IBM

BladeCenter JS22
Type 7998

Installation and User's Guide

Welcome.

Thank you for buying an IBM blade server. This blade server takes advantage of IBM Power Architecture technologies and features superior performance, availability, and scalability.

This *Installation and User's Guide* contains information for setting up, configuring, and using your blade server.

Additionally, a service information label is attached to each BladeCenter unit and blade server. This label provides a graphical summary of many of the installation and service activities that are associated with each device.

For more information about your BladeCenter components and features, you can view the publications on the *IBM BladeCenter Documentation* CD or download from the IBM Support Web site.

Go to http://www.ibm.com/systems/support/.

Before installing the BladeCenter JS22 Type 7998, you should have completed the following procedures:

- Installed and configured the rack according to the documentation that came with the rack.
- Installed and configured the BladeCenter unit into the rack. See the documentation provided with the BladeCenter unit to install the unit into the rack.
- Supplied input power to the BladeCenter unit.

↓

Install options in the blade server:
- Drives
- Memory modules
- I/O expansion card
See Chapter 3 for more information.

↓

Make sure that the BladeCenter management module and the Ethernet switch module firmware support the Serial over LAN (SOL) feature. See the *Serial Over LAN Setup Guide* for more information.

↓

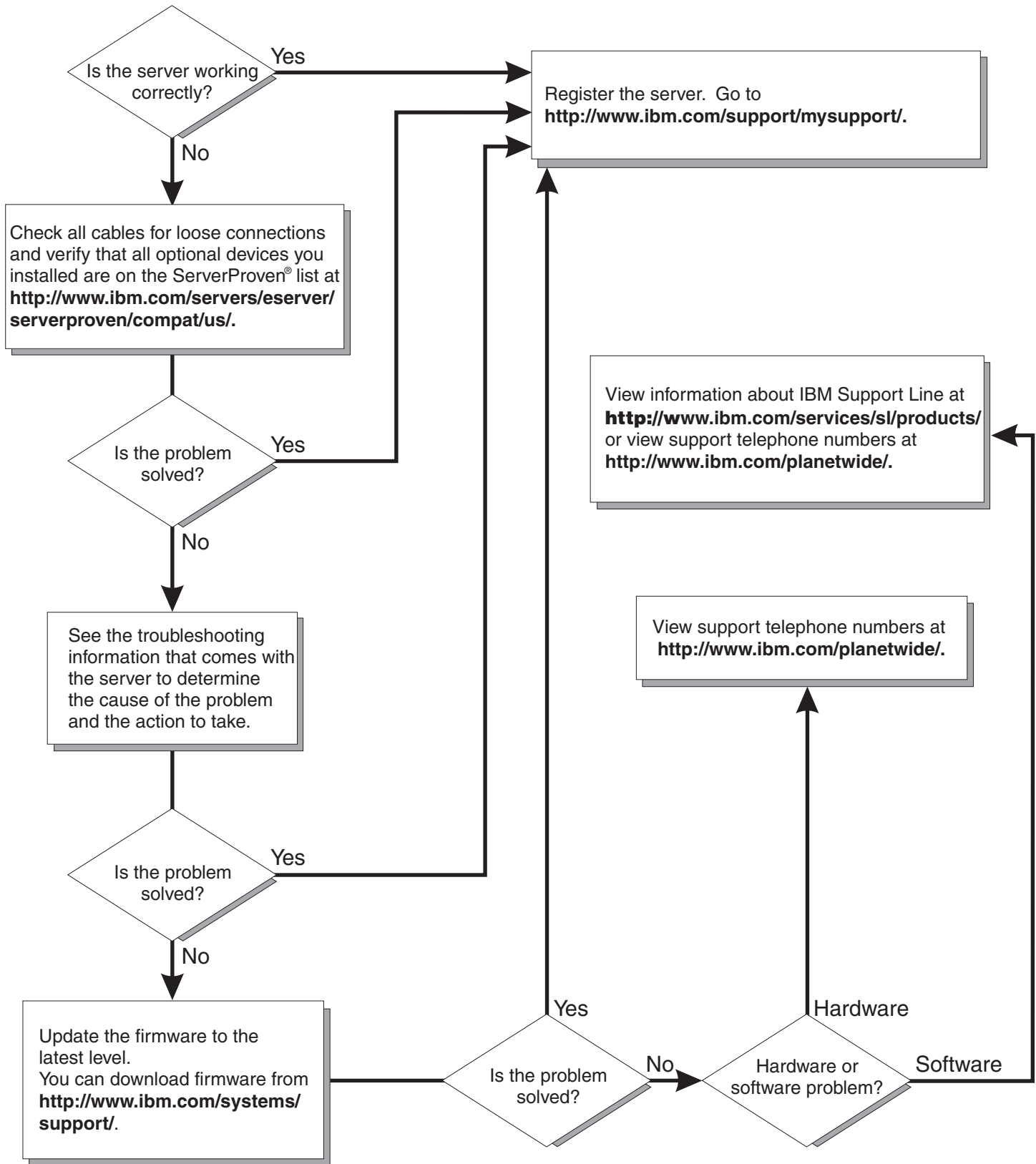Install the blade server in the BladeCenter unit. See Chapter 3 for more information.

↓

Establish an SOL session with the blade server. See the *Serial Over LAN Setup Guide* for more information.

↓

Install the operating system. See Chapter 5 for more information.

↓

Install additional applications according to the instructions provided with the applications.

↓

The blade server is now ready to use. Be sure to register and profile your blade server on the IBM support web site.

Server Support

Is the server working correctly?

— Yes → Register the server. Go to **http://www.ibm.com/support/mysupport/.**

No ↓

Check all cables for loose connections and verify that all optional devices you installed are on the ServerProven® list at **http://www.ibm.com/servers/eserver/serverproven/compat/us/.**

Is the problem solved?

— Yes → Register the server. Go to **http://www.ibm.com/support/mysupport/.**

No ↓

See the troubleshooting information that comes with the server to determine the cause of the problem and the action to take.

Is the problem solved?

— Yes → Register the server. Go to **http://www.ibm.com/support/mysupport/.**

No ↓

Update the firmware to the latest level.
You can download firmware from **http://www.ibm.com/systems/support/.**

→ Is the problem solved?

Yes ↑ → Register the server. Go to **http://www.ibm.com/support/mysupport/.**

No → Hardware or software problem?

Hardware ↑ → View support telephone numbers at **http://www.ibm.com/planetwide/.**

Software → View information about IBM Support Line at **http://www.ibm.com/services/sl/products/** or view support telephone numbers at **http://www.ibm.com/planetwide/.**

IBM

BladeCenter JS22
Type 7998

Installation and User's Guide

IBM

Note

Before using this information and the product it supports, read the general information in Appendix B, "Notices," on page 57 and the *Warranty and Support Information* document for your blade server type on the *Documentation* CD.

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

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 přečtete 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.

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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.

Safety statements

Important: Each caution and danger statement in this documentation is labeled
with a number. This number is used to cross reference an English-language caution
or danger statement with translated versions of the caution or danger statement in
the *Safety Information* document.

For example, if a caution statement is labeled, ″Statement 1,″ translations for that
caution statement are in the *Safety Information* document under ″Statement 1.″ Be
sure to read all caution and danger statements in this documentation before you
perform the procedures. Read any additional safety information that comes with
your 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 IBM® Part Number 33F8354 or an equivalent type 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.

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.
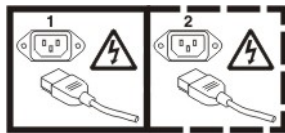
Statement 8

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 10

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

Chapter 1. Product overview

The IBM BladeCenter® JS22 Type 7998 blade server is based on IBM Performance Optimization with Enhanced RISC (POWER™) Architecture technologies. The BladeCenter JS22 Type 7998 blade server runs in BladeCenter units to provide a high-density, high-performance blade server environment using advanced processing technology.

Note: Unless otherwise stated, references to the BladeCenter unit apply to BladeCenter H units, BladeCenter HT units, and BladeCenter S units.

The printed *Installation and User's Guide* comes with the blade server. All of the information in the document is also in the online information center. It contains the following information:
- Setting up the blade server
- Starting and configuring the blade server
- Installing optional hardware devices
- A reference to more information about installing supported operating systems
- Performing basic troubleshooting of the blade server

Packaged with the hardcopy *Installation and User's Guide* are software CDs that help you to configure hardware, install device drivers, and install the operating system.

The blade server comes with a limited warranty. For information about the terms of the warranty and getting service and assistance, see the online information center or the *Warranty and Support Information* document that is on the IBM *BladeCenter Documentation* CD.

The blade server might have features that are not described in the documentation that comes with the blade 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 original blade server documentation. The most recent version of all BladeCenter JS22 Type 7998 documentation is in the BladeCenter information center.

The online BladeCenter information center is available in the at IBM Systems Information Center.

Download and install updated device drivers and the JS22 firmware. Go to the IBM Support site to download the updates. Select your product, type, model, and operating system, and then click **Go**. Click the **Download** tab, if necessary, for device driver and firmware updates.

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

Print Table 1 on page 2 and use it to record information about your blade server.

You will need this information when you register the blade server with IBM. You can register the blade server at http://www.ibm.com/support/mysupport/.

Table 1 includes a place for you to record the JS22 vital product data.

To determine the values for your JS22 blade server, use the management module and the **lsvpd** command. If you are running Linux®, download and install the service and productivity tools for Linux on POWER systems to install the **lsvpd** command.

Table 1. JS22 vital product data

Vital product data field	Vital product data	How to find this data
Product name	**BladeCenter JS22**	
Type model number	**7998-61X**	Advanced management module HW VPD
Serial number	_____ (7 characters)	Advanced management module HW VPD
System unique ID	_____ (12 characters)	**lsvpd** | **grep SU** command
WorldWide port number	_____ (12 characters)	**lsvpd** | **grep WN** command
Brand	**B0** (B followed by zero)	**lsvpd** | **grep BR** command

The model number and serial number are on the ID label that is behind the control panel door on the front of the blade server, and on a label on the side of the blade server that is visible when the blade server is not in the BladeCenter unit.

A set of blank labels comes with the blade server. When you install the blade server in the BladeCenter unit, write identifying information on a label and place the label on the BladeCenter unit bezel. See the documentation for your BladeCenter unit for recommended label placement.

Important: Do not place the label where it will block any ventilation holes on the blade server or the BladeCenter unit.

Related documentation

Documentation for the JS22 blade server includes documents in Portable Document Format (PDF) on the IBM *BladeCenter Documentation* CD and the online information center.

The most recent version of all BladeCenter documentation is in the BladeCenter information center.

The online BladeCenter information center is available in the at IBM Systems Information Center.

You can find the following documents in PDF on the IBM *BladeCenter Documentation* CD and in the online information center:

- *Problem Determination and Service Guide*

  This document contains information to help you solve problems yourself, and it contains information for service technicians.

- *Safety Information*

  This document contains translated caution and danger statements. Each caution and danger statement that appears in the documentation has a number that you can use to locate the corresponding statement in your language in the *Safety Information* document.

- *Warranty and Support Information*

  This document contains information about the terms of the warranty and about getting service and assistance.

- *BladeCenter Serial over LAN Setup Guide*

  This document explains how to update and configure BladeCenter components for Serial over LAN (SOL) operation. The SOL connection provides access to the text-based console command prompt on each blade server and enables the blade servers to be managed from a remote location.

Additional documents might be included in the online information center and on the IBM *BladeCenter Documentation* CD.

The blade server might have features that are not described in the documentation that comes with the blade server. 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 documentation that comes with the blade server.

Review the online information or the *Planning Guide* and the *Installation Guide* for your IBM BladeCenter unit. The information can help you prepare for system installation and configuration. The most current version of each document is available in the BladeCenter information center.

The IBM Documentation CD

You can run the IBM *BladeCenter Documentation* CD on any personal computer that meets the hardware and software requirements.

The IBM *BladeCenter Documentation* CD contains documentation for your blade server in Portable Document Format (PDF) and includes the IBM Documentation Browser to help you find information quickly.

Hardware and software requirements

The IBM *BladeCenter Documentation* CD requires the following minimum hardware and software levels.

