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Installation and User Guide

ThinkThinkThinkServerThink

ThinkServer TD200
Machine Types: 3724, 3808, 3809, 3815, 3817, 3824, 3826, and 3836

ThinkServer TD200 Types 3724, 3808, 3809, 3815, 3817, 3824, 3826, 3836

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Installation and User Guide

Note:

Note: Before using this information and the product it supports, read the general information in Appendix B, “Notices,” on page 191 and the *Warranty and Support Information* document on *ThinkServer Documentation* DVD.

First Edition (June 2009)

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 Safety Information (安全信息)。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας (safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

Important:

All caution and danger statements in this documentation begin with a number. This number is used to cross reference an English caution or danger statement with translated versions of the caution or danger statement in the *Safety Information* book.

For example, if a caution statement begins with a number 1, translations for that caution statement appear in the *Safety Information* document under statement 1.

Be sure to read all caution and danger statements in this documentation before performing the instructions. Read any additional safety information that comes with the blade server or optional device before you install the device.

Statement 1:

DANGER

Electrical current from power, telephone, and communication cables is hazardous.

To avoid a shock hazard:

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached to this product.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

To Connect:	**To Disconnect:**
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

Statement 2:

CAUTION:
When replacing the lithium battery, use only a battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

Dispose of the battery as required by local ordinances or regulations.

Statement 3:

CAUTION:
When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
- **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

DANGER

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

Statement 4:

≥ 18 kg (39.7 lb)

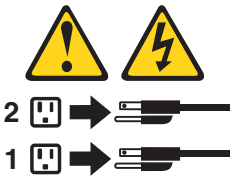
≥ 32 kg (70.5 lb)

≥ 55 kg (121.2 lb)

CAUTION:
Use safe practices when lifting.

Statement 5:

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



Statement 8:

CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.

Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Statement 11:

CAUTION:
The following label indicates sharp edges, corners, or joints nearby.

Statement 12:

CAUTION:
The following label indicates a hot surface nearby.

Statement 13:

DANGER

Overloading a branch circuit is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards, ensure that your system electrical requirements do not exceed branch circuit protection requirements. Refer to the information that is provided with your device for electrical specifications.

Statement 15:

CAUTION:
Make sure that the rack is secured properly to avoid tipping when the server unit is extended.

Statement 17:

CAUTION:
The following label indicates moving parts nearby.

Statement 26:

CAUTION:
Do not place any object on top of rack-mounted devices.

This server is suitable for use on an IT power-distribution system whose maximum phase-to-phase voltage is 240 V under any distribution fault condition.

Important: This product is not suitable for use with visual display workplace devices according to Clause 2 of the German Ordinance for Work with Visual Display Units.

Chapter 1. Introduction

This *Installation and User Guide* contains information and instructions for setting up your ThinkServer TD200 Types 3724, 3808, 3809, 3815, 3817, 3824, 3826, 3836 server, instructions for installing optional devices, and instructions for cabling and configuring the server. For removing and installing optional devices, diagnostics and troubleshooting information, see the *Hardware Maintenance Manual*.

The ThinkServer TD200 Types 3724, 3808, 3809, 3815, 3817, 3824, 3826, 3836 is a 5-U-high, high-performance server. This server is ideally suited for networking environments that require superior microprocessor performance, input/output (I/O) flexibility, and manageability.

Performance, ease of use, reliability, and expansion capabilities were key considerations in the design of the server. These design features make it possible for you to customize the system hardware to meet your needs today and provide flexible expansion capabilities for the future.

The server comes with a limited warranty. For information about the terms of the warranty and getting service and assistance, see the *Warranty and Support Information* document.

Some server models support four 3.5-inch simple-swap SATA hard disk drives, or four 3.5-inch hot-swap SAS or SATA hard disk drives, or eight 2.5-inch hot-swap SAS or SATA hard disk drives. The illustrations in this document might differ slightly from your model.

If firmware and documentation updates are available, you can download them from http://www.lenovo.com. The server might have features that are not described in the documentation that comes with the server, and the documentation might be updated occasionally to include information about those features, or technical updates might be available to provide additional information that is not included in the server documentation. To check for updates, do the following:

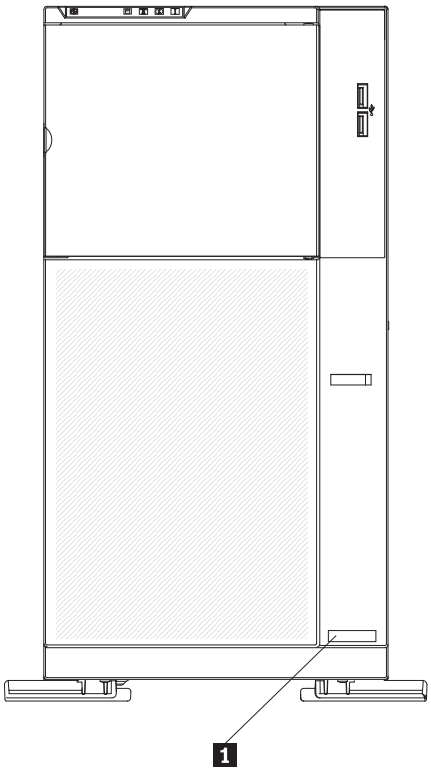
Note: Changes are made periodically to the Lenovo Web site. Procedures for locating firmware and documentation might vary slightly from what is described in this document.

1. Go to: http://www.lenovo.com/support.
2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
3. From **Family** list, select **ThinkServer TD200**, and click **Continue**.
4. Click **Downloads and drivers** to download firmware updates.

Record information about the server in the following table.

Product name	ThinkServer TD200
Machine type	3724, 3808, 3809, 3815, 3817, 3824, 3826, 3836
Model number	_____
Serial number	_____

The model number and serial number are on the lower right side of the bezel. **1**



Note: The illustrations in this document might differ slightly from your hardware.

The server comes with the *ThinkServer EasyStartup* DVD to help you configure the hardware and install the operating system.

Important: The server keys cannot be duplicated by a locksmith. If you lose them, order replacement keys from the key manufacturer. The key serial number and the telephone number of the manufacturer are on a tag that is attached to the keys.

Notices and statements in this document

The caution and danger statements in this document are also in the multilingual *Safety Information* document, which is on the Lenovo *ThinkServer Documentation* DVD. Each statement is numbered for reference to the corresponding statement in your language in the *Safety Information* document.

The following notices and statements are used in this document:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate potential damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage might occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.

- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

Related documentation

The Lenovo *ThinkServer Documentation* DVD contains documentation for the server in Portable Document Format (PDF). The Lenovo *ThinkServer Documentation* DVD requires Adobe® Acrobat Reader 5.0 (or later) or xpdf, which comes with Linux® operating systems.

The following table describes the content and location of documentation that is provided with your server.

Document	Description	Location
Read Me First	This document directs you to the *ThinkServer Documentation* DVD for complete warranty and support information.	printed, provided in server packaging
Important Notices	This document includes safety and legal notices that you are expected to read before using the server.	printed, provided in server packaging
Hardware Maintenance Manual	This document provides diagnostic information, parts listing, and replacement procedures for all field replaceable units (parts replaced by trained service personnel) as well as all customer replaceable units (CRUs).	Lenovo Support Web site: http://www.lenovo.com/support
Warranty and Support Information	This document includes the warranty statement and information about how to contact Lenovo Support.	Available on the *ThinkServer Documentation* DVD.
Safety Information	This document includes translations of all of the safety statements used in the ThinkServer documentation.	Available on the *ThinkServer Documentation* DVD.

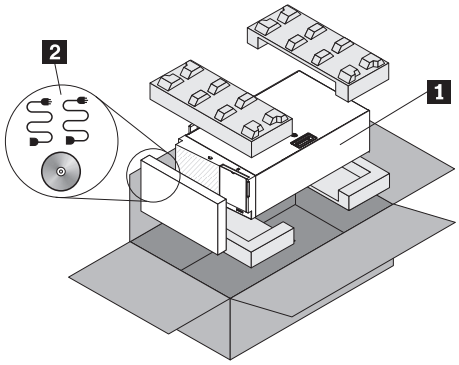
Chapter 2. Server setup roadmap

The installation process varies depending on the configuration of the server when it was delivered. In some cases, the server is fully configured and just needs to be installed in the rack, connected to power and the network, and started. In other cases, the server needs to have hardware features installed, requires hardware and firmware configuration, and required the operating system to be installed.

Task	Where to find information
Unpack	Chapter 3, “What is included with your server,” on page 7
Install hardware features	Chapter 5, “Installing optional devices and replacing customer replaceable units,” on page 37
Connect Ethernet cable and power cords to network and power connectors	“Rear view” on page 26
Start to verify operation	“Turning on the server” on page 35
Review UEFI settings and customize as needed.	“Using the Setup Utility” on page 138
Configure RAID controllers and arrays	“Configuring RAID controllers” on page 142
Install operating system and basic drivers	“Using the *EasyStartup* DVD” on page 147
Install any additional drivers needed for added features	Refer to the instructions that came with the hardware option.
Configure Ethernet settings in operating system	See the operating-system help. This step is not required if the operating system was installed using the EasyStartup program.
Check for firmware and driver updates.	See the Lenovo Support Web site: 1. Go to: http://www.lenovo.com/support. 2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list. 3. From **Family** list, select **ThinkServer TD200**, and click **Continue**. 4. Click **Downloads and drivers** to download firmware updates.
Test IMM (requires the presence of the virtual media key option)	“Using the integrated management module” on page 155
Install integrated management applications	“Installing EasyManage software” on page 160
Install applications	Refer to the documentation that accompanies the applications that you want to install.

Chapter 3. What is included with your server

The TD200 server package includes the server, power cords, and the *ThinkServer Documentation* DVD.



1 Server
2 Shipgroup box containing power cords and the *ThinkServer Documentation* DVD

Features and technologies

The server uses the following features and technologies:

- **Integrated Management Module**

  The Integrated Management Module (IMM) combines service processor functions, video controller, and (when an optional virtual media key is installed) remote presence function in a single chip. The IMM provides advanced service-processor control, monitoring, and alerting function. If an environmental condition exceeds a threshold or if a system component fails, the IMM lights LEDs to help you diagnose the problem, records the error in the event log, and alerts you to the problem. Optionally, the IMM also provides a virtual presence capability for remote server management capabilities. The IMM provides remote server management through the following industry-standard interfaces:

  – Intelligent Platform Management Interface (IPMI) version 2.0
  – Simple Network Management Protocol (SNMP) version 3
  – Common Information Model (CIM)
  – Web browser

  For additional information, see “Using the integrated management module” on page 155.

- **UEFI-compliant server firmware**

  The UEFI-compliant server firmware offers several features, including Unified Extensible Firmware Interface (UEFI) version 2.1 compliance, enhanced reliability, availability, and serviceability (RAS) capabilities, and basic input/output system (BIOS) compatibility support. UEFI replaces the legacy BIOS. UEFI defines a standard interface between the operating system, platform firmware and external devices, and offers capabilities that far exceeds that of the legacy BIOS.

  The server design combines the UEFI capabilities and features with legacy BIOS compatibility. The server is capable of booting UEFI-compliant operating systems, BIOS-based operating systems, and BIOS-based adapters as well as UEFI-compliant adapters.

Note: The server does not support Disk Operating System (DOS).

- **Preboot diagnostics program**

  The preboot diagnostics programs are stored on the integrated USB memory. They collect and analyze system information to aid in diagnosing server problems. The diagnostics programs collect the following information about the server:

  – System configuration
  – Network interfaces and settings
  – Installed hardware
  – EasyLED status
  – Service processor status and configuration
  – Vital product data, firmware, and UEFI (formerly called BIOS) configuration
  – Hard disk drive health
  – RAID controller configuration
  – Event logs for RAID controllers and service processors

  The diagnostics programs create a merged log that includes events from all collected logs. The information is collected into a file that you can send to service and support. Additionally, you can view the information locally through a generated text report file. You can also copy the log to a removable media and view the log from a Web browser.

  For additional information about diagnostics, see the *Hardware Maintenance Manual*.

- **High-performance graphics controller**

  The server comes with an onboard high-performance graphics controller that supports high resolutions and includes many performance-enhancing features for the operating-system environment.

- **Integrated network support**

  The server comes with an integrated dual-port Broadcom Gigabit Ethernet controller, which supports connection to a 10 Mbps, 100 Mbps, or 1000 Mbps network. For more information, see “Enabling the Broadcom Gigabit Ethernet Utility program” on page 151.

- **Integrated Trusted Platform Module (TPM)**

  This integrated security chip performs cryptographic functions and stores private and public secure keys. It provides the hardware support for the Trusted Computing Group (TCG) specification. You can download the software to support the TCG specification, when the software is available. You can enable TPM support through the Setup Utility under the **System Security** menu option.

- **Large data-storage capacity and hot-swap capabilities**

  Some hot-swap server models support eight slim-high, 2.5-inch hot-swap hard disk drives or four 3.5-inch hot-swap hard disk drives (depending on the model). With the hot-swap feature, you can add, remove, or replace hard disk drives without turning off the server.

- **Large system-memory capacity**

  The server supports up to 48 GB (reduced to 24 GB in mirroring mode) of system memory. The memory controller supports error correcting code (ECC) for up to 12 industry-standard PC3-10600R-999 (single-rank or dual-rank), 800, 1067, and 1333 MHz, DDR3 (third-generation double-data-rate), registered, synchronous dynamic random access memory (SDRAM) dual inline memory modules (DIMMs).

- **Memory mirroring**

Some models support memory mirroring. Memory mirroring replicates and stores data on two pairs of DIMMs within two channels (channel 0 and 1) simultaneously. If a failure occurs, the memory controller switches from the primary pair of memory DIMMs to the backup pair of DIMMs. To support memory mirroring, you must install a pair of DIMMs at a time. One DIMM must be in channel 0, and the mirroring DIMM must be in the same slot in channel 1. For more information, see 91.

- **RAID support**

  The ServeRAID adapter provides hardware redundant array of independent disks (RAID) support to create configurations. The standard RAID adapter provides RAID levels 0, 1, and 1E. The optional RAID adapters are available for purchase and provide RAID levels 0, 1, 5, 6, 10, 50, and 60. See “Installing an adapter” on page 96 and “Using the LSI Configuration Utility program” on page 143 for more information about supported adapters and creating RAID arrays.

- **Symmetric multiprocessing (SMP)**

  The server supports up to two Intel Xeon microprocessors. Each microprocessor provides symmetric multiprocessing capability. When you install the second microprocessor, this will enhance the performance of the server.

- **Systems-management capabilities**

  The server comes with an integrated management module (IMM). When the IMM is used with the systems-management software that comes with the server, you can manage the functions of the server locally and remotely. The IMM also provides system monitoring, event recording, and network alert capability. The systems-management connector on the rear of the server is dedicated to the IMM. The dedicated systems-management connector provides additional security by physically separating the management network traffic from the production network. You can use the Setup Utility to configure the server to use a dedicated systems-management network or a shared network.

- **TCP/IP offload engine (TOE) support**

  The Ethernet controllers in the server support TOE, which is a technology that offloads the TCP/IP flow from the microprocessor and I/O subsystem to increase the speed of the TCP/IP flow. When an operating system that supports TOE is running on the server and TOE is enabled, the server supports TOE operation. See the operating-system documentation for information about enabling TOE. The Windows operating system requires that the Windows Scalable Network Pack (SNP) be installed for TOE support.

  Note: As of the date of this document, the Linux operating system does not support TOE.

Specifications

The following information is a summary of the features and specifications for machine types 3724, 3808, 3809, 3815, 3817, 3824, 3826, 3836. Depending on the server model, some features might not be available, or some specifications might not apply.

Table 1. Features and specifications

Microprocessor: • Supports up to two Intel® Pentium® dual-core or quad-core microprocessors (one installed) with integrated memory controller and QuickPath Interconnect (QPI) architecture. The second microprocessor comes with a pluggable VRM • Designed for LGA 1366 socket • Scalable up to four cores • 32 KB instruction cache, 32 KB data cache, and 8 MB cache that is shared among the cores • Support for Intel Extended Memory 64 Technology (EM64T) **Note:** • Use the Setup Utility to determine the type and speed of the microprocessors. • For a list of supported microprocessors, see http://www.lenovo.com/thinkserver. **Memory:** • Minimum: 2 GB • Maximum: 48 GB (24 GB in mirrored mode) • Types: PC3-10600R-900 (single-rank or dual-rank, 800, 1066, and 1333 MHz, ECC, DDR3 registered SDRAM DIMMs only) • Connectors: twelve dual inline memory module (DIMM) connectors, two-way interleaved • Supports 1 GB, 2 GB, 4 GB, and 8 GB (when available)	**Fans:** Three speed-controlled hot-swap fans **Power supply:** One 670 watt (100 - 240 V ac) **Size:** • Height: 440 mm (17.3 in.) • Depth: 767 mm (30.2 in.) • Width: 218 mm (8.6 in.) • Weight: 20 kg (42 lb) to 34 kg (75 lb) depending upon configuration	**RAID controllers:** • A ServeRAID-BR10i SAS/SATA adapter that provides RAID levels 0, 1, and 1E (comes standard on some hot-swap SAS and hot-swap SATA models). • An optional ServeRAID-MR10i SAS/SATA adapter that provides RAID levels 0, 1, 5, 6, 10, 50, and 60 can also be ordered. • An optional ServeRAID-MR10is SAS/SATA adapter that provides RAID levels 0, 1, 5, 6, 10, 50, and 60 can also be ordered.

Table 1. Features and specifications (continued)

Drives (depending on the model): • Optical drives: SATA • Hard disk drives: SAS and SATA **Drive bays (depending on the model):** • Three 5.25-in. bays (one half-high DVD-ROM drive installed). Optionally you can install one full-high or two half-high internal tape drives in bays 2 and 3. • One of the following: – Four 3.5-inch simple-swap SATA drives – Four 3.5-inch hot-swap SAS or SATA drives – Eight 2.5-inch hot-swap SAS or SATA drives	**Integrated functions:** • Integrated Management Module (IMM), which provides service processor control and monitoring functions, video controller, and (when the optional virtual media key is installed) remote keyboard, video, mouse, and remote hard disk drive capabilities • Broadcom BCM5709 Gb Ethernet controller with TCP/IP Offload Engine (TOE) and Wake on LAN® support • Onboard SATA controller (simple-swap models) • Seven Universal Serial Bus (USB) 2.0 ports (two front and four rear of the chassis), and one for the internal USB tape drive. • Two Ethernet ports • One System Management RJ-45 on the rear to connect to a systems-management network. This systems-management connector is dedicated to the IMM functions. This connector is active with or without the optional Virtual Media Key installed. • One serial port • Six SATA ports (four through the iPASS connector for simple-swap drives and two for the optical drives)	**Acoustical noise emissions:** • Sound power, idling: 5.5 bel • Sound power, operating: 6.0 bel **Environment:** • Air temperature: – Server on: 10° to 35°C (50° to 95°F) Altitude: 0 to 915 m (3000 ft) – Server on: 10° to 32°C (50° to 90°F) Altitude: 0 to 915 m (3000 ft) to 2134 m (7000 ft) – Server on: 10° to 28°C (50° to 83°F) Altitude: 2134 m (7000 ft) to 3050 m (10000 ft) – Server off: 5° to 45°C (41.0° to 113°F) – Shipping: -40° to 60°C (-40° to 140°F) • Humidity (operating and storage): – Server on: 20% to 80%, Maximum dew point 21°C, Maximum rate of change 5°C/hr. – Server off: 8% to 80%, Maximum dew point 27°C **Heat output:** Approximate heat output in British thermal units (Btu) per hour: • Minimum configuration: 693 Btu per hour (203 watts) • Maximum configuration: 2788 Btu per hour (817 watts)

Table 1. Features and specifications (continued)

Up to eight expansion slots (depending on the model): • Six expansion slots on the system board – Four PCI Express Gen2 x8 slots (two x8 links and two x4 link) – One PCI Express Gen2 x16 slot (x8 link) – One PCI 32-bit/33 MHz slot • One PCI Express Gen1 x8 (x4) slot on the one-slot extender card • Two PCI-X 32-bit/64-bit 133/100/66/ MHz slots on the two-slot extender card	**Video controller (integrated into IMM):** • Matrox G200eV video graphics controller integrated on the system board – Compatible with SVGA and VGA – 8 MB DDR2 SDRAM video memory controller **Note:** The maximum video resolution is 1600 x 1200 at 85 MHz **Diagnostic LEDs:** • Fan • Microprocessor • Memory • Power supply • Voltage regulator module (VRM) • PCI • Battery • IMM heartbeat • Enclosure manager heartbeat	**Electrical input:** • Sine-wave input (50 or 60 Hz) required • Input voltage and frequency ranges automatically selected • Input voltage low range: – Minimum: 100 V ac – Maximum: 127 V ac • Input voltage high range: – Minimum: 200 V ac – Maximum: 240 V ac • Input kilovolt-amperes (kVA) approximately: – Minimum: 0.21 kVA (all models) – Maximum: 0.82 kVA **Notes:** 1. Power consumption and heat output vary depending on the number and type of optional features installed and the power-management optional features in use. 2. These levels were measured in controlled acoustical environments according to the procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with ISO 9296. Actual sound-pressure levels in a given location might exceed the average values stated because of room reflections and other nearby noise sources. The declared sound-power levels indicate an upper limit, below which a large number of computers will operate.

Software

Lenovo provides software to help get your server up and running.

EasyStartup

The EasyStartup program simplifies the process of configuring your RAID controllers and installing supported Windows and Linux operating systems and device drivers on your server. The EasyStartup program is provided with your server on DVD. The DVD is self starting (bootable). The User Guide for the EasyStartup program is on the DVD and can be accessed directly from the program's interface. For additional information, see “Using the *EasyStartup* DVD” on page 147.

EasyManage

The ThinkServer EasyManage Core server provides centralized hardware and software inventory management and secure automated systems management through a centralized console. The ThinkServer EasyManage Agent enables other clients on the network to be managed by the centralized console. The ThinkServer EasyManage Core Server is supported on 32-bit Windows Server 2003 and 32-bit Windows Server 2008 products. The ThinkServer EasyManage Agent is supported on 32-bit and 64-bit Windows, Red Hat, and SUSE operating systems.

Reliability, availability, and serviceability

Three important server design features are reliability, availability, and serviceability (RAS). The RAS features help to ensure the integrity of the data that is stored in the server, the availability of the server when you need it, and the ease with which you can diagnose and repair problems.

The server might have the following RAS features (the features vary depending on your model):

- Advanced Configuration and Power Interface (ACPI)
- Advanced Desktop Management Interface (DMI) features
- Automatic error retry or recovery
- Automatic memory downsizing on error detection
- Automatic restart on nonmaskable interrupt (NMI)
- Automatic Server Restart (ASR) logic supporting a system restart when the operating system becomes unresponsive
- Automatic server restart after a power failure, based on the UEFI setting
- Availability of microcode level
- Boot-block recovery
- Built-in, menu-driven setup, system configuration, and redundant array of independent disks (RAID) configuration
- Built-in monitoring for fan, power, temperature, and voltage
- Cooling fans with speed-sensing capability
- Customer support center that is available 24 hours a day, 7 days a week

  Note: Service availability will vary by country. Response time varies; may exclude holidays.
- Diagnostic support of ServeRAID™ adapters
- Error codes and messages
- Error correcting code (ECC) double-data-rate 3 (DDR3) synchronous dynamic random-access memory (SDRAM) with serial presence detect (SPD)
- Error logging of POST failures
- Hot-swap Serial Attached SCSI (SAS) and hot-swap Serial ATA (SATA) hard disk drives
- Integrated Ethernet controller
- Key-lock support for physical security
- Memory change messages posted to the error log
- Integrated management module (IMM)
- Power management
- Power-on self-test (POST)
- Read-only memory (ROM) checksums
- ROM-based diagnostics programs
- Simple-swap Serial Advanced Technology Attachment (SATA) hard disk drives
- Standby voltage for systems-management features and monitoring
- System auto-configuring from the configuration menu
- System-error LED on the front bezel and diagnostic LEDs on the system board
- Upgradeable integrated management module (IMM) firmware

- Upgradeable microcode for POST, server firmware, and read-only memory (ROM) resident code, locally or over a LAN
- Vital product data (VPD); includes serial-number information and replacement part numbers, stored in nonvolatile memory, for easier remote maintenance

Chapter 4. Server controls, LEDs, and power

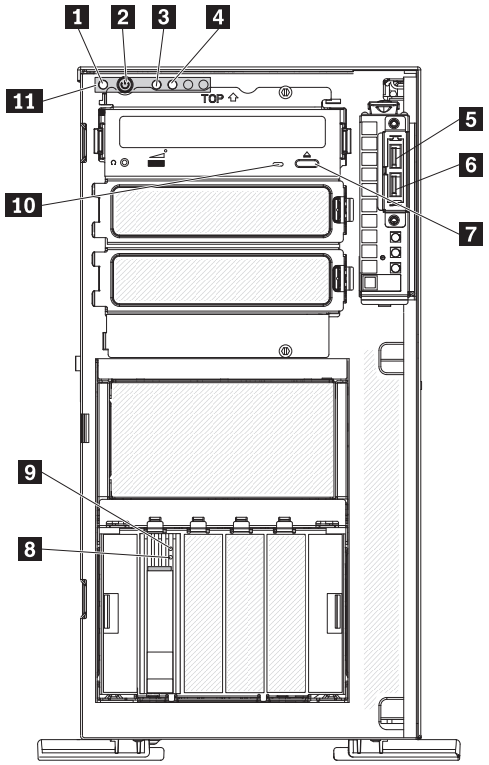
This section describes the controls, light-emitting diodes (LEDs), and connectors on the front and rear of the server, and how to turn the server on and off. For the location of the LEDs on the system board, see “System-board LEDs” on page 33.

Note: The illustrations in this document might differ slightly from your model.

Front view

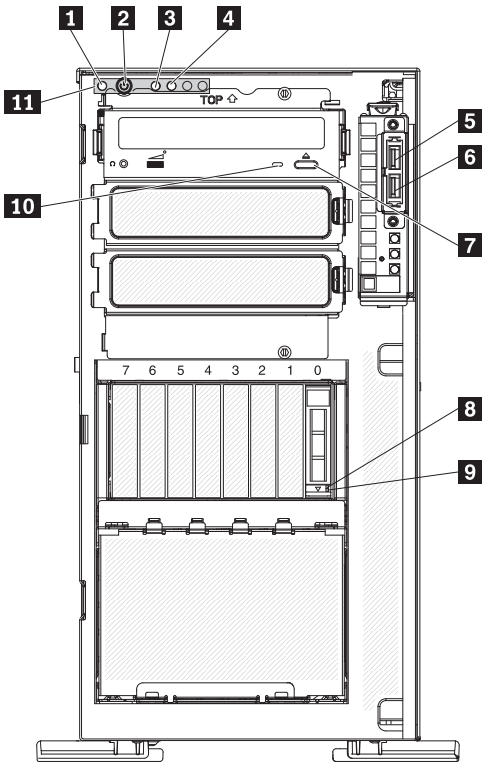
The following illustrations show the controls, LEDs, and connectors on the front of the server models.

The following is an illustration of the 3.5-inch SAS/SATA hot-swap hard disk drive model:



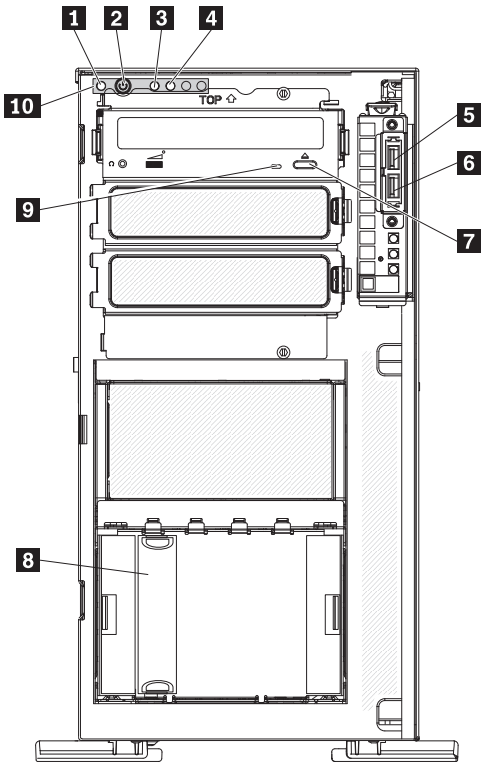
1	Power-on LED	7	DVD-eject button
2	Power-control button	8	Hard disk drive activity LED (green)
3	Hard disk drive activity LED	9	Hard disk drive status LED (amber)
4	System-error LED	10	DVD drive activity LED (green)
5	USB 2	11	Front information panel
6	USB 1		

The following is an illustration of the 2.5-inch SAS/SATA hot-swap hard disk drive model:



1	Power-on LED	7	DVD-eject button
2	Power-control button	8	Hard disk drive activity LED (green)
3	Hard disk drive activity LED	9	Hard disk drive status LED (amber)
4	System-error LED	10	DVD drive activity LED (green)
5	USB 2	11	Front information panel
6	USB 1		

The following is an illustration of the 3.5-inch SATA simple-swap hard disk drive model:



1	Power-on LED	6	USB 1
2	Power-control button	7	DVD-eject button
3	Hard disk drive activity LED	8	Simple-swap hard disk drive
4	System-error LED	9	DVD drive activity LED (green)
5	USB 2	10	Information panel

Power control button and power-on LED

Press this button to turn the server on and off manually or to wake the server from a reduced-power state. The states of the power-on LED are as follows:

Off: ac power is not present, or the power supply or the LED itself has failed.

Flashing rapidly (4 times per second): The server is turned off and is not ready to be turned on. The power-control button is disabled. This will last approximately 1 to 3 minutes.

Flashing slowly (once per second): The server is turned off and is ready to be turned on. You can press the power-control button to turn on the server.

Lit: The server is turned on.

Fading on and off: The server is in a reduced-power state. To wake the server, press the power-control button or use the IMM Web interface. See “Logging on to the Web interface” on page 157 for information on logging on to the IMM Web interface.

Hard disk drive activity LED

When this LED is flashing rapidly, it indicates that a hard disk drive is in use.

System-error LED

When this amber LED is lit, it indicates that a system error has occurred.

An LED on the system board might also be lit to help isolate the error. Detailed troubleshooting information is in the *Hardware Maintenance Manual*.

USB connectors

Connect USB devices to these connectors.

DVD-eject button

Press this button to release a CD or DVD from the DVD drive.

DVD drive activity LED

When this LED is lit, it indicates that the DVD drive is in use.

Hot-swap hard disk drive activity LED (some models)

On some server models, each hot-swap drive has a hard disk drive activity LED. When this green LED is flashing, it indicates that the associated hard disk drive is in use.

When the drive is removed, this LED also is visible on the SAS/SATA backplane, next to the drive connector. The backplane is the printed circuit board behind drive bays 4 through 7 on 3.5-inch hard disk drive models and bays 4 through 11 on 2.5-inch hard disk drive models.

Hot-swap hard disk drive status LED (some models)

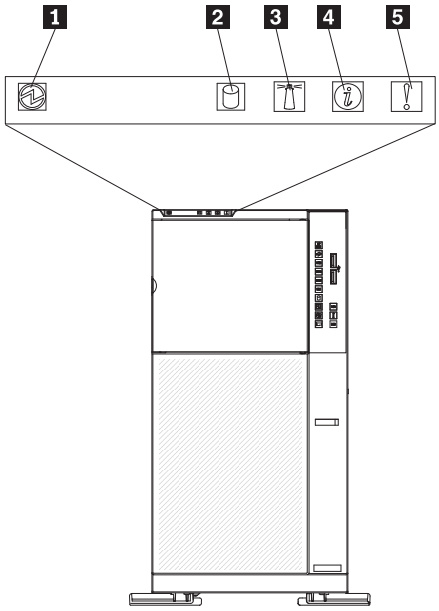
On some server models, each hot-swap hard disk drive has an amber status LED. If this amber status LED is lit, it indicates that the associated hard disk drive has failed.

If an optional ServeRAID adapter is installed in the server and the LED flashes slowly (one flash per second), the drive is being rebuilt. If the LED flashes rapidly (three flashes per second), the adapter is identifying the drive.

When the drive is removed, this LED also is visible on the SAS/SATA backplane, below the hot-swap hard disk drive activity LED.

Operator information panel

The following illustration shows the LEDs on the operator information panel on the front of the server.



1 System power-on LED
2 Hard disk drive activity LED
3 System-locator LED
4 System-information LED
5 System-error LED

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

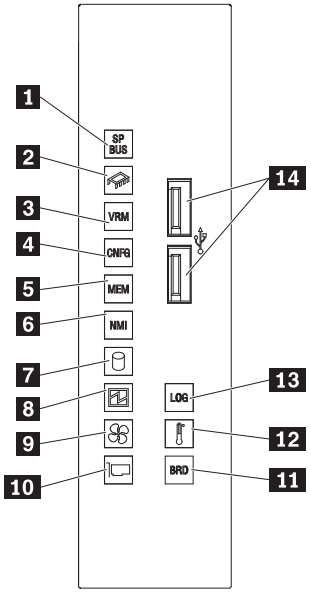
Lit EasyLED; diagnostic LEDs with the system-error or information LED also lit	**Description**
System power-on (green)	The states of the power-on LED are as follows: • **Off:** ac power is not present, or the power supply or the LED itself has failed. • **Flashing rapidly (4 times per second):** The server is turned off and is not ready to be turned on. The power-control button is disabled. Approximately 3 minutes after the server is connected to ac power, the power-control button becomes active. • **Flashing slowly (once per second):** The server is turned off and is ready to be turned on. You can press the power-control button to turn on the server. • **Lit:** The server is turned on. • **Fading on and off:** The server is in a reduced-power state. To wake the server, press the power-control button or use the IMM Web interface.

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).** • **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**	
Lit EasyLED; diagnostic LEDs with the system-error or information LED also lit	**Description**
Hard-disk drive activity (green)	When this LED is flashing rapidly, it indicates that there is activity on a hard disk drive.
System locator (blue)	Use this LED to visually locate the server among other servers.
System information (amber)	When this amber LED is on, it indicates that information about a suboptimal condition in the server is available in the IMM event log or in the system-event log. Check the EasyLED diagnostic panel for more information.
System error (amber)	When this LED is lit, it indicates that a system error has occurred. Use the diagnostic LED panel and the system service label to further isolate the error.

EasyLED diagnostic panel

The following illustration shows the front LEDs on the EasyLED diagnostic panel. The EasyLED diagnostic panel is located inside the front bezel.

Note: The EasyLED diagnostics LEDs remain lit only while the server is connected to power.



1	Server processor bus	8	Power supply
2	Microprocessor	9	Fan
3	VRM	10	PCI bus
4	Microprocessor/memory configuration	11	System board
5	Memory	12	Temperature
6	NMI	13	System-event log
7	Hard disk drive/RAID	14	USB ports

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Lit EasyLED diagnostics LED with the system-error or information LED also lit	Description	Action
System-event log (LOG)	A system error occurred.	View the contents of the system-event log (see "Event logs" on page 176).
Temperature	The system temperature has exceeded a threshold level.	1. See the system-event log for the source of the fault (see "Event logs" on page 176). 2. Make sure that the airflow in the server is not blocked. 3. Make sure that the room temperature is neither too hot nor too cold (see "Environment" in "Features and technologies" on page 7).
System board (BRD)	An error occurred on the system board.	1. Check the LEDs on the system board to identify the component that is causing the error. The BRD LED can be lit for the following conditions: • Failed or missing battery • Failed voltage regulator 2. Check the system-event log for information about the error. 3. Replace any failed or missing replaceable components, such as the battery. 4. (Trained service technician only) If a voltage regulator has failed, replace the system board.
PCI bus	A PCI adapter has failed.	1. See the system-event log (see "Event logs" on page 176). 2. Check the LEDs on the PCI slots to identify the component that is causing the error, and reseat the failing adapter. 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. Failing adapter b. (Trained service technician only) System board
Fan	A fan has failed or is operating too slowly.	1. Reinstall the removed fan. 2. If an individual fan LED is lit, replace the fan. 3. (Trained service technician only) Replace the system board.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Lit EasyLED diagnostics LED with the system-error or information LED also lit	**Description**	**Action**
Power supply	A power supply has failed or has been removed. **Note:** In a redundant power configuration, the dc power LED on one power supply might be off.	1. Check the individual power-supply LEDs. 2. Reseat the following components: a. Power supply b. (Trained service technician only) Power-supply cage cables 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. Power supply b. (Trained service technician only) Power-supply cage
DASD/RAID	A hard disk drive, SAS controller, or RAID adapter error has occurred. **Notes:** 1. This LED is also lit when a hard disk drive is removed from the server. 2. The error LED on the failing hard disk drive is also lit. 3. Check the system-event log for a RAID error.	1. Reinstall the removed drive. 2. Reseat the following components: a. Failing hard disk drive b. SAS hard disk drive backplane c. SAS signal and power cables d. System board e. ServeRAID adapter 3. Replace the components one at a time, in the order shown, restarting the server each time.
NMI	A hardware error has been reported to the operating system.	1. See the system-event log (see "Event logs" on page 176). 2. If the PCI LED is lit, follow the instructions for that LED. 3. If the MEM LED is lit, follow the instructions for that LED. 4. Restart the server.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Lit EasyLED diagnostics LED with the system-error or information LED also lit	Description	Action
Memory (MEM)	A memory error has occurred. **Note:** The error LED on the DIMM is also lit.	1. Determine whether the CNFG LED is also lit, which indicates that the memory configuration is invalid. Reinstall the DIMMs in a supported configuration. 2. If the CNFG LED is not lit, one of the following conditions might be present: • The server did not start and a failing DIMM LED is lit: a. Check for a PFA log event in the system-event log. b. Reseat the DIMM. c. Move the DIMM to a different slot or replace the DIMM. d. (Trained service technician only) Replace the system board. • The server started, the failing DIMM is disabled, and the LED is lit: a. If the LEDs are lit by two DIMMs, check the system-event log for a PFA event on one of the DIMMs, and then replace that DIMM. Otherwise, replace both DIMMs. b. If the LED is lit by only one DIMM, replace that DIMM. c. Re-enable the DIMM, using the Setup Utility.
Microprocessor/ Memory Configuration (CNFG)	A hardware configuration error has occurred. (This LED is used with the MEM, VRM, and CPU LEDs.)	1. (The system-error LED, CPU LED, and this LED are lit when POST detects a microprocessor mismatch.) Remove and install two microprocessors of the same cache size, type, and clock speed. 2. (The system-error LED, MEM LED, and this LED are lit when POST detects an invalid memory configuration.) Remove and install supported DIMMs (see "Removing a memory module" on page 86 and "Installing a memory module" on page 89). 3. (The system-error LED, VRM LED, and this LED are lit when POST detects a missing VRM.) Install a VRM for microprocessor 2 (see "Installing a second microprocessor" on page 99). 4. Check the system-error log for information indicating incompatible components.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Lit EasyLED diagnostics LED with the system-error or information LED also lit	Description	Action
VRM	A VRM has failed.	1. Check the system-event log to determine the reason for the lit LED (for a VRM). 2. Determine whether the CNFG LED is also lit. If the CNFG LED is lit, the memory configuration is invalid. Reseat the VRM. 3. If the CNFG LED is not lit, reseat the following components: a. Failing VRM b. (Trained service technician only) Microprocessor associated with the VRM 4. Replace the following components one at a time, in the order shown, restarting the server each time: a. Failing VRM b. (Trained service technician only) Microprocessor associated with the VRM c. (Trained service technician only) System board
Microprocessor (CPU)	A microprocessor has failed, or an invalid microprocessor configuration is installed. **Note:** (Trained service technician only) Make sure that the microprocessors are installed in the correct sequence.	1. Check the system-event log to determine the reason for the lit LED. 2. Determine whether the CNFG LED is also lit. If the CNFG LED is not lit, a microprocessor has failed. a. Make sure that the failing microprocessor, which is indicated by the CPU1 or CPU2 error LED on the system board, is installed correctly. b. Replace the following components one at a time, in the order shown, restarting the server each time: 1) (Trained service technician only) Failing microprocessor 2) (Trained service technician only) System board c. If the CNFG LED is lit and the CPU mismatch LED on the system board is also lit, an invalid microprocessor configuration is installed: 1) Make sure that the microprocessors are compatible with each other. They must match in speed and cache size. Use the Setup Utility to compare the microprocessor information. 2) (Trained service technician only) Replace the incompatible microprocessor.

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).** • **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**		
Lit EasyLED diagnostics LED with the system-error or information LED also lit	**Description**	**Action**
Service processor bus (SP BUS)	The IMM detects an internal error.	1. Disconnect the server from ac power; then, reconnect the server to power and restart the server. 2. Update the IMM firmware.

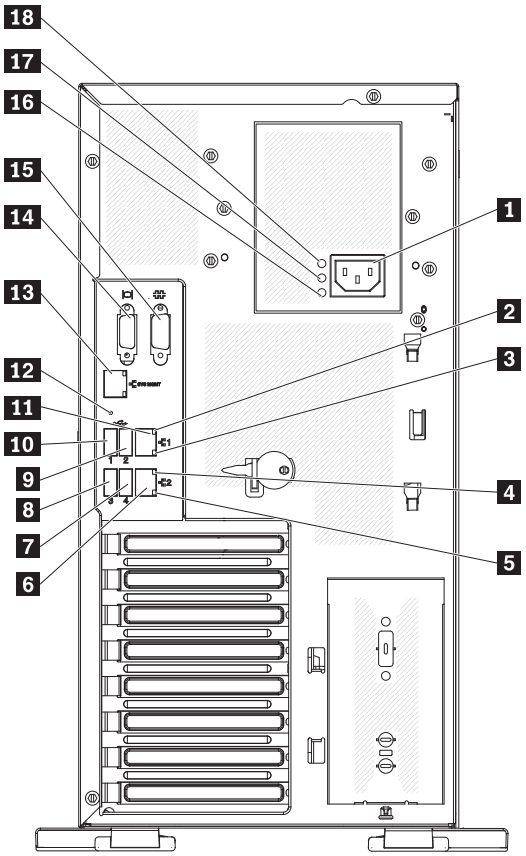
1. The following table lists the EasyLED diagnostics LEDs, the problems that they indicate, and actions to solve the problems.

   Look at the system service label on the top of the server, which gives an overview of internal components that correspond to the LEDs on the EasyLED diagnostic panel. This information can often provide enough information to diagnose the error.
2. Remove the server cover and look inside the server for lit LEDs. Certain components inside the server have LEDs that are lit to indicate the location of a problem (See "System-board LEDs" on page 33).

   The following illustration shows the LEDs on the system board.

Rear view

The following illustration shows the LEDs and connectors on the rear of the server.



1	Power cord connector	10	USB 1
2	Ethernet transmit/receive activity LED	11	Ethernet 1 10/100/1000
3	Ethernet link status LED	12	NMI button
4	Ethernet transmit/receive activity LED	13	Systems-management Ethernet connector
5	Ethernet link status LED	14	Video
6	Ethernet 2 10/100/1000	15	Serial 1 (COM 1)
7	USB 4	16	Fault (error) LED
8	USB 3	17	ac power LED
9	USB 2	18	dc power LED

Power-cord connector

Connect the power cord to this connector.

ac power LED

This green LED provides status information about the power supply. During typical operation, both the ac and dc power LEDs are lit. For any other combination of LEDs, see the *Hardware Maintenance Manual*.

dc power LED

This green LED provides status information about the power supply. During typical operation, both the ac and dc power LEDs are lit. For any other combination of LEDs, see the *Hardware Maintenance Manual*.

Power-error (Fault) LED

When this amber LED is lit, it indicates that the power supply has failed. For any other combination of LEDs, see the *Hardware Maintenance Manual*.

Video connector

Connect a monitor to this connector.

Note: The maximum video resolution is 1600 x 1200 at 60 MHz.

Serial connector

Connect a 9-pin serial device to this connector.

Systems-management Ethernet connector

Use this connector to manage the server, using a dedicated management network. If you use this connector, the IMM cannot be accessed directly from a production network. A dedicated management network provides additional security by physically separating the management network traffic from the production network. You can use the Setup Utility to configure the server to use a dedicated systems-management network or a shared network.

USB connectors

Connect USB devices to these connectors.

Ethernet connectors

Use these connectors to connect the server to a network.

Ethernet transmit/receive activity LED

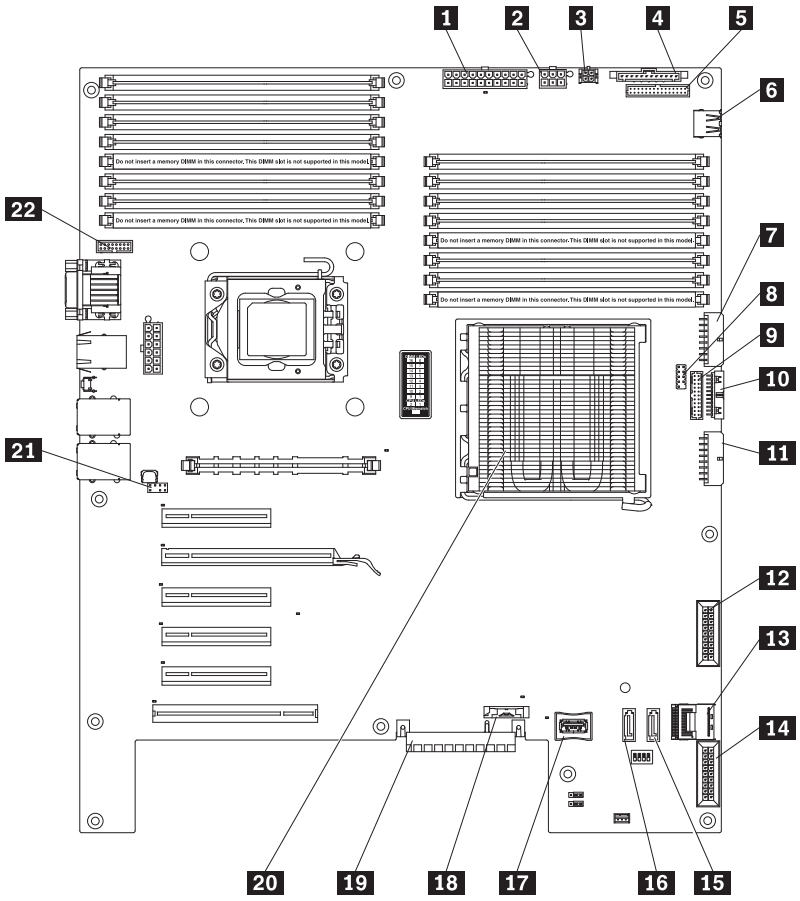
This LED is on the Ethernet connector on the rear of the server. When this LED is lit, it indicates that there is activity between the server and the network.

Ethernet link status LED

This LED is on the Ethernet connector on the rear of the server. When this LED is lit, it indicates that there is an active connection on the Ethernet port.

