facing up.
   b. Remove the access panel (on page 25).
5. For rack models, do the following:
   a. Extend the server from the rack (on page 27).
   b. Remove the access panel (on page 25).
6. If installed, remove the PCI air baffle (on page 28).
7. Open the PCI slot cover retainer latch.

8. Release the full-length expansion board retainer latch and remove the expansion board.



IMPORTANT: If removing an expansion board from PCI slot 2, release the retainer latch on the system board, and then remove the expansion board from the system.



Setup

Optional installation services

Delivered by experienced, certified engineers, HP Care Pack services help you keep your servers up and running with support packages tailored specifically for HP ProLiant systems. HP Care Packs let you integrate both hardware and software support into a single package. A number of service level options are available to meet your needs.

HP Care Pack Services offer upgraded service levels to expand your standard product warranty with easy-to-buy, easy-to-use support packages that help you make the most of your server investments. Some of the Care Pack services are:

- Hardware support
  - 6-Hour Call-to-Repair
  - 4-Hour 24x7 Same Day
  - 4-Hour Same Business Day
- Software support
  - Microsoft®
  - Linux
  - HP ProLiant Essentials (HP SIM and RDP)
  - VMware
- Integrated hardware and software support
  - Critical Service
  - Proactive 24
  - Support Plus
  - Support Plus 24
- Startup and implementation services for both hardware and software

For more information on HP Care Pack Services, see the HP website (http://www.hp.com/services/carepack).

Rack planning resources

The rack resource kit ships with all HP branded or Compaq branded 9000, 10000, and H9 series racks. For more information on the content of each resource, see the rack resource kit documentation.

Optimum environment

When installing the server, select a location that meets the environmental standards described in this section.

Space and airflow requirements

Tower server

In a tower configuration, leave at least a 7.6-cm (3-in) clearance space at the front and back of the server for proper ventilation.

Rack server

To allow for servicing and adequate airflow, observe the following space and airflow requirements when deciding where to install a rack:

- Leave a minimum clearance of 63.5 cm (25 in) in front of the rack.
- Leave a minimum clearance of 76.2 cm (30 in) behind the rack.
- Leave a minimum clearance of 121.9 cm (48 in) from the back of the rack to the back of another rack or row of racks.

HP servers draw in cool air through the front door and expel warm air through the rear door. Therefore, the front and rear rack doors must be adequately ventilated to allow ambient room air to enter the cabinet, and the rear door must be adequately ventilated to allow the warm air to escape from the cabinet.

△ **CAUTION:** To prevent improper cooling and damage to the equipment, do not block the ventilation openings.

When vertical space in the rack is not filled by a server or rack component, the gaps between the components cause changes in airflow through the rack and across the servers. Cover all gaps with blanking panels to maintain proper airflow.

△ **CAUTION:** Always use blanking panels to fill empty vertical spaces in the rack. This arrangement ensures proper airflow. Using a rack without blanking panels results in improper cooling that can lead to thermal damage.

The 9000 and 10000 Series Racks provide proper server cooling from flow-through perforations in the front and rear doors that provide 64 percent open area for ventilation.

△ **CAUTION:** When using a Compaq branded 7000 series rack, install the high airflow rack door insert (PN 327281-B21 for 42U rack, PN 157847-B21 for 22U rack) to provide proper front-to-back airflow and cooling.

△ **CAUTION:** If a third-party rack is used, observe the following additional requirements to ensure adequate airflow and to prevent damage to the equipment:

- Front and rear doors—If the 42U rack includes closing front and rear doors, you must allow 5,350 sq cm (830 sq in) of holes evenly distributed from top to bottom to permit adequate airflow (equivalent to the required 64 percent open area for ventilation).
- Side—The clearance between the installed rack component and the side panels of the rack must be a minimum of 7 cm (2.75 in).

Temperature requirements

To ensure continued safe and reliable equipment operation, install or position the system in a well-ventilated, climate-controlled environment.

The maximum recommended ambient operating temperature (TMRA) for most server products is 35°C (95°F). The temperature in the room where the rack is located must not exceed 35°C (95°F).

CAUTION: To reduce the risk of damage to the equipment when installing third-party options:

- Do not permit optional equipment to impede airflow around the server or to increase the internal rack temperature beyond the maximum allowable limits.
- Do not exceed the manufacturer's TMRA.

Power requirements

Installation of this equipment must comply with local and regional electrical regulations governing the installation of information technology equipment by licensed electricians. This equipment is designed to operate in installations covered by NFPA 70, 1999 Edition (National Electric Code) and NFPA-75, 1992 (code for Protection of Electronic Computer/Data Processing Equipment). For electrical power ratings on options, refer to the product rating label or the user documentation supplied with that option.

WARNING: To reduce the risk of personal injury, fire, or damage to the equipment, do not overload the AC supply branch circuit that provides power to the rack. Consult the electrical authority having jurisdiction over wiring and installation requirements of your facility.

CAUTION: Protect the server from power fluctuations and temporary interruptions with a regulating uninterruptible power supply. This device protects the hardware from damage caused by power surges and voltage spikes and keeps the system in operation during a power failure.

When installing more than one server, you may need to use additional power distribution devices to safely provide power to all devices. Observe the following guidelines:

- Balance the server power load between available AC supply branch circuits.
- Do not allow the overall system AC current load to exceed 80 percent of the branch circuit AC current rating.
- Do not use common power outlet strips for this equipment.
- Provide a separate electrical circuit for the server.

Electrical grounding requirements

The server must be grounded properly for proper operation and safety. In the United States, you must install the equipment in accordance with NFPA 70, 1999 Edition (National Electric Code), Article 250, as well as any local and regional building codes. In Canada, you must install the equipment in accordance with Canadian Standards Association, CSA C22.1, Canadian Electrical Code. In all other countries, you must install the equipment in accordance with any regional or national electrical wiring codes, such as the International Electrotechnical Commission (IEC) Code 364, parts 1 through 7. Furthermore, you must be sure that all power distribution devices used in the installation, such as branch wiring and receptacles, are listed or certified grounding-type devices.

Because of the high ground-leakage currents associated with multiple servers connected to the same power source, HP recommends the use of a PDU that is either permanently wired to the building's branch circuit or includes a nondetachable cord that is wired to an industrial-style plug. NEMA locking-style plugs or those complying with IEC 60309 are considered suitable for this purpose. Using common power outlet strips for the server is not recommended.

Rack warnings

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 might 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: 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.

Server warnings and cautions

WARNING: This server is very heavy. 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.
- Get help to lift and stabilize the product during installation or removal, especially when the product is not fastened to the rails. HP recommends that a minimum of two people are required for all rack server installations. A third person may be required to help align the server if the server is installed higher than chest level.
- Use caution when installing the server in or removing the server from the rack; it is unstable when not fastened to the rails.

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

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/DC power is removed.

CAUTION: Protect the server from power fluctuations and temporary interruptions with a regulating uninterruptible power supply. This device protects the hardware from damage caused by power surges and voltage spikes and keeps the system in operation during a power failure.

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.

Identifying tower server shipping carton contents

Unpack the server shipping carton and locate the materials and documentation necessary for installing the server.

The contents of the server shipping carton include:

- Server
- Power cord
- Keyboard
- Mouse
- Tower feet
- Hardware documentation, Documentation CD, and software products

In addition to the supplied items, you might need:

- Hardware options
- Operating system or application software
- PDU

Installing hardware options

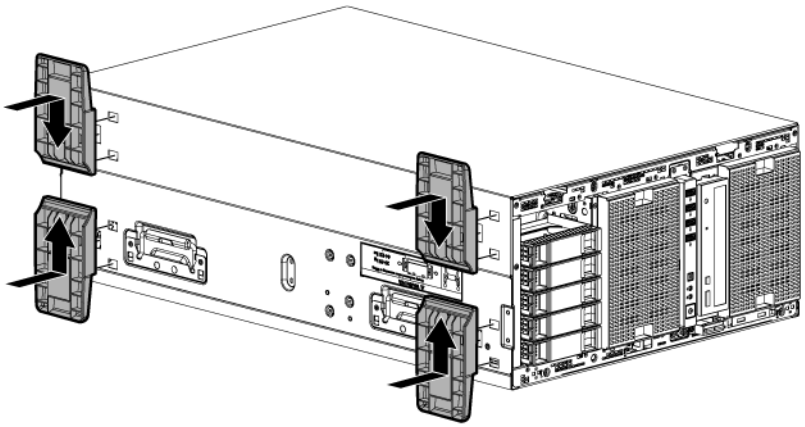
Install any hardware options before initializing the server. For options installation information, refer to the option documentation. For server-specific information, refer to "Hardware options installation (on page 47)."

Setting up a tower server

Follow the steps in this section to set up a tower model server. If you are going to install the server into a rack, see the rack installation section.

1. Place the server on a flat, stable surface.

2. Install the server base feet.



3. Connect peripheral devices to the server.

WARNING: To reduce the risk of electric shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into RJ-45 connectors.

4. Connect the power cord to the rear of the server.
5. Connect the power cord to the AC power source.

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.

Installing the server into the rack

To install the server into a rack with square, round, or threaded holes, see the instructions that ship with the rack hardware kit.

If you are installing the server into a rack, order the appropriate option kit from the RackSolutions website. To install the rack brackets, follow the server-specific instructions on the website.

⚠ **WARNING:** This server is very heavy. 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.
- Get help to lift and stabilize the product during installation or removal, especially when the product is not fastened to the rails. HP recommends that a minimum of two people are required for all rack server installations. A third person may be required to help align the server if the server is installed higher than chest level.
- Use caution when installing the server in or removing the server from the rack; it is unstable when not fastened to the rails.

⚠ **CAUTION:** Always plan the rack installation so that the heaviest item is on the bottom of the rack. Install the heaviest item first, and continue to populate the rack from the bottom to the top.

1. Install the server and cable management arm into the rack. For more information, see the installation instructions that ship with the 3-7U Quick Deploy Rail System (rack installation only).
2. Connect peripheral devices to the server.

Powering up and configuring the server

To power up the server:

1. Connect each power cord to the server.
2. Connect each power cord to the power source.
3. Press the Power On/Standby button.

The server exits standby mode and applies full power to the system. The system power LED changes from amber to green.

During POST, the system recognizes devices.

To configure the server:

- When the system recognizes a controller, to launch the ACU GUI, press **F5.**
- To change the server settings using RBSU, when prompted during the boot process, press the **F9**. The system is set up by default for the English language.

For more information on the automatic configuration, see the *HP ROM-Based Setup Utility User Guide* located on the Documentation CD.

Installing the operating system

This HP ProLiant server does not ship with provisioning media. Everything needed to manage and install the system software and firmware is preloaded on the server.

To operate properly, the server must have a supported operating system. For the latest information on operating system support, see the HP website (http://www.hp.com/go/supportos).

To install an operating system on the server, use one of the following methods:

- Intelligent Provisioning—The iLO Management Engine is a new feature on ProLiant servers that contains Intelligent Provisioning for embedded deployment, updating, and provisioning capabilities. Intelligent

Provisioning can configure the server and install an operating system, eliminating the need for SmartStart CDs and Smart Update Firmware DVDs.

To install an operating system on the server with Intelligent Provisioning (local or remote):

a. Connect the Ethernet cable between the network connector on the server and a network jack.
b. Press the Power On/Standby button.
c. During server POST, press the **F10** key.
d. Complete the initial Preferences and Registration portion of Intelligent Provisioning (on page 114).
e. At the 1 Start screen, click the **Configure and Install** button.
f. To finish the installation, follow the onscreen prompts. An Internet connection is required to update the firmware and systems software.

- Remote deployment installation—To remotely deploy an operating system, use Insight Control server deployment for an automated solution.

For additional system software and firmware updates, download the HP Service Pack for ProLiant from the HP website (http://www.hp.com/go/spp/download). Software and firmware must be updated before using the server for the first time, unless any installed software or components require an older version. For more information, see "Keeping the system current (on page 122)."

The Smart Update Firmware DVD ISO is also available at the download tab on the HP website (http://www.hp.com/go/foundation).

For more information on using these installation methods, see the HP website (http://www.hp.com/go/ilo).

Registering the server

To register the server, see the HP Registration website (http://register.hp.com).

Hardware options installation

Introduction

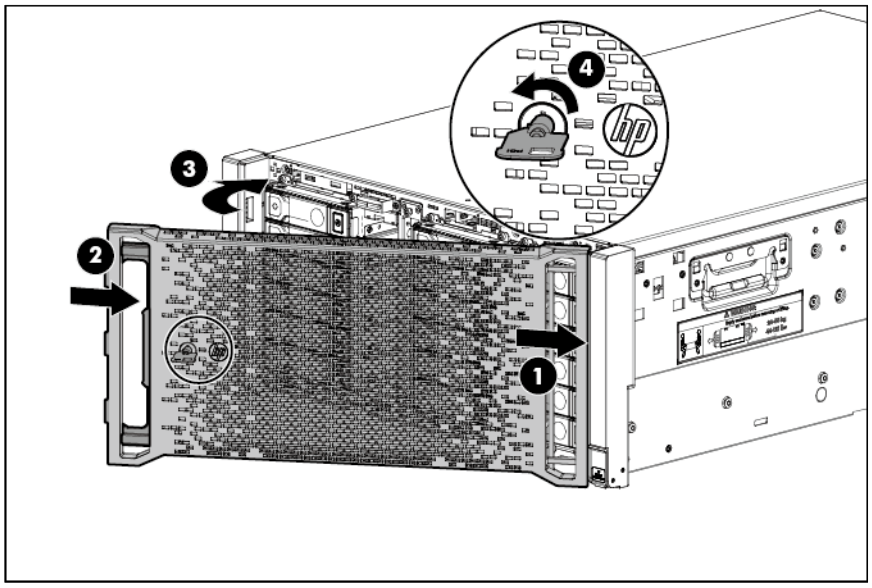
If more than one option is being installed, read the installation instructions for all the hardware options and identify similar steps to streamline the installation process.

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: To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause electrostatic discharge.

Security bezel option

Install the security bezel into the chassis, and then lock the security bezel with the key.



Second processor option

The server supports single-processor and dual-processor operation.

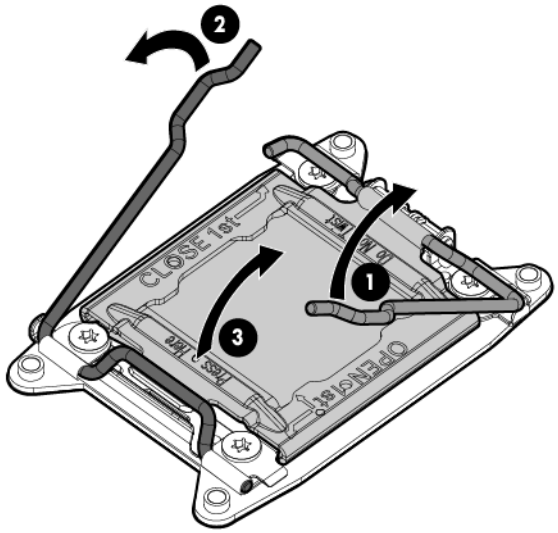
CAUTION: To avoid damage to the processor and system board, only authorized personnel should attempt to replace or install the processor in this server.

CAUTION: To prevent possible server malfunction and damage to the equipment, multiprocessor configurations must contain processors with the same part number.

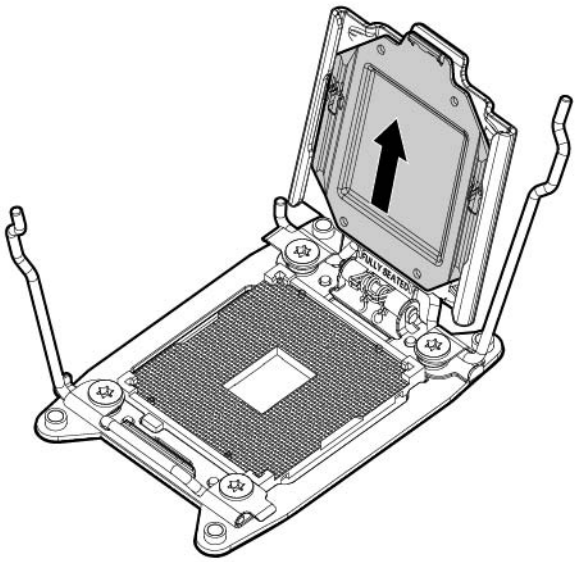
IMPORTANT: If installing a processor with a faster speed, update the system ROM before installing the processor.

To install a processor:

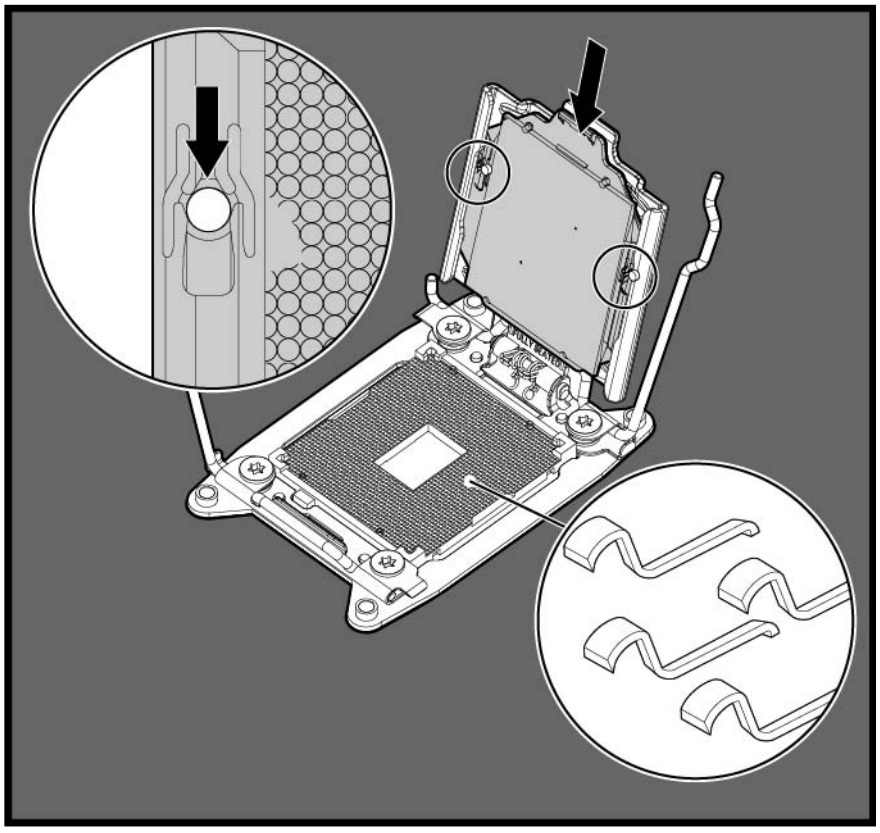
1. Do one of the following:
   - For tower models, open and remove the bezel ("Remove the tower bezel" on page 22).
   - For rack models, if installed, remove the security bezel (on page 24).
2. Power down the server (on page 22).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. For tower models, do the following:
   a. Place the server on a flat, level surface with the access panel facing up.
   b. Remove the access panel (on page 25).
5. For rack models, do the following:
   a. Extend the server from the rack (on page 27).
   b. Remove the access panel (on page 25).
6. Remove the PCI air baffle (on page 28), if installed.
7. Remove the system air baffle (on page 30).
8. Open each of the processor locking levers in the order indicated, and then open the processor retaining bracket.



9. Remove the clear processor socket cover. Retain the processor socket cover for future use.



10. Install the processor. Verify that the processor is fully seated in the processor retaining bracket by visually inspecting the processor installation guides on either side of the processor. **THE PINS ON THE SYSTEM BOARD ARE VERY FRAGILE AND EASILY DAMAGED.**

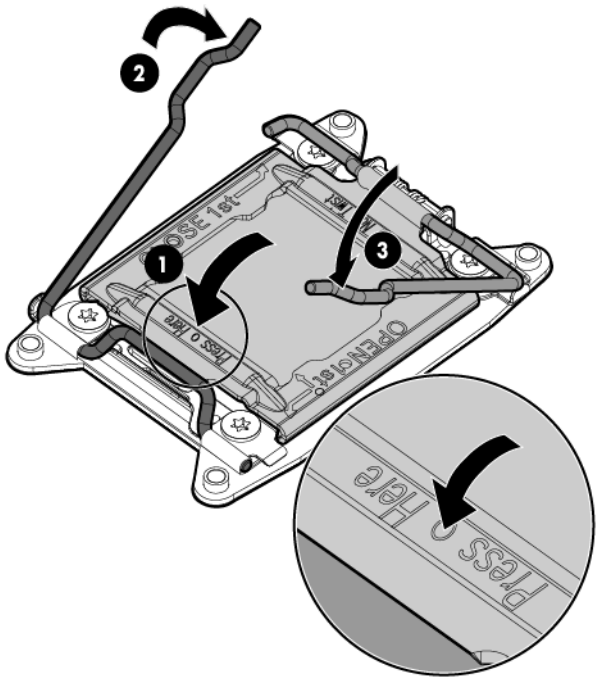


△ **CAUTION: THE PINS ON THE SYSTEM BOARD ARE VERY FRAGILE AND EASILY DAMAGED.** To avoid damage to the system board, do not touch the processor or the processor socket contacts.

11. Close the processor retaining bracket. When the processor is installed properly inside the processor retaining bracket, the processor retaining bracket clears the flange on the front of the socket.

△ **CAUTION:** Do not press down on the processor. Pressing down on the processor may cause damage to the processor socket and the system board. Press only in the area indicated on the processor retaining bracket.

12. Press and hold the processor retaining bracket in place, and then close each processor locking lever. Press only in the area indicated on the processor retaining bracket.



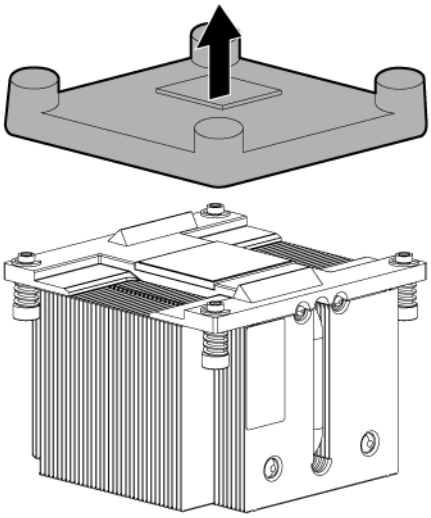
△ **CAUTION:** Close and hold down the processor cover socket while closing the processor locking levers. The levers should close without resistance. Forcing the levers closed can damage the processor and socket, requiring system board replacement.

△ **CAUTION:** The pins on the processor socket are very fragile. Any damage to them may require replacing the system board.

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

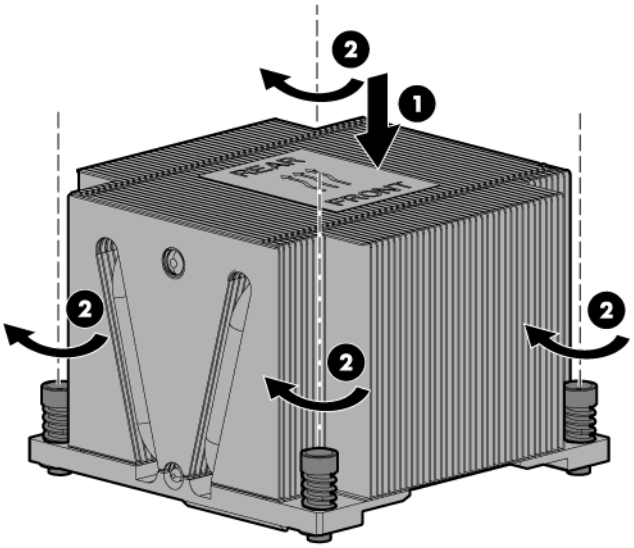
13. Remove the thermal interface protective cover from the heatsink.

△ **CAUTION:** After the cover is removed, do not touch the thermal interface media.



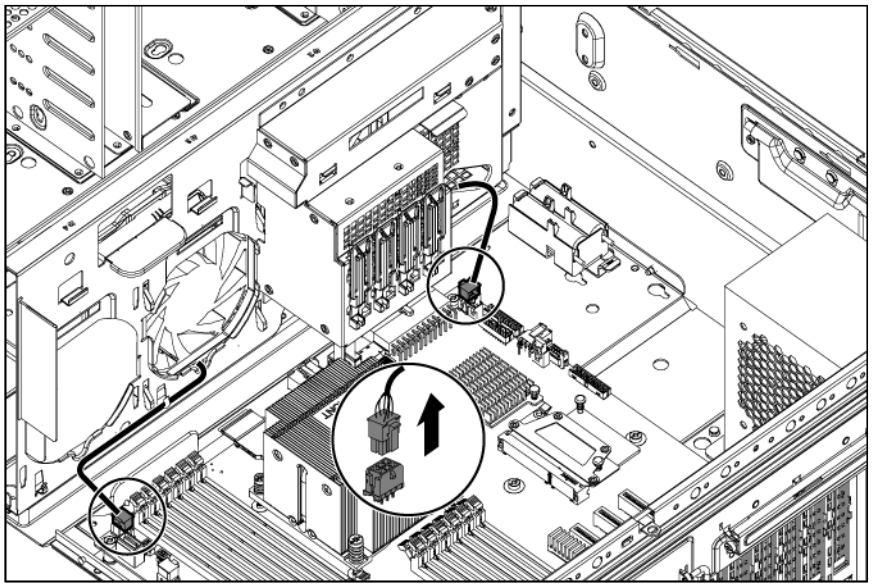
14. Align the heatsink for correct air flow orientation, and then install the heatsink.

> △ **CAUTION:** When tightening the heatsink screws, tighten one pair of diagonally opposite screws halfway, and then tighten the other pair of screws halfway. Finish the installation by completely tightening the screws in the same sequence.



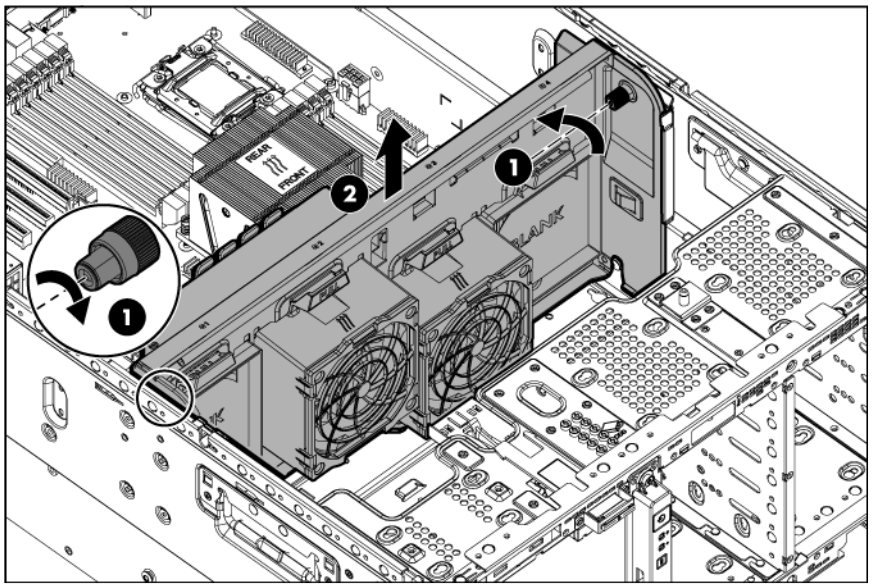
15. Remove any installed full-length PCI cards.
16. Remove the fan cage from the server:

a. Disconnect all fan connectors from the system board.



b. Loosen the thumbscrews on either side of the fan cage.

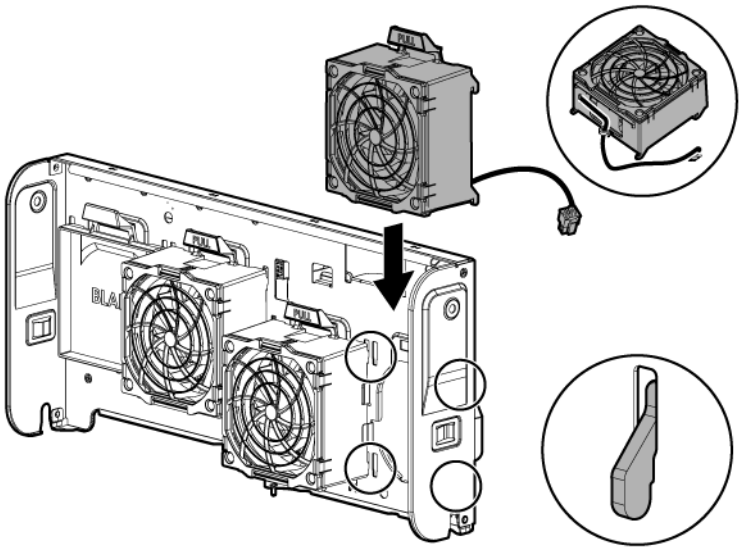
c. Remove the fan cage from the server.



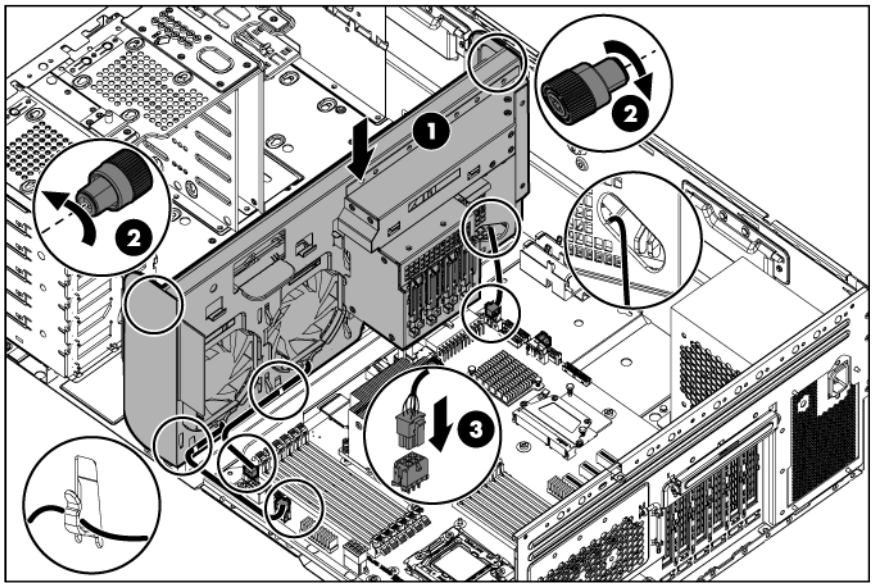
NOTE: The processor kit fan is not required if the Redundant Enablement Kit is installed and all four fans are installed.

17. Remove the fan blank from location 4.

18. Install the fan into location 4 of the fan cage, and then route the fan cable through the cable management slot.



19. Install the fan module into the server, tighten the two thumbscrews, and then connect all fan cables to the system board.



20. Install any PCI cards that were removed.
21. Install the system air baffle (on page 30).
22. If removed, install the PCI air baffle (on page 29).
23. Install the access panel (on page 26).
24. Power up the server (on page 22).
25. Do one of the following:
    - For tower models, install the bezel, and then return the server to an upright position ("Install the tower bezel" on page 23).
    - For rack models, install the security bezel, and then install the server into the rack ("Security bezel option" on page 47).