- Microsoft® Windows NT® XP, Windows 2000, or Red Hat Linux
- 100 MHz microprocessor
- 32 MB of RAM
- Adobe® Acrobat Reader 3.0 (or later) or xpdf, which comes with Linux operating systems

Using the Documentation Browser

Use the Documentation Browser to browse the contents of the CD, read brief descriptions of the documents, and view documents, using Adobe Acrobat Reader or xpdf.

The Documentation Browser automatically detects the regional settings in your system and displays the documents in the language for that region (if available). If a document is not available in the language for that region, the English-language version is displayed.

Use one of the following procedures to start the Documentation Browser:

- If Autostart is enabled, insert the CD into the CD or DVD drive. The Documentation Browser starts automatically.
- If Autostart is disabled or is not enabled for all users, use one of the following procedures:
  - If you are using a Windows® operating system, insert the CD into the CD or DVD drive and click **Start --> Run**. In the **Open** field, type

    `e:\win32.bat`

    where *e* is the drive letter of the CD or DVD drive, and click **OK**.
  - If you are using Red Hat Linux, insert the CD into the CD or DVD drive; then, run the following command from the /mnt/cdrom directory:

    `sh runlinux.sh`

Select the blade server from the **Product** menu. The **Available Topics** list displays all the documents for the blade server. Some documents might be in folders. A plus sign (+) indicates each folder or document that has additional documents under it. Click the plus sign to display the additional documents.

When you select a document, a description of the document is displayed under **Topic Description**. To select more than one document, press and hold the Ctrl key while you select the documents. Click **View Book** to view the selected document or documents in Acrobat Reader or xpdf. If you selected more than one document, all the selected documents are opened in Acrobat Reader or xpdf.

To search all the documents, type a word or word string in the **Search** field and click **Search**. The documents in which the word or word string occurs are listed in order of the most occurrences. Click a document to view it, and press Crtl+F to use the Acrobat search function, or press Alt+F to use the xpdf search function within the document.

Click **Help** for detailed information about using the Documentation Browser.

Notices and statements in this documentation

The caution and danger statements in this document are also in the multilingual *Safety Information*. 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.

Features and specifications

Features and specifications of the IBM BladeCenter JS22 Type 7998 blade server are summarized in this overview.

The JS22 blade server is used in an IBM BladeCenter H (8852), BladeCenter HT (8740 and 8750), or BladeCenter S (8886) unit.

Notes:

- Power, cooling, removable-media drives, external ports, and advanced system management are provided by the BladeCenter unit.
- The operating system in the blade server must provide support for the Universal Serial Bus (USB), to enable the blade server to recognize and communicate internally with the removable-media drives and front-panel USB ports.

Microprocessor:	Integrated functions:	Predictive Failure Analysis® (PFA) alerts:

Support for two dual-core, 64-bit POWER6™ microprocessors; 4.0 GHz
 	
Support for Energy Scale thermal management for power management/oversubscription (throttling) and environmental sensing
 	
Memory:
- Dual-channel (DDR2) with 4 angled DIMM slots
- Supports 1 GB, 2 GB, 4 GB, and 8 GB DDR2 DIMMs for a maximum of 32 GB (as of the date of this publication)
- Supports 2-way interleaved, DDR2, PC2-4200 or PC2-5300, ECC SDRAM registered x4, memory scrubbing, Chipkill™, and bit steering DIMMs
 	
Virtualization:
PowerVM Standard Edition hardware feature supports Integrated Virtualization Manager and Virtual I/O Server
	- Two 1 Gigabit Ethernet controllers
	- Expansion card interface
	- The baseboard management controller (BMC) is a flexible service processor with Intelligent Platform Management Interface (IPMI) firmware and SOL support
	- ATI RN 50 ES1000 video controller
	- SAS controller
	- Light path diagnostics
	- RS-485 interface for communication with the management module
	- Automatic server restart (ASR)
	- Serial over LAN (SOL)
	- Support for local keyboard and video
	- Four Universal Serial Bus (USB) buses for communication with keyboard and removable-media drives
	- Transferable Anchor function (Renesas Technology HD651330 microcontroller) in the management card
	
	Storage:
	Support for one internal small-form-factor (SFF) Serial Attached SCSI (SAS) drive
		- Microprocessor
		- Memory
		
		Electrical input: 12 V dc
		
		Environment:
		- Air temperature:
		  – Blade server on: 10° to 35°C (50° to 95°F). Altitude: 0 to 914 m (3000 ft)
		  – Blade server on: 10° to 32°C (50° to 90°F). Altitude: 914 m to 2133 m (3000 ft to 7000 ft)
		  – Blade server off: -40° to 60°C (-40° to 140°F)
		- Humidity:
		  – Blade server on: 8% to 80%
		  – Blade server off: 8% to 80%
		
		Size:
		- Height: 24.5 cm (9.7 inches)
		- Depth: 44.6 cm (17.6 inches)
		- Width: 2.9 cm (1.14 inches)
		- Maximum weight: 5.0 kg (11 lb)

See the ServerProven Web site for information about supported operating-system versions and all JS22 blade server optional devices.

What your blade server offers

The design of the blade server takes advantage of advancements in chip technology, memory management, and data storage.

The blade server uses the following features and technologies:

- **Baseboard management controller (BMC)**

  The enhanced BMC for the JS22 blade server is a flexible service processor that provides support for the following functions:
  - Alert Standard Format (ASF) and RS-485 interfaces to the management modules
  - Intelligent Platform Management Interface (IPMI)
  - The operating system
  - Power control and advanced power management
  - Reliability, availability, and serviceability (RAS) features
  - Serial over LAN (SOL)
  - Continuous health monitoring and control
  - Configurable notification and alerts
  - Event logs that are time stamped and saved in nonvolatile memory and that can be attached to e-mail alerts
  - Point-to-point protocol (PPP) support
  - Remote power control
  - Remote firmware update and access to critical blade server settings

- **Disk drive support**

  The blade server supports one 2.5 inch (small-form-factor) Serial Attached SCSI (SAS) hard disk drive.

- **IBM Director**

  IBM Director is a workgroup-hardware-management tool that you can use to centrally manage the JS22 blade server, including updating the JS22 firmware.

  For more information, see the IBM Director documentation on the *IBM Director* CD.

- **Impressive performance using the latest microprocessor technology**

  The blade server comes with two POWER6 microprocessors.

- **Integrated network support**

  The blade server has two integrated (onboard) 1 gigabit-per-second (Gbps) Host Ethernet Adapter (HEA) controllers that provide advanced acceleration features, such as checksum offload, TCP large send, and jumbo frames. Capabilities include virtualized adapter sharing among logical partitions that does not require the shared Ethernet adapters of Virtual I/O Server. TCP advanced features include hardware de-multiplexing and per connection queues.

- **I/O expansion**

  The blade server has connectors on the system board for optional PCI-X and PCIe expansion cards, such as Fibre Channel and InfiniBand expansion cards, for adding more network communication capabilities to the blade server.

- **Large system memory capacity**

  The memory bus in the JS22 Type 7998 Model 61X blade server supports up to 32 GB of system memory. For the official list of supported DIMMs, see the ServerProven® Web site at http://www.ibm.com/servers/eserver/serverproven/compat/us/.

- **Light path diagnostics**

  Light path diagnostics provides light-emitting diodes (LEDs) to help you diagnose problems. An LED on the blade server control panel is lit if an unusual condition or a problem occurs. If this happens, you can look at the LEDs on the system board to locate the source of the problem.

  For more information, see the online information or the *Problem Determination and Service Guide*.

- **Power throttling**

  If your BladeCenter unit supports power management, the power consumption of the blade server can be dynamically managed through the management module. For more information, see the online management-module documentation or the IBM support site at http://www.ibm.com/systems/support/.

Reliability, availability, and serviceability features

Three of the most important features in server design are reliability, availability, and serviceability (RAS). The reliability of the BladeCenter JS22 starts with components, devices, and subsystems that are fault tolerant.

Reliability, availability, and serviceability protect the integrity of the data that is stored in the blade server, maintain the availability of the blade server when you need it, and enhance the ease with which you can diagnose and correct problems.

Component-level RAS features

The blade server has the following component-level RAS features:
- Alternate processor recovery
- Bit steering
- Chipkill memory for dual inline memory modules (DIMMs)
- Diagnostic support of Ethernet controllers
- Dual inline memory module (DIMM) failure isolation
  - DIMM pair identification through unrecoverable error (UE) checkpointing and message-related recovery actions
  - Single DIMM identification through recoverable component error (CE) checkpointing and garding
- Dynamic deallocation (runtime POWER6 garding of microprocessor and memory)
- L2 cache line delete
- Memory chip kill - Chipkill memory for DIMMs
- Memory Predictive Failure Analysis (PFA) alerts through scrubbing and error-checking and correction (ECC)
- Memory scrubbing
- Peripheral component interconnect (PCI) bus parity, ECRC, and surprise link down
- PFA thresholding of correctable hardware errors of the microprocessors and L2 cache
- Processor runtime diagnostics (PRD) that initiates the following actions to recover from errors:
  - Self-healing, such as redundant bit steering for memory
  - Deallocation at runtime of a failing resource, such as a processor core, a memory page
  - Identifying parts for service
  - Runtime error persistent deallocation, if necessary, for I-Cash, D-cash, L2 cache, L3 cache

   – Transparent microprocessor hardware error recovery (for example, for L2 cache errors)
- Single processor checkstop (including a partition checkstop)

Blade-level RAS features

The blade server has the following blade-level RAS features:
- Automatic service processor (BMC) reset and reload recovery for service processor errors
- Automatic server recovery and restart that provides automatic reboot after boot hangs or detection of checkstop conditions
- Automatic server restart (ASR)
- Built-in monitoring for temperature, voltage, hard disk drives, and flash drives
- Call Home - eCare client
- Checkstop analysis
- Checkstop detection with automated restart
- Customer-upgradeable basic input/output system (BIOS) code (firmware code)
- Customer support center 24 hours per day, 7 days a week[1]
- Degraded boot support (memory and microprocessors)
- Repeat Gard
- Extended Error Handling (EEH) for PCI host and root complex, PCIe link, and PCI adapter failures
- Emergency power off (EPOW) for the blade server and expansion cards
- Environmental monitors and alerts
- Error codes and messages
- ECC memory
- Failover Ethernet support
- First Failure Data Capture (FFDC) for determining failure root cause
- Service processor communication with the management module to enable remote blade server management
- Light emitting diodes (LEDs) for identifying failing customer replaceable units (CRUs) or field replaceable units (FRUs)
- Light path diagnostics
- POWER6 RAS design and objectives
- POWER6 Hypervisor (PHYP) partition recovery or partition termination when unrecoverable errors occur
- Power-on self-test (POST)
- SDRAM with serial presence detect (SPD) and vital product data (VPD)
- System error logging
- System Management Services (SMS) menu support
- System-wide checkstop
- Vital product data (VPD) unique identifiers on blade server and all major electronic components with information stored in nonvolatile memory for remote viewing

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1. Service availability will vary by country. Response time will vary depending on the number and nature of incoming calls.

BladeCenter unit-level RAS features

The BladeCenter unit provides the following RAS features:
- Power-supply error detection
- Redundant power supplies
- Remote power control
- Management-module system-event log
- Redundant blowers, I/O modules (switches)
- Hot plug of BladeCenter CRUs (blowers, switches, power supplies)

Major components of the blade server

Remove the blade server from the BladeCenter unit and remove the blade server cover to see its components.