System-board internal connectors

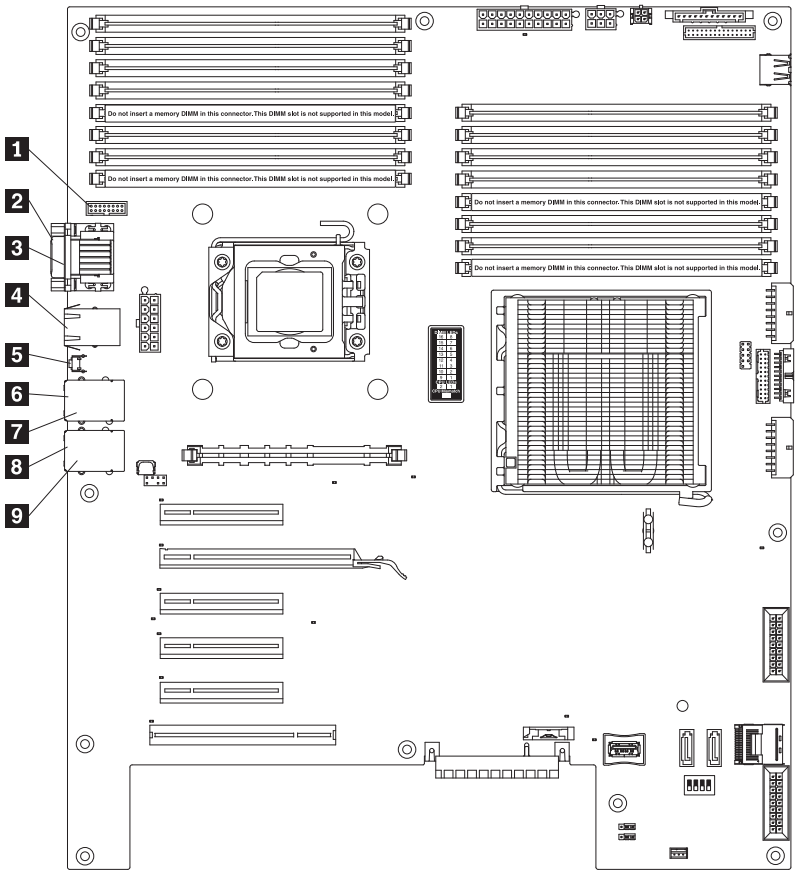
The following illustration shows the internal connectors on the system board.



1	Main power	12	Reserved
2	Reserved	13	Simple-swap SATA signal cable connector
3	Optical power	14	Hot-swap main fan connector
4	Front panel connector	15	SATA 0 (optical drive connector)
5	Reserved	16	SATA 1
6	USB internal tape drive signal connector	17	Reserved
7	Reserved	18	Battery
8	Front USB connector	19	PCI extender card connector
9	Reserved	20	Microprocessor 1
10	Hard disk drive backplane configuration signal cable connector	21	Virtual media key connector
11	Hard disk drive backplane configuration signal cable connector	22	Power connector 2

System-board external connectors

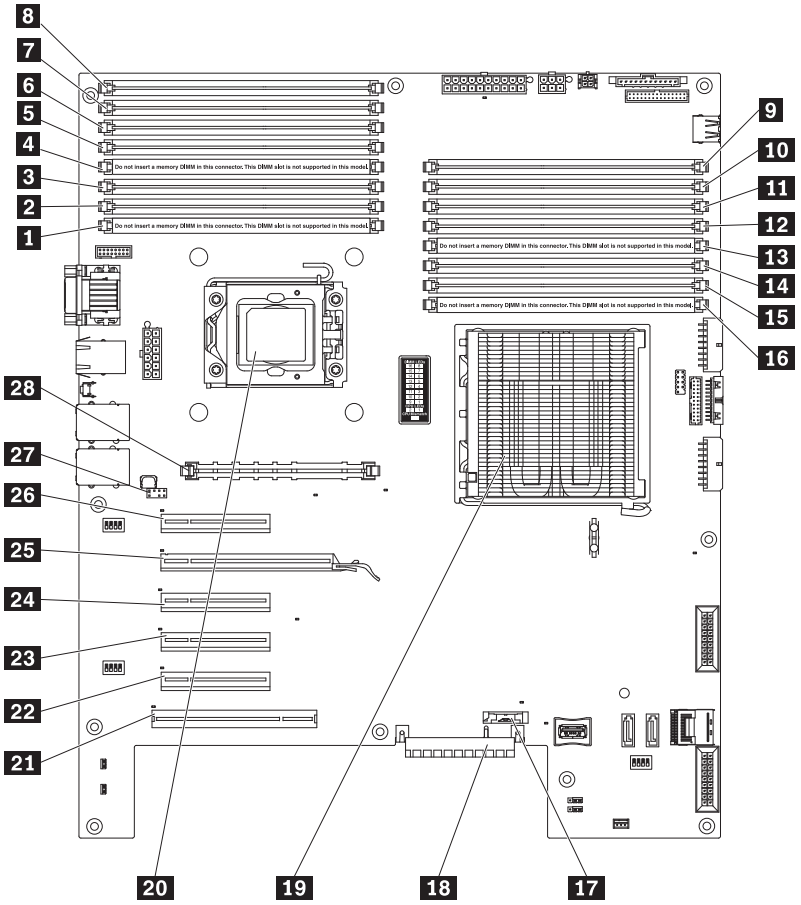
The following illustration shows the external input/output (I/O) connectors on the system board.



1	Power connector	6	USB 1-2
2	Serial (COM 1)	7	Ethernet 1
3	Video	8	USB 3-4
4	Systems-management Ethernet connector	9	Ethernet 2
5	NMI button		

System-board option connectors

The following illustration shows the system-board connectors for user-installable options.

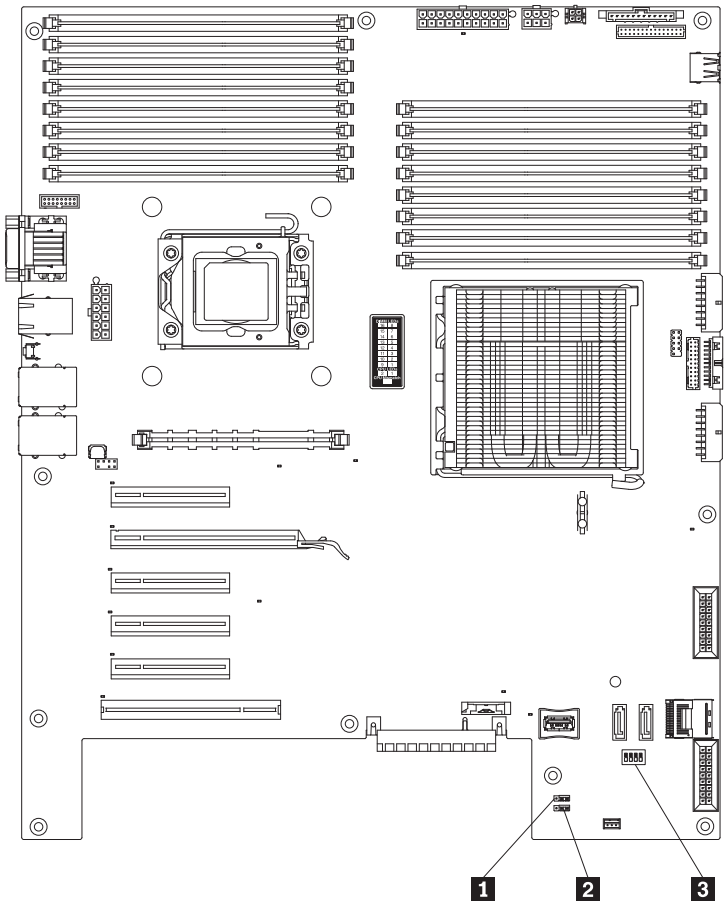


1	DIMM 9 (reserved)	15	DIMM 2
2	DIMM 10	16	DIMM 1 (reserved)
3	DIMM 11	17	Battery
4	DIMM 12 (reserved)	18	PCI extender card connector
5	DIMM 13	19	Microprocessor 1
6	DIMM 14	20	Microprocessor 2
7	DIMM 15	21	Slot 6, PCI 32 bit/33 MHz
8	DIMM 16	22	Slot 5, PCI Express Gen2 x8 (x8)
9	DIMM 8	23	Slot 4, PCI Express Gen2 x8 (x4)
10	DIMM 7	24	Slot 3, PCI Express Gen2 x8 (x4)
11	DIMM 6	25	Slot 2, PCI Express Gen2 x18 (x8)
12	DIMM 5	26	Slot 1, PCI Express Gen2 x8 (x8)
13	DIMM 4 (reserved)	27	Virtual media key connector
14	DIMM 3	28	Optional VRM connector

Note: Do not insert memory DIMMs into connectors marked as reserved. These DIMM slots are not supported in this model.

System-board switches and jumpers

The following illustration shows the switches and jumpers on the system board.



1 UEFI boot recovery jumper (JP8)
2 Clear CMOS jumper (JP1)
3 SW8 switch block

The following table describes the jumpers on the system board.

Table 2. System-board jumpers

Jumper number	Jumper name	Jumper setting
JP1	Clear CMOS jumper	• Pins 1 and 2: Normal (default) - This keeps the CMOS data. • Pins 2 and 3: This clears the CMOS data, which clears the power-on password and administrator password.

Table 2. System-board jumpers (continued)

Jumper number	Jumper name	Jumper setting
JP6	UEFI boot recovery jumper	• Pins 1 and 2: Normal (default) - Loads the primary server firmware ROM. • Pins 2 and 3: This enables the server to recovery if the server firmware becomes damaged.
Notes: • If no jumper is present, the server responds as if the pins are set to 1 and 2. • Do not change the jumper pin position after the server is turned on. Changing the position of the UEFI boot recovery jumper from pins 1 and 2 to pins 2 and 3 before the server is turned on alters which flash ROM page is loaded. This can cause an unpredictable problem.		

The following table describes the function of each pin on the SW6 switch block.

Table 3. System-board switches

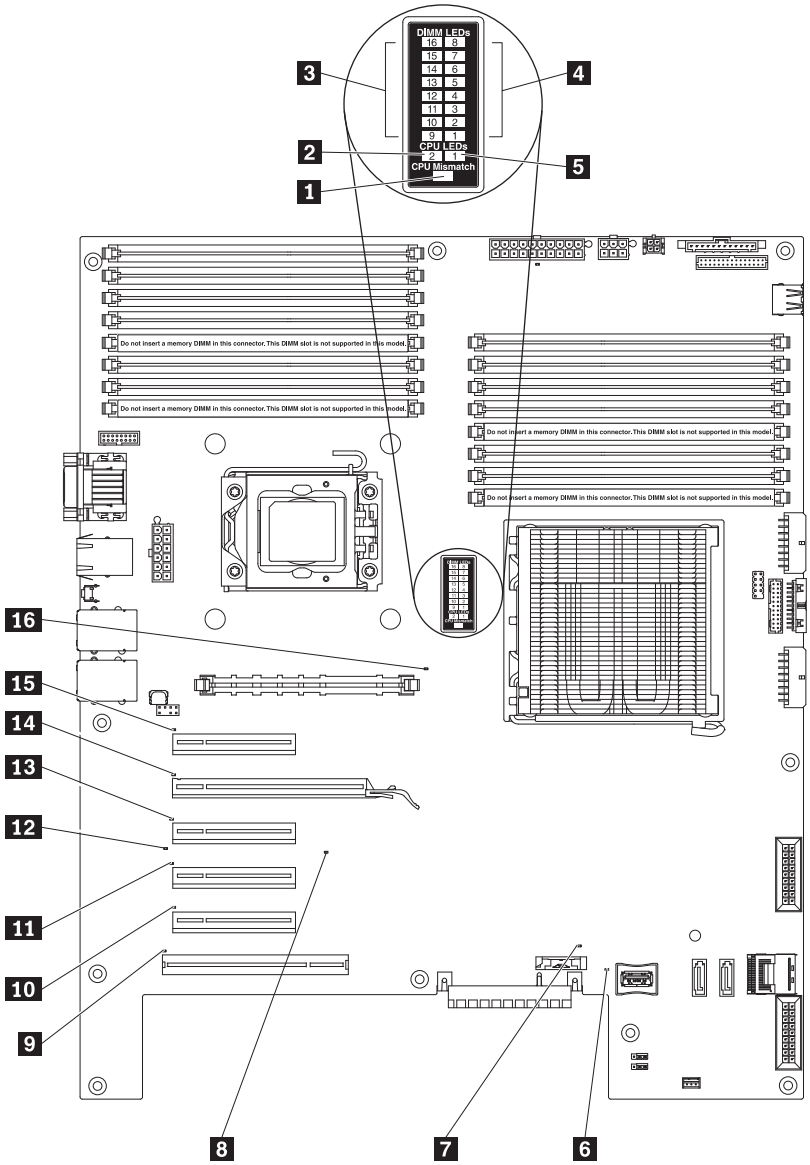
Switch pin number	Default value	Description
1	Off	Reserved.
2	Off	Power-on password override. Changing the position of this switch bypasses the power-on password check the next time the server is turned on and starts the Setup Utility so that you can change or delete the power-on password. You do not have to move the switch back to the default position after the power-on password is overridden. Changing the position of this switch does not affect the administrator password check if an administrator password is set. See “Passwords” on page 141 for additional information about passwords.
3	Off	Reserved.
4	Off	• When this switch is on **Off**, this is normal mode. This loads the primary IMM firmware ROM page. • When this switch is toggled to **On**, this loads the secondary (backup) IMM firmware ROM page.

Important:

1. Before you change any switch settings or move any jumpers, turn off the server, then, disconnect all power cords and external cables. Read the safety information (see “Safety” on page vii, “Handling static-sensitive devices” on page 39, and “Working inside the server with the power on” on page 38).
2. Any system-board switch blocks or jumpers that are not shown in the illustrations in this document are reserved.

System-board LEDs

The following illustration shows the light-emitting diodes (LEDs) on the system board.

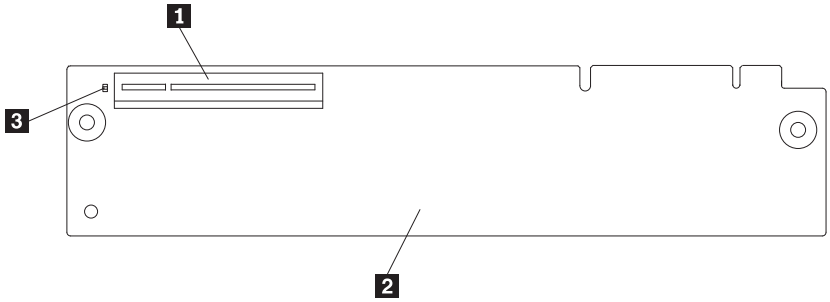


1 Microprocessor mismatch LED
2 Microprocessor 2 error LED
3 DIMMs 9-18 error LEDs
4 DIMMs 1-8 error LEDs
5 Microprocessor 1 error LED
6 System-board error LED
7 Battery error LED
8 IMM heartbeat LED
9 PCI slot 6 error LED
10 PCI slot 5 error LED
11 PCI slot 4 error LED
12 Enclosure manager heartbeat LED
13 PCI slot 3 error LED
14 PCI slot 2 error LED
15 PCI slot 1 error LED
16 VRM error LED

For more information about the system-board LEDs, see the *Hardware Maintenance Manual*.

Optional one-slot PCI extender card

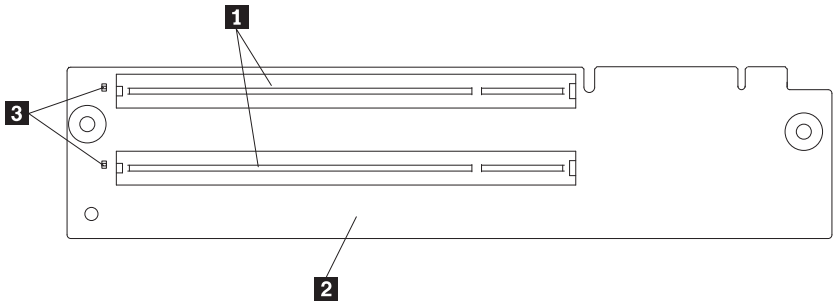
The following is an illustration of the one-slot PCI extender card that you can install to add an additional PCI slot to the server.



1 PCI Express Gen1 x8 (x4) slot
2 One-slot extender card
3 PCI slot error LED

Optional two-slot PCI extender card

The following is an illustration of the two-slot PCI extender cards that you can install to add two additional PCI slots to the server.



1 PCI-X 32-bit/84-bit 133/100/66 MHz slots
2 Two-slot extender card
3 PCI slots error LEDs

Server power features

When the server is connected to an ac power source but is not turned on, the operating system does not run, and all core logic except for the service processor (the Integrated Management Module) is shut down; however, the server can respond to requests to the service processor, such as a remote request to turn on the server. The power-on LED flashes to indicate that the server is connected to ac power but is not turned on.

Turning on the server

Approximately 5 seconds after the server is connected to ac power, one or more fans might start running to provide cooling while the server is connected to power and the power-on button LED will blink quickly. Approximately 1 to 3 minutes after the server is connected to ac power, the power-control button becomes active (the power-on LED will blink slowly). You can turn on the server by pressing the power-control button.

The server can also be turned on in any of the following ways:

- If a power failure occurs while the server is turned on, the server will restart automatically when power is restored.

Note: When 4 GB or more of memory (physical or logical) is installed, some memory is reserved for various system resources and is unavailable to the operating system. The amount of memory that is reserved for system resources depends on the operating system, the configuration of the server, and the configured peripheral component interconnect (PCI) options.

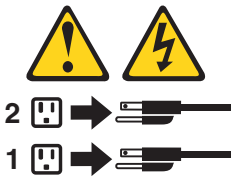
Turning off the server

When you turn off the server and leave it connected to ac power, the server can respond to requests to the service processor, such as a remote request to turn on the server. While the server remains connected to ac power, one or more fans might continue to run. To remove all power from the server, you must disconnect it from the power source.

Some operating systems require an orderly shutdown before you turn off the server. See your operating-system documentation for information about shutting down the operating system.

Statement 5:

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



The server can be turned off in any of the following ways:

- You can turn off the server from the operating system, if your operating system supports this feature. After an orderly shutdown of the operating system, the server will be turned off automatically.
- You can press the power-control button to start an orderly shutdown of the operating system and turn off the server, if your operating system supports this feature.
- If the operating system stops functioning, you can press and hold the power-control button for more than 4 seconds to turn off the server.
- The integrated management module (IMM) can turn off the server as an automatic response to a critical system failure.

Chapter 5. Installing optional devices and replacing customer replaceable units

Important: Before you install optional hardware, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, if an operating system is installed. If the server is not working correctly, see the *Hardware Maintenance Manual* and “Troubleshooting tables” on page 163 for diagnostic information.

This chapter provides detailed instructions for installing optional hardware devices in the server.

Installation guidelines

Before you install options, read the following information:

- Read the safety information (see “Safety” on page vii, “Handling static-sensitive devices” on page 39, and “Working inside the server with the power on” on page 38). This information will help you work safely.
- When you install your new server, take the opportunity to download and apply the most recent firmware updates. This step will help to ensure that any known issues are addressed and that your server is ready to function at maximum levels of performance. To download firmware updates for your server, do the following:
  1. Go to: http://www.lenovo.com/support.
  2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
  3. From **Family** list, select **ThinkServer TD200**, and click **Continue**.
  4. Click **Downloads and drivers** to download firmware updates.
- Before you install optional hardware, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, if an operating system is installed. If the server is not working correctly, see the *Hardware Maintenance Manual* for diagnostic information.
- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.
- If you must start the server while the cover is removed, make sure that no one is near the server and that no tools or other objects have been left inside the server.
- Do not attempt to lift an object that you think is too heavy for you. If you have to lift a heavy object, observe the following precautions:
  - Make sure that you can stand safely without slipping.
  - Distribute the weight of the object equally between your feet.
  - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
  - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.
- Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and other devices.
- Back up all important data before you make changes to disk drives.
- Have a small flat-blade screwdriver, a small Phillips screwdriver, and a T8 torx screwdriver available.

- You do not have to turn off the server to install or replace hot-swap fans and hot-swap drives.
- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.
- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing and installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- When you have to access the inside of the server, you might find it easier to position the server on its side.
- When you are finished working on the server, reinstall all safety shields, guards, labels, and ground wires.
- For a list of supported options for the server, see http://www.lenovo.com/thinkserver.

System reliability guidelines

To help ensure proper system cooling and system reliability, make sure that the following requirements are met:

- Each of the drive bays has a drive or a filler panel and electromagnetic compatibility (EMC) shield installed in it.
- There is adequate space around the server to allow the server cooling system to work properly. Leave approximately 50 mm (2.0 in.) of open space around the front and rear of the server. Do not place objects in front of the fans. For proper cooling and airflow, replace the server cover before turning on the server. Operating the server for extended periods of time (more than 30 minutes) with the server cover removed might damage server components.
- You have followed the cabling instructions that come with optional adapters.
- You have replaced a failed fan as soon as possible.
- You have replaced a hot-swap fan within 30 seconds of removal.
- You have replaced a hot-swap drive within 2 minutes of removal.
- You do not operate the server without the air baffle installed. Operating the server without the air baffle might cause the microprocessor to overheat.

Working inside the server with the power on

Attention: Static electricity that is released to internal server components when the server is powered on might cause the server to halt, which could result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when working inside the server with the power on.

The server (some models) supports hot-swap devices and is designed to operate safely while it is turned on and the cover is removed. Follow these guidelines when you work inside a server that is turned on.

- Avoid wearing loose-fitting clothing on your forearms. Button long-sleeved shirts before working inside the server; do not wear cuff links while you are working inside the server.
- Do not allow your necktie or scarf to hang inside the server.

- Remove jewelry, such as bracelets, necklaces, rings, and loose-fitting wrist watches.
- Remove items from your shirt pocket, such as pens and pencils, that could fall into the server as you lean over it.
- Avoid dropping any metallic objects, such as paper clips, hairpins, and screws, into the server.

Handling static-sensitive devices

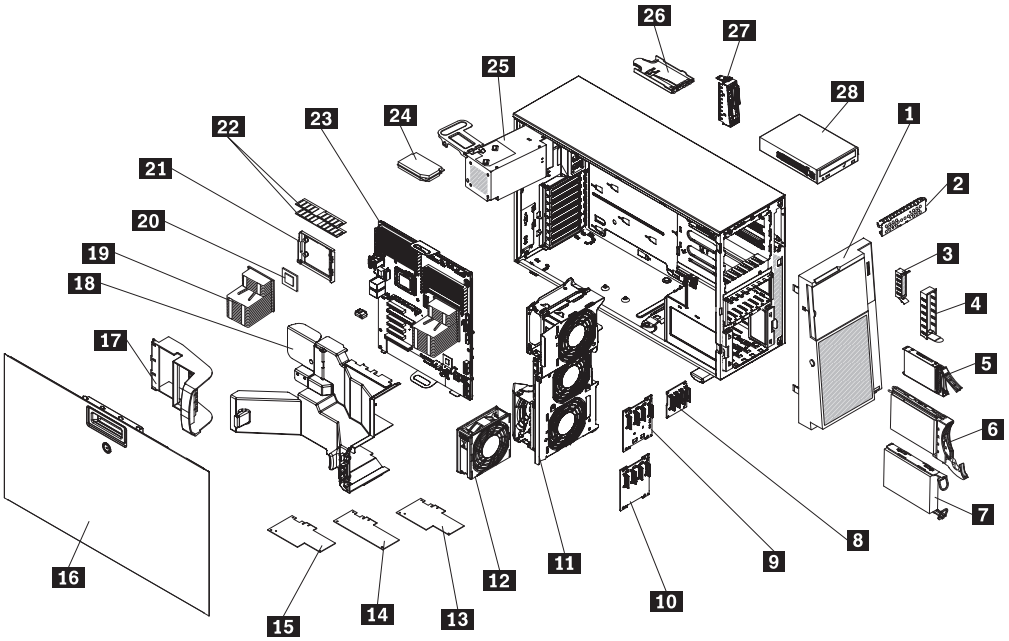
Attention: Static electricity can damage the server and other electronic devices. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

To reduce the possibility of electrostatic discharge, observe the following precautions:

- Limit your movement. Movement can cause static electricity to build up around you.
- The use of a grounding system is recommended. For example, wear an electrostatic-discharge wrist strap, if one is available. Always use an electrostatic-discharge wrist strap or other grounding system when working inside the server with the power on.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its static-protective package, touch it to an unpainted metal surface on the outside of the server for at least 2 seconds. This drains static electricity from the package and from your body.
- Remove the device from its package and install it directly into the server without setting down the device. If it is necessary to set down the device, put it back into its static-protective package. Do not place the device on the server cover or on a metal surface.
- Take additional care when handling devices during cold weather. Heating reduces indoor humidity and increases static electricity.

Major components of the server

The following illustration shows the major components in the server (depending on the server model). The illustrations in this document might differ slightly from your hardware.



1	Bezel	15	ServeRAID MR10is
2	Optical drive bay EMC shield	16	Cover
3	2.5-inch EMC shield	17	Rear adapter retention bracket
4	3.5-inch EMC shield	18	Air baffle
5	2.5-inch hot-swap	19	Heat sink
6	3.5-inch hot-swap	20	Microprocessor
7	3.5-inch simple-swap drive	21	Heat sink retention bracket
8	SAS/SATA 2.5-inch backplane	22	DIMMs
9	SAS/SATA 3.5-inch backplane	23	System board
10	Simple-swap 3.5-inch backplane	24	VRM
11	Fan assembly	25	Power supply
12	Hot-swap fan	26	Control panel assembly
13	ServeRAID MR10i	27	USB cable assembly
14	ServeRAID BR10i	28	DVD drive

Opening the bezel

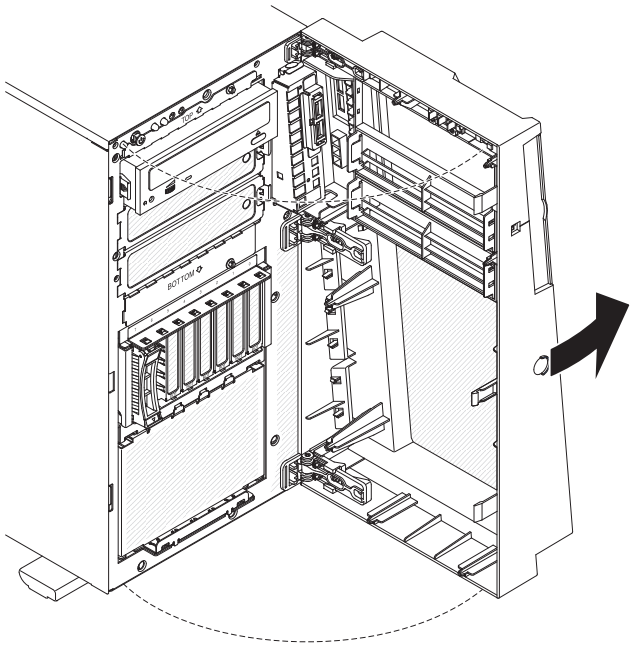
To open the bezel, do the following:

Note: The illustrations in this document might differ slightly from your hardware.

1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37).
2. Unlock the side cover.

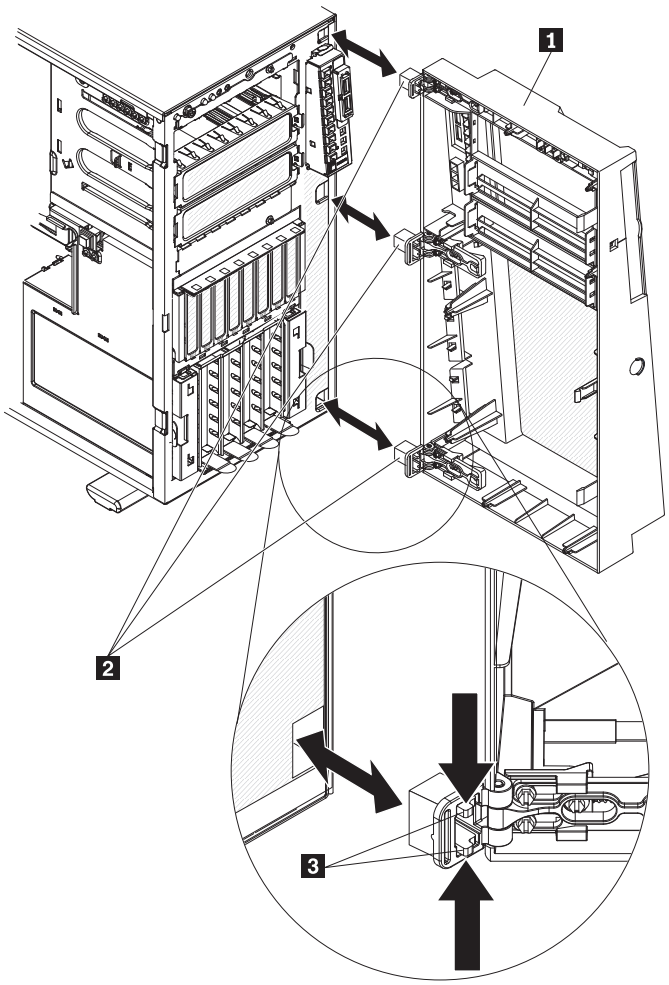
Note: You must unlock the side cover to open or remove the bezel. When you lock the server side cover, it locks both the cover and the bezel.

3. Remove the bezel. Position your finger on the depressed area on the left side of the bezel and rotate the bezel away from the server.



4. If you want to remove the bezel completely, press the retention tabs on the hinge assembly toward each other and pull the hinge assembly out of the chassis.

   Note: While pressing the retention tabs together, you might need a screwdriver to help pry the hinge out.



1 Bezel
2 Hinge assembly
3 Retention tabs

Note: The bezel will also disengage from the chassis hinges if you rotate the bezel beyond 180° or if excessive pressure is applied to the bezel. Do not be alarmed because this is how the bezel was designed. The bezel is designed with breakaway hinges so that you can easily reattach it to the chassis.

Opening and closing the bezel media door

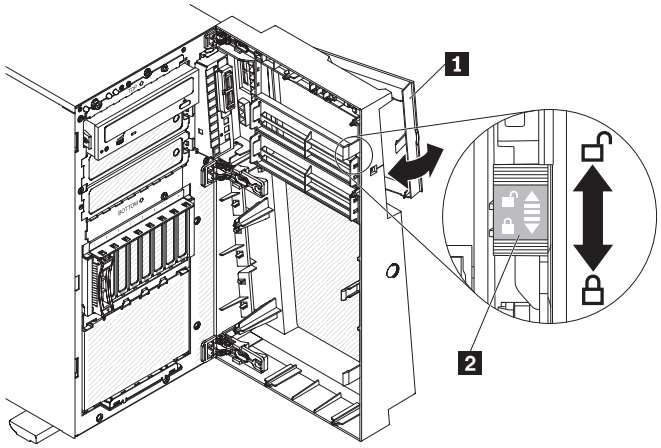
To open the media door, do the following:

1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37).
2. Unlock the side cover.

   Note: You must unlock the side cover to open or remove the bezel. When you lock the server side cover, it locks both the cover and the bezel.
3. Grasp the pull-point area on the left side of the bezel door and rotate the bezel to the open position.

4. From inside of the top section of the bezel door, slide the blue tab up to unlock the bezel media door (slide the tab down when you want to lock it); then, grasp the pull-point area on the left side of the media door and pull the door open.

   Note: To close and lock the bezel media door, rotate the door to the closed position and slide the blue tab down to lock it.



1 Bezel media door
2 Media door lock

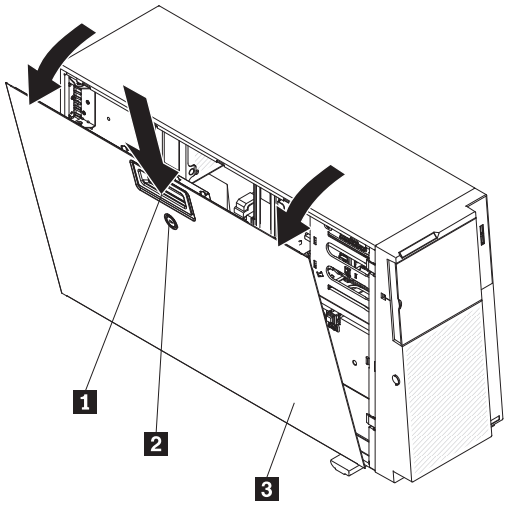
Removing the side cover

Important: Before you install optional hardware, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, if an operating system is installed. If the server is not working correctly, see the *Hardware Maintenance Manual* for diagnostic information.

To remove the server side cover, do the following:

Attention: Operating the server for more than 30 minutes with the side cover removed might damage server components. For proper cooling and airflow, replace the side cover before turning on the server.

1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37).
2. Turn off the server and all attached devices (see “Turning off the server” on page 35); then, disconnect all power cords and external cables.
3. Unlock the side cover.
4. Press the cover-release latch down (as shown in the illustration); then, remove the cover and set it aside.



1 Cover release latch
2 Latch
3 Left-side cover

To replace the side cover, see “Installing the side cover” on page 134.

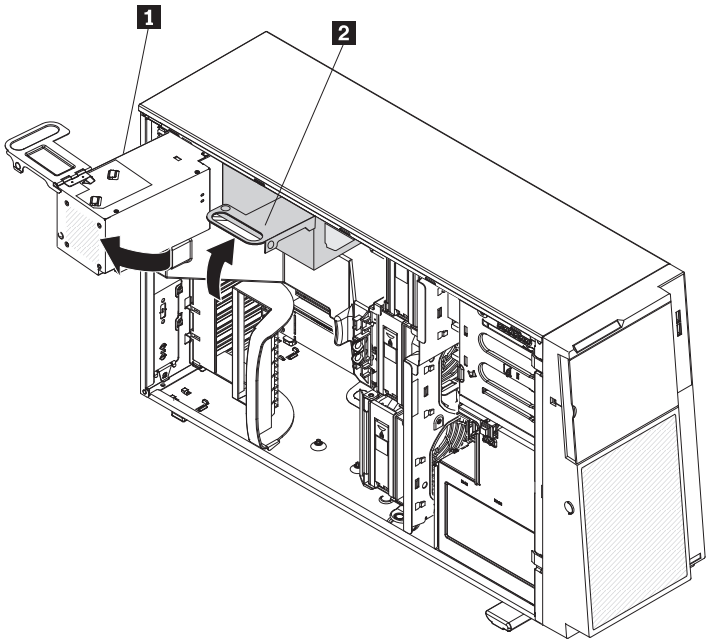
Attention: For proper cooling and airflow, replace the cover before turning on the server. Operating the server for extended periods of time (more than 30 minutes) with the cover removed might damage server components.

Removing the air baffle

To remove the air baffle, do the following:

1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37).
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Carefully position the server on its side so that it is lying flat and the cover is facing up.

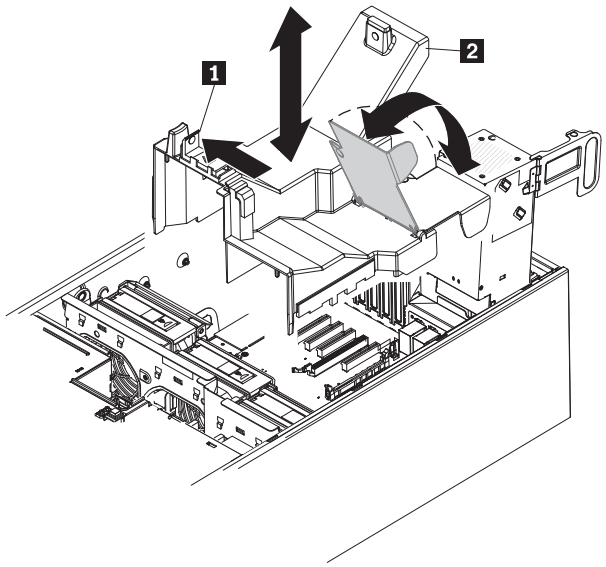
   Attention: Do not allow the server to fall over.
4. Position the server on its side.
5. Unlock the side cover.
6. Remove the cover (see “Removing the side cover” on page 43).
7. Rotate the power-supply cage assembly out of the chassis. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.



1 Power supply
2 Power-supply handle

8. Remove the air baffle assembly. Press the blue tab (on top of the fan cage) on the air baffle assembly to the left and lift it from the server and set it aside.

   Note: It might be easier to remove the air baffle if you lift up the plastic tab that is over the DIMMs in the rear of the server.



1 Air baffle pinch tab
2 Air baffle

Removing the fan cage assembly

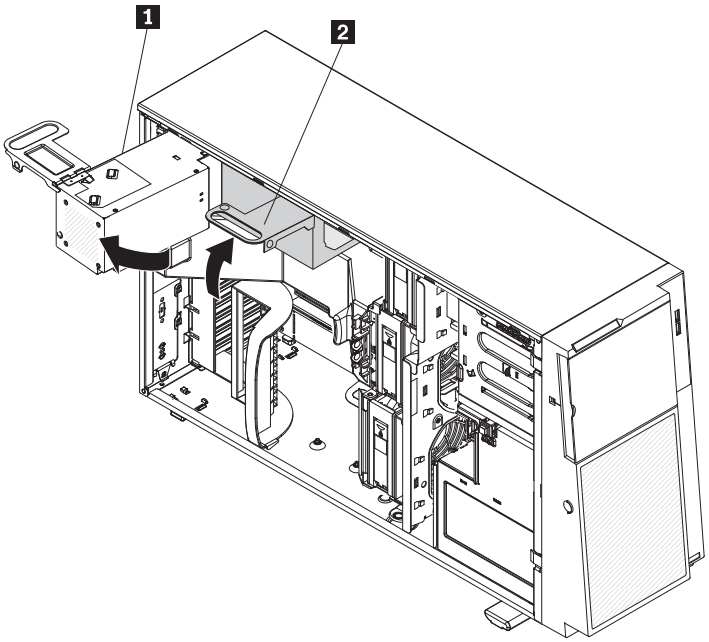
Attention:

- Replace a hot-swap fan within 30 seconds of removal.
- To ensure proper cooling and airflow, do not operate the server for more than 2 minutes with the side cover removed.

To remove the front fan cage assembly, do the following:

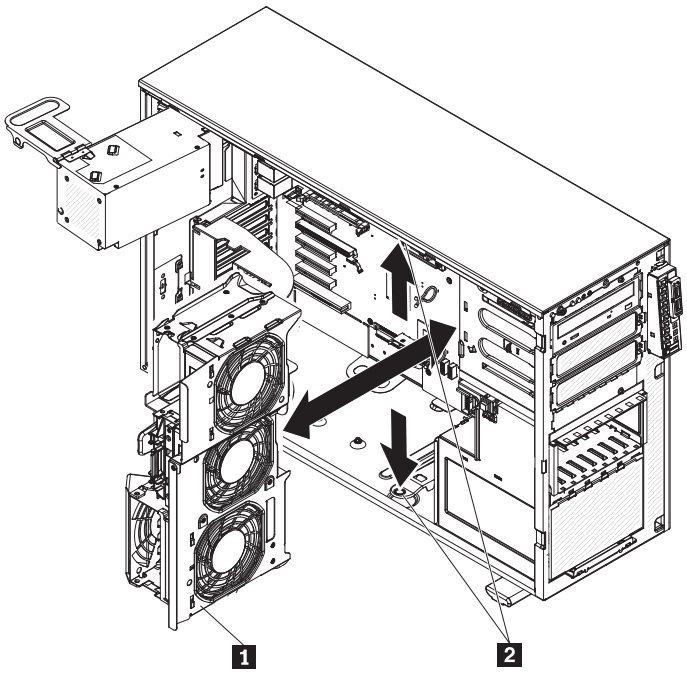
1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37).
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 43).
4. Carefully position the server on its side so that it is lying flat and facing up.

   Note: Do not allow the server to fall over.
5. Rotate the power-supply cage assembly out of the chassis. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.



1 Power supply
2 Power-supply handle

6. Remove the air baffle (see “Removing the air baffle” on page 44).
7. Press in on the fan cage assembly release buttons on both sides of the chassis to release the fan cage assembly from the connector on the chassis. Lift the fan cage assembly up and out of the chassis and set it aside.



1 Fan cage assembly
2 Fan cage assembly release buttons

8. If you are instructed to return the fan cage, follow all packaging instructions, and use any packaging materials that are supplied to you for shipping.

Installing the fan cage assembly

Attention:

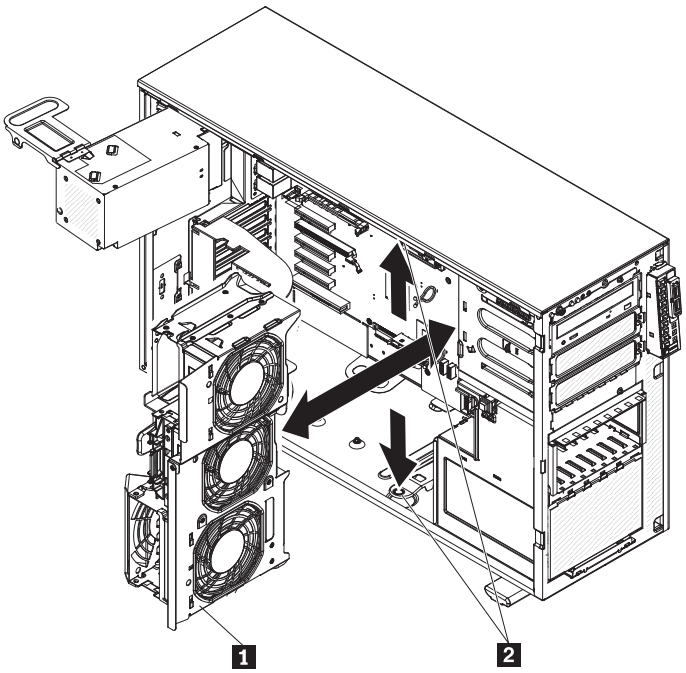
- Replace a hot-swap fan within 30 seconds of removal.
- To ensure proper cooling and airflow, do not operate the server for more than 2 minutes with the side cover removed.

To install the fan cage assembly, do the following:

Note: If you have to order a replacement fan cage assembly, it comes pre-routed with two cables. Only one of the cables is necessary for this server.

1. Make sure that the server is flat on its side and align the fan cage with the guide rails on the sides of the chassis.

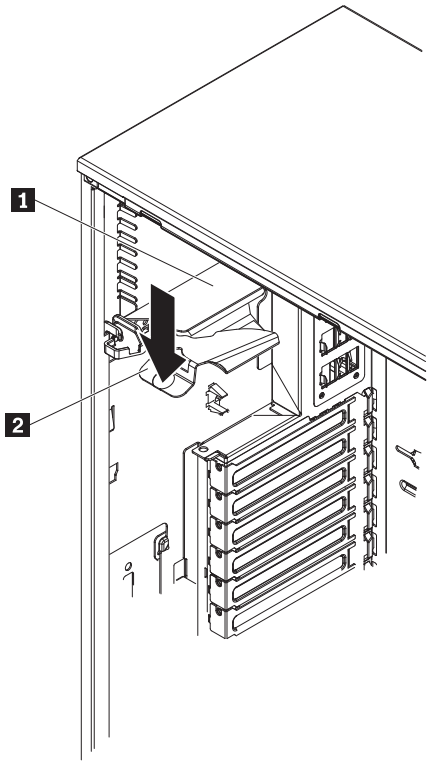
   Note: Make sure that all cables are routed so that they are not damaged when inserting the fan cage assembly into the server.



1 Fan cage assembly
2 Fan cage assembly release buttons

2. Slide the fan cage into the chassis and press firmly until the fan cage is seated firmly in place.

   Note: Make sure that both release buttons click into place.
3. Install the air baffle (see “Installing the air baffle” on page 132).
4. Rotate the power-supply cage assembly back into the server. Press the power-supply release tab and rotate the power-supply cage assembly into the chassis.



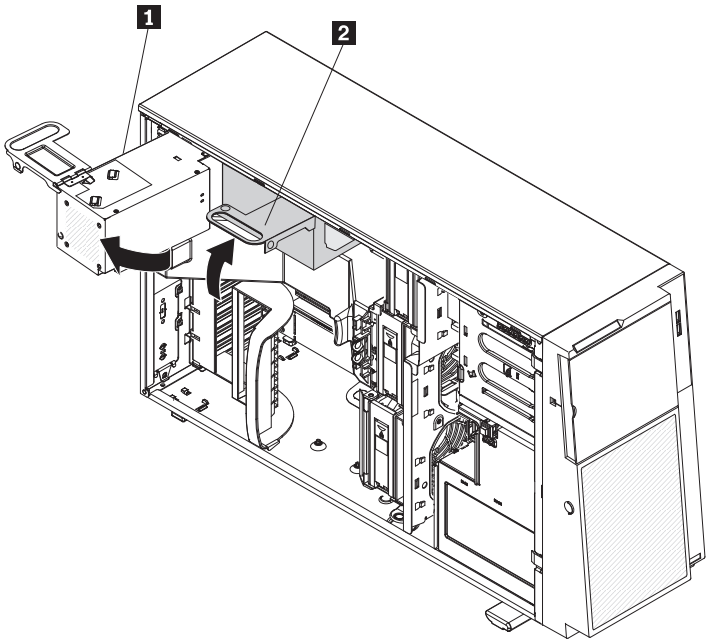
1 Power supply support bracket
2 Power supply release tab

5. Install the side cover (see “Installing the side cover” on page 134).
6. Lock the side cover.
7. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the front USB connector assembly

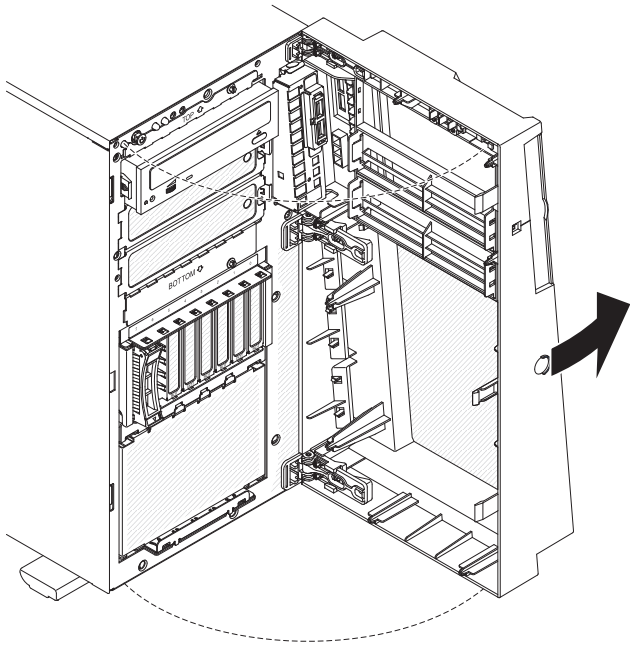
To remove the front USB connector assembly, do the following:

1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37).
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 43).
4. Rotate the power-supply cage assembly out of the chassis. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.



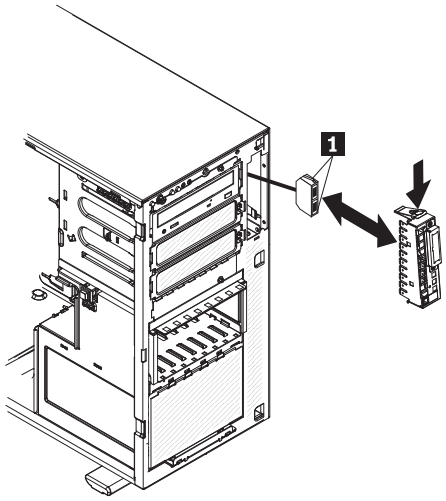
1 Power supply
2 Power-supply handle

5. Remove the air baffle (see “Removing the air baffle” on page 44).
6. Remove the fan cage assembly (see “Removing the fan cage assembly” on page 46).
7. Open the bezel. Place your finger on the pull-point area on the left side of the bezel door and rotate it away from the server.



8. Disconnect the front USB cable from the system board, noting the routing of the cable (see “System-board internal connectors” on page 28 for the location of the front USB connector).

9. Press the release tab on the front USB housing; then, tilt the top of the housing away from the chassis and lift the housing out of the chassis.