Memory options

IMPORTANT: This server does not support mixing LRDIMMs, RDIMMs, or UDIMMs. Attempting to mix any combination of these DIMMs can cause the server to halt during BIOS initialization.

The memory subsystem in this server can support RDIMMs or UDIMMs:

- UDIMMs represent the most basic type of memory module and offer lower latency in one DIMM per channel configurations and relatively low power consumption, but are limited in capacity.
- RDIMMs offer larger capacities than UDIMMs and include address parity protection.

When information applies to all types of memory, the memory are referred to as DIMMs When memory is specified as RDIMM or UDIMM, the information applies to only that type of memory. All memory installed in the server must be the same type.

The server supports the following DIMM speeds:

- Single-rank and dual-rank PC3-10600 (DDR-1333) RDIMMs operating at up to 1333 MT/s
- Single-rank and dual-rank PC3-12800 (DDR-1600) RDIMMs operating at up to 1600 MT/s
- Single-rank and dual-rank PC3-10600 (DDR-1333) UDIMMs operating at up to 1333 MT/s

Speed, voltage, and capacity

DIMM type	DIMM rank	DIMM capacity	Native speed (MT/s)	Voltage
RDIMM	Dual	8 GB	1333	LV
RDIMM	Single	8 GB	1600	STD
RDIMM	Dual	16 GB	1333	LV
UDIMM	Dual	8 GB	1333	LV

Depending on the processor model, the number of DIMMs installed, and whether UDIMMs or RDIMMs are installed, the memory clock speed can be reduced to 1333 or 1066 MT/s. Clock speed can also be reduced when using low voltage DIMMs.

Populated DIMM speed (MT/s)

DIMM type	DIMM rank	1 DIMM per channel	—	2 DIMMs per channel	—
—	—	**1.35V**	**1.5V**	**1.35V**	**1.5V**
RDIMM	Dual rank (8GB)	1333	n/a	1333	n/a
RDIMM	Single rank (8 GB)	n/a	1600	n/a	1600
RDIMM	Dual rank (16 GB)	1333	n/a	1333	n/a
UDIMM	Dual rank (8 GB)	1333	n/a	1333*	n/a

* UDIMM is supported at 2DPC at 1333 using HP SmartMemory only. Third-party memory supports up to 2DPC at 1066.

HP SmartMemory

HP SmartMemory, introduced for Gen8 servers, authenticates and unlocks certain features available only on HP Qualified memory and verifies whether installed memory has passed HP qualification and test processes.

Qualified memory is performance-tuned for HP ProLiant and BladeSystem servers and provides future enhanced support through HP Active Health and manageability software.

Certain performance features are unique with HP SmartMemory. HP SmartMemory 1.35V DDR3-1333 Registered memory is engineered to achieve the same performance level as 1.5V memory. For example, while the industry supports DDR3-1333 RDIMM at 1.5V, the ML350e server supports DDR3-1333 RDIMM up to 2 DIMMs per channel at 1333 MT/s running at 1.35V. This equates to up to 20% less power at the DIMM level with no performance penalty. In addition, the industry supports UDIMM at 2 DIMMs per channel at 1066 MT/s. HP SmartMemory supports 2 DIMMs per channel at 1333 MT/s, or 25% greater bandwidth.

Memory subsystem architecture

The memory subsystem in this server is divided into channels. Each processor supports three channels, and each channel supports two DIMM slots.

-	Memory subsystem channel (Processor 2)	Population order	Slot number (Processor 2)	-	Memory subsystem channel (Processor 1)	Population order	Slot number (Processor 1)
Processor 2	1	A D	1 2	**Processor 1**	3	F C	1 2
Processor 2	2	B E	3 4	**Processor 1**	2	E B	3 4
Processor 2	3	C F	5 6	**Processor 1**	1	D A	5 6

For the location of the slot numbers, see "DIMM slots ("General DIMM slot population guidelines" on page 57)."

This multi-channel architecture provides enhanced performance in Advanced ECC mode. This architecture also enables Lockstep and Online Spare Memory modes.

DIMM slots in this server are identified by number and by letter. Letters identify the population order. Slot numbers indicate the DIMM slot ID for spare replacement.

Single-rank, dual-rank, and quad-rank DIMMs

To understand and configure memory protection modes properly, an understanding of single-, dual-, and quad-rank DIMMs is helpful. Some DIMM configuration requirements are based on these classifications.

A single-rank DIMM has one set of memory chips that is accessed while writing to or reading from the memory. A dual-rank DIMM is similar to having two single-rank DIMMs on the same module, with only one rank accessible at a time. A quad-rank DIMM is, effectively, two dual-rank DIMMs on the same module. Only one rank is accessible at a time. The server memory control subsystem selects the proper rank within the DIMM when writing to or reading from the DIMM.

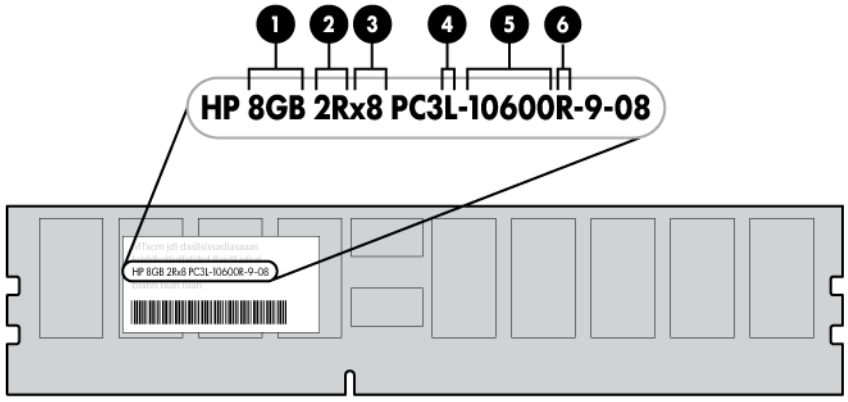
Dual- and quad-rank DIMMs provide the greatest capacity with the existing memory technology. For example, if current DRAM technology supports 8-GB single-rank DIMMs, a dual-rank DIMM would be 16 GB, and a quad-rank DIMM would be 32 GB.

LRDIMMs are labeled as quad-rank DIMMs; however, they function more like dual-rank DIMMs. There are four ranks of DRAM on the DIMM, but the LRDIMM buffer creates an abstraction that allows the DIMM to

appear as a dual-rank DIMM to the system. The LRDIMM buffer also isolates the electrical loading of the DRAM from the system to allow for faster operation. These two changes allow the system to support up to three LRDIMMs per memory channel, providing for up to 50% greater memory capacity and higher memory operating speed compared to quad-rank RDIMMs.

DIMM identification

To determine DIMM characteristics, use the label attached to the DIMM and the following illustration and table.



Item	Description	Definition
1	Size	—
2	Rank	1R = Single-rank 2R = Dual-rank 3R = Three-rank 4R = Quad-rank
3	Data width	x4 = 4-bit x8 = 8-bit
4	Voltage rating	L = Low voltage (1.35V) U = Ultra low voltage (1.25V) Blank or omitted = Standard
5	Memory speed	12800 = 1600-MT/s 10600 = 1333-MT/s 8500 = 1066-MT/s
6	DIMM type	R = RDIMM (registered) E = UDIMM (unbuffered with ECC) L = LRDIMM (load reduced)

For the latest supported memory information, see the QuickSpecs on the HP website (http://h18000.www1.hp.com/products/quickspecs/ProductBulletin.html). At the website, choose the geographic region, and then locate the product by name or product category.

Memory configurations

To optimize server availability, the server supports the following AMP modes:

- Advanced ECC—Provides up to 4-bit error correction and enhanced performance over Lockstep mode. This mode is the default option for this server.
- Online spare memory—Provides protection against failing or degraded DIMMs. Certain memory is reserved as spare, and automatic failover to spare memory occurs when the system detects a DIMM that is degrading. This feature enables DIMMs that have a higher probability of receiving an uncorrectable memory error (which would result in system downtime) to be removed from operation.

Advanced Memory Protection options are configured in RBSU. If the requested AMP mode is not supported by the installed DIMM configuration, the server boots in Advanced ECC mode. For more information, see "HP ROM-Based Setup Utility (on page 117)."

The server also can operate in independent channel mode or combined channel mode (lockstep). When running in lockstep mode, you gain reliability in one of two ways:

- If running with UDIMMs (built with x8 DRAM devices), the system can survive a complete DRAM failure (SDDC). In independent channel mode, this failure would be an uncorrectable error.
- If running with RDIMM (built with x4 DRAM devices), the system can survive the complete failure of two DRAM devices (DDDC). Running in independent mode, the server can only survive the complete failure of a single DRAM device (SDDC).

Maximum capacity

DIMM type	DIMM rank	One processor	Two processors
RDIMM	Single-rank	1 GB	4 GB
RDIMM	Dual-rank	2 GB	8 GB

For the latest memory configuration information, see the QuickSpecs on the HP website (http://www.hp.com).

General DIMM slot population guidelines

Observe the following guidelines for all AMP modes:

- Install DIMMs only if the corresponding processor is installed.
- When two processors are installed, balance the DIMMs across the two processors.
- White DIMM slots denote the first slot of a channel (Ch 1-A, Ch 2-B, Ch 3-C).
- Do not mix UDIMMs or RDIMMs.
- When two processors are installed, install the DIMMs in sequential alphabetical order balanced between the two processors: P1-A, P2-A, P1-B, P2-B, P1-C, P2-C, and so on.

For detailed memory configuration rules and guidelines, use the Online DDR3 Memory Configuration Tool on the HP website (http://www.hp.com/go/ddr3memory-configurator).

DIMM speeds are supported as indicated in the following table.

Populated slots (per channel)	Rank	Speeds supported (MT/s)
1	Single or dual rank	1333, 1600

Populated slots (per channel)	Rank	Speeds supported (MT/s)
1	Quad rank	1333
2	Single or dual rank	1333
3	Single or dual rank	1066

Advanced ECC memory configuration

Advanced ECC memory is the default memory protection mode for this server. Standard ECC can correct single-bit memory errors and detect multi-bit memory errors. When multi-bit errors are detected using Standard ECC, the error is signaled to the server and causes the server to halt.

Advanced ECC protects the server against some multi-bit memory errors. Advanced ECC can correct both single-bit memory errors and 4-bit memory errors if all failed bits are on the same DRAM device on the DIMM.

Advanced ECC provides additional protection over Standard ECC because it is possible to correct certain memory errors that would otherwise be uncorrected and result in a server failure. Using HP Advanced Memory Error Detection technology, the server provides notification when a DIMM is degrading and has a higher probability of uncorrectable memory error.

Online Spare memory configuration

Online spare memory provides protection against degraded DIMMs by reducing the likelihood of uncorrected memory errors. This protection is available without any operating system support.

Online spare memory protection dedicates one rank of each memory channel for use as spare memory. The remaining ranks are available for OS and application use. If correctable memory errors occur at a rate higher than a specific threshold on any of the non-spare ranks, the server automatically copies the memory contents of the degraded rank to the online spare rank. The server then deactivates the failing rank and automatically switches over to the online spare rank.

Lockstep memory configuration

Lockstep mode provides protection against multi-bit memory errors that occur on the same DRAM device. Lockstep mode can correct any single DRAM device failure on x4 and x8 DIMM types. The DIMMs in each channel must have identical HP part numbers.

Advanced ECC population guidelines

For Advanced ECC mode configurations, observe the following guidelines:

- Observe the general DIMM slot population guidelines.
- DIMMs may be installed individually.

Online spare population

For Online Spare memory mode configurations, observe the following guidelines:

- Observe the general DIMM slot population guidelines.

- Each channel must have a valid online spare configuration.
- Each channel can have a different valid online spare configuration.
- Each populated channel must have a spare rank:
  - A single dual-rank DIMM is not a valid configuration.
  - LRDIMMs are treated as dual-rank DIMMs.

Lockstep Memory population guidelines

For Lockstep memory mode configurations, observe the following guidelines:

- Observe the general DIMM slot population guidelines.
- DIMM configuration on all channels of a processor must be identical.
- In multi-processor configurations, each processor must have a valid Lockstep Memory configuration.
- In multi-processor configurations, each processor may have a different valid Lockstep Memory configuration.

Population order

For memory configurations with a single processor or multiple processors, populate the DIMM slots in the following order:

- RDIMM: Sequentially in alphabetical order (A through F)
- UDIMM: A through F, sequentially in alphabetical order

After installing the DIMMs, use RBSU to configure Advanced ECC, online spare, or lockstep memory support.

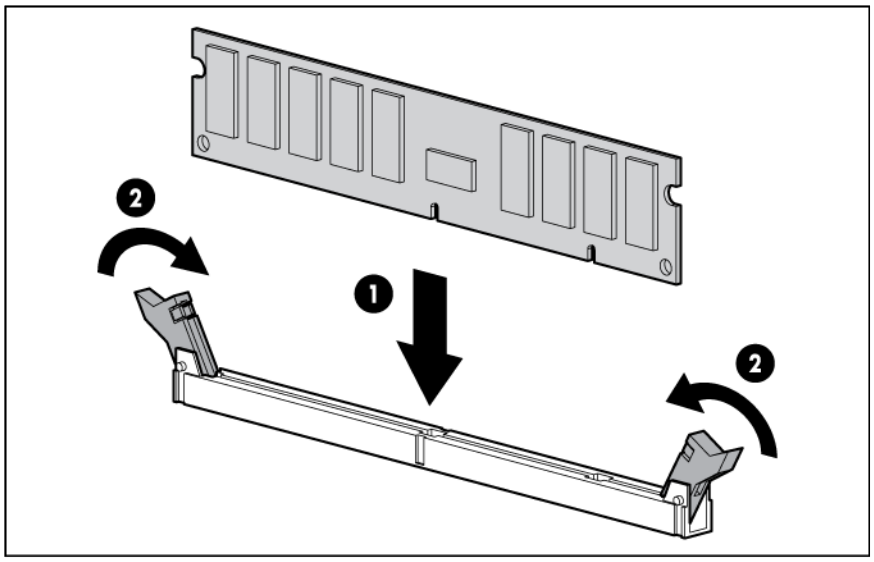
Installing a DIMM

△ **CAUTION:** To avoid damage to the hard drives, memory, and other system components, the air baffle, drive blanks, and access panel must be installed when the server is powered up.

To install the component:

1. Do one of the following:
   - For tower models, open and remove the bezel ("Remove the tower bezel" on page 22).
   - For rack models, if installed, remove the security bezel (on page 24).
2. Power down the server (on page 22).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Do one of the following:
   - For tower models, place the server on a flat, level surface with the access panel facing up.
   - For rack models, extend the server from the rack (on page 27).
5. Remove the access panel (on page 25).
6. If installed, remove the PCI air baffle (on page 28).

7. Remove the system air baffle (on page 30).
8. Open the DIMM slot latches..
9. Install the DIMM.



SAS drive options

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

- The system automatically sets all device numbers.
- If only one drive is used, install it in the bay with the lowest device number ("SAS and SATA device numbers" on page 15).
- Drives must be the same capacity to provide the greatest storage space efficiency when drives are grouped together into the same drive array.

Installing a hot-plug drive option

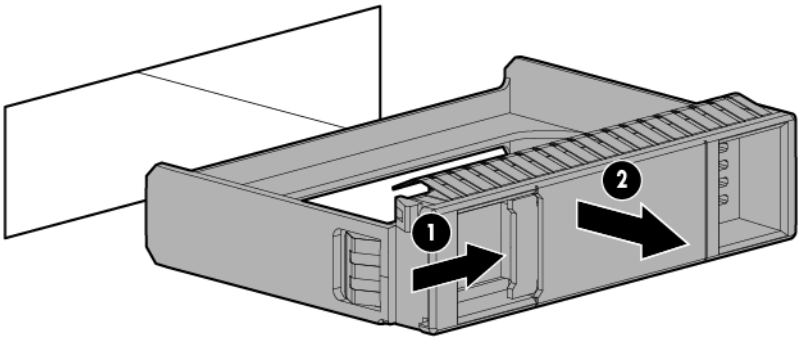
The server supports SAS, SATA, or solid state drives.

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

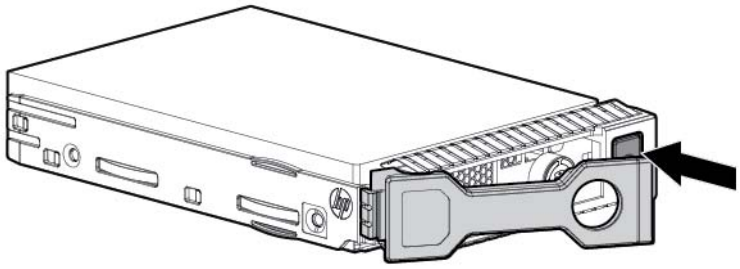
To install the component:

1. Do one of the following:
   - For tower models, open and remove the bezel ("Remove the tower bezel" on page 22).
   - For rack models, if installed, remove the security bezel (on page 24).

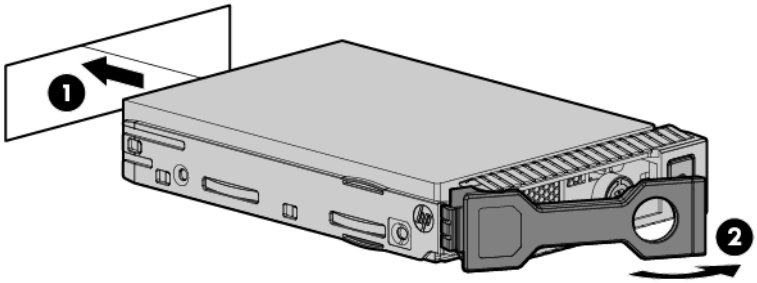
2. Remove the drive blank.



3. Prepare the drive.



4. Install the drive.



5. Determine the status of the drive from the drive LED definitions (on page 19).

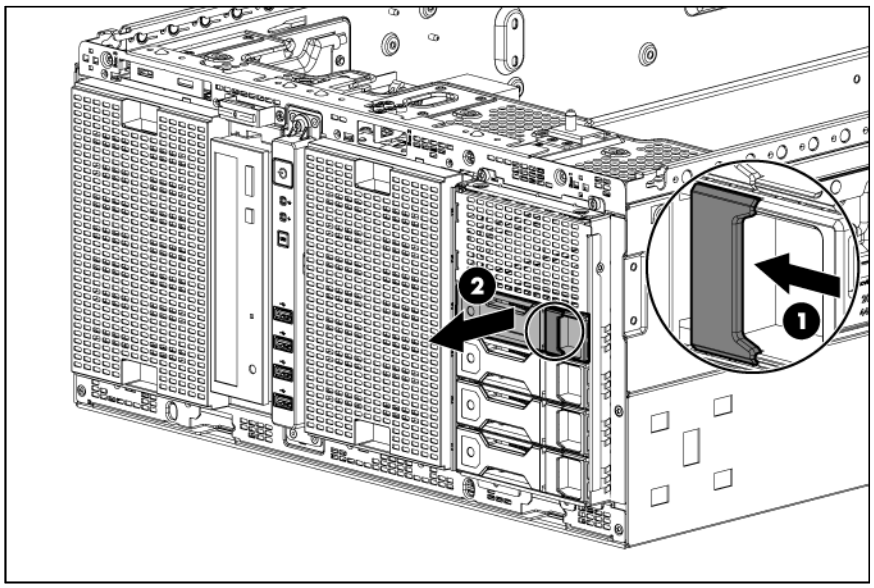
Installing a non-hot-plug drive

△ **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.

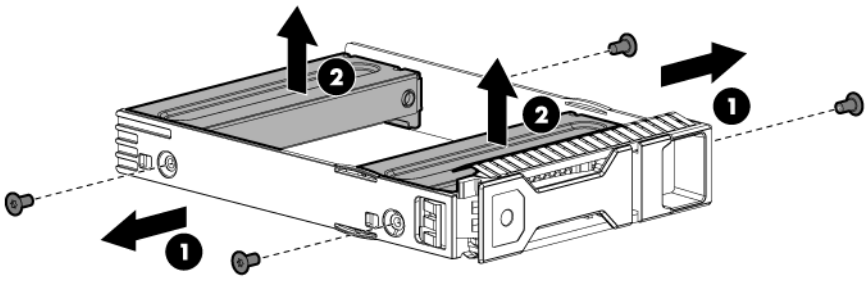
To install the component:

1. Do one of the following:
   - For tower models, open and remove the bezel ("Remove the tower bezel" on page 22).
   - For rack models, if installed, remove the security bezel (on page 24).

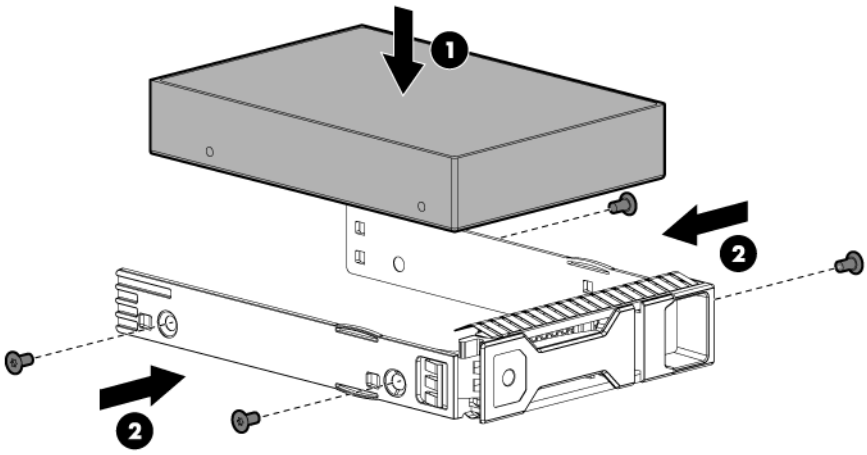
2. Power down the server (on page 22).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Do one of the following:
   - For tower models, place the server on a flat, level surface with the access panel facing up.
   - For rack models, extend the server from the rack (on page 27).
5. Remove the access panel (on page 25).
6. Remove the existing non-hot-plug drive blank.



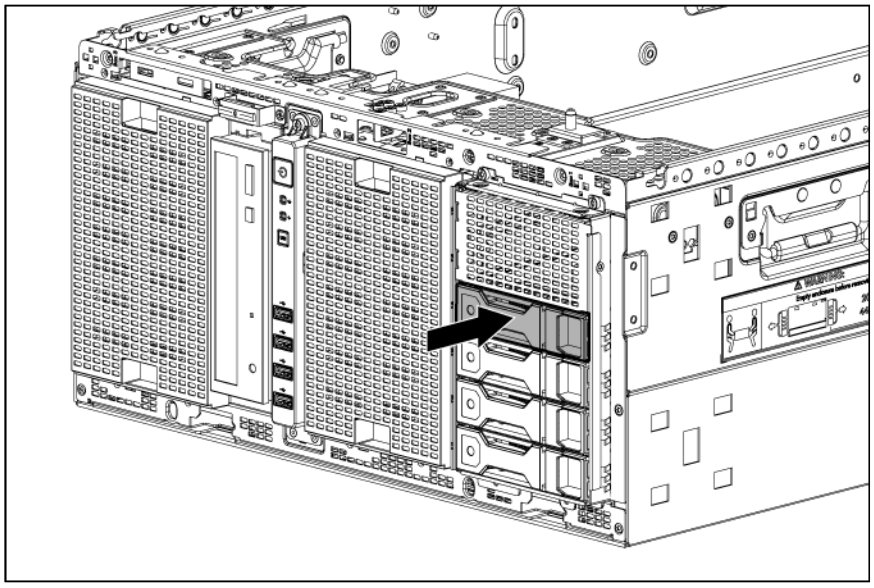
7. Remove the screws to remove the two metal brackets from the drive blank.



8. Install the non-hot-plug drive on the blank and attach the screws.



9. Install the drive into the drive bay.

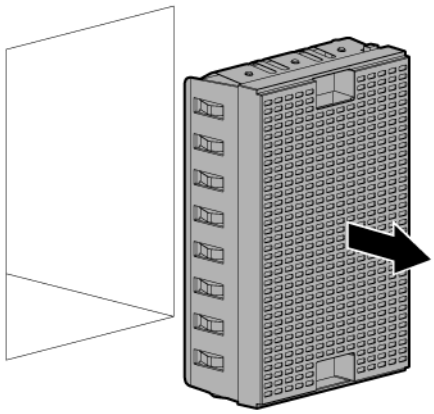


10. For tower models, do the following:
    a. Install the access panel (on page 26).
    b. Return the server to an upright position.
11. For rack models, do the following:
    a. Install the access panel (on page 26).
    b. Slide the server back into the rack.
12. Power up the server (on page 22).
13. Do one of the following:
    - For tower models, install the bezel ("Install the tower bezel" on page 23).
    - For rack models, if removed, install the security bezel ("Security bezel option" on page 47).

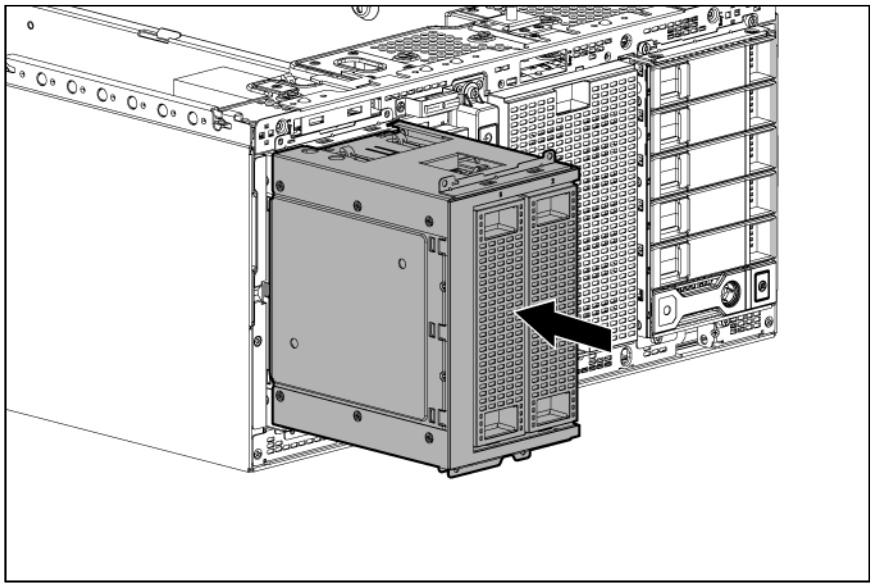
Optical drive cage option

To install the component:

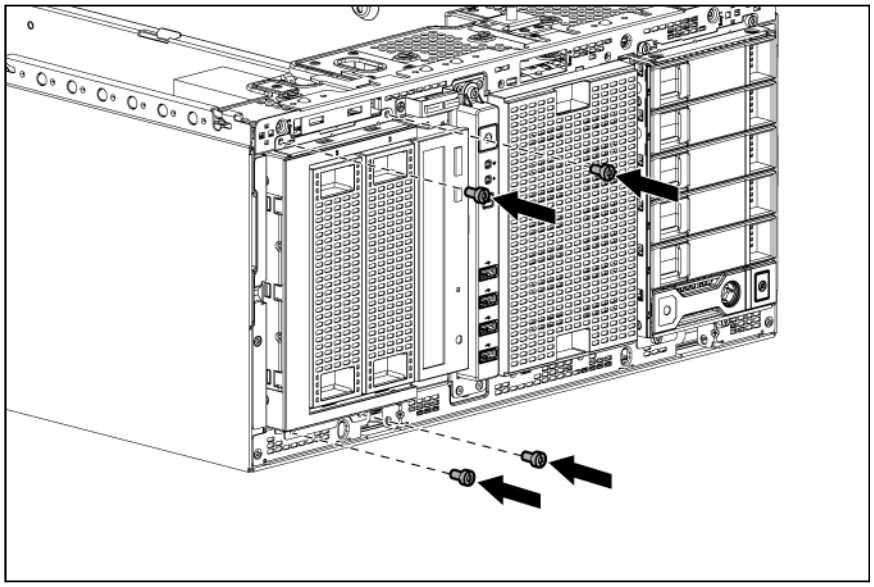
1. Do one of the following:
   - For tower models, open and remove the bezel ("Remove the tower bezel" on page 22).
   - For rack models, if installed, remove the security bezel (on page 24).
2. Power down the server (on page 22).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. For tower models, do the following:
   a. Place the server on a flat, level surface with the access panel facing up.
   b. Remove the access panel (on page 25).
5. For rack models, do the following:
   a. Extend the server from the rack (on page 27).
   b. Remove the access panel (on page 25).
   c. Release thumbscrews and remove the rack bezel ("Remove the rack bezel" on page 24).
6. Remove the blank from box 3.



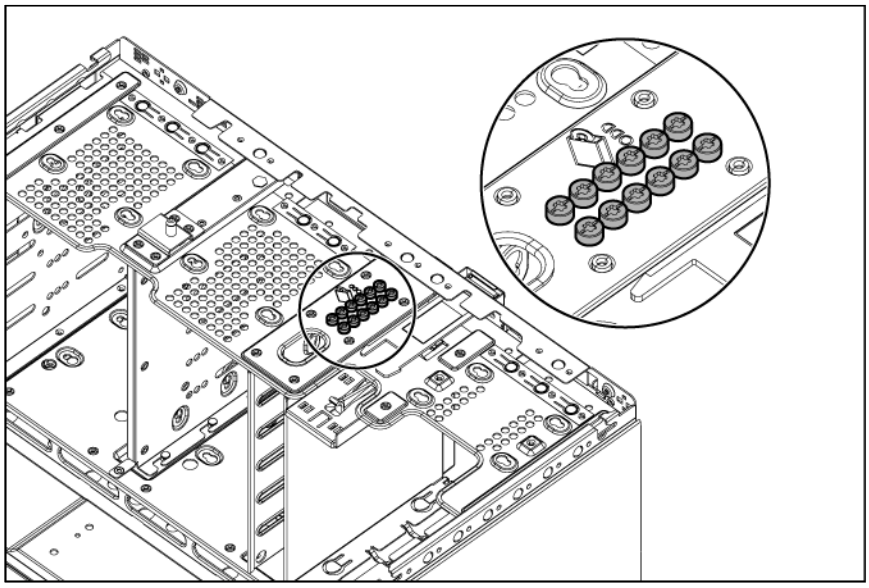
7. Install the optical drive cage.



8. Using the T-15 screws, secure the optical drive cage.



The Torx screws required to install optical drives are located on the chassis.