Illustrations in this information might differ slightly from your hardware. The following illustration shows the major components of the blade server.
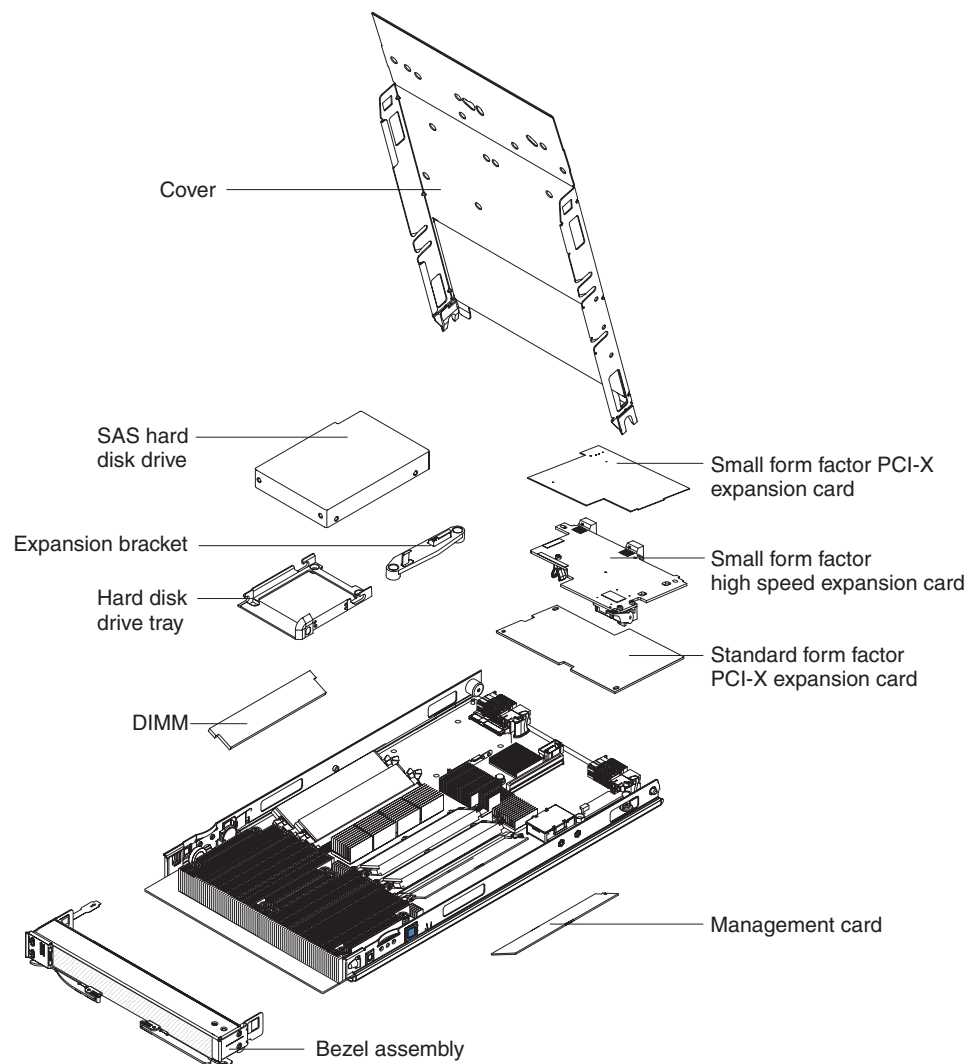
Figure 1. Major components of the blade server

Note: The microprocessors are soldered onto the system board and are not removable.

IBM Director

Use IBM Director to perform network and system management tasks.

With IBM Director, a network administrator can perform the following tasks:
- View the hardware configuration of remote systems, in detail
- Monitor the usage and performance of critical components, such as microprocessors, disks, and memory
- Centrally manage individual or large groups of IBM and non-IBM x86-processor-based servers, desktop computers, workstations, and notebook computers on a variety of platforms

IBM Director provides a comprehensive entry-level workgroup hardware manager. It includes the following key features:
- Advanced self-management capabilities for maximum system availability.
- Multiple operating-system platform support, including Microsoft Windows Server 2003, Windows 2000 Server, Windows XP Professional, Red Hat Linux, SUSE Linux, VMware, Novell NetWare, AIX®, and IBM i operating system (formerly known as i5/OS®). For a complete list of operating systems that support IBM Director, see the IBM Director Compatibility Document. This document is in Portable Document Format (PDF) at http://www.ibm.com/systems/management/director/resources. It is updated every 6 to 8 weeks.
- Support for IBM and non-IBM servers, desktop computers, workstations, and notebook computers.
- Support for systems-management industry standards.
- Integration into leading workgroup and enterprise systems-management environments.
- Ease of use, training, and setup.

IBM Director also provides an extensible platform that supports advanced server tools that are designed to reduce the total cost of managing and supporting networked systems. By deploying IBM Director, you can achieve reductions in ownership costs through the following benefits:
- Reduced downtime
- Increased productivity of IT personnel and users
- Reduced service and support costs

Chapter 2. Power, controls, indicators, and connectors

You can use the control panel to turn the blade server on or off and to view some controls and indicators. Other indicators are on the system board. The system board also has connectors for various components.

Blade server control panel buttons and LEDs

Blade server control panel buttons and LEDs provide operational controls and status indicators.

Note: Figure 2 shows the control-panel door in the closed (normal) position. To access the power-control button, you must open the control-panel door.
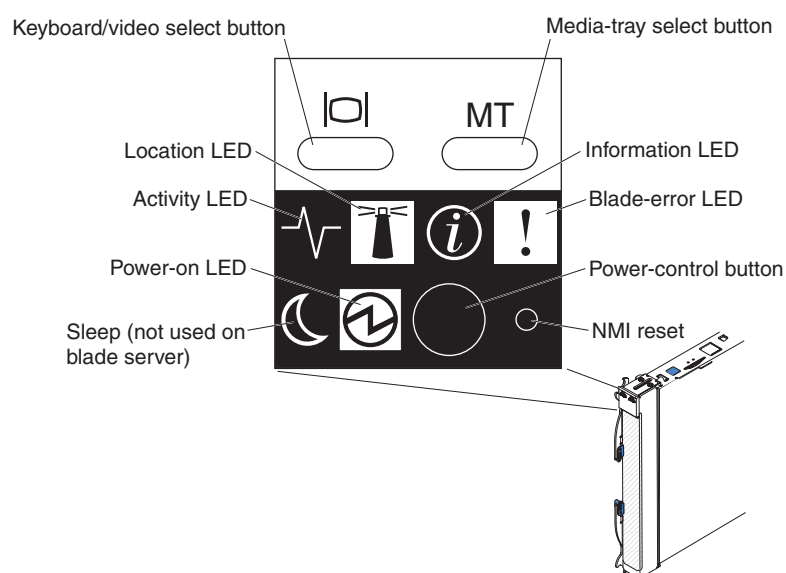

Figure 2. Blade server control panel buttons and LEDs

Keyboard/video select button: When you use an operating system that supports a local console and keyboard, press this button to associate the shared BladeCenter unit keyboard and video ports with the blade server.

Notes:
- The operating system in the blade server must provide USB support for the blade server to recognize and use the keyboard, even if the keyboard has a PS/2-style connector.
- The keyboard and video are available after partition firmware loads and is running. Power-on self-test (POST) codes and diagnostics are not supported using the keyboard and video. Use the management module to view checkpoints.

The LED on this button flashes while the request is being processed, then is lit when the ownership of the keyboard and video has been transferred to the blade server. It can take approximately 20 seconds to switch control of the keyboard and video to the blade server.

Using a keyboard that is directly attached to the management module, you can press keys in the following sequence to switch keyboard and video control between blade servers:

NumLock NumLock *blade_server_number* Enter

Where *blade_server_number* is the two-digit number for the blade bay in which the blade server is installed. When you use some keyboards, such as the 28L3644 (37L0888) keyboard, hold down the Shift key while you enter this key sequence.

If there is no response when you press the keyboard/video select button, you can use the Web interface of the management module to determine whether local control has been disabled on the blade server.

Media-tray select button: Press this button to associate the shared BladeCenter unit media tray (removable-media drives and front-panel USB ports) with the blade server. The LED on the button flashes while the request is being processed, then is lit when the ownership of the media tray has been transferred to the blade server. It can take approximately 20 seconds for the operating system in the blade server to recognize the media tray.

If there is no response when you press the media-tray select button, use the management module to determine whether local control has been disabled on the blade server.

Note: The operating system in the blade server must provide USB support for the blade server to recognize and use the removable-media drives and USB ports.

Information LED: When this amber LED is lit, it indicates that information about a system error for the blade server has been placed in the management-module event log. The information LED can be turned off through the Web interface of the management module or through IBM Director Console.

Blade-error LED: When this amber LED is lit, it indicates that a system error has occurred in the blade server. The blade-error LED will turn off after one of the following events:
- Correcting the error
- Reseating the blade server in the BladeCenter unit
- Cycling the BladeCenter unit power

Power-control button: This button is behind the control panel door. Press this button to turn on or turn off the blade server.

The power-control button has effect only if local power control is enabled for the blade server. Local power control is enabled and disabled through the Web interface of the management module.

Press the power button for 5 seconds to begin powering down the blade server.

NMI reset (recessed): The nonmaskable interrupt (NMI) reset dumps the partition. Use this recessed button only as directed by IBM Support.

Power-on LED: This green LED indicates the power status of the blade server in the following manner:
- Flashing rapidly: The service processor (BMC) is initializing the blade server.
- Flashing slowly: The blade server has completed initialization and is waiting for a power-on command.
- Lit continuously: The blade server has power and is turned on.

Note: The enhanced service processor (BMC) can take as long as three minutes to initialize after you install the BladeCenter JS22 blade server, at which point the LED begins to flash slowly.

Activity LED: When this green LED is lit, it indicates that there is activity on the hard disk drive or network.

Location LED: When this blue LED is lit, it has been turned on by the system administrator to aid in visually locating the blade server. The location LED can be turned off through the Web interface of the management module or through IBM Director Console.

Turning on the blade server

After you connect the blade server to power through the BladeCenter unit, you can start the blade server after the discovery and initialization process is complete.

You can start the blade server in any of the following ways.

- Start the blade server by pressing the power-control button on the front of the blade server.

  The power-control button is behind the control panel door, as described in "Blade server control panel buttons and LEDs" on page 13.

  After you push the power-control button, the power-on LED continues to blink slowly for about 15 seconds, then is lit solidly when the power-on process is complete.

  Wait until the power-on LED on the blade server flashes slowly before you press the blade server power-control button. If the power-on LED is flashing rapidly, the service processor is initializing the blade server. The power-control button does not respond during initialization.

  Note: The enhanced service processor (BMC) can take as long as three minutes to initialize after you install the BladeCenter JS22 blade server, at which point the LED begins to flash slowly.

- Start the blade server automatically when power is restored after a power failure.

  If a power failure occurs, the BladeCenter unit and then the blade server can start automatically when power is restored. You must configure the blade server to restart through the management module.

- Start the blade server remotely using the management module.

  After you initiate the power-on process, the power-on LED blinks slowly for about 15 seconds, then is lit solidly when the power-on process is complete.

Turning off the blade server

When you turn off the blade server, it is still connected to power through the BladeCenter unit. The blade server can respond to requests from the service processor, such as a remote request to turn on the blade server. To remove all power from the blade server, you must remove it from the BladeCenter unit.

Shut down the operating system before you turn off the blade server. See the operating-system documentation for information about shutting down the operating system.

You can turn off the blade server in one of the following ways.
- Turn off the blade server by pressing the power-control button for at least 5 seconds.

  The power-control button is on the blade server behind the control panel door. See "Blade server control panel buttons and LEDs" on page 13 for the location.

  Note: The power-control LED can remain on solidly for up to 1 minute after you push the power-control button. After you turn off the blade server, wait until the power-control LED is blinking slowly before you press the power-control button to turn on the blade server again.

  If the operating system stops functioning, press and hold the power-control button for more than 5 seconds to force the blade server to turn off.
- Use the management module to turn off the blade server.

  The power-control LED can remain on solidly for up to 1 minute after you initiate the power-off process. After you turn off the blade server, wait until the power-control LED is blinking slowly before you initiate the power-on process from the AMM to turn on the blade server again.

  Use the management-module Web interface to configure the management module to turn off the blade server if the system is not operating correctly.

  For additional information, see the online documentation or the *User's Guide* for the management module.

System-board layouts

Illustrations show the connectors and LEDs on the system board. The illustrations might differ slightly from your hardware.

System-board connectors

Blade server components attach to the connectors on the system board.