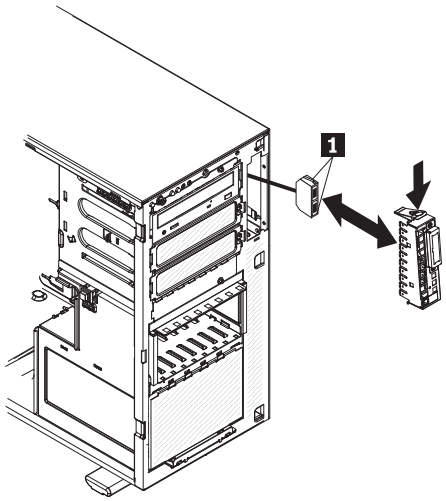


10. Squeeze the spring clips **1** on the sides of the front USB connector assembly and pull the assembly out of the back of the housing.
11. Pull the front USB cable out of the chassis.
12. If you are instructed to return the front USB connector assembly, follow all packaging instructions, and use any packaging materials that are supplied to you for shipping.

Installing the front USB connector assembly

To install the front USB connector assembly, do the following:

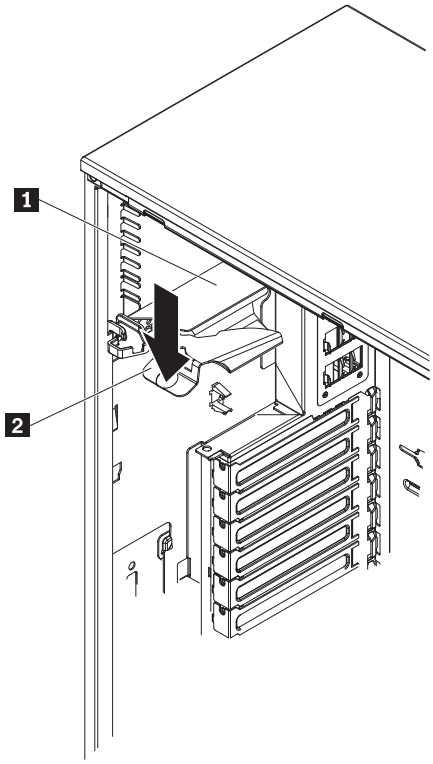
1. Feed the front USB cable through the opening in the front of the chassis.
2. Squeeze the spring clips **1** on the front USB connector assembly and insert the assembly into the housing.
3. Place the bottom edge of the housing into the chassis; then, tilt the top of the housing into position until it clicks into place.



4. Route and connect the front USB cable to the system board (see “System-board internal connectors” on page 28 for the location of the front USB connector).
5. Close the bezel.

6. Install the fan cage assembly (see “Installing the fan cage assembly” on page 47).

   Note: Make sure that all cables are routed so that they are not damaged when inserting the fan cage assembly into the server.
7. Install the air baffle (see “Installing the air baffle” on page 132).
8. Rotate the power-supply cage assembly back into the server. Press the power-supply cage release tab and rotate the power-supply cage assembly into the chassis.



1 Power supply support bracket
2 Power-supply release tab

9. Install the side cover (see “Installing the side cover” on page 134).
10. Lock the side cover.
11. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

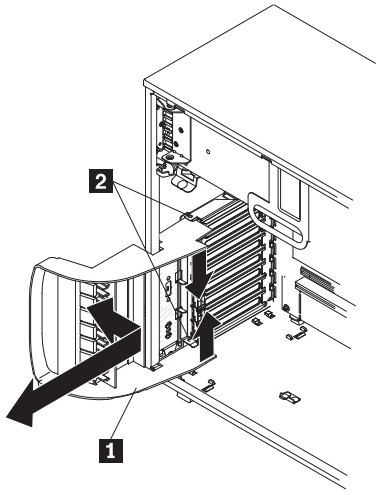
Removing the rear adapter-retention bracket

To remove the rear adapter-retention bracket, do the following:

1. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
2. Unlock and remove the side cover (see “Removing the side cover” on page 43).
3. Remove all adapters and place the adapters on static-protective surface (see “Removing an adapter” on page 95).

   Note: You might find it helpful to note where each adapter is installed before removing the adapters.

4. Open the rear adapter retention bracket.
5. Press the rear adapter retention bracket and release the top hinge point; then, release the other hinge point and remove the bracket from the chassis.



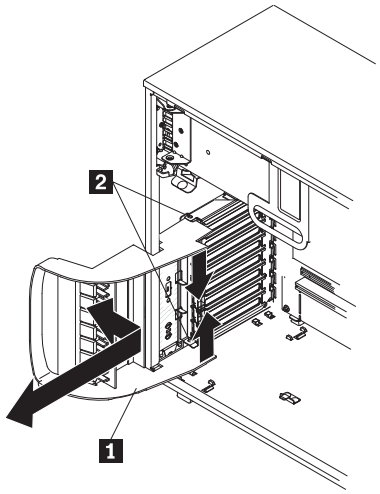
1 Rear adapter retention bracket
2 Hinge pins

6. If you are instructed to return the rear adapter-retention bracket, follow all packaging instructions, and use any packaging materials that are supplied to you for shipping.

Installing the rear adapter retention bracket

To install the rear adapter retention bracket, do the following:

1. Insert the bottom hinge point on the rear adapter retention bracket into the matching hole in the chassis; then, insert the top hinge point into the matching hole.



1 Rear adapter retention bracket
2 Hinge pins

2. Install the adapters (see “Installing an adapter” on page 96).
3. Close the rear adapter retention bracket.

4. Install the side cover (see “Installing the side cover” on page 134).
5. Lock the side cover, if necessary.
6. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the front adapter-retention bracket

To remove the front adapter-retention bracket, do the following:

1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37).
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 43).
4. Open the front and rear adapter-retention brackets.
5. Remove all adapters and place the adapters on static-protective surface (see “Removing an adapter” on page 95).

   Note: You might find it helpful to note where each adapter is installed before removing the adapters.
6. Lift the top of the front adapter-retainer bracket and release the hinge point; then, remove the bottom hinge point and remove the bracket from the chassis.
7. If you are instructed to return the front adapter-retention bracket, follow all packaging instructions, and use any packaging materials that are supplied to you for shipping .

Installing the front adapter-retention bracket

To install the front adapter retention bracket, do the following:

1. Insert one hole on the front adapter-retention bracket into the hinge point.
2. Position the other hole and insert the adapter-retention bracket into the hinge point.
3. Install the adapters (see “Installing an adapter” on page 96).
4. Close the front and rear adapter retention brackets.
5. Install the side cover (see “Installing the side cover” on page 134).
6. Lock the side cover.
7. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the battery

The following notes describe information that you must consider when removing and replacing the battery in the server:

- The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to the following instructions.
- You must replace the battery with a lithium battery of the same type from the same manufacturer.
- To avoid possible danger, read and follow the following safety statement.

Statement 2:

CAUTION:
When replacing the lithium battery, use only a battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

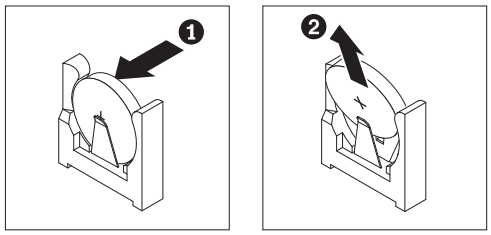
Do not:

- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

To remove the battery, do the following:

1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37).
2. Follow any special handling and installation instructions that come with the battery.
3. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
4. Carefully position the server flat on its side so that it is facing up.

   Note: Do not allow the server to fall over.
5. Unlock and remove the side cover (see “Removing the side cover” on page 43).
6. Remove any adapters that impede access to the battery.
7. Locate the battery on the system board (see “System-board internal connectors” on page 28 for the location of the battery on the system board).
8. Remove the battery:
   a. Use a finger to push the battery horizontally out of its socket, pushing it away from the socket **1** .
   b. Lift and remove the battery from the socket **2** .



9. Dispose of the battery as required by local ordinances or regulations.

Installing the battery

The following notes describe information that you must consider when replacing the battery in the server.

- After you replace the battery, you must reconfigure the server and reset the system date and time.

- The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to the following instructions.
- You must replace the battery with a lithium battery of the same type from the same manufacturer.
- To avoid possible danger, read and follow the following safety statement.

Statement 2:

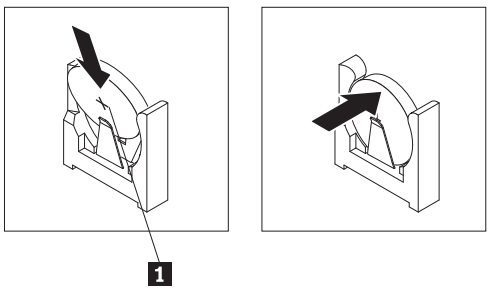
CAUTION:
When replacing the lithium battery, use only a battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

To install the battery, do the following:

1. Follow any special handling and installation instructions that come with the replacement battery.
2. Insert the new battery:
   a. Position the battery so that it is tilted slightly and the smaller side is facing the socket.
   b. Place the battery into the socket toward the right side of the socket, press it down and slide it to the left of the socket housing until it snaps firmly in place.



1 Positive (+) side

3. Install the side cover (see “Installing the side cover” on page 134).
4. Lock the side cover.
5. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Note: You must wait approximately 1 to 3 minutes after you connect the power cord of the server to an electrical outlet before pressing the power-control button.

6. Start the Setup Utility and reset the configuration.
   - Set the system date and time.
   - Set the power-on password.
   - Reconfigure the server.

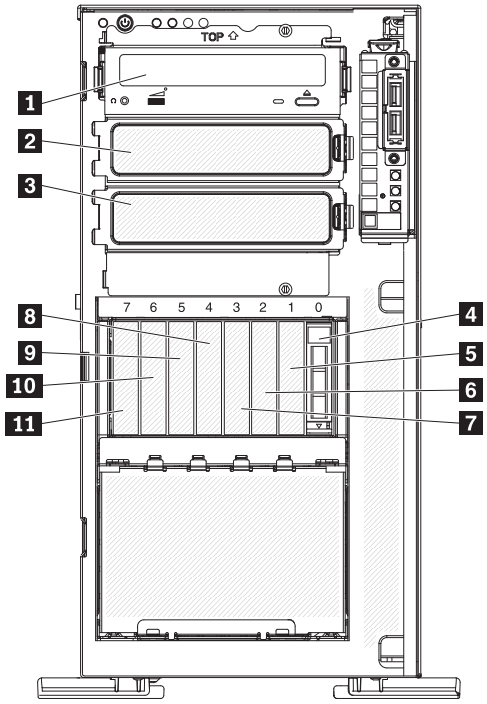
   See “Using the Setup Utility” on page 138 for details.

Removing and installing drives

Depending on the server model, the server might come with a SATA attached DVD-ROM drive in bay 1.

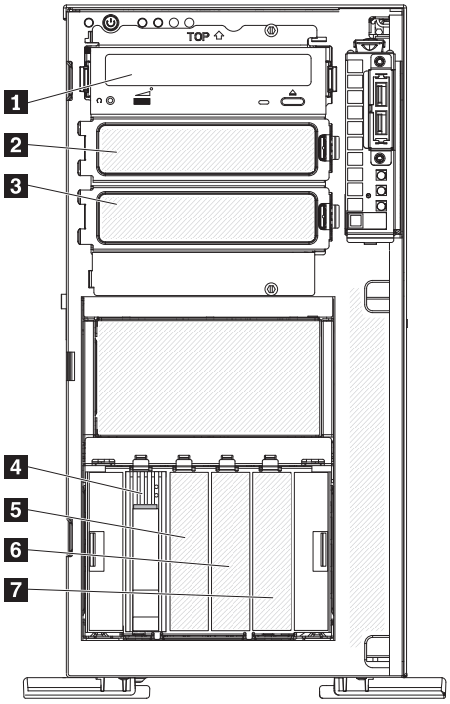
The following are illustrations of the server and the location of the drive bays. Your hardware might differ, depending on the model.

The following illustration shows the location of the drive bays in the 2.5-inch hot-swap SAS or hot-swap SATA hard disk drive server models.



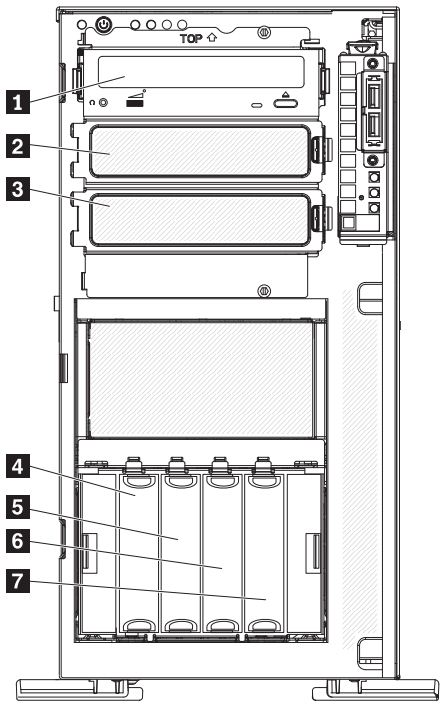
1	Bay 1	7	Bay 3
2	Bay 2	8	Bay 4
3	Bay 3	9	Bay 5
4	Bay 0	10	Bay 6
5	Bay 1	11	Bay 7
6	Bay 2		

The following illustration shows the location of the drive bays in the 3.5-inch hot-swap SAS or hot-swap SATA hard disk drive server models.



1 Bay 1
2 Bay 2
3 Bay 3
4 Bay 4
5 Bay 5
6 Bay 6
7 Bay 7

The following illustration shows the location of the drive bays in the 3.5-inch simple-swap SATA hard disk drive server models.



1 Bay 1
2 Bay 2
3 Bay 3
4 Bay 4
5 Bay 5
6 Bay 6
7 Bay 7

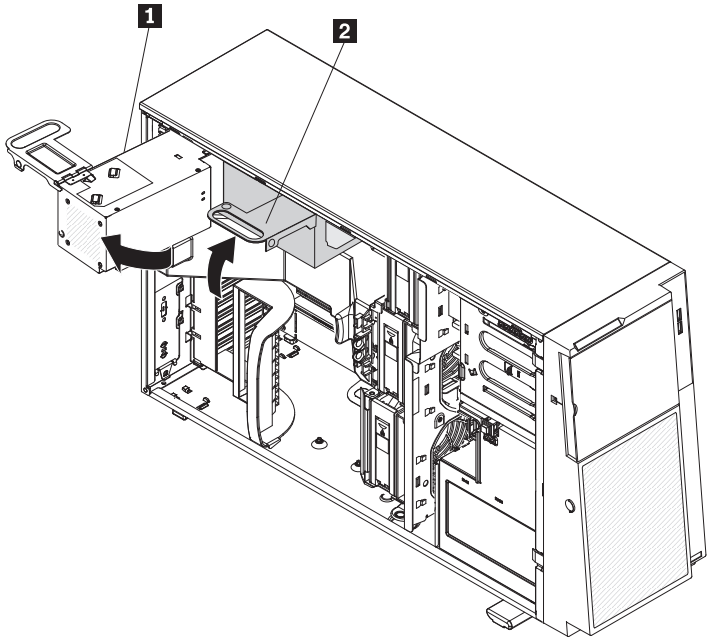
The following notes describe the types of drives that the server supports and other information that you must consider when installing a drive:

- Make sure that you have all the cables and other equipment that is specified in the documentation that comes with the drive.
- Check the instructions that come with the drive to see whether you have to set any switches or jumpers on the drive. If you are installing a SAS or SATA device, be sure to set the SAS or SATA ID for that device.
- Optional external tape drives and DVD-ROM drives are examples of removable-media drives. You can install removable-media drives only in bays 1, 2, and 3.
- To install a 3.5-in. drive in a 5.25-in. bay, you must use a 5.25-in. conversion kit.
- The electromagnetic interference (EMI) integrity and cooling of the server are protected by having all bays and PCI slots covered or occupied. When you install a drive or PCI adapter, save the EMC shield and filler panel from the bay or the PCI adapter slot cover in the event that you later remove the drive or adapter.
- For a complete list of supported options for the server, see http://www.lenovo.com/thinkserver.

Removing a DVD drive

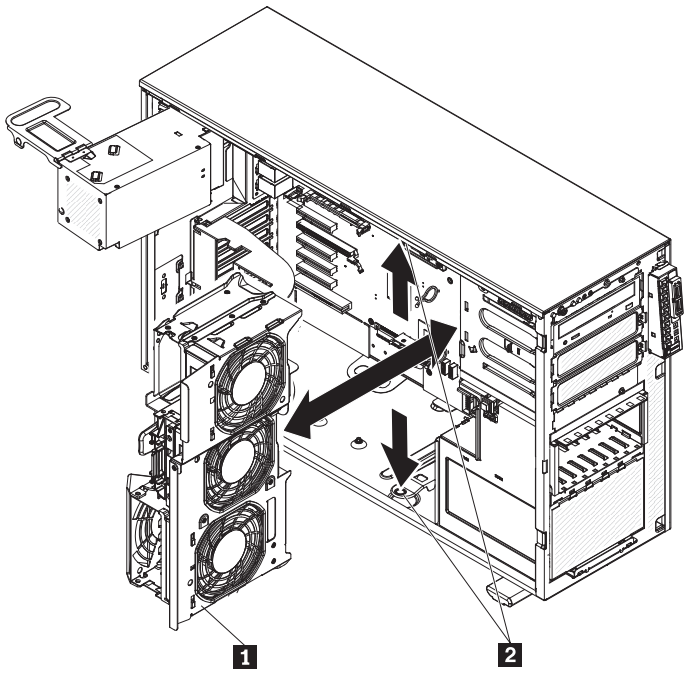
To remove a DVD drive, do the following:

1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37).
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 43).
4. Open the bezel. Place your finger on the pull-point area on the left side of the bezel door and rotate it away from the server.
5. Rotate the power-supply cage assembly out of the chassis. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.



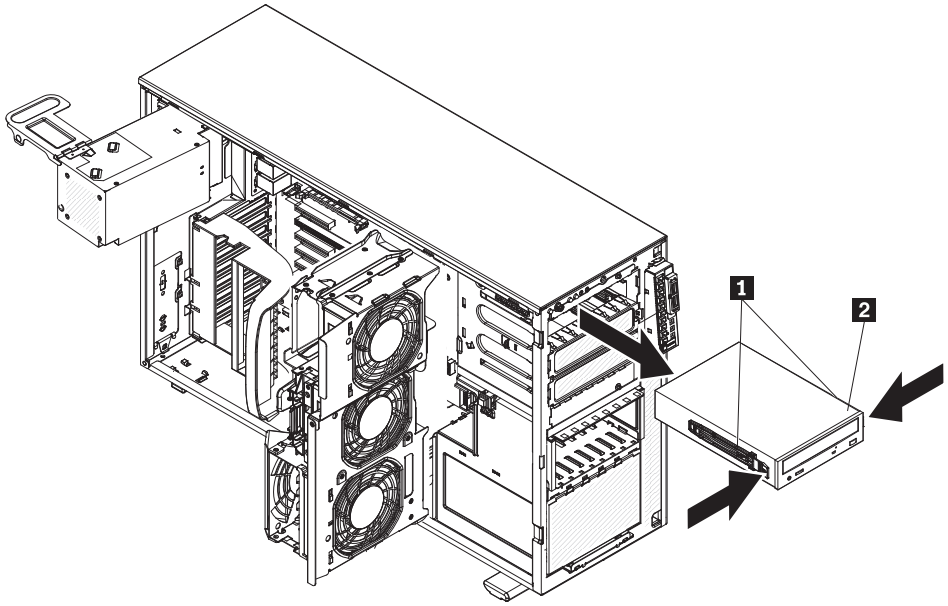
1 Power supply
2 Power-supply handle

6. Remove the air baffle (see “Removing the air baffle” on page 44).
7. Remove the fan cage assembly (see “Removing the fan cage assembly” on page 46).



1 Fan cage assembly
2 Fan cage assembly release buttons

8. Disconnect the power and signal cables from the drive that is to be removed.
9. Press and hold the blue release tabs on each side of the DVD drive to release the drive; then, pull the drive out of the front of the server.



10. Remove the blue optical drive rails 1 from the side of the drive 2 and save the optical rails to use when you install the replacement drive.
11. If you are instructed to return the DVD drive, follow all packaging instructions, and use any packaging materials that are supplied to you for shipping .

Installing a DVD drive

To install a DVD drive, do the following:

1. If you are replacing a drive, make sure that:
   - You have all the cables and other equipment that are specified in the documentation that comes with the new drive.
   - You have checked the instructions that come with the new drive to determine whether you must set any switches or jumpers in the drive.
   - You have removed the blue optical drive rails from the side of the old drive and have them available for installation on the new drive.

   Note: If you are installing a drive that contains a laser, observe the following safety precaution.
   Statement 3:

   CAUTION:
   When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:
   - **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
   - **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

   DANGER

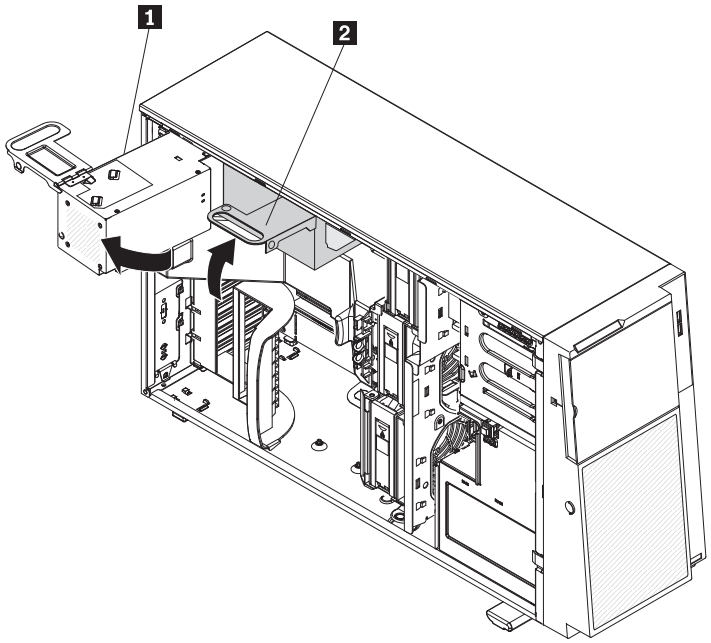
   Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

   Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

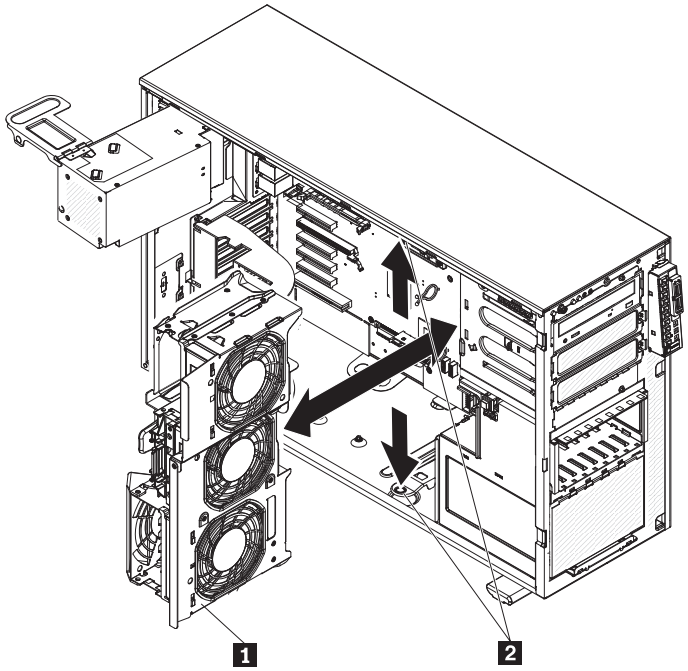
   Class 1 Laser Product
   Laser Klasse 1
   Laser Klass 1
   Luokan 1 Laserlaite
   Appareil À Laser de Classe 1

2. Rotate the power-supply cage assembly out of the chassis. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.



1 Power supply
2 Power-supply handle

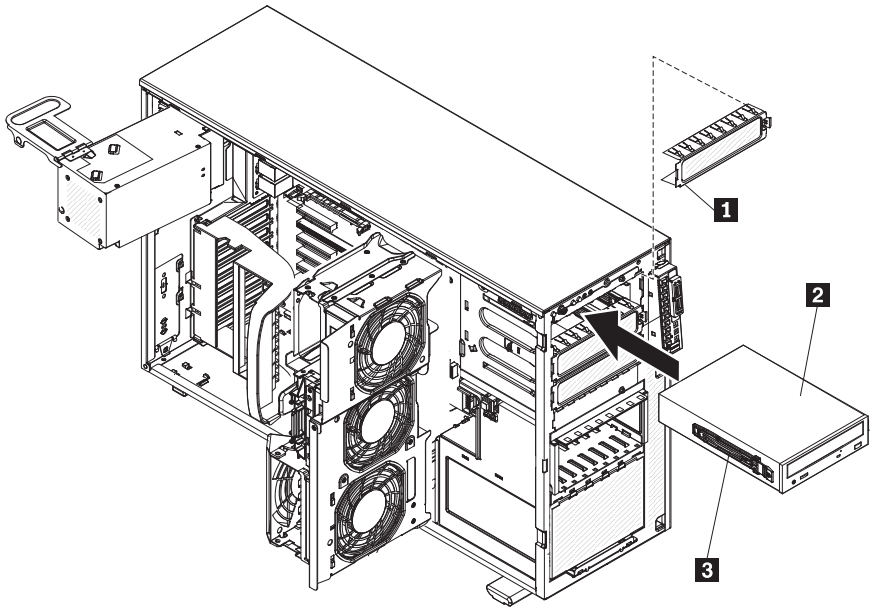
3. Remove the air baffle (see “Removing the air baffle” on page 44).
4. Remove the fan cage assembly. Press in on the fan cage assembly release buttons on the sides of the chassis to release the fan cage assembly from the connector on the chassis. Lift the fan cage assembly up and out of the chassis and set it aside.



1 Fan cage assembly
2 Fan cage assembly release buttons

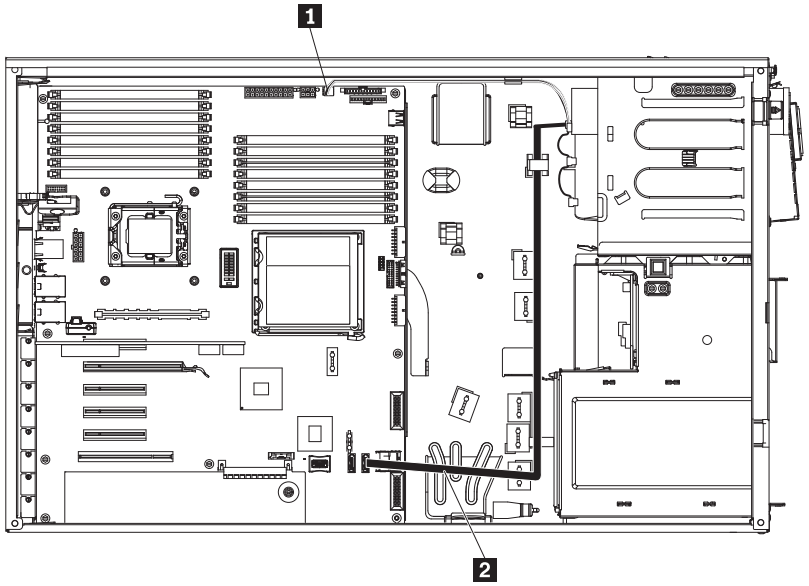
5. Touch the static-protective package that contains the new DVD drive to any unpainted metal surface on the server; then, remove the DVD drive from the package and place it on a static-protective surface.
6. Follow the instructions that come with the drive to set jumpers or switches, if there are any.

   Note: You might find it easier to install the new drive from the front and then attach the cables.
7. Align the holes on the blue optical drive rails with the pins on the side of the drive and snap the optical drive rails onto the drive. Align the rails on the DVD drive with the guides on the drive bay and slide the drive into the drive bay until it locks into place.



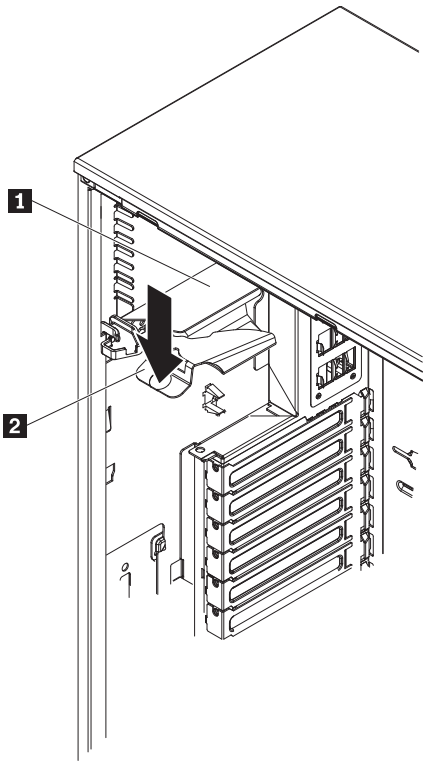
1 EMC shield
2 Optical drive
3 Optical drive rails

8. Reconnect the power and signal cables to the drive.
9. Make sure that the signal cable is routed through the plastic slot on the bottom of the chassis underneath the fan cage assembly so that it does not block the airflow to the rear of the drives as shown in the following illustration:



1 Optical drive power cable
2 SATA optical drive signal cable

10. Install the fan cage assembly (see “Installing the fan cage assembly” on page 47).
11. Install the air baffle (see “Installing the air baffle” on page 132).
12. Rotate the power-supply cage assembly back into the server. Press the power-supply cage release tab and rotate the power-supply cage assembly into the chassis.



1 Power supply support bracket
2 Power supply release tab

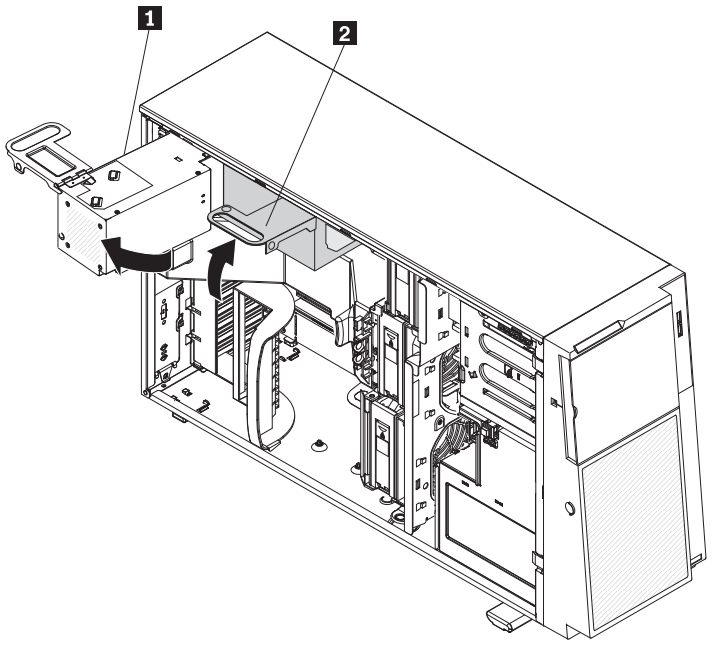
13. Close the bezel.
14. Install the side cover (see “Installing the side cover” on page 134).
15. Lock the side cover.
16. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

If you have other options to install or remove, do so now; otherwise go to “Completing the installation” on page 130.

Removing an optional tape drive

To remove an optional full-high tape drive, do the following:

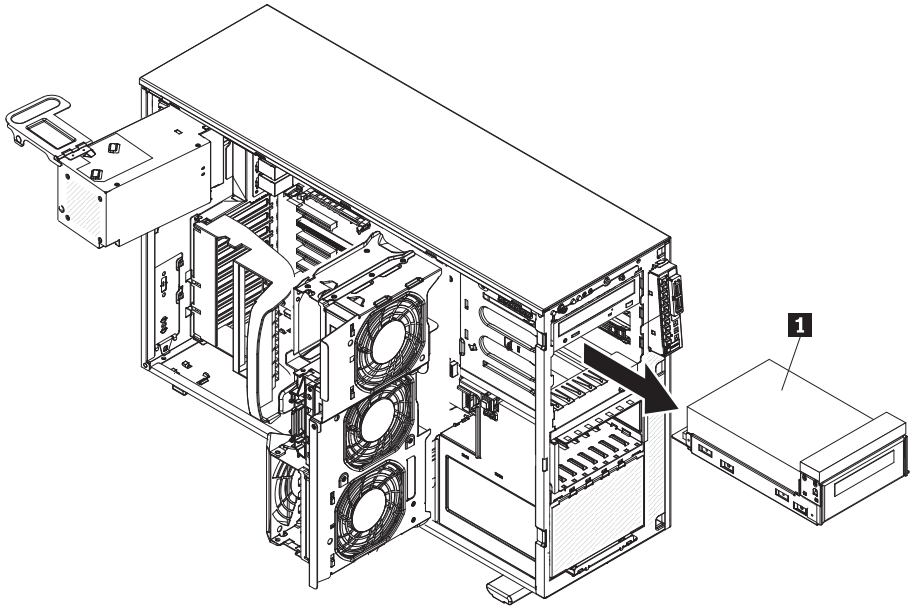
1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37).
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Unlock and the side cover (see “Removing the side cover” on page 43).
4. Open the bezel. Place your finger on the pull-point area on the left side of the bezel door and rotate it away from the server.
5. Rotate the power-supply cage assembly out of the chassis. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.



1 Power supply
2 Power-supply handle

6. Remove the air baffle (see “Removing the air baffle” on page 44).
7. Remove the fan cage assembly. Press in on the fan cage assembly release buttons on the sides of the chassis to release the fan cage assembly from the connector on the chassis. Lift the fan cage assembly up and out of the chassis

and set it aside.

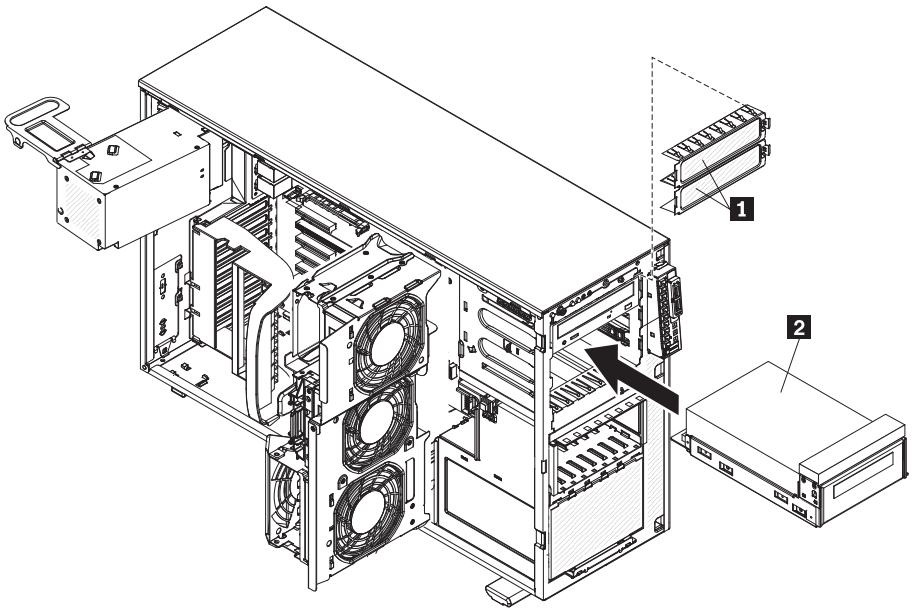


8. Disconnect the tape drive cable from the system board.
9. Remove the screws that secure the tape drive **1** to the server.
10. Gently pull the drive out of the server.
11. If you are instructed to return the tape drive, follow all packaging instructions, and use any packaging materials that are supplied to you for shipping.

Installing an optional tape drive

To install a optional full-high tape drive, do the following:

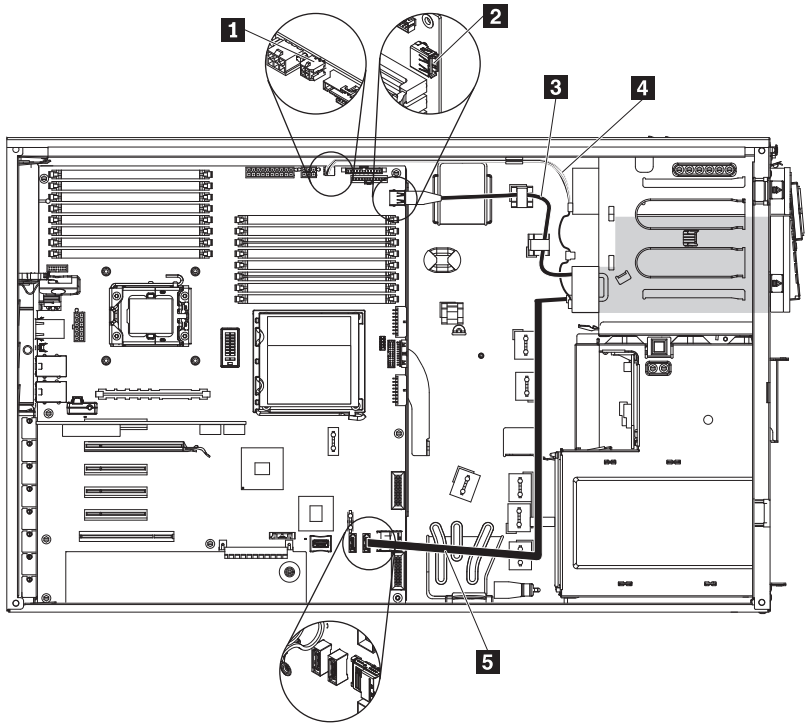
1. Remove the EMC shields from the drive bay, if installed.
2. Touch the static-protective package that contains the tape drive to any unpainted metal surface on the server; then, remove the tape drive from the package and place it on a static-protective surface.
3. Install the blue rails on the sides of the tape drive.
4. Align the rails on tape drive with the guides in the drive bay; then, slide the tape drive into the server from the front of the server until it clicks into place.



1 EMC shield
2 Tape drive

5. If the tape drive comes with screws, secure the tape drive to the chassis with the supplied screws.
6. Connect one of the connectors on the optical drive power cable to the tape drive.

   Note: If you are installing an RDX internal USB tape drive, use the SATA-to-traditional power converter cable to serve as a bridge between the optical power cable and the power connector on the RDX tape drive.
7. Connect one end of the tape drive signal cable to the tape drive and the other end to the connector on the system board. Route the cable through the plastic slots on the bottom of the chassis underneath the fan cage assembly as shown in the following illustration:



1 SATA optical drive power cable
2 USB signal cable connector
3 USB signal cable
4 SATA optical drive power cable (SATA-to-traditional power converter cable also included but not pictured)
5 SATA optical drive signal cable

8. Reinstall the fan cage assembly. Align the fan cage assembly over the fan cage assembly slot and with the connector on the system board. Lower the fan cage assembly into the chassis and press down firmly until the fan cage assembly is seated firmly in place.

   Note: Make sure that all wires and cables inside the server are routed correctly before installing the fan cage assembly. Wiring that is not properly routed could be damaged or might prevent the fan cage assembly from seating properly in the server.
9. Install the air baffle (see “Installing the air baffle” on page 132).
10. Rotate the power-supply cage assembly back into the server. Press the power-supply cage release tab and rotate the power-supply cage assembly into the chassis.
11. Close the bezel.
12. Install the side cover (see “Installing the side cover” on page 134).
13. Lock the side cover.
14. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

If you have other options to install or remove, do so now; otherwise go to “Completing the installation” on page 130.

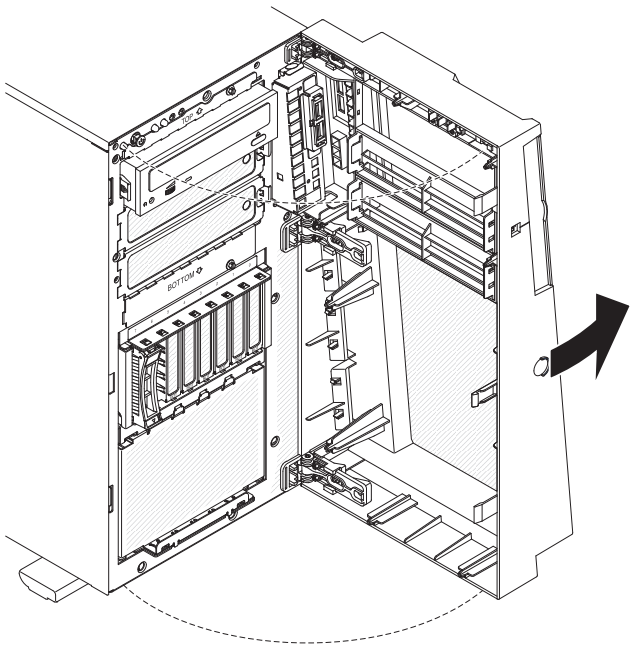
Removing a 2.5-inch hot-swap hard disk drive

Attention: To maintain proper system cooling, do not operate the server for more than 10 minutes without either a drive or a filler panel installed in each drive bay.

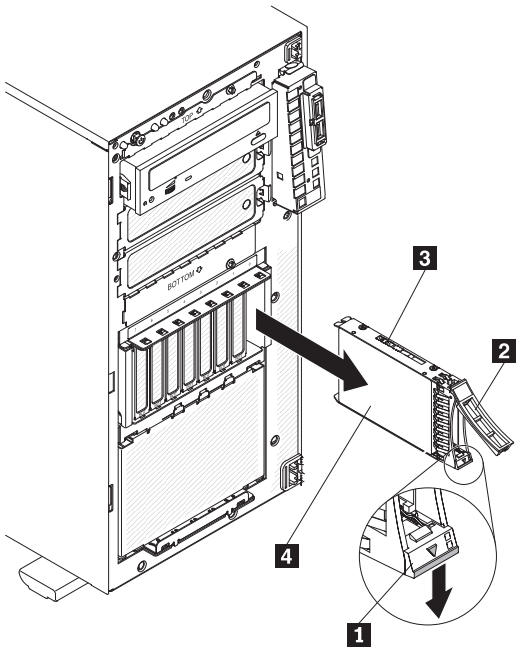
To remove a 2.5-inch hot-swap hard disk drive, do the following:

1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37).

   Attention: Static electricity that is released to internal server components when server is powered on might cause the server to halt, which might result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when you work inside the server with the power on.
2. Unlock the side cover.
3. Open the bezel. Place your finger on the pull-point area on the left side of the bezel door and rotate it away from the server.



4. Press the release latch at the top of the drive to release the drive handle.
5. Rotate the handle on the drive upward to the open position.
6. Pull the hot-swap drive out of the bay approximately 25 mm (1 inch). Wait approximately 45 seconds while the drive spins down before you remove the drive completely from the bay.



1 Release latch
2 Drive tray handle (in open position)
3 Drive tray
4 Hard disk drive

7. If you are instructed to return the 2.5-inch hot-swap hard disk drive, follow all packaging instructions, and use any packaging materials that are supplied to you for shipping.

Installing a 2.5-inch hot-swap hard disk drive

Before installing a 2.5-inch hot-swap hard disk drive, read the following information:

- The 2.5-inch hot-swap drives must be either all SAS hard disk drives or all SATA hard disk drives; do not mix SAS and SATA drives.
- Inspect the drive tray for signs of damage.
- To maintain proper system cooling, do not operate the server for more than 10 minutes without either a drive or a filler panel installed in each drive bay.
- You do not have to turn off the server to install hot-swap drives in the hot-swap drive bays.

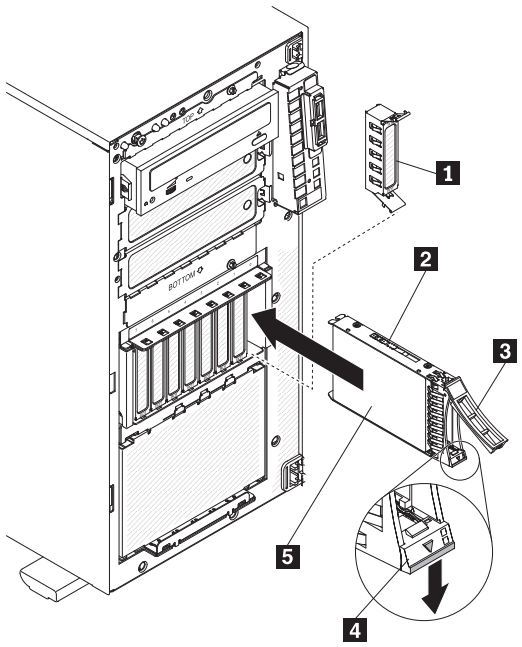
Locate the documentation that comes with the hard disk drive and follow those instructions in addition to the instructions in this section.

Attention: Static electricity that is released to internal server components when server is powered-on might cause the server to halt, which might result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when you work inside the server with the power on.

To install a 2.5-inch hot-swap hard disk drive, do the following:

Attention: To maintain proper system cooling, do not operate the server for more than 10 minutes without either a drive or a filler panel installed in each bay.

1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37).
2. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
3. Remove the filler panel from the drive bay, if one is installed.
4. Orient the drive as shown in the illustration.



1 EMC shield
2 Drive tray
3 Drive tray handle (in open position)
4 Release latch
5 Hard disk drive

5. Make sure that the tray handle is open.
6. Align the drive assembly with the guide rails in the bay.
7. Push the drive into the bay until the drive stops.
8. Push the tray handle to the closed (locked) position.
9. Check the hard disk drive status indicator to make sure that the hard disk drive is operating correctly.

   After you replace a failed hard disk drive, the green activity LED flashes as the disk spins up. The amber LED turns off after approximately 1 minute. If the new drive starts to rebuild, the amber LED flashes slowly, and the green activity LED remains lit during the rebuild process. If the amber LED remains lit continuously, the drive is faulty and must be replaced. See the *Hardware Maintenance Manual*.

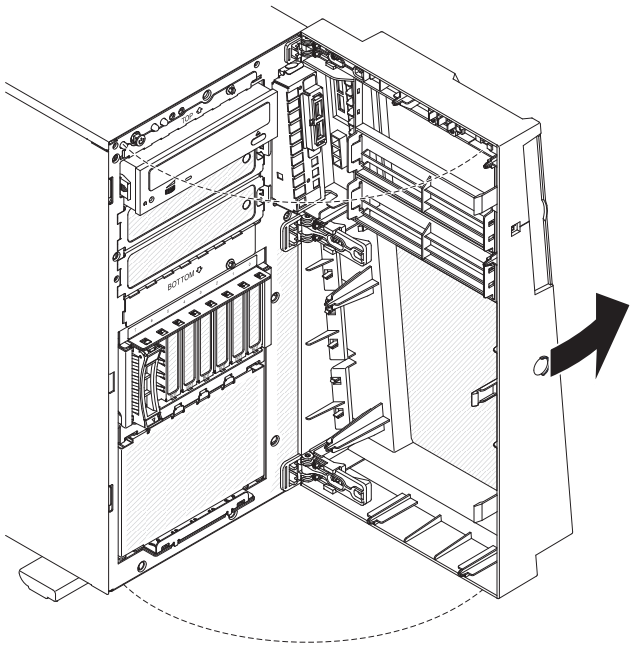
   Note: You might have to reconfigure the disk arrays after you install hard disk drives.
10. Close the bezel.
11. Lock the side cover.