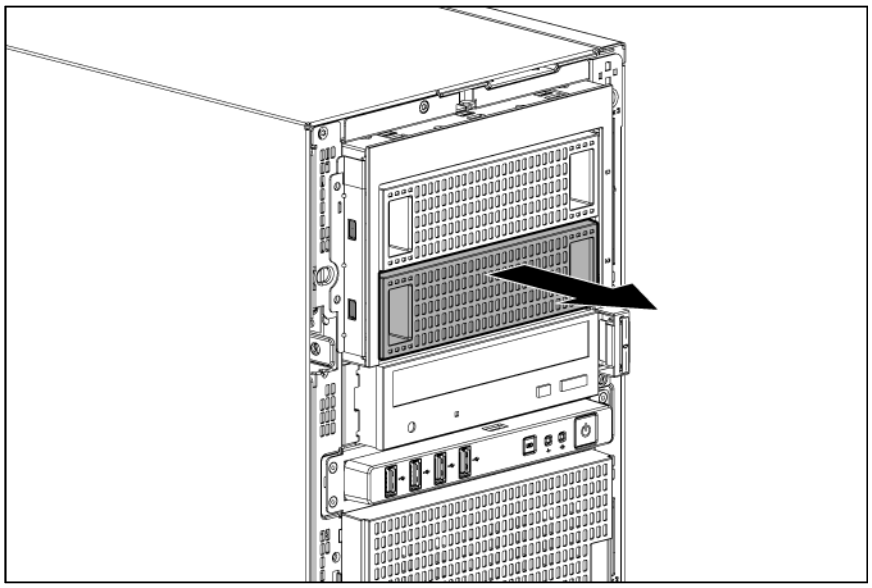
9. For tower models, do the following:
   a. Install the access panel (on page 26).
   b. Return the server to an upright position.
10. For rack models, do the following:
   a. Install the rack bezel (on page 25).
   b. Install the access panel (on page 26).
   c. Slide the server back into the rack.
11. Power up the server (on page 22).
12. Do one of the following:
   - For tower models, install the bezel ("Install the tower bezel" on page 23).
   - For rack models, if removed, install the security bezel ("Security bezel option" on page 47).

Optical drive option

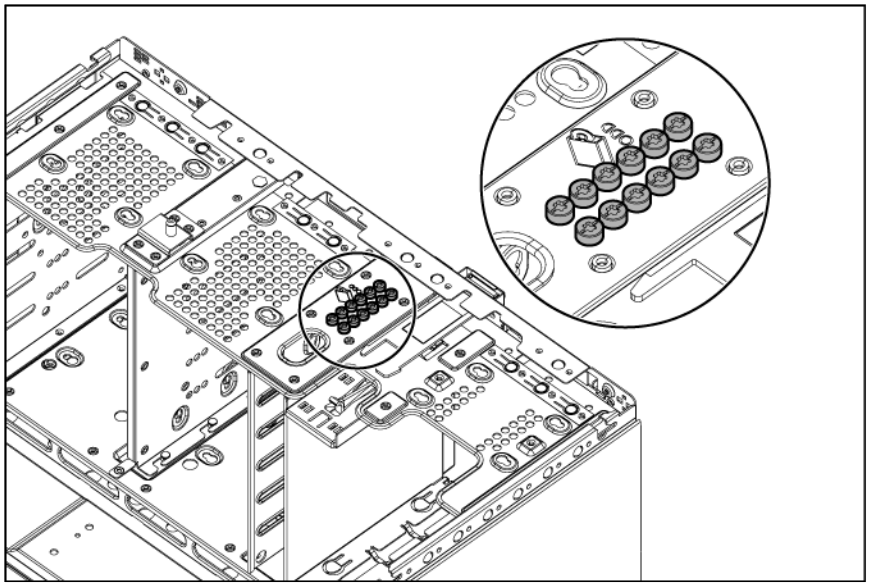
To install the component:

1. Do one of the following:
   - For tower models, open and remove the bezel ("Remove the tower bezel" on page 22).
   - For rack models, if installed, remove the security bezel (on page 24).
2. Power down the server (on page 22).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Do one of the following:
   - For tower models, place the server on a flat, level surface with the access panel facing up.
   - For rack models, extend the server from the rack (on page 27).

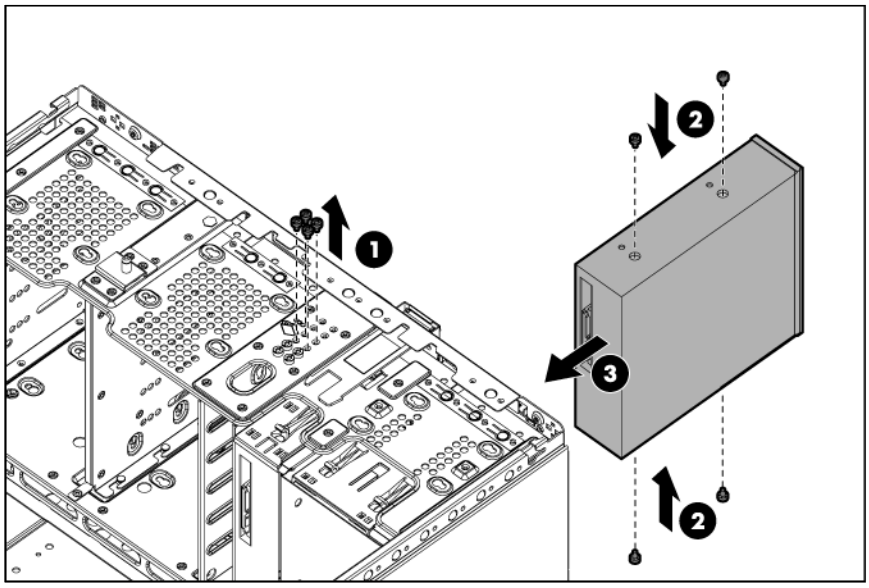
5. Remove the access panel (on page 25).
6. If installed, remove the PCI air baffle (on page 28).
7. Remove any installed full-length PCI cards.
8. Remove the system air baffle (on page 30).
9. Disconnect the fan cables and remove the fan cage (on page 31).
10. Remove the optical drive cage blank, and retain it for future use.



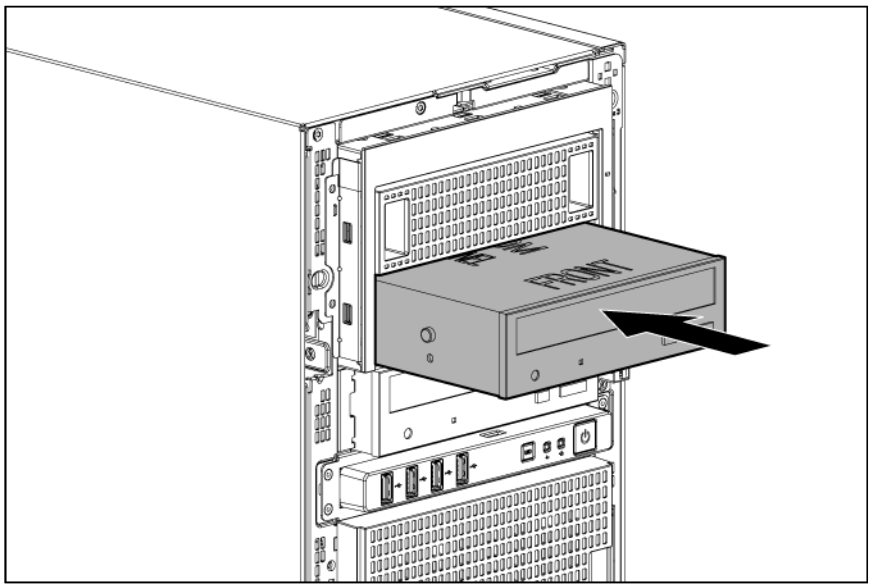
11. Locate the four guide screws for optical drive on the chassis.



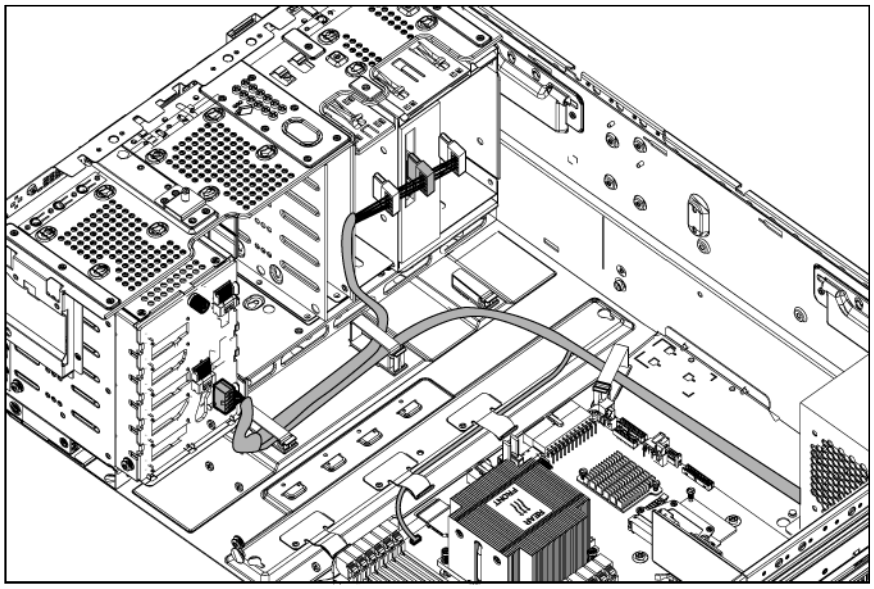
12. Install the guide screws from the chassis to the optical drive.



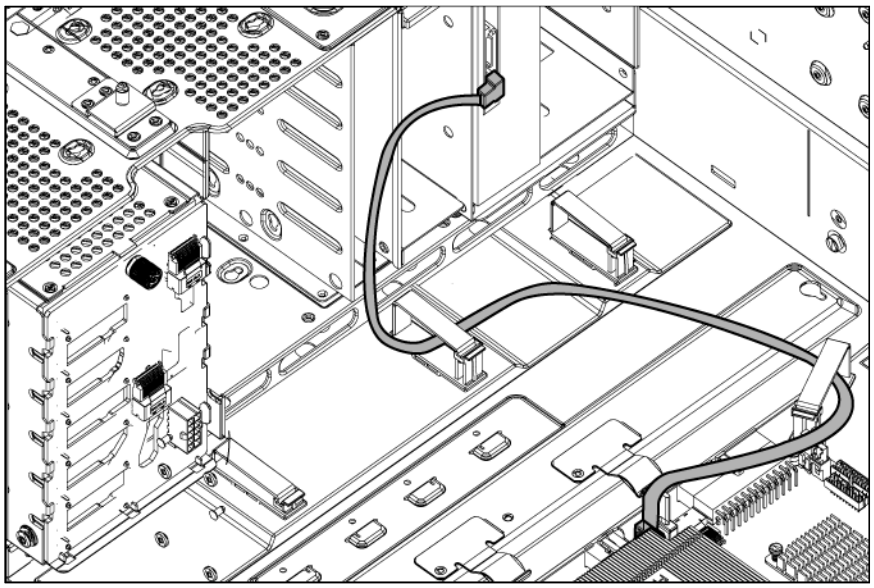
13. Install the optical drive into the optical drive cage. When fully inserted, the assembly locking latch clicks.



14. Connect the optical drive power cable to the optical drive.

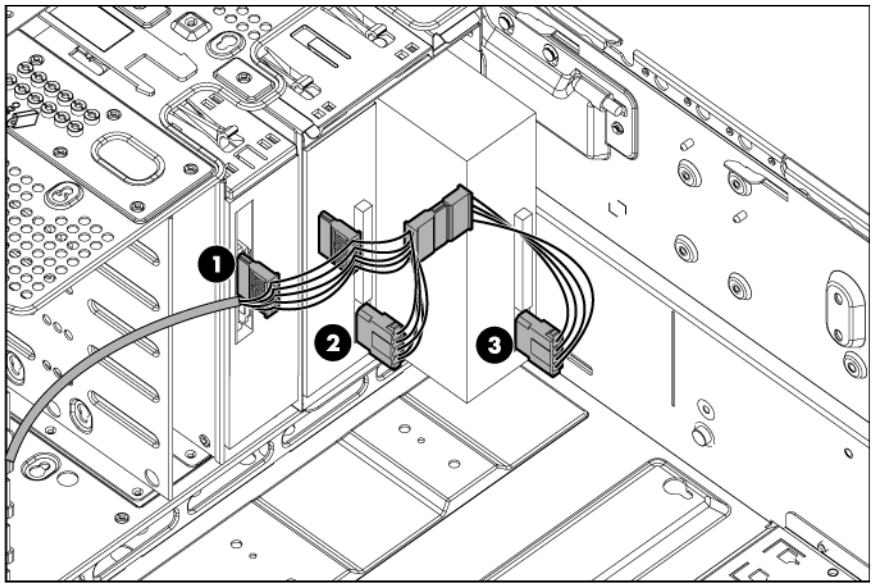


15. Connect the optical drive SATA cables, (HP part number 448180-002) included with the Optical drive option, to the SATA connectors on the system board.



16. If installing two tape drives using 4-pin PATA power connectors in the second optical drive cage, do the following:
    a. Connect the third SATA power connector to the extender cable from the option kit.

b. Connect the 4-pin PATA power connector end of the extender cable to the second tape drive.



Item	Description
1	SATA power connector to default optical drive
2	4-pin PATA power connector to the first tape drive
3	Extender cable 4-pin PATA power connector to the second tape drive

17. Install the fan cage, and then connect the fan cables.
18. Install the full-length PCI cards that were removed.
19. Install the system air baffle (on page 30).
20. If removed, install the PCI air baffle (on page 29).
21. For tower models, do the following:
    a. Install the access panel (on page 26).
    b. Return the server to an upright position.
22. For rack models, do the following:
    a. Install the access panel (on page 26).
    b. Slide the server back into the rack.
23. Power up the server (on page 22).
24. Do one of the following:
    - For tower models, install the bezel ("Install the tower bezel" on page 23).
    - For rack models, if removed, install the security bezel ("Security bezel option" on page 47).

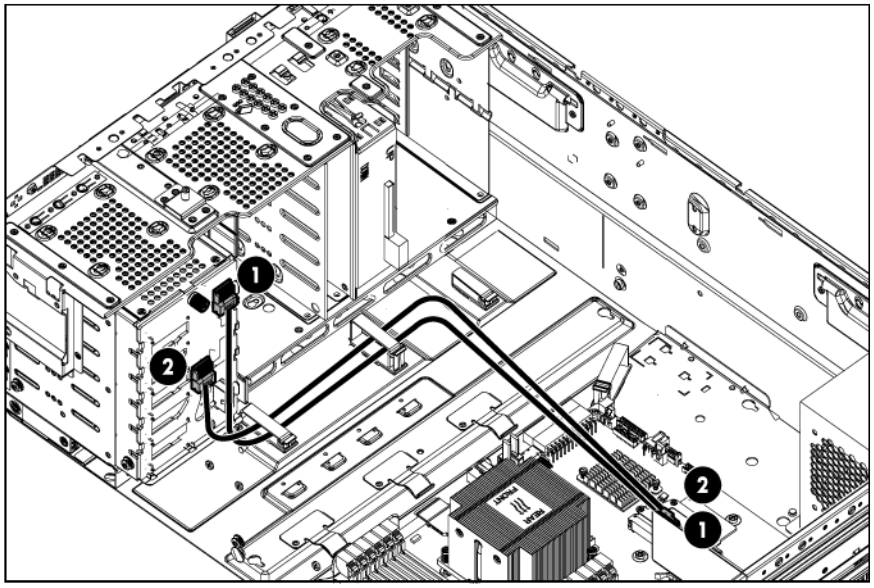
Installing a storage controller

IMPORTANT: For additional installation and configuration information, refer to the documentation that ships with the option.

To install the component:

1. Do one of the following:
   - For tower models, open and remove the bezel ("Remove the tower bezel" on page 22).
   - For rack models, if installed, remove the security bezel (on page 24).
2. Power down the server (on page 22).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Do one of the following:
   - For tower models, place the server on a flat, level surface with the access panel facing up.
   - For rack models, extend the server from the rack (on page 27).
5. Remove the access panel (on page 25).
6. If installed, remove PCI air baffle ("Remove the PCI air baffle" on page 28).
7. Remove the system air baffle (on page 30).
8. Remove any installed full-length PCI cards.
9. Remove the fan cage (on page 31).
10. If installed, remove the Mini-SAS cable connected to the system board.
11. Install the storage controller.

    For more information, see the documentation that ships with the option.
12. Connect the Mini-SAS cable from the drive backplane to the controller card.



    For controller-specific instructions, see the controller documentation provided with the storage controller.
13. Install the fan cage.
14. Install the PCI cards that were removed.
15. Install the system air baffle (on page 30).
16. Install the PCI air baffle (on page 29), if removed.

17. Install the access panel (on page 26).
18. Do one of the following:
    - For tower models, return the server to an upright position.
    - For rack models, slide the server back into the rack.
19. Install the rack bezel (on page 25).
20. Power up the server (on page 22).
21. Do one of the following:
    - For tower models, install the bezel ("Install the tower bezel" on page 23).
    - For rack models, if removed, install the security bezel ("Security bezel option" on page 47).

For more information about the controller and its features, see the *HP Smart Array Controllers for HP ProLiant Servers User Guide* on the HP website (http://www.hp.com/support/SAC_UG_ProLiantServers_en). To configure arrays, see the *Configuring Arrays on HP Smart Array Controllers Reference Guide* on the HP website (http://www.hp.com/support/CASAC_RG_en).

FBWC options

The server supports FBWC options:

FBWC consists of a cache module and a capacitor pack. The DDR cache module buffers and stores data being written by the controller. When the system is powered on, the capacitor pack charges fully in about 5 minutes. In the event of a system power failure, a fully charged capacitor pack provides power for up to 80 seconds. During that interval, the controller transfers the cached data from DDR memory to flash memory, where the data remains indefinitely or until a controller retrieves the data.

△ **CAUTION:** The cache module connector does not use the industry-standard DDR3 mini-DIMM pinout. Do not use the controller with cache modules designed for other controller models, because the controller can malfunction and you can lose data. Also, do not transfer this cache module to an unsupported controller model, because you can lose data.

△ **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.

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.

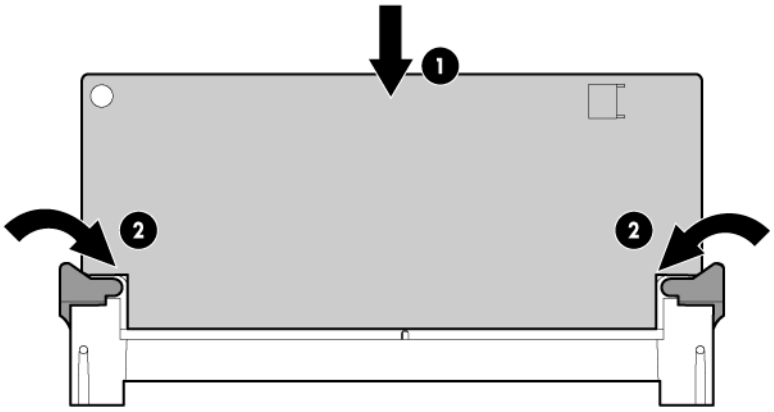
NOTE: The data protection and the time limit also apply if a power outage occurs. When power is restored to the system, an initialization process writes the preserved data to the hard drives.

Installing the FBWC module (P222, P420, P421, and P822)

CAUTION: The cache module connector does not use the industry-standard DDR3 mini-DIMM pinout. Do not use the controller with cache modules designed for other controller models, because the controller can malfunction and you can lose data. Also, do not transfer this cache module to an unsupported controller model, because you can lose data.

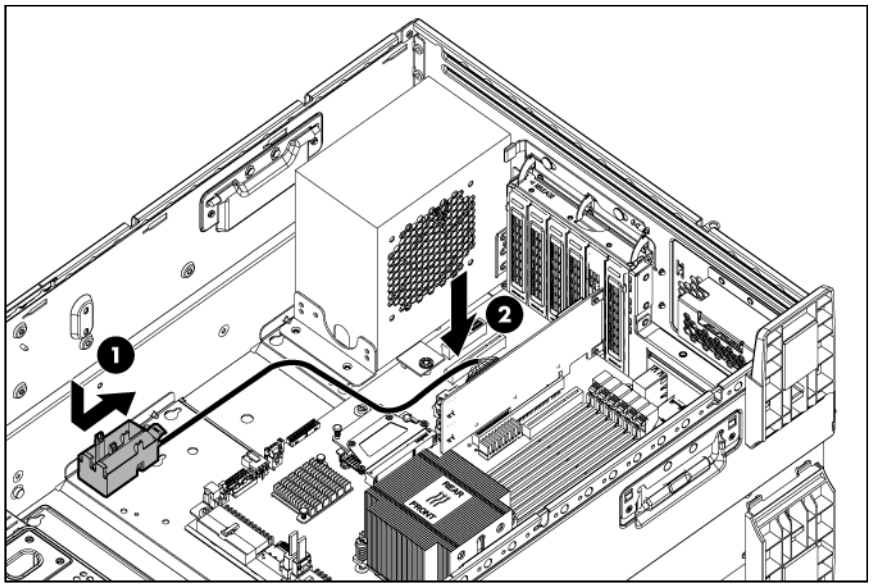
To install the component:

1. Do one of the following:
   - For tower models, open and remove the bezel ("Remove the tower bezel" on page 22).
   - For rack models, if installed, remove the security bezel (on page 24).
2. Power down the server (on page 22).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Do one of the following:
   - For tower models, place the server on a flat, level surface with the access panel facing up.
   - For rack models, extend the server from the rack (on page 27).
5. Remove the access panel (on page 25).
6. Remove the PCI air baffle (on page 28), if installed.
7. Install the FBWC module into the storage controller.

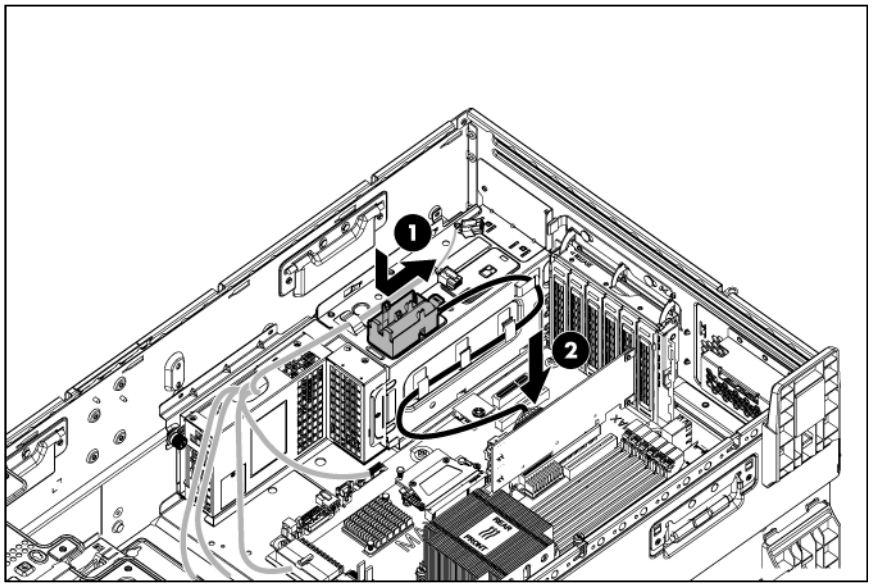


8. Install the storage controller, if not already installed.
9. Install the capacitor pack:

- For an ATX power supply



- For a redundant power supply



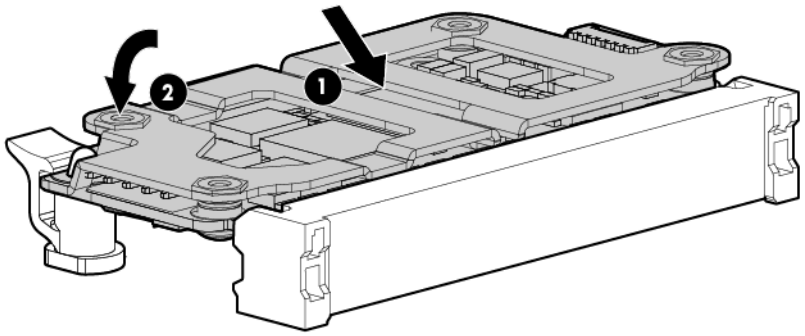
10. Install the PCI air baffle (on page 29), if removed.
11. Install the access panel (on page 26).
12. Do one of the following:
    - For tower models, return the server to an upright position.
    - For rack models, install the server onto the rails.
13. Connect each power cord to the server.
14. Connect each power cord to the power source.
15. Press the Power On/Standby button.

    The server exits standby mode and applies full power to the system. The system power LED changes from amber to green.
16. Do one of the following:

- For tower models, install the bezel ("Install the rack bezel" on page 25).
- For rack models, if removed, install the security bezel ("Security bezel option" on page 47).

Installing the B120i cache module

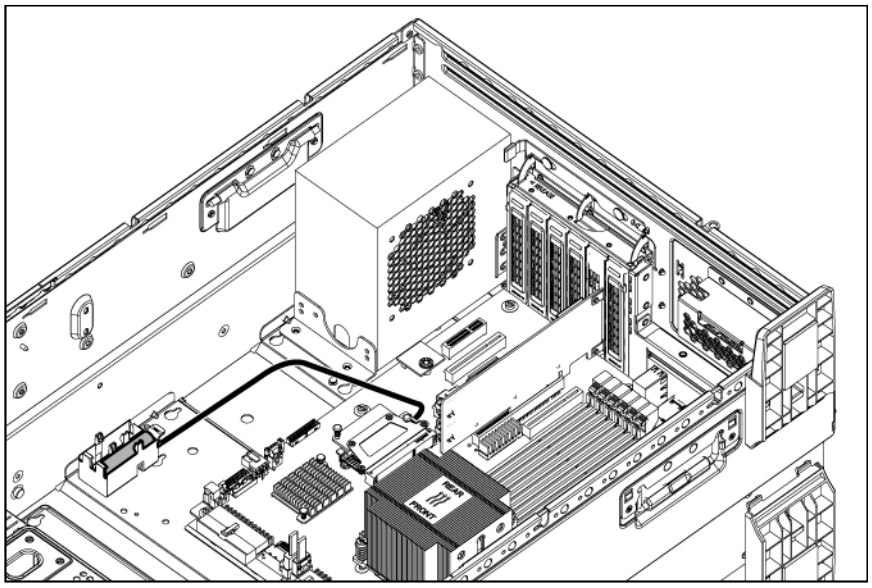
1. Do one of the following:
   - For tower models, open and remove the bezel ("Remove the tower bezel" on page 22).
   - For rack models, if installed, remove the security bezel (on page 24).
2. Power down the server (on page 22).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Do one of the following:
   - For tower models, place the server on a flat, level surface with the access panel facing up.
   - For rack models, extend the server from the rack (on page 27).
5. Remove the access panel (on page 25).
6. Remove the PCI air baffle (on page 28), if installed.
7. Remove any PCI cards installed in PCI slots 3, 4, 5 and 6.
8. Install the FBWC module in the cache module connector on the system board.



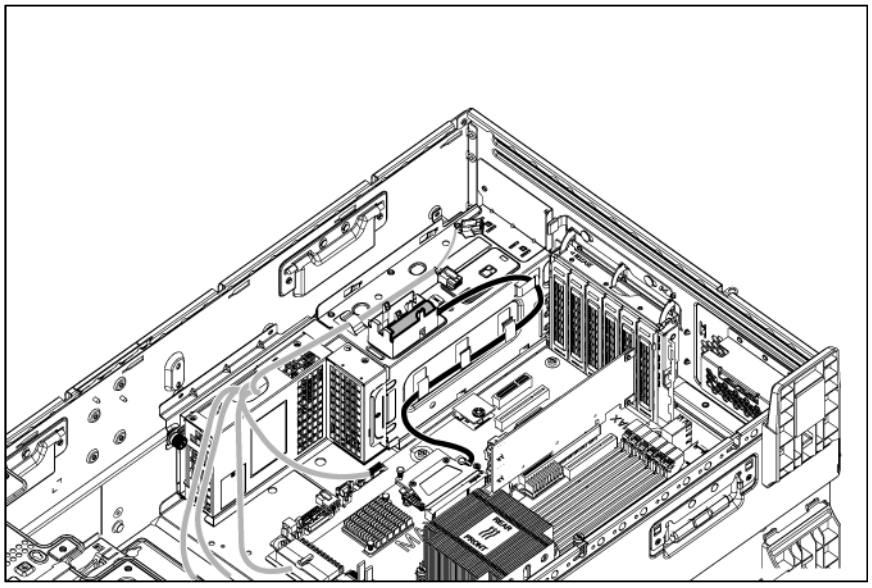
9. Install the FBWC capacitor pack.

CAUTION: When connecting or disconnecting the capacitor pack cable, the connectors on the cache module and cable are susceptible to damage. Avoid excessive force and use caution to avoid damage to these connectors.

- For an ATX power supply



- For a redundant power supply



10. Install any PCI cards removed from slots 3, 4, 5 and 6.
11. Install the PCI air baffle (on page 29), if removed.
12. Install the access panel (on page 26).
13. Do one of the following:
    - For tower models, return the server to an upright position.
    - For rack models, slide the server back into the rack.
14. Connect each power cord to the server.

    Connect each power cord to the power source.
15. Press the Power On/Standby button.

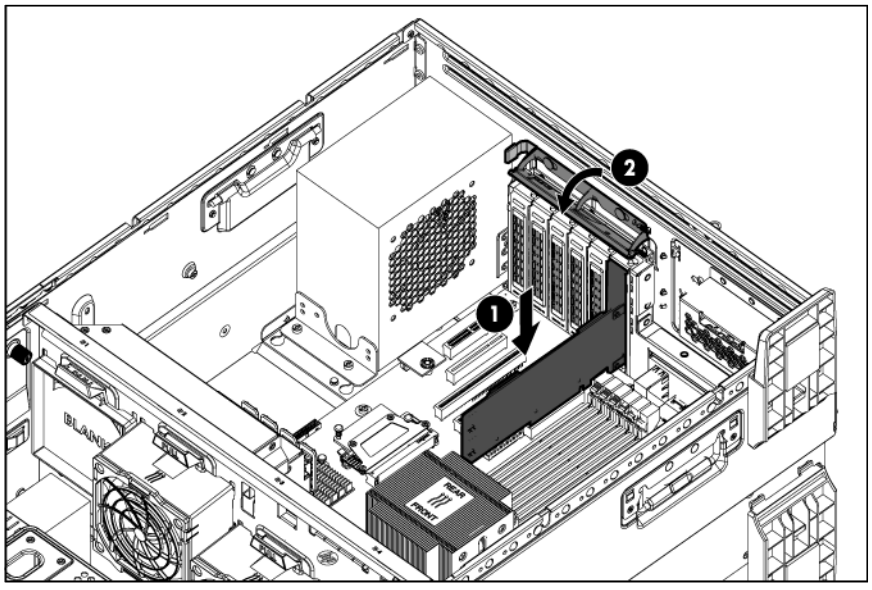
    The server exits standby mode and applies full power to the system. The system power LED changes from amber to green.

16. Do one of the following:
    - For tower models, install the bezel ("Install the tower bezel" on page 23).
    - For rack models, if removed, install the security bezel ("Security bezel option" on page 47).