Figure 3 on page 18 shows the connectors on the system board in the blade server.
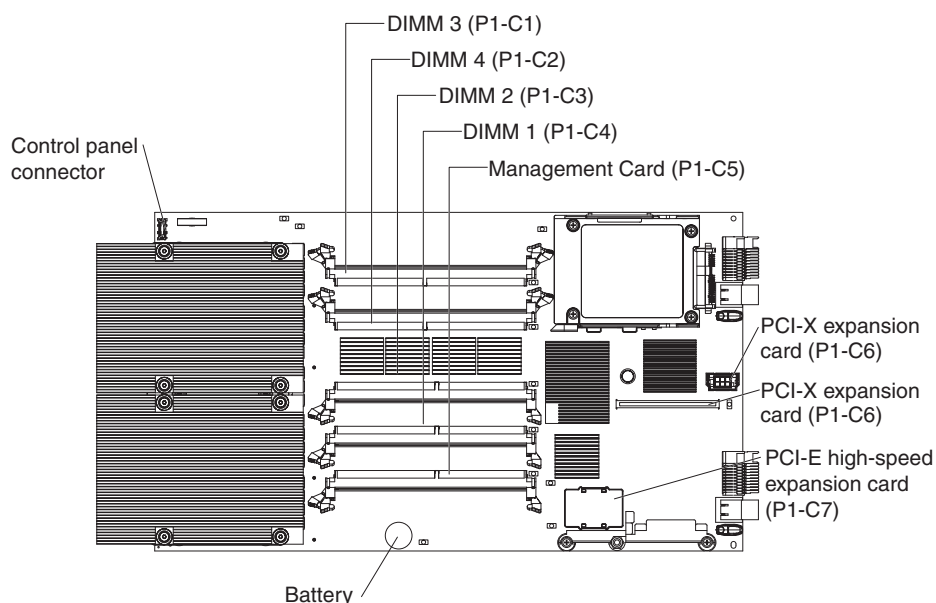
Figure 3. System-board connectors

System-board LEDs

Use the illustration of the LEDs on the system board to identify a light emitting diode (LED).

Remove the blade server from the BladeCenter unit, open the cover to see any error LEDs that were turned on during error processing, and use Figure 4 to identify the failing component.
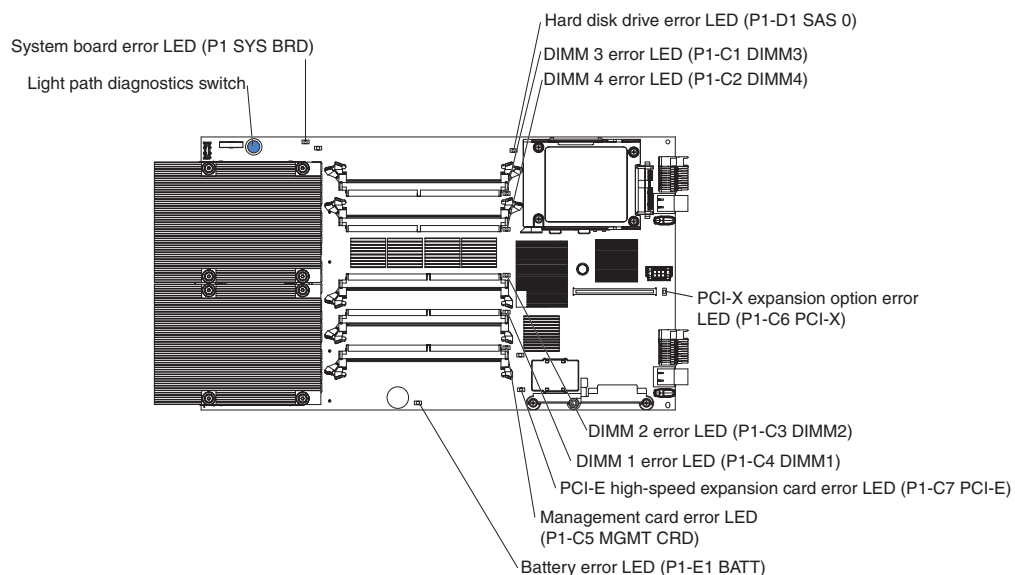

Figure 4. System-board LEDs

Chapter 3. Installing and removing options

Install or remove hardware options, such as memory modules or input/output expansion cards. Some installation procedures require you to remove an installed option.

Installation guidelines

Follow these guidelines to remove and replace blade server components.

- Read the safety information in "Safety" on page v and the guidelines in "Handling static-sensitive devices" on page 20. This information will help you work safely.
- When you install a new blade server, download and apply the most recent firmware updates.

  Download and install updated device drivers and the JS22 firmware. Go to the IBM Support site to download the updates. Select your product, type, model, and operating system, and then click **Go**. Click the **Download** tab, if necessary, for device driver and firmware updates.

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

- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.
- Back up all important data before you make changes to disk drives.
- Before you remove a hot-swap blade server from the BladeCenter unit, you must shut down the operating system and turn off the blade server. You do not have to shut down the BladeCenter unit itself.
- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the blade 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 blade server and operating system support hot-swap capability, you can remove or install the component while the blade server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or 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 are finished working on the blade server, reinstall all safety shields, guards, labels, and ground wires.

See the ServerProven Web site for information about supported operating-system versions and all JS22 blade server optional devices.

System reliability guidelines

Follow these guidelines to help ensure proper cooling and system reliability.

- Verify that the ventilation holes on the blade server are not blocked.
- Verify that you are maintaining proper system cooling in the unit.

  Do not operate the BladeCenter unit without a blade server, expansion unit, or filler blade installed in each blade bay. See the documentation for your BladeCenter unit for additional information.

- Verify that you have followed the reliability guidelines for the BladeCenter unit.
- Verify that the blade server battery is operational. If the battery becomes defective, replace it immediately, as described in the *Problem Determination and Service Guide*.

Handling static-sensitive devices

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

Attention:

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

- Limit your movement. Movement can cause static electricity to build up around you.
- 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 part of the BladeCenter unit or any unpainted metal surface on any other grounded rack component in the rack you are installing the device in 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 blade 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 blade server cover or on a metal surface.
- Take additional care when handling devices during cold weather. Heating dry winter air further reduces its humidity and increases static electricity.

Removing the blade server from a BladeCenter unit

Remove the blade server from the BladeCenter unit to access options, connectors, and system-board indicators.

Release handles (open)
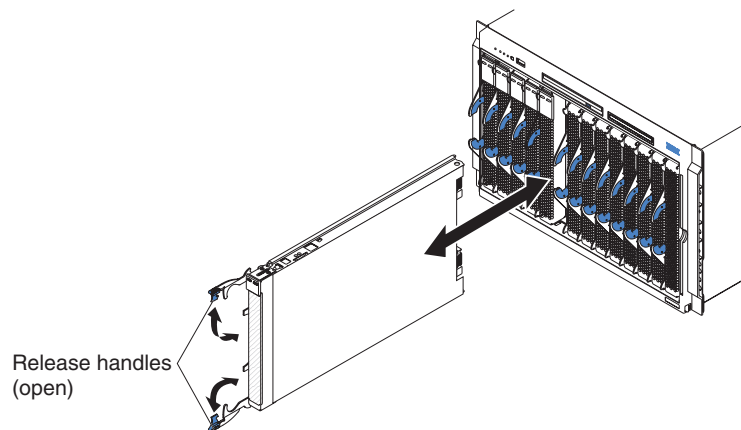
Figure 5. Removing the blade server from the BladeCenter unit

Attention:
- To maintain proper system cooling, do not operate the BladeCenter unit without a blade server, expansion unit, or blade filler installed in each blade bay.
- When you remove the blade server, note the bay number. Reinstalling a blade server into a different bay from the one where it was removed might have unintended consequences. Some configuration information and update options are established according to bay numbers. If you reinstall the blade server into a different bay, you might have to reconfigure the blade server.

Perform the following procedure to remove the blade server.
1. Read "Safety" on page v and the "Installation guidelines" on page 19.
2. If the blade server is operating, shut down the operating system.
3. Press the power-control button (behind the control-panel door) to turn off the blade server. See "Turning off the blade server" on page 16.
4. Wait at least 30 seconds for the hard disk drive to stop spinning.
5. Open the two release handles as shown in the illustration. The blade server moves out of the bay approximately 0.6 cm (0.25 inch).
6. Pull the blade server out of the bay. Spring-loaded doors farther back in the bay move into place to cover the bay temporarily.
7. Carefully lay the blade server on a flat, static-protective surface, with the cover side up.

8. Place either a blade filler or another blade server in the bay within 1 minute. The recessed spring-loaded doors move out of the way as you insert the blade server or filler blade.

Removing the blade server cover

Remove the blade server from the chassis unit and press the blade server cover releases to open and remove the blade server cover.
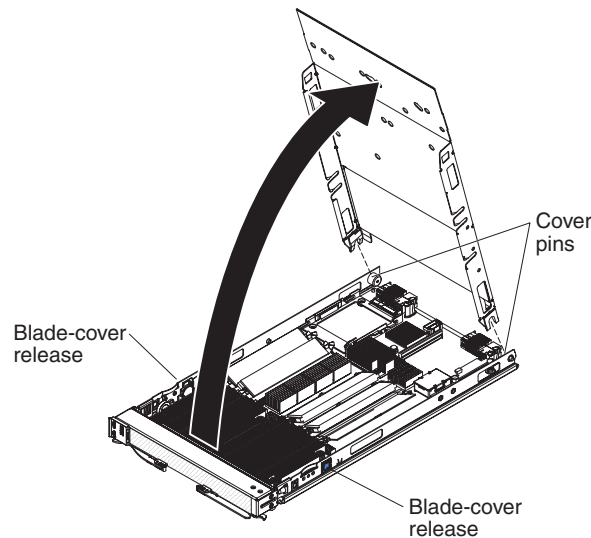
Figure 6. Removing the cover

Perform the following procedure to open and remove the blade server cover.

1. Read "Safety" on page v and the "Installation guidelines" on page 19.
2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See "Removing the blade server from a BladeCenter unit" on page 21.
3. Carefully lay the blade server on a flat, static-protective surface, with the cover side up.
4. Press the blade-cover release on each side of the blade server and lift the cover open.
5. Lay the cover flat, or lift it from the blade server and store it for future use.

   Statement 21

   CAUTION:
   Hazardous energy is present when the blade server is connected to the power source. Always replace the blade server cover before installing the blade server.

Installing the SAS hard disk drive

Install the SAS hard disk drive.

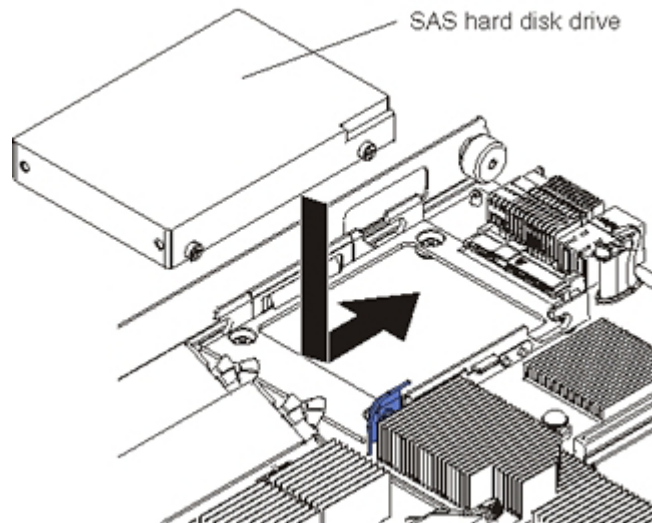**Note:** Do not install a SAS hard disk drive if you intend to install a standard-form-factor expansion card. The standard-form-factor expansion card occupies the same area as the hard disk drive.

Figure 7 shows how to install the SAS drive.

Figure 7. Installing a SAS hard disk

To install a SAS hard disk drive, complete the following steps:

1. Read "Safety" on page v and the "Installation guidelines" on page 19.
2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See "Removing the blade server from a BladeCenter unit" on page 21.
3. Carefully lay the blade server on a flat, static-protective surface, with the cover side up.
4. Open and remove the blade server cover. See "Removing the blade server cover" on page 22.
5. Locate the SAS connector for the hard disk drive.
6. If a standard-form-factor expansion card is installed in the SAS connector, remove the expansion card:
   a. Remove the expansion card and its mounting bracket, and save the screws that secure the tray to the system board. Store the screws in a safe place.
   b. Install the SAS connector drive tray. Secure the drive tray to the system board with the screws from the option kit.

7. Place the drive into the hard disk drive tray and push it toward the rear of the blade, into the connector until the drive moves past the lever at the front of the tray.