Removing a 3.5-inch hot-swap hard disk drive

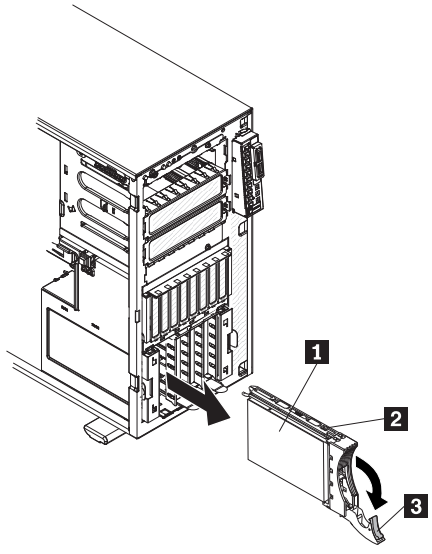
Attention: To maintain proper system cooling, do not operate the server for more than 10 minutes without either a drive or a filler panel installed in each drive bay.

To remove a 3.5-inch hot-swap SAS or hot-swap SATA hard disk drive, do the following:

1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37).
2. Unlock the side cover.
3. Open the bezel. Place your finger on the pull-point area on the left side of the bezel door and rotate it away from the server.



4. Rotate the drive tray handle of the drive assembly to the open position.
5. Grasp the handle of the drive and pull the drive out of the bay.



1 Hot-swap hard disk drive
2 Drive tray
3 Drive tray handle (in open position)

6. If you are instructed to return the 3.5-inch hot-swap hard disk drive, follow all packaging instructions, and use any packaging materials that are supplied to you for shipping.

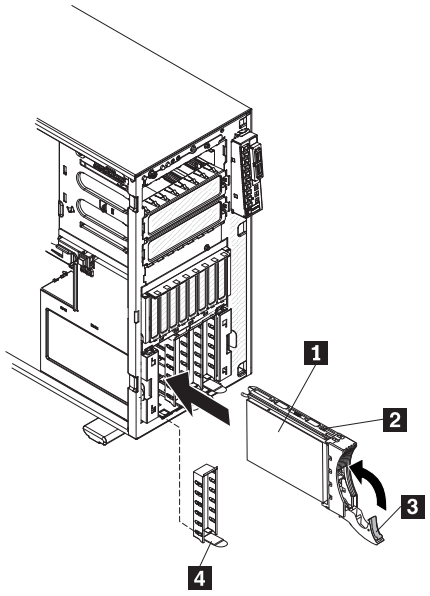
Installing a 3.5-inch hot-swap hard disk drive

Before installing a 3.5-inch hot-swap hard disk drive, read the following information:

- The 3.5-inch hot-swap drives must be either all SAS hard disk drives or all SATA hard disk drives; do not mix SAS and SATA drives.
- Inspect the drive tray for signs of damage.
- To maintain proper system cooling, do not operate the server for more than 10 minutes without either a drive or a filler panel installed in each drive bay.
- You do not have to turn off the server to install hot-swap drives in the hot-swap drive bays.

To install a 3.5-inch hot-swap hard disk drive, do the following:

1. Remove the EMC shield, if one is present.
2. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
3. Make sure that the drive tray handle is in the open position.
4. Align the drive assembly with the guide rails in the bay; then, carefully slide the drive assembly into the drive bay until the drive snaps into place.



1 Hot-swap hard disk drive
2 Drive tray
3 Drive tray handle (in open position)
4 EMC shield

5. Rotate the drive tray handle to the closed position.

6. Check the hard disk drive status indicator to make sure that the hard disk drive is operating correctly.

   After you replace a failed hard disk drive, the green activity LED flashes as the disk spins up. The amber LED turns off after approximately 1 minute. If the new drive starts to rebuild, the amber LED flashes slowly, and the green activity LED remains lit during the rebuild process. If the amber LED remains lit, see the *Hardware Maintenance Manual*.

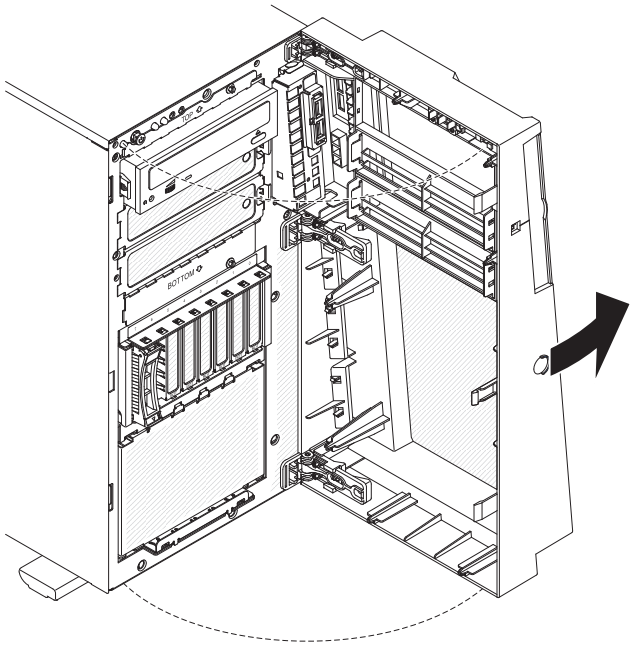
   Note: You might have to reconfigure the disk arrays after you install hard disk drives.
7. Close the bezel.
8. Lock the side cover.

Removing a simple-swap hard disk drive

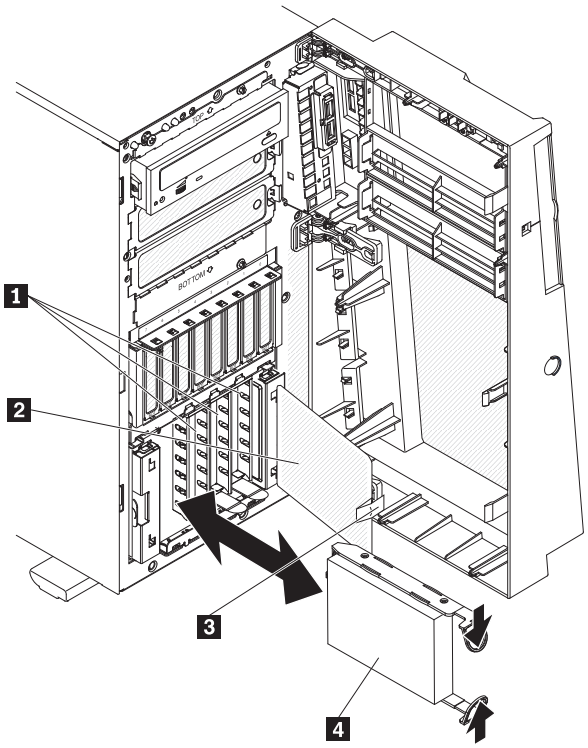
Attention: Simple-swap hard disk drives are not hot-swappable. Disconnect all power from the server before removing or installing a simple-swap hard disk drive.

To remove a simple-swap hard disk drive, do the following:

1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37).
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock the side cover.
4. Open the bezel. Place your finger on the pull-point area on the left side of the bezel door and rotate it away from the server.



5. Grasp the tab on the drive bay EMC shield and rotate it to the open position.



1 Filler panels
2 Drive-bay EMC shield
3 Tab
4 Hard disk drive

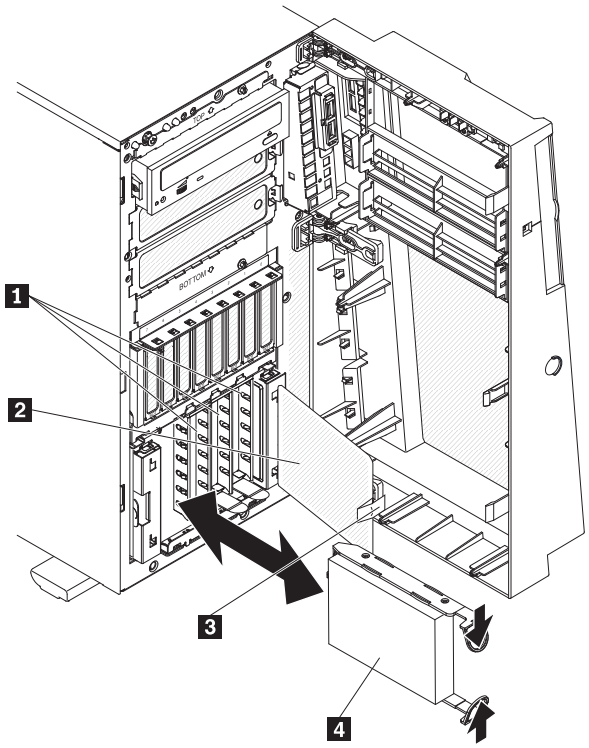
6. Pull the loops of the drive assembly that is to be removed toward each other; then, pull the drive assembly out of the bay and set it aside.
7. If you are instructed to return the simple-swap hard disk drive, follow all packaging instructions, and use any packaging materials that are supplied to you for shipping.

Installing a simple-swap hard disk drive

Attention: Simple-swap hard disk drives are not hot-swappable. Disconnect all power from the server before removing or installing a simple-swap hard disk drive.

To install a simple-swap hard disk drive, do the following:

1. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
2. Align the drive assembly with the guide rails in the bay.



1 Filler panels
2 Drive-bay EMC shield
3 Tab
4 Hard disk drive

3. Pull the loops of the drive assembly toward each other; then, carefully slide the drive assembly into the drive bay until it stops and release the loops.

   Note: Do not release the loops on the drive assembly until it is completely seated.
4. Close the drive bay EMC shield.
5. Close the bezel.
6. Lock the side cover.
7. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

IDs for hot-swap hard disk drives

Hot-swap server models have drive bays that are connected to a SAS/SATA backplane. This backplane, also known as the hot-swap-drive backplane, is the printed circuit board behind these bays.

The hot-swap-drive backplane controls the IDs for the internal hot-swap drive bays. The following tables list the IDs for the hard disk drives and backplane that are connected to hot-swap models.

Table 4. IDs for the four-bay 3.5-inch hot-swap drive models

Drive bay number	ID
Drive bay 4	0

Table 4. IDs for the four-bay 3.5-inch hot-swap drive models (continued)

Drive bay number	ID
Drive bay 5	1
Drive bay 6	2
Drive bay 7	3

Table 5. IDs for the eight-bay 2.5-inch hot-swap models

Drive bay number	ID
Drive bay 4	0
Drive bay 5	1
Drive bay 6	2
Drive bay 7	3
Drive bay 8	4
Drive bay 9	5
Drive bay 10	6
Drive bay 11	7

Power and signal cables for internal drives

The server uses cables to connect SATA attached, simple-swap SATA, hot-swap SATA and hot-swap SAS devices to the power supply and to the system board. (See “System-board internal connectors” on page 28 for the location of system-board connectors.) Review the following information before connecting power and signal cables to internal drives:

- The drives that are preinstalled in the server come with power and signal cables attached. If you replace any drives, remember which cable is attached to which drive.
- When you route a cable, make sure that it does not block the airflow to the rear of the drives or over the microprocessor or DIMMs.

The following cables are provided:

- The DVD drive is attached to an ATA signal cable. The blue connector is attached to the system board. The connector on the other end is attached to the SATA device. The middle connector attaches to an optional optical device or tape drive. A separate power cable provides power to the device from the system board.
- **Simple-swap SATA models:** The simple-swap SATA models come with a combination signal/power cable that connects to the connector on the system board and the simple-swap SATA backplate to provide signal and power to the simple-swap SATA drives. Connect the power connector on the split end of the cable to the **Hard disk drive backplane power connector** on the system board and connect the signal connector on the split end of the cable to the **Simple-swap SATA signal cable connector** on the system board. On the other end of the combination signal/power cable, connect a signal connector to each drive bay signal connector on the simple-swap SATA backplate and connect a power connector to each drive bay power connector on the simple-swap SATA backplate.
- **Hot-swap SAS or hot-swap SATA models:**

– The 2.5-inch hot-swap SAS and hot-swap SATA models come with the following cables to provide signal and power to the hot-swap SAS/SATA drives:
  - Two single signal cables (thick red and black) that connects to the signal cable connectors on the hard disk drive backplanes and the connectors on the SAS/SATA RAID adapter (see the ServeRAID adapters installation instructions in this document for more cabling information).
  - A split power cable (red/yellow/black). The end of the power cable with the single connector connects to the **Hard disk drive backplane power connector** on the system board and the end of the power cable with the two connectors, connects to the power connectors on the hard disk drive backplanes.
  - A split configuration signal cable (black). The end of the configuration signal cable with the single connector connects to the **Hard disk drive backplane configuration signal connector** on the system board and the end of the configuration signal cable with the two connectors, connects to the configuration signal connectors on the hard disk drive backplanes.
– The 3.5-inch hot-swap SAS and hot-swap SATA models come with the following to provide signal and power to the 3.5-inch hot-swap SAS/SATA drives:
  - A single signal cable (thick red and black) that connects to the hard disk drive backplane and one of the connectors on the SAS/SATA RAID adapter (see the ServeRAID adapters installation instructions in this document for more cabling information).
  - A single power cable (red/yellow/black) that connects to the **Hard disk drive backplane power connector** on the system board and to the power connector on the hard disk drive backplane.
  - A single configuration signal cable (black) that connects to the **Hard disk drive backplane configuration signal connector** on the system board and the configuration signal connector on the hard disk drive backplane.

For more information about the requirements for SAS/SATA cables and connecting SAS/SATA devices, see the documentation that comes with these devices.

For a list of supported options for the server, see http://www.lenovo.com/thinkserver.

Removing a power supply

When you remove or install a power supply, observe the following precautions.

Statement 8:

CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.

Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Statement 11:

CAUTION:
The following label indicates sharp edges, corners, or joints nearby.

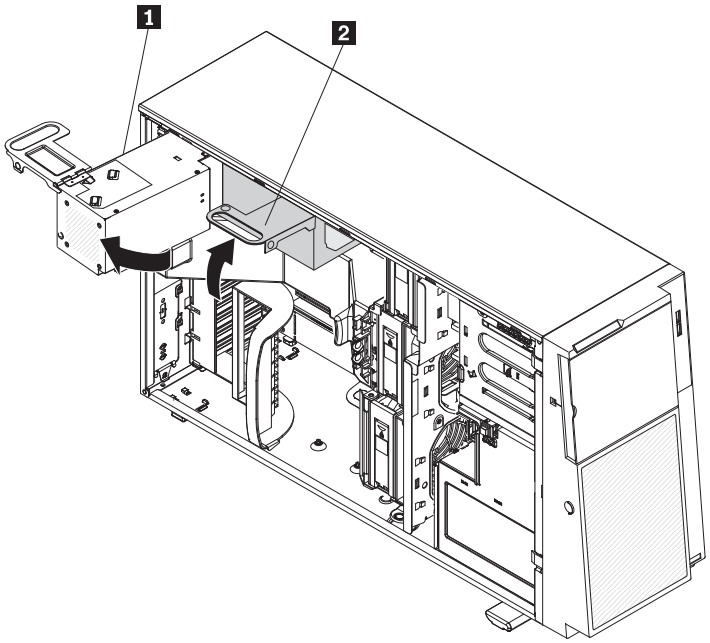
Statement 17:

CAUTION:
The following label indicates moving parts nearby.

To remove a power supply, do the following:

1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37).
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 43).

   Note: It might be helpful to position the server on its side for the remainder of this procedure.
4. Rotate the power-supply cage assembly out of the chassis. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.

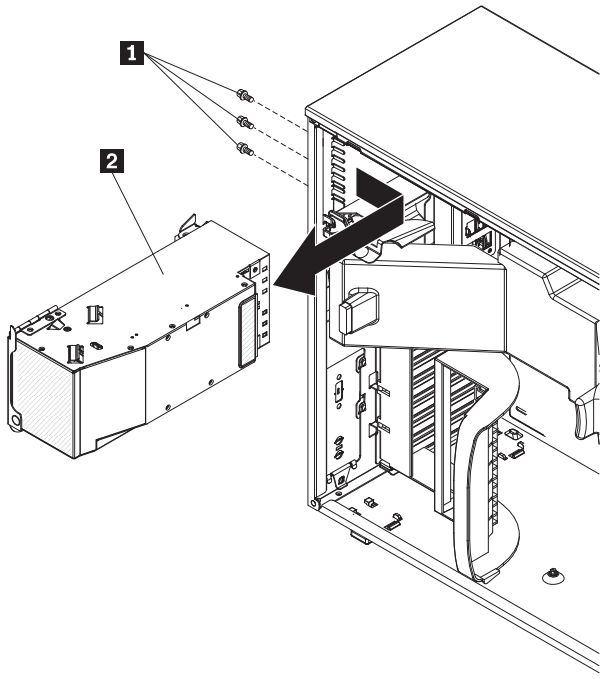


1 Power supply
2 Power-supply handle

5. Disconnect the cables from the power supply to the system board and all internal components. Be sure to make a note of the cable routing.

   Attention: Support the power supply while you remove the mounting screws. After the screws are removed, the power supply is loose and can damage other components in the server.

6. While you support the power-supply, remove the three screws from the pivot bracket that secure the power supply to the chassis; then, lift the power supply off the chassis. Save the screws to use when you install the replacement power supply.



1 Power supply retaining screws
2 Power supply assembly

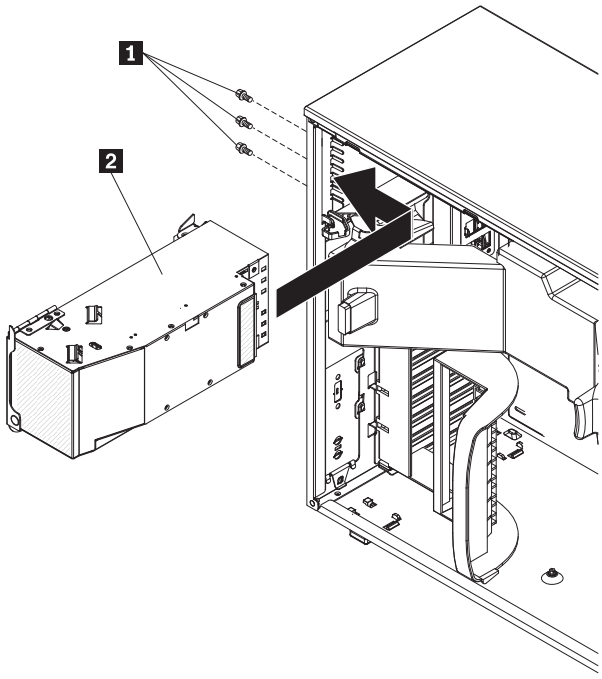
7. If you are instructed to return the power supply, follow all packaging instructions, and use any packaging materials that are supplied to you for shipping.

Installing a power supply

To install a power supply, do the following:

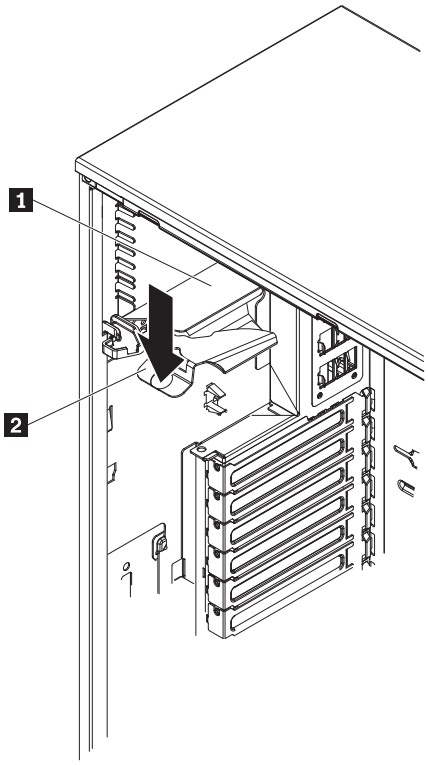
Note: Approximately 1 to 3 minutes after the server is connected to ac power, the power-control button becomes active.

1. Align the screw holes in the power-supply-cage pivot bracket with the corresponding screw holes on the rear of the chassis.



1 Power supply retaining screws
2 Power supply assembly

2. While you support the power supply cage, install the three screws that secure the power supply to the chassis.
3. Connect the cables from the power supply to the system board and all internal components.
4. Rotate the power-supply-cage assembly back into the server. Press the power-supply-cage release tab and rotate the power-supply-cage assembly into the chassis.



1 Power supply support bracket
2 Power supply release tab

5. Install the side cover (see “Installing the side cover” on page 134).
6. Lock the side cover.
7. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing a hot-swap fan

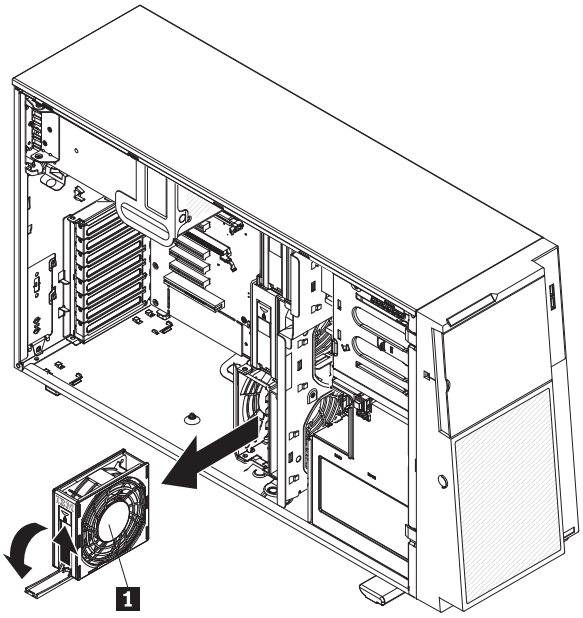
Attention:

- Replace a hot-swap fan within 30 seconds of removal.
- To ensure proper cooling and airflow, do not operate the server for more than 2 minutes with the side cover removed.

To replace a hot-swap fan, do the following:

1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37).

   Attention: Static electricity that is released to internal server components when the server is powered on might cause the server to halt, which could result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when working inside the server with the power on.
2. Unlock and remove the side cover (see “Removing the side cover” on page 43).
3. With your finger, slide the orange release tab in the direction indicated by the arrow on top of the fan to unlock the fan handle. Grasp the fan handle and pull the fan 1 out of the fan cage assembly.



4. If you are instructed to return the hot-swap fan, follow all packaging instructions, and use any packaging materials that are supplied to you for shipping.

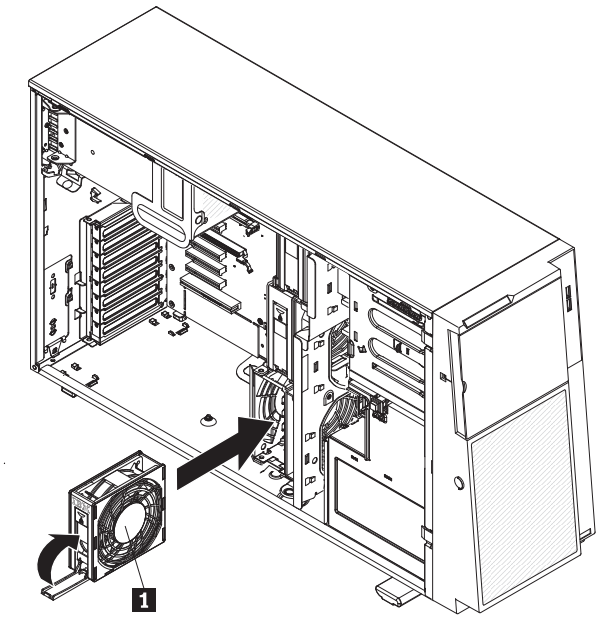
Installing a hot-swap fan

Attention:

- Replace a hot-swap fan within 30 seconds of removal.
- To ensure proper cooling and airflow, do not operate the server for more than 2 minutes with the side cover removed.

To install a hot-swap fan, do the following:

1. Touch the static-protective package that contains the hot-swap fan to any unpainted metal surface on the server; then, remove the fan from the package and place it on a static-protective surface.
2. Align the fan **1** over the fan slot and lower fan into the slot in the fan cage assembly.



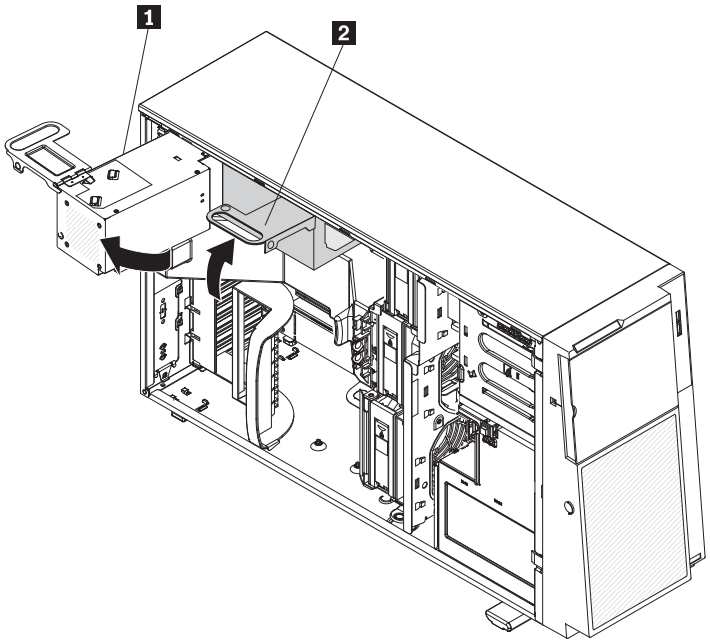
3. Press down on the fan until it locks into place; then, close the fan handle to the locking position.
4. Install the side cover (see “Installing the side cover” on page 134).
5. Lock the side cover.

Removing a memory module

To remove a DIMM, do the following:

1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37).
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Carefully position the server on its side so that it is facing up.

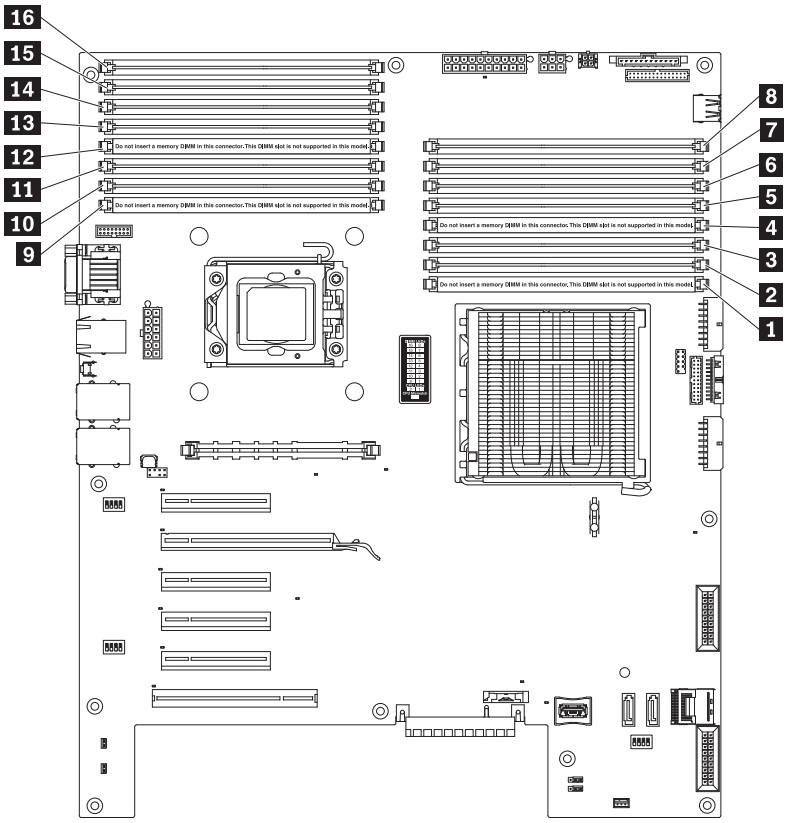
   Note: Do not allow the server to fall over.
4. Unlock and remove the side cover (see “Removing the side cover” on page 43).
5. Rotate the power-supply cage assembly out of the chassis. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.



1 Power supply
2 Power-supply handle

6. Remove the air baffle (see “Removing the air baffle” on page 44).
7. Locate the DIMM connector that contains the DIMM that is to be replaced.

   Note: Do not insert memory DIMMs into connectors marked as reserved. These DIMM slots are not supported in this model.

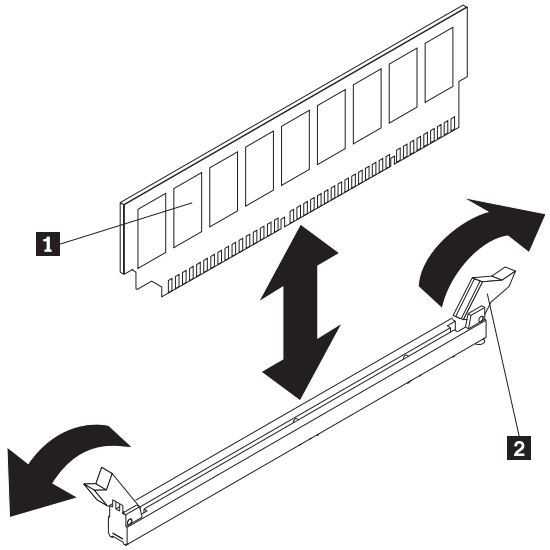

16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
Do not insert a memory DIMM in this connector. This DIMM slot is not supported in this model.
Do not insert a memory DIMM in this connector. This DIMM slot is not supported in this model.
Do not insert a memory DIMM in this connector. This DIMM slot is not supported in this model.
Do not insert a memory DIMM in this connector. This DIMM slot is not supported in this model.

1	DIMM 1 (reserved)	9	DIMM 9 (reserved)
2	DIMM 2	10	DIMM 10
3	DIMM 3	11	DIMM 11
4	DIMM 4 (reserved)	12	DIMM 12 (reserved)
5	DIMM 5	13	DIMM 13
6	DIMM 6	14	DIMM 14
7	DIMM 7	15	DIMM 15
8	DIMM 8	16	DIMM 16

.

Attention: To avoid breaking the DIMM retaining clips or damaging the DIMM connectors, open and close the clips gently.

8. Carefully open the retaining clips on each end of the DIMM connector and remove the DIMM.



1 DIMM
2 Retaining clip

9. If you are instructed to return the DIMM, follow all packaging instructions, and use any packaging materials that are supplied to you for shipping.

Installing a memory module

Note: If you are replacing a faulty DIMM, make sure that the replacement DIMM is the correct type of memory. If you are adding DIMMs, install the DIMMs in the sequence indicated in this section.

The following notes describe the types of dual inline memory modules (DIMMs) that the server supports and other information that you must consider when installing DIMMs (see “System-board option connectors” on page 30 for the location of the DIMM connectors):

- The server supports industry-standard, 800, 1066, or 1333 MHz, PC3-10600R-999 (single-rank or dual-rank) double-data-rate 3 (DDR3), registered, synchronous dynamic random-access memory (SDRAM) dual inline memory modules (DIMMs) with error correcting code (ECC). For a list of

supported options for the server, see http://www.lenovo.com/thinkserver; then, select your country and navigate to the list of options for the server.

– The specifications of a DDR3 DIMM are on a label on the DIMM, in the following format.

*ggg e*Rx*ff*-PC3-*wwwwwm-aa-bb-cc*

where:

ggg is the total capacity of the DIMM (for example, 1GB, 2GB, or 4GB)

e is the number of ranks

1 = single-rank

2 = dual-rank

4 = quad-rank

ff is the device organization (bit width)

4 = x4 organization (4 DQ lines per SDRAM)

8 = x8 organization

16 = x16 organization

wwwww is the DIMM bandwidth, in MBps

6400 = 6.40 GBps (PC3-800 SDRAMs, 8-byte primary data bus)

8500 = 8.53 GBps (PC3-1066 SDRAMs, 8-byte primary data bus)

10600 = 10.66 GBps (PC3-1333 SDRAMs, 8-byte primary data bus)

12800 = 12.80 GBps PC3-1600 SDRAMs, 8-byte primary data bus)

m is the DIMM type

E = Unbuffered DIMM (UDIMM) with ECC (x72-bit module data bus)

R = Registered DIMM (RDIMM)

U = Unbuffered DIMM with no ECC (x64-bit primary data bus)

aa is the CAS latency, in clocks at maximum operating frequency

bb is the JEDEC SPD Revision Encoding and Additions level

cc is the reference design file for the design of the DIMM

d is the revision number of the reference design of the DIMM

- The server supports a maximum of 12 single-rank or dual-rank DIMMs.

  Note: To determine the type of a DIMM, see the label on the DIMM. The information on the label is in the format xxxxx nRxxx PC3-xxxxx-xx-xx-xxx. The numeral in the sixth numerical position indicates whether the DIMM is single-rank (n=1) or dual-rank (n=2).

- The server supports three single-rank or dual-rank DIMMs per channel. The following table shows an example of the maximum amount of memory that you can install, using ranked DIMMs.

Table 6. Maximum memory installation using ranked DIMMs

Number of DIMMs	DIMM type	DIMM size	Total memory
12	Single-rank DIMMs	4 GB	48 GB
12	Dual-rank DIMMs	4 GB	48 GB
12	Dual-rank DIMMs	8 GB (if available)	96 GB

- The DIMM options that are available for the server are 1 GB, 2 GB, 4 GB, and 8 GB (when available). The server supports a minimum of 2 GB and a maximum of 96 GB of system memory.

Note: The amount of usable memory is reduced depending on the system configuration. A certain amount of memory must be reserved for system resources. To view the total amount of installed memory and the amount of configured memory, run the Setup Utility. For additional information, see “Using the Setup Utility” on page 138.

- A minimum of one DIMM must be installed for each microprocessor. For example, you must install a minimum of two DIMMs if the server has two microprocessors installed. However, to improve system performance, install a minimum of three DIMMs for each microprocessor.
- The maximum operating speed of the server is determined by the slowest DIMM install in the server.
- The server comes with a minimum of two 1 GB DIMMs, installed in slots 3 and 6.
- When you install additional DIMMs in independent mode, install them in the order shown in the following table to optimize system performance. All three channels on the memory interface for each microprocessor can be populated in any order and have no matching requirements.

Table 7. Independent mode DIMM installation sequence

Installed microprocessors	DIMM connector population sequence
Microprocessor socket 1	3, 6, 8, 2, 5, 7
Microprocessor socket 2	11, 14, 16, 10, 13, 15
Note: DIMM connectors 1, 4, 9, and 12 are not functional. Do not install DIMMs in these connectors.	

- The server supports memory mirroring (mirroring mode):
  - Memory-mirroring mode replicates and stores data on two pairs of DIMMs within two channels (channels 0 and 1) simultaneously. If a failure occurs, the memory controller switches from the primary pair of memory DIMMs to the backup pair of DIMMs. To enable memory mirroring through the Setup Utility, select **System Settings → Memory**. For more information, see “Using the Setup Utility” on page 138. When you use the memory mirroring feature, consider the following information:
    - When you use memory mirroring, you must install a pair of DIMMs at a time. One DIMM must be in channel 0, and the mirroring DIMM must be in the same slot in channel 1. The two DIMMs in each pair must be identical in size, type, and rank (single or dual), and organization, but not in speed. The channels run at the speed of the slowest DIMM in any of the channels.
    - Channel 2, DIMM connectors 7, 8, 15, and 16 are not used in memory-mirroring mode.
    - The maximum available memory is reduced to half of the installed memory when memory mirroring is enabled. For example, if you install 48 GB of memory, only 24 GB of addressable memory is available when you use memory mirroring.

  The following table lists the usable DIMM connectors on each memory channel.

Table 8. Connectors on each memory channel

Memory channel	DIMM connectors
Channel 0	2, 3, 10, 11
Channel 1	5, 6, 13, 14
Channel 2	7, 8, 15, 16

The following table lists the installation sequence for installing DIMMs in memory-mirroring mode.

Table 9. Memory-mirroring mode DIMM population sequence

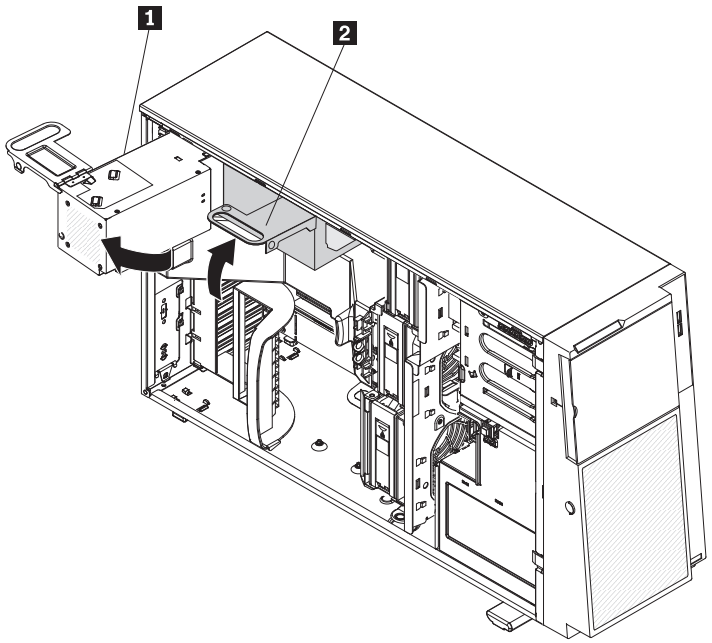
DIMMs	Number of installed microprocessors	DIMM connector
First pair of DIMMs	1	3, 6
Second pair of DIMMs	1	2, 5
Third pair of DIMMs	2	11, 14
Fourth pair of DIMMs	2	10, 13
Note: DIMM connectors 7, 8, 15, and 16 are not used in memory-mirroring mode and DIMM connectors 1, 4, 9, and 12 are not functional on this server. Do not install DIMMs in these connectors.		

- When you install or remove DIMMs, the server configuration information changes. When you restart the server, the system displays a message that indicates that the memory configuration has changed.

Attention: Static electricity that is released to internal server components when the server is powered on might cause the server to stop, which could result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when working inside the server with the power on.

To install a DIMM, do the following:

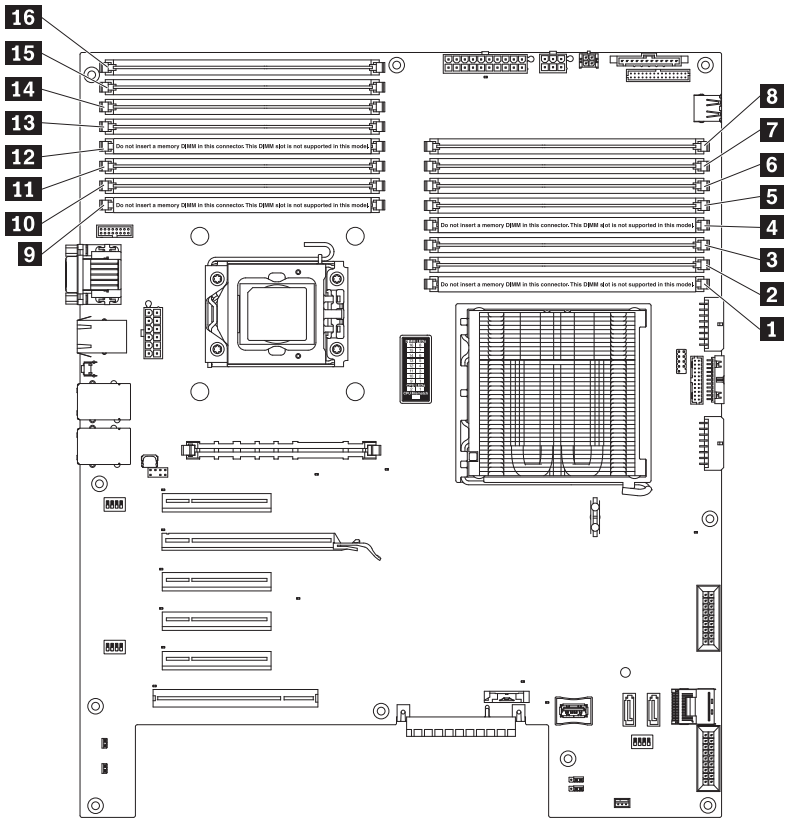
1. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
2. Unlock and remove the side cover (see “Removing the side cover” on page 43).
3. Rotate the power-supply cage assembly out of the chassis. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.



1 Power supply
2 Power-supply handle

4. Remove the air baffle (see “Removing the air baffle” on page 44).
5. Locate the DIMM connectors on the system board. Determine the connector in which you will install the DIMM. Install the DIMMs in the sequence indicated earlier in this section.

   Note: DIMM connectors 1, 4, 9, and 12 are not functional in this server. Do not install DIMMs in these connectors.

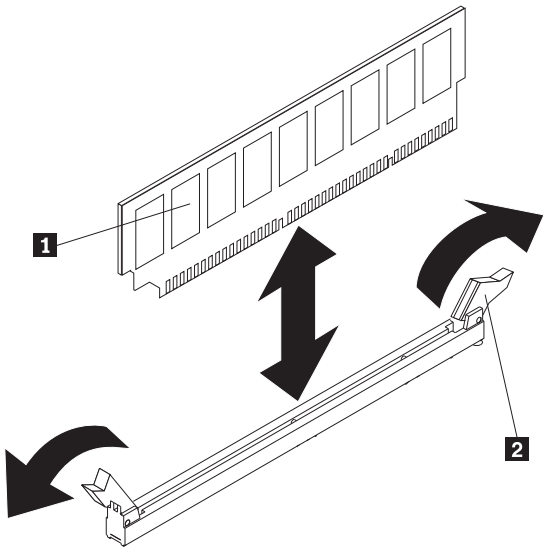


1	DIMM 1 (reserved)	9	DIMM 9 (reserved)
2	DIMM 2	10	DIMM 10
3	DIMM 3	11	DIMM 11
4	DIMM 4 (reserved)	12	DIMM 12 (reserved)
5	DIMM 5	13	DIMM 13
6	DIMM 6	14	DIMM 14
7	DIMM 7	15	DIMM 15
8	DIMM 8	16	DIMM 16

   Note: Do not insert memory DIMMs into connectors marked as reserved. These DIMM slots are not supported in this model.
6. Open the retaining clips on the DIMM connector.

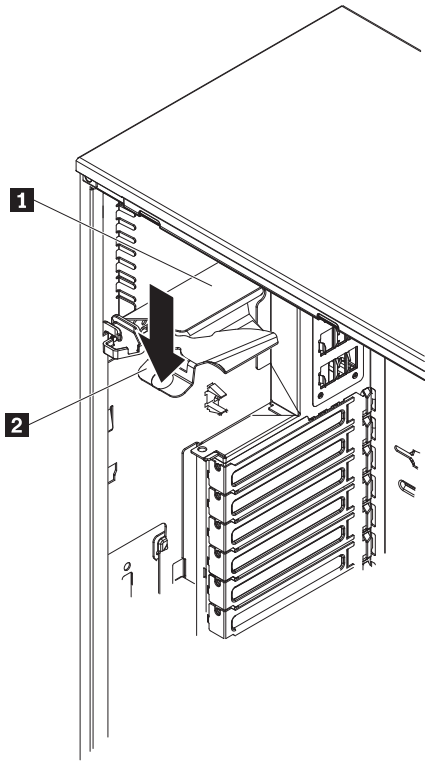
   Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, open and close the clips gently.
7. Touch the static-protective package that contains the DIMM to any unpainted metal surface on the server; then, remove the new DIMM from the package.

8. Turn the DIMM so that the DIMM keys align correctly with the connector.



1 DIMM
2 Retaining clip

9. Insert the DIMM into the connector by aligning the edges of the DIMM with the slots at the ends of the DIMM connector. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector. If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly installed. Open the retaining clips, remove the DIMM, and then reinsert it.
10. Install the air baffle (see “Installing the air baffle” on page 132).
11. Rotate the power-supply cage assembly back into the server. Press the power-supply cage release tab and rotate the power-supply cage assembly into the chassis.



1 Power supply support bracket
2 Power supply release tab

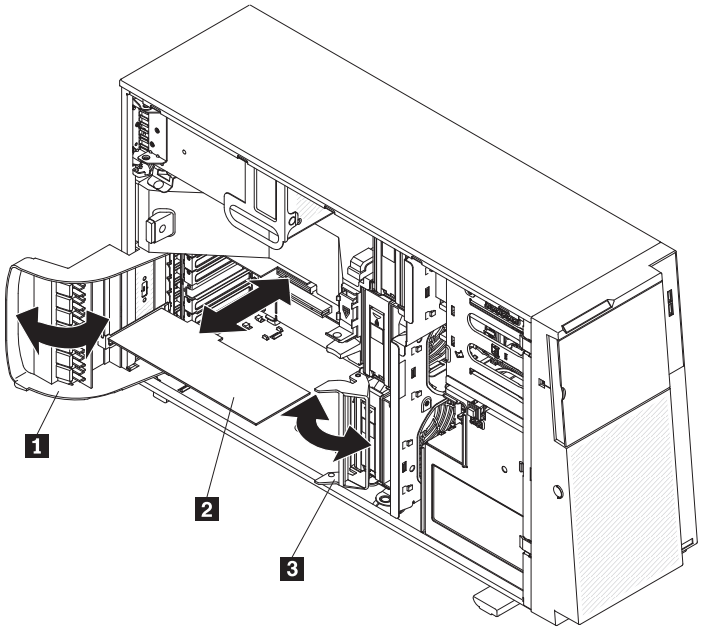
12. Install the side cover (see “Installing the side cover” on page 134).
13. Lock the side cover.
14. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing an adapter

To remove an adapter, do the following:

1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37).
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 43).
4. Disconnect any cables from the adapter or any cables that impede access to the adapter.
5. Rotate the rear adapter retention bracket to the open (unlocked) position. If you are removing a full-length adapter, open the front adapter-retention bracket also.
6. If necessary, remove the expansion-slot screw at the rear of the adapter.
7. Carefully grasp the adapter by its top edge or upper corners, and pull the adapter from the server.

   Attention: Expansion-slot covers must be installed in all empty slots. This maintains the electronic emissions standards of the computer and ensures proper ventilation of computer components.



1 Rear adapter-retention bracket
2 Adapter
3 Front adapter-retention bracket

8. If the adapter is not being replaced, install an expansion-slot cover in the expansion-slot opening.
9. If you are instructed to return the adapter, follow all packaging instructions, and use any packaging materials that are supplied to you for shipping.

Installing an adapter

The following notes describe the types of adapters that the server supports and other information that you must consider when installing an adapter. Adapter that the server supports might vary, depending on your server model.

- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this section. If you must change the switch setting or jumper settings on the adapter, follow the instructions that come with the adapter.
- Read the documentation that comes with your operating system.
- Use PCI slot 2 for video adapters.
- Do not set the maximum digital video adapter resolution above 1600 x 1200 at 60 Hz for an LCD monitor. This is the highest resolution that is supported for any add-on video adapter that you install in the server.
- Any high-definition video-out connector or stereo connector on any add-on video adapter is not supported
- The server provides up to eight adapter connectors, or slots as follows (depending on your server model):

  Note: The *x8 (x4)* designation for slot 3 (for example) identifies an x8 slot that is designed to support x8 adapters and x4 adapters that can downshift to operate at the x4 bandwidth. If you install an x8 adapter in slot 3 that can downshift to the x4 bandwidth, it will run at the x4 bandwidth. The x8 connector can be used

for x4 and x8 adapters. These same rules apply to the other PCI slots also. Check the information that comes with your adapter for compatibility information.