Installing an expansion board

To install the component:

1. Do one of the following:
    - For tower models, open and remove the bezel ("Remove the tower bezel" on page 22).
    - For rack models, if installed, remove the security bezel (on page 24).
2. Power down the server (on page 22).
3. Remove all power:
    a. Disconnect each power cord from the power source.
    b. Disconnect each power cord from the server.
4. Do one of the following:
    - For tower models, place the server on a flat, level surface with the access panel facing up.
    - For rack models, extend the server from the rack (on page 27).
5. Remove the access panel (on page 25).
6. If installed, remove PCI air baffle ("Remove the PCI air baffle" on page 28).
7. Remove the system air baffle ("Remove the PCI air baffle" on page 28).
8. Remove the fan cage (on page 31).
9. Remove the full-length expansion board retainer, if any full-length expansion boards are installed.
10. Remove the expansion slot cover.
11. Install the expansion board.



12. Connect any required internal or external cables to the expansion board. See the documentation that ships with the expansion board.

13. Install the full-length expansion board retainer, if any full-length expansion boards were removed.
14. Install the fan cage.
15. Install the system air baffle (on page 30).
16. Install the PCI air baffle (on page 29), if removed.
17. For tower models, do the following:
    a. Install the access panel (on page 26).
    b. Return the server to an upright position.
18. For rack models, do the following:
    a. Install the access panel (on page 26).
    b. Slide the server back into the rack.
19. Power up the server (on page 22).
20. Do one of the following:
    - For tower models, install the bezel ("Install the tower bezel" on page 23).
    - For rack models, if removed, install the security bezel ("Security bezel option" on page 47).

Eight-bay SFF drive cage option

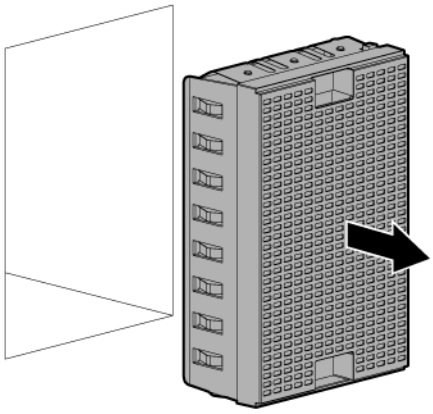
Install the optional eight-bay SFF drive cage in drive cage bay 2 or drive cage bay 3.

To install an additional eight-bay SFF drive cage, an optional Smart Array controller and redundant power supply is required. To obtain the options, contact an HP authorized reseller.

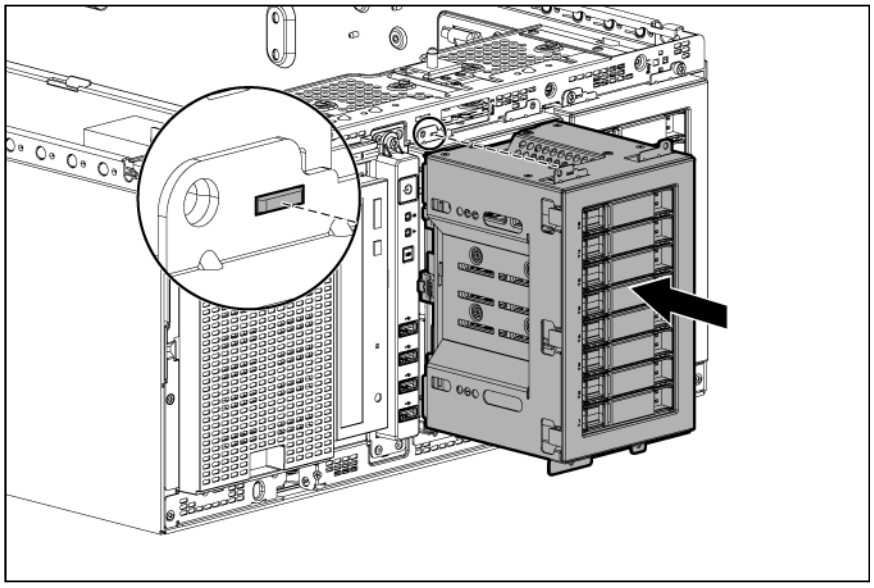
Installing the optional SFF hot-plug drive cage

1. Do one of the following:
    - For tower models, open and remove the bezel ("Remove the tower bezel" on page 22).
    - For rack models, if installed, remove the security bezel (on page 24).
2. Power down the server (on page 22).
3. Remove all power:
    a. Disconnect each power cord from the power source.
    b. Disconnect each power cord from the server.
4. Do one of the following:
    - For tower models, place the server on a flat, level surface with the access panel facing up.
    - For rack models, extend the server from the rack (on page 27).
5. Remove the access panel (on page 25).
6. Remove the rack bezel (on page 24).

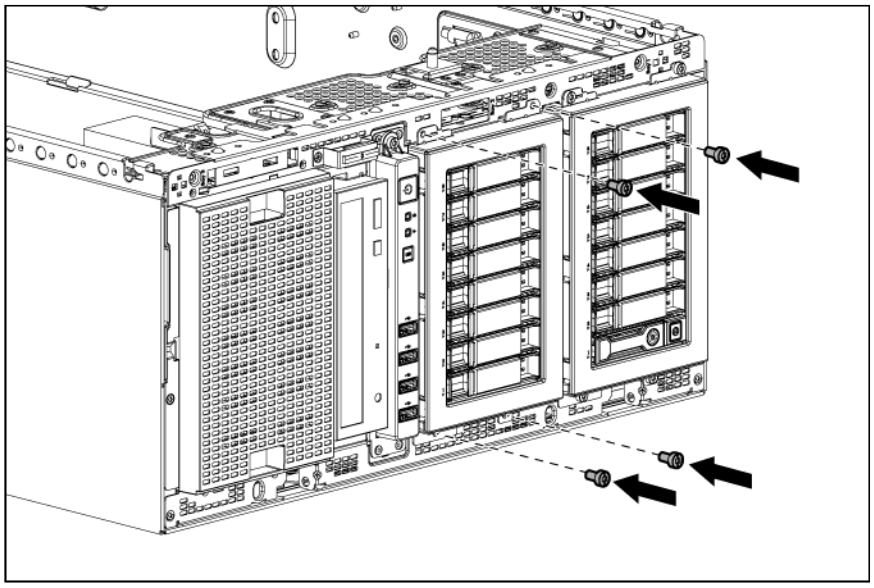
7. Remove the blank from box 2 or box 3.



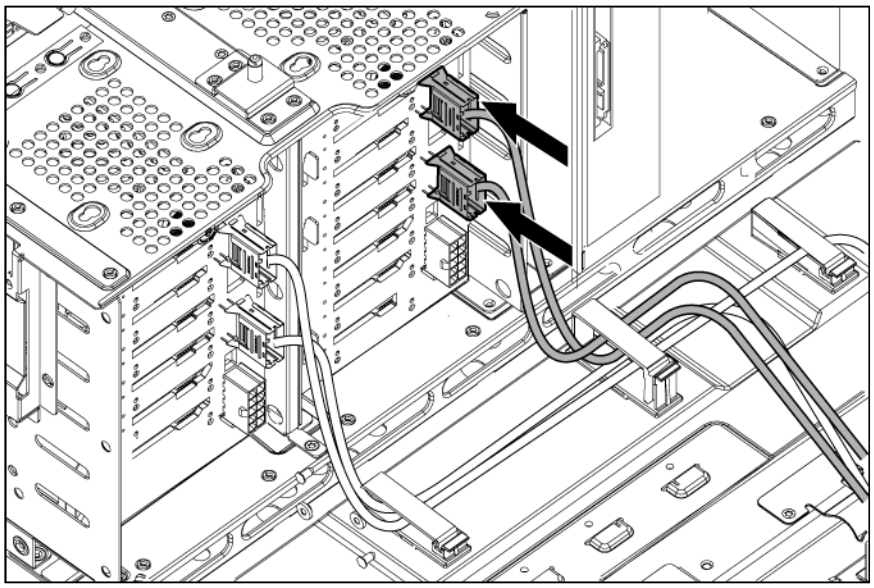
8. Install the SFF hard drive cage.



9. Using the T-15 screws, secure the hard drive cage to the server.

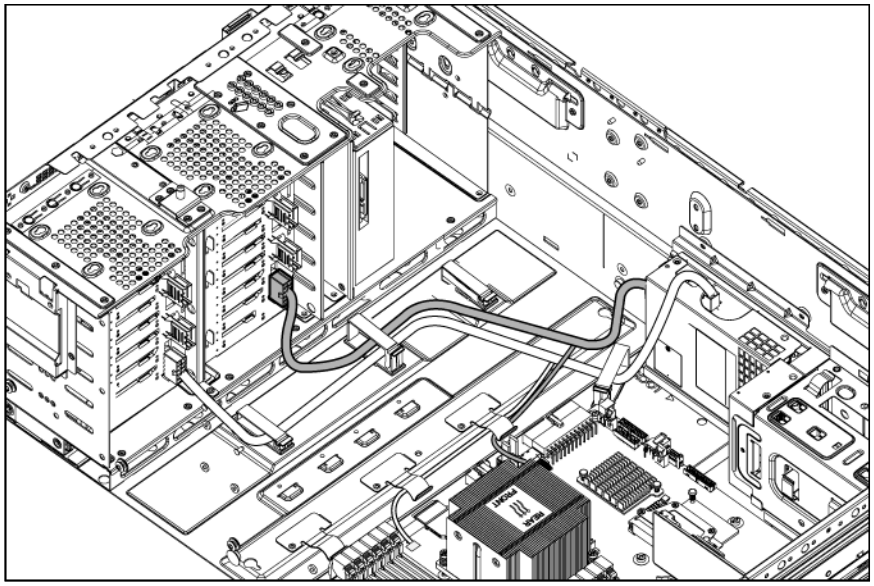


10. If installed, remove the PCI air baffle (on page 28).
11. Remove the system air baffle (on page 30).
12. Remove any installed full-length PCI cards.
13. Remove the fan cage (on page 31).
14. Connect the Mini-SAS cables to the drive cage backplane.



15. Connect the Mini-SAS cables to the Smart Array controller.

16. Connect the power cable that came with the RPS option kit (HP part number 676745-001), from the optional drive cage backplane to the RPS backplane connector.



17. Install the fan cage.
18. Install the full-length PCI cards that were removed.
19. Install the system air baffle (on page 30).
20. Install the PCI air baffle (on page 29), if removed.
21. For tower models, do the following:
    a. Install the access panel (on page 26).
    b. Return the server to an upright position.
22. For rack models, do the following:
    a. Install the rack bezel (on page 25).
    b. Install the access panel (on page 26).
    c. Slide the server back into the rack.
23. Connect each power cord to the server.
24. Connect each power cord to the power source.
25. Press the Power On/Standby button.

    The server exits standby mode and applies full power to the system. The system power LED changes from amber to green.
26. Do one of the following:
    - For tower models, install the bezel ("Install the tower bezel" on page 23).
    - For rack models, if removed, install the security bezel ("Security bezel option" on page 47).

Six-bay LFF drive cage

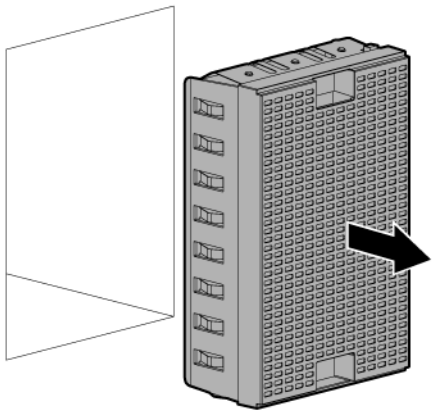
To install a six-bay, LFF hot-plug drive cage in a server, a Smart array controller option and redundant power supply option is required.

To obtain the Smart Array controller option, contact an authorized HP reseller.

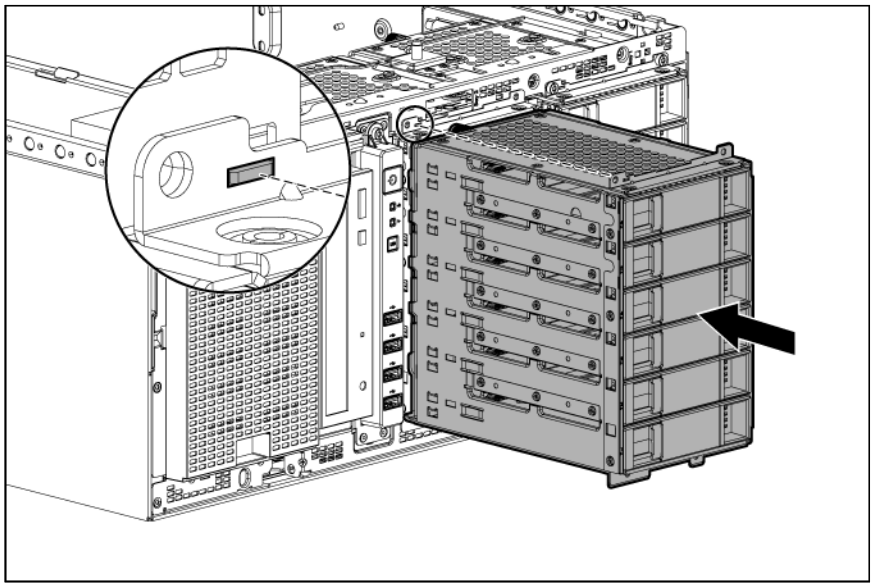
To install the Smart Array controller option, see the documentation that ships with Smart Array controller option kit.

Installing the optional LFF hot-plug drive cage

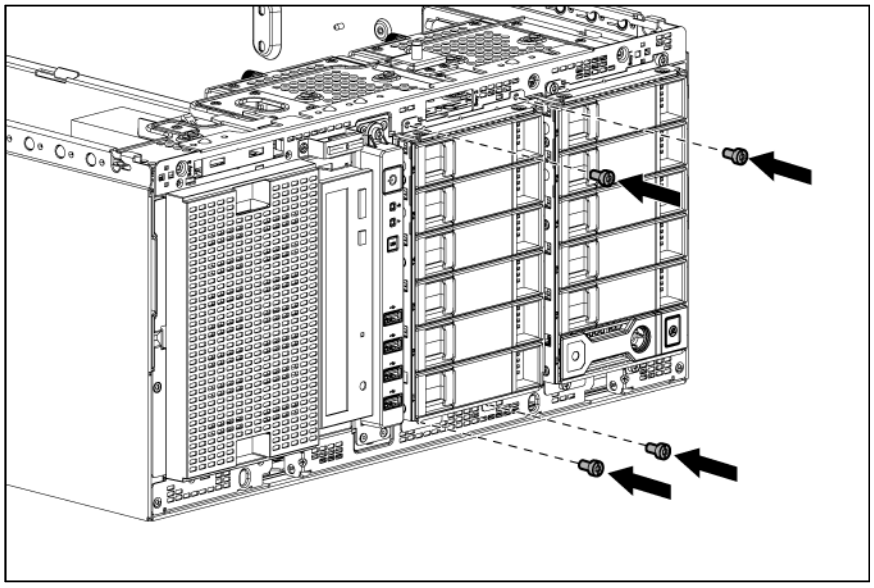
1. Do one of the following:
   - For tower models, open and remove the bezel ("Remove the tower bezel" on page 22).
   - For rack models, if installed, remove the security bezel (on page 24).
2. Power down the server (on page 22).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. For tower models, do the following:
   a. Place the server on a flat, level surface with the access panel facing up.
   b. Remove the access panel (on page 25).
5. For rack models, do the following:
   a. Extend the server from the rack (on page 27).
   b. Remove the access panel (on page 25).
   c. Release thumbscrews and remove the rack bezel ("Remove the rack bezel" on page 24).
6. Remove the blank from box 2 or box 3.



7. Install the LFF hot-plug drive cage.

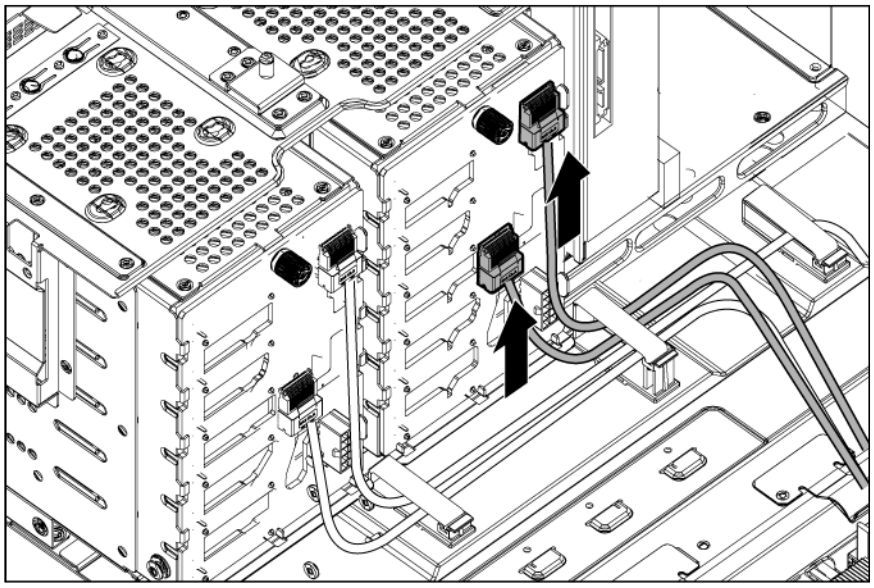


8. Using the T-15 screws, secure the drive cage to the server.



9. If installed, remove the PCI air baffle (on page 28).
10. Remove any installed full-length PCI cards.
11. Remove the system air baffle (on page 30).
12. Remove the fan cage (on page 31).

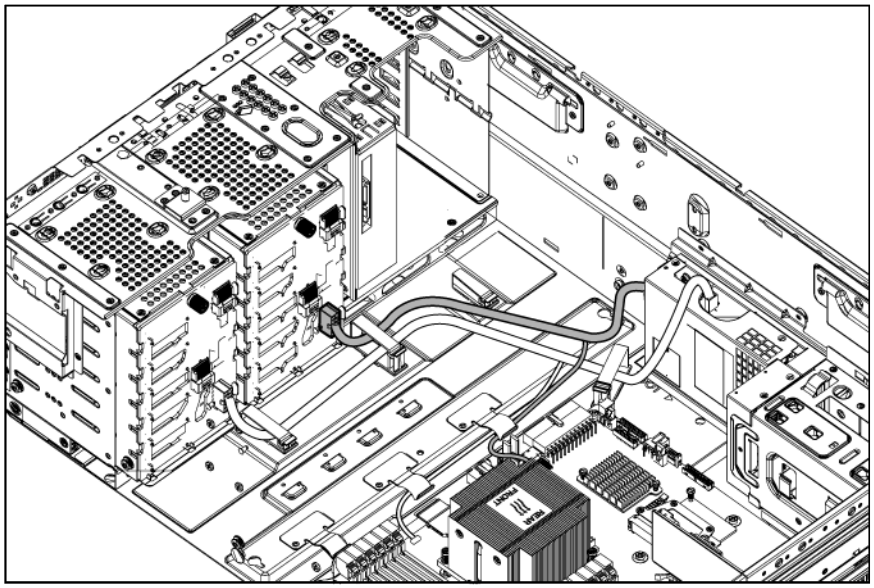
13. Connect the mini-SAS cables to the drive backplane.



14. Connect the Mini-SAS cables to the Smart Array controller.

> **NOTE:** For more information about connecting the cables to Smart Array controller, see the documentation that ships with Smart Array controller option kit.

15. Connect the power cable that came with the RPS option kit (HP part number 676745-001), from the optional drive cage backplane to the RPS backplane connectors.



16. Install the fan cage and connect the fan cables to the system board.
17. Install the full-length PCI cards removed.
18. Install the system air baffle (on page 30).
19. Install the PCI air baffle (on page 29), if removed.
20. For tower models, do the following:
    a. Install the access panel (on page 26).

b. Return the server to an upright position.

21. For rack models, do the following:
    a. Install the rack bezel (on page 25).
    b. Install the access panel (on page 26).
    c. Slide the server back into the rack.
22. Connect each power cord to the server.
23. Connect each power cord to the power source.
24. Press the Power On/Standby button.

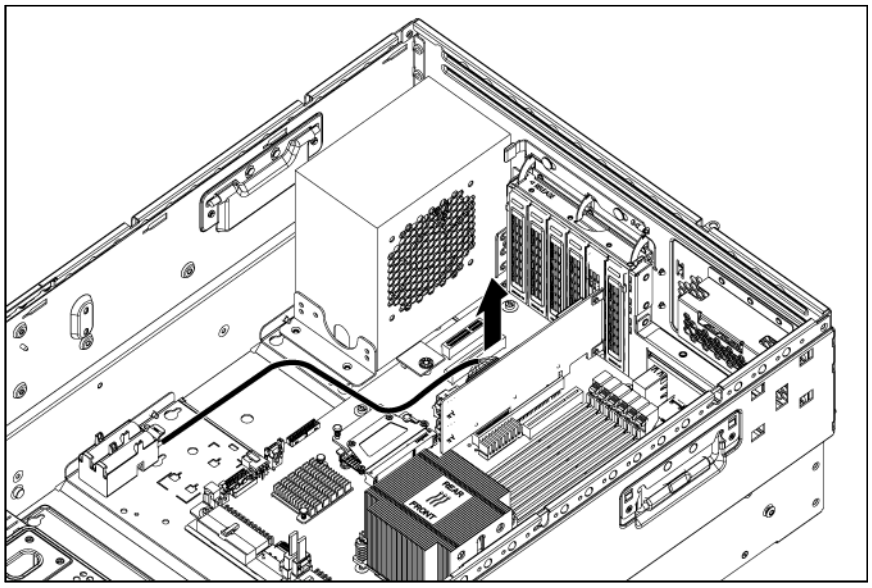
    The server exits standby mode and applies full power to the system. The system power LED changes from amber to green.
25. Do one of the following:
    - For tower models, install the bezel ("Install the tower bezel" on page 23).
    - For rack models, if removed, install the security bezel ("Security bezel option" on page 47).

Redundant Enablement Option

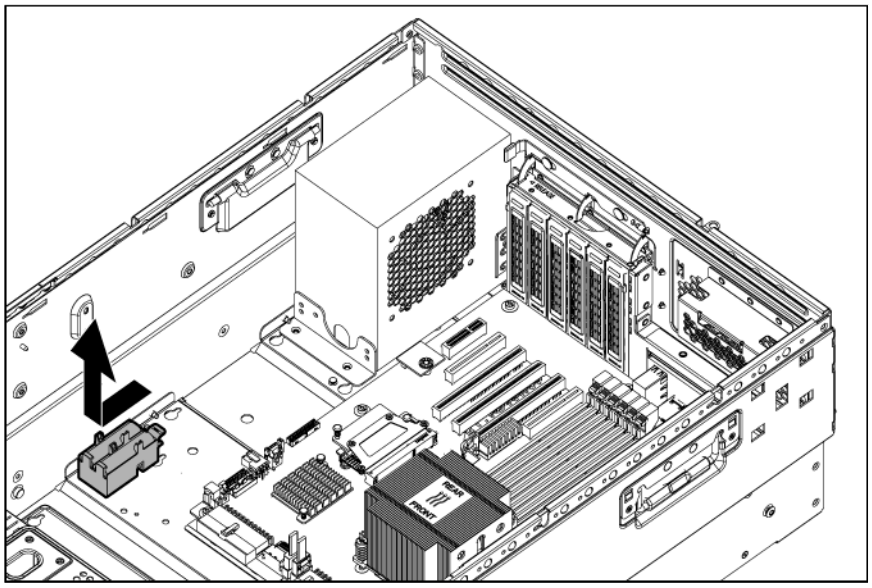
Preparing the server for installation

1. Do one of the following:
    - For tower models, open and remove the bezel ("Remove the tower bezel" on page 22).
    - For rack models, if installed, remove the security bezel (on page 24).
2. Power down the server (on page 22).
3. Remove all power:
    a. Disconnect each power cord from the power source.
    b. Disconnect each power cord from the server.
4. Do one of the following:
    - For tower models, place the server on a flat, level surface with the access panel facing up.
    - For rack models, remove the server from the rack and place it on a flat, level surface with the access panel facing up.
5. Remove the access panel (on page 25).
6. Remove the system air baffle (on page 30).

7. If a Smart Array Controller is installed, then disconnect the capacitor cable from it.

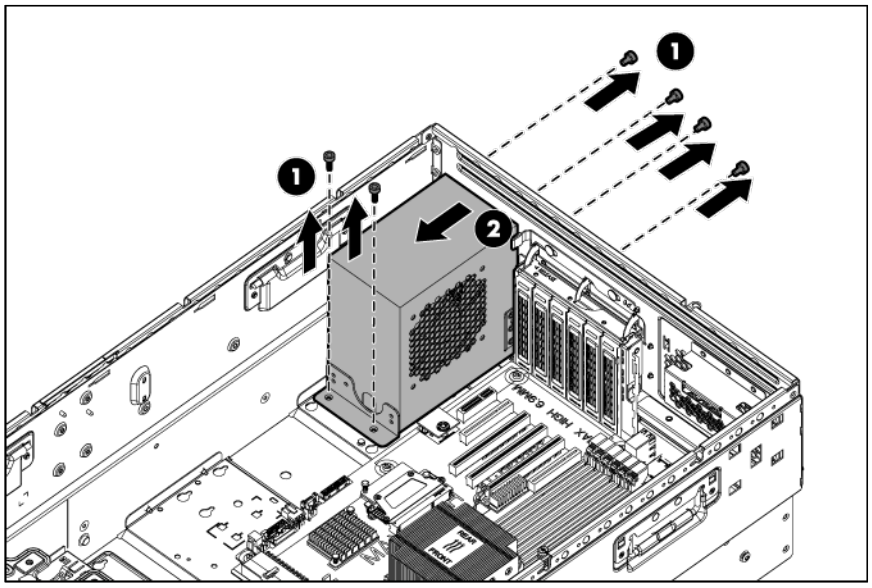


8. Remove any installed PCI cards.
9. Remove the fan cage (on page 31).
10. Remove the capacitor holder from the server.



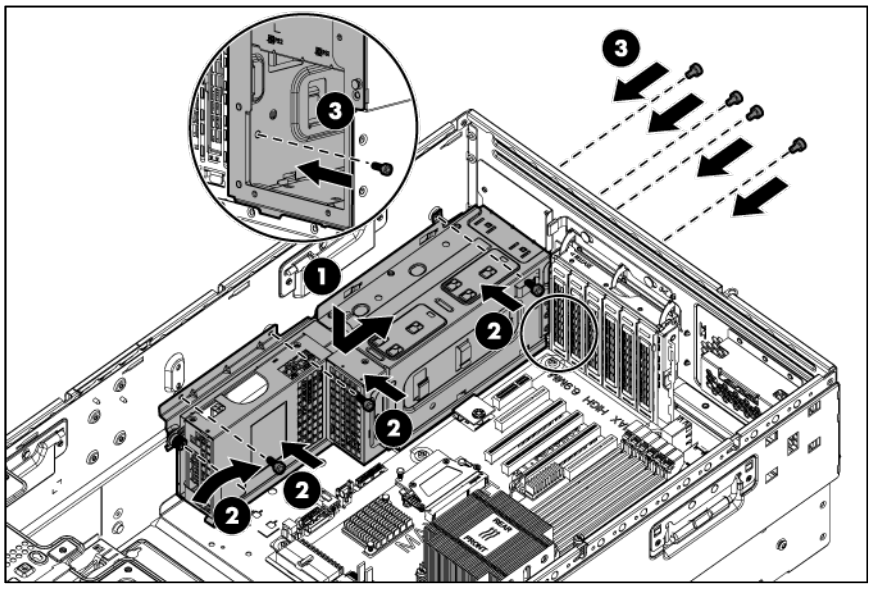
11. Disconnect all power cables from the system.

12. Remove the nonredundant power supply.



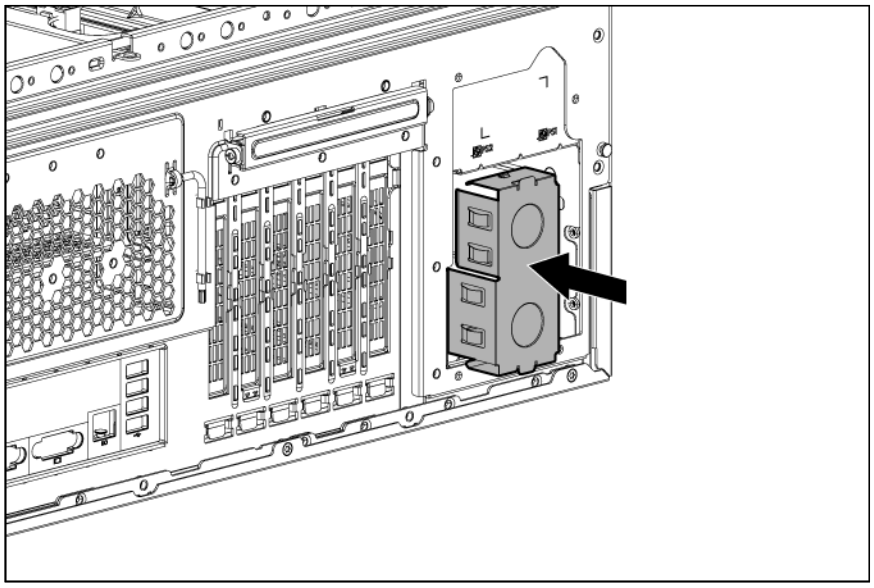
Installing the RPS Enablement Kit

1. Install the redundant power supply assembly:
   a. Insert the redundant power supply assembly into the server chassis.
   b. Secure the three internal screws and the thumbscrew on the redundant power supply back.
   c. Secure the five external screws with T-10 and T-15 screwdrivers.

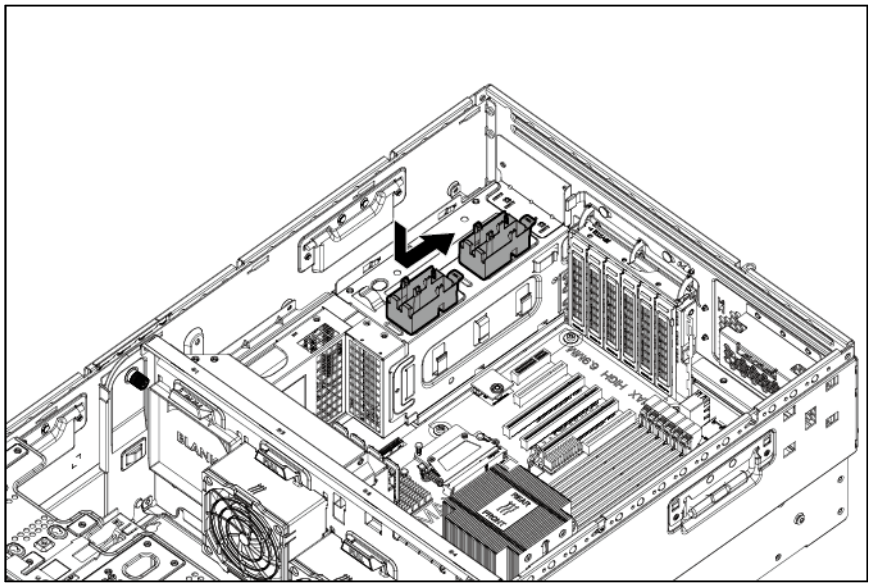


NOTE: When a Smart Array controller option is installed in the server, the capacitor holder must be secured to the top of the power supply assembly.