   Attention: Do not press on the top of the drive. Pressing the top might damage the drive.

If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 32.

Removing the SAS hard disk drive

Remove the SAS hard disk drive to install a new drive or to install certain expansion cards.
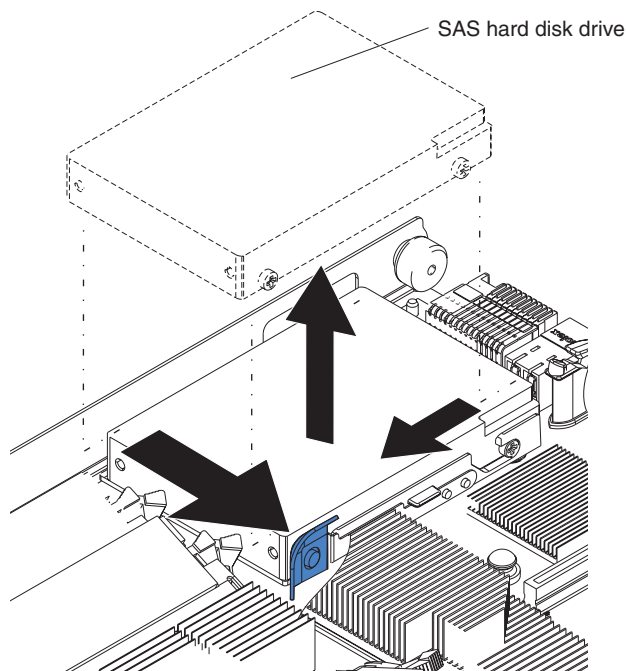
Figure 8. Removing a SAS hard disk

Perform the following procedure to remove the SAS hard disk drive.

1. Back up the data from the drive to another storage device.
2. Read "Safety" on page v and the "Installation guidelines" on page 19.
3. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See "Removing the blade server from a BladeCenter unit" on page 21.

4. Carefully lay the blade server on a flat, static-protective surface, with the cover side up.
5. Open and remove the blade server cover. See "Removing the blade server cover" on page 22.
6. Remove the drive:
   a. Pull and hold the blue release lever at the front of the hard disk drive tray.
   b. Slide the drive forward to disengage the connector.
   c. Lift the drive out of the drive tray.

Installing a memory module

Install dual inline memory modules (DIMMs) in the blade server.

Table 2 shows the sequence for installing DIMMs.

Table 2. Installing a memory module

Pair	DIMM connectors
First	DIMM 1 and DIMM 2
Second	DIMM 3 and DIMM 4

See "Supported DIMMs" on page 26 for additional information about the type of memory that is compatible with the blade server, and the rules that control which sizes and speeds you can use in the blade server. Figure 9 shows how to open the retaining clip to install the memory module.

DIMM

Retaining clip
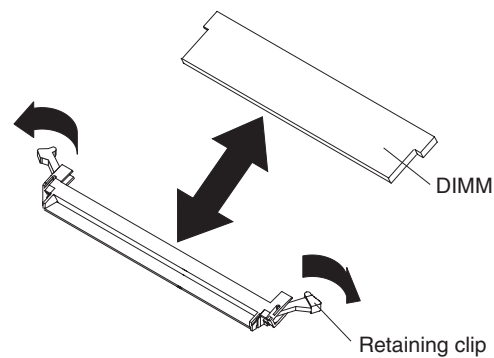
Figure 9. Installing a memory module

To install a DIMM, complete the following steps:
1. Read "Safety" on page v and the "Installation guidelines" on page 19.
2. Read the documentation that comes with the DIMMs.

3. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See "Removing the blade server from a BladeCenter unit" on page 21.

4. Carefully lay the blade server on a flat, static-protective surface, with the cover side up.

5. Open and remove the blade server cover. See "Removing the blade server cover" on page 22.

6. Locate the DIMM connectors on the system board. See the illustration in "System-board connectors" on page 17. Determine the connector into which you will install the DIMM.

7. Touch the static-protective package that contains the part to any *unpainted* metal surface on the BladeCenter unit or any *unpainted* metal surface on any other grounded rack component; then, remove the part from its package.

8. Verify that both of the connector retaining clips are in the fully open position.

9. Turn the DIMM so that the DIMM keys align correctly with the connector on the system board.

   Attention: To avoid breaking the DIMM retaining clips or damaging the DIMM connectors, handle the clips gently.

10. Insert the DIMM by pressing the DIMM along the guides into the connector. Verify that each retaining clip snaps into the closed position.

    Important: If there is a gap between the DIMM and the retaining clips, the DIMM is not correctly installed. Open the retaining clips to remove and reinsert the DIMM.

If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 32.

Supported DIMMs

The BladeCenter JS22 Type 7998 blade server contains four angled memory connectors for industry-standard registered dual inline memory modules (RDIMMs). The total memory capacity ranges from a minimum of 2 GB to a maximum of 32 GB.

See the "Parts Listing" in the online information center or in the *Problem Determination and Service Guide* for memory modules that you can order from IBM.

Memory module rules:
- Install DIMMs in pairs in connectors DIMM 1 and DIMM 2, or in connectors DIMM 3 and DIMM 4. See "System-board connectors" on page 17 for DIMM connector locations.
- Both DIMMs in a pair must be the same size, speed, type, technology, and physical design. You can mix compatible DIMMs from different manufacturers.
- The second pair of DIMMs can be a different size and speed than the first pair, but must follow the preceding rule, which applies to each pair.
- Install only supported DIMMs, as described on the ServerProven Web site. See http://www.ibm.com/servers/eserver/serverproven/compat/us/.
- Installing or removing DIMMs changes the configuration of the blade server. After you install or remove a DIMM, the blade server is automatically reconfigured, and the new configuration information is stored.

Installing an I/O expansion card

Add an I/O expansion card to the blade server to provide additional connections for communicating on a network.

The blade server supports various types of I/O expansion cards, including Gigabit Ethernet, Fibre Channel, and Myrinet expansion cards.

Verify that any expansion card that you are using is listed on the ServerProven Web site in the list of supported expansion cards for the JS22 blade server. For example, the following expansion cards are not supported by the JS22 blade server:
- BladeCenter SFF Gb Ethernet
- Cisco 1X InfiniBand
- Qlogic 4Gb SFF Fibre Channel Expansion card

See the ServerProven Web site for information about supported operating-system versions and all JS22 blade server optional devices.

Installing a small-form-factor expansion card

Install a small-form-factor expansion card to expand the I/O capabilities of the blade server.
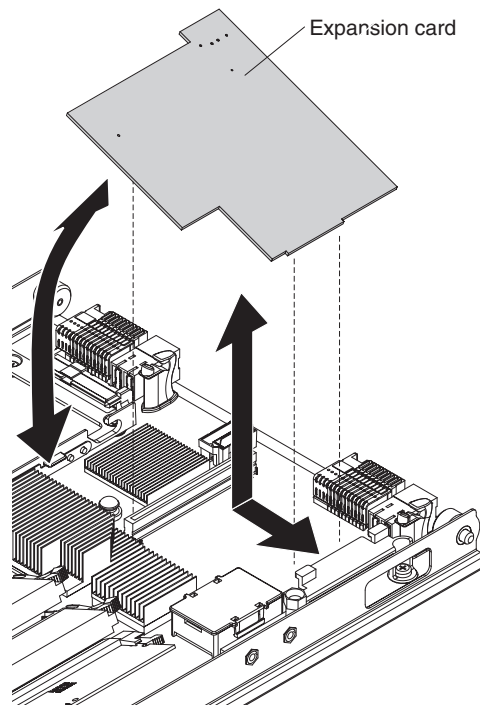
Figure 10. Installing a small-form-factor expansion card

To install a small-form-factor expansion card, complete the following steps:

1. Read "Safety" on page v and the "Installation guidelines" on page 19.
2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See "Removing the blade server from a BladeCenter unit" on page 21.
3. Carefully lay the blade server on a flat, static-protective surface, with the cover side up.
4. Open and remove the blade server cover. See "Removing the blade server cover" on page 22.
5. Touch the static-protective package that contains the part to any *unpainted* metal surface on the BladeCenter unit or any *unpainted* metal surface on any other grounded rack component; then, remove the part from its package.
6. Orient the expansion card over the system board.
7. Slide the notch in the narrow end of the card into the raised hook on the system board; then, gently pivot the card into the expansion card connectors.

If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 32.

Installing a standard-form-factor expansion card

Install a standard-form-factor expansion card to expand the I/O capabilities of your blade server.
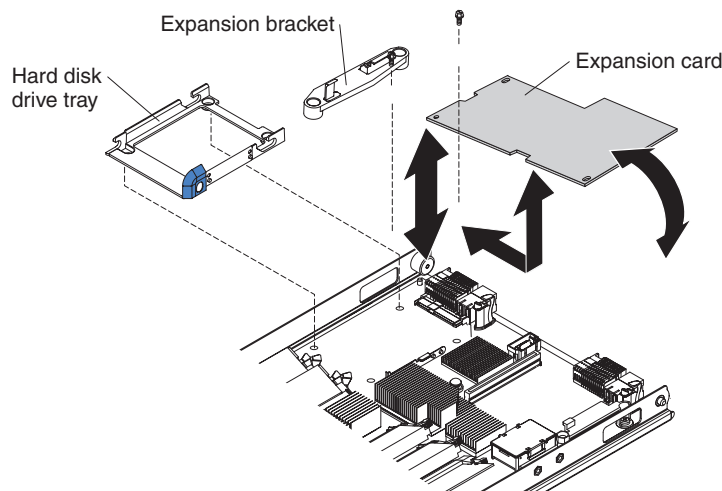

Figure 11. Installing a standard-form-factor expansion card

To install a standard-form-factor expansion card, complete the following steps:

1. Read "Safety" on page v and the "Installation guidelines" on page 19.
2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See "Removing the blade server from a BladeCenter unit" on page 21.
3. Carefully lay the blade server on a flat, static-protective surface, with the cover side up.
4. Open and remove the blade server cover. See "Removing the blade server cover" on page 22.
5. If a drive is connected to the SAS connector, remove the drive and the tray. See "Removing the SAS hard disk drive" on page 24 and "Removing the hard disk drive tray."

   If a SAS drive is connected to the SAS connector, you cannot install a standard-form-factor expansion card.
6. Install the expansion bracket. See "Installing the expansion bracket" on page 30.
7. Touch the static-protective package that contains the part to any *unpainted* metal surface on the BladeCenter unit or any *unpainted* metal surface on any other grounded rack component; then, remove the part from its package.
8. Orient the expansion card and slide the notch in the narrow end of the card into the raised hook on the expansion bracket; then, gently pivot the wide end of the card into the expansion card connectors.

If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 32.

Removing the hard disk drive tray

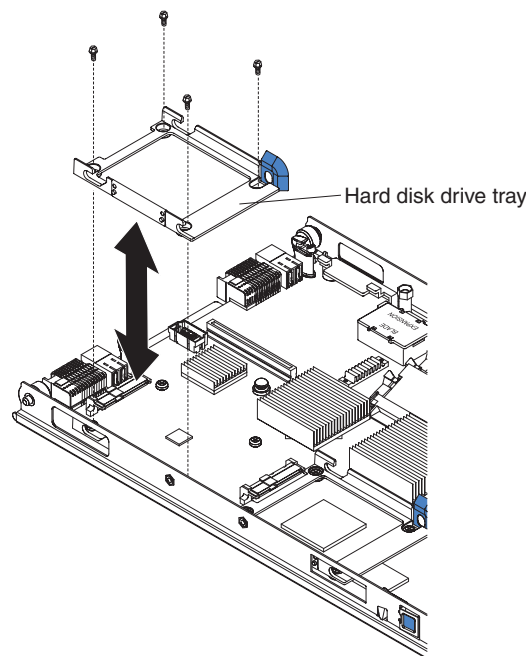You can remove the hard disk drive tray.

*Figure 12. Removing the hard disk drive tray*

Perform the following procedure to remove the hard disk drive tray.