  - Slots on the system board:
    - Slot 1, PCI Express Gen 2 x8 (x8)
    - Slot 2, PCI Express Gen 2 x16 (x8)
    - Slot 3, PCI Express Gen 2 x8 (x4)
    - Slot 4, PCI Express Gen 2 x8 (x4)
    - Slot 5, PCI Express Gen 2 x8 (x8)
    - Slot 6, PCI 32-bit/33 MHz
  - If you install the one-slot PCI extender card in the server:
    - One additional PCI Express Gen 1 x8 (x4) slot is available
  - If you install the two-slot PCI extender card in the server:

- You can install full-length adapters that are supported in slots 2, 3, 4, and 5 on the system board, and the slots on the one-slot or two-slot extender cards. You can only install half-length adapters in slots 1 and 6.
- The 32-bit slot 6 supports 5.0 V keyed PCI adapters; they do not support 3.3 V keyed adapters. Universal adapters are supported in slots 4 and 5 if they are universally keyed.
- You can install the ServeRAID-BR10i SAS/SATA controller, the optional ServeRAID-MR10i SAS/SATA controller, or the optional ServeRAID-MR10is VAULT SAS/SATA controller in slots 1 of hot-swap SAS or hot-swap SATA models. These ServeRAID adapters are not supported on the simple-swap models.
- The ServeRAID-BR10i adapter comes standard on hot-swap SAS and hot-swap SATA models and provides RAID levels 0, 1, and 1E support. You can order the ServeRAID-MR10i adapter which provides RAID levels 0, 1, 5, 6, 10, 50, and 60 support, and the optional ServeRAID-MR10is adapter with an encryption 1078 DE chip provides RAID levels 0, 1, 5, 6, 10, 50, and 60 support.

  To ensure that any of your ServeRAID 10i, 10is, or 10M adapters function properly on UEFI-based servers, make sure that the adapter firmware level is updated to at least 11.x.x-XXX , and the supporting drivers.

  Attention: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.
- The server scans PCI Express slot 1 and PCI Express slots 2 and 3 to assign system resources. Then, the server starts the devices in the following order, if you have not changed the default startup sequence: PCI Express slot 1, PCI Express slot 2, PCI slot 6, and PCI Express slot 3.
- For a list of supported options for the server, see http://www.lenovo.com/thinkserver.

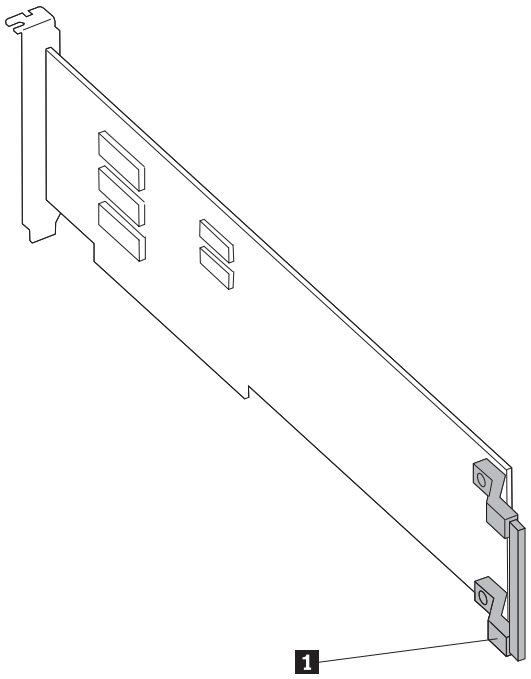
To install an adapter, do the following:

Note: The instructions in this section apply to any PCI adapter (for example, video graphics adapters or network adapters).

1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37).
2. Turn off the server and peripheral devices and disconnect all external cables and power cords; then, remove the side cover. See “Removing the side cover” on page 43.
3. Carefully position the server on its side so that it is lying flat and facing up.

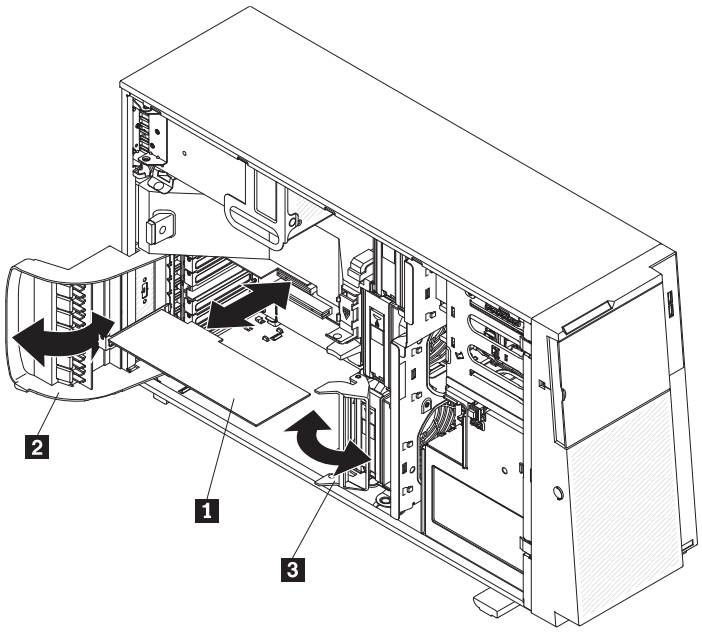
Note: Do not allow the server to fall over.

4. Follow the cabling instructions that come with the adapter to set jumpers or switches, if there are any. Route the adapter cables before you install the adapter.
5. Rotate the rear adapter-retention bracket to the open (unlocked) position.
6. If you are installing a full-length adapter, press on the release lever on the right side of the front adapter-retention bracket to release the retaining tab on the left side of the bracket.



7. Carefully grasp the adapter by the top edge or upper corner, and move the adapter directly from the static-protective package to the adapter slot. Align the adapter with the expansion slot guides; then, press the adapter firmly into the expansion slot. For a full-length adapter, make sure that the front edge of the adapter is properly seated in the correct slot in the front adapter-retention bracket.

   Note: Make sure that the adapter is seated correctly in the expansion slot before you turn on the server. Incomplete installation of an adapter might damage the system board or the adapter.



1 Adapter
2 Rear adapter retention bracket
3 Front adapter retention bracket

8. Connect all required cables to the adapter. Route cables so that they do not block air flow from the fans.
9. Rotate the rear and front adapter-retention brackets to the closed position.
10. Close the bezel.

    Install the side cover (see “Installing the side cover” on page 134).

    Lock the side cover.

    Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 130.

Installing a second microprocessor

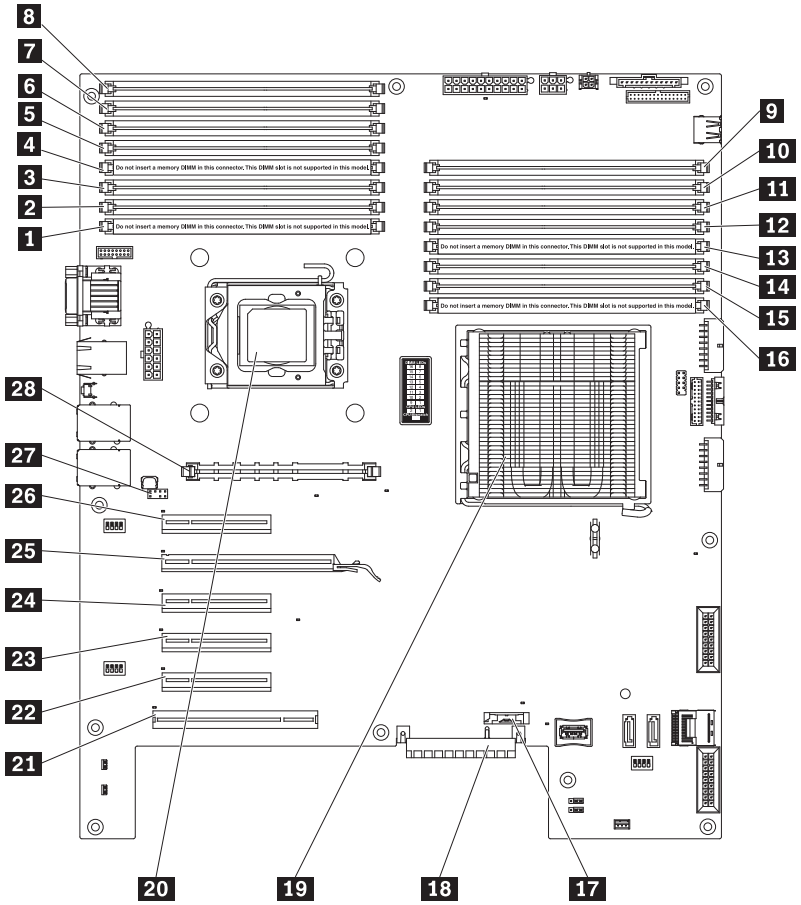
The following notes describe the type of microprocessor that the server supports and other information that you must consider when installing a microprocessor:

- The server comes with one microprocessor installed, but supports up to two microprocessors.

  Note: A microprocessor must be installed and removed only by a trained service technician.
- To download the most current level of the firmware for your server, do the following:
  1. Go to: http://www.lenovo.com/support.
  2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
  3. From **Family** list, select **ThinkServer TD200**, and click **Continue**.
  4. Click **Downloads and drivers** to download firmware updates.

- The first microprocessor must always be installed in microprocessor socket 1.
- When one microprocessor is installed, a heat sink filler is not required for microprocessor socket 2; however, the air baffle must be installed to provide proper system cooling.
- Do not remove the first microprocessor from the system board when you install the second microprocessor.
- When you install the second microprocessor, you must also install additional memory. See “Installing a memory module” on page 89.
- The first microprocessor voltage regulator module (VRM) is integrated on the system board.
- When you install a second microprocessor, you must also install the voltage regulator module (VRM), which comes with the microprocessor option kit, in the VRM connector on the system board.
- Some models support dual-core microprocessors or quad-core microprocessors. Do not mix dual-core microprocessors and quad-core microprocessors in the same system. Install all dual-core or all quad-core microprocessors in the server.
- To ensure proper server operation when you install an additional microprocessor, use microprocessors that have the same QuickPath Interconnect (QPI) link speed, integrated memory controller frequency, core frequency, power segment, internal cache size, and type. You can use the Setup Utility to determine the specific type of microprocessor that is installed on the system board.
- Mixing microprocessors of different stepping levels within the same server model is supported. You do not have to install the microprocessor with the lowest stepping level and features in microprocessor socket 1.
- The microprocessor speeds are automatically set for this server; therefore, you do not have to set any microprocessor frequency-selection jumpers or switches.
- If the thermal-grease protective cover (for example, a plastic cap or tape liner) is removed from the heat sink, do not touch the thermal grease on the bottom of the heat sink or set down the heat sink.
- If you have to replace a microprocessor, call for service.
- To order additional microprocessor options, contact your Lenovo marketing representative or authorized reseller.

The following illustration shows the location of the microprocessor connectors and the VRM connector.

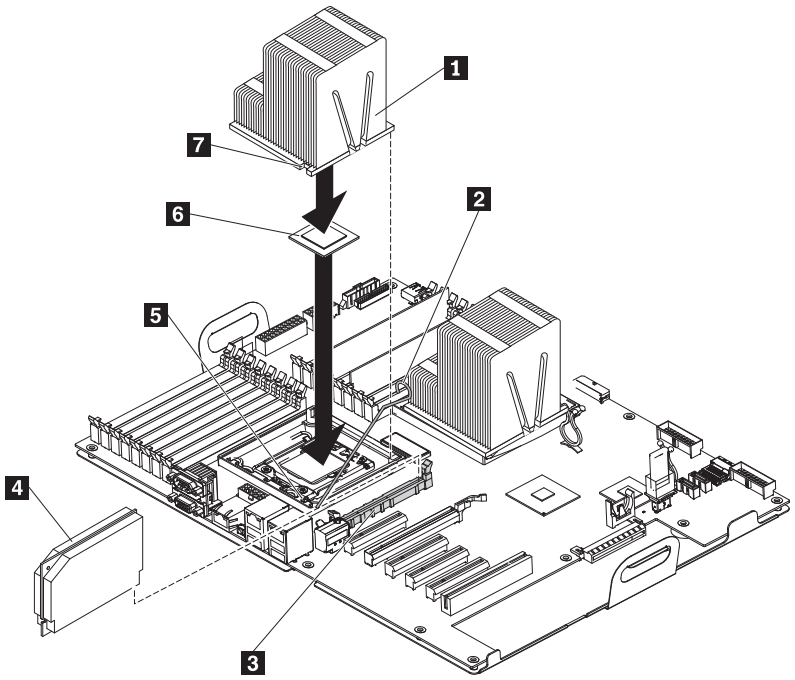


1	DIMM 9 (reserved)	15	DIMM 2
2	DIMM 10	16	DIMM 1 (reserved)
3	DIMM 11	17	Battery
4	DIMM 12 (reserved)	18	PCI extender card connector
5	DIMM 13	19	Microprocessor 1
6	DIMM 14	20	Microprocessor 2
7	DIMM 15	21	Slot 6, PCI 32 bit/33 MHz
8	DIMM 16	22	Slot 5, PCI Express Gen2 x8 (x8)
9	DIMM 8	23	Slot 4, PCI Express Gen2 x8 (x4)
10	DIMM 7	24	Slot 3, PCI Express Gen2 x8 (x4)
11	DIMM 6	25	Slot 2, PCI Express Gen2 x18 (x8)
12	DIMM 5	26	Slot 1, PCI Express Gen2 x8 (x8)
13	DIMM 4 (reserved)	27	Virtual media key connector
14	DIMM 3	28	Optional VRM connector

To install an additional microprocessor, do the following:

1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37).
2. Turn off the server and disconnect all power cords and external cables (see “Turning off the server” on page 35); then, unlock and remove the server cover (see “Removing the side cover” on page 43).
3. Rotate the power-supply cage assembly out of the chassis. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.

4. Remove the air baffle (see “Removing the air baffle” on page 44).
5. Remove the fan cage assembly (see “Removing the fan cage assembly” on page 46).
6. Install the VRM in the VRM connector:
   a. Turn the VRM so that the VRM keys align correctly with the slot connector.
   b. Firmly press the VRM straight down into the connector by applying pressure on both ends of the VRM simultaneously.



1 Heatsink 2
2 Microprocessor release lever
3 VRM connector
4 Microprocessor 2 VRM
5 Alignment key tab
6 Microprocessor 2
7 Alignment key

   c. Make sure that the retaining clips are in the locked position when the VRM is firmly seated in the connector.
   d. Make sure that the retaining clips are in the locked position when the VRM is firmly seated in the connector.
7. Locate the second microprocessor connector on the system board.
8. Install the microprocessor:
   a. Touch the static-protective package that contains the microprocessor to any unpainted metal surface on the server. Then, remove the microprocessor from the package.
   b. Remove the protective cover, tape, or label from the surface of the microprocessor socket, if any is present.

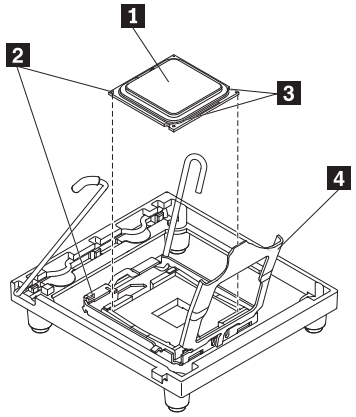
      Attention: Make sure that the release latch on the microprocessor socket is in the fully open position before you insert the microprocessor in the socket. Failure to do so might result in permanent damage to the microprocessor, microprocessor socket, and system board.

c. Rotate the microprocessor release latch on the microprocessor socket from the closed and locked position to the fully open position.

Attention:

- Do not touch the microprocessor contact; handle the microprocessor by the edges only. Contaminants on the microprocessor contacts, such as oil from your skin, can cause connection failures between the contacts and the socket.
- Handle the microprocessor carefully. Dropping the microprocessor during installation or removal can damage the contacts.
- Do not use excessive force when pressing the microprocessor into the socket.
- Make sure that the microprocessor is oriented and aligned with land number 1 in the socket before you try to close the latch.

d. Align the microprocessor with the socket (note the alignment mark and the position of the notches); then, carefully place the microprocessor on the socket and close the microprocessor bracket frame.



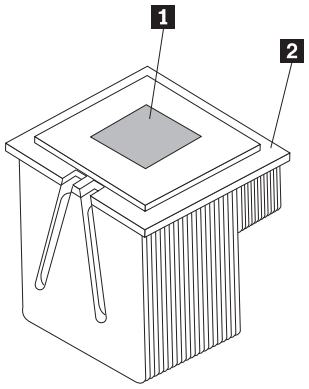
1 Microprocessor
2 Alignment triangles
3 Notches
4 Microprocessor bracket frame

e. Carefully close the microprocessor release latch to secure the microprocessor in the socket.

9. Install the heat sink.

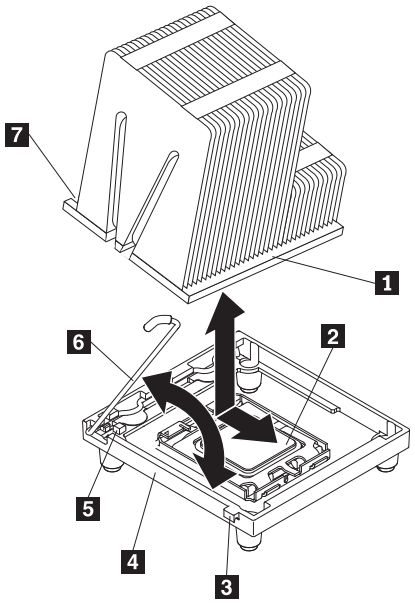
Attention: Do not touch the thermal grease on the bottom of the heat sink or set down the heat sink after you remove the plastic cover. Touching the thermal grease will contaminate it.

The following illustration shows the bottom surface of the heat sink.



1 Thermal grease
2 Heat sink

a. Make sure that the heat-sink release lever is in the open position.
b. Remove the plastic protective cover from the bottom of the heat sink.
c. If the new heat sink did not come with thermal grease, (Trained service technician only) apply thermal grease on the microprocessor before you install the heat sink (see the *Hardware Maintenance Manual* for information on applying thermal grease).
d. Align the heat sink above the microprocessor with the thermal-grease side down.



1 Heat-sink flange
2 Microprocessor
3 Release lever locking tab
4 Retainer bracket
5 Alignment tab
6 Heat-sink release lever
7 Notch

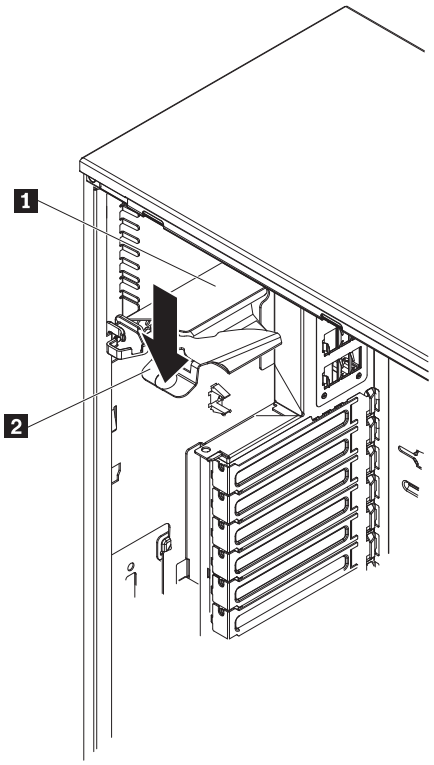
e. Tilt the heat sink slightly to the side and slide the heat sink flange underneath the flange of the heat sink retainer bracket.

f. Press down firmly on the heat sink until it is seated securely.

g. Rotate the heat-sink lever to the closed position and hook it underneath the lock tab.

10. Reinstall the air baffle (see “Installing the air baffle” on page 132).

11. Rotate the power-supply cage assembly back into the server. Press the power-supply cage release tab and rotate the power-supply cage assembly into the chassis.



1 Power supply support bracket
2 Power supply release tab

If you have other options to install or remove, do so now. Otherwise, go to “Completing the installation” on page 130.

Removing a ServeRAID-BR10i SAS/SATA controller

To remove a ServeRAID-BR10i SAS/SATA adapter, do the following:

1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37).
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables. Remove the side cover (see “Removing the side cover” on page 43).
3. Carefully position the server on its side so that it is lying flat and facing up.

   Note: Do not allow the server to fall over.

4. Rotate the rear adapter-retention bracket to the open (unlocked) position.

5. Disconnect any cables connected to the adapter.

   Attention: To avoid breaking the retaining clips or damaging the ServeRAID-BR10i adapter connector, open and close the clips gently.
6. Carefully open the retaining clip on each end of the ServeRAID-BR10i adapter connector and remove the adapter from the server.
7. If you are instructed to return the adapter, follow all packaging instructions, and use any packaging materials that are supplied to you for shipping.

Installing the ServeRAID-BR10i SAS/SATA controller

The ServeRAID-BR10i SAS/SATA controller must be installed in the dedicated connector, PCI slot 1, on the system board. The ServeRAID-BR10i adapter is supported on hot-swap server models only. The ServeRAID-BR10i SAS/SATA adapter enables integrated RAID levels 0, 1, and 1E capability on hot-swap hard disk drives.

Attention: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

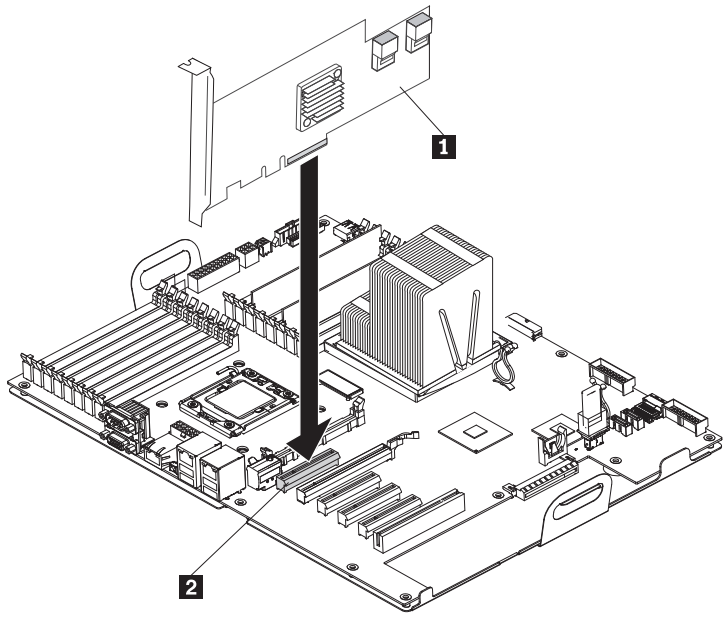
To install the ServeRAID-BR10i adapter, do the following:

1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37).
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables. Remove the side cover (see “Removing the side cover” on page 43).

   Attention: To avoid breaking the retaining clips or damaging the ServeRAID-BR10i adapter connector, open and close the clips gently.
3. Carefully position the server on its side so that it is lying flat and facing up.

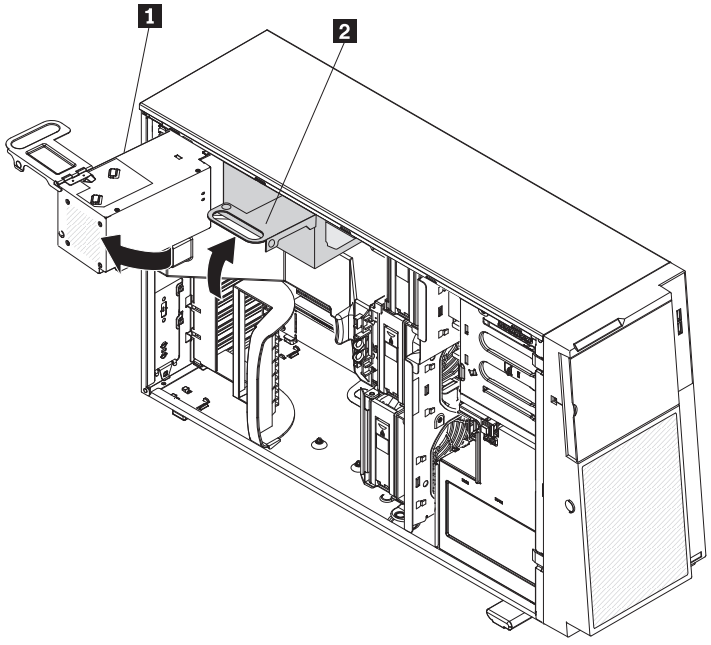
   Note: Do not allow the server to fall over.
4. Rotate the rear adapter-retention bracket to the open (unlocked) position.
5. Open the retaining clip on each end of the ServeRAID-BR10i adapter connector on the system board.
6. Touch the static-protective package containing the ServeRAID-BR10i adapter to any unpainted metal surface on the server. Then, remove the ServeRAID-BR10i adapter from the package.
7. Turn the ServeRAID-BR10i adapter so that the ServeRAID-BR10i adapter keys align correctly with the connector.

   Attention: Incomplete insertion might cause damage to the system board or the ServeRAID-BR10i adapter.



1 ServeRAID-BR10i controller
2 PCI slot 1

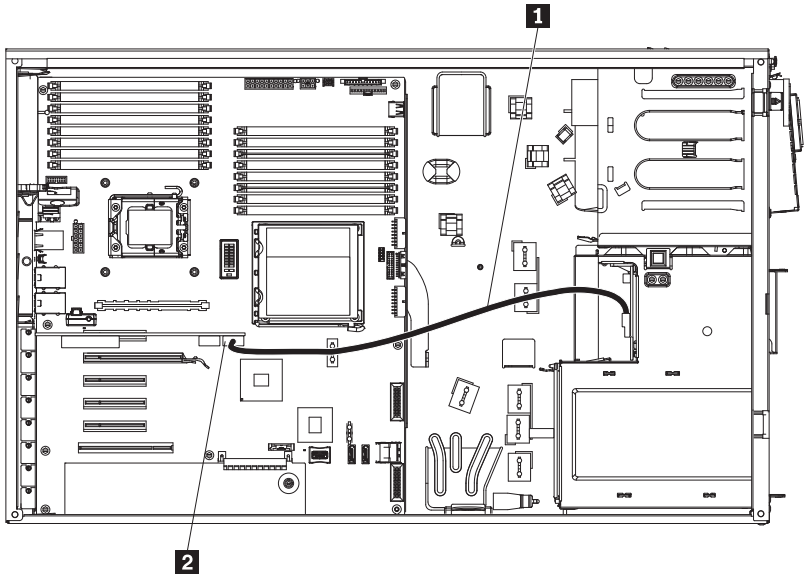
8. Press the ServeRAID-BR10i adapter firmly into the connector on the system board.
9. Rotate the power-supply cage assembly out of the chassis. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.



1 Power supply
2 Power-supply handle

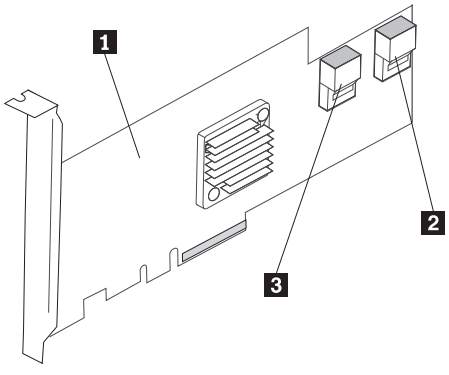
10. Remove the air baffle (see “Removing the air baffle” on page 44).

11. Remove the fan cage assembly (see “Removing the fan cage assembly” on page 46).
12. Connect the configuration signal cable. See “Power and signal cables for internal drives” on page 78 for information about cabling the power and signal cables.
13. Complete the cabling of the ServeRAID-BR10i SAS/SATA adapter.
    - For the eight drive-bay, 2.5-inch server model, connect one end of the signal cable to the drive backplane for drive bays 0 through 3 and route the other end through the plastic slot on the bottom of the chassis underneath the front fan cage; then, connect it to the ServeRAID-BR10i SAS/SATA controller as shown in the following illustrations:



1 Signal cable for drives 0-3
2 Adapter connector for drives 0-3 signal cable

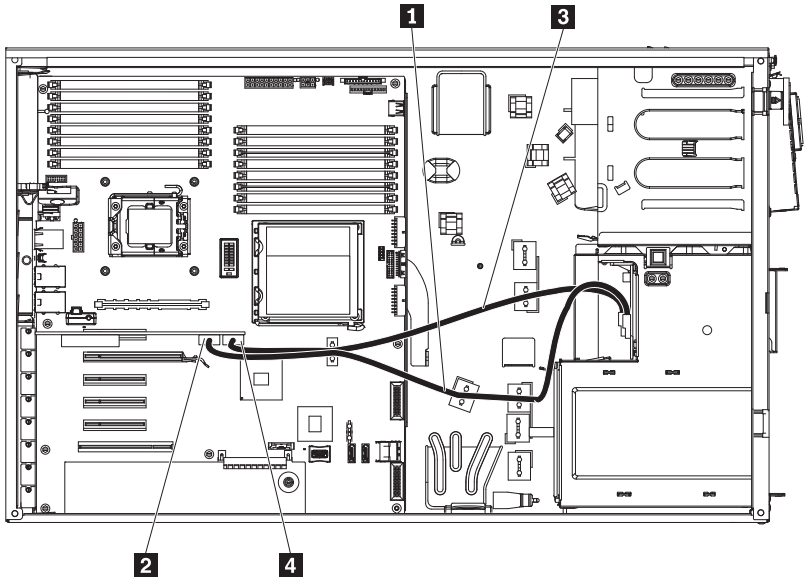
The following illustration shows the connectors on the controller to which you connect the signal cables from the drive backplanes.



1 ServeRAID-BR10i controller
2 Adapter connector for drives 0-3 signal cable
3 Adapter connector for drives 4-7 signal cable

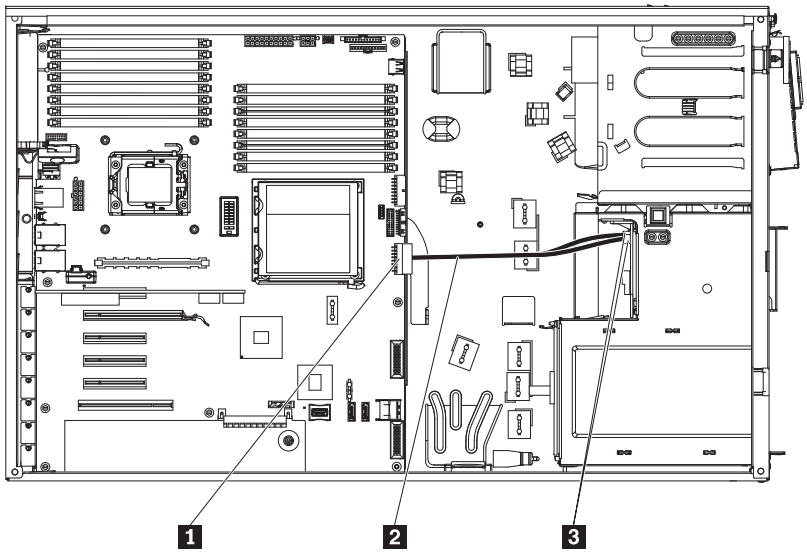
Connect one end of the other signal cable to the drive backplane for drive bays 4 through 7 and route the other end of the cable through the plastic

slots on the bottom of the chassis underneath the fan cage assembly; then, connect it to the ServeRAID-BR10i SAS/SATA controller as shown in the following illustration:



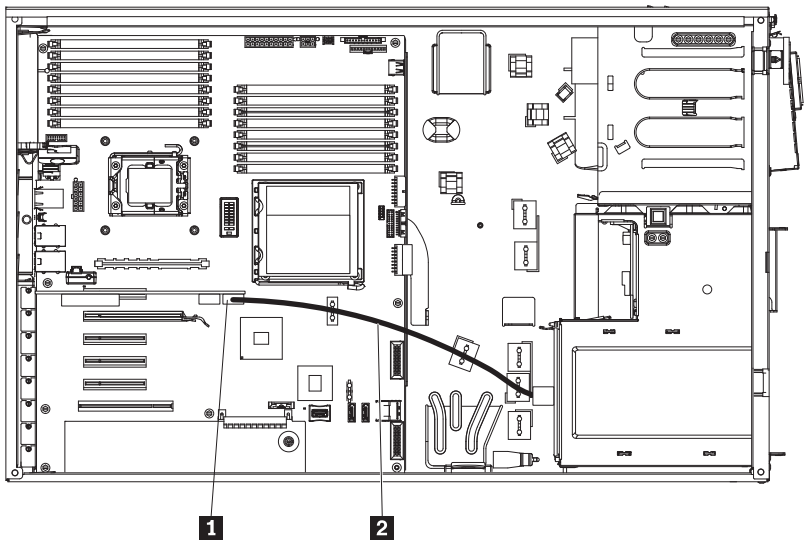
1 Signal cable for drives 4-7
2 Adapter connector for drives 4-7 signal cable
3 Signal cable for drives 0-3
4 Adapter connector for drives 0-3 signal cable

Connect the single end of the power cable to the **Hard disk drive backplane power connector** on the system board and connect the split end of the power cable to the connectors on the backplane as shown in the following illustration.



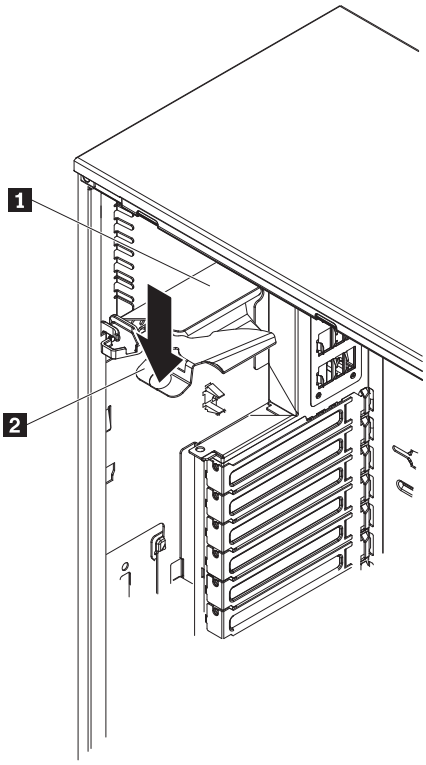
1 Power connector
2 Power cable
3 Backplane power connectors

- For the four drive-bay, 3.5-inch server model, connect the signal cable as shown in the following illustration:



1 Adapter connector
2 Signal cable

14. Reinstall the front fan cage assembly. Align the front fan cage assembly over the fan cage assembly slot and with the connector on the system board. Lower the fan cage assembly into the chassis and press down firmly until the fan cage assembly is seated firmly in place. Make sure that no cables will be pinched.
15. Reinstall the air baffle (see “Installing the air baffle” on page 132).
16. Rotate the rear adapter-retention bracket to the closed (locked) position.
17. Rotate the power-supply cage assembly back into the server. Press the power-supply cage release tab and rotate the power-supply cage assembly into the chassis.



1 Power supply support bracket
2 Power supply release tab

If you have other options to install or remove, do so now. Otherwise, Go to “Completing the installation” on page 130.

Removing an optional ServeRAID-MR10i SAS/SATA controller

To remove a ServeRAID-MR10i SAS/SATA adapter, do the following:

1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37).
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables. Remove the side cover (see “Removing the side cover” on page 43).
3. Carefully position the server on its side so that it is lying flat and facing up.

   Note: Do not allow the server to fall over.
4. Rotate the rear adapter-retention bracket to the open (unlocked) position.
5. Disconnect any cables connected to the adapter.

   Attention: To avoid breaking the retaining clips or damaging the ServeRAID-MR10i adapter connector, open and close the clips gently.
6. Carefully open the retaining clip on each end of the ServeRAID-MR10i adapter connector and remove the adapter from the server.
7. If you are instructed to return the adapter, follow all packaging instructions, and use any packaging materials that are supplied to you for shipping.

Installing the optional ServeRAID-MR10i SAS/SATA controller

The optional ServeRAID-MR10i SAS/SATA controller can be installed only in its dedicated connector, PCI slot 1, on the system board. The ServeRAID-MR10i adapter is supported on hot-swap server models only. The ServeRAID-MR10i SAS/SATA adapter enables integrated RAID levels 0, 1, 5, 6, 10, 50, and 60 support capability on hot-swap hard disk drives. For configuration information, see the documentation on the ServeRAID CD that comes with the adapter.

Important: To ensure that any of your ServeRAID 10i, 10is, or 10M adapters function properly on UEFI-based servers, make sure that the adapter firmware level is updated to at least 11.xx-XXX, and the supporting drivers.

Attention: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

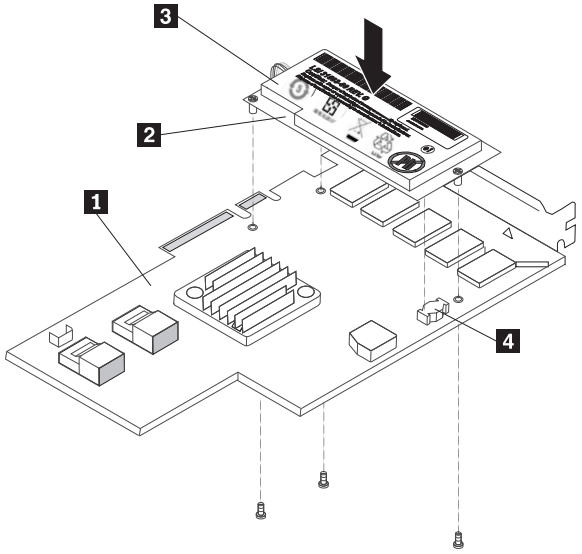
To install the ServeRAID-MR10i adapter, do the following:

1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37).
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables. Remove the side cover (see “Removing the side cover” on page 43).

   Attention: To avoid breaking the retaining clips or damaging the ServeRAID-MR10i adapter connector, open and close the clips gently.
3. Remove the side cover (see “Removing the side cover” on page 43).
4. Carefully position the server on its side so that it is lying flat and facing up.

   Note: Do not allow the server to fall over.
5. Remove the screw that secures the expansion-slot cover to the chassis (if no adapter is installed in the slot). Store the expansion-slot cover and screw in a safe place for future use.

   Note: Expansion-slot covers must be installed on all vacant slots. This maintains the electronic emissions standards of the server and ensures proper ventilation of server components.
6. Open the retaining clips on each end of the ServeRAID-MR10i adapter connector on the system board.
7. Touch the static-protective package that contains the ServeRAID-MR10i adapter to any unpainted metal surface on the server. Then, remove the ServeRAID-MR10i adapter and battery pack from the package.
8. If the battery pack (battery carrier and battery) did not come installed on the ServeRAID adapter, install the battery pack.
   a. Align the battery carrier pins and the connector for the battery carrier with the pin holes and connector on the ServeRAID adapter; then, lower the battery carrier onto the ServeRAID adapter.



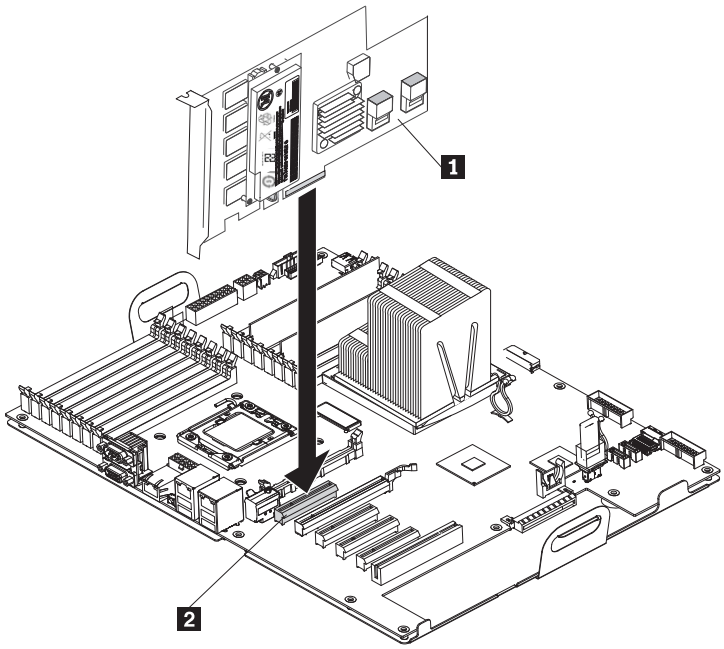
1 ServeRAID adapter
2 Battery carrier
3 Battery
4 Connector for battery carrier

b. Press the battery carrier into the connector on the ServeRAID adapter until it is firmly connected.

c. Secure the battery carrier to the ServeRAID adapter with the screws that came with the battery pack.

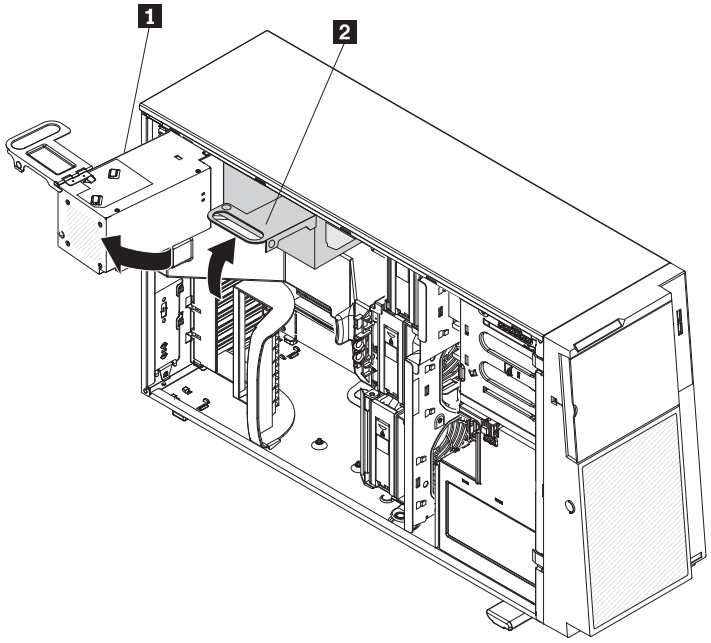
9. Turn the ServeRAID-MR10i adapter so that the ServeRAID-MR10i adapter keys align correctly with the connector.

   Attention: Incomplete insertion might cause damage to the system board or the ServeRAID-MR10i adapter.



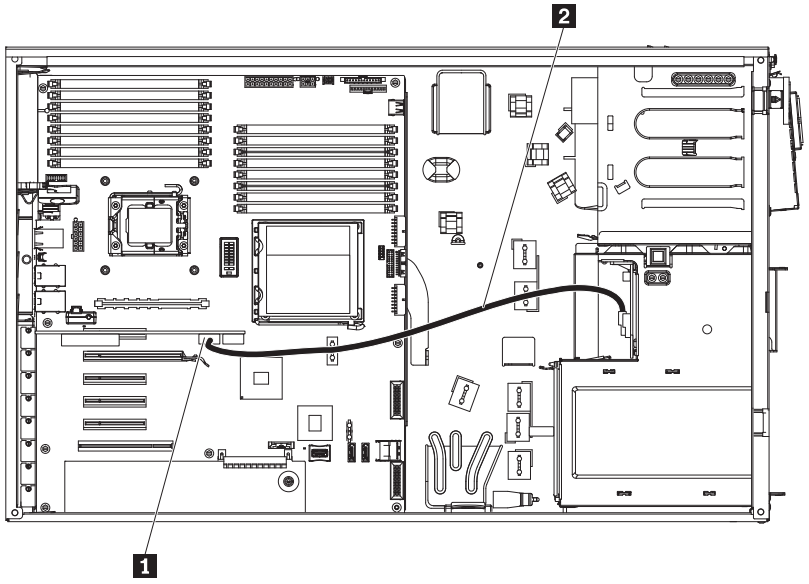
1 ServeRAID-MR10i controller
2 PCI slot 1

10. Press the ServeRAID-MR10i adapter firmly into the connector on the system board.
11. Rotate the power-supply cage assembly out of the chassis. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.



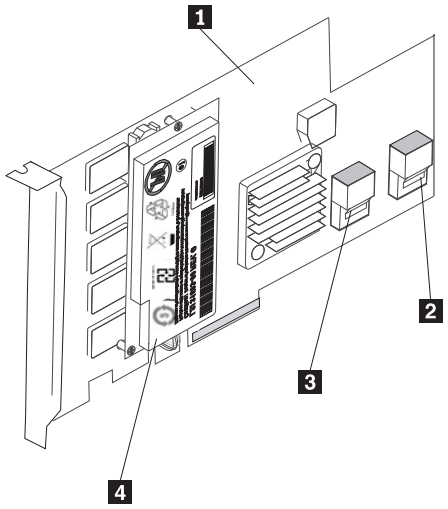
1 Power supply
2 Power-supply handle

12. Remove the air baffle (see “Removing the air baffle” on page 44).
13. Remove the front fan cage assembly (see “Removing the fan cage assembly” on page 46).
14. Connect the configuration signal cable. See “Power and signal cables for internal drives” on page 78 for information about cabling the power and signal cables.
15. Complete the cabling of the ServeRAID-MR10i adapter. See “Power and signal cables for internal drives” on page 78 for additional information about cabling the power and signal cables.
    - For the eight drive-bay, 2.5-inch server model, connect one end of the signal cable to the drive backplane for drive bays 0 through 3 and route the other end through the plastic slot on the bottom of the chassis underneath the front fan cage; then, connect it to the ServeRAID-MR10i SAS/SATA controller as shown in the following illustrations:



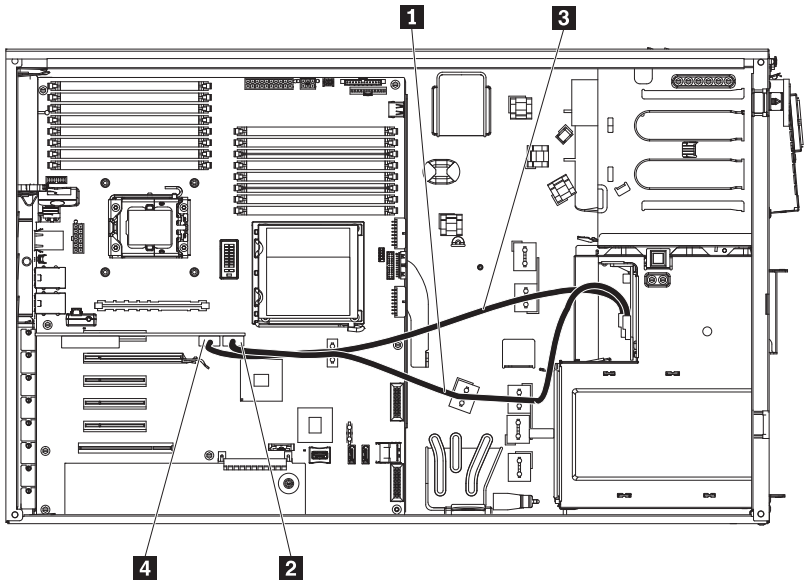
1 Adapter connector for drives 0-3 signal cable
2 Signal cable for drives 0-3

The following illustration shows the connectors on the controller to which you connect the signal cables from the drive backplanes.