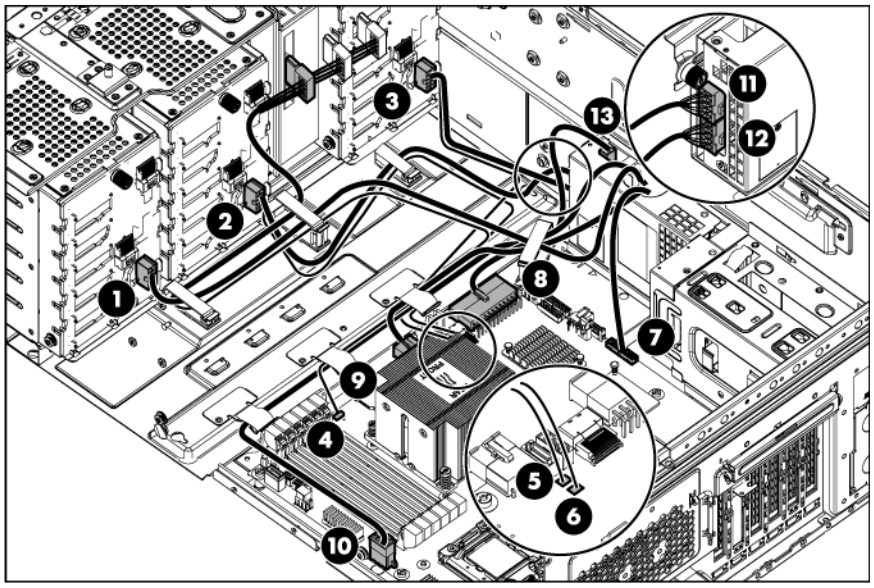
2. If only one power supply is installed, install a power supply blank into the empty power supply slot.



3. Install the two capacitor holders on top of the redundant power supply assembly.

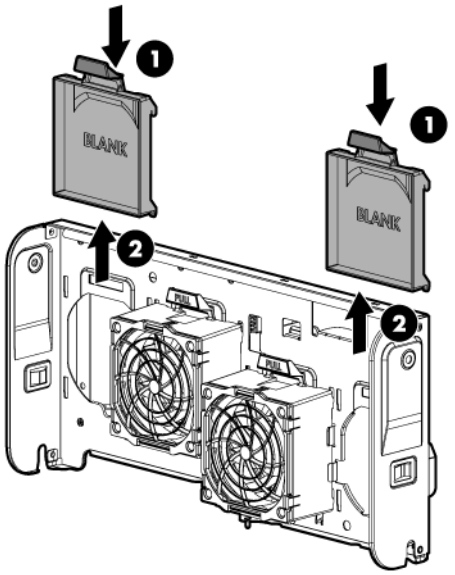


4. Route and connect the redundant power supply cables to the system board.



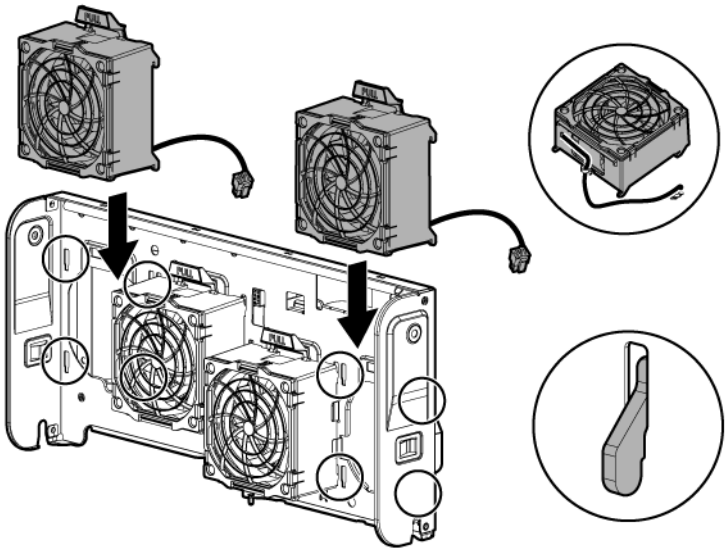
Item	Description
1	Drive box 1 connector
2	Drive box 2 connector
3	Drive box 3 connector
4	Drive cage power good connector for drive 3
5	Drive cage power good connector for drive 1
6	Drive cage power good connector for drive 2
7	RPS connector
8	System board power connector
9	Processor 1 connector
10	Processor 2 connector
11	Drive box 2 RPS backplane connector
12	Drive box 3 RPS backplane connector
13	Processor 2 RPS backplane connector

5. Remove the fan blanks from locations 1 and 4.

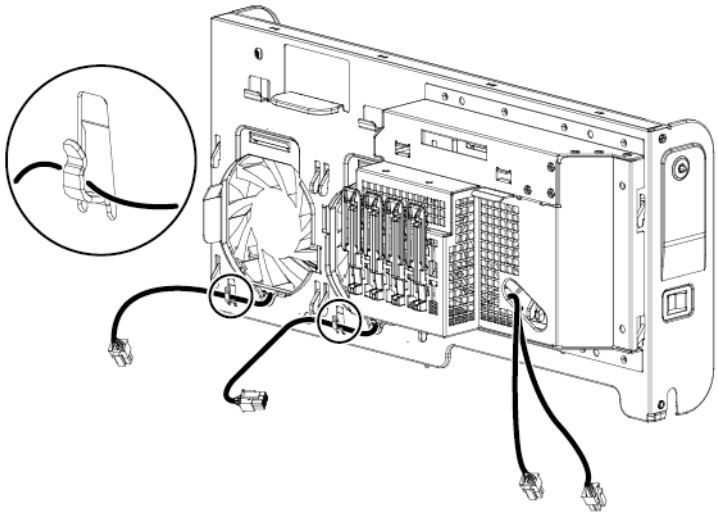


NOTE: If the server already has three fans installed, install the fourth fan into fan bay 1 and store the extra fan as a spare.

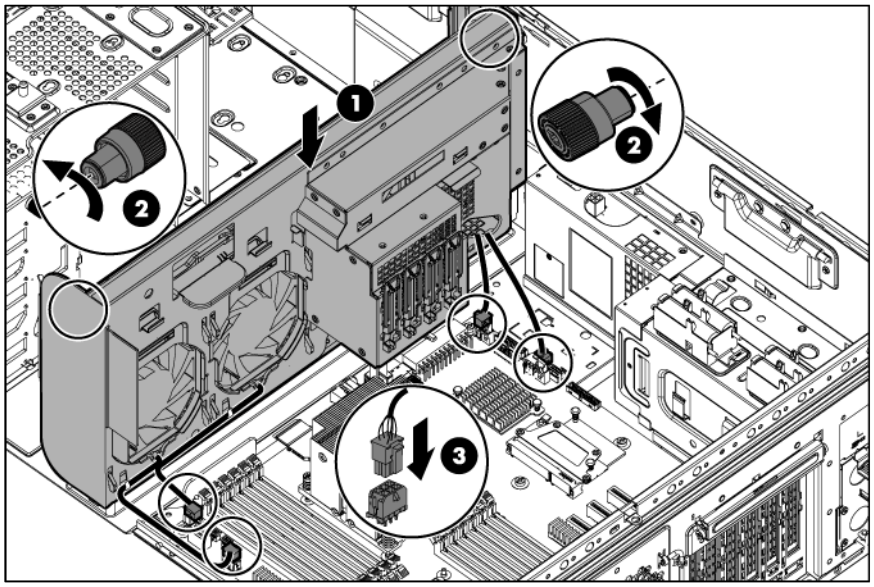
6. Install two fans into the fan module:
   a. Install fans in locations 1 and 4.



b. Route the fan cables through the cable management slots.

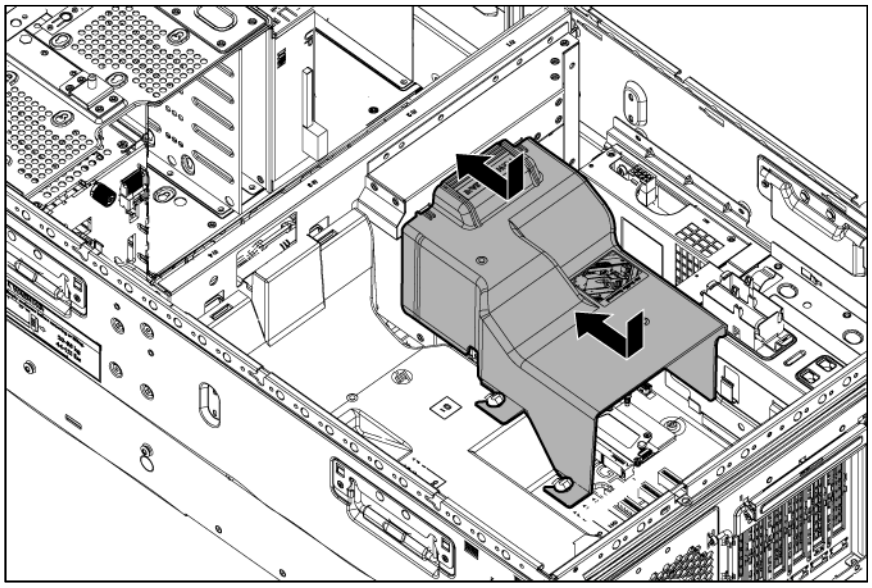


7. Install the fan module into the server cage, tighten the two thumbscrews, and then connect all fan cables to the system board.



8. Install any installed PCI cards that were removed from the server.
9. If a Smart Array controller is installed, install the capacitor pack into the holder and connect the cable to the controller card.
10. Install the system air baffle (on page 30).

11. Install the PCI air baffle into the server ("Install the PCI air baffle" on page 29).



12. Install the access panel (on page 26).
13. Do one of the following:
    - For tower models, return the server to an upright position.
    - For rack models, install the server onto the rails.
14. Connect each power cord to the server.
15. Connect each power cord to the power source.
16. Press the Power On/Standby button.

    The server exits standby mode and applies full power to the system. The system power LED changes from amber to green.
17. Do one of the following:
    - For tower models, install the bezel ("Install the rack bezel" on page 25).
    - For rack models, if removed, install the security bezel ("Security bezel option" on page 47).

Redundant power supply module

Power redundancy requires the presence of two power supply modules in the system.

△ **CAUTION:** All power supplies installed in the server must have the same output power capacity. Verify that all power supplies have the same part number and label color. The system becomes unstable and may shut down when it detects mismatched power supplies.

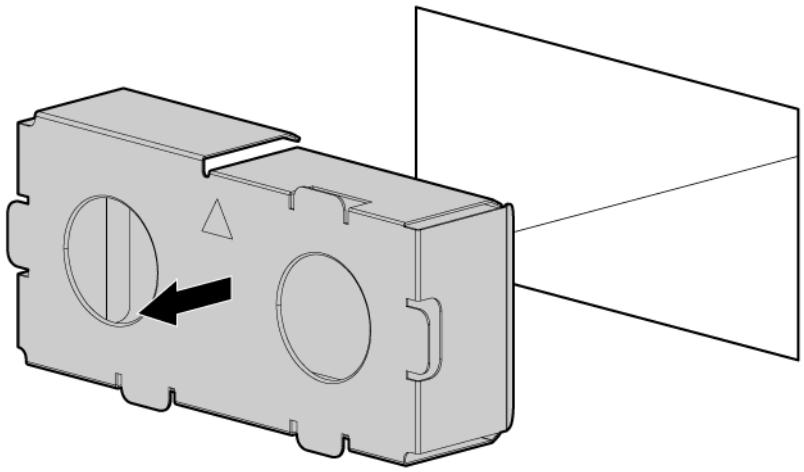
Label color	Output
Blue	460 W
Orange	750 W

△ **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.

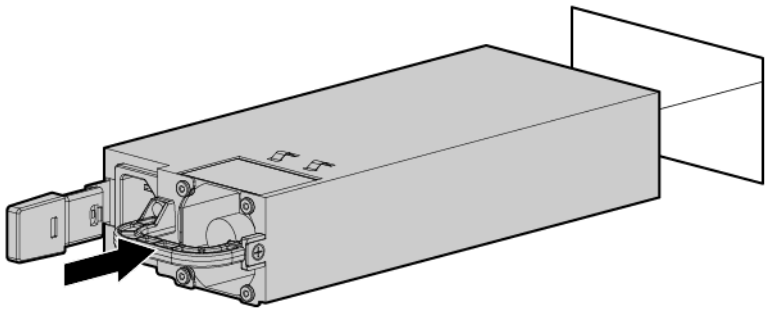
To install the component:

1. Access the product rear panel.
2. Remove the blank.

> **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the power supply or power supply blank to cool before touching it.



3. Insert the power supply into the power supply bay until it clicks into place.



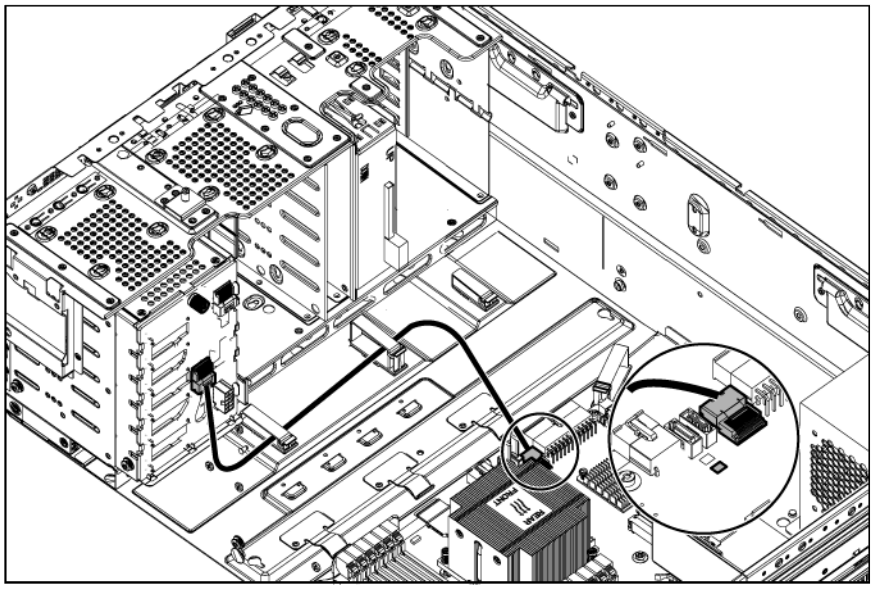
4. Connect the power cord to the power supply.
5. Connect the power cord to the AC power source.
6. Be sure that the power supply LED is green.

Installing the LFF 5/6 drive cable option

1. Do one of the following:
   - For tower models, open and remove the bezel ("Remove the tower bezel" on page 22).
   - For rack models, if installed, remove the security bezel (on page 24).
2. Power down the server (on page 22).
3. Remove all power:

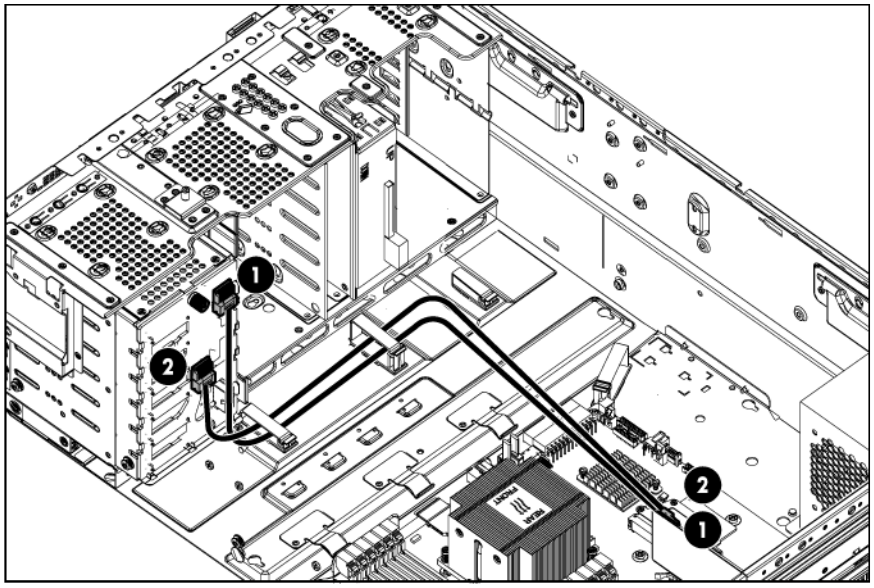
a. Disconnect each power cord from the power source.
b. Disconnect each power cord from the server.

4. Do one of the following:
   - For tower models, place the server on a flat, level surface with the access panel facing up.
   - For rack models, extend the server from the rack (on page 27).
5. Remove the access panel (on page 25).
6. Remove PCI air baffle ("Remove the PCI air baffle" on page 28), if installed.
7. Remove the system air baffle (on page 30).
8. Install an optional Smart Array controller ("Installing an expansion board" on page 77).
9. Remove any installed full-length PCI cards.
10. Remove the fan cage (on page 31).
11. Disconnect the existing SAS cable from the system board connector.

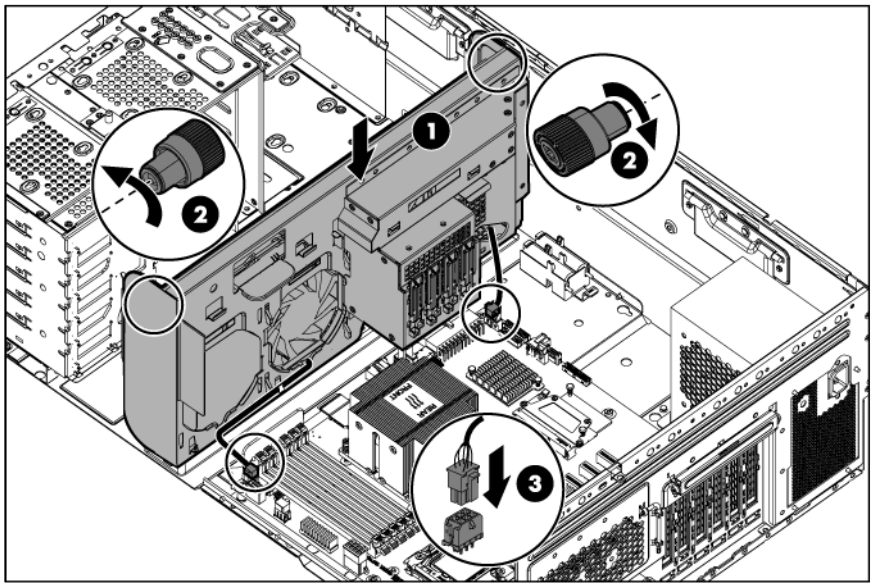


12. Connect the SAS cables:
    a. Connect the mini-SAS cable that came with the kit to the empty SAS connector on the drive backplane.

b. Route the SAS cables through the cable management clips and connect to the Smart Array controller.

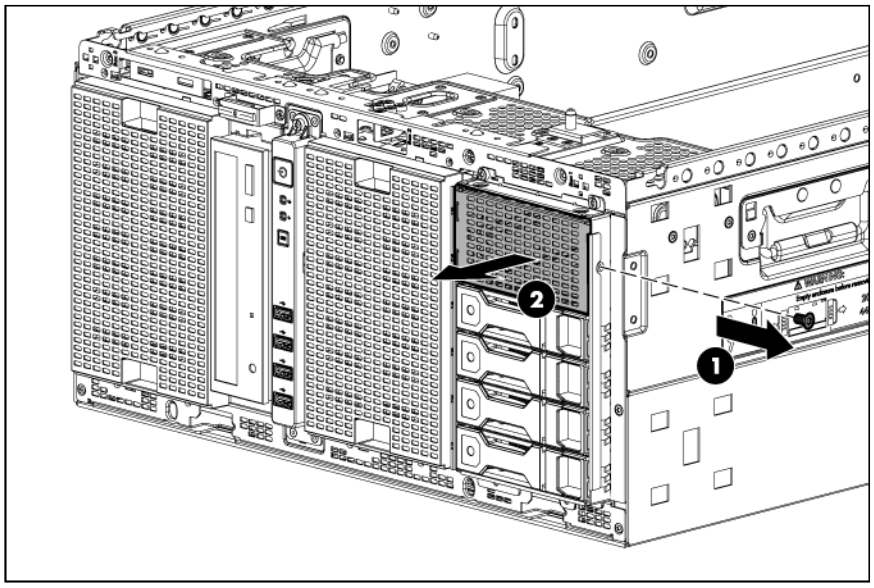


13. Install the fan cage into the server, tighten the two thumbscrews, and then connect all fan cables to the system board.

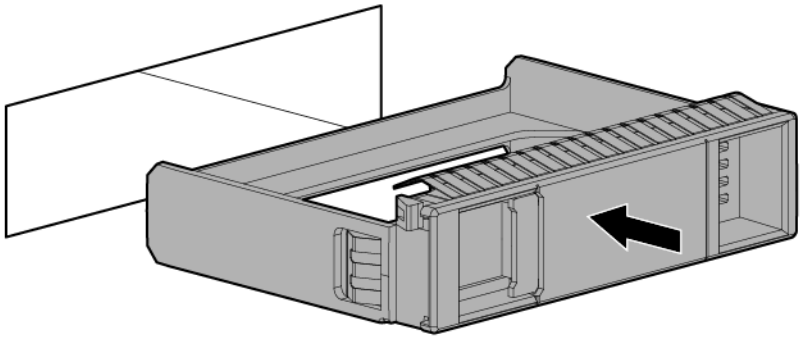


14. For rack models, remove the rack bezel (on page 24).

15. Using a T-10 screwdriver, remove the EMI shield covering the drive bays 5 and 6.



16. Install one or two drives into drive bays 5 and 6.
17. Install a drive blank into any unused drive bays.



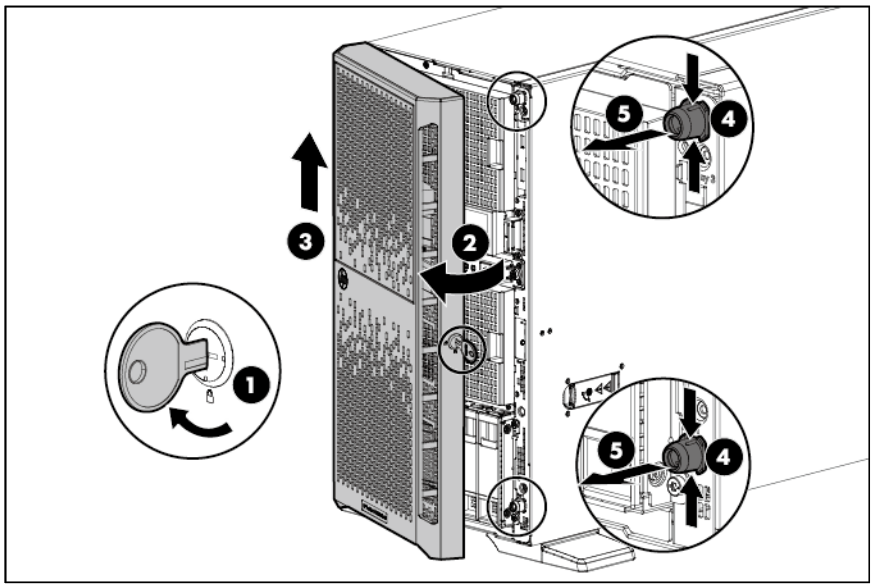
18. Install any PCI cards removed.
19. Install the system air baffle (on page 30).
20. Install the PCI air baffle (on page 29), if removed.
21. Install the access panel (on page 26).
22. Do one of the following:

- For tower models, return the server to an upright position.
- For rack models, slide the server back into the rack.

23. Install the rack bezel (on page 25).
24. Power up the server (on page 22).
25. Do one of the following:
    - For tower models, install the bezel ("Install the tower bezel" on page 23).
    - For rack models, if removed, install the security bezel ("Security bezel option" on page 47).

Tower-to-rack conversion option

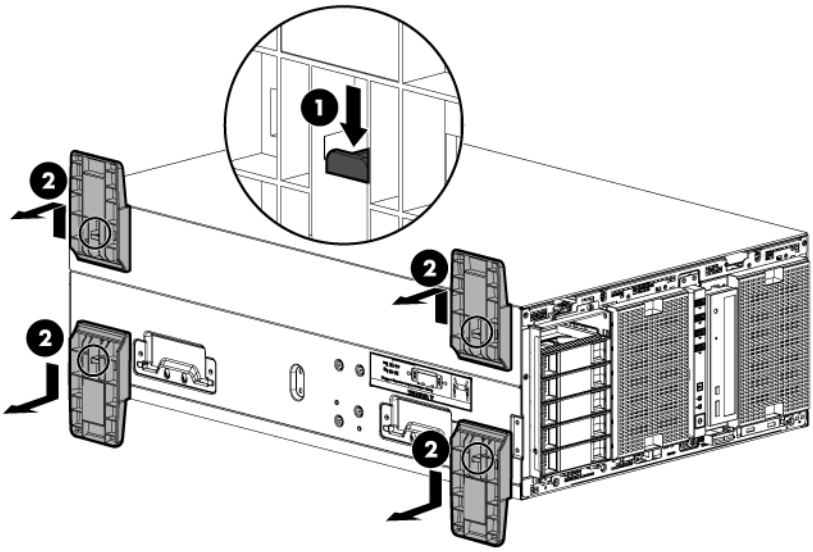
1. Back up the server data, and then record configuration information.
2. Close all applications, and then using the normal shutdown sequence, shut down the operating system.
3. Remove the bezel:
    a. Unlock the tower bezel and then open the bezel door completely.
    b. Slide the bezel up, removing it completely from the chassis.
    c. Remove the two bezel snaps.



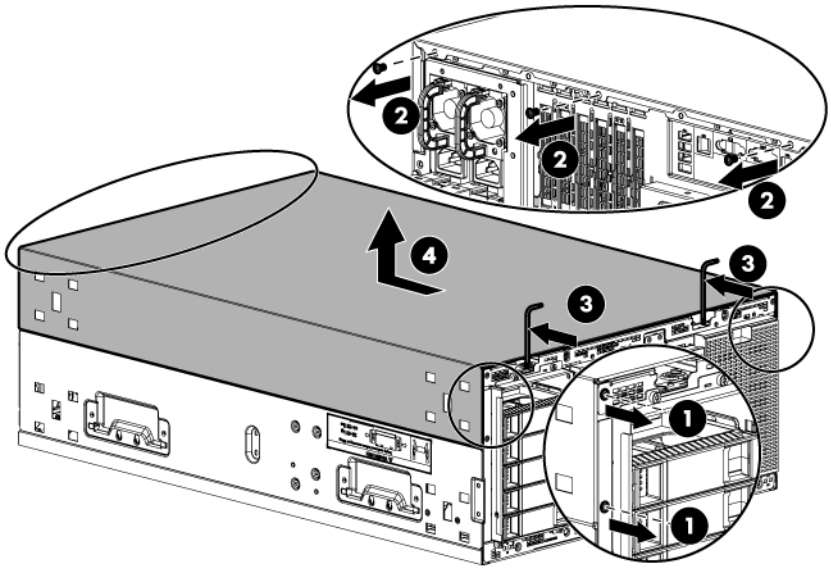
4. Press the Power On/Standby button.

   The server powers down and enters standby mode. The system power LED changes from green to amber. Power is still applied to the server.
5. Remove all power:
    a. Disconnect each power cord from the power source.
    b. Disconnect each power cord from the server.
6. Place the server on a flat, level work surface.

7. Remove the server base feet.

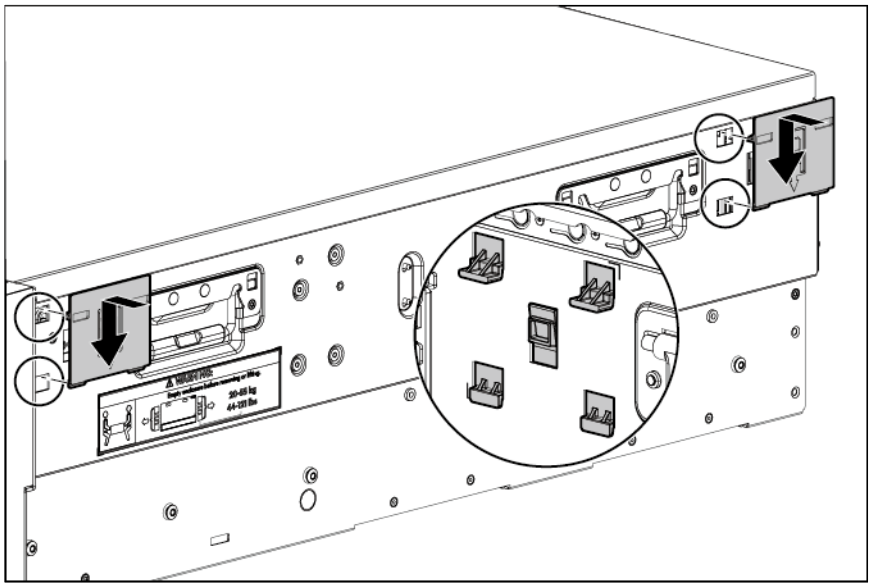


8. Remove the base cover:
   a. Remove all screws securing the base cover to the chassis.
   b. Place two Torx screwdrivers in the bezel hinge holes to help slide the base cover towards the rear of the server, and then remove the base cover.

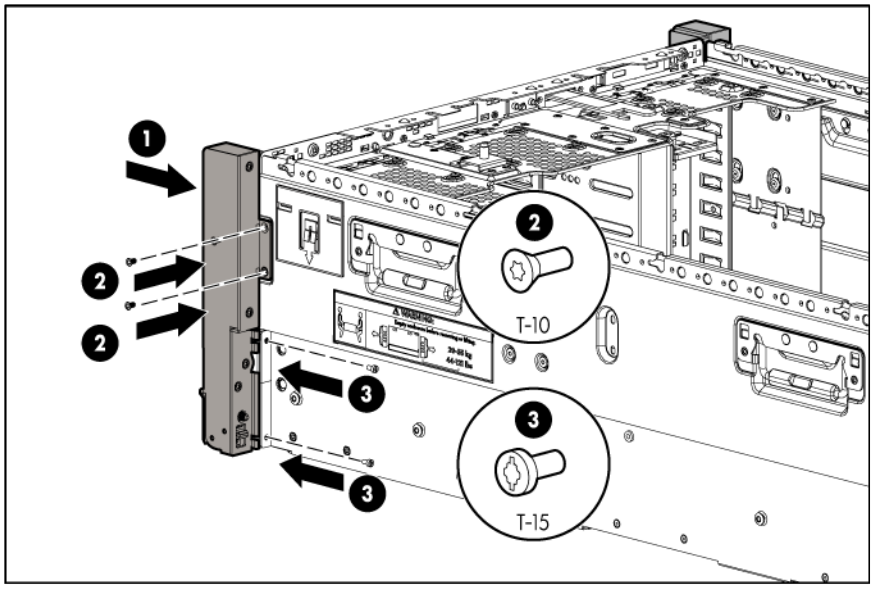


9. Rotate the server 180°.

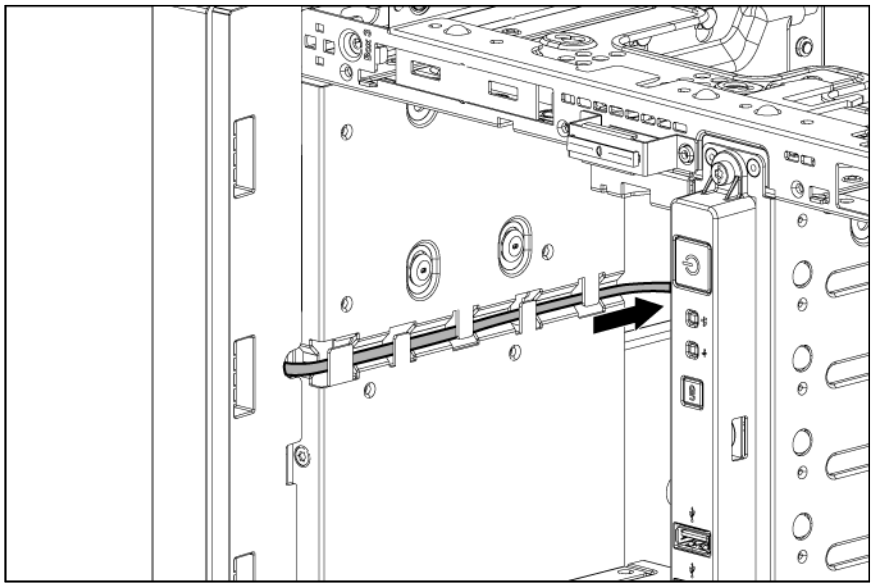
10. To block the server base feet holes, install the server base blank covers.