1. Read "Safety" on page v and the "Installation guidelines" on page 19.
2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See "Removing the blade server from a BladeCenter unit" on page 21.
3. Carefully lay the blade server on a flat, static-protective surface, with the cover side up.
4. Open and remove the blade server cover. See "Removing the blade server cover" on page 22.
5. Remove the hard disk drive if one is installed. See "Removing the SAS hard disk drive" on page 24.
6. Remove the four screws that secure the drive tray to the system board and remove the drive tray.

   Save the screws that secure the tray to the system board. Store the screws in a safe place.

Installing the expansion bracket

You can install the expansion bracket.
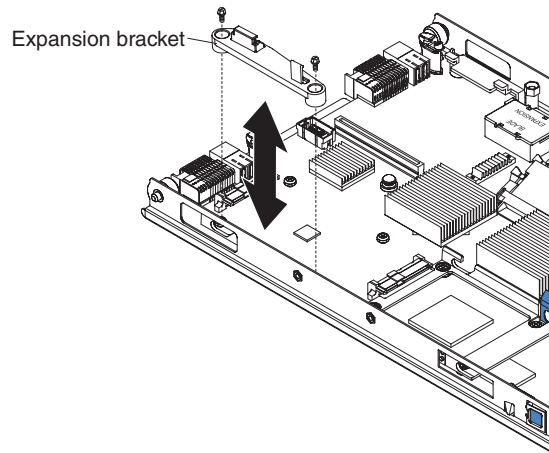
Figure 13. Installing the expansion bracket

To install the expansion bracket, complete the following steps:
1. Place the expansion bracket in position on the system board.
2. Secure the bracket to the system board with two screws from the option kit or from the removed drive tray.

If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 32.

Installing a combination-form-factor expansion card

Install a combination-form-factor expansion card to expand the I/O capabilities of the blade server.
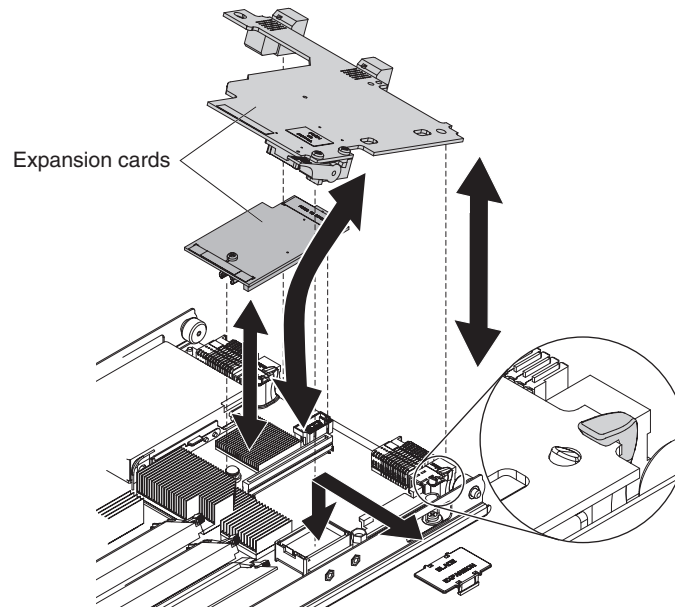

Figure 14. Installing a combination-form-factor expansion card

To install a combination-form-factor expansion card, complete the following steps:

1. Read "Safety" on page v and the "Installation guidelines" on page 19.
2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See "Removing the blade server from a BladeCenter unit" on page 21.
3. Carefully lay the blade server on a flat, static-protective surface, with the cover side up.
4. Open and remove the blade server cover. See "Removing the blade server cover" on page 22.
5. Install the vertical (CFFv) CFFx portion of the expansion card (the smaller card) by gently pushing the card onto the PCI-X connector.
6. Install the horizontal (CFFh) CFFe portion of the expansion card.
   a. Slide the card into the raised hook on the system board.
   b. Gently pivot the card into the PCIe connector.

If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation."

Completing the installation

To complete the installation, you must install and close the blade server cover, install the blade server into the BladeCenter unit, and turn on the blade server.

1. Install and close the blade server cover. See "Installing and closing the blade server cover" on page 33.

   Statement 21

   CAUTION:
   Hazardous energy is present when the blade server is connected to the power source. Always replace the blade server cover before installing the blade server.

2. Install the blade server into the BladeCenter unit. See "Installing the blade server in a BladeCenter unit" on page 34.

3. Turn on the blade server, as described in "Turning on the blade server" on page 16.

   Note: If you have just connected the power cords of the BladeCenter unit to electrical outlets, you must wait until the power-on LED on the blade server flashes slowly before you press the power-control button.

4. If you installed an I/O expansion card, use the documentation that comes with the expansion card to install device drivers and to perform any configuration that the expansion card requires.

5. For certain optional devices, run the blade server SMS Utility program, as described in "Using the SMS utility" on page 41.

Installing and closing the blade server cover

Install and close the cover of the blade server before you insert the blade server into the BladeCenter unit. Do not attempt to override this important protection.
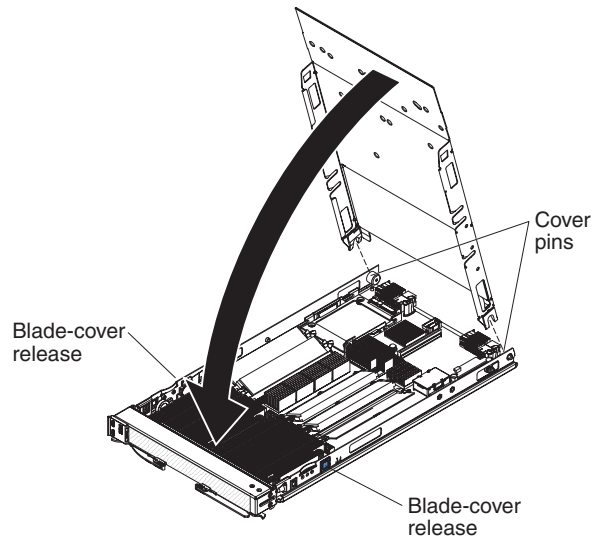

Figure 15. Installing the cover

Statement 21

CAUTION:
Hazardous energy is present when the blade server is connected to the power source. Always replace the blade server cover before installing the blade server.

Perform the following procedure to replace and close the blade server cover.

1. Read "Safety" on page v and the "Installation guidelines" on page 19.
2. Lower the cover so that the slots at the rear slide down onto the pins at the rear of the blade server. Before you close the cover, verify that all components are installed and seated correctly and that you have not left loose tools or parts inside the blade server.
3. Pivot the cover to the closed position until it clicks into place.
4. Install the blade server into the BladeCenter unit. See "Installing the blade server in a BladeCenter unit" on page 34.

Installing the blade server in a BladeCenter unit

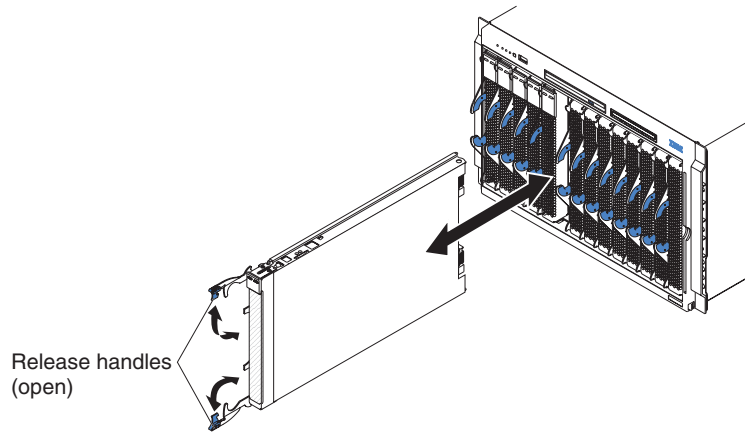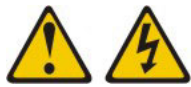Install the blade server in a BladeCenter unit to use the blade server.

Release handles
(open)

Figure 16. Installing the blade server in a BladeCenter unit

Statement 21

CAUTION:
Hazardous energy is present when the blade server is connected to the power source. Always replace the blade server cover before installing the blade server.

Perform the following procedure to install a blade server in a BladeCenter unit.

1. Go to http://www.ibm.com/systems/support/ to download the latest firmware for the blade server.

   Download the firmware so that you can use it later to update the blade server after you start it.

2. Read "Safety" on page v and the "Installation guidelines" on page 19.

3. If you have not done so already, install any optional devices that you want, such as a SAS drive or memory modules.

4. Select the bay for the blade server.
   - See the online information or the *Installation and User's Guide* that comes with your BladeCenter unit to verify that the bay you choose is powered.
   - Ensure proper cooling, performance, and system reliability by installing a blade server, expansion unit, or blade filler in each blade bay.
   - Reinstall a blade server in the same blade bay to preserve some configuration information and update options that are established by blade bay. Reinstalling into a different blade bay can have unintended consequences, which might include reconfiguring the blade server.

5. Verify that the release handles on the blade server are in the open position (perpendicular to the blade server).

6. If you installed a filler blade or another blade server in the bay from which you removed the blade server, remove it from the bay.

7. Slide the blade server into the blade bay from which you removed it until the blade server stops.

   The spring-loaded doors farther back in the bay that cover the bay opening move out of the way as you insert the blade server.

8. Push the release handles on the front of the blade server to close and lock them.

   The discovery and initialization process can take up to three minutes to complete. The discovery and initialization process is complete when the green LED stops flashing rapidly and begins to flash slowly. At this point, you can power on the blade server.

9. Turn on the blade server. See "Turning on the blade server" on page 16.

10. Verify that the power-on LED on the blade server control panel is lit continuously. The continuous light indicates that the blade server is receiving power and is turned on.

11. Optional: Write identifying information on one of the user labels that come with the blade servers and place the label on the BladeCenter unit bezel.

    Important: Do not place the label on the blade server or in any way block the ventilation holes on the blade server. See the online information or the documentation that comes with your BladeCenter unit for information about label placement.

12. Use the SMS Utility program to configure the blade server. See "Using the SMS utility" on page 41.

13. Also use the management module to configure the blade server. See the documentation for the management module to understand the functions that the management module provides.

If you have changed the configuration of the blade server or if this is a different blade server than the one you removed, you must configure the blade server. You might also have to install the blade server operating system.

See the "Installing the operating system" in the online information or the *Installation and User's Guide* PDF for detailed information about these tasks.

See Chapter 5, "Installing the operating system," on page 47.

Input/output connectors and devices

The input/output connectors that are available to the blade server are supplied by the BladeCenter unit.

See the documentation that comes with the BladeCenter unit for information about the input/output connectors.

The blade server has a media-tray select button on the control panel. See "Blade server control panel buttons and LEDs" on page 13 for information about this button and its function.

The Ethernet controllers on the blade server communicate with the network through the Ethernet-compatible I/O modules on the BladeCenter unit. Network signals to and from the blade server or any expansion cards are automatically routed to a same-network-interface I/O module through circuitry in the BladeCenter unit.

Chapter 4. Configuring the blade server

While the firmware is running POST and before the operating system starts, a POST menu with POST indicators is displayed. The POST indicators are the words *Memory*, *Keyboard*, *Network*, *SCSI*, and *Speaker* that are displayed as each component is tested. You can then select configuration utilities from the POST menu.

- **System management services (SMS)**

  Use the system management services (SMS) utility to view information about your system or partition and to perform tasks such as setting up remote IPL, changing SCSI settings, and selecting boot options. The SMS utility can be used for AIX or Linux partitions. See "Using the SMS utility" on page 41 for more information.

- **Default boot list**

  Use this utility to initiate a system boot in service mode through the default service mode boot list. This mode attempts to boot from the first device of each type that is found in the list.

  Note: This is the preferred method of starting the stand-alone AIX diagnostics from CD.

- **Stored boot list**

  Use this utility to initiate a system boot in service mode, using the customized service mode boot list that was set up by AIX when AIX was first booted, or manually using the AIX service aids.

- **Open firmware prompt**

  This utility is for advanced users of the IEEE 1275 specifications only.

- **Management module**

  Use the management module to change the boot list, determine which firmware image to boot, and perform other configuration tasks.

Updating the firmware

IBM periodically makes firmware updates available for you to install on the blade server, the management module, or expansion cards in the blade server.