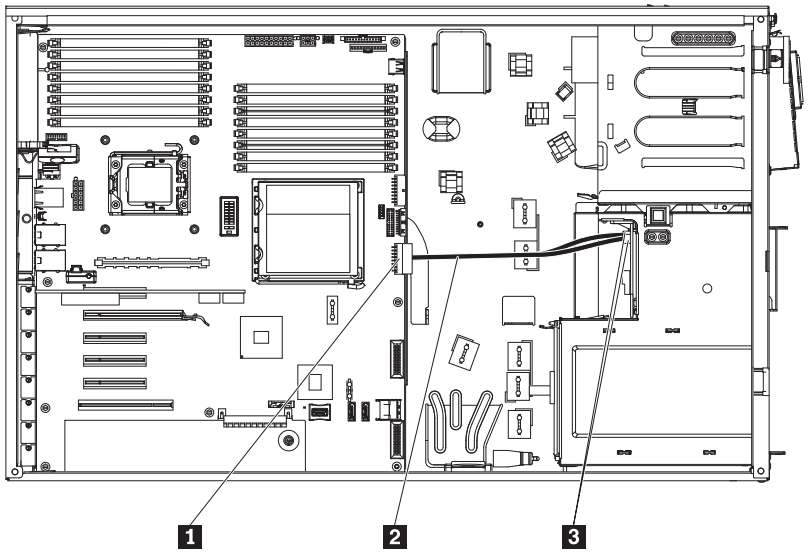
1 ServeRAID-MR10i controller
2 Adapter connector for drives 4-7 signal cable
3 Adapter connector for drives 0-3 signal cable
4 Battery

Connect one end of the signal cable to the drive backplane for drive bays 4 through 7 and route the other end of the cable through the plastic slots on the bottom of the chassis underneath the fan cage assembly; then, connect it the ServeRAID-MR10i SAS/SATA controller as shown in the following illustration:



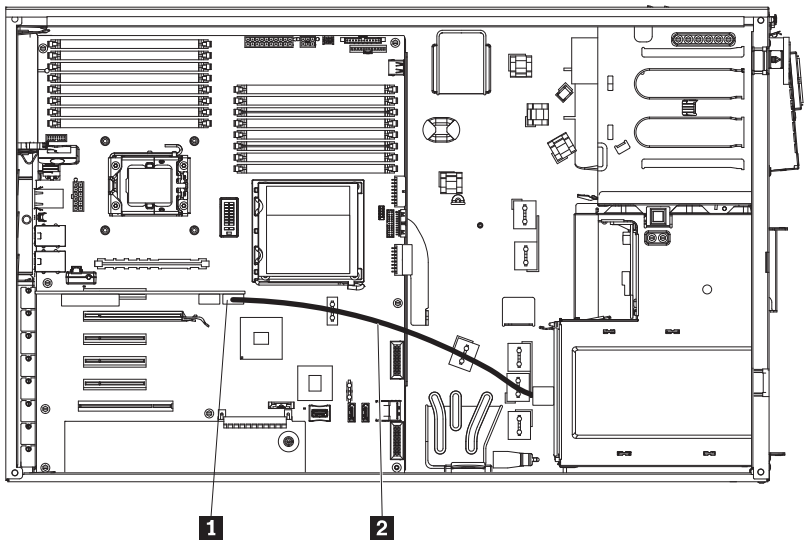
1 Signal cables for drives 4-7
2 Adapter connector for drives 4-7 signal cable
3 Signal cable for drives 0-3
4 Adapter connector for drives 0-3 signal cable

Connect the single end of the power cable to the **Hard disk drive backplane power connector** on the system board and connect the split end of the power cable to the connectors on the backplane as shown in the illustration.



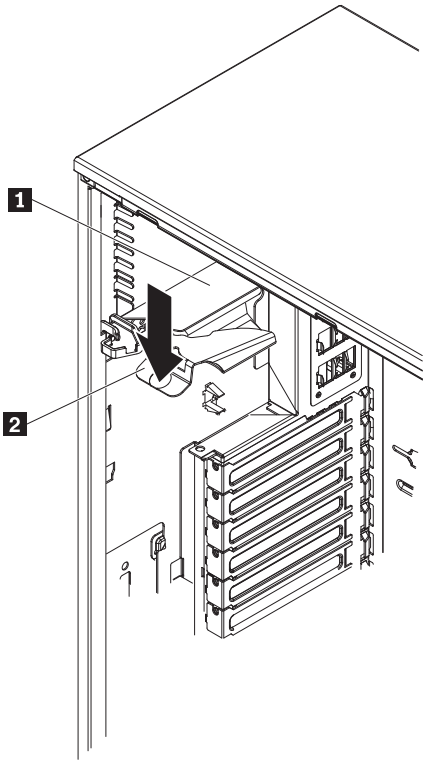
1 Power connector
2 Power cable
3 Backplane power connectors

- For the four drive-bay, 3.5-inch server model, connect the signal cable as shown in the following illustration:



1 Adapter connector
2 Signal cable

16. Reinstall the front fan cage assembly. Align the front fan cage assembly over the fan cage assembly slot and with the connector on the system board. Lower the fan cage assembly into the chassis and press down firmly until the fan cage assembly is seated firmly in place. Make sure that no cables will be pinched.
17. Reinstall the air baffle (see “Installing the air baffle” on page 132).
18. Rotate the power-supply cage assembly back into the server. Press the power-supply cage release tab and rotate the power-supply cage assembly into the chassis.



1 Power supply support bracket
2 Power supply release tab

19. If you have other options to install or remove, do so now.
20. Replace the side cover (see “Installing the side cover” on page 134). Go to “Completing the installation” on page 130.

If you have other options to install or remove, do so now. Otherwise, go to “Completing the installation” on page 130.

Removing an optional ServeRAID-MR10is VAULT SAS/SATA controller

To remove a ServeRAID-MR10is SAS/SATA adapter, do the following:

1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37).
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables. Remove the side cover (see “Removing the side cover” on page 43.
3. Carefully position the server on its side so that it is lying flat and facing up.

   Note: Do not allow the server to fall over.
4. Rotate the rear adapter-retention bracket to the open (unlocked) position.
5. Disconnect any cables connected to the adapter.

   Attention: To avoid breaking the retaining clips or damaging the ServeRAID-MR10is adapter connector, open and close the clips gently.
6. Carefully open the retaining clip on each end of the ServeRAID-MR10is adapter connector and remove the adapter from the server.
7. If you are instructed to return the adapter, follow all packaging instructions, and use any packaging materials that are supplied to you for shipping.

Installing the optional ServeRAID-MR10is VAULT SAS/SATA controller

The optional ServeRAID-MR10is VAULT SAS/SATA controller can be installed only in its dedicated connector, PCI slot 1, on the system board. The ServeRAID-MR10is adapter is supported on hot-swap server models only. The ServeRAID-MR10is SAS/SATA adapter with an encryption 1078 DE chip set enables integrated RAID levels 0, 1, 5, 6, 10, 50, and 60 support capability on hot-swap hard disk drives. For configuration information, see the documentation on the ServeRAID CD that comes with the adapter.

Important: To ensure that any of your ServeRAID 10i, 10is, or 10M adapters function properly on UEFI-based servers, make sure that the adapter firmware level is updated to at least 11.xx-XXX, and the supporting drivers.

Attention: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

To install the ServeRAID-MR10is SAS/SATA controller and route the cables, do the following:

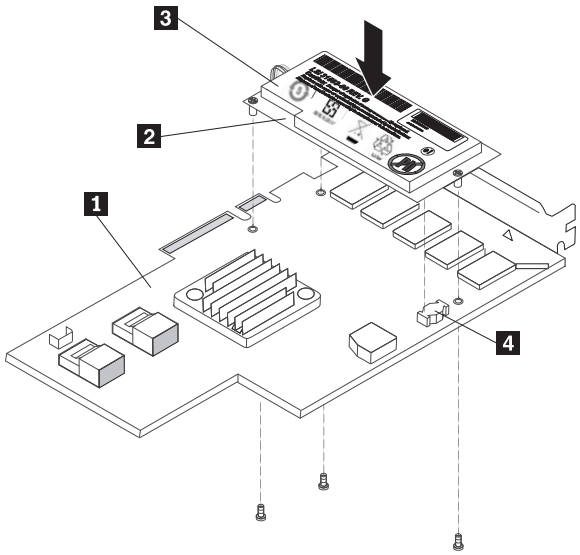
1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37).

2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.

   Attention: To avoid breaking the retaining clips or damaging the ServeRAID-MR10is SAS/SATA adapter connector, open and close the clips gently.
3. Remove the side cover (see “Removing the side cover” on page 43).
4. Carefully position the server on its side so that it is lying flat and facing up.

   Note: Do not allow the server to fall over.
5. Rotate the rear adapter-retention bracket to the open (unlocked) position.
6. Remove the screw that secures the expansion-slot cover to the chassis (if no adapter is installed in the slot). Store the expansion-slot cover and screw in a safe place for future use.

   Note: Expansion-slot covers must be installed on all vacant slots. This maintains the electronic emissions standards of the server and ensures proper ventilation of server components.
7. Open the retaining clips on each end of the slot connector in which you want to install the ServeRAID-MR10is adapter.
8. Touch the static-protective package that contains the ServeRAID-MR10is adapter to any unpainted metal surface on the server; then, remove the ServeRAID-MR10is adapter from the package and place it on a static-protective surface.
9. If the battery pack (battery carrier and battery) did not come installed on the ServeRAID adapter, install the battery pack.
   a. Align the battery carrier pins and the connector for the battery carrier with the pin holes and connector on the ServeRAID adapter; then, lower the battery carrier onto the ServeRAID adapter.



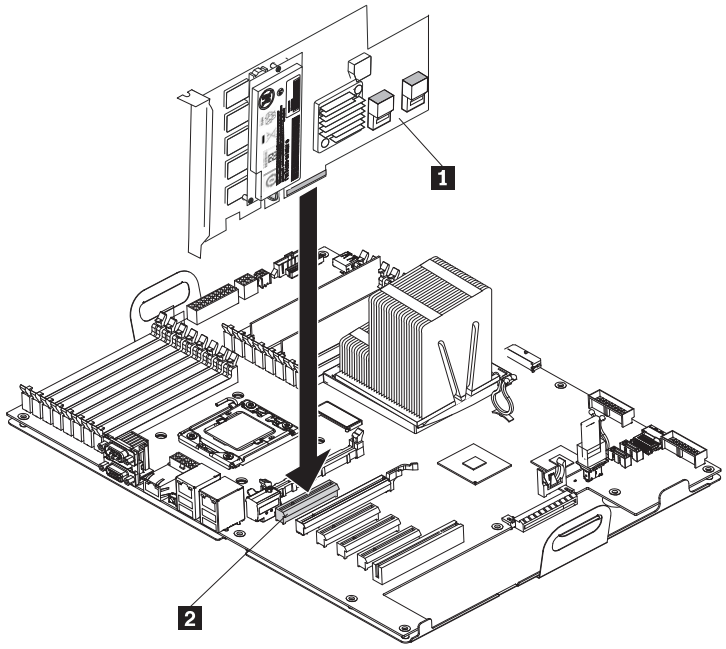
1 ServeRAID adapter
2 Battery carrier
3 Battery
4 Connector for battery carrier

   b. Press the battery carrier into the connector on the ServeRAID adapter until it is firmly connected.

c. Secure the battery carrier to the ServeRAID adapter with the screws that came with the battery pack.

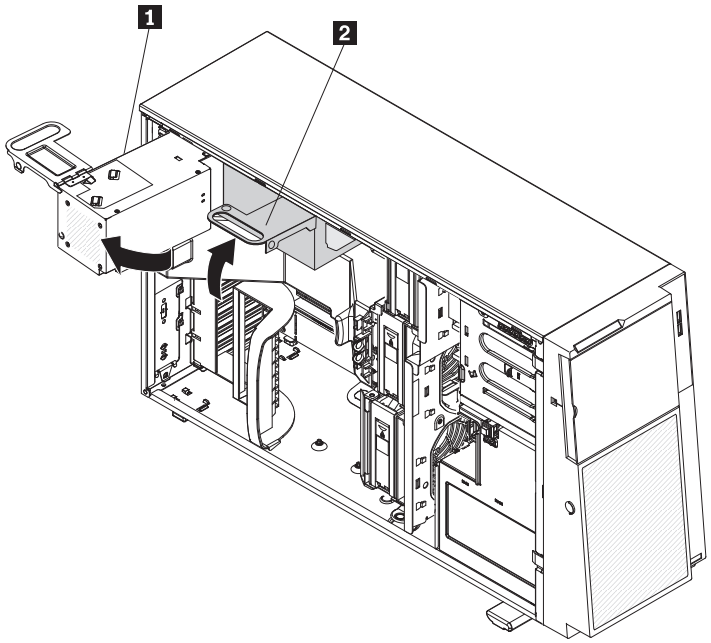
10. Turn the ServeRAID-MR10is adapter so that the ServeRAID-MR10is adapter keys align correctly with the connector on the system board.

    Attention: Incomplete insertion might cause damage to the system board or the ServeRAID-MR10is adapter.



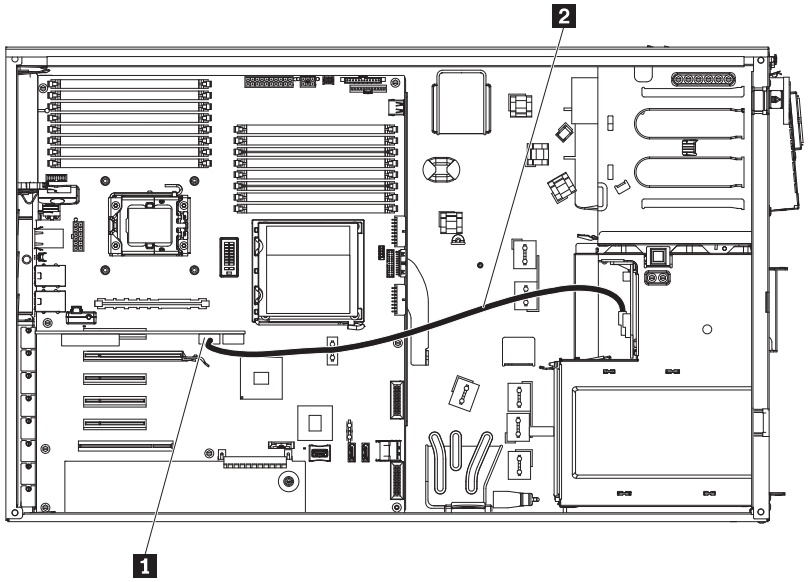
1 ServeRAID-MR10is connector
2 PCI slot 1

11. Press the ServeRAID-MR10is adapter firmly into the connector on the system board.
12. Rotate the power-supply cage assembly out of the chassis. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.



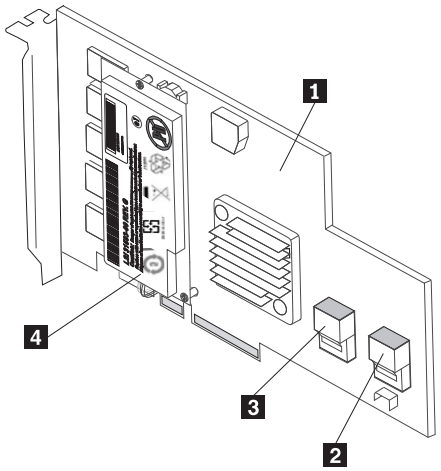
1 Power supply
2 Power-supply handle

13. Remove the air baffle (see “Removing the air baffle” on page 44).
14. Remove the front fan cage assembly (see “Removing the fan cage assembly” on page 46).
15. Connect one end of the black configuration signal cable to the backplane and connect the other end to the hard disk drive backplane configuration signal cable connector on the system board.
16. Complete the cabling of the ServeRAID-MR10is SAS/SATA adapter.
    - For the eight drive-bay, 2.5-inch server model, connect one end of the signal cable to the drive backplane for drive bays 0 through 3 and route the other end through the plastic slot on the bottom of the chassis underneath the front fan cage; then, connect it to connector J8 on the ServeRAID-MR10is SAS/SATA controller as shown in the following illustrations:



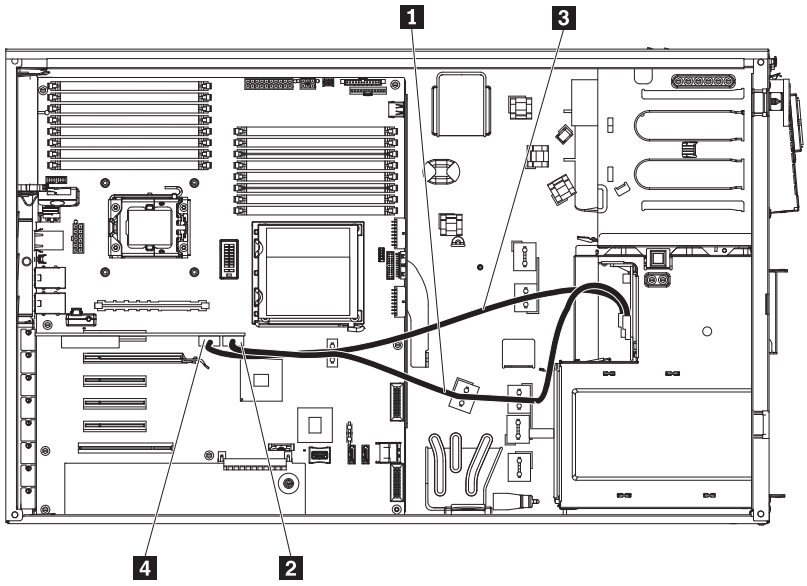
1 Adapter connector for drives 0-3 signal cable
2 Signal cable for drives 0-3

The following illustration shows the connectors on the controller to which you connect the signal cables from the drive backplanes.



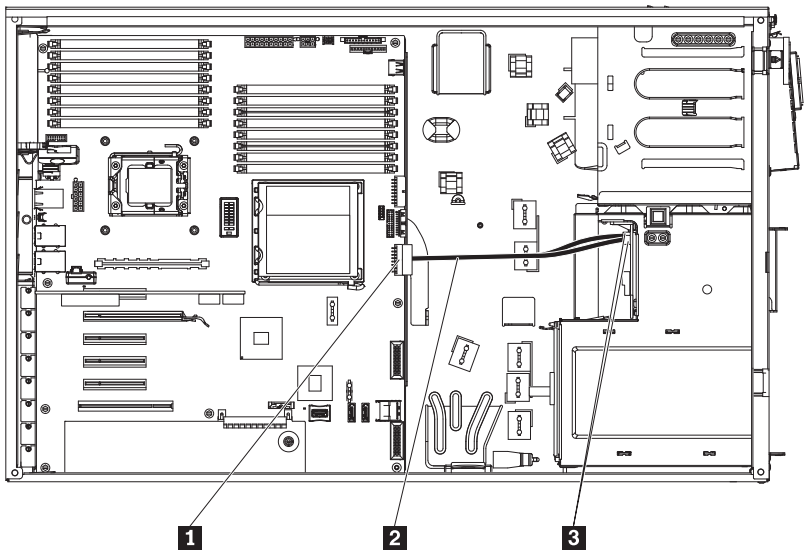
1 ServeRAID-MR10i controller
2 Adapter connector (J9) for drives 4-7 signal cable
3 Adapter connector (J8) for drives 0-3 signal cable
4 Battery

Connect one end of the other signal cable to the drive backplane for drive bays 4 through 7 and route the other end of the cable through the plastic slots on the bottom of the chassis underneath the fan cage assembly; then, connect it to connector J9 on the ServeRAID-MR10is SAS/SATA controller as shown in the following illustration:



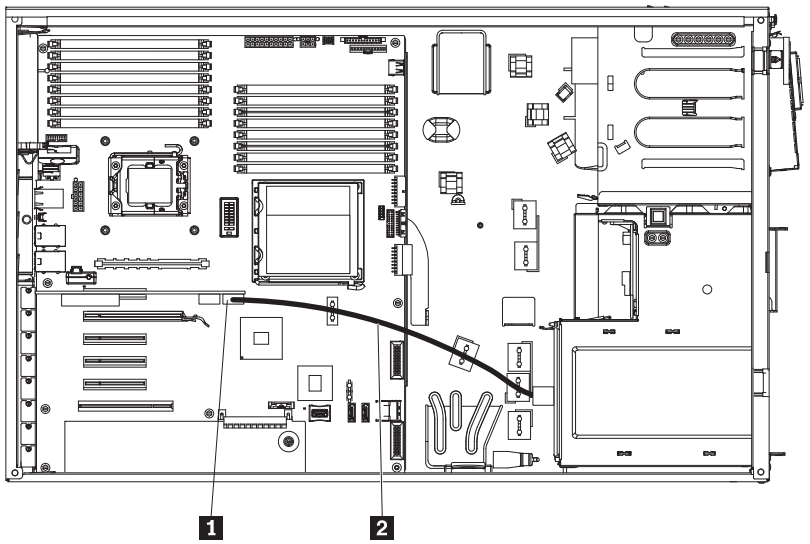
1 Signal cable for drives 4-7
2 Adapter connector for drives 4-7 signal cable
3 Signal cable for drives 0-3
4 Adapter connector for drives 0-3 signal cable

Connect the single end of the power cable to the **Hard disk drive backplane power connector** on the system board and connect the split end of the power cable to the connectors on the backplane as shown in the following illustration.



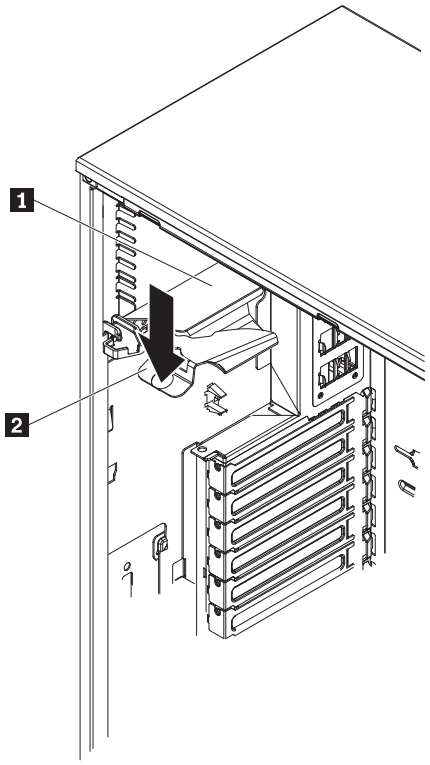
1 Power connector
2 Power cable
3 Backplane power connectors

- For the four drive-bay, 3.5-inch server model, connect the signal cable as shown in the following illustration:



1 Adapter connector
2 Signal cable

17. Reinstall the front fan cage assembly. Align the front fan cage assembly over the fan cage assembly slot and with the connector on the system board. Lower the fan cage assembly into the chassis and press down firmly until the fan cage assembly is seated firmly in place. Make sure that no cables will be pinched.
18. Reinstall the air baffle (see “Installing the air baffle” on page 132).
19. Rotate the rear adapter-retention bracket to the closed (locked) position.
20. Rotate the power-supply cage assembly back into the server. Press the power-supply cage release tab and rotate the power-supply cage assembly into the chassis.



1 Power supply support bracket
2 Power supply release tab

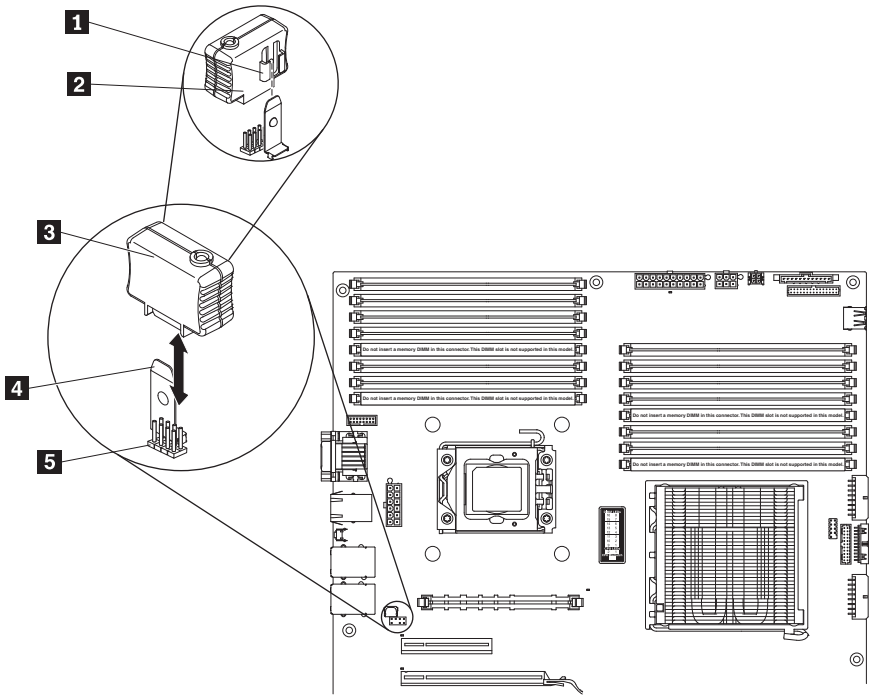
21. If you have other options to install or remove, do so now.
22. Replace the side cover (see “Installing the side cover” on page 134). Go to “Completing the installation” on page 130.

Removing the virtual media key

To remove the virtual media key, do the following:

1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37).
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables. Unlock and remove the side cover (see “Removing the side cover” on page 43).
3. Carefully position the server on its side so that it is lying flat and facing up.

   Note: Do not allow the server to fall over.
4. Rotate the rear adapter-retention bracket to the open (unlocked) position.
5. Remove any adapters that prevent you from accessing the virtual media key connector on the system board (see “Removing an adapter” on page 95).
6. Press outward on the retention tab and pull the virtual media key out of the connector.



1 Alignment bracket
2 Virtual media key (rear)
3 Virtual media key (front)
4 Retention tab
5 Virtual media key connector

7. If you are instructed to return the virtual media key, follow all packaging instructions, and use any packaging materials that are supplied to you for shipping.

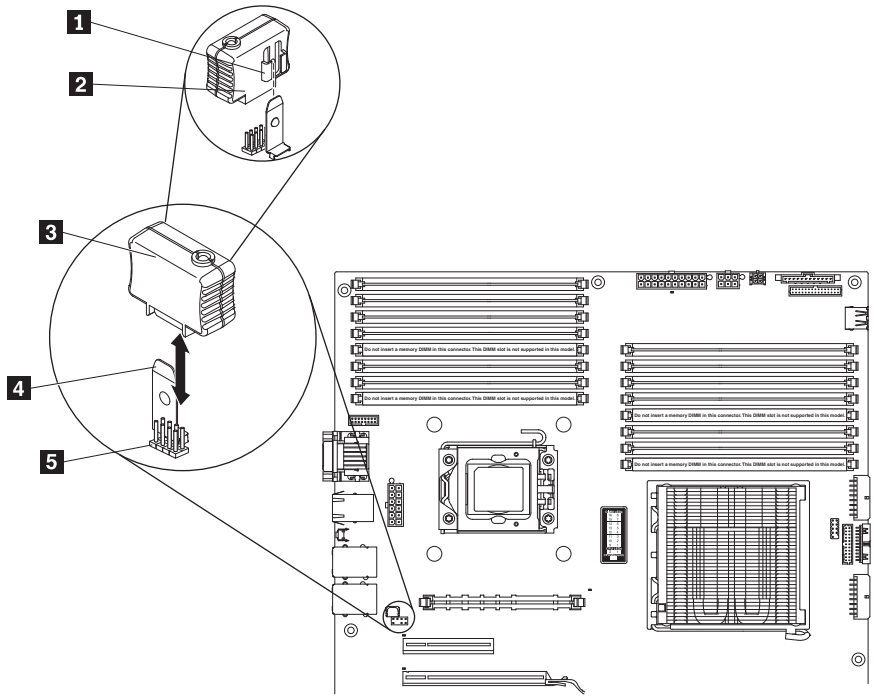
Installing the virtual media key

To install a virtual media key, do the following:

1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37).
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Unlock the side cover.
4. Remove the side cover (see “Removing the side cover” on page 43).
5. Carefully position the server on its side so that it is lying flat and facing up.

   Note: Do not allow the server to fall over.
6. Rotate the rear adapter-retention bracket to the open (unlocked) position.
7. Remove any adapters that prevent you from accessing the virtual media key connector on the system board.

   Note: Make a note of the cabling for later when you reinstall the adapters.
8. Align the alignment bracket on the rear of the key with the retention tab on the system board; then, slide the key down into the virtual media key connector on the system board until it is firmly seated in place.



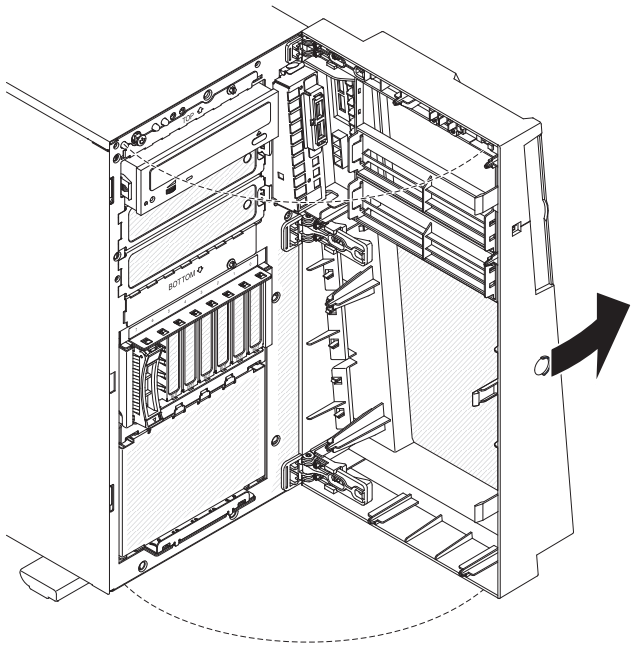
1 Alignment bracket
2 Virtual media key (rear)
3 Virtual media key (front)
4 Retention tab
5 Virtual media key connector

9. Reinstall any adapters that you removed earlier.
10. Rotate the rear adapter retention bracket to the closed (locked) position.
11. Reinstall the side cover (see “Installing the side cover” on page 134).
12. Lock the side cover.
13. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

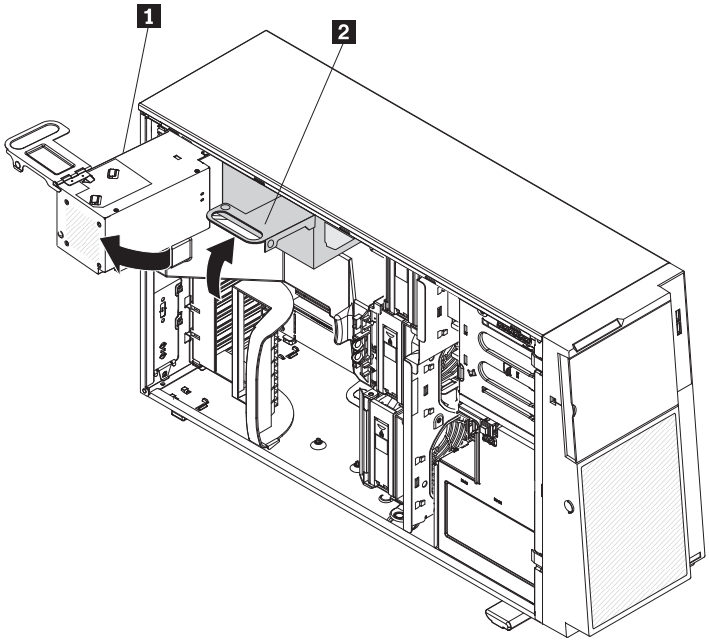
Removing the control-panel assembly

To remove the control-panel assembly, do the following:

1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37).
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 43).
4. Open the bezel. Place your finger on the pull point area on the left side of the bezel door and rotate it away from the server.



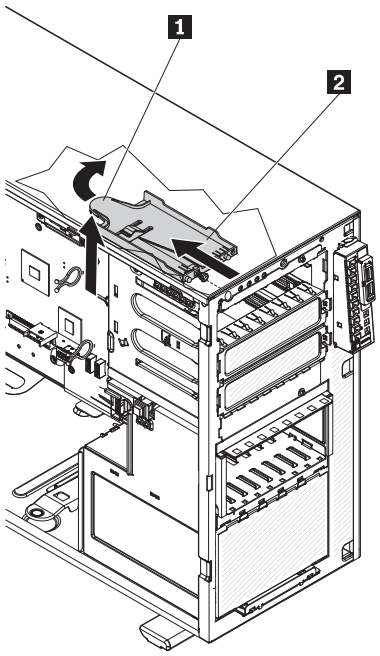
5. Rotate the power-supply cage assembly out of the chassis. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.



1 Power supply
2 Power-supply handle

6. Remove the air baffle (see “Removing the air baffle” on page 44).
7. Remove the fan cage assembly (see “Removing the fan cage assembly” on page 46).
8. Slide the drives in bay 1 and bay 2 forward slightly toward the front of the server. It is not necessary to remove these drives.

9. Disconnect the control-panel assembly cable from the system board, noting the routing of the cable (see “System-board internal connectors” on page 28 for the location of the front panel connector).
10. Locate the control-panel assembly release latch.
11. Press down the release latch of the control-panel assembly and pull the assembly toward the rear of the server. After you pull the assembly out approximately halfway, start turning it downward and pull it out of the chassis.



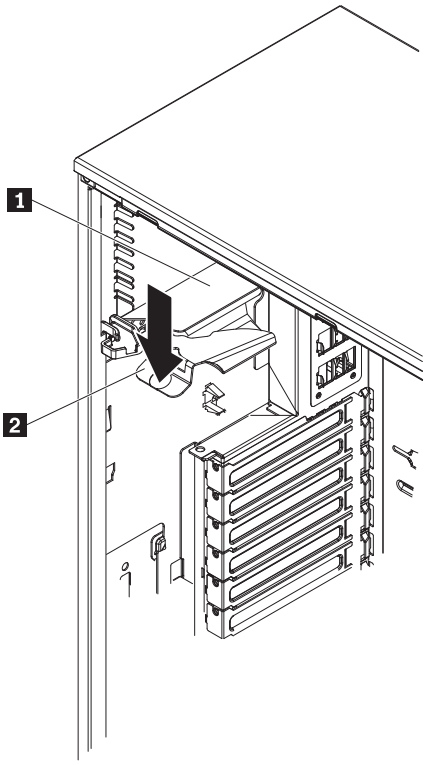
1 Release latch
2 Control panel assembly

12. If you are instructed to return the control-panel assembly, follow all packaging instructions, and use any packaging materials that are supplied to you for shipping.

Installing the control-panel assembly

To install the control-panel assembly, do the following:

1. Position the front end of the control-panel assembly in the channel above drive bay 1.
2. Slide the control-panel assembly toward the front of the chassis until it clicks into place.
3. Route and connect the control-panel assembly cable to the system board (see “System-board internal connectors” on page 28 for the location of the front control panel connector).
4. Slide the drives in bay 1 and bay 2 back into the drive bays, if necessary.
5. Install the fan cage assembly (see “Installing the fan cage assembly” on page 47y).
6. Install the air baffle (see “Installing the air baffle” on page 132).
7. Rotate the power-supply cage assembly back into the server. Press the power-supply cage release tab and rotate the power-supply cage assembly into the chassis.



1 Power supply support bracket
2 Power supply release tab

8. Close the bezel.
9. Install the side cover (see “Installing the side cover” on page 134).
10. Lock the side cover.
11. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

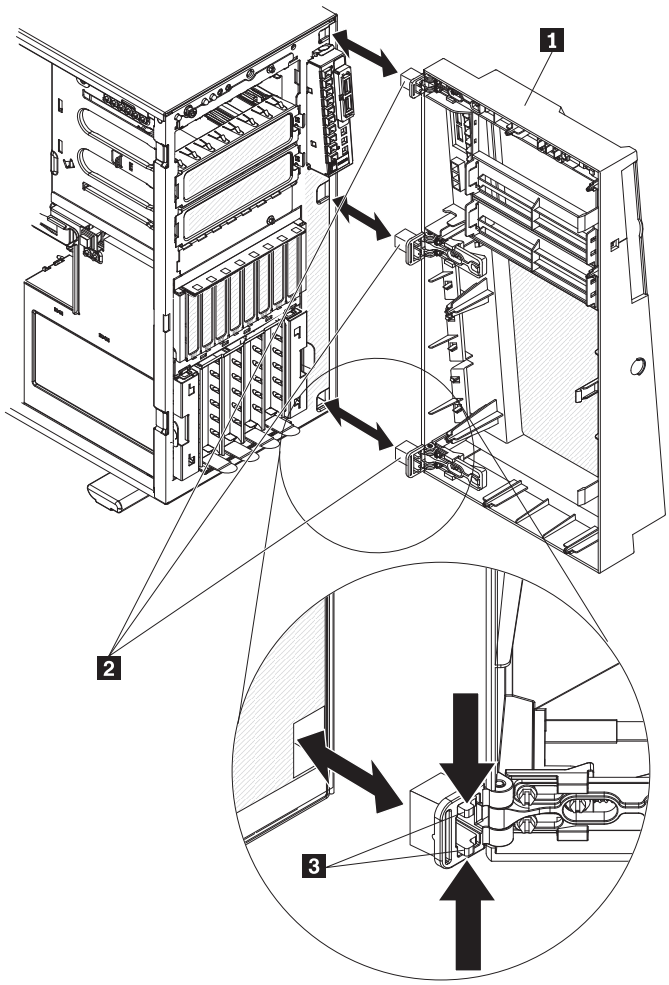
Completing the installation

To complete the installation, you must install the bezel, install the side cover, and connect all the cables and, for certain options, run the Setup Utility. Follow the instructions in this section.

Closing the bezel

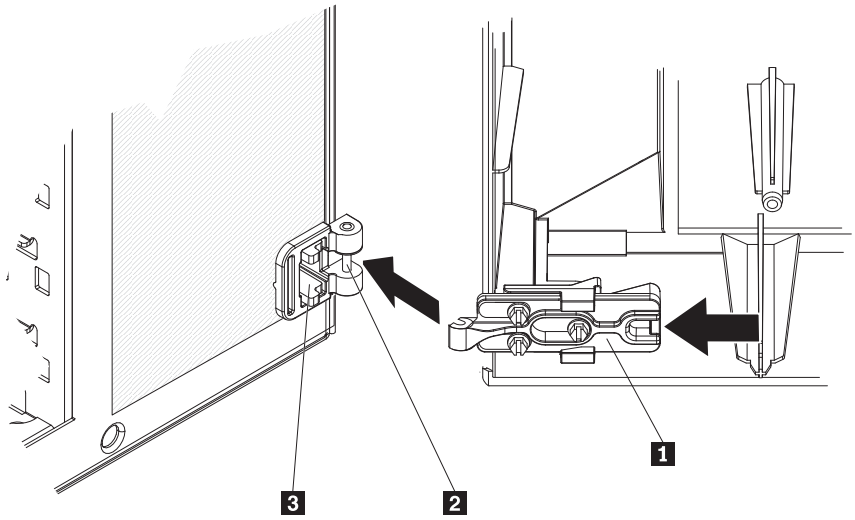
To close the bezel, do the following:

1. If you removed the bezel from the chassis, align the hinge assembly with the hinge holes on the chassis.



1 Bezel
2 Hinge assembly
3 Retention tabs

2. Push the hinges into the holes on the chassis until they snap into place.
3. If however, the bezel was removed by detaching the sliding hinge mount from the hinge assembly (using the breakaway method as the bezel was designed to do), do the following to reattach the bezel:
   a. Press in on the rear of the sliding hinge mount until it extends beyond the edge of the bezel and hold it in place.



1 Sliding hinge mount
2 Hinge pin
3 Hinge assembly

b. Align the sliding hinge mount with the hinge pin on the hinge assembly on the chassis.
c. Press the sliding hinge mount against the hinge pin until the sliding hinge mount snaps onto the hinge pin.

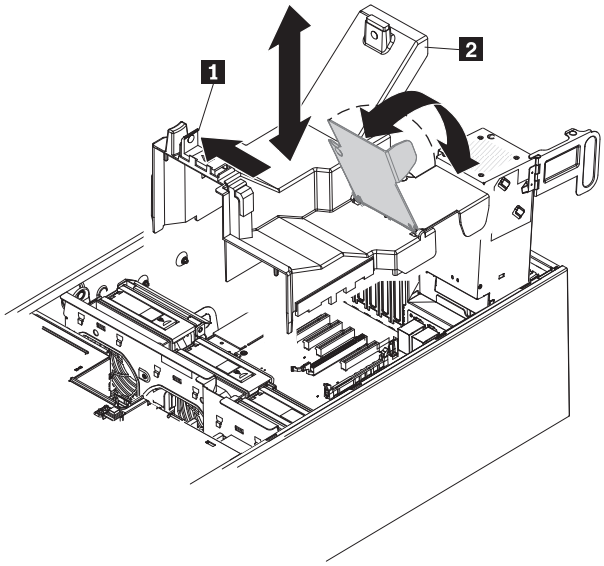
4. Close the bezel.

Note: When you lock the server side cover, it locks both the cover and the bezel.

Installing the air baffle

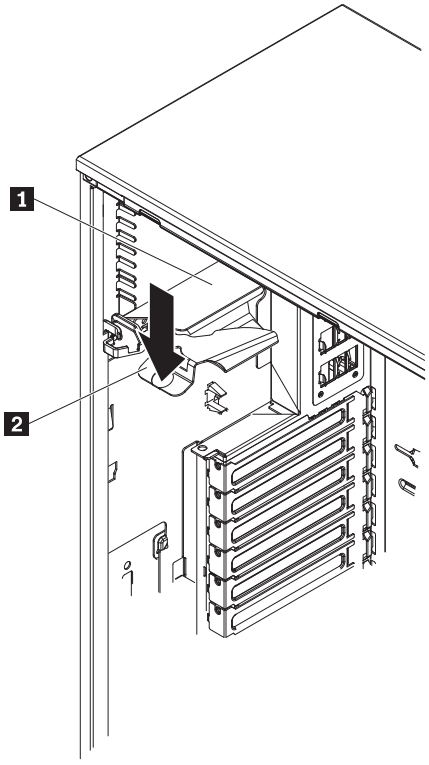
To replace the air baffle, do the following:

1. Align the air baffle pins with the holes on the fan cage and the pin hole on the rear of the chassis.



1 Air baffle pinch tab
2 Air baffle

2. Lower the air baffle into the server until the air baffle is seated firmly.
3. Press the power supply release tab and rotate the power supply back into the server.



1 Power supply support bracket
2 Power supply release tab

4. Install the side cover (see “Installing the side cover” on page 134).

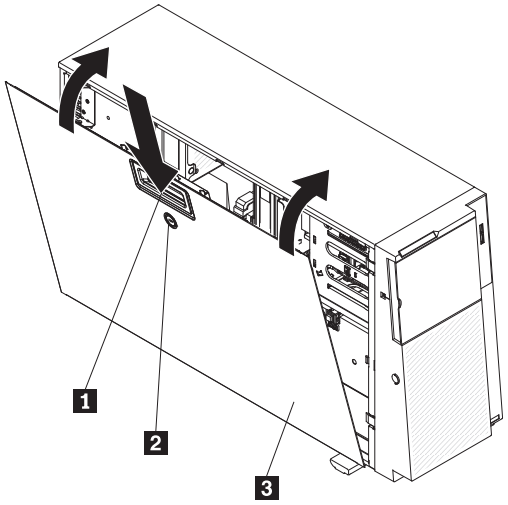
5. Lock the side cover.
6. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Installing the side cover

If you removed the side cover, reinstall it.

Attention: For proper cooling and airflow, replace the side cover before turning on the server. Operating the server for extended periods of time (more than 30 minutes) with the side cover removed might damage server components.

To install the side cover, do the following:



1 Cover release latch
2 Lock
3 Left-side cover

To reinstall the side cover, do the following:

1. Make sure that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server. Also, make sure that all internal cables are correctly routed.
2. Insert the bottom edges of the cover onto the inside lip of the chassis and rotate the cover toward the server.
3. Press down on the cover-release latch and close the cover to secure it in place.
4. Lock the side cover.

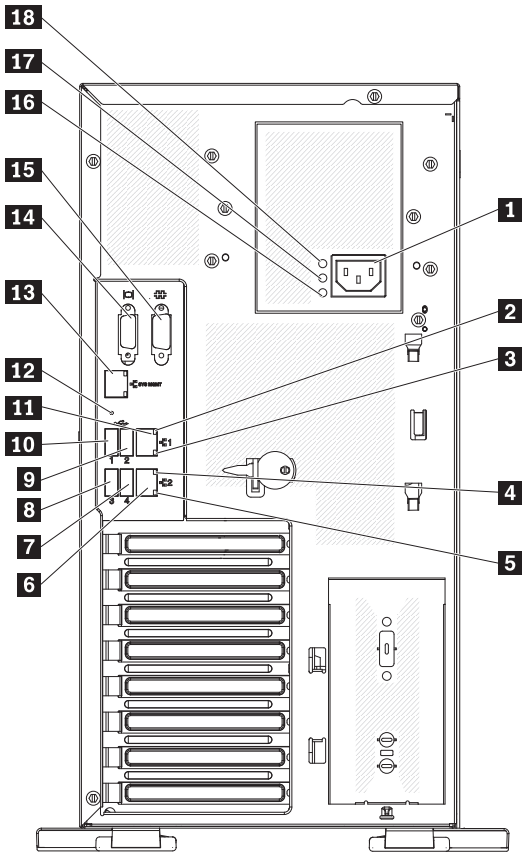
   Note: When you lock the server side cover, it locks both the cover and the bezel.

Connecting the cables

Attention: To prevent damage to equipment, connect the power cords last.

If the server cables and connector panel have color-coded connections, match the color of the cable end with the color of the connector. For example, match a blue cable end with a blue panel connector, a red cable end with a red connector, and so on.

The following illustration shows the input/output (I/O) connectors on the rear of the server.



1	Power cord connector	10	USB 1
2	Ethernet transmit/receive activity LED	11	Ethernet 1 10/100/1000
3	Ethernet link status LED	12	NMI button
4	Ethernet transmit/receive activity LED	13	Systems-management Ethernet connector
5	Ethernet link status LED	14	Video
6	Ethernet 2 10/100/1000	15	Serial 1 (COM 1)
7	USB 4	16	Fault (error) LED
8	USB 3	17	ac power LED
9	USB 2	18	dc power LED

Updating the server configuration

When you start the server for the first time after you add or remove an internal option or an external device, you might receive a message that the configuration has changed. The Setup Utility starts automatically so that you can save the new configuration settings. For additional information, see “Using the Setup Utility” on page 138.

Some options have device drivers that you must install. For information about installing device drivers, see the documentation that comes with each option.

If the server has a ServeRAID adapter and you have installed or removed a hard disk drive, see the ServeRAID documentation for information about reconfiguring the disk arrays.

Connecting external devices

If you install a supported optional adapter, you can attach external devices to the server.

To attach an external device, do the following:

1. Read the safety information (see “Safety” on page vii and “Installation guidelines” on page 37) as well as the documentation that comes with the device.
2. Turn off the server and all attached devices.
3. Follow the instructions that come with the device to prepare it for installation and to connect it to the server.

Chapter 6. Configuring the server

The following configuration programs and utilities come with the server:

- **Setup Utility**

  The UEFI (formerly BIOS) Setup Utility program is part of the basic input/output system firmware. Use it to change the startup-device sequence, set the date and time, and set passwords. For information about using this program, see “Using the Setup Utility” on page 138.

- **Boot Manager program**

  The Boot Manager program is part of the server firmware. Use it to override the startup sequence that is set in the Setup Utility and temporarily assign a device to be first in the startup sequence. For more information about using this program, see “Using the Boot Manager program” on page 150.

- **Integrated Management Module**

  Use the integrated management module (IMM) for configuration, to update the firmware and sensor data record/field replaceable unit (SDR/FRU) data, and to remotely manage a network. For information about using the IMM, see “Using the integrated management module” on page 155.

- **Remote presence capability and blue-screen capture**

  The remote presence and blue-screen capture feature are integrated into the Integrated Management Module (IMM). The virtual media key is required to enable the remote presence functions. When the optional virtual media key is installed in the server, it activates the remote presence functions. Without the virtual media key, you will not be able to access the network remotely to mount or unmount drives or images on the client system. However, you will still be able to access the Web interface without the virtual media key. You can order the optional virtual media key, if one did not come with your server. For more information about how to enable the remote presence function, see “Enabling the remote presence feature” on page 156.

- **Ethernet controller configuration**

  For information about configuring the Ethernet controller, see “Configuring the Broadcom Gigabit Ethernet controller” on page 151.

- **LSI Configuration Utility program**

  Use the LSI Configuration Utility program to configure the integrated SAS/SATA controller with RAID capabilities and the devices that are attached to it. For information about using this program, see “Using the LSI Configuration Utility program” on page 143.