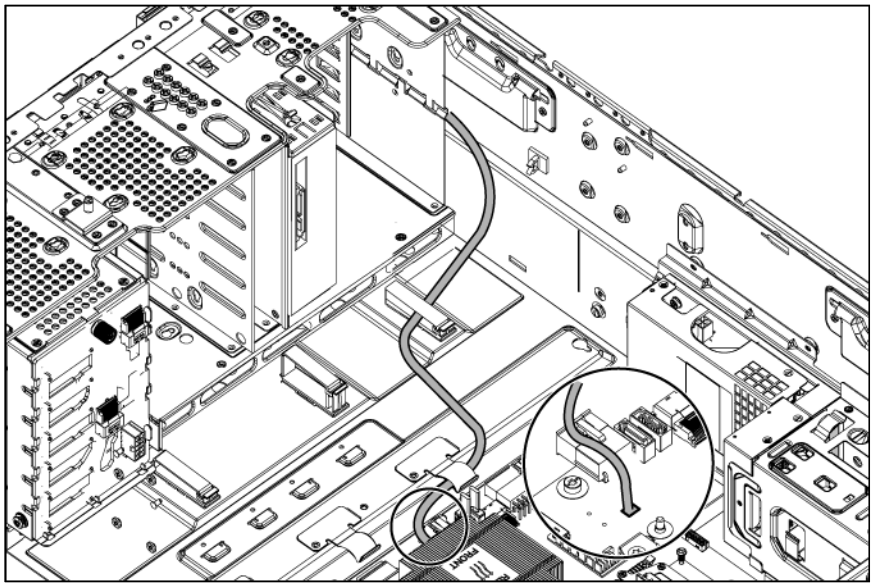
11. Turn the server over, and then remove the access panel ("Remove the access panel" on page 25).
12. Remove the PCI air baffle (on page 28), if installed.
13. Remove any installed full length PCI expansion boards.
14. Remove the system air baffle (on page 30).
15. Remove the fan cage (on page 31).
16. Install the left and right rack ears with T-10 and T-15 screws.



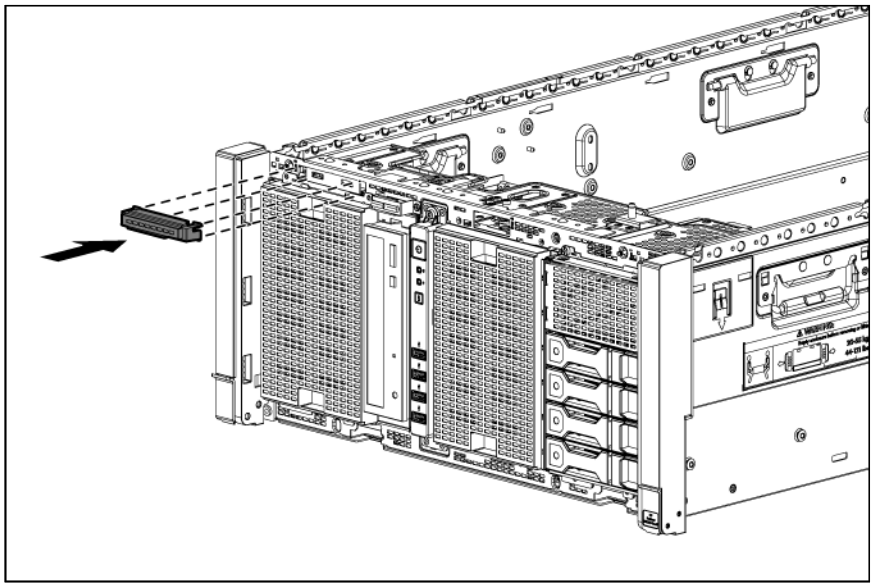
17. Route the discovery service cable from the left rack ear bezel through the chassis hooks.



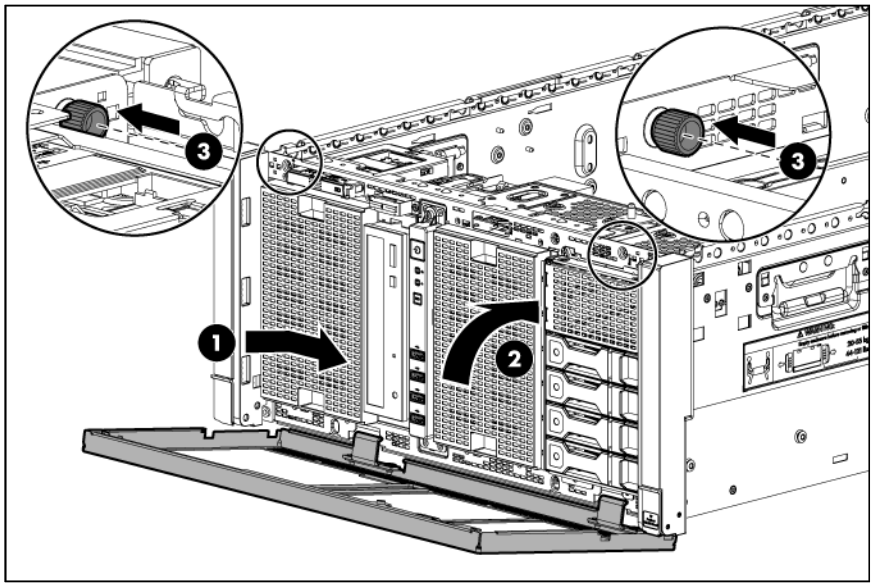
18. Connect the discovery service cable to the discovery service cable connector.



19. Install the System Insight Display blank.

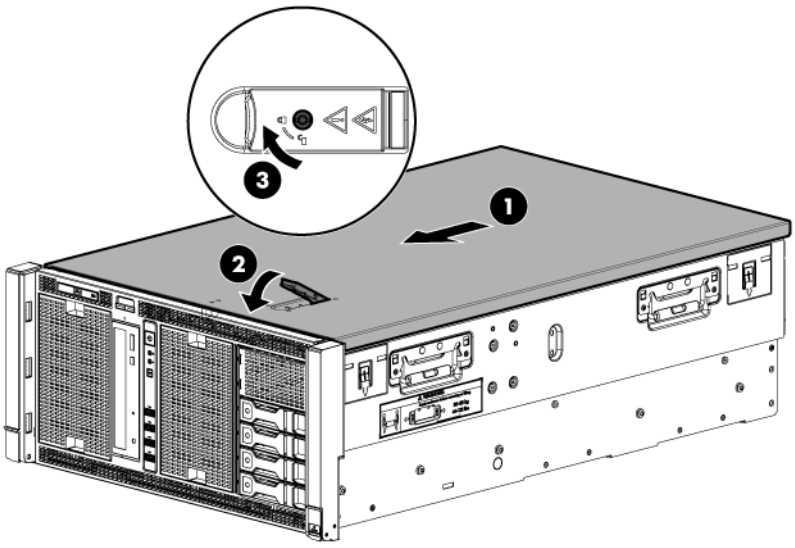


20. Install and lock the rack bezel.



21. Install the fan cage.
22. Install any PCI expansion boards removed earlier.
23. Install the system air baffle (on page 30).
24. Install the PCI air baffle (on page 29).

25. Install the access panel.



26. Install the included Quick Deploy Rail System, install the server on the rack rail, and then slide the assembly into the rack.

> **NOTE:** For detailed instructions on installing the server into the rack, see the Quick Deploy Rail System Installation Instructions included with the kit.

27. Connect each power cord to the server.
28. Connect each power cord to the power source.
29. Press the Power On/Standby button.

    The server exits standby mode and applies full power to the system. The system power LED changes from amber to green.

HP Trusted Platform Module option

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the HP Product Bulletin website (http://www.hp.com/go/productbulletin).

Use these instructions to install and enable a TPM on a supported server. This procedure includes three sections:

1. Installing the Trusted Platform Module board.
2. Retaining the recovery key/password (on page 105).
3. Enabling the Trusted Platform Module (on page 105).

   Enabling the TPM requires accessing RBSU ("HP ROM-Based Setup Utility" on page 117). For more information about RBSU, see the HP website (http://www.hp.com/go/ilomgmtengine/docs).

TPM installation requires the use of drive encryption technology, such as the Microsoft Windows BitLocker Drive Encryption feature. For more information on BitLocker, see the Microsoft website (http://www.microsoft.com).

> △ **CAUTION:** Always observe the guidelines in this document. Failure to follow these guidelines can cause hardware damage or halt data access.

When installing or replacing a TPM, observe the following guidelines:

- Do not remove an installed TPM. Once installed, the TPM becomes a permanent part of the system board.
- When installing or replacing hardware, HP service providers cannot enable the TPM or the encryption technology. For security reasons, only the customer can enable these features.
- When returning a system board for service replacement, do not remove the TPM from the system board. When requested, HP Service provides a TPM with the spare system board.
- Any attempt to remove an installed TPM from the system board breaks or disfigures the TPM security rivet. Upon locating a broken or disfigured rivet on an installed TPM, administrators should consider the system compromised and take appropriate measures to ensure the integrity of the system data.
- When using BitLocker, always retain the recovery key/password. The recovery key/password is required to enter Recovery Mode after BitLocker detects a possible compromise of system integrity.
- HP is not liable for blocked data access caused by improper TPM use. For operating instructions, see the encryption technology feature documentation provided by the operating system.

Installing the Trusted Platform Module board

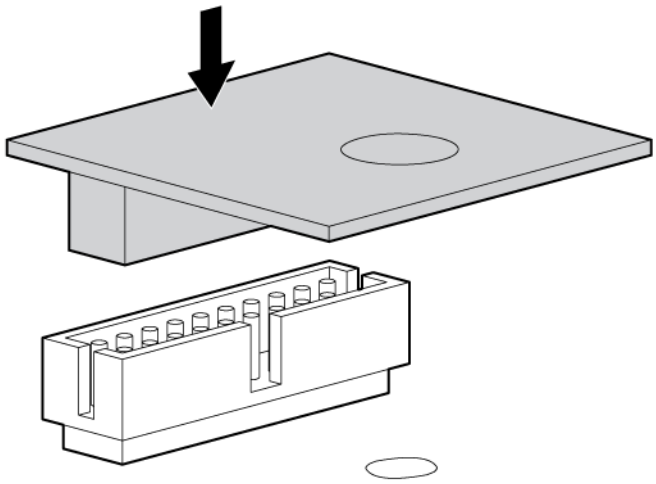
WARNING: To reduce the risk of personal injury, electric shock, or damage to the equipment, remove the power cord to remove power from the server. The front panel Power On/Standby button does not completely shut off system power. Portions of the power supply and some internal circuitry remain active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

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

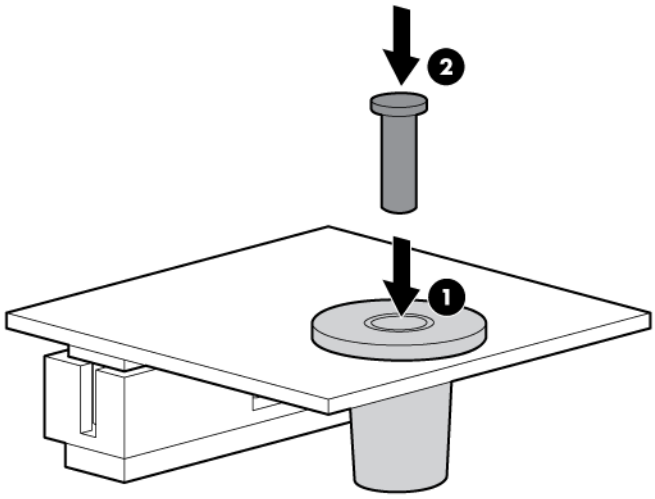
1. Do one of the following:
   - For tower models, open and remove the bezel ("Remove the tower bezel" on page 22).
   - For rack models, if installed, remove the security bezel (on page 24).
2. Power down the server (on page 22).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Do one of the following:
   - For tower models, place the server on a flat, level surface with the access panel facing up.
   - For rack models, extend the server from the rack (on page 27).
5. Remove the access panel (on page 25).
6. Remove the PCI air baffle (on page 28), if installed.
7. If installed, remove the PCI card from slot 6 ("Remove a full-length expansion board" on page 37).

CAUTION: Any attempt to remove an installed TPM from the system board breaks or disfigures the TPM security rivet. Upon locating a broken or disfigured rivet on an installed TPM, administrators should consider the system compromised and take appropriate measures to ensure the integrity of the system data.

8. Install the TPM board. Press down on the connector to seat the board.



9. Install the TPM security rivet by pressing the rivet firmly into the system board.



10. If removed, install the PCI card in slot 6.
11. Install the PCI air baffle (on page 29), if removed.
12. Install the access panel (on page 26).
13. Do one of the following:
    - For tower models, return the server to an upright position.
    - For rack models, install the server onto the rails.
14. Connect each power cord to the server.
15. Connect each power cord to the power source.
16. Press the Power On/Standby button.

    The server exits standby mode and applies full power to the system. The system power LED changes from amber to green.
17. Do one of the following:

- For tower models, install the bezel ("Install the rack bezel" on page 25).
- For rack models, if removed, install the security bezel ("Security bezel option" on page 47).

Retaining the recovery key/password

The recovery key/password is generated during BitLocker™ setup, and can be saved and printed after BitLocker™ is enabled. When using BitLocker™, always retain the recovery key/password. The recovery key/password is required to enter Recovery Mode after BitLocker™ detects a possible compromise of system integrity.

To help ensure maximum security, observe the following guidelines when retaining the recovery key/password:

- Always store the recovery key/password in multiple locations.
- Always store copies of the recovery key/password away from the server.
- Do not save the recovery key/password on the encrypted hard drive.

Enabling the Trusted Platform Module

1. When prompted during the start-up sequence, access RBSU by pressing the **F9** key.
2. From the Main Menu, select **Server Security**.
3. From the Server Security Menu, select **Trusted Platform Module**.
4. From the Trusted Platform Module Menu, select **TPM Functionality**.
5. Select **Enable**, and then press the **Enter** key to modify the TPM Functionality setting.
6. Press the **Esc** key to exit the current menu, or press the **F10** key to exit RBSU.
7. Reboot the server.
8. Enable the TPM in the OS. For OS-specific instructions, see the OS documentation.

△ **CAUTION:** When a TPM is installed and enabled on the server, data access is locked if you fail to follow the proper procedures for updating the system or option firmware, replacing the system board, replacing a hard drive, or modifying OS application TPM settings.

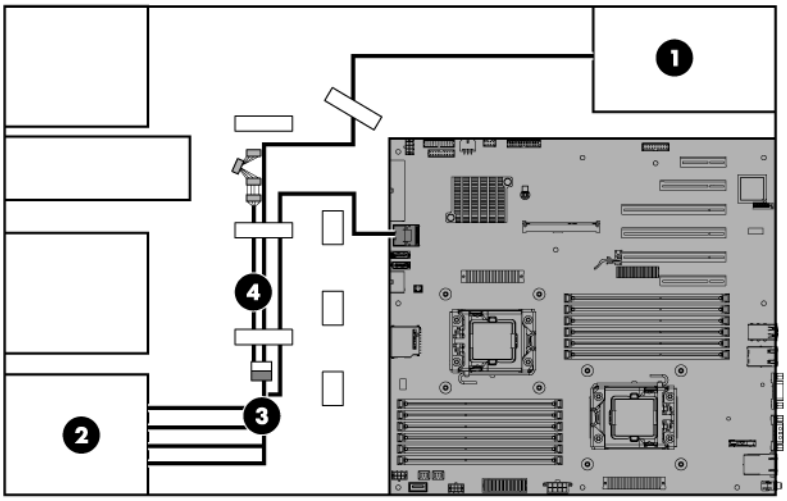
For more information on firmware updates and hardware procedures, see the *HP Trusted Platform Module Best Practices White Paper* on the HP website (http://www.hp.com/support).

For more information on adjusting TPM usage in BitLocker™, see the Microsoft website (http://technet.microsoft.com/en-us/library/cc732774.aspx).

Cabling

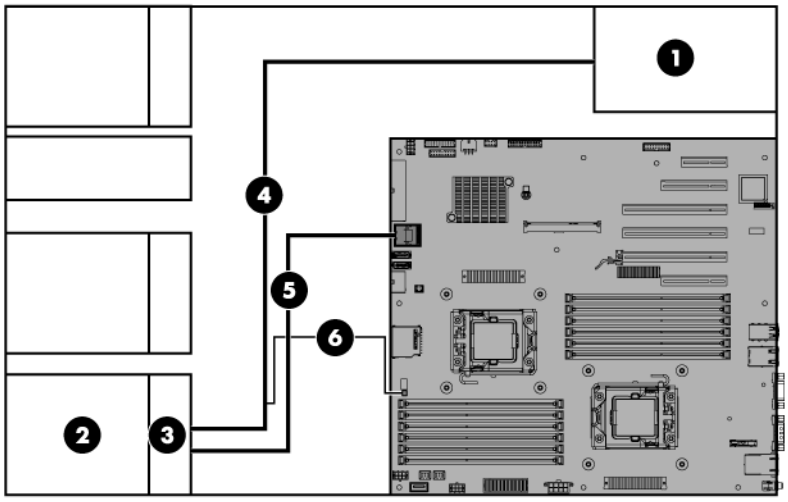
Storage cabling

Non-hot-plug four LFF drive cabling



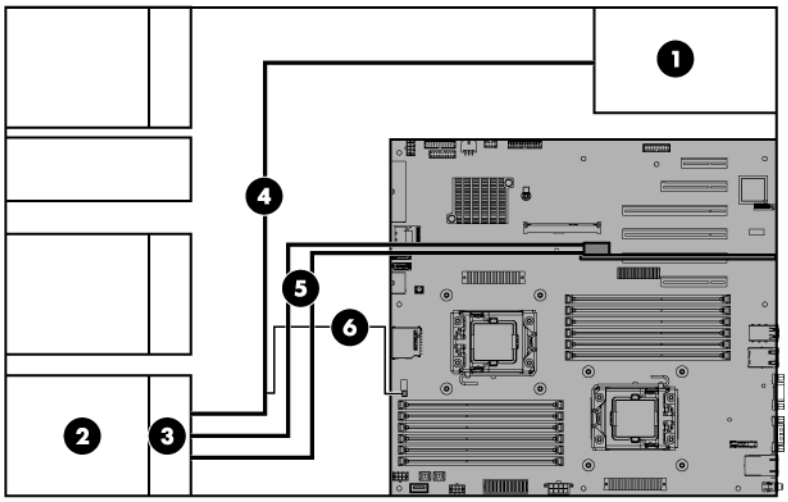
Item	Description
1	Power supply
2	Non-hot-plug LFF drive bay (1 to 4)
3	Mini SAS to 4 SATA/SAS cable
4	Power supply cable

Hot-plug four LFF drive cabling



Item	Description
1	Power supply
2	Hot-plug LFF drive bay (1 to 4)
3	LFF backplane
4	Power supply cable
5	Mini-SAS cable to system board
6	Power good cable to system board

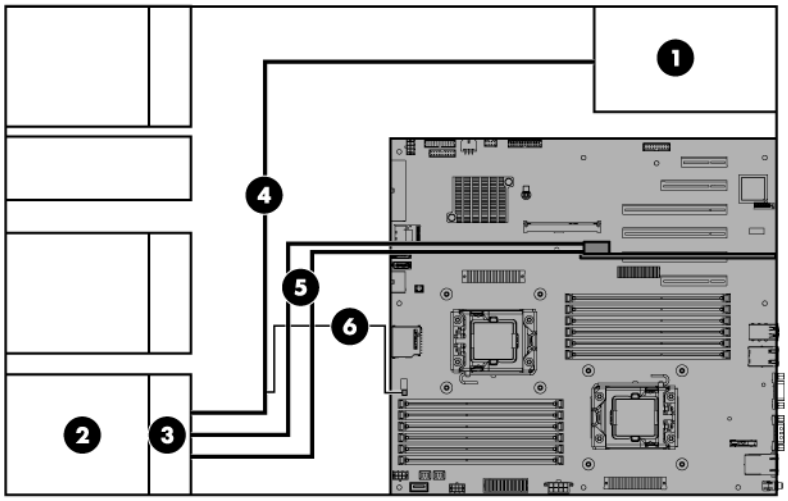
Hot-plug eight SFF drive cabling



Item	Description
1	Power supply
2	Hot-plug SFF drive bay (1 to 8)
3	SFF backplane
4	Power supply cable
5	Mini-SAS cable (2) to Smart Array Controller card
6	Power good cable to system board

Smart Array controller card cabling

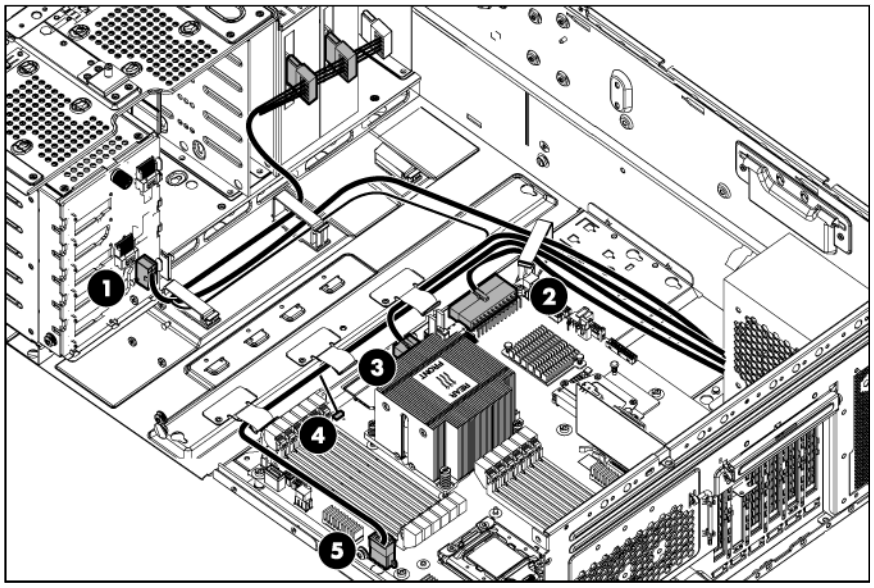
5/6 LFF Smart Array controller card cabling



Item	Description
1	Power supply
2	Drive bay (1 to 6)
3	LFF drive backplane
4	Power supply cable
5	Mini-SAS cables (2) to Smart Array controller card
6	Power good cable to system board

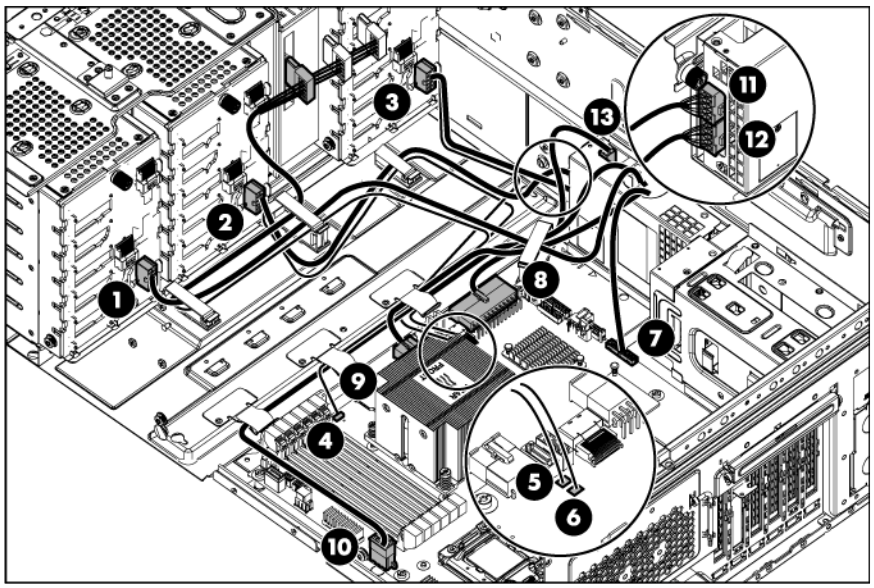
Power cabling

ATX power cabling



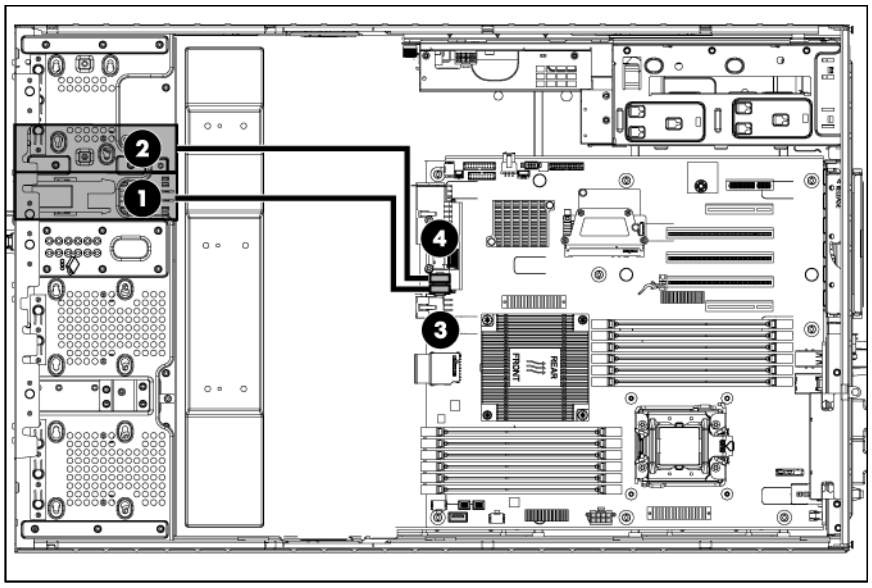
Item	Description
1	Drive box 1 connector
2	System board power connector
3	Processor 1 connector
4	Drive cage power good connector
5	Processor 2 connector

RPS power cabling



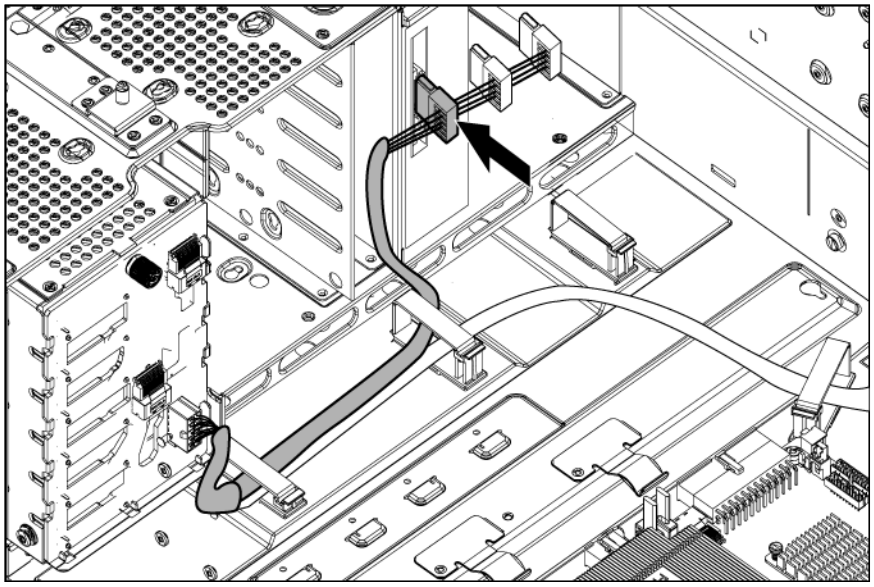
Item	Description
1	Drive box 1 connector
2	Drive box 2 connector
3	Drive box 3 connector
4	Drive cage power good connector for drive 3
5	Drive cage power good connector for drive 1
6	Drive cage power good connector for drive 2
7	RPS connector
8	System board power connector
9	Processor 1 connector
10	Processor 2 connector
11	Drive box 2 RPS backplane connector
12	Drive box 3 RPS backplane connector
13	Processor 2 RPS backplane connector

Media device data cabling



Item	Description
1	Optical drive
2	Optical drive
3	SATA connector
4	SATA connector

DVD-ROM and DVD-RW drive power cabling



Software and configuration utilities

Server mode

The software and configuration utilities presented in this section operate in online mode, offline mode, or in both modes.

Software or configuration utility	Server mode
HP iLO (on page 112)	Online and Offline
Active Health System (on page 113)	Online and Offline
Integrated Management Log (on page 114)	Online and Offline
Intelligent Provisioning (on page 114)	Offline
HP Insight Diagnostics (on page 115)	Online and Offline
HP Insight Remote Support software (on page 116)	Online
HP Insight Online	Online
Erase Utility (on page 115)	Offline
Scripting Toolkit (on page 116)	Online
HP Service Pack for ProLiant (on page 116)	Online and Offline
HP Smart Update Manager (on page 117)	Online and Offline
HP ROM-Based Setup Utility (on page 117)	Offline
Array Configuration Utility (on page 120)	Online and Offline
Option ROM Configuration for Arrays (on page 121)	Offline
ROMPaq utility (on page 121)	Offline

HP product QuickSpecs

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the HP Product Bulletin website (http://www.hp.com/go/productbulletin).

HP iLO Management Engine

The HP iLO Management Engine is a set of embedded management features supporting the complete lifecycle of the server, from initial deployment through ongoing management.

HP iLO

The iLO 4 subsystem is a standard component of selected HP ProLiant servers that simplifies initial server setup, server health monitoring, power and thermal optimization, and remote server administration. The iLO 4 subsystem includes an intelligent microprocessor, secure memory, and a dedicated network interface. This design makes iLO 4 independent of the host server and its operating system.

iLO 4 enables and manages the Active Health System (on page 113) and also features Agentless Management. All key internal subsystems are monitored by iLO 4. SNMP alerts are sent directly by iLO 4 regardless of the host operating system or even if no host operating system is installed.