Important: To avoid problems and to maintain proper system performance, always verify that the blade server BIOS, service processor, and diagnostic firmware levels are consistent for all blade servers within the BladeCenter unit. See "Verifying the system firmware levels" on page 39 for more information.

Plan to use a method of applying blade server firmware updates other than the management module. The JS22 blade server enhanced BMC has a larger firmware image that makes it impractical to download and install over the RS-485 bus of the management module. Therefore, a firmware update for the blade server is not supported from the management module.

You can still use the other methods of performing firmware updates for the blade server:
- In-band operating system capabilities, such as the **update_flash** command for Linux and AIX or the **ldfware** command for Virtual I/O Server
- The firmware update function of AIX diagnostics
- The firmware update function of the stand-alone *Diagnostics CD*

Attention: Before the installation of the new firmware to the Temporary side begins, the contents of the Temporary side are copied into the Permanent side. After the firmware installation begins, the previous level of firmware on the Permanent side is no longer available.

Use the following procedure to install updated firmware.
1. Start the TEMP image, as described in "Starting the TEMP image" on page 39.
2. Download the JS22 firmware.
    a. Go to the IBM Support site at http://www.ibm.com/systems/support/ to download the updates.
    b. Select your product, type, model, and operating system, and then click **Go**.
    c. Click the **Download** tab, if necessary, for device driver and firmware updates.
    d. Download the firmware to the /tmp/fwupdate directory.
3. Log on to the AIX or Linux system as root, or log on to the Virtual I/O Server/IVM alpha partition as padmin.
4. Type `ls /tmp/fwupdate` to identify the name of the firmware.

    The result of the command lists any firmware updates that you downloaded to the directory, such as the following update, for example:

    `01EA3xx_yyy_zzz`

5. Install the firmware update with one of the following methods:
   - Install the firmware with the in-band diagnostics of your AIX system, as described in Using the AIX diagnostics to install the server firmware update through AIX.
   - Install the firmware with the **update_flash** command on AIX:
     ```
     cd /tmp/fwupdate
     /usr/lpp/diagnostics/bin/update_flash -f 01EA3xx_yyy_zzz
     ```
   - Install the firmware with the **update_flash** command on Linux:
     ```
     cd /tmp/fwupdate
     /usr/sbin/update_flash -f 01EA3xx_yyy_zzz
     ```
   - Install the firmware with the **ldfware** command on Virtual I/O Server:
     ```
     cd /tmp/fwupdate
     ldfware -file 01EA3xx_yyy_zzz
     ```

   Reference codes CA2799FD and CA2799FF are displayed alternately on the control panel during the server firmware installation process. The system automatically powers off and on when the installation is complete.

6. Verify that the update installed correctly, as described in "Verifying the system firmware levels."

Starting the TEMP image

Start the TEMP image before you update the firmware.

Perform the following procedure to start the TEMP image.

1. Access the advanced management module.

   See the *BladeCenter Management Module Command-Line Interface Reference Guide* or the *BladeCenter Serial-Over-LAN Setup Guide* for more information.

2. Click **Blade Tasks** → **Configuration** → **Boot Mode**.
3. Click the applicable JS22 blade server in the list of blade servers in the BladeCenter unit.
4. Select **Temporary** to force the system to start from the TEMP image.
5. Restart the blade server.
6. Verify that the system starts from the TEMP image, as described in "Verifying the system firmware levels."

Verifying the system firmware levels

The diagnostics program displays the current system firmware levels for the TEMP and PERM images. This function also displays which image the blade server used to start up.

1. Start the diagnostics program.

   See the online information center or the *Problem Determination and Service Guide* for information about running the diagnostics program.

   The online BladeCenter information center is available in the at IBM Systems Information Center.

2. From the **Function Selection** menu, select **Task Selection** and press Enter.
3. From the **Tasks Selection List** menu, select **Update and Manage System Flash** and press **Enter**.

   The **Update and Manage System Flash** menu is displayed. The top of the window displays the system firmware level for the PERM and the TEMP images and the image that the blade server used to start.

   Note: If the TEMP image level is more current than the PERM image, commit the TEMP image.

   See the online information center or the *Problem Determination and Service Guide* for information about committing the TEMP system firmware image.
4. When you have verified the firmware levels, press F3 until the Diagnostic Operating Instructions window is displayed; then press F3 again to exit the diagnostic program.

Entering vital product data

The management card contains the vital product data (VPD) for the service processor.

IBM sets the correct VPD values for a new JS22 blade server. If you order a replacement management card, the replacement part is not configured. If you install the management card on the original system board and chassis assembly, the firmware recognizes the new management card during the initial program load (IPL) and uses cached values to initialize the management card correctly. After the management card is initialized, nothing can change its data values.

If you also replace the system board and chassis assembly, or if you somehow delete the cached data from NVRAM, the firmware cannot initialize the new management card. At that time, the firmware prompts you for values for the vital product data.

You cannot boot the blade server until you enter valid values for the data.

Important: The first time that you turn on the blade server after you replace the system board and chassis assembly and the management card, the firmware prompts you to enter the product type and model and other vital product data (VPD). If you enter the wrong values, you cannot correct them after the firmware initializes the management card. Wrong values can prevent the JS22 blade server from booting.

See Chapter 1, "Product overview," on page 1 for a description of the VPD information that you recorded during the installation of the JS22 blade server.

Perform the following procedure to enter VPD data into the management card.

1. Respond to the `Enter the Type Model Number (Must be 8 characters)` prompt by typing 7998-61X. Press Y to confirm the value.
2. Respond to the `Enter the Serial Number (Must be 7 characters)` prompt by typing the serial number that is displayed in the Advanced Management Module HW VPD panel. Press Y to confirm the value.
3. Respond to the `Enter System Unique ID (Must be 12 characters)` prompt by typing the system unique ID (SUID) that is displayed when you use the `lsvpd` command at an operating-system prompt. Press Y to confirm the value.
4. Respond to the `Enter WorldWide Port Number (Must be 12 characters)` prompt by typing the worldwide port number (WWPN) that is displayed when you use the `lsvpd` command at an operating-system prompt. Press Y to confirm the value.
5. Respond to the `Enter Brand (Must be 2 characters)` prompt by typing B0, which is B followed by a zero. Press Y to confirm the value.

   After you enter the VPD values, the blade server powers down the first partition and reboots the service processor.
6. Start the JS22 blade server to continue using the blade server with the new management card.

Using the SMS utility

Use the System Management Services (SMS) utility to perform a variety of configuration tasks on the JS22 blade server.

Starting the SMS utility

Start the SMS utility to configure the blade server.

1. Turn on or restart the blade server, and establish an SOL session with it.

   See the *BladeCenter Management Module Command-Line Interface Reference Guide* or the *BladeCenter Serial-Over-LAN Setup Guide* for more information.
2. When the POST menu and indicators are displayed, press the 1 key after the word `Keyboard` is displayed and before the word `Speaker` is displayed .
3. Follow the instructions on the screen.

SMS utility menu choices

Select SMS tasks from the SMS utility main menu. Choices on the SMS utility main menu depend on the version of the firmware in the blade server. Some menu choices might differ slightly from these descriptions.

- **Select Language**

  Select this choice to change the language that is used to display the SMS menus.
- **Setup Remote IPL (Initial Program Load)**

  Select this choice to enable and set up the remote startup capability of the blade server or partition.
- **Change SCSI Settings**

  Select this choice to view and change the addresses of the SCSI controllers that are attached to the blade server.
- **Select Console**

  Select this choice to select the console on which the SMS menus are displayed.
- **Select Boot Options**

  Select this choice to view and set various options regarding the installation devices and boot devices.

  Note: If a device that you are trying to select (such as a USB CD drive in the BladeCenter media tray) is not displayed in the **Select Device Type** menu, select **List all Devices** and select the device from that menu.

Creating a CE login

If the blade server is running an AIX operating system, you can create a customer engineer (CE) login to perform operating system commands that are required to service the system without being logged in as a root user.

The CE login must have a role of Run Diagnostics and be a primary group of System. This enables the CE login to perform the following tasks:
- Run the diagnostics, including the service aids, certify, and format.
- Run all the operating-system commands that are run by system group users.
- Configure and unconfigure devices that are not in use.

In addition, this login can have Shutdown Group enabled to allow use of the Update System Microcode service aid and the shutdown and reboot operations.

The recommended CE login user name is qserv.

Configuring the Gigabit Ethernet controllers

Two Ethernet controllers are integrated on the blade server system board. You must install a device driver to enable the blade server operating system to address the Ethernet controllers.

Each controller provides a 1000 Mbps full-duplex interface for connecting to one of the Ethernet-compatible I/O modules in I/O-module bays 1 and 2, which enables simultaneous transmission and reception of data on the Ethernet local area network (LAN).

The routing from an Ethernet controller to an I/O-module bay varies according to the blade server type, the BladeCenter unit, and the operating system that is installed. For example, each Ethernet controller on the JS22 system board is routed to a different I/O module in I/O module bay 1 or module bay 2 of the BladeCenter H or HT.

See "Blade server Ethernet controller enumeration" on page 44 for information about how to determine the routing from an Ethernet controller to an I/O-module bay for the blade server.

Note: Other types of blade servers, such as the BladeCenter HS20 Type 8678 blade server, in the same BladeCenter unit as the JS22 Type 7998 blade server might have different Ethernet controller routing. See the documentation for a blade server for information.

You do not have to configure controllers for the blade server operating system. However, you must install a device driver for the blade server operating system to address the Ethernet controllers. For device drivers and information about configuring Ethernet controllers, see the *Broadcom NetXtreme Gigabit Ethernet Software* CD that comes with the blade server. For updated information about configuring the controllers, see http://www.ibm.com/systems/support/.

The Ethernet controllers in your blade server support failover, which provides automatic redundancy for the Ethernet controllers. Failover capabilities vary per BladeCenter unit.

Without failover, only one Ethernet controller can be connected from each server to each virtual LAN or subnet. With failover, you can configure more than one Ethernet controller from each server to attach to the same virtual LAN or subnet. Either one of the integrated Ethernet controllers can be configured as the primary Ethernet controller. If you have configured the controllers for failover and the primary link fails, the secondary controller takes over. When the primary link is restored, the Ethernet traffic switches back to the primary Ethernet controller. See the operating-system device-driver documentation for information about configuring for failover.

Important: To support failover on the blade server Ethernet controllers, the Ethernet switch modules in the BladeCenter unit must have identical configurations.

Blade server Ethernet controller enumeration

The enumeration of the Ethernet controllers in a blade server is operating-system dependent. You can verify the Ethernet controller designations that a blade server uses through the operating-system settings.

The routing of an Ethernet controller to a particular I/O-module bay depends on the type of blade server. You can verify which Ethernet controller is routed to which I/O-module bay by using the following test:

1. Install only one Ethernet switch module or pass-thru module in I/O-module bay 1.
2. Make sure that the ports on the switch module or pass-thru module are enabled. Click **I/O Module Tasks** → **Admin/Power/Restart** in the management-module Web interface.
3. Enable only one of the Ethernet controllers on the blade server. Note the designation that the blade server operating system has for the controller.
4. Ping an external computer on the network that is connected to the switch module or pass-thru module. If you can ping the external computer, the Ethernet controller that you enabled is associated with the switch module or pass-thru module in I/O-module bay 1. The other Ethernet controller in the blade server is associated with the switch module or pass-thru module in I/O-module bay 2.

If you have installed an I/O expansion card in the blade server, communication from the expansion card should be routed to I/O-module bays 3 and 4, if these bays are supported by your BladeCenter unit. You can verify which controller on the card is routed to which I/O-module bay by performing the same test and using a controller on the expansion card and a compatible switch module or pass-thru module in I/O-module bay 3 or 4.

MAC addresses for host Ethernet adapters

Two integrated Ethernet controllers in the JS22 blade server each provide a Host Ethernet Adapter (HEA) that, in turn, provides virtual *logical host Ethernet adapters* (LHEAs) to client logical partitions (LPARs). The Virtual I/O Server software uses LHEAs as if they were real physical adapters.

The logical HEAs in the JS22 blade server bypass the need for further bridging from Virtual I/O Server, because the LHEAs connect directly to the integrated Ethernet controllers in the blade server, and from there to the I/O modules in the BladeCenter unit.