  The following table lists the different server configurations and the applications that are available for configuring and managing RAID arrays.

Table 10. Server configuration and applications for configuring and managing RAID arrays

Server configuration	RAID array configuration (before operating system is installed)	RAID array management (after operating system is installed)
ServeRAID-BR10i adapter (LSI 1068) installed	LSI Utility (Setup Utility, press Ctrl+C)	MegaRAID Storage Manager (for monitoring storage only)
ServeRAID-MR10i adapter (LSI 1078) installed	MegaRAID Storage Manager (MSM), MegaRAID BIOS Configuration Utility (press C to start)	MegaRAID Storage Manager (MSM)

- **Advanced Settings Utility (ASU) program**

  Use this program as an alternative to the Setup Utility for modifying UEFI settings and IMM settings. Use the ASU program online or out of band to modify UEFI settings from the command line without the need to restart the server to access the Setup Utility. For more information about using this program, see “Advanced Settings Utility program” on page 159.

Using the Setup Utility

Use the Unified Extensible Firmware Interface (UEFI), formerly BIOS, Setup Utility program to perform the following tasks:

- View configuration information
- View and change assignments for devices and I/O ports
- Set the date and time
- Set the startup characteristics of the server and the order of startup devices
- Set and change settings for advanced hardware features
- View, set, and change settings for power-management features
- View and clear error logs
- Resolve configuration conflicts

Starting the Setup Utility

To start the Setup Utility, do the following:

1. Turn on the server.

   Note: Approximately 1 to 3 minutes after the server is connected to ac power, the power-control button becomes active.
2. When the prompt `<F1> Setup` is displayed, press F1. If you have set an administrator password, you must type the administrator password to access the full Setup Utility menu. If you do not type the administrator password, a limited Setup Utility menu is available.
3. Select settings to view or change.

Setup Utility menu choices

The following choices are on the Setup Utility main menu for the UEFI. Depending on the version of the firmware, some menu choices might differ slightly from these descriptions.

- **System Information**

  Select this choice to view information about the server. When you make changes through other choices in the Setup Utility, some of those changes are reflected in the system information; you cannot change settings directly in the system information. This choice is on the full Setup Utility menu only.

  – **System Summary**

    Select this choice to view configuration information, including the ID, speed, and cache size of the microprocessors, machine type and model of the server, the serial number, the system UUID, and the amount of installed memory. When you make configuration changes through other options in the Setup Utility, the changes are reflected in the system summary; you cannot change settings directly in the system summary.

  – **Product Data**

Select this choice to view the system-board identifier, the revision level or issue date of the firmware, the integrated management module and diagnostics code, and the version and date.

This choice is on the full Setup Utility menu only.

- **System Settings**

  Select this choice to view or change the server component settings.

  – **Processors**

    Select this choice to view or change the processor settings.

  – **Memory**

    Select this choice to view or change the memory settings.

  – **Devices and I/O Ports**

    Select this choice to view or change assignments for devices and input/output (I/O) ports. You can configure the serial ports; configure remote console redirection; enable or disable integrated Ethernet controllers, the SAS/SATA controller, SATA optical drive channels, and PCI slots. If you disable a device, it cannot be configured, and the operating system will not be able to detect it (this is equivalent to disconnecting the device).

  – **Power**

    Select this choice to view or change power capping to control consumption, processors, and performance states.

  – **Legacy Support**

    Select this choice to view or set legacy support.

    - **Force Legacy Video on Boot**

      Select this choice to force INT video support, if the operating system does not support UEFI video output standards.

    - **Rehook INT 19h**

      Select this choice to enable or disable devices from taking control of the boot process. The default is **Disable**.

    - **Legacy Thunk Support**

      Select this choice to enable or disable UEFI to interact with PCI mass storage devices that are non-UEFI compliant.

  – **Integrated Management Module**

    Select this choice to view or change the settings for the integrated management module.

    - **POST Watchdog Timer**

      Select this choice to view or enable the POST watchdog timer.

    - **POST Watchdog Timer Value**

      Select this choice to view or set the POST loader watchdog timer value.

    - **Reboot System on NMI**

      Enable or disable restarting the system whenever a nonmaskable interrupt (NMI) occurs. **Enable** is the default.

    - **Commands on USB Interface Preference**

      Select this choice to enable or disable the Ethernet over USB interface on IMM.

    - **Network Configuration**

      Select this choice to view the systems-management network interface port, the IMM MAC address, the current IMM IP address, and the host name; define the static IMM IP address, subnet mask, and gateway address;

specify whether to use the static IP address or have DHCP assign the IMM IP address; save the network changes.

- **Reset IMM to Defaults**

  Select this choice to view or reset IMM to the default settings.

- **Reset IMM**

  Select this choice to reset IMM.

– **System Security**

  Select this choice to view or configure Trusted Platform Module (TPM) support.

– **Adapters and UEFI Drivers**

  Select this choice to view information about the UEFI 1.10 and UEFI 2.0 compliant adapters and drivers installed in the server.

– **Network**

  Select this choice to view or configure the network device options, such as iSCSI, PXE, and network devices.

  Note: The configuration forms for UEFI 2.1 and greater compliant add-on network devices might be located here.

- **Date and Time**

  Select this choice to set the date and time in the server, in 24-hour format (*hour*:*minute*:*second*).

  This choice is on the full Setup Utility menu only.

- **Start Options**

  Select this choice to view or boot to devices, including the startup sequence. The server starts from the first boot record that it finds.

  This choice is on the full Setup Utility menu only.

- **Boot Manager**

  Select this choice to view, add, delete, or change the device boot priority, boot from a file, select a one-time boot, or reset the boot order to the default setting.

- **System-event Logs**

  Select this choice to enter the System Event Manager, where you can view the error messages in the system event logs. You can use the arrow keys to move between pages in the error log.

  The system-event logs contain all event and error messages that have been generated during POST, by the systems-management interface handler, and by the system-service processor. Run the diagnostics programs to get more information about error codes that occur. See the *Hardware Maintenance Manual* for instructions for running the diagnostics programs.

  Important: If the system-error LED on the front of the server is lit but there are no other error indications, clear the IMM system-event log. Also, after you complete a repair or correct an error, clear the IMM system-event log to turn off the system-error LED on the front of the server.

  – **POST Event Viewer**

    Select this choice to enter the POST event viewer to view the POST error messages.

  – **System-event Log**

    Select this choice to view the IMM system-event log.

  – **Clear System-event Log**

    Select this choice to clear the IMM system-event log.

- **User Security**

  Select this choice to set, change, or clear passwords. See “Passwords” for more information.

  This choice is on the full and limited Setup Utility menu.

  – **Set Power-on Password**

    Select this choice to set or change a power-on password. See “Power-on password” on page 142 for more information.

  – **Clear Power-on Password**

    Select this choice to clear a power-on password. See “Power-on password” on page 142 for more information.

  – **Set Administrator Password**

    Select this choice to set or change an administrator password. An administrator password is intended to be used by a system administrator; it limits access to the full Setup Utility menu. If an administrator password is set, the full Setup Utility menu is available only if you type the administrator password at the password prompt. For more information, see “Power-on password” on page 142.

  – Clear Administrator Password

    Select this choice to clear an administrator password. For more information, see “Passwords.”

- **Save Settings**

  Select this choice to save the changes that you have made in the settings.

- **Restore Settings**

  Select this choice to cancel the changes that you have made in the settings and restore the previous settings.

- **Load Default Settings**

  Select this choice to cancel the changes that you have made in the settings and restore the factory settings.

- **Exit Setup**

  Select this choice to exit from the Setup Utility. If you have not saved the changes that you have made in the settings, you are asked whether you want to save the changes or exit without saving them.

Passwords

From the **User Security** menu choice, you can set, change, and delete a power-on password and an administrator password. The **User Security** choice is on the full Setup Utility menu only.

If you set only a power-on password, you must type the power-on password to complete the system startup and to have access to the full Setup Utility menu.

An administrator password is intended to be used by a system administrator; it limits access to the full Setup Utility menu. If you set only an administrator password, you do not have to type a password to complete the system startup, but you must type the administrator password to access the Setup Utility menu.

If you set a power-on password for a user and an administrator password for a system administrator, you can type either password to complete the system startup. A system administrator who types the administrator password has access to the full Setup Utility menu; the system administrator can give the user authority to set, change, and delete the power-on password. A user who types the power-on

password has access to only the limited Setup Utility menu; the user can set, change, and delete the power-on password, if the system administrator has given the user that authority.

Power-on password

If a power-on password is set, when you turn on the server, the system startup will not be completed until you type the power-on password. You can use any combination of up to seven characters (A - Z, a - z, and 0 - 9) for the password.

If you forget the power-on password, you can regain access to the server in the following way:

- If an administrator password is set, type the administrator password at the password prompt. Start the Setup Utility and reset the power-on password.

Administrator password

An administrator password is intended to be used by a system administrator; it limits access to the full Setup Utility menu. You can use any combination of up to seven characters (A - Z, a - z, and 0 - 9) for the password.

Configuring RAID controllers

The following table lists the various utilities available to configure RAID controllers before an operating system is installed.

Table 11. RAID configuration utilities

RAID configuration utility	Description	Location	Where to find more information
EasyStartup RAID configuration utility	• For use with all factory-supported RAID controllers • Automatically detects hardware and lists all supported RAID configurations • Configures one disk array per controller using all drives currently attached to the controller • Creates a RAID response file that can be used to configure RAID controllers on similarly configured Lenovo servers.	EasyStartup DVD	"Using the *EasyStartup* DVD" on page 147

Table 11. RAID configuration utilities (continued)

RAID configuration utility	Description	Location	Where to find more information
MegaRAID BIOS Configuration Utility (WebBIOS)	For: • ServeRAID-MR10i controller • ServeRAID-MR10is controller • ServeRAID-MR10m controller	In system firmware. To access: • Use UEFI Setup Utility. • Press Ctrl + H at the WebBIOS prompt during startup.	"Using the WebBIOS utility" on page 145
LSI Logic MPT Setup Utility	For: • ServeRAID-BR10i controller • ServeRAID-BR10ie controller	In system firmware. To access: • Use UEFI Setup Utility. • Press Ctrl + C at the LSI prompt during startup.	"Using the LSI Configuration Utility program"

Using the LSI Configuration Utility program

Use the LSI Configuration Utility program to configure and manage redundant array of independent disks (RAID) arrays. Be sure to use this program as described in this document.

- Use the LSI Configuration Utility program to:
  - Perform a low-level format on a hard disk drive
  - Create an array of hard disk drives with or without a hot-spare drive
  - Set protocol parameters on hard disk drives

The integrated SAS/SATA controller with RAID capabilities supports RAID arrays. You can use the LSI Configuration Utility program to configure RAID 1 (IM), RAID 1E (IME), and RAID 0 (IS) for a single pair of attached devices. If you install a different type of RAID adapter, follow the instructions in the documentation that comes with the adapter to view or change settings for attached devices.

When you are using the LSI Configuration Utility program to configure and manage arrays, consider the following information:

- The integrated SAS/SATA controller with RAID capabilities supports the following features:
  - Integrated Mirroring (IM) with hot-spare support (also known as RAID 1)

    Use this option to create an integrated array of two disks plus up to two optional hot spares. All data on the primary disk can be migrated.
  - Integrated Mirroring Enhanced (IME) with hot-spare support (also known as RAID 1E)

    Use this option to create an integrated mirror enhanced array of three to eight disks, including up to two optional hot spares. All data on the array disks will be deleted.
  - Integrated Striping (IS) (also known as RAID 0)

    Use this option to create an integrated striping array of two to eight disks. All data on the array disks will be deleted.

- Hard disk drive capacities affect how you create arrays. The drives in an array can have different capacities, but the RAID controller treats them as if they all have the capacity of the smallest hard disk drive.
- If you use an integrated SAS/SATA controller with RAID capabilities to configure a RAID 1 (mirrored) array after you have installed the operating system, you will lose access to any data or applications that were previously stored on the secondary drive of the mirrored pair.
- If you install a different type of RAID controller, see the documentation that comes with the controller for information about viewing and changing settings for attached devices.

Starting the LSI Configuration Utility program

To start the LSI Configuration Utility program, do the following:

1. Turn on the server.

   Note: Approximately 3 minutes after the server is connected to power, the power-control button becomes active.
2. When the prompt <F1> Setup is displayed, press F1. If you have set an administrator password, you must type the administrator password to access the full Setup Utility menu. If you do not type the administrator password, a limited Setup Utility menu is available.
3. Select **System Settings → Adapters and UEFI drivers**.
4. Select **Please refresh this page first** and press Enter.
5. Select the device driver that is applicable for the SAS controller in the server (for example, **LSI Logic Fusion MPT SAS Driver**).
6. To perform storage-management tasks, see the SAS controller documentation.

When you have finished changing settings, press Esc to exit from the program; select **Save** to save the settings that you have changed.

Formatting a hard disk drive

Low-level formatting removes all data from the hard disk. If there is data on the disk that you want to save, back up the hard disk before you perform this procedure.

Note: Before you format a hard disk, make sure that the disk is not part of a mirrored pair.

To format a drive, do the following:

1. From the list of adapters, select the controller (channel) for the drive that you want to format and press Enter.
2. Select **SAS Topology** and press Enter.
3. Select **Direct Attach Devices** and press Enter.
4. To highlight the drive that you want to format, use the Up Arrow and Down Arrow keys. To scroll left and right, use the Left Arrow and Right Arrow keys or the End key. Press Alt+D.
5. To start the low-level formatting operation, select **Format** and press Enter.

Creating a RAID array of hard disk drives

To create a RAID array of hard disk drives, do the following:

1. From the list of adapters, select the controller (channel) for which you want to create an array.
2. Select **RAID Properties**.

3. Select the type of array that you want to create.
4. In the RAID Disk column, use the Spacebar or Minus (-) key to select **[Yes]** (select) or **[No]** (deselect) to select or deselect a drive from a RAID disk.
5. Continue to select drives, using the Spacebar or Minus (-) key, until you have selected all the drives for your array.
6. Press C to create the disk array.
7. Select **Save changes then exit this menu** to create the array.
8. Exit the Setup Utility.

Using the WebBIOS utility

The WebBIOS configuration utility enables you to create and manage RAID configurations on LSI SAS controllers. The WebBIOS utility resides in the SAS controller BIOS and operates independently of the operating system. The WebBIOS utility provides a configuration wizard to guide you through the configuration of virtual disks and physical arrays.

Starting the WebBIOS utility

Do the following to start the WebBIOS utility and access the main menu:

1. After you turn on the power and when the computer is starting, you are prompted to press Ctrl + H when the following message is displayed:

   ```
   Copyright© LSI Logic Corporation
   Press <Ctrl><H> for WebBIOS
   ```

2. Select an adapter from the list.
3. Click **Start**. The main WebBIOS utility interface is displayed. You can toggle between the physical view and logical view of the storage devices that are connected to the controller. Click **Physical View** or **Logical View** on the menu in the left pane to change the view.

Main menu of the WebBIOS utility

The main menu includes the following options:

Adapter Properties
From this view, you can display and modify the properties of the SAS that is currently selected.

Scan Devices
From this view, you can re-scan the physical and virtual disks for any changes in the drive status or physical configuration.

Virtual Disks
From this view, you can display and modify the virtual disk properties, delete virtual disks, initialize disks, and perform other tasks.

Physical Drives
From this view, you can view the physical drive properties, create hot-spare disks, and perform other tasks.

Configuration Wizard
Select this to start the Configuration Wizard and create a new storage configuration, clear a configuration, or add a new configuration.

Adapter Selection
From this view, you can select a different SAS adapter. Then, you can view information about the adapter and the drives connected to it, or create a new configuration for the adapter.

Physical View or Logical View
Select this to toggle between the Physical View and Logical View.

Events
From this view, you can display the system events in the Event Information page.

Exit Select this to exit the WebBIOS utility and continue with the system boot.

Creating a storage configuration using the Configuration Wizard

Do the following to start create a storage configuration:

1. Click **Configuration Wizard** to start the wizard.
2. Select a configuration option:

   Attention: If you select **Clear Configuration** or **New Configuration**, all existing data in the configuration is deleted. Make a backup copy of any data that you want to keep before selecting these options.

   Clear Configuration
   Clears the existing configuration.

   New Configuration
   Clears the existing configuration and lets you create a new configuration.

   Add Configuration
   Retains the existing storage configuration and adds new drives to it (this does not cause any data loss).
3. Click **Next**.
4. Select a configuration mode from the following options:

   Custom Configuration
   In this mode, you can control all attributes of the new storage configuration.

   Auto Configuration and Redundancy
   This mode automatically creates an optimal RAID 1 or RAID 5 configuration, providing data redundancy.

   Auto Configuration without Redundancy
   This mode automatically creates a non-redundant RAID 0 configuration.
5. Click **Next** to continue.

Viewing and changing properties

You can view information for one LSI SAS at a time. If your system has multiple LSI SAS adapters, click **Adapter Selection** on the main view. To view the properties for the currently selected adapter, click **Adapter Properties** on the main WebBIOS screen.

Viewing and changing virtual disk properties

On the WebBIOS main screen, select a virtual disk from the list and click **Virtual Disk**.

The Properties panel displays the RAID level, state, size, and stripe size.

The Policies panel lists the virtual disk policies that were defined when the storage configuration was created. To change any of these policies, select a policy from the

menu and click **Change**. The Operations panel lists operations that can be performed on the virtual disk. Select the operation and click **Go**. Then choose from the following operations:

- Select **Del** to delete this virtual disk.
- Select **Locate** and the LEDs flash on the physical drives used by this virtual disk.
- Select **Fast** or **Slow** to initialize this virtual disk.

  Attention: Before you run an initialization, back up any data on the virtual disk that you want to save. All data on the virtual disk is lost when you initialize it.

Using the *EasyStartup* DVD

The *EasyStartup* DVD simplifies the process of configuring your RAID controller and installing an operating system. The program works in conjunction with your Windows or Linux operating-system installation disc to automate the process of installing the operating system and associated device drivers.

If you did not receive an *EasyStartup* DVD with your server, you can download an image from the Lenovo Web site at http://www.lenovo.com/support.

The EasyStartup program has the following features:

- Self-booting DVD
- Easy-to-use, language-selectable interface
- Integrated help system
- Automatic hardware detection
- RAID configuration utility
- Device drivers (based on the server model and detected devices)
- Selectable partition size and file system type
- Support for Windows, Red Hat, and SUSE Server operating systems
- Installs the operating system and device drivers in an unattended mode to save time
- Creates a reusable response file that can be used with similarly configured Lenovo servers to make future installations even faster.

Before you use the *EasyStartup* DVD

Functionality and supported operating systems can vary with different versions of the EasyStartup program. To learn more about the version you have, do the following:

1. Insert the *EasyStartup* DVD and restart the server.
2. Advance to the Home screen.
3. Click **Compatibility notes**. The compatibility notes feature provides detailed information about the operating systems and server configurations supported by that version of the EasyStartup program.
4. Click **User Guide**. The User Guide provides an overview of the various functions provided by that version of the EasyStartup program.

Before using the EasyStartup program to install an operating system, make sure any external storage devices and fiber channels are configured correctly.

Configuring RAID

The RAID configuration feature that is part of the EasyStartup program enables you to view and change RAID settings for supported RAID controllers. Through this feature, you have the ability to select one RAID level for each installed controller, and the program automatically uses the discs currently attached to the controller to support that RAID level. This method satisfies most users' needs.

If you have a need to assign a primary and secondary RAID on the same controller and assign some of your discs to the primary RAID and some to the secondary RAID, you can use either of the following methods:

- **Manually remove the drives that you do not want included in your primary array before you configure your RAID controller through the EasyStartup program.**

  This method enables you to use the EasyStartup program to configure your RAID controller and install the operating system. After the operating system is installed, reinstall the drives and use the RAID configuration utility provided in the firmware to configure the secondary RAID.
- **Configure the controller using the RAID configuration utility provided in the firmware before you use the EasyStartup program.**

  For details, see “Configuring RAID controllers” on page 142. After your RAID controller is configured, start the EasyStartup program and install your operating system.

EasyStartup overview

The EasyStartup program requires a supported Lenovo server with an enabled, startable (bootable) DVD drive. In addition to the *EasyStartup* DVD, you also must have the operating-system installation CD or DVD and the product key or installation number for the operating system (if provided).

The EasyStartup program performs the following tasks:

- Detects installed hardware devices
- Guides you through the process of configuring one or more RAID controllers
- Guides you through the process of creating a response file for the unattended installation of the operating system
- Enables you to create scripts or commands that run at the end of the operating-system installation process
- Facilitates the installation of the ThinkServer EasyManage products and DVD-burning software (Windows installation only)
- Prepares the hard disk for installation
- Prompts you to insert the operating-system installation disc
- Initiates an unattended installation of the operating system and device drivers

Setup and configuration

When you start the *EasyStartup* DVD, you will be prompted for the following:

- Select the language in which you want to view the program.
- Select the language of the keyboard you will be using with the program.

Note: The following language keyboards are supported: English, French, German, Spanish, Japanese, Korean, Turkish, Italian, and Dutch.

You will then see one or more reminders about configuring storage devices, and then you will be presented with the Lenovo License Agreement. Read the license agreement carefully. You must agree with terms in order to continue.

After agreeing to the license agreement, you will be given the following choices:

- Continue to the main program interface
- Use a shortcut to install an operating system based on a response file that you previously created using the EasyStartup program
- Use a short cut to configure RAID controllers based on a RAID response file that you previously created using the EasyStartup program

If you continue to the main program interface, you will have the following selectable options:

- **Compatibility notes:** This selection provides information about the operating systems and server configurations supported by that version of the EasyStartup program.
- **User Guide:** This selection provides information about the features provided by that version of the EasyStartup program.
- **Hardware list:** This selection displays a list of hardware devices detected by the EasyStartup program.
- **Configure RAID:** This selection enables you to view the current RAID configuration for each installed RAID controller and make changes if needed.
- **Install operating system:** This selection displays a series of choices and prompts to collect information required for installation, prepares the hard disk for installation, and then initiates the installation process using the user-provided operating-system installation CD or DVD.
- **About:** This selection displays version information and legal notices.

Typical operating-system installation

When you select **Install operating system**, you will be prompted for information required for the installation. The prompts vary depending on the operating system selected. This section describes the tasks associated with a typical Windows operating-system installation. Each task must be completed in order before moving to the next task.

Note: Ensure that your RAID controller is correctly configured before you select an operating system to install.

- **Select operating system:** This task enables you to select the operating system that you will be installing.
- **Select disk:** This task enables you to select the disk where you want to install the operating system.

  Note: The disk that you select must be set as the boot disk in UEFI.
- **Partition options:** This task enables you to choose whether you want to repartition the selected drive or use an existing partition.
- **Partition settings:** This task enables you to choose the file system type and define the partition size.
- **Installation settings:** This task prompts you for user and system settings, the operating-system product key, and the administrator password.
- **Network settings:** This task prompts you for domain and workgroup settings, Ethernet controller type, IP address settings, DNS settings, and WINS address settings.

- **Install applications:** This task enables you to run custom commands or scripts at the end of the installation process. It also facilitates the installation of DVD-burning software and EasyManage software products.
- **Install Windows components:** This task enables you to install optional Windows components such as IIS, ASP.NET, and SNMP.
- **Confirm settings:** This task enables you to review all of the information you provided.
- **Save response file:** This task gives you the option of saving the information on a diskette or USB device as a response file for future installations on similarly configured Lenovo servers.
- **Start installation:** This task starts the actual installation process. First, the disk is prepared using the disk and partition information you specified. Then you are prompted to insert the operating-system disk, and the operating system is installed using the information that you specified.

Installing your operating system without using EasyStartup

If you have already configured the server hardware and you are not using the EasyStartup program to install your operating system, do the following to download the latest operating-system installation instructions from the Lenovo Spport Web site:

Note: Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to: http://www.lenovo.com/support.
2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
3. From **Family** list, select **ThinkServer TD200**, and click **Continue**.
4. Select the operating system that you want from the **Operating system** list, and click **Continue**.
5. Click **Operating system installation** to download instructions to install the operating system.

Using the Boot Manager program

The Boot Manager program is a built-in, menu-driven configuration utility program that you can use to temporarily redefine the first startup device without changing settings in the Setup Utility.

To use the Boot Manager program, do the following:

1. Turn off the server.
2. Restart the server.
3. When the prompt `<F12> Select Boot Device` is displayed, press F12. If a bootable USB mass storage device is installed, a submenu item (**USB Key/Disk**) is displayed.
4. Use the Up arrow and Down arrow keys to select an item from the **Boot Selection Menu** and press **Enter**.

The next time the server starts, it returns to the startup sequence that is set in the Setup Utility.

Enabling the Broadcom Gigabit Ethernet Utility program

The Broadcom Gigabit Ethernet Utility program is part of the server firmware. You can use it to configure the network as a startable device, and you can customize where the network startup option appears in the startup sequence.

To enable the Broadcom Gigabit Ethernet Utility program, do the following:

1. From the Setup Utility main menu, select **Devices and I/O Ports** and press Enter.
2. Select **Enable/Disable onboard device(s)** and press Enter.
3. Select **Ethernet** and press Enter.
4. Select **Enable** and press Enter.
5. Exit to the main menu and select **Save Settings** and press Enter.

Configuring the Broadcom Gigabit Ethernet controller

The Ethernet controllers are integrated on the system board. They provide an interface for connecting to a 10-Mbps, 100-Mbps, or 1-Gbps network and provides full duplex (FDX) capability, which enables simultaneous transmission and reception of data on the network. If the Ethernet ports in the server supports auto-negotiation, the controllers detect the data-transfer rate (10BASE-T, 100BASE-TX, or 1000BASE-T) and duplex mode (full-duplex or half-duplex) of the network and automatically operates at that rate and mode.

You do not have to set any jumpers or configure the controller. However, you must install a device driver to enable the operating system to address the controller. To find updated information about configuring the controllers, do the following:

Note: Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to: http://www.lenovo.com/support.
2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
3. From **Family** list, select **ThinkServer TD200**, and click **Continue**.
4. Click **Downloads and drivers** to download firmware updates.

Updating the firmware

Important:: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

The firmware for the server is periodically updated and is available for download on the Lenovo Web site. To check for the latest level of firmware, such as the server firmware, vital product data (VPD) code, device drivers, and service processor firmware, do the following:

Note: Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to: http://www.lenovo.com/support.
2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.

3. From **Family** list, select **ThinkServer TD200**, and click **Continue**.
4. Click **Downloads and drivers** to download firmware updates.

Download the latest firmware for the server; then, install the firmware, using the instructions that are included with the downloaded files.

When you replace a device in the server, you might have to either update the server with the latest version of the firmware that is stored in memory on the device or restore the pre-existing firmware from a diskette or CD image.

The following items are downloadable from the Web at http://www.lenovo.com/thinkserver:

- Server firmware is stored in ROM on the system board.
- IMM firmware is stored in ROM on the system board.
- Ethernet firmware is stored in ROM on the Ethernet controller.
- ServeRAID firmware is stored in ROM on the ServeRAID adapter.
- SAS/SATA firmware is stored in ROM on the SAS/SATA controller on the system board.

Major components contain VPD code. You can select to update the VPD code during the server firmware update procedure.

Starting the backup server firmware

The system board contains a backup copy area for the server firmware (formerly BIOS firmware). This is a secondary copy of the server firmware that you update only during the process of updating the server firmware. If the primary copy of the server firmware becomes damaged, use this backup copy.

To force the server to start from the backup copy, turn off the server; then, place the J6 jumper in the backup position (pins 2 and 3).

Use the backup copy of the server firmware until the primary copy is restored. After the primary copy is restored, turn off the server; then, move the J6 jumper back to the primary position (pins 1 and 2).

Recovering the server firmware

Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

If the server firmware has become corrupted, such as from a power failure during an update, you can recover the server firmware in one of two ways:

- **In-band method:** Recover server firmware, using either the boot block jumper (Automated Boot Recovery) and a server Firmware Update Package Service Pack.
- **Out-of-band method:** Use the IMM Web Interface to update the firmware, using the latest server firmware update package.

Note: You can obtain a server update package from one of the following sources:

- Download the server firmware update from the World Wide Web.
- Contact your Lenovo service representative.

To download the server firmware update package from the World Wide Web, do the following:

Note: Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

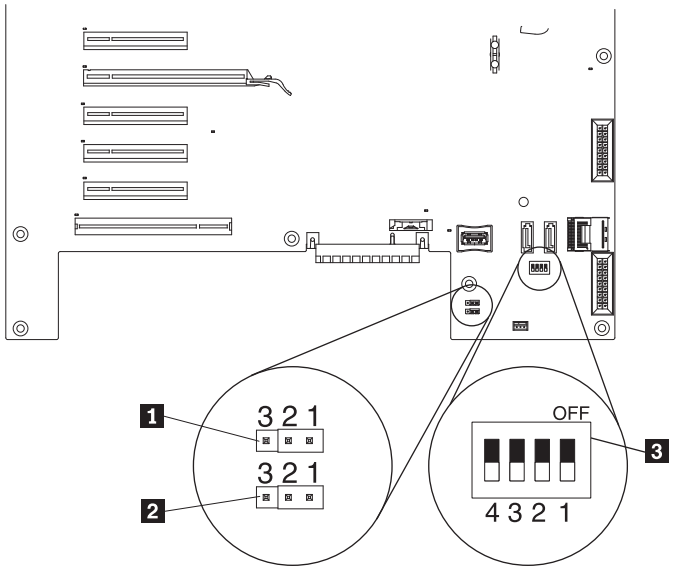
1. Go to: http://www.lenovo.com/support.
2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
3. From **Family** list, select **ThinkServer TD200**, and click **Continue**.
4. Click **Downloads and drivers** to download firmware updates.

The flash memory of the server consists of a primary bank and a backup bank. It is essential that you maintain the backup bank with a bootable firmware image. If the primary bank becomes corrupted, you can either manually boot the backup bank with the boot block jumper, or in the case of image corruption, this will occur automatically with the Automated Boot Recovery function.

In-band manual recovery method

To recover the server firmware and restore the server operation to the primary bank, do the following:

1. Read the safety information (see “Safety” on page vii, “Handling static-sensitive devices” on page 39, and “Working inside the server with the power on” on page 38).
2. Turn off the server, and disconnect all power cords and external cables.
3. Unlock and remove the server cover (see “Removing the side cover” on page 43).
4. Locate the UEFI boot recovery jumper (JP6) on the system board.



1 UEFI boot recover jumper (JP6)
2 Clear CMOS jumper (JP1)
3 SW6 switch block

5. Move the jumper from pins 1 and 2 to pins 2 and 3 to enable the UEFI recovery mode.

6. Reinstall the server cover (see “Installing the side cover” on page 134); then, reconnect all power cords.
7. Restart the server. The power-on self-test (POST) starts.
8. Boot the server to an operating system that is supported by the firmware update package that you downloaded.
9. Perform the firmware update by following the instructions that are in the firmware update package readme file.
10. Copy the downloaded firmware update package into a directory.
11. From a command line, type *filename*-s, where *filename* is the name of the executable file that you downloaded with the firmware update package.
12. Turn off the server and disconnect all power cords and external cables, and then remove the server cover.
13. Move the UEFI boot recovery jumper back to the primary position (pins 1 and 2).
14. Reinstall the server cover, and then reconnect all the power cables.
15. Restart the server.

See “System-board switches and jumpers” on page 31 for descriptions of the jumpers and switches.

In-band automated boot recovery method

Note: Use this method if the system board error LED is lit and there is a log entry or `Booting Backup Image` is displayed on the firmware splash screen; otherwise, use the in-band manual recovery method.

1. Boot the server to an operating system that is supported by the firmware update package that you downloaded.
2. Perform the firmware update by following the instructions that are in the firmware update package readme file.
3. Restart the server.
4. At the firmware splash screen, press F3 when prompted to restore to the primary bank. The server boots from the primary bank.

Out-of-band method: See the IMM documentation.

Automated boot recovery (ABR)

If the server is booting up and the IMM detects problems with the server firmware in the primary bank, it will automatically switch to the backup firmware bank and give you the opportunity to recover the primary bank. To recover to the server firmware primary bank, do the following:

1. Restart the server.
2. When the prompt press `F3 to restore to primary` is displayed, press F3 to recover the primary bank. Pressing F3 will restart the server.

Three boot failure

Configuration changes, such as added devices or adapter firmware updates can cause the server to fail POST (power-on self-test). If this occurs on three consecutive boot attempts, the server will temporarily uses the default configuration values and automatically goes to F1 Setup. To solve the problem, do the following:

1. Undo any configuration changes that you made recently and restart the server.

2. Remove any devices that you added recently and restart the server.
3. If the problem remains, go to the Setup utility and select **Load Default Settings**, and then click **Save** to restore the server factory settings.

Using the integrated management module

The integrated management module (IMM) is a second generation of the functions that were formerly provided by the baseboard management controller hardware. It combines service processor functions, video controller, and (when an optional virtual media key is installed) remote presence function in a single chip.

The IMM supports the following basic systems-management features:

- Environmental monitor with fan speed control for temperature, voltages, fan failure, and power supply failure.
- EasyLED indicators to report errors that occur with fans, power supplies, microprocessor, hard disk drives, and system errors.
- DIMM error assistance. The Unified Extensible Firmware Interface (UEFI) disables a failing DIMM that is detected during POST, and the IMM lights the associated system-error LED and the failing DIMM error LED.
- System-event log (SEL).
- ROM-based IMM firmware flash updates.
- Auto Boot Failure Recovery (ABR).
- A virtual media key, which enables remote presence support (remote video, remote keyboard/mouse, and remote storage).
- Automatic microprocessor disable on failure and restart in a two-microprocessor configuration when one microprocessor signals an internal error. When one of the microprocessors fail, the server will disable the failing microprocessor and restart with the other microprocessor.
- Nonmaskable interrupt (NMI) detection and reporting.
- Automatic Server Restart (ASR) when POST is not complete or the operating system hangs and the operating-system watchdog timer times-out. The IMM might be configured to watch for the operating-system watchdog timer and reboot the system after a timeout, if the ASR feature is enabled. Otherwise, the IMM allows the administrator to generate a nonmaskable interrupt (NMI) by pressing an NMI button on the system board for an operating-system memory dump. ASR is supported by IPMI.
- Intelligent Platform Management Interface (IPMI) Specification V2.0 and Intelligent Platform Management Bus (IPMB) support.
- Serial port redirection over telnet or ssh.
- Serial over LAN (SOL).
- Active Energy Manager.
- Query power-supply input power.
- PECI 2 support.
- Power/reset control (power-on, hard and soft shutdown, hard and soft reset, schedule power control).
- Alerts (in-band and out-of-band alerting, PET traps - IPMI style, SNMP, e-mail).
- Operating-system failure blue screen capture.
- Command-line interface.
- Configuration save and restore.
- PCI configuration data.

- Boot sequence manipulation.

The IMM also provides the following remote server management capabilities:

- **Command-line interface (IPMI Shell)**

  The command-line interface provides direct access to server management functions through the IPMI 2.0 protocol. Use the command-line interface to issue commands to control the server power, view system information, and identify the server. You can also save one or more commands as a text file and run the file as a script.

- **Serial over LAN**

  Establish a Serial over LAN (SOL) connection to manage servers from a remote location. You can remotely view and change the UEFI settings, restart the server, identify the server, and perform other management functions. Any standard Telnet client application can access the SOL connection.

Using the remote presence capability and blue-screen capture

The remote presence and blue-screen capture features are integrated functions of the integrated management module (IMM). When the optional Virtual Media Key is installed in the server, it activates the remote presence functions. The virtual media key is required to enable the integrated remote presence and blue-screen capture features. Without the virtual media key, you will not be able to access the network remotely to mount or unmount drives or images on the client system. However, you can still access the Web interface without the key.

After the virtual media key is installed in the server, it is authenticated to determine whether it is valid. If the key is not valid, you receive a message from the Web interface (when you attempt to start the remote presence feature) indicating that the hardware key is required to use the remote presence feature.

The virtual media key has an LED. When this LED is lit and green, it indicates that the key is installed and functioning correctly. When the LED is not lit, it indicates that the key might not be installed correctly.

The remote presence feature provides the following functions:

- Remotely viewing video with graphics resolutions up to 1280 x 1024 at 75 Hz, regardless of the system state
- Remotely accessing the server, using the keyboard and mouse from a remote client
- Mapping the CD or DVD drive, diskette drive, and USB flash drive on a remote client, and mapping ISO and diskette image files as virtual drives that are available for use by the server
- Uploading a diskette image to the IMM memory and mapping it to the server as a virtual drive

The blue-screen capture feature captures the video display contents before the IMM restarts the server when the IMM detects an operating-system hang condition. A system administrator can use the blue-screen capture to assist in determining the cause of the hang condition.

Enabling the remote presence feature

To enable the remote presence feature, do the following:

1. Install the virtual media key into the dedicated slot on the system board (see “System-board option connectors” on page 30).
2. Turn on the server.

   Note: Approximately 1 to 3 minutes after the server is connected to ac power, the power-control button becomes active.

Obtaining the IP address for the IMM

To access the Web interface, you need the IP address for the IMM. You can obtain the IMM IP address through the Setup Utility. The server comes with a default IP address for the IMM of 192.168.70.125. To locate the IP address, do the following:

1. Turn on the server.

   Note: Approximately 1 to 3 minutes after the server is connected to ac power, the power-control button becomes active.
2. When the prompt `<F1> Setup` is displayed, press F1. (This prompt is displayed on the screen for only a few seconds. You must press F1 quickly.) If you have set both a power-on password and an administrator password, you must type the administrator password to access the full Setup Utility menu.
3. From the Setup Utility main menu, select **System Settings**.
4. On the next screen, select **Integrated Management Module**.
5. On the next screen, select **Network Configuration**.
6. Find the IP address and write it down.
7. Exit from the Setup Utility.

Logging on to the Web interface

To log on to the Web interface to use the remote presence functions, do the following:

1. Open a Web browser and in the **address** or **URL** field, type the IP address or host name of the IMM to which you want to connect.

   Note: The IMM defaults to DHCP. If a DHCP host is not available, the IMM assigns a static IP address of 192.168.70.125.
2. On the Login page, type the user name and password. If you are using the IMM for the first time, you can obtain the user name and password from your system administrator. All login attempts are documented in the event log.

   Note: The IMM is set initially with a user name of USERID and password of PASSW0RD (passw0rd with a zero, not a the letter O). You have read/write access. You must change the default password the first time you log on.
3. On the Welcome page, type a timeout value (in minutes) in the field that is provided. The IMM will log you off of the Web interface if your browser is inactive for the number of minutes that you entered for the timeout value.
4. Click **Continue** to start the session. The System Health page provides a quick view of the system status.

Diagnostics programs and messages

The diagnostics programs are the primary method of testing the major components of the server. As you run the diagnostics programs, text messages are displayed on the screen and are saved in the test log. A diagnostics text message indicates that a problem has been detected and provides the action you should take as a result of the text message.

Make sure that the server has the latest version of the diagnostics programs. To download the latest version, do the following:

Note: Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to: http://www.lenovo.com/support.
2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
3. From **Family** list, select **ThinkServer TD200**, and click **Continue**.
4. Click **Downloads and drivers** to download firmware updates.

Utilities are available to reset and update the diagnostics code on the integrated USB flash device, if the diagnostic partition becomes damaged and does not start the diagnostic programs. For more information and to download the utilities, go to http://www.lenovo.com/thinkserver.

The DSA diagnostic programs collect information about the following aspects of the system:

- System configuration
- Network interfaces and settings
- Hardware inventory, including PCI and USB information
- Drive health information
- SAS/SATA RAID and controller configuration
- Event logs for ServeRAID controllers and service processors

The DSA diagnostics programs can also provide diagnostics for the following system components, if they are installed in the system:

- BroadCom Dual Gigabit Ethernet
- Optical drives
- Hard disk drives
- SAS/SATA RAID controller
- Integrated management module (IMM)
- Trusted Platform Module chip
- Memory
- Microprocessor

Running the diagnostics programs

To run the DSA Preboot diagnostics programs, do the following:

1. If the server is running, turn off the server and all attached devices.
2. Turn on all attached devices; then, turn on the server.
3. When the prompt `<F2> Diagnostics` is displayed, press F2.

Note: The DSA Preboot diagnostics program might appear to be unresponsive for an unusual length of time when you start the program. This is normal operation while the program loads.

4. Optionally, select **Quit to DSA** to exit from the stand-alone memory diagnostics program.

   Note: After you exit from the stand-alone memory diagnostics environment, you must restart the server to access the stand-alone memory diagnostics environment again.
5. Select **gui** to display the graphical user interface, or select **cmd** to display the DSA interactive menu.
6. Follow the instructions on the screen to select the diagnostic test to run.

If the diagnostics programs do not detect any hardware errors but the problem remains during normal server operations, a software error might be the cause. If you suspect a software problem, see the information that comes with your software.

A single problem might cause more than one error message. When this happens, correct the cause of the first error message. The other error messages usually will not occur the next time you run the diagnostics programs.

Exception: If multiple error codes or LEDs indicate a microprocessor error, the error might be in a microprocessor or in a microprocessor socket. See "Microprocessor problems" on page 168 for information about diagnosing microprocessor problems.

If the server stops during testing and you cannot continue, restart the server and try to run the diagnostics programs again. If the problem remains, replace the component that was being tested when the server stopped.

For a list of diagnostics messages, see the *Hardware Maintenance Manual*.

Advanced Settings Utility program

The Advanced Settings Utility (ASU) program is an alternative to the Setup Utility for modifying UEFI settings. Use the ASU program online or out of band to modify UEFI settings from the command line without the need to restart the system to access the Setup Utility.

You can also use the ASU program to configure the optional remote presence features or other IMM settings. The remote presence features provide enhanced systems-management capabilities.

In addition, the ASU program provides limited settings for configuring the IPMI function in the IMM through the command-line interface.

Use the command-line interface to issue setup commands. You can save any of the settings as a file and run the file as a script. The ASU program supports scripting environments through a batch-processing mode.

Installing EasyManage software

You can install the ThinkServer™ EasyManage Core Server program from the EasyManage CD or you can download and install the program from http://www.lenovo.com/support. After one instance of the EasyManage Core Server has been installed, you can use the EasyManage Agent installer to install the agent on other servers and clients on the network.

Also, the EasyManage program provides an option to either install the EasyManage Agent as part of the operating-system installation process or install a desktop icon to assist with the installation of the EasyManage Core Server after the operating system has been installed.

Installation requirements

Before installing EasyManage software on your server, your environment must meet the following requirements:

- Microsoft® Windows Server 2003 or Windows Server 2008 is installed on the server where you intend to install the Core Server.
- The original Windows Server operating-system installation CDs are available in case files are needed while installing the prerequisites.
- The server has Internet access to obtain prerequisites and to activate the software after the installation is complete.
- The server has a static IP address.
- The server is not a domain controller. However, it is recommended to have the server join a domain.
- The account that you use to log in and to install the Core Server has Administrator privileges on the server with full read/write access. Ideally, this account is also a Domain Administrator account. This account will be used to create the initial administrator-level account used to log in to the EasyManage console.
- Any previous agent from EasyManage or LANDesk must be removed prior to installing the Core Server and Management Console.

Installation order

The order in which you install the operating system and Windows Components is critical to install EasyManage software successfully. To ensure a clean, working installation of EasyManage software, use the following installation order:

1. Install Microsoft Windows Server 2003 or Microsoft Windows Server 2008 32-bit with the latest Service Pack.
2. Install the following Windows Components: See “Installing Windows 2003 components on the Core Server” on page 161 or “Installing Windows 2008 32-bit components” on page 161.
3. Use Windows Update to install all available critical updates.
4. (For Windows Server 2003 only) Download Microsoft .NET Framework 2.0 Service Pack 1 or newer from the following Web site: http://www.microsoft.com/downloads/details.aspx?FamilyID=0856eacb-4362-4b0d-8edd-aab15c5e04f5&DisplayLang=en. Install the software using the default settings.
5. (For both Windows Server 2003 and 2008) Download Microsoft Web Services Enhancement 2.0 Service Pack 3 (LANDesk Process Manager only) from the following Web site: http://www.microsoft.com/downloads/details.aspx?FamilyID=1ba1f631-c3e7-420a-bc1e-ef18bab66122&DisplayLang=en. Install the software using the default settings.

Note: This specific version is required.

6. Use Windows Update to install all available critical updates.
7. Launch the EasyManage installation.
8. After EasyManage is installed, enable Security and Patch Manager to obtain the LANDesk 8.8 Software Updates. In the console application, click **Help -> LANDesk -> Security Updates** for a guide to configuring Security and Patch Manager.
9. Install Adobe Flash Player 9 if you plan to use the Management Console functions from the same server on which the Core Server is installed. You can obtain Adobe Flash Player 9 from the Adobe Web site: http://www.adobe.com/products/flashplayer/

Installing Windows 2003 components on the Core Server

To install IIS, ASP.Net, and SNMP on the Core Server, do the following procedure for each component:

1. In the Windows Control Panel, double-click **Add or Remove Programs**.
2. In the toolbar on the left, click **Add/Remove Windows Components** to launch the Windows Components Wizard.
3. Select from the Components list:
   - When installing IIS and ASP.NET, click **Application Server**; then, click **Details**.
   - When installing SNMP, click **Management and Monitoring Tools**; then, click **Details**.
4. Select the component that you want to install:
   - When installing IIS, select **Internet Information Services (IIS)**; then, click **OK**.
   - When installing ASP.NET, select **ASP.NET**; then, click **OK**.
   - When installing SNMP, select **Simple Network Management Protocol**; then, click **OK**.
5. Click **Next** to continue the wizard.
6. If prompted, insert the original Windows operating-system CD. If the autorun launches when you insert the CD, close it. The Windows Components Wizard will automatically detect and install the necessary files.
7. Click **Finish**.

Installing Windows 2008 32-bit components

To install the Windows Server 2008 32-bit components necessary for an EasyManage core server installation, do the following:

Installing Web Server Role (IIS)

To install the Web Server Role (IIS), do the following:

1. Click **Start** -> **Server Manager**.
2. Under Roles Summary, click **Add Roles**. The **Add Roles** wizard appears.
3. Click **Next**.
4. Select the check box next to **Web Server (IIS)**. A dialog box displays the additional features that are required.
5. Click **Add Required Features**, then click **Next**. In the list of additional role services that can be installed, ensure that the follow are checked:
   - HTTP Redirection

- Static Content
- ASP.NET
- ASP
- CGI
- Server Side Includes
- Windows Authentication
- IIS 6 Metabase Compatibility

Note: When you select **ASP.Net** or **ASP**, a dialog box displays the additional role services required. Click **Add Required Role Services**.

6. Click **Install**.

Note: If IIS is already installed and certain Role Services are still required, expand **Roles** in the tree view on the left in Server Manager and click **Web Server (IIS)**, then click **Add Role Services**. Select the necessary role services and click **Install**.

Installing Microsoft SNMP services

To install Microsoft SNMP services, do the following:

1. Click **Add Features** in the **Features Summary** section on the main page of Server Manager.
2. Select the **SNMP Services** check box.
3. Click **Next**, then **Install**.

Uninstalling the LANDesk Software Agent

If the Core Server has LANDesk agents on it from a previous Management Suite release, it will fail the autorun prerequisite check. You must remove the old agents by running uninstallwinclient.exe from the \Program Files\LANDesk\ManagementSuite folder.

Chapter 7. Troubleshooting

This chapter describes the diagnostic tools that are available to help you solve problems that might occur in the server.

If you cannot locate and correct the problem using the information in this chapter, see the *Hardware Maintenance Manual* for more information.

Troubleshooting tables

Use the troubleshooting tables to find solutions to problems that have identifiable symptoms.