HP Insight Remote Support software (on page 116) is also available in HP iLO with no operating system software, drivers, or agents.

Using iLO 4, you can do the following:

- Access a high-performance and secure Remote Console to the server from anywhere in the world.
- Use the shared iLO 4 Remote Console to collaborate with up to six server administrators.
- Remotely mount high-performance Virtual Media devices to the server.
- Securely and remotely control the power state of the managed server.
- Have true Agentless Management with SNMP alerts from iLO 4 regardless of the state of the host server.
- Access Active Health System troubleshooting features through the iLO 4 interface.
- Subscribe to HP Insight Remote Support software without installing any drivers or agents.

For more information about iLO 4 features (which may require an iLO Advanced Pack or iLO Advanced for BladeSystem license), see the iLO 4 documentation on the Documentation CD or on the HP website (http://www.hp.com/go/ilo/docs).

Active Health System

HP Active Health System provides the following features:

- Combined diagnostics tools/scanners
- Always on, continuous monitoring for increased stability and shorter downtimes
- Rich configuration history
- Health and service alerts
- Easy export and upload to Service and Support

The HP Active Health System monitors and records changes in the server hardware and system configuration. The Active Health System assists in diagnosing problems and delivering rapid resolution when server failures occur.

The Active Health System collects the following types of data:

- Server model
- Serial number
- Processor model and speed
- Storage capacity and speed
- Memory capacity and speed
- Firmware/BIOS

HP Active Health System does not collect information about Active Health System users' operations, finances, customers, employees, partners, or data center, such as IP addresses, host names, user names, and passwords. HP Active Health System does not parse or change operating system data from third-party error event log activities, such as content created or passed through by the operating system.

The data that is collected is managed according to the HP Data Privacy policy. For more information see the HP website (http://www.hp.com/go/privacy).

The Active Health System log, in conjunction with the system monitoring provided by Agentless Management or SNMP Pass-thru, provides continuous monitoring of hardware and configuration changes, system status, and service alerts for various server components.

The Agentless Management Service is available in the SPP, which is a disk image (.iso) that you can download from the HP website (http://www.hp.com/go/spp/download). The Active Health System log can be downloaded manually from iLO 4 or HP Intelligent Provisioning and sent to HP. For more information, see the *HP iLO User Guide* or *HP Intelligent Provisioning User Guide* on the HP website (http://www.hp.com/go/ilo/docs).

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
- From within operating system-specific IML viewers
  - For Windows: IML Viewer
  - For Linux: IML Viewer Application
- From within the iLO 4 user interface
- From within HP Insight Diagnostics (on page 115)

Intelligent Provisioning

Several packaging changes have taken place with HP ProLiant Gen8 servers: SmartStart CDs and the Smart Update Firmware DVD will no longer ship with these new servers. Instead, the deployment capability is embedded in the server as part of HP iLO Management Engine's Intelligent Provisioning.

Intelligent Provisioning is an essential single-server deployment tool embedded in HP ProLiant Gen8 servers that simplifies HP ProLiant server setup, providing a reliable and consistent way to deploy HP ProLiant server configurations.

- Intelligent Provisioning assists with the OS installation process by preparing the system for installing "off-the-shelf" versions of leading operating system software and automatically integrating optimized HP ProLiant server support software from SPP. SPP is the installation package for operating system-specific bundles of HP ProLiant optimized drivers, utilities, management agents, and system firmware.
- Intelligent Provisioning provides maintenance-related tasks through Perform Maintenance features.
- Intelligent Provisioning provides installation help for Microsoft Windows, Red Hat and SUSE Linux, and VMware. For specific OS support, see the *HP Intelligent Provisioning Release Notes* on the HP website (http://www.hp.com/go/intelligentprovisioning/docs).

For more information about Intelligent Provisioning software, see the HP website (http://www.hp.com/go/intelligentprovisioning). For more information about Intelligent Provisioning drivers, firmware, and SPP, see the HP website (http://www.hp.com/go/spp/download).

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, boot the server using Intelligent Provisioning (on page 114).

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, see the HP website (http://www.hp.com/servers/diags). HP Insight Diagnostics Online Edition is also available in the SPP. For more information, see the HP website (http://www.hp.com/go/spp/download).

HP Insight Diagnostics survey functionality

HP Insight Diagnostics (on page 115) provides survey functionality that gathers critical hardware and software information on ProLiant servers.

This functionality supports operating systems that are supported by the server. For operating systems supported by the server, see the HP website (http://www.hp.com/go/supportos).

If a significant change occurs between data-gathering intervals, the survey function marks the previous information and overwrites the survey data files to reflect the latest changes in the configuration.

Survey functionality is installed with every Intelligent Provisioning-assisted HP Insight Diagnostics installation, or it can be installed through the SPP ("HP Service Pack for ProLiant" on page 116).

Erase Utility

CAUTION: Perform a backup before running the System Erase Utility. The utility sets the system to its original factory state, deletes the current hardware configuration information, including array setup and disk partitioning, and erases all connected hard drives completely. Refer to the instructions for using this utility.

Use the Erase Utility to erase hard drives and Active Health System logs, and to reset RBSU settings. Run the Erase Utility if you must erase the system for the following reasons:

- You want to install a new operating system on a server with an existing operating system.
- You encounter an error when completing the steps of a factory-installed operating system installation.

To access the Erase Utility, click the Perform Maintenance icon from the Intelligent Provisioning home screen, and then select **Erase**.

Run the Erase utility to:

- **Do not erase** — does not erase hard drive operations.
- **Reset** — erases the master boot record for the hard drives so they are no longer bootable.
- **Secure erase** —performs an overwrite pattern erase so no data is recoverable.

After selecting the appropriate option, click **Erase Selected**. A Confirm Erase window is displayed, prompting you to confirm or cancel the Erase.

HP Insight Remote Support software

HP strongly recommends that you install HP Insight Remote Support software to complete the installation or upgrade of your product and to enable enhanced delivery of your HP Warranty, HP Care Pack Service, or HP contractual support agreement. HP Insight Remote Support supplements your monitoring continuously to ensure maximum system availability by providing intelligent event diagnosis, and automatic, secure submission of hardware event notifications to HP, which will initiate a fast and accurate resolution, based on your product's service level. Notifications may be sent to your authorized HP Channel Partner for onsite service, if configured and available in your country.

The HP Insight Remote Support software extends the HP enterprise remote support portfolio for customers with small and medium size IT environments. The software is available in two variants:

- **HP Insight Remote Support 7.x software** is optimized to support up to 500 managed systems and can be installed on a Windows ProLiant hosting device or a Windows ESXi Virtual Machine. It can be integrated easily to work with a supported version of HP Systems Insight Manager. HP Insight Remote Support 7.x provides anytime, anywhere personalized access to your IT environment through HP Insight Online, and is also the recommended version for HP Proactive Care Service.
- **HP Insight Remote Support Advanced** supports medium-sized to large environments with up to 3,500 devices. It can be installed on a Windows ProLiant hosting device or a Windows ESXi Virtual Machine and requires HP Systems Insight Manager. Optionally, customers using HP Operations Manager or SAP Solution Manager to manage their environment can integrate these platforms easily to create a single view. This software is also optimized to deliver Mission Critical Services through additional features.

For more information about the Insight Remote Support Advanced software, see the HP website (http://www.hp.com/go/insightremotesupport).

The *HP Insight Remote Support Release Notes* detail the prerequisites, supported hardware, and associated operating systems. The release notes are available on the HP website (http://www.hp.com/go/insightremotesupport/docs). HP Insight Remote Support is included as part of HP Warranty, HP Care Pack Service, or HP contractual support agreement.

Scripting Toolkit

The Scripting Toolkit is a server deployment product that enables you to build an unattended automated installation for high-volume server deployments. The Scripting Toolkit is designed to support ProLiant BL, ML, DL, and SL servers. The toolkit includes a modular set of utilities and important documentation that describes how to apply these tools to build an automated server deployment process.

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 deployment, making it possible to scale rapid, high-volume server deployments.

For more information, and to download the Scripting Toolkit, see the HP website (http://www.hp.com/go/ProLiantSTK).

HP Service Pack for ProLiant

SPP is a release set that contains a comprehensive collection of firmware and system software components, all tested together as a single solution stack for HP ProLiant servers, their options, BladeSystem enclosures, and limited HP external storage.

SPP has several key features for updating HP ProLiant servers. Using HP SUM as the deployment tool, SPP can be used in an online mode on a Windows or Linux hosted operating system, or in an offline mode where the server is booted to the ISO so that the server can be updated automatically with no user interaction or updated in interactive mode.

For more information or to download SPP, see the HP website (http://www.hp.com/go/spp).

HP Smart Update Manager

HP SUM is included in many HP products for installing and updating firmware and software on HP ProLiant servers. HP SUM provides a GUI and a command-line scriptable interface for deployment of firmware and software for single or one-to-many HP ProLiant servers and network-based targets, such as iLOs, OAs, and VC Ethernet and Fibre Channel modules.

Key features of HP SUM include:

- Dependency checking, which ensures appropriate installation order and dependency checking between components
- Intelligent deployment of only required updates
- Simultaneous firmware and software deployment for multiple remote targets in both GUI and CLI modes
- Improved deployment performance
- Local online deployment of HP ProLiant servers and enclosures
- Remote (one-to-many) online deployment of HP ProLiant servers and enclosures
- Local offline firmware deployments with HP Support Pack for ProLiant deliverables
- Remote offline deployment when used with the Scripting Toolkit (HP ProLiant Gen8 and later), iLO Virtual Media, or PXE booted media
- GUI or CLI scripts with extensive logging
- Remote command-line deployment
- Support for updating firmware on network-based targets such as the OA, iLO through the Network Management Port, VC Ethernet and Fibre Channel modules, and 3Gb/6Gb SAS BL Switch interconnects on HP ProLiant servers

For more information about HP SUM and to access the *HP Smart Update Manager User Guide*, see the HP website (http://www.hp.com/go/hpsum/documentation).

HP ROM-Based Setup Utility

RBSU is a configuration utility embedded in HP ProLiant servers that performs a wide range of configuration activities that can include the following:

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

For more information on RBSU, see the *HP ROM-Based Setup Utility User Guide* on the Documentation CD or the HP website (http://www.hp.com/support/rbsu).

Using RBSU

To use RBSU, use the following keys:

- To access RBSU, press the **F9** key during power-up when prompted.
- To navigate the menu system, use the arrow keys.
- To make selections, press the **Enter** key.
- To access Help for a highlighted configuration option, press the **F1** key.

IMPORTANT: RBSU automatically saves settings when you press the **Enter** key. The utility does not prompt you for confirmation of settings before you exit the utility. To change a selected setting, you must select a different setting and press the **Enter** key.

Default configuration settings are applied to the server at one of the following times:

- Upon the first system power-up
- After defaults have been restored

Default configuration settings are sufficient for proper typical server operation, but configuration settings can be modified using RBSU. The system will prompt you for access to RBSU with each power-up.

Auto-configuration process

The auto-configuration process automatically runs when you boot the server for the first time. During the power-up sequence, the system ROM automatically configures the entire system without needing any intervention. During this process, the ORCA utility, in most cases, automatically configures the array to a default setting based on the number of drives connected to the server.

NOTE: If the boot drive is not empty or has been written to in the past, ORCA does not automatically configure the array. You must run ORCA to configure the array settings.

NOTE: The server may not support all the following examples.

Drives installed	Drives used	RAID level
1	1	RAID 0
2	2	RAID 1
3, 4, 5, or 6	3, 4, 5, or 6	RAID 5
More than 6	0	None

To change any ORCA default settings and override the auto-configuration process, press the **F8** key when prompted.

For more information on RBSU, see the *HP ROM-Based Setup Utility User Guide* on the Documentation CD or the HP website (http://www.hp.com/support/rbsu).

Boot options

Near the end of the boot process, the boot options screen is displayed. This screen is visible for several seconds before the system attempts to boot from a supported boot device. During this time, you can do the following:

- Access RBSU by pressing the **F9** key.
- Access Intelligent Provisioning Maintenance Menu by pressing the **F10** key.
- Access the boot menu by pressing the **F11** key.
- Force a PXE Network boot by pressing the **F12** key.

Configuring AMP modes

Not all HP ProLiant servers support all AMP modes. RBSU provides menu options only for the modes supported by the server. Advanced memory protection within RBSU enables the following advanced memory modes:

- Advanced ECC Mode—Provides memory protection beyond Standard ECC. All single-bit failures and some multi-bit failures can be corrected without resulting in system downtime.
- Online Spare Mode—Provides protection against failing or degraded DIMMs. Certain memory is set aside as spare, and automatic failover to spare memory occurs when the system detects a degraded DIMM. DIMMs that are likely to receive a fatal or uncorrectable memory error are removed from operation automatically, resulting in less system downtime.

For DIMM population requirements, see the server-specific user guide.

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 **Service Options**.
4. Select **Serial Number**. The following warning appears:

   ```
   Warning: The serial number should ONLY be modified by qualified service
   personnel. This value should always match the serial number located on the
   chassis.
   ```
5. Press the **Enter** key to clear the warning.
6. Enter the serial number and press the **Enter** key.
7. Select **Product ID**. The following warning appears:

   ```
   Warning: The Product ID should ONLY be modified by qualified service
   personnel. This value should always match the Product ID located on the
   chassis.
   ```
8. Enter the product ID and press the **Enter** key.
9. Press the **Esc** key to close the menu.
10. Press the **Esc** key to exit RBSU.
11. Press the **F10** key to confirm exiting RBSU. The server automatically reboots.

Utilities and features

Array Configuration Utility

ACU is a utility with the following features:

- Runs as a local application or remote service accessed through the HP System Management Homepage
- Supports online array capacity expansion, logical drive extension, assignment of online spares, and RAID or stripe size migration
- Suggests the optimum configuration for an unconfigured system
- For supported controllers, provides access to licensed features, including:
  - Moving and deleting individual logical volumes
  - Advanced Capacity Expansion (SATA to SAS and SAS to SATA)
  - Offline Split Mirror
  - RAID 6 and RAID 60
  - RAID 1 (ADM) and RAID 10 (ADM)
  - HP Drive Erase
  - Video-On-Demand Advanced Controller Settings
- Provides different operating modes, enabling faster configuration or greater control over the configuration options
- Remains available any time that the server is on
- Displays on-screen tips for individual steps of a configuration procedure
- Provides context-sensitive searchable help content
- Provides diagnostic and SmartSSD Wear Gauge functionality on the Diagnostics tab

ACU is now available as an embedded utility, starting with HP ProLiant Gen8 servers. To access ACU, use one of the following methods:

- If an optional controller is not installed, press **F10** during boot.
- If an optional controller is installed, when the system recognizes the controller during POST, press **F5**.

For optimum performance, the minimum display settings are 1024 × 768 resolution and 16-bit color. Servers running Microsoft® operating systems require one of the following supported browsers:

- Internet Explorer 6.0 or later
- Mozilla Firefox 2.0 or later

For Linux servers, see the README.TXT file for additional browser and support information.

For more information about the controller and its features, see the *HP Smart Array Controllers for HP ProLiant Servers User Guide* on the HP website (http://www.hp.com/support/SAC_UG_ProLiantServers_en). To configure arrays, see the *Configuring Arrays on HP Smart Array Controllers Reference Guide* on the HP website (http://www.hp.com/support/CASAC_RG_en).

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
- Selecting the boot volume

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

For more information regarding the default configurations that ORCA uses, see the *HP ROM-Based Setup Utility User Guide* on the Documentation CD or the HP website (http://www.hp.com/support/rbsu).

For more information about the controller and its features, see the *HP Smart Array Controllers for HP ProLiant Servers User Guide* on the HP website (http://www.hp.com/support/SAC_UG_ProLiantServers_en). To configure arrays, see the *Configuring Arrays on HP Smart Array Controllers Reference Guide* on the HP website (http://www.hp.com/support/CASAC_RG_en).

ROMPaq utility

The ROMPaq utility enables you to upgrade the system firmware (BIOS). To upgrade the firmware, insert a ROMPaq USB Key into an available USB port and boot the system. In addition to ROMPaq, Online Flash Components for Windows and Linux operating systems are available for updating the system firmware.

The ROMPaq utility checks the system and provides a choice (if more than one exists) of available firmware revisions.

For more information, go to the HP website (http://www.hp.com/go/hpsc) and click on **Drivers, Software & Firmware**. Then, enter your product name in the **Find an HP product** field and click **Go**.

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 (does not apply to HP ProLiant DL980 Servers), 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. 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 System Management Homepage or through RBSU.

USB support

HP provides both standard USB 2.0 support and legacy USB 2.0 support. Standard support is provided by the OS through the appropriate USB device drivers. Before the OS loads, HP provides support for USB devices through legacy USB support, which is enabled by default in the system ROM.

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

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

Redundant ROM support

The server enables you to upgrade or configure the ROM safely with redundant ROM support. The server has a single ROM that acts as two separate ROM images. In the standard implementation, one side of the ROM contains the current ROM program version, while the other side of the ROM contains a backup version.

NOTE: The server ships with the same version programmed on each side of the ROM.

Safety and security benefits

When you flash the system ROM, ROMPaq writes over the backup ROM and saves the current ROM as a backup, enabling you to switch easily to the alternate ROM version if the new ROM becomes corrupted for any reason. This feature protects the existing ROM version, even if you experience a power failure while flashing the ROM.

Keeping the system current

Drivers

IMPORTANT: Always perform a backup before installing or updating device drivers.

The server includes new hardware that may not have driver support on all OS installation media.

If you are installing an Intelligent Provisioning-supported OS, use Intelligent Provisioning (on page 114) and its Configure and Install feature to install the OS and latest supported drivers.

If you do not use Intelligent Provisioning to install an OS, drivers for some of the new hardware are required. These drivers, as well as other option drivers, ROM images, and value-add software can be downloaded as part of an SPP.

If you are installing drivers from SPP, be sure that you are using the latest SPP version that your server supports. To verify that your server is using the latest supported version and for more information about SPP, see the HP website (http://www.hp.com/go/spp/download).

To locate the drivers for a particular server, go to the HP website (http://www.hp.com/go/hpsc) and click on **Drivers, Software & Firmware**. Then, enter your product name in the **Find an HP product** field and click **Go**.

Software and firmware

Software and firmware should be updated before using the server for the first time, unless any installed software or components require an older version. For system software and firmware updates, download the SPP ("HP Service Pack for ProLiant" on page 116) from the HP website (http://www.hp.com/go/spp).

Version control

The VCRM and VCA are web-enabled Insight Management Agents tools that HP SIM uses to schedule software update tasks to the entire enterprise.

- VCRM manages the repository for SPP. Administrators can view the SPP contents or configure VCRM to automatically update the repository with internet downloads of the latest software and firmware from HP.
- VCA compares installed software versions on the node with updates available in the VCRM managed repository. Administrators configure VCA to point to a repository managed by VCRM.

For more information about version control tools, see the *HP Systems Insight Manager User Guide,* the *HP Version Control Agent User Guide*, and the *HP Version Control Repository User Guide* on the HP website (http://www.hp.com/go/hpsim).

HP operating systems and virtualization software support for ProLiant servers

For information about specific versions of a supported operating system, see the HP website (http://www.hp.com/go/ossupport).

Change control and proactive notification

HP offers Change Control and Proactive Notification to notify customers 30 to 60 days in advance of upcoming hardware and software changes on HP commercial products.

For more information, refer to the HP website (http://www.hp.com/go/pcn).

Troubleshooting

Troubleshooting resources

The *HP ProLiant Gen8 Troubleshooting Guide, Volume I: Troubleshooting* provides procedures for resolving common problems and comprehensive courses of action for fault isolation and identification, issue resolution, and software maintenance on ProLiant servers and server blades. To view the guide, select a language:

- English (http://www.hp.com/support/ProLiant_TSG_v1_en)
- French (http://www.hp.com/support/ProLiant_TSG_v1_fr)
- Spanish (http://www.hp.com/support/ProLiant_TSG_v1_sp)
- German (http://www.hp.com/support/ProLiant_TSG_v1_gr)
- Japanese (http://www.hp.com/support/ProLiant_TSG_v1_jp)
- Simplified Chinese (http://www.hp.com/support/ProLiant_TSG_v1_sc)

The *HP ProLiant Gen8 Troubleshooting Guide, Volume II: Error Messages* provides a list of error messages and information to assist with interpreting and resolving error messages on ProLiant servers and server blades. To view the guide, select a language:

- English (http://www.hp.com/support/ProLiant_EMG_v1_en)
- French (http://www.hp.com/support/ProLiant_EMG_v1_fr)
- Spanish (http://www.hp.com/support/ProLiant_EMG_v1_sp)
- German (http://www.hp.com/support/ProLiant_EMG_v1_gr)
- Japanese (http://www.hp.com/support/ProLiant_EMG_v1_jp)
- Simplified Chinese (http://www.hp.com/support/ProLiant_EMG_v1_sc)

Battery replacement

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

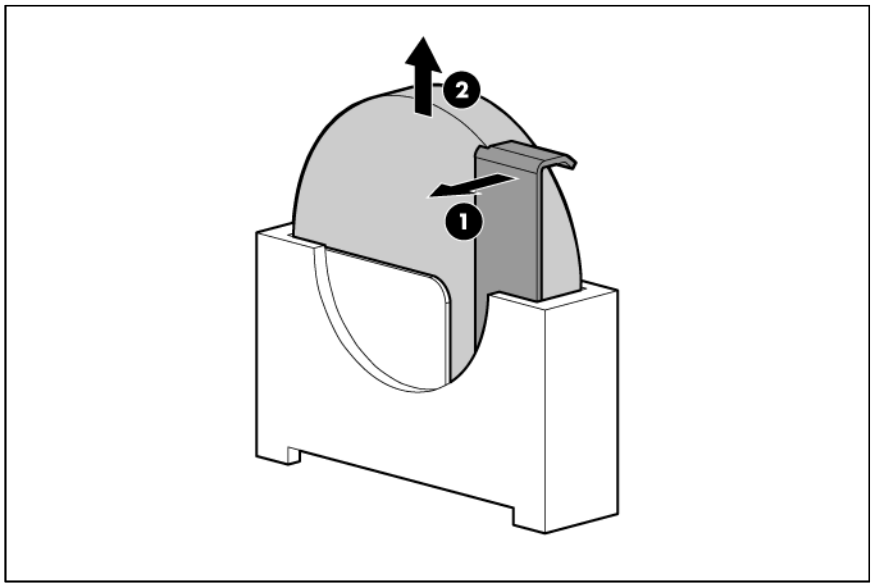
⚠ **WARNING:** The computer contains an internal lithium manganese dioxide, a vanadium pentoxide, or an alkaline battery pack. A risk of fire and burns exists if the battery pack is not properly handled. To reduce the risk of personal injury:

- 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. Do one of the following:
   - For tower models, open and remove the bezel ("Remove the tower bezel" on page 22).
   - For rack models, if installed, remove the security bezel (on page 24).
2. Power down the server (on page 22).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Do one of the following:
   - For tower models, place the server on a flat, level surface with the access panel facing up.
   - For rack models, extend the server from the rack (on page 27).
5. Remove the access panel (on page 25).
6. Remove the PCI air baffle (on page 28), if installed.
7. Remove the system air baffle (on page 30).

8. 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.

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

Regulatory information

Safety and regulatory compliance

For safety, environmental, and regulatory information, see *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products*, available at the HP website (http://www.hp.com/support/Safety-Compliance-EnterpriseProducts).

Turkey RoHS material content declaration

Türkiye Cumhuriyeti: EEE Yönetmeliğine Uygundur

Ukraine RoHS material content declaration

Обладнання відповідає вимогам Технічного регламенту щодо обмеження використання деяких небезпечних речовин в електричному та електронному обладнанні, затвердженого постановою Кабінету Міністрів України від 3 грудня 2008 № 1057

Warranty information

HP ProLiant and X86 Servers and Options (http://www.hp.com/support/ProLiantServers-Warranties)

HP Enterprise Servers (http://www.hp.com/support/EnterpriseServers-Warranties)

HP Storage Products (http://www.hp.com/support/Storage-Warranties)

HP Networking Products (http://www.hp.com/support/Networking-Warranties)

Electrostatic discharge

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.

Grounding methods to prevent electrostatic discharge

Several methods are used for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm ±10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.
- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have an authorized reseller install the part.

For more information on static electricity or assistance with product installation, contact an authorized reseller.

Specifications

Environmental specifications

Specification	Value
Temperature range*	
Operating	10°C to 35°C (50°F to 95°F)
Nonoperating	-30°C to 60°C (-22°F to 140°F)
Relative humidity (noncondensing)	
Operating, maximum wet bulb temperature of 28°C (82.4°F)	10% to 90%
Nonoperating, maximum wet bulb temperature of 38.7°C (101.7°F)	5% to 95%

* All temperature ratings shown are for sea level. An altitude derating of 1°C per 304.8 m (1.8°F per 1,000 ft) to 3048 m (10,000 ft) is applicable. No direct sunlight allowed.

Server specifications

Specification	Value
Dimensions	—
Rack model	—
Height	21.8 cm (8.58 in)
Depth	73.22 cm (28.83 in)
Width	48.26 cm (19.00 in)
Tower model	—
Height	46.2 cm (18.19 in)
Depth	74.00 cm (29.13 in)
Width	21.8 cm (8.58 in)
Weight	—
Maximum	43.85 kg (96.67 lbs)
Minimum	26.05 kg (57.43 lbs)

Power supply specifications

Depending on installed options, the server is configured with one of the following power supplies:

- HP ProLiant 460 W non-hot-plug power supply (68%)

Specification	Value
Input requirements	

Rated input voltage	100 to 120 V AC, 200 to 240 V AC
Rated input frequency	50 Hz to 60 Hz
Rated input current	6 A at 100 V AC 2.9 A at 200 V AC
Rated input power	590 W at 115 V AC input 570 W at 230 V AC input
BTUs per hour	2044 at 100 V AC input 2013 at 115 V AC input 2004 at 200 V AC input 1941 at 230 V AC input
Power supply output	
Rated steady-state power	460 W at 100 V to 120 V AC input 460 W at 200 V to 240 V AC input
Maximum peak power	460 W at 100 V to 120 V AC input 460 W at 200 V to 240 V AC input

- HP ProLiant 460 W CS power supply (92% efficiency)

Specification	Value
Input requirements	
Rated input voltage	100 to 120 V AC, 200 to 240 V AC
Rated input frequency	50 Hz to 60 Hz
Rated input current	5.5 A at 100 V AC 2.6 A at 200 V AC
Rated input power	526 W at 100 V AC input 505 W at 200 V AC input
BTUs per hour	1794 at 100 V AC input 1725 at 200 V AC input
Power supply output	
Rated steady-state power	460 W at 100 V to 120 V AC input 460 W at 200 V to 240 V AC input
Maximum peak power	460 W at 100 V to 120 V AC input 460 W at 200 V to 240 V AC input

- HP ProLiant 460 W CS power supply (94% efficiency)

Specification	Value
Input requirements	—
Rated input voltage	100 to 120 VAC, 200 to 240 VAC
Rated input frequency	50 Hz to 60 Hz

Rated input current	5.2 A at 100 VAC 2.5 A at 200 VAC
Rated input power	509 W at 115V AC input 495 W at 230V AC input
Btus per hour	1764 at 100V AC input 1736 at 115V AC input 1694 at 200V AC input 1687 at 230V AC input
Power supply output	—
Rated steady-state power	460 W at 100V to 120V AC input 460 W at 200V to 240V AC input
Maximum peak power	460 W at 100V to 120V AC input 460 W at 200V to 240V AC input

- HP ProLiant 750 W CS hot-plug power supply (92% efficiency)

Specification	Value
Input requirements	
Rated input voltage	100 to 120 V AC, 200 to 240 V AC
Rated input frequency	50 Hz to 60 Hz
Rated input current	8.9 A at 100 V AC 4.3 A at 200 V AC
Rated input power	857 W at 100V AC input 824 W at 200V AC input
BTUs per hour	2925 at 100V AC input 2812 at 200V AC input
Power supply output	
Rated steady-state power	750 W at 100 V to 120 V AC input 750 W at 200 V to 240 V AC input
Maximum peak power	750 W at 100 V to 120 V AC input 750 W at 200 V to 240 V AC input

- HP ProLiant 750 W CS hot-plug power supply (94% efficiency)

Specification	Value
Input requirements	—
Rated input voltage	100 V AC–240 V AC
Rated input frequency	50 Hz–60 Hz
Rated input current	9 A–4.5 A
Maximum rated input power	831 W at 115 V AC input 808 W at 230 V AC input
Btus per hour	2878 at 100 V AC input 2834 at 115 V AC input 2769 at 200 V AC input 2758 at 230 V AC input

Power supply output	—
Rated steady-state power	750 W at 100 V to 120 V AC input 750 W at 200 V to 240 V AC input
Maximum peak power	750 W at 100 V to 120 V AC input 750 W at 200 V to 240 V AC input

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/).

Support and other resources

Before you contact HP

Be sure to have the following information available before you call HP:

- Active Health System log (HP ProLiant Gen8 or later products)

  Download and have available an Active Health System log for 3 days before the failure was detected. For more information, see the *HP iLO 4 User Guide* or *HP Intelligent Provisioning User Guide* on the HP website (http://www.hp.com/go/ilo/docs).
- Onboard Administrator SHOW ALL report (for HP BladeSystem products only)

  For more information on obtaining the Onboard Administrator SHOW ALL report, see the HP website (http://h20000.www2.hp.com/bizsupport/TechSupport/Document.jsp?lang=en&cc=us&objectID=c02843807).
- Technical support registration number (if applicable)
- Product serial number
- Product model name and number
- Product identification number
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level

HP contact information

For United States and worldwide contact information, see the Contact HP website (http://www.hp.com/go/assistance).

In the United States:

- To contact HP by phone, call 1-800-334-5144. For continuous quality improvement, calls may be recorded or monitored.
- If you have purchased a Care Pack (service upgrade), see the Support & Drivers website (http://www8.hp.com/us/en/support-drivers.html). If the problem cannot be resolved at the website, call 1-800-633-3600. For more information about Care Packs, see the HP website (http://pro-aq-sama.houston.hp.com/services/cache/10950-0-0-225-121.html).

Customer Self Repair

HP products are designed with many Customer Self Repair (CSR) parts to minimize repair time and allow for greater flexibility in performing defective parts replacement. If during the diagnosis period HP (or HP service

providers or service partners) identifies that the repair can be accomplished by the use of a CSR part, HP will ship that part directly to you for replacement. There are two categories of CSR parts:

- **Mandatory**—Parts for which customer self repair is mandatory. If you request HP to replace these parts, you will be charged for the travel and labor costs of this service.
- **Optional**—Parts for which customer self repair is optional. These parts are also designed for customer self repair. If, however, you require that HP replace them for you, there may or may not be additional charges, depending on the type of warranty service designated for your product.

NOTE: Some HP parts are not designed for customer self repair. In order to satisfy the customer warranty, HP requires that an authorized service provider replace the part. These parts are identified as "No" in the Illustrated Parts Catalog.