If you cannot find the problem in these tables, see the *Hardware Maintenance Manual*.

If you have just added new software or a new optional device and the server is not working, do the following before using the troubleshooting tables:

1. Check the LEDs on the control panel or the system board.
2. Remove the software or device that you just added.
3. Run the diagnostic tests to determine whether the server is running correctly.
4. Reinstall the new software or new device.

CD or DVD drive problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
The CD or DVD drive is not recognized.	1. Make sure that: • The SATA channel to which the CD or DVD drive is attached (primary or secondary) is enabled in the Setup Utility. • All cables and jumpers are installed correctly. • The correct device driver is installed for the CD or DVD drive. 2. Run the CD or DVD drive diagnostics programs. 3. Reseat the CD or DVD drive cable. 4. Replace the following components one at a time, in the order shown, restarting the server each time: a. CD or DVD drive cable b. CD or DVD drive c. (Trained service technician only) System board

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
A CD or DVD is not working correctly.	1. Clean the CD or DVD. 2. Run the CD or DVD drive diagnostics programs. 3. Reseat the CD or DVD drive cable. 4. Replace the following components one at a time, in the order shown, restarting the server each time: a. CD or DVD drive cable b. CD or DVD drive
The CD or DVD drive tray is not working.	1. Make sure that the server is turned on. 2. Insert the end of a straightened paper clip into the manual tray-release opening. 3. Reseat the CD or DVD drive cable. 4. Replace the following components one at a time, in the order shown, restarting the server each time: a. CD or DVD drive cable b. CD or DVD drive

Diskette drive problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
The optional diskette drive activity LED stays lit, or the server bypasses the diskette drive.	• If there is a diskette in the drive, make sure that: – The diskette drive cables are correctly and securely connected. – The diskette drive is enabled in the Setup Utility. – The diskette is good and not damaged. (Try another diskette if you have one.) – The diskette is inserted correctly in the drive. – The diskette contains the necessary files to start the server. – Your software program is working properly. • To prevent diskette drive read/write errors, make sure that the distance between monitors and diskette drives is at least 76 mm (3 in.). If the problem remains, replace the internal diskette drive.

General problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
A cover lock is broken, an LED is not working, or a similar problem has occurred.	If the part is a CRU, replace it. If the part is a FRU, the part must be replaced by a trained service technician.

Hard disk drive problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
Not all drives are recognized by the hard disk drive diagnostic test (the Fixed Disk Test).	Remove the drive that is indicated by the diagnostic tests; then, run the hard disk drive diagnostic test again. If the remaining drives are recognized, replace the drive that you removed with a new one.
The server stops responding during the hard disk drive diagnostic test.	Remove the hard disk drive that was being tested when the server stopped responding, and run the diagnostic test again. If the hard disk drive diagnostic test runs successfully, replace the drive that you removed with a new one.
A hard disk drive was not detected while the operating system was being started.	Reseat all hard disk drives and cables; then, run the hard disk drive diagnostic tests again.
A hard disk drive passes the diagnostic Fixed Disk Test or SCSI Attached Disk Test, but the problem remains.	Run the diagnostic SCSI Attached Disk Test. **Note:** This test is supported on server models with RAID arrays that use the ServeRAID-BR10i, ServeRAID-MR10i, or ServeRAID-MR10is controllers or servers with SATA hard disk drives that use the onboard SATA/SAS controller to create RAID arrays. Use the Fixed Disk Test for SATA hard disk drives or servers that have RAID arrays.

Intermittent problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
A problem occurs only occasionally and is difficult to diagnose.	1. Make sure that: • All cables and cords are connected securely to the rear of the server and attached devices. • When the server is turned on, air is flowing from the fan grille. If there is no airflow, the fan is not working. This can cause the server to overheat and shut down. 2. Check the system-event log or IMM system-event log.

Keyboard, mouse, or pointing-device problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
All or some keys on the keyboard do not work.	1. Make sure that: • The keyboard cable is securely connected. • The server and the monitor are turned on. 2. If you are using a USB keyboard and it is connected to a USB hub, disconnect the keyboard from the hub and connect it directly to the server. 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. Keyboard b. (Trained service technician only) System board
The mouse or pointing device does not work.	1. Make sure that: • The mouse or pointing-device cable is securely connected to the server. • The mouse or pointing-device drivers are installed correctly. • The server and the monitor are turned on. • The mouse option is enabled in the Setup Utility program. 2. If you are using a USB mouse or pointing device and it is connected to a USB hub, disconnect the mouse or pointing device from the hub and connect it directly to the server. 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. Mouse or pointing device b. (Trained service technician only) System board

Memory problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
The amount of system memory that is displayed is less than the amount of installed physical memory.	1. Make sure that: • No error LEDs are lit on the control-panel assembly or on the system board. • Memory mirroring does not account for the discrepancy. • The memory modules are seated correctly. • You have installed the correct type of memory. • All DIMMs are enabled. The server might have automatically disabled a DIMM when it detected a problem. 2. Check the POST event log for error message 289: • If a DIMM was disabled by a systems-management interrupt (SMI), replace the DIMM. 3. Run memory diagnostics. 4. Make sure that there is no memory mismatch when the server is over the minimum memory configuration (one 1 GB DIMM) and that you have installed the correct number of DIMMs. 5. Reseat the DIMMs. 6. Replace the following components one at a time, in the order shown, restarting the server each time: a. DIMMs b. (Trained service technician only) System board
Multiple rows of DIMMs in a branch are identified as failing.	1. Reseat the DIMMs; then, restart the server. 2. Replace the failing DIMM. 3. (Trained service technician only) Replace the system board.

Microprocessor problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
A microprocessor LED is lit during POST, indicating that the startup (boot) microprocessor is not working correctly.	1. Make sure that the server supports all the microprocessors and that the microprocessors match in speed and cache size. 2. Reseat the following components: a. (Trained service technician only) Microprocessor b. VRM 3. (Trained service technician only) If there is no indication of which microprocessor has failed, isolate the error by testing with one microprocessor at a time. 4. Replace the following components one at a time, in the order shown, restarting the server each time: a. (Trained service technician only) Microprocessor b. (Trained service technician only) System board 5. (Trained service technician only) If there are multiple error codes or LEDs that indicate a microprocessor error, reverse the locations of the microprocessors or with a microprocessor socket.

Monitor or video problems

Some Lenovo monitors have their own self-tests. If you suspect a problem with your monitor, see the documentation that comes with the monitor for instructions for testing and adjusting the monitor. If you cannot diagnose the problem, call for service.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
Testing the monitor	1. Make sure that the monitor cables are firmly connected. 2. Try using a different monitor on the server, or try using the monitor that is being tested on a different server. 3. Run the diagnostics programs. If the monitor passes the diagnostics programs, the problem might be a video device driver. 4. Replace the following components one at a time, in the order shown, restarting the server each time: a. (Trained service technician only) System board

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
The screen is blank.	1. Make sure that: • The server is turned on. If there is no power to the server, see "Power problems" on page 171. • The monitor cables are connected correctly. • The monitor is turned on and the brightness and contrast controls are adjusted correctly. **Important:** In some memory configurations, the 3-3-3 beep code might sound during POST, followed by a blank monitor screen. If this occurs and the **Boot Fail Count** option in the **Start Options** of the Setup Utility program is enabled, you must restart the server three times to reset the configuration settings to the default configuration (the memory connector or bank of connectors enabled). 2. Make sure that the correct server is controlling the monitor, if applicable. 3. Make sure that damaged server firmware is not affecting the video; see "Updating the firmware" on page 151. 4. See "Solving undetermined problems" on page 173.
The monitor works when you turn on the server, but the screen goes blank when you start some application programs.	1. Make sure that: • The application program is not setting a display mode that is higher than the capability of the monitor. • You installed the necessary device drivers for the application. 2. Run video diagnostics. • If the server passes the video diagnostics, the video is good; see "Troubleshooting tables" on page 163. • (Trained service technician only) If the server fails the video diagnostics, replace the system board.
The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted.	1. If the monitor self-tests show the monitor is working correctly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescent lights, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor. **Attention:** Moving a color monitor while it is turned on might cause screen discoloration. Move the device and the monitor at least 305 mm (12 in.) apart, and turn on the monitor. **Notes:** a. To prevent diskette drive read/write errors, make sure that the distance between the monitor and any external diskette drive is at least 76 mm (3 in.). b. Non-Lenovo monitor cables might cause unpredictable problems. 2. Reseat the following components: a. Monitor cable 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. Monitor b. (Trained service technician only) System board

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
Wrong characters appear on the screen.	1. If the wrong language is displayed, update the server firmware with the correct language (see "Using the Setup Utility" on page 138). 2. Reseat the monitor cable. 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. Monitor b. (Trained service technician only) System board

Optional-device problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
A Lenovo optional device that was just installed does not work.	1. Make sure that: • The device is designed for the server. • You followed the installation instructions that came with the device and the device is installed correctly. • You have not loosened any other installed devices or cables. • You updated the configuration information in the Setup Utility program. Whenever memory or any other device is changed, you must update the configuration. 2. Reseat the device that you just installed. 3. Replace the device that you just installed.
A Lenovo optional device that used to work does not work now.	1. Make sure that all of the hardware and cable connections for the device are secure. 2. If the device comes with test instructions, use those instructions to test the device. 3. Reseat the failing device. 4. Replace the failing device.

Power problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
The power-control button does not work (the server does not start). **Note:** The power-control button will not function until 1 to 3 minutes after the server has been connected to ac power.	1. Make sure that the control-panel assembly power-control button is working correctly: a. Disconnect the server power cords. b. Reconnect the power cords. c. Press the power-control button. If the server does not start, check the power-control button for damage. 2. Make sure that: • The power cords are correctly connected to the server and to a working electrical outlet. • The power LEDs (ac, dc) are lit correctly. • The server power-on LED on the front information panel is flashing after ac power cord is connected and that it stays on after the power-button is pressed. • The server contains the correct type of DIMMs. • The DIMMs are correctly seated. • A POST beep code did not sound, indicating a memory initialization error. • The LEDs on the power supply do not indicate a problem. • The microprocessor is correctly installed. 3. Reseat the following components: a. DIMMs b. Power-supply cables to all internal components 4. Replace the following components one at a time, in the order shown, restarting the server each time: a. DIMMs b. (Trained service technician only) Power supply 5. If you just installed an optional device, remove it, and restart the server. If the server now starts, you might have installed more devices than the power supply supports. 6. See "Solving undetermined problems" on page 173.
The server does not turn off.	1. Determine whether you are using an Advanced Configuration and Power Interface (ACPI) or a non-ACPI operating system. If you are using a non-ACPI operating system, do the following: a. Press Ctrl+Alt+Delete. b. Turn off the server by holding the power-control button for 5 seconds. c. Restart the server. d. If the server fails POST and the power-control button does not work, disconnect the ac power cord for 20 seconds; then, reconnect the ac power cord and restart the server. 2. (Trained service technician only) If the problem remains or if you are using an ACPI-aware operating system, suspect the system board.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
The server unexpectedly shuts down, and the LEDs on the control-panel assembly are not lit.	See "Solving undetermined problems" on page 173.

Serial port problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
The number of serial ports that are identified by the operating system is less than the number of installed serial ports.	1. Make sure that: • Each port is assigned a unique address in the Setup Utility program and none of the serial ports is disabled. • The serial port adapter (if one is present) is seated correctly. 2. Reseat the serial port adapter. 3. Replace the serial port adapter.
A serial device does not work.	1. Make sure that: • The device is compatible with the server. • The serial port is enabled and is assigned a unique address. • The device is connected to the correct connector. 2. Reseat the following components: a. Failing serial device b. Serial cable 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. Failing serial device b. Serial cable c. (Trained service technician only) System board

Software problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
You suspect a software problem.	1. To determine whether the problem is caused by the software, make sure that: • The server has the minimum memory that is needed to use the software. For memory requirements, see the information that comes with the software. If you have just installed an adapter or memory, the server might have a memory-address conflict. • The software is designed to operate on the server. • Other software works on the server. • The software works on another server. 2. If you receive any error messages when using the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem. 3. Contact your place of purchase of the software.

Universal Serial Bus (USB) port problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
A USB device does not work.	1. Run USB diagnostics. 2. Make sure that: • The correct USB device driver is installed. • The operating system supports USB devices. • A standard PS/2 keyboard or mouse is not connected to the server. If it is, a USB keyboard or mouse will not work during POST. 3. Make sure that the USB configuration options are set correctly in the Setup Utility program. 4. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server.

Solving undetermined problems

If the diagnostic tests did not diagnose the failure or if the server is inoperative, use the information in this section.

If you suspect that a software problem is causing failures (continuous or intermittent), see "Software problems."

Damaged data in CMOS memory or damaged server firmware can cause undetermined problems. To reset the CMOS data, use the clear CMOS jumper to

clear the CMOS memory; see “System-board switches and jumpers” on page 31. If you suspect that the server firmware is damaged, see “Recovering the server firmware” on page 152.

Check the LEDs on all the power supplies. If the LEDs indicate that the power supplies are working correctly, do the following:

1. Turn off the server.
2. Make sure that the server is cabled correctly.
3. Remove or disconnect the following devices, one at a time, until you find the failure. Turn on the server and reconfigure it each time.
   - Any external devices.
   - Surge-suppressor device (on the server).
   - Modem, printer, mouse, and non-Lenovo devices.
   - Each adapter.
   - Hard disk drives.
   - Memory modules. The minimum configuration requirement is two 1 GB DIMM on the system board.

The following minimum configuration is required for the server to start:

- One microprocessor
- One 1 GB DIMM on the system board
- One power supply
- Power cord
- ServeRAID SAS/SATA adapter
- System board

4. Turn on the server. If the problem remains, suspect the following components in the following order:
   a. Memory module
   b. Microprocessor
   c. System board

If the problem is solved when you remove an adapter from the server but the problem recurs when you reinstall the same adapter, suspect the adapter; if the problem recurs when you replace the adapter with a different one, suspect the system board.

If you suspect a networking problem and the server passes all the system tests, suspect a network cabling problem that is external to the server.

Solving SCSI problems

Note: This information also applies to Serial Attached SCSI (SAS) problems.

For any SCSI error message, one or more of the following devices might be causing the problem:

- A failing SCSI device (adapter, drive, or controller)
- An incorrect SCSI termination jumper setting
- A missing or incorrectly installed SCSI terminator
- A defective SCSI terminator
- An incorrectly installed cable
- A defective cable

For any SCSI error message, follow these suggested actions in the order in which they are listed until the problem is solved:

1. Make sure that external SCSI devices are turned on before you turn on the server.
2. Make sure that the cables for all external SCSI devices are connected correctly.
3. If an external SCSI device is attached, make sure that the external SCSI termination is set to automatic.
4. Make sure that the last device in each SCSI chain is terminated correctly.
5. Make sure that the SCSI devices are configured correctly.

Solving power problems

Power problems can be difficult to solve. For example, a short circuit can exist anywhere on any of the power distribution buses. Usually, a short circuit will cause the power subsystem to shut down because of an overcurrent condition. To diagnose a power problem, use the following general procedure:

1. Turn off the server and disconnect all ac power cords.
2. Check for loose cables in the power subsystem. Also check for short circuits, for example, if a loose screw is causing a short circuit on a circuit board.
3. Remove the adapters and disconnect the cables and power cords to all internal and external devices until the server is at the minimum configuration that is required for the server to start (see “Solving undetermined problems” on page 173 for the minimum configuration).
4. Reconnect all ac power cords and turn on the server. If the server starts successfully, replace the adapters and devices one at a time until the problem is isolated.

If the server does not start from the minimum configuration, replace the components in the minimum configuration one at a time until the problem is isolated.

Solving Ethernet controller problems

The method that you use to test the Ethernet controller depends on which operating system you are using. See the operating-system documentation for information about Ethernet controllers, and see the Ethernet controller device-driver readme file.

Try the following procedures:

- Make sure that the correct device drivers, which come with the server, are installed and that they are at the latest level.
- Make sure that the Ethernet cable is installed correctly.
  - The cable must be securely attached at all connections. If the cable is attached but the problem remains, try a different cable.
  - If you set the Ethernet controller to operate at 100 Mbps, you must use Category 5 cabling.
  - If you directly connect two servers (without a hub), or if you are not using a hub with X ports, use a crossover cable. To determine whether a hub has an X port, check the port label. If the label contains an X, the hub has an X port.
- Determine whether the hub supports auto-negotiation. If it does not, try configuring the integrated Ethernet controller manually to match the speed and duplex mode of the hub.
- Check the Ethernet controller LEDs on the rear panel of the server. These LEDs indicate whether there is a problem with the connector, cable, or hub.
  - The Ethernet link status LED is lit when the Ethernet controller receives a link pulse from the hub. If the LED is off, there might be a defective connector or cable or a problem with the hub.

  - The Ethernet transmit/receive activity LED is lit when the Ethernet controller sends or receives data over the Ethernet network. If the Ethernet transmit/receive activity light is off, make sure that the hub and network are operating and that the correct device drivers are installed.
- Check the LAN activity LED on the rear of the server. The LAN activity LED is lit when data is active on the Ethernet network. If the LAN activity LED is off, make sure that the hub and network are operating and that the correct device drivers are installed.
- Check for operating-system-specific causes of the problem.
- Make sure that the device drivers on the client and server are using the same protocol.

If the Ethernet controller still cannot connect to the network but the hardware appears to be working, the network administrator must investigate other possible causes of the error.

POST

When you turn on the server, it performs a series of tests to check the operation of the server components and some optional devices in the server. This series of tests is called the power-on self-test, or POST.

Note: This server does not use beep codes for server status.

If a power-on password is set, you must type the password and press Enter, when prompted, for POST to run.

If POST detects a problem, an error message is displayed. See “POST error codes” on page 178 for more information.

Event logs

Error codes and messages are displayed in the following types of event logs. Some of the error codes and messages in the logs are abbreviated.

- **POST event log:** This log contains the three most recent error codes and messages that were generated during POST. You can view the contents of the POST event log from the Setup Utility (see “Using the Setup Utility” on page 138).
- **System-event log:** This log contains messages that were generated during POST and all system status messages from the service processor. You can view the contents of the system-event log from the Setup Utility (see “Using the Setup Utility” on page 138 for more information).

  The system-event log is limited in size. When it is full, new entries will not overwrite existing entries; therefore, you must periodically clear the system-event log through the Setup Utility (when the IMM logs an event that indicates that the log is more than 75% full). When you are troubleshooting an error, be sure to clear the system-event log so that you can find current errors more easily.

  Each system-event log entry is displayed on its own page. Messages are listed on the left side of the screen, and details about the selected message are displayed on the right side of the screen. To move from one entry to the next, use the Up Arrow (↑) and Down Arrow (↓) keys.

  The system-event log indicates an assertion event when an event has occurred. It indicates a deassertion event when the event is no longer occurring.

- **Integrated management module (IMM) event log:** This log contains a superset of IMM, POST, and systems-management interrupt (SMI) information that is in the system-event log. You can only access the event log through the IMM Web interface.
- **DSA log:** This log is generated by the Dynamic System Analysis (DSA) Preboot program, and it contains merged contents of the system-event log and the IMM system-event log. You can view the DSA log from the DSA Preboot program (see "Viewing event logs without restarting the server").

Viewing event logs from the Setup Utility

To view the event logs, do the following:

1. Turn on the server.
2. When the prompt <F1> Setup is displayed, press F1. If you have set both a power-on password and an administrator password, you must type the administrator password to view the event logs.
3. Select **System Event Logs** and use one of the following procedures:
   - To view the POST event log, select **POST Event Viewers**.
   - To view the IMM system-event log, select **System Event Log**.

Viewing event logs without restarting the server

When the server is not hung and the IMM is connected to a network, methods are available for you to view one or more event logs without having to restart the server.

If you have installed Portable or Installable Dynamic System Analysis (DSA), you can use it to view the system-event log (as the IPMI event log), the IMM event log (as the ASM event log) or merged DSA log, which merges the contents of the system-event log and the IMM system-event log. You can also use DSA Preboot to view the DSA log, although you must restart the server to use DSA Preboot. To install Portable DSA or DSA Preboot or download a DSA Preboot CD image, do the following:

Note: Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to: http://www.lenovo.com/support.
2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
3. From **Family** list, select **ThinkServer TD200**, and click **Continue**.
4. Click **Downloads and drivers** to download firmware updates.

If IPMItool is installed in the server, you can use it to view the system-event log. Most recent versions of the Linux operating system come with a current version of IPMItool. Go to http://www.lenovo.com/thinkserver for more information.

You can view the IMM system-event log through the **Event Log** link in the integrated management module (IMM) Web interface. For more information, see "Using the integrated management module" on page 155.

The following table describes the methods that you can use to view the event logs, depending on the condition of the server. The first three conditions generally do not require that you restart the server.

Table 12. Methods for viewing event logs

Condition	Action
The server is not hung and is connected to a network.	Run Portable or Installable DSA to view the event log or create an output file that you can send to Lenovo service and support. Alternatively, you can use IPMItool to view the system-event log.
The server is not hung and is not connected to a network.	Use IPMItool locally to view the system-event log.
The server is not hung and the integrated management module (IMM) is connected to a network.	In a Web browser, type the IP address for the IMM and go to the Event Log page. For more information, see “Obtaining the IP address for the IMM” on page 157and “Using the integrated management module” on page 155.
The server is hung.	• If DSA Preboot is installed, restart the server and press F2 to start DSA Preboot and view the event logs. • If DSA Preboot is not installed, insert the DSA Preboot CD and restart the server to start DSA Preboot and view the event logs. • Alternatively, you can restart the server and press F1 to start the Setup Utility and view the POST event log or system-event log. For more information, see “Event logs” on page 176.

Clearing the event logs

To clear the event logs, do the following:

Note: The POST event log is automatically cleared each time the server is restarted.

1. Turn on the server.
2. When the prompt `<F1> Setup` is displayed, press F1. If you have set both a power-on password and an administrator password, you must type the administrator password to view the event logs.
3. Use one of the following procedures:
   - To clear the IMM system-event log, select **System Event Logs --> System Event Log**. Select **Clear System Event Log**; then, press **Enter** twice.

POST error codes

The following table describes the POST error codes and suggested actions to correct the detected problems. These errors can appear as severe, warning, or informational.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action
0010002	Microprocessor not supported.	1. Reseat the following components one at a time, in the order shown, restarting the server each time. a. (Trained service technician only) Microprocessor 1. b. (Trained service technician only) Microprocessor 2 (if installed.) 2. (Trained service technician only) Remove microprocessor 2 and restart the server. 3. (Trained service technician only) Remove microprocessor 1 and install microprocessor 2 in the microprocessor 1 connector. Restart the server. If the error is corrected, then microprocessor 1 is bad and must be replaced. 4. Replace the following components one at a time, in the order shown, restarting the server each time. a. (Trained service technician only) Microprocessor 1. b. (Trained service technician only) Microprocessor 2. c. (Trained service technician only) System board.
0011000	Invalid microprocessor type.	1. Update the server firmware to the latest level (see "Updating the firmware" on page 151). 2. (Trained service technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type (see http://www.lenovo.com/thinkserver).
0011002	Microprocessor mismatch.	1. Run the Setup Utility and select **System Information → System Summary → Processor Details** to view the microprocessor information to compare the installed microprocessor specifications. 2. (Trained service technician only) Remove and replace one of the microprocessors so that they both match.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action
0011004	Microprocessor failed BIST.	1. Update the server firmware to the latest level (see "Updating the firmware" on page 151). 2. (Trained service technician only) Reseat microprocessor 2. 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. (Trained service technician only) Microprocessor b. (Trained service technician only) System board
001100A	Microcode updated failed.	1. Update the server firmware to the latest level (see "Updating the firmware" on page 151). 2. (Trained service technician only) Replace the microprocessor.
0050001	DIMM disabled.	1. If the server fails the POST memory test, reseat the DIMMs. 2. Remove and replace any DIMM for which the associated error LED is lit (see "Removing a memory module" on page 86 and "Installing a memory module" on page 89). 3. Run the Setup Utility to enable all the DIMMs. 4. Run the DSA Preboot memory test (see 8).
0051003	Uncorrectable DIMM error	1. If the server failed the POST memory test, reseat the DIMMs. 2. Remove and replace any DIMM for which the associated error LED is lit (see "Removing a memory module" on page 86 and "Installing a memory module" on page 89). 3. Run the Setup Utility to enable all the DIMMs. 4. Run the DSA Preboot memory test (see8).
0051006	DIMM mismatch detected	Make sure that the DIMMs match and are installed in the correct sequence (see "Installing a memory module" on page 89).
0051009	No memory detected.	1. Make sure that the server contains DIMMs. 2. Reseat the DIMMs. 3. Install DIMMs in the correct sequence (see "Installing a memory module" on page 89).

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action
005100A	No usable memory detected.	1. Make sure that the server contains DIMMs. 2. Reseat the DIMMs. 3. Install DIMMs in the correct sequence (see "Installing a memory module" on page 89). 4. Clear CMOS memory to re-enable all the memory connectors (see "System-board switches and jumpers" on page 31).
0058001	PFA threshold exceeded	1. Update the server firmware to the latest level (see "Updating the firmware" on page 151). 2. Reseat the DIMMs and run the memory test (see the *Hardware Maintenance Manual*). 3. Replace the failing DIMM, which is indicated by a lit LED on the system board.
0058007	DIMM population is unsupported.	1. Reseat the DIMMs, and then restart the server. 2. Remove the lowest-numbered DIMM pair of those that are identified and replace it with an identical pair of known good DIMMs, then restart the server. 3. Return the removed DIMMs, one pair at a time, to their original connectors, restarting the server after each pair, until a pair fails. Replace the DIMMs in the failed pair with identical known good DIMMs, restarting the server after each DIMM is installed. Replace the failed DIMM. Repeat this step until you have tested all removed DIMMs. 4. (Trained service technician only) Replace the system board.
0058008	DIMM failed memory test.	1. Reseat the DIMMs, and then restart the server. 2. Replace the following components one at a time, in the order shown, then restart the server after each: a. DIMM b. (Trained service technician only) System board
00580A1	Invalid DIMM population for mirroring mode	1. If a fault LED is lit, resolve the failure. 2. Install the DIMMs in the correct sequence (see "Installing a memory module" on page 89).
00580A4	Memory population changed.	Information only. Memory has been added, moved, or changed.
00580A5	Mirror failover complete	Information only. Memory redundancy has been lost. Check the event log for uncorrected DIMM failure events.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action
0068002	CMOS battery cleared.	1. Reseat the battery. 2. Clear the CMOS memory. 3. Replace the following components one at a time, in the following order, restarting the server after each one: a. Battery b. (Trained service technician only) System board.
2011001	PCI-X PERR	1. Reseat all affected adapters. 2. Update the PCI adapter firmware. 3. Remove the adapter. 4. Replace the following components one at a time, in the order shown, restarting the server each time: a. Adapter b. (Trained service technician only) System board
2018001	PCI Express uncorrected or uncorrected error	1. Reseat all affected adapters. 2. Update the PCI adapter firmware. 3. Remove the adapter. 4. Replace the following components one at a time, in the order shown, restarting the server each time: a. Adapter b. (Trained service technician only) System board

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action
2018002	Option ROM resource allocation failure	Informational message that some devices might not be initialized. 1. If possible, rearrange the order of the adapters in the PCI slots to change the load order of the optional-device ROM code. 2. Run the Setup Utility, select **Startup Options**, and change the boot priority to change the load order of the optional-device ROM code. 3. Run the Setup Utility and disable some other resources, if their functions are not being used, to make more space available. a. Select **Startup Options**, then **Planar Ethernet (PXE/DHCP)** to disable the integrated Ethernet controller ROM. b. Select **Advanced Functions**, then **PCI Bus Control**, then **PCI ROM Control Execution** to disable the ROM of the adapter in the PCI slots. c. Select **Devices and I/O Ports** to disable any of the integrated devices. 4. Replace the following components one at a time, in the order shown, restarting the server each time: a. Each adapter b. (Trained service technician only) System board
3*xx*0007 (*xx* can be 00 - 19)	Firmware fault detected, system halted	1. Recover the server firmware to the latest level (see "Updating the firmware" on page 151). 2. Undo any recent configuration changes, or clear CMOS memory to restore the settings to the default values. 3. Remove any recently installed hardware.
3038003	Firmware corrupted	1. Run the Setup Utility, select **Load Default Settings**, and save the settings to recover the server firmware. 2. (Trained service technician only) Replace the system board.
3048005	Booted secondary (backup) UEFI Image	Information only. The backup switch was used to boot the secondary bank.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action
3048006	Booted secondary (backup) UEFI image because of ABR	1. Run the Setup Utility, select **Load Default Settings**, and save the settings to recover the primary UEFI settings. 2. Turn off the server and remove it from the power source. 3. Reconnect the server to the power source, then turn on the server.
3058000A	RTC date/time is incorrect	1. Adjust the date and time settings in the Setup Utility, and then restart the server. 2. Reseat the battery. 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. Battery b. (Trained service technician only) System board
3058001	System configuration invalid	1. Run the Setup Utility, and select **Save Settings**. 2. Run the Setup Utility, select **Load Default Settings**, and save the settings. 3. Reseat the following components one at a time in the order shown, restarting the server each time: a. Battery b. Failing device (if the device is a FRU, then it must be reseated by a trained service technician only) 4. Replace the following components one at a time, in the order shown, restarting the server each time: a. Battery b. Failing device (if the device is a FRU, then it must be replaced by a trained service technician only) c. (Trained service technician only) System board
3058004	Three boot failure	1. Undo any recent system changes, such as new settings or newly installed devices. 2. Make sure that the server is attached to a reliable power source. 3. Remove all hardware that is not listed on the Lenovo Web site at http://www.lenovo.com/thinkserver. 4. Make sure that the operating system is not corrupted. 5. Run the Setup Utility, save the configuration, and then restart the server.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action
3108007	System configuration restored to default settings	Information only. This is message is usually associated with the CMOS battery clear event.
3138002	Boot configuration error	1. Remove any recent configuration changes made to the Setup Utility. 2. Run the Setup Utility, select **Load Default Settings**, and save the settings.
3808000	IMM communication failure	1. Remove power from the server for 30 seconds, and then reconnect the server to power and restart it. 2. Update the IMM firmware to the latest level (see "Updating the firmware" on page 151). 3. Make sure that the virtual media key is seated and not damaged. 4. (Trained service technician only) Replace the system board.
3808002	Error updating system configuration to IMM	1. Remove power from the server, and then reconnect the server to power and restart it. 2. Run the Setup Utility and select **Save Settings**. 3. Update the IMM firmware to the latest level (see "Updating the firmware" on page 151).
3808003	Error retrieving system configuration from IMM	1. Remove power from the server, and then reconnect the server to power and restart it. 2. Run the Setup Utility and select **Save Settings**. 3. Update the IMM firmware to the latest level (see "Updating the firmware" on page 151).
3808004	IMM system event log full	• When using out-of-band, use the IMM Web interface or IPMItool to clear the logs from the operating system. • When using the local console: 1. Run the Setup Utility. 2. Select **System Event Log**. 3. Select **Clear System Event Log**. 4. Restart the server.
3818001	Core Root of Trust Measurement (CRTM) update failed	1. Run the Setup Utility, select **Load Default Settings**, and save the settings. 2. (Trained service technician only) Replace the system board.
3818002	Core Root of Trust Measurement (CRTM) update aborted	1. Run the Setup Utility, select **Load Default Settings**, and save the settings. 2. (Trained service technician only) Replace the system board.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action
3818003	Core Root of Trust Measurement (CRTM) flash lock failed	1. Run the Setup Utility, select **Load Default Settings**, and save the settings. 2. (Trained service technician only) Replace the system board.
3818004	Core Root of Trust Measurement (CRTM) system error	1. Run the Setup Utility, select **Load Default Settings**, and save the settings. 2. (Trained service technician only) Replace the system board.
3818005	Current Bank Core Root of Trust Measurement (CRTM) capsule signature invalid	1. Run the Setup Utility, select **Load Default Settings**, and save the settings. 2. (Trained service technician only) Replace the system board.
3818006	Opposite bank CRTM capsule signature invalid	1. Switch the server firmware bank to the backup bank. 2. Run the Setup Utility, select **Load Default Settings**, and save the settings. 3. Switch the bank back to the primary bank. 4. (Trained service technician only) Replace the system board.
3818007	CRTM update capsule signature invalid	1. Run the Setup Utility, select **Load Default Settings**, and save the settings. 2. (Trained service technician only) Replace the system board.
3828004	AEM power capping disabled	1. Check the settings and the event logs. 2. Make sure that the Active Energy Manager feature is enabled in the Setup Utility. Select **System Settings**, **Power**, **Active Energy**, and **Capping Enabled**. 3. Update the server firmware to the latest level (see "Updating the firmware" on page 151). 4. Update the IMM firmware to the latest level (see "Updating the firmware" on page 151).

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about Lenovo products, you will find a wide variety of sources available from Lenovo to assist you. This section contains information about where to go for additional information about Lenovo and Lenovo products, what to do if you experience a problem with your system, and whom to call for service, if it is necessary.

Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the *Hardware Maintenance Manual*.
- Go to http://www.lenovo.com/support to check for technical information, hints, tips, and new device drivers or to submit a request for information.

You can solve many problems without outside assistance by using the information available on the Lenovo support site or by following the troubleshooting procedures that Lenovo provides in the documentation that is provided with your Lenovo product. The documentation that comes with Lenovo systems also describes the diagnostic tests that you can perform. Most systems, operating systems, and programs come with documentation that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

Using the documentation

Information about your Lenovo system and preinstalled software, if any, or optional device is available in the documentation that comes with the product. That documentation can include printed documents, online documents, readme files, and help files. Most of the documentation for your server is on the *ThinkServer Documentation* DVD provided with your server. See the troubleshooting information in your system documentation for instructions for using the diagnostics programs. The troubleshooting information or the diagnostics programs might tell you that you need additional or updated device drivers or other software. Lenovo maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to http://www.lenovo.com/support and follow the instructions.

Getting help and information from the World Wide Web

On the World Wide Web, the Lenovo Web site has up-to-date information about Lenovo systems, optional devices, services, and support. For general information about Lenovo products or to purchase Lenovo products, go to http://www.lenovo.com. For support on Lenovo products, go to http://www.lenovo.com/support.

Calling for service

During the warranty period, you can get help and information by telephone through the Customer Support Center.

These services are available during the warranty period:

- **Problem determination -** Trained personnel are available to assist you with determining a hardware problem and deciding what action is necessary to fix the problem.
- **Hardware repair -** If the problem is caused by hardware under warranty, trained service personnel are available to provide the applicable level of service.
- **Engineering Change management -** There might be changes that are required after a product has been sold. Lenovo or your reseller will make selected Engineering Changes (ECs) available that apply to your hardware.

These items are not covered by the warranty:

- Replacement or use of parts not manufactured for or by Lenovo or non-warranted Lenovo parts
- Identification of software problem sources
- Configuration of BIOS as part of an installation or upgrade
- Changes, modifications, or upgrades to device drivers
- Installation and maintenance of network operating systems (NOS)
- Installation and maintenance of application programs

Refer to the safety and warranty information that is provided with your computer for a complete explanation of warranty terms. You must retain your proof of purchase to obtain warranty service.

For a list of service and support phone numbers for your country or region, go to http://www.lenovo.com/support and click **Support phone list** or refer to the safety and warranty information provided with your computer.

Note: Phone numbers are subject to change without notice. If the number for your country or region is not provided, contact your Lenovo reseller or Lenovo marketing representative.

If possible, be at your computer when you call. Have the following information available:

- Machine type and model
- Serial numbers of our hardware products
- Description of the problem
- Exact working of any error messages
- Hardware and software configuration information

Using other services

If you travel with a Lenovo notebook computer or relocate your computer to a country where your desktop, notebook, or server machine type is sold, your computer might be eligible for International Warranty Service, which automatically entitles you to obtain warranty service throughout the warranty period. Service will be performed by service providers authorized to perform warranty service.

Service methods and procedures vary by country, and some services might not be available in all countries. International Warranty Service is delivered through the method of service (such as depot, carry-in, or on-site service) that is provided in the servicing country. Service centers in certain countries might not be able to service all models of a particular machine type. In some countries, fees and restrictions might apply at the time of service.

To determine whether your computer is eligible for International Warranty Service and to view a list of the countries where service is available, go to http://www.lenovo.com/support, click **Warranty**, and follow the instructions on the screen.

For technical assistance with the installation of, or questions related to, Service Packs for your preinstalled Microsoft Windows® product, refer to the Microsoft Product Support Services Web site at http://www.support.microsoft.com/directory/, or you can contact the Customer Support Center. Some fees might apply.

Purchasing additional services

During and after the warranty period, you can purchase additional services, such as support for hardware, operating systems, and application programs; network setup and configuration; upgraded or extended hardware repair services; and custom installations. Service availability and service name might vary by country or region. For more information about these services, go to the Lenovo Web site at http://www.lenovo.com/.

Lenovo product service

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Appendix B. Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area. Any reference to a Lenovo product, program, or service is not intended to state or imply that only that Lenovo product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any Lenovo intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any other product, program, or service.

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Any references in this publication to non-Lenovo Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this Lenovo product, and use of those Web sites is at your own risk.

Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been

estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

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Important notes

Processor speed indicates the internal clock speed of the microprocessor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard disk drive bays with the largest currently supported drives that are available from Lenovo.

Maximum memory might require replacement of the standard memory with an optional memory module.

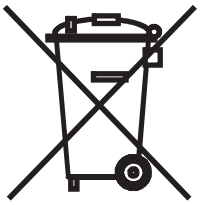
Lenovo makes no representations or warranties with respect to non-Lenovo products. Support (if any) for the non-Lenovo products is provided by the third party, not Lenovo.

Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

Product recycling and disposal

This unit must be recycled or discarded according to applicable local and national regulations. Lenovo encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed. Lenovo offers a variety of product return programs and services in several countries to assist equipment owners in recycling their IT products. Information on Lenovo product recycling offerings can be found on Lenovo's Internet site at: http://www.lenovo.com/lenovo/environment/recycling.

Esta unidad debe reciclarse o desecharse de acuerdo con lo establecido en la normativa nacional o local aplicable. Lenovo recomienda a los propietarios de equipos de tecnología de la información (TI) que reciclen responsablemente sus equipos cuando éstos ya no les sean útiles. Lenovo dispone de una serie de programas y servicios de devolución de productos en varios países, a fin de ayudar a los propietarios de equipos a reciclar sus productos de TI. Se puede encontrar información sobre las ofertas de reciclado de productos de Lenovo en el sitio web de Lenovo
http://www.lenovo.com/lenovo/environment/recycling.



Notice: This mark applies only to countries within the European Union (EU) and Norway.

This appliance is labeled in accordance with European Directive 2002/96/EC concerning waste electrical and electronic equipment (WEEE). The Directive determines the framework for the return and recycling of used appliances as applicable throughout the European Union. This label is applied to various products to indicate that the product is not to be thrown away, but rather reclaimed upon end of life per this Directive.

注意: このマークは EU 諸国およびノルウェーにおいてのみ適用されます。

この機器には、EU 諸国に対する廃電気電子機器指令 2002/96/EC(WEEE) のラベルが貼られています。この指令は、EU 諸国に適用する使用済み機器の回収とリサイクルの骨子を定めています。このラベルは、使用済みになった時に指令に従って適正な処理をする必要があることを知らせるために種々の製品に貼られています。

Remarque : Cette marque s'applique uniquement aux pays de l'Union Européenne et à la Norvège.

L'etiquette du système respecte la Directive européenne 2002/96/EC en matière de Déchets des Equipements Electriques et Electroniques (DEEE), qui détermine les dispositions de retour et de recyclage applicables aux systèmes utilisés à travers l'Union européenne. Conformément à la directive, ladite étiquette précise que le produit sur lequel elle est apposée ne doit pas être jeté mais être récupéré en fin de vie.

In accordance with the European WEEE Directive, electrical and electronic equipment (EEE) is to be collected separately and to be reused, recycled, or recovered at end of life. Users of EEE with the WEEE marking per Annex IV of the WEEE Directive, as shown above, must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and recovery of WEEE. Customer participation is important to minimize any potential effects of EEE on the environment and human health due to the potential presence of hazardous substances in EEE. For proper collection and treatment, contact your local Lenovo representative.

Compliance with Republic of Turkey Directive on the Restriction of Hazardous Substances

Meets requirements of the Republic of Turkey Directive on the Restriction of the Use of Certain Hazardous Substances In Electrical and Electronic Equipment (EEE).

Türkiye EEE Yönetmeliğine Uygunluk Beyanı

Bu Lenovo ürünü, T.C. Çevre ve Orman Bakanlığı'nın
"Elektrik ve Elektronik Eşyalarda Bazı Zararlı Maddelerin
Kullanımının Sınırlandırılmasına Dair Yönetmelik (EEE)"
direktiflerine uygundur.

EEE Yönetmeliğine Uygundur.

Recycling statements for Japan

リチウム電池交換後の廃棄処理について

本機器には、ボタン型のリチウム電池がシステム・ボード上に取り付けられています。この電池を交換する場合には、お買い上げいただいた販売店にお問い合わせいただくか、弊社の修理サービスをご利用ください。万一お客様が交換された場合の古い電池を廃棄する際は、ビニール・テープなどで絶縁処理をして、お買い上げいただいた販売店にお問い合わせいただくか、もしくは産業廃棄物処理業者に処理をご依頼ください。また一般家庭などから、一般廃棄物として自治体に廃棄を依頼するときは、地方自治体の条例・規則に従って廃棄してください。

日本のリサイクルに関して

本機器またはモニターの回収リサイクルについて

企業のお客様が、本機が使用済みとなり廃棄される場合は、廃棄物処理法の規定により、産業廃棄物として、地域を管轄する県知事あるいは、政令市長の許可を持った産業廃棄物処理業者に適正処理を委託する必要があります。また、弊社では資源有効利用促進法に基づき使用済みパソコンの回収および再利用・再資源化を行う「PC 回収リサイクル・サービス」を提供しています。詳細については、以下のURL にアクセスしてください。
http://www.ibm.com/jp/pc/service/recycle/pcrecycle

また、同法により、家庭で使用済みとなったパソコンのメーカー等による回収再資源化が2003 年10 月1 日よりスタートしました。詳細については、以下のURL にアクセスしてください。
http://www.ibm.com/jp/pc/service/recycle/personal

重金属を含む内部部品の廃棄処理について

本機器のプリント基板等には微量の重金属(鉛など) が使用されています。使用後は適切な処理を行うため、上記「本機器またはモニターの回収リサイクルについて」に従って廃棄してください。

Battery return program

This product may contain a lithium or lithium ion battery. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal or batteries outside the United States, go to http://www.lenovo.com/lenovo/environment or contact your local waste disposal facility.

For Taiwan: Please recycle batteries.

For the European Union:

Notice: This mark applies only to countries within the European Union (EU).

Batteries or packaging for batteries are labeled in accordance with European Directive 2006/66/EC concerning batteries and accumulators and waste batteries and accumulators. The Directive determines the framework for the return and recycling of used batteries and accumulators as applicable throughout the European Union. This label is applied to various batteries to indicate that the battery is not to be thrown away, but rather reclaimed upon end of life per this Directive.

Les batteries ou emballages pour batteries sont étiquetés conformément aux directives européennes 2006/66/EC, norme relative aux batteries et accumulateurs en usage et aux batteries et accumulateurs usés. Les directives déterminent la marche à suivre en vigueue dans l'Union Européenne pour le retour et le recyclage des batteries et accumulateurs usés. Cette étiquette est appliquée sur diverses batteries pour indiquer que la batterie ne doit pas être mise au rebut mais plutôt récupérée en fin de cycle de vie selon cette norme.

In accordance with the European Directive 2006/66/EC, batteries and accumulators are labeled to indicate that they are to be collected separately and recycled at end of life. The label on the battery may also include a chemical symbol for the metal concerned in the battery (Pb for lead, Hg for mercury, and Cd for cadmium). Users of batteries and accumulators must not dispose of batteries and accumulators as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and treatment of batteries and accumulators. Customer participation is important to minimize any potential effects of batteries and accumulators on the environment and human health due to the potential presence of hazardous substances. For proper collection and treatment, go to http://www.lenovo.com/lenovo/environment.

For California:

Perchlorate material - special handling may apply. See http://www.dtsc.ca.gov/hazardouswaste/perchlorate/.

The foregoing notice is provided in accordance with California Code of Regulations Title 22, Division 4.5 Chapter 33. Best Management Practices for Perchlorate Materials. This product/part may include a lithium manganese dioxide battery which contains a perchlorate substance.

German Ordinance for Work gloss statement

The product is not suitable for use with visual display work place devices according to clause 2 of the German Ordinance for Work with Visual Display Units.

Das Produkt ist nicht für den Einsatz an Bildschirmarbeitsplätzen im Sinne § 2 der Bildschirmarbeitsverordnung geeignet.

Electronic emission notices

Federal Communications Commission (FCC) statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Class A emission compliance statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Australia and New Zealand Class A statement

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

United Kingdom telecommunications safety requirement

Notice to Customers

This apparatus is approved under approval number NS/G/1234/J/100003 for indirect connection to public telecommunication systems in the United Kingdom.

European Union EMC Directive conformance statement

CE

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. Lenovo cannot accept responsibility for any

failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-Lenovo option cards

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22/European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Germany Class A compliance statement

Deutschsprachiger EU Hinweis:

Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG (früher 89/336/EWG) zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der Lenovo empfohlene Kabel angeschlossen werden. Lenovo übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung der Lenovo verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der Lenovo gesteckt/eingebaut werden.

Deutschland:

Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Betriebsmittein

Dieses Produkt entspricht dem “Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln” EMVG (früher “Gesetz über die elektromagnetische Verträglichkeit von Geräten”). Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG (früher 89/336/EWG) in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln, EMVG vom 20. Juli 2007 (früher Gesetz über die elektromagnetische Verträglichkeit von Geräten), bzw. der EMV EG Richtlinie 2004/108/EC (früher 89/336/EWG), für Geräte der Klasse A.

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen. Verantwortlich für die Konformitätserklärung nach Paragraf 5 des EMVG ist die Lenovo (Deutschland) GmbH, Gropiusplatz 10, D-70563 Stuttgart.

Informationen in Hinsicht EMVG Paragraf 4 Abs. (1) 4:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.

Nach der EN 55022: “Dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen durchzuführen und dafür aufzukommen.”

Nach dem EMVG: “Geräte dürfen an Orten, für die sie nicht ausreichend entstört sind, nur mit besonderer Genehmigung des Bundesministers für Post und Telekommunikation oder des Bundesamtes für Post und Telekommunikation betrieben werden. Die Genehmigung wird erteilt, wenn keine elektromagnetischen Störungen zu erwarten sind.” (Auszug aus dem EMVG, Paragraph 3, Abs. 4). Dieses Genehmigungsverfahren ist nach Paragraph 9 EMVG in Verbindung mit der entsprechenden Kostenverordnung (Amtsblatt 14/93) kostenpflichtig.

Anmerkung: Um die Einhaltung des EMVG sicherzustellen sind die Geräte, wie in den Handbüchern angegeben, zu installieren und zu betreiben.

Japanese Voluntary Control Council for Interference (VCCI) statement

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Taiwan Class A warning statement

警告使用者:
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

People's Republic of China Class A warning statement

声　　明
此为 A 级产品。在生活环境中，
该产品可能会造成无线电干扰。
在这种情况下，可能需要用户对其
干扰采取切实可行的措施。

Korea Class A warning statement

이 기기는 업무용으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이점을 주의하시기 바라며, 만약 잘못 판매 또는 구입하였을 때에는 가정용으로 교환하시기 바랍니다.

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Part Number: 44W2344

Printed in USA

(1P) P/N: 44W2344