Based on availability and where geography permits, CSR parts will be shipped for next business day delivery. Same day or four-hour delivery may be offered at an additional charge where geography permits. If assistance is required, you can call the HP Technical Support Center and a technician will help you over the telephone. HP specifies in the materials shipped with a replacement CSR part whether a defective part must be returned to HP. In cases where it is required to return the defective part to HP, you must ship the defective part back to HP within a defined period of time, normally five (5) business days. The defective part must be returned with the associated documentation in the provided shipping material. Failure to return the defective part may result in HP billing you for the replacement. With a customer self repair, HP will pay all shipping and part return costs and determine the courier/carrier to be used.

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).

Réparation par le client (CSR)

Les produits HP comportent de nombreuses pièces CSR (Customer Self Repair = réparation par le client) afin de minimiser les délais de réparation et faciliter le remplacement des pièces défectueuses. Si pendant la période de diagnostic, HP (ou ses partenaires ou mainteneurs agréés) détermine que la réparation peut être effectuée à l'aide d'une pièce CSR, HP vous l'envoie directement. Il existe deux catégories de pièces CSR:

Obligatoire - Pièces pour lesquelles la réparation par le client est obligatoire. Si vous demandez à HP de remplacer ces pièces, les coûts de déplacement et main d'œuvre du service vous seront facturés.

Facultatif - Pièces pour lesquelles la réparation par le client est facultative. Ces pièces sont également conçues pour permettre au client d'effectuer lui-même la réparation. Toutefois, si vous demandez à HP de remplacer ces pièces, l'intervention peut ou non vous être facturée, selon le type de garantie applicable à votre produit.

REMARQUE: Certaines pièces HP ne sont pas conçues pour permettre au client d'effectuer lui-même la réparation. Pour que la garantie puisse s'appliquer, HP exige que le remplacement de la pièce soit effectué par un Mainteneur Agréé. Ces pièces sont identifiées par la mention "Non" dans le Catalogue illustré.

Les pièces CSR sont livrées le jour ouvré suivant, dans la limite des stocks disponibles et selon votre situation géographique. Si votre situation géographique le permet et que vous demandez une livraison le jour même ou dans les 4 heures, celle-ci vous sera facturée. Pour bénéficier d'une assistance téléphonique, appelez le Centre d'assistance technique HP. Dans les documents envoyés avec la pièce de rechange CSR, HP précise s'il est nécessaire de lui retourner la pièce défectueuse. Si c'est le cas, vous devez le faire dans le délai indiqué, généralement cinq (5) jours ouvrés. La pièce et sa documentation doivent être retournées dans l'emballage fourni. Si vous ne retournez pas la pièce défectueuse, HP se réserve le droit de vous facturer les coûts de remplacement. Dans le cas d'une pièce CSR, HP supporte l'ensemble des frais d'expédition et de retour, et détermine la société de courses ou le transporteur à utiliser.

Pour plus d'informations sur le programme CSR de HP, contactez votre Mainteneur Agrée local. Pour plus d'informations sur ce programme en Amérique du Nord, consultez le site Web HP (http://www.hp.com/go/selfrepair).

Riparazione da parte del cliente

Per abbreviare i tempi di riparazione e garantire una maggiore flessibilità nella sostituzione di parti difettose, i prodotti HP sono realizzati con numerosi componenti che possono essere riparati direttamente dal cliente (CSR, Customer Self Repair). Se in fase di diagnostica HP (o un centro di servizi o di assistenza HP) identifica il guasto come riparabile mediante un ricambio CSR, HP lo spedirà direttamente al cliente per la sostituzione. Vi sono due categorie di parti CSR:

Obbligatorie – Parti che devono essere necessariamente riparate dal cliente. Se il cliente ne affida la riparazione ad HP, deve sostenere le spese di spedizione e di manodopera per il servizio.

Opzionali – Parti la cui riparazione da parte del cliente è facoltativa. Si tratta comunque di componenti progettati per questo scopo. Se tuttavia il cliente ne richiede la sostituzione ad HP, potrebbe dover sostenere spese addizionali a seconda del tipo di garanzia previsto per il prodotto.

NOTA: alcuni componenti HP non sono progettati per la riparazione da parte del cliente. Per rispettare la garanzia, HP richiede che queste parti siano sostituite da un centro di assistenza autorizzato. Tali parti sono identificate da un "No" nel Catalogo illustrato dei componenti.

In base alla disponibilità e alla località geografica, le parti CSR vengono spedite con consegna entro il giorno lavorativo seguente. La consegna nel giorno stesso o entro quattro ore è offerta con un supplemento di costo solo in alcune zone. In caso di necessità si può richiedere l'assistenza telefonica di un addetto del centro di supporto tecnico HP. Nel materiale fornito con una parte di ricambio CSR, HP specifica se il cliente deve restituire dei componenti. Qualora sia richiesta la resa ad HP del componente difettoso, lo si deve spedire ad HP entro un determinato periodo di tempo, generalmente cinque (5) giorni lavorativi. Il componente difettoso deve essere restituito con la documentazione associata nell'imballo di spedizione fornito. La mancata restituzione del componente può comportare la fatturazione del ricambio da parte di HP. Nel caso di riparazione da parte del cliente, HP sostiene tutte le spese di spedizione e resa e sceglie il corriere/vettore da utilizzare.

Per ulteriori informazioni sul programma CSR di HP contattare il centro di assistenza di zona. Per il programma in Nord America fare riferimento al sito Web HP (http://www.hp.com/go/selfrepair).

Customer Self Repair

HP Produkte enthalten viele CSR-Teile (Customer Self Repair), um Reparaturzeiten zu minimieren und höhere Flexibilität beim Austausch defekter Bauteile zu ermöglichen. Wenn HP (oder ein HP Servicepartner) bei der Diagnose feststellt, dass das Produkt mithilfe eines CSR-Teils repariert werden kann, sendet Ihnen HP dieses Bauteil zum Austausch direkt zu. CSR-Teile werden in zwei Kategorien unterteilt:

Zwingend – Teile, für die das Customer Self Repair-Verfahren zwingend vorgegeben ist. Wenn Sie den Austausch dieser Teile von HP vornehmen lassen, werden Ihnen die Anfahrt- und Arbeitskosten für diesen Service berechnet.

Optional – Teile, für die das Customer Self Repair-Verfahren optional ist. Diese Teile sind auch für Customer Self Repair ausgelegt. Wenn Sie jedoch den Austausch dieser Teile von HP vornehmen lassen möchten, können bei diesem Service je nach den für Ihr Produkt vorgesehenen Garantiebedingungen zusätzliche Kosten anfallen.

HINWEIS: Einige Teile sind nicht für Customer Self Repair ausgelegt. Um den Garantieanspruch des Kunden zu erfüllen, muss das Teil von einem HP Servicepartner ersetzt werden. Im illustrierten Teilekatalog sind diese Teile mit „No“ bzw. „Nein“ gekennzeichnet.

CSR-Teile werden abhängig von der Verfügbarkeit und vom Lieferziel am folgenden Geschäftstag geliefert. Für bestimmte Standorte ist eine Lieferung am selben Tag oder innerhalb von vier Stunden gegen einen Aufpreis verfügbar. Wenn Sie Hilfe benötigen, können Sie das HP technische Support Center anrufen und sich von einem Mitarbeiter per Telefon helfen lassen. Den Materialien, die mit einem CSR-Ersatzteil geliefert werden, können Sie entnehmen, ob das defekte Teil an HP zurückgeschickt werden muss. Wenn es erforderlich ist, das defekte Teil an HP zurückzuschicken, müssen Sie dies innerhalb eines vorgegebenen Zeitraums tun, in der Regel innerhalb von fünf (5) Geschäftstagen. Das defekte Teil muss mit der zugehörigen Dokumentation in der Verpackung zurückgeschickt werden, die im Lieferumfang enthalten ist. Wenn Sie das defekte Teil nicht zurückschicken, kann HP Ihnen das Ersatzteil in Rechnung stellen. Im Falle von Customer Self Repair kommt HP für alle Kosten für die Lieferung und Rücksendung auf und bestimmt den Kurier-/Frachtdienst.

Weitere Informationen über das HP Customer Self Repair Programm erhalten Sie von Ihrem Servicepartner vor Ort. Informationen über das CSR-Programm in Nordamerika finden Sie auf der HP Website unter (http://www.hp.com/go/selfrepair).

Reparaciones del propio cliente

Los productos de HP incluyen muchos componentes que el propio usuario puede reemplazar (*Customer Self Repair*, CSR) para minimizar el tiempo de reparación y ofrecer una mayor flexibilidad a la hora de realizar sustituciones de componentes defectuosos. Si, durante la fase de diagnóstico, HP (o los proveedores o socios de servicio de HP) identifica que una reparación puede llevarse a cabo mediante el uso de un componente CSR, HP le enviará dicho componente directamente para que realice su sustitución. Los componentes CSR se clasifican en dos categorías:

- **Obligatorio:** componentes para los que la reparación por parte del usuario es obligatoria. Si solicita a HP que realice la sustitución de estos componentes, tendrá que hacerse cargo de los gastos de desplazamiento y de mano de obra de dicho servicio.
- **Opcional:** componentes para los que la reparación por parte del usuario es opcional. Estos componentes también están diseñados para que puedan ser reparados por el usuario. Sin embargo, si precisa que HP realice su sustitución, puede o no conllevar costes adicionales, dependiendo del tipo de servicio de garantía correspondiente al producto.

NOTA: Algunos componentes no están diseñados para que puedan ser reparados por el usuario. Para que el usuario haga valer su garantía, HP pone como condición que un proveedor de servicios autorizado realice la sustitución de estos componentes. Dichos componentes se identifican con la palabra "No" en el catálogo ilustrado de componentes.

Según la disponibilidad y la situación geográfica, los componentes CSR se enviarán para que lleguen a su destino al siguiente día laborable. Si la situación geográfica lo permite, se puede solicitar la entrega en el mismo día o en cuatro horas con un coste adicional. Si precisa asistencia técnica, puede llamar al Centro de asistencia técnica de HP y recibirá ayuda telefónica por parte de un técnico. Con el envío de materiales para la sustitución de componentes CSR, HP especificará si los componentes defectuosos deberán devolverse a HP. En aquellos casos en los que sea necesario devolver algún componente a HP, deberá hacerlo en el periodo de tiempo especificado, normalmente cinco días laborables. Los componentes defectuosos deberán devolverse con toda la documentación relacionada y con el embalaje de envío. Si no enviara el componente defectuoso requerido, HP podrá cobrarle por el de sustitución. En el caso de todas

sustituciones que lleve a cabo el cliente, HP se hará cargo de todos los gastos de envío y devolución de componentes y escogerá la empresa de transporte que se utilice para dicho servicio.

Para obtener más información acerca del programa de Reparaciones del propio cliente de HP, póngase en contacto con su proveedor de servicios local. Si está interesado en el programa para Norteamérica, visite la página web de HP siguiente (http://www.hp.com/go/selfrepair).

Customer Self Repair

Veel onderdelen in HP producten zijn door de klant zelf te repareren, waardoor de reparatieduur tot een minimum beperkt kan blijven en de flexibiliteit in het vervangen van defecte onderdelen groter is. Deze onderdelen worden CSR-onderdelen (Customer Self Repair) genoemd. Als HP (of een HP Service Partner) bij de diagnose vaststelt dat de reparatie kan worden uitgevoerd met een CSR-onderdeel, verzendt HP dat onderdeel rechtstreeks naar u, zodat u het defecte onderdeel daarmee kunt vervangen. Er zijn twee categorieën CSR-onderdelen:

Verplicht: Onderdelen waarvoor reparatie door de klant verplicht is. Als u HP verzoekt deze onderdelen voor u te vervangen, worden u voor deze service reiskosten en arbeidsloon in rekening gebracht.

Optioneel: Onderdelen waarvoor reparatie door de klant optioneel is. Ook deze onderdelen zijn ontworpen voor reparatie door de klant. Als u echter HP verzoekt deze onderdelen voor u te vervangen, kunnen daarvoor extra kosten in rekening worden gebracht, afhankelijk van het type garantieservice voor het product.

OPMERKING: Sommige HP onderdelen zijn niet ontwikkeld voor reparatie door de klant. In verband met de garantievoorwaarden moet het onderdeel door een geautoriseerde Service Partner worden vervangen. Deze onderdelen worden in de geïllustreerde onderdelencatalogus aangemerkt met "Nee".

Afhankelijk van de leverbaarheid en de locatie worden CSR-onderdelen verzonden voor levering op de eerstvolgende werkdag. Levering op dezelfde dag of binnen vier uur kan tegen meerkosten worden aangeboden, indien dit mogelijk is gezien de locatie. Indien assistentie gewenst is, belt u een HP Service Partner om via de telefoon technische ondersteuning te ontvangen. HP vermeldt in de documentatie bij het vervangende CSR-onderdeel of het defecte onderdeel aan HP moet worden geretourneerd. Als het defecte onderdeel aan HP moet worden teruggezonden, moet u het defecte onderdeel binnen een bepaalde periode, gewoonlijk vijf (5) werkdagen, retourneren aan HP. Het defecte onderdeel moet met de bijbehorende documentatie worden geretourneerd in het meegeleverde verpakkingsmateriaal. Als u het defecte onderdeel niet terugzendt, kan HP u voor het vervangende onderdeel kosten in rekening brengen. Bij reparatie door de klant betaalt HP alle verzendkosten voor het vervangende en geretourneerde onderdeel en kiest HP zelf welke koerier/transportonderneming hiervoor wordt gebruikt.

Neem contact op met een Service Partner voor meer informatie over het Customer Self Repair programma van HP. Informatie over Service Partners vindt u op de HP website (http://www.hp.com/go/selfrepair).

Reparo feito pelo cliente

Os produtos da HP são projetados com muitas peças para reparo feito pelo cliente (CSR) de modo a minimizar o tempo de reparo e permitir maior flexibilidade na substituição de peças com defeito. Se, durante o período de diagnóstico, a HP (ou fornecedores/parceiros de serviço da HP) concluir que o reparo pode ser efetuado pelo uso de uma peça CSR, a peça de reposição será enviada diretamente ao cliente. Existem duas categorias de peças CSR:

Obrigatória – Peças cujo reparo feito pelo cliente é obrigatório. Se desejar que a HP substitua essas peças, serão cobradas as despesas de transporte e mão-de-obra do serviço.

Opcional – Peças cujo reparo feito pelo cliente é opcional. Essas peças também são projetadas para o reparo feito pelo cliente. No entanto, se desejar que a HP as substitua, pode haver ou não a cobrança de taxa adicional, dependendo do tipo de serviço de garantia destinado ao produto.

OBSERVAÇÃO: Algumas peças da HP não são projetadas para o reparo feito pelo cliente. A fim de cumprir a garantia do cliente, a HP exige que um técnico autorizado substitua a peça. Essas peças estão identificadas com a marca "No" (Não), no catálogo de peças ilustrado.

Conforme a disponibilidade e o local geográfico, as peças CSR serão enviadas no primeiro dia útil após o pedido. Onde as condições geográficas permitirem, a entrega no mesmo dia ou em quatro horas pode ser feita mediante uma taxa adicional. Se precisar de auxílio, entre em contato com o Centro de suporte técnico da HP para que um técnico o ajude por telefone. A HP especifica nos materiais fornecidos com a peça CSR de reposição se a peça com defeito deve ser devolvida à HP. Nos casos em que isso for necessário, é preciso enviar a peça com defeito à HP dentro do período determinado, normalmente cinco (5) dias úteis. A peça com defeito deve ser enviada com a documentação correspondente no material de transporte fornecido. Caso não o faça, a HP poderá cobrar a reposição. Para as peças de reparo feito pelo cliente, a HP paga todas as despesas de transporte e de devolução da peça e determina a transportadora/serviço postal a ser utilizado.

Para obter mais informações sobre o programa de reparo feito pelo cliente da HP, entre em contato com o fornecedor de serviços local. Para o programa norte-americano, visite o site da HP (http://www.hp.com/go/selfrepair).

カスタマーセルフリペア

修理時間を短縮し、故障部品の交換における高い柔軟性を確保するために、HP製品には多数のCSR部品があります。診断の際に、CSR部品を使用すれば修理ができるとHP（HPまたはHP正規保守代理店）が判断した場合、HPはその部品を直接、お客様に発送し、お客様に交換していただきます。CSR部品には以下の2通りがあります。

- **必須 -** カスタマーセルフリペアが必須の部品。当該部品について、もしもお客様がHPに交換作業を依頼される場合には、その修理サービスに関する交通費および人件費がお客様に請求されます。
- **任意 -** カスタマーセルフリペアが任意である部品。この部品もカスタマーセルフリペア用です。当該部品について、もしもお客様がHPに交換作業を依頼される場合には、お買い上げの製品に適用される保証サービス内容の範囲内においては、別途費用を負担していただくことなく保証サービスを受けることができます。

注： HP製品の一部の部品は、カスタマーセルフリペア用ではありません。製品の保証を継続するためには、HPまたはHP正規保守代理店による交換作業が必須となります。部品カタログには、当該部品がカスタマーセルフリペア除外品である旨が記載されています。

部品供給が可能な場合、地域によっては、CSR部品を翌営業日に届くように発送します。また、地域によっては、追加費用を負担いただくことにより同日または4時間以内に届くように発送することも可能な場合があります。サポートが必要なときは、HPの修理受付窓口に電話していただければ、技術者が電話でアドバイスします。交換用のCSR部品または同梱物には、故障部品をHPに返送する必要があるかどうかが表示されています。故障部品をHPに返送する必要がある場合は、指定期限内（通常は5営業日以内）に故障部品をHPに返送してください。故障部品を返送する場合は、届いた時の梱包箱に関連書類とともに入れてください。故障部品を返送しない場合、HPから部品費用が請求されます。カスタマーセルフリペアの際には、HPは送料および部品返送費を全額負担し、使用する宅配便会社や運送会社を指定します。

客户自行维修

HP 产品提供许多客户自行维修 (CSR) 部件，以尽可能缩短维修时间和在更换缺陷部件方面提供更大的灵活性。如果在诊断期间 HP（或 HP 服务提供商或服务合作伙伴）确定可以通过使用 CSR 部件完成维修，HP 将直接把该部件发送给您进行更换。有两类 CSR 部件：

- **强制性的** — 要求客户必须自行维修的部件。如果您请求 HP 更换这些部件，则必须为该服务支付差旅费和人工费用。
- **可选的** — 客户可以选择是否自行维修的部件。这些部件也是为客户自行维修设计的。不过，如果您要求 HP 为您更换这些部件，则根据为您的产品指定的保修服务类型，HP 可能收取或不再收取任何附加费用。

注：某些 HP 部件的设计并未考虑客户自行维修。为了满足客户保修的需要，HP 要求授权服务提供商更换相关部件。这些部件在部件图解目录中标记为“否”。

CSR 部件将在下一个工作日发运（取决于备货情况和允许的地理范围）。在允许的地理范围内，可在当天或四小时内发运，但要收取额外费用。如果需要帮助，您可以致电 HP 技术支持中心，将会有技术人员通过电话为您提供帮助。HP 会在随更换的 CSR 部件发运的材料中指明是否必须将有缺陷的部件返还给 HP。如果要求您将有缺陷的部件返还给 HP，那么您必须在规定期限内（通常是五 (5) 个工作日）将缺陷部件发给 HP。有缺陷的部件必须随所提供的发运材料中的相关文件一起返还。如果未能送还有缺陷的部件，HP 可能会要求您支付更换费用。客户自行维修时，HP 将承担所有相关运输和部件返回费用，并指定快递商/承运商。

有关 HP 客户自行维修计划的详细信息，请与您当地的服务提供商联系。有关北美地区的计划，请访问 HP 网站 (http://www.hp.com/go/selfrepair)。

客戶自行維修

HP 產品設計了許多「客戶自行維修」(CSR) 的零件以減少維修時間，並且使得更換瑕疵零件時能有更大的彈性。如果在診斷期間 HP（或 HP 服務供應商或維修夥伴）辨認出此項維修工作可以藉由使用 CSR 零件來完成，則 HP 將直接寄送該零件給您作更換。CSR 零件分為兩種類別：

- **強制的** — 客戶自行維修所使用的零件是強制性的。如果您要求 HP 更換這些零件，HP 將會向您收取此服務所需的外出費用與勞動成本。
- **選購的** — 客戶自行維修所使用的零件是選購的。這些零件也設計用於客戶自行維修之用。不過，如果您要求 HP 為您更換，則可能需要也可能不需要負擔額外的費用，端視針對此產品指定的保固服務類型而定。

備註：某些 HP 零件沒有消費者可自行維修的設計。為符合客戶保固，HP 需要授權的服務供應商更換零件。這些零件在圖示的零件目錄中，被標示為「否」。

基於材料取得及環境允許的情況下，CSR 零件將於下一個工作日以快遞寄送。在環境的允許下當天或四小時內送達，則可能需要額外的費用。若您需要協助，可致電「HP 技術支援中心」，會有一位技術人員透過電話來協助您。不論損壞的零件是否必須退回，HP 皆會在與 CSR 替換零件一起運送的材料中註明。若要將損壞的零件退回 HP，您必須在指定的一段時間內（通常為五 (5) 個工作天），將損壞的零件寄回 HP。損壞的零件必須與寄送資料中隨附的相關技術文件一併退還。如果無法退還損壞的零件，HP 可能要向您收取替換費用。針對客戶自行維修情形，HP 將負責所有運費及零件退還費用並指定使用何家快遞/貨運公司。

如需 HP 的「客戶自行維修」方案詳細資訊，請連絡您當地的服務供應商。至於北美方案，請參閱 HP 網站 (http://www.hp.com/go/selfrepair)。

고객 셀프 수리

HP 제품은 수리 시간을 최소화하고 결함이 있는 부품 교체 시 더욱 융통성을 발휘할 수 있도록 하기 위해 고객 셀프 수리(CSR) 부품을 다량 사용하여 설계되었습니다. 진단 기간 동안 HP(또는 HP 서비스 공급업체 또는 서비스 협력업체)에서 CSR 부품을 사용하여 수리가 가능하다고 판단되면 HP는 해당 부품을 바로 사용자에게 보내어 사용자가 교체할 수 있도록 합니다. CSR 부품에는 두 가지 종류가 있습니다.

- **고객 셀프 수리가 의무 사항인 필수 부품.** 사용자가 HP에 이 부품의 교체를 요청할 경우 이 서비스에 대한 출장비 및 작업비가 청구됩니다.
- **고객 셀프 수리가 선택 사항인 부품.** 이 부품들도 고객 셀프 수리가 가능하도록 설계되었습니다. 하지만 사용자가 HP에 이 부품의 교체를 요청할 경우 사용자가 구입한 제품에 해당하는 보증 서비스 유형에 따라 추가 비용 없이 교체가 가능할 수 있습니다.

참고: 일부 HP 부품은 고객 셀프 수리가 불가능하도록 설계되었습니다. HP는 만족스러운 고객 보증을 위해 공인 서비스 제공업체를 통해 부품을 교체하도록 하고 있습니다. 이러한 부품들은 Illustrated Parts Catalog에 "No"라고 표시되어 있습니다.

CSR 부품은 재고 상태와 지리적 조건이 허용하는 경우 다음 영업일 납품이 가능하도록 배송이 이루어집니다. 지리적 조건이 허용하는 경우 추가 비용이 청구되는 조건으로 당일 또는 4시간 배송이 가능할 수도 있습니다. 도움이 필요하시면 HP 기술 지원 센터로 전화하십시오. 전문 기술자가 전화로 도움을 줄 것입니다. HP는 결함이 발생한 부품을 HP로 반환해야 하는지 여부를 CSR 교체 부품과 함께 배송된 자료에 지정합니다. 결함이 발생한 부품을 HP로 반환해야 하는 경우에는 지정된 기간 내(통상 영업일 기준 5일)에 HP로 반환해야 합니다. 이 때 결함이 발생한 부품은 제공된 포장 재료에 넣어 관련 설명서와 함께 반환해야 합니다. 결함이 발생한 부품을 반환하지 않는 경우 HP가 교체 부품에 대해 비용을 청구할 수 있습니다. 고객 셀프 수리의 경우, HP는 모든 운송 및 부품 반환 비용을 부담하며 이용할 운송업체 및 택배 서비스를 결정합니다.

HP 고객 셀프 수리 프로그램에 대한 자세한 내용은 가까운 서비스 제공업체에 문의하십시오. 북미 지역의 프로그램에 대해서는 HP 웹 사이트(http://www.hp.com/go/selfrepair)를 참조하십시오.

Acronyms and abbreviations

ABEND

abnormal end

ACU

Array Configuration Utility

AMP

Advanced Memory Protection

ASR

Automatic Server Recovery

CSA

Canadian Standards Association

CSR

Customer Self Repair

DDR

double data rate

FBWC

flash-backed write cache

IEC

International Electrotechnical Commission

iLO

Integrated Lights-Out

IML

Integrated Management Log

LFF

large form factor

NMI

nonmaskable interrupt

NVRAM

nonvolatile memory

ORCA

Option ROM Configuration for Arrays

PATA

parallel ATA

PCIe

peripheral component interconnect express

POST

Power-On Self Test

RBSU

ROM-Based Setup Utility

RDIMM

registered dual in-line memory module

RDP

Rapid Deployment Pack

SAS

serial attached SCSI

SFF

small form factor

SIM

Systems Insight Manager

TMRA

recommended ambient operating temperature

UDIMM

unregistered dual in-line memory module

UID

unit identification

USB

universal serial bus

VCA

Version Control Agent

Documentation feedback

HP is committed to providing documentation that meets your needs. To help us improve the documentation, send any errors, suggestions, or comments to Documentation Feedback (mailto:docsfeedback@hp.com). Include the document title and part number, version number, or the URL when submitting your feedback.

Index

A

access panel 25, 26
Active Health System 112, 113
ACU (Array Configuration Utility) 112, 120
Advanced ECC memory 58, 119
air baffle 28, 29, 30
airflow requirements 40
AMP (Advanced Memory Protection) 119
AMP modes 119
Array Configuration Utility (ACU) 120
ASR (Automatic Server Recovery) 121
authorized reseller 133
auto-configuration process 118
Automatic Server Recovery (ASR) 121

B

Basic Input/Output System (BIOS) 112, 121
bezel 24, 25
BIOS (Basic Input/Output System) 112, 121
BIOS upgrade 112, 121
boot options 119
BSMI notice 127
buttons 7

C

cables 93, 106
cabling 106, 107, 108, 109, 110, 111
cache module 75
cache module installation 75
Canadian notice 127
Care Pack 39
cautions 41
Change Control 123
change control and proactive notification 123
components 7, 14
configuration of system 112
configuring AMP modes 119
connectors 7
contacting HP 133
controller options 14

D

Declaration of Conformity 127
default settings 58
device numbers 15
diagnosing problems 124
diagnostic tools 112, 115, 121
diagnostics utility 115
DIMM identification 56
DIMM installation guidelines 59
DIMM population guidelines 57, 59
DIMM slots 14
DIMMs 55
downloading files 133
drive cage, installing 36, 81, 82
drive LEDs 19
drivers 122
drives, installing 47, 60, 66
DVD-ROM drive 35, 111

E

Eight-bay SFF drive cage 78
electrical grounding requirements 41
electrostatic discharge 128
environmental requirements 39
Erase Utility 112, 115
error messages 124
European Union notice 127
expansion boards 37, 77
extending server from rack 27

F

fan cage 31
fans 20, 33
fans, removing 33
FBWC cabling 106
FBWC module 33, 73
features 7, 120
Federal Communications Commission (FCC) notice 127
firmware update 116, 123
firmware upgrade utility, troubleshooting 124
firmware, updating 116, 123

firmware, upgrading 123

G

grounding methods 128
grounding requirements 41

H

hard drive LEDs 19
hard drives, determining status of 19
hardware options 47
hardware options installation 43, 47
health driver 121
help resources 133
HP contact information 133
HP iLO 7, 112
HP iLO Management Engine 112
HP Insight Diagnostics 115
HP Insight Diagnostics survey functionality 115
HP Insight Remote Support software 116
HP Service Pack for ProLiant 112, 116
HP Smart Update Manager overview 112, 117
HP technical support 133
HP website 133

I

identifying components 7
iLO (Integrated Lights-Out) 112, 113, 114
IML (Integrated Management Log) 112, 114
Insight Diagnostics 115, 122
installation services 39
installing operating system 45
Integrated Lights-Out (iLO) 112
Integrated Management Log (IML) 114
Intelligent Provisioning 112, 114
internal cables 106

J

Japanese notice 127

L

LEDs, FBWC module 17, 18
LEDs, hard drive 16, 19
lockstep memory 58, 59

M

maintenance guidelines 122
memory 54, 56, 58
memory configurations 57, 58
memory, Advanced ECC 58, 119
memory, configuration requirements 59
memory, configuring 58
memory, lockstep 58, 59
memory, online spare 58, 119

N

NMI header 13

O

online spare memory 58, 119
operating system version support 123
operating systems 45, 123
operating systems supported 123
optical drive cage 64
optimum environment 39
Option ROM Configuration for Arrays (ORCA) 112, 121
options installation 43, 47
ORCA (Option ROM Configuration for Arrays) 112, 121

P

passwords 105
phone numbers 133
power cabling 109, 110
power calculator 132
power distribution unit (PDU) 41
power requirements 41, 132
power supplies 92
power supply specifications 129
powering down 22
powering up 22
preparation procedures 22
pro-active notification 123
problem diagnosis 124
processors 47
Product ID 119

Q

QuickSpecs 112

R

rack installation 39, 41, 44
rack resources 39
RBSU (ROM-Based Setup Utility) 112, 117, 118, 119

RBSU configuration 118
rear panel components 9
rear panel LEDs 10
recovery key 105
redundant power supply 85, 87
redundant power supply cable connector 20
redundant ROM 122
registering the server 46
regulatory compliance notices 127
required information 133
ROM redundancy 122
ROM-Based Setup Utility (RBSU) 105, 117
ROMPaq utility 112, 121, 122

S

safety considerations 122, 127
safety information 122, 127
SAS drive numbers 15, 60, 61
scripted installation 116
scripting toolkit 112, 116
serial number 119
server features and options 47
Server mode 112
server specifications 129
server warnings and cautions 42
setup 39
shipping carton contents 43
site requirements 40
Smart Update Manager 112, 117
software 123
software upgrades 123
space requirements 40
specifications, server 129
static electricity 128
storage controller 70
supported operating systems 123
system board components 11
system components 7
system configuration settings 122
System Erase Utility 115
system maintenance switch 12
system power LED 13
system, keeping current 122

T

Taiwan battery recycling notice 127
technical support 133
telephone numbers 133
temperature requirements 40
Torx screwdriver 21
tower bezel, installing 23
tower bezel, removing 22
tower server, setting up 43
TPM (Trusted Platform Module) 102, 103, 105
troubleshooting 124
troubleshooting resources 124
troubleshooting, firmware upgrade utility 124
Trusted Platform Module (TPM) 102, 105

U

updating the system ROM 122
UPS (uninterruptible power supply) 41
USB support 121
utilities 112, 120
utilities, deployment 112, 116, 117

V

ventilation 39
Version Control 123
Version Control Agent (VCA) 123
Version Control Repository Manager (VCRM) 123

W

warnings 41, 42
website, HP 133