The JS22 blade server uses two physical HEA ports and 14 logical HEA ports to share the two integrated physical Ethernet adapters on the blade server. The 14 logical HEA medium access control (MAC) addresses are in the same range as the two integrated Ethernet controllers (eth0 and eth1) and the two associated physical HEA ports on the blade server.

The MAC addresses of the two physical HEAs are displayed in the advanced management module. The MAC address of the first integrated Ethernet controller (eth0) is listed on a label on the blade server. The label also lists the last MAC address. Table 3 on page 45 shows the relative addressing scheme.

Table 3. MAC addressing scheme for physical and logical host Ethernet adapters

Node	Name in management module	Relation to the MAC that is listed on the JS22 label	Example
Integrated Ethernet controller eth0		Same as first MAC address	00:1A:64:44:0e:c4
Integrated Ethernet controller eth1		MAC + 1	00:1A:64:44:0e:c5
HEA port 0	MAC address 1	MAC + 2	00:1A:64:44:0e:c6
HEA port 1	MAC address 2	MAC + 3	00:1A:64:44:0e:c7
Logical HEA ports		MAC +4 to MAC +16	00:1A:64:44:0ec8 to 00:1A:64:44:0ed5
Logical HEA port		MAC +17 Same as last MAC address on the label	00:1A:64:44:0ec8 to 00:1A:64:44:0ed5

For more information about planning, deploying, and managing the use of host Ethernet adapters, see the Configuring section of the PowerVM Information Roadmap.

Updating IBM Director

If you plan to use IBM Director to manage the blade server, you must check for the latest applicable IBM Director updates and interim fixes.

To install the IBM Director updates and any other applicable updates and interim fixes, complete the following steps.

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

1. Check for the latest version of IBM Director:
    a. Go to the IBM Director download site at http://www.ibm.com/systems/management/director/downloads.html.
    b. If the drop-down list shows a newer version of IBM Director than the version that comes with the blade server, follow the instructions on the Web page to download the latest version.
2. Install IBM Director.
3. Download and install any applicable updates or interim fixes for the blade server:
    a. Go to the IBM Support site at http://www.ibm.com/systems/support/.
    b. Under **Product support**, click **BladeCenter**.
    c. Under **Popular links**, click **Software and device drivers**.
    d. Click **BladeCenter JS22** to display the list of downloadable files for the blade server.

Chapter 5. Installing the operating system

Before you install the operating system on the blade server, verify that the blade server is installed in the BladeCenter unit, the management-module firmware is at the latest available level, and the blade server is turned on.

If you are not using an unattended network-installation method to install your operating system, you must first provide a Serial over LAN (SOL) connection to the blade server to install your operating system. If you have not already done so, configure the SOL feature on the blade server to establish an SOL connection, enable the SOL feature, and start an SOL session. For instructions, see the *IBM BladeCenter Serial over LAN Setup Guide* and the *BladeCenter Management Module Command-Line Interface Reference Guide*. For information about SOL commands, see the documentation for your operating system.

Important:

- If you plan to install the operating system through the Ethernet network, you must install and configure a second Ethernet switch module into the applicable I/O-module bay of the BladeCenter unit. For additional information, see:
  - "Configuring the Gigabit Ethernet controllers" on page 42
  - "Blade server Ethernet controller enumeration" on page 44
  - The documentation that comes with the Ethernet switch module that you are using
- After you install the operating system on the blade server, you must install any service packs or update packages that come with the operating system. For additional information, see the instructions that come with your operating-system documentation and the service packs or update packages.
- The blade server has no external USB ports, but communicates with and uses the removable-media drives and USB ports that are in the media tray of the BladeCenter unit.
- The operating system in the blade server must provide USB support for the blade server to recognize and use the removable-media drives in the BladeCenter unit. The BladeCenter unit uses USB for internal communication with these devices.
- For the BladeCenter JS22 Type 7998 blade server, if you plan to install an Ethernet expansion card, first install the operating system to enable the onboard ports to be recognized and configured before the ports on the expansion card. If you install the Ethernet expansion card *before* you install the operating system, the expansion card ports will be assigned before the onboard ports.

See the ServerProven Web site for information about supported operating-system versions and all JS22 blade server optional devices.

Locating the installation instructions

You can order the JS22 blade server with either Virtual I/O Server or AIX already installed. If you did not, you can install AIX, Linux, or Virtual I/O Server as a native operating system. After installing Virtual I/O Server, you can install AIX, Linux, or IBM i operating system (formerly known as i5/OS) as a client operating system in a logical partition (LPAR).

After you configure the blade server hardware, go to the operating-system documentation for the latest operating-system installation instructions. See the following operating system descriptions for more information:

- **Installing Virtual I/O Server**

  See the Installing section of the *PowerVM Information Roadmap*.

  If you did not order the JS22 blade server with the Virtual I/O Server software installed, you can use the *Virtual I/O Server* DVD in the product package to install Virtual I/O Server and set up a virtual environment that supports client operating systems in logical partitions. You can then install any of the supported operating systems as a client in an LPAR.

  The order of installation of Virtual I/O Server and the operating systems is important. You can update the firmware first with the stand-alone *Diagnostics* CD, but you must install the Virtual I/O Server software before you install any other software. The Virtual I/O Server software creates the *Integrated Virtual Manager* administrator console and the first logical partition, which Virtual I/O Server and Integrated Virtual Manager occupy.

  After you install Virtual I/O Server, you can use Integrated Virtual Manager and Micro-Partitioning™ to create client partitions for client operating systems.

- **Installing Linux**

  You can install a Linux operating system by following the installation instructions in the IBM Systems Information Center.

  The online Linux installation instructions are available in the *Linux on BladeCenter JS12 and JS22* topic in the IBM Systems Information Center.

- **Installing IBM i**

  You can install the IBM i operating system in a client partition of the Virtual I/O Server.

  Also see the IBM System i Information Roadmap.

- **Installing AIX**

  You can install the AIX operating system by following the installation instructions in the IBM Systems Information Center.

  See the online AIX Installation and migration topic for more information. You can find more information about AIX in the IBM System p Information Roadmap on the IBM Web site.

  Note: After you install AIX from CD or DVD, using the keyboard and video interface, run the **change console** command and restart the blade server to switch the AIX console to an SOL connection. (The command does not affect the console that is used by partition firmware.) You can use the following commands:

  ```
  chcons /dev/vty0
  shutdown -Fr
  ```

  Notes:

1. Some optional devices have device drivers that you must install. See the documentation that comes with the devices for information about installing any required device drivers.

   If your operating system does not have the required device drivers, contact your IBM marketing representative or authorized reseller, or see your operating-system documentation for additional information.

2. The IBM Remote Deployment Manager (RDM) program does not support the BladeCenter JS22 Type 7998 blade server. However, you can use the following programs for remote deployment:

   - For AIX, Red Hat Linux, or SUSE Linux operating-system deployments, you can use Cluster Systems Management (CSM) from IBM. Go to http://www.ibm.com/servers/eserver/clusters/software/.

   - For AIX operating-system deployments, you can use Network Installation Manager (NIM) from IBM. See your AIX operating-system documentation for additional information.

   - For SUSE Linux operating-system deployments, you can use the AutoYast utility program from Novell, Inc. Go to http://www.suse.de/~nashif/autoinstall/.

After you install the operating system, install operating system updates; then, install any utilities that apply to your operating system.

Installing service and productivity tools for Linux on POWER

Linux on POWER service and productivity tools include hardware diagnostic aids and productivity tools, and installation aids. The installation aids are provided in the IBM Installation Toolkit for Linux on POWER, a set of tools that aids the installation of Linux on IBM servers with POWER architecture. You can also use the tools to update the JS22 blade server firmware.

The hardware diagnostic aids and productivity tools are available as downloadable Red Hat Package Manager (RPM) files for Red Hat Enterprise Linux (RHEL) and SUSE Linux Enterprise Server (SLES). The IBM Installation Toolkit for Linux on POWER is available as an ISO compact disc (CD) image, which you can use to create your own CD. The Service and productivity tools for Linux on POWER systems site describes how to create a CD.

The hardware diagnostic aids and productivity tools are required for such hardware reliability, availability, and serviceability (RAS) functions as first-failure data-capture and error-log analysis. With the tools installed, problem determination and correction are greatly enhanced and the likelihood of an extended system outage is reduced.

For example, the **update_flash** command for installing system firmware updates can be performed only if the hardware diagnostic aids and productivity tools are installed.

Other tools modify various serviceability policies, manipulate system LEDs, update the bootlist, and capture extended error data to aid analysis of intermittent errors.

Other commands and a boot-time scanning script constitute a hardware inventory system. The **lsvpd** command provides vital product data (VPD) about hardware components.

The Error Log Analysis (ELA) tool provides automatic analysis and notification of errors that are reported by the platform firmware. ELA writes analyzed error data to /var/log/platform and to the servicelog. If a corrective action is required, a notification event sends the event to registered tools and subscribed users.

Install the LINUX operating system before you download and install the hardware diagnostic aids and productivity tools for Linux on POWER. The Installation Toolkit for Linux on Power is provided as-is only. You are not entitled to IBM Software Support for the Installation Toolkit.

Install the Virtual I/O Server and the Integrated Virtualization Manager (IVM) before you install your Linux operating system if you plan to have a virtual environment.

Chapter 6. Solving problems

Use the diagnostic tools that are available to help you solve some common problems that might occur while you are setting up the blade server.

If you install the blade server in the BladeCenter unit and the blade server does not start, perform the following actions:

- Make sure that the BladeCenter unit is correctly connected to a power source.
- Reseat the blade server in the BladeCenter unit, as described in "Installing the blade server in a BladeCenter unit" on page 34.
- If the power-on LED is flashing slowly, turn on the blade server, as described in "Turning on the blade server" on page 16.
- If you have just added a new optional device or component, make sure that it is correctly installed and compatible with the blade server and its components. If the device or component is not compatible, remove it from the blade server, reinstall the blade server in the BladeCenter unit, and then restart the blade server.

If the blade server does not start after you have performed the preceding actions, see the online information or the *Problem Determination and Service Guide* on the IBM *BladeCenter Documentation* CD.

If you cannot see the AIX console after you install AIX locally by using the keyboard/video select button and local media, run the **change console** command and restart the blade server to switch the AIX console to a SOL connection:

```
chcons /dev/vty0
shutdown -Fr
```

The commands do not affect the console that is used by partition firmware.

The following tools are available to help you diagnose and solve hardware-related problems:

- **Power-on self-test (POST) firmware checkpoints and error codes**

  The firmware checkpoints are progress codes that your blade server writes to the management-module event log during POST.

  See the online information or the *Problem Determination and Service Guide* for more information.

- **Firmware error codes and location codes**

  For detailed descriptions of the firmware error codes, see the online information or the *Problem Determination and Service Guide*.

  Some firmware error codes also include location codes. The location code information is required to identify the failing component. Check the event log in the management module to determine the location code information that corresponds to the firmware error code.

  For additional information about location codes, see the online information or the *Problem Determination and Service Guide*.

- **Troubleshooting tables**

  Use the troubleshooting tables to find solutions to problems that have identifiable symptoms.

See the online information or the *Problem Determination and Service Guide* for your blade server.

- **Diagnostic utilities for the Linux operating system**

  Diagnostic utilities for the Linux operating system are available from IBM. To obtain these utilities and information about them, complete the following steps:

  1. Go to http://www.ibm.com/systems/bladecenter/.
  2. Under **Product support**, click **BladeCenter**.
  3. From the **Product family** menu, select **BladeCenter JS22**.
  4. From the **Operating system** menu, select your Linux operating system, and then click **Go** to display the available downloads.

- **Diagnostic utilities for the AIX operating system**

  An AIX operating-system diagnostic CD, also known as the stand-alone *Diagnostics* CD, is available from IBM. You can start the CD from a CD drive or from NIM. To download the CD image, go to http://www14.software.ibm.com/webapp/set2/sas/f/diags/home.html.

  See the *Problem Determination and Service Guide* for instructions for using the diagnostic utilities.

- **Diagnostic utilities for other operating systems**

  Other supported operating systems might have diagnostic tools that are available through the operating system. See your operating-system documentation for more information.

- **Light path diagnostics**

  Use light path diagnostics LEDs on the system board to identify system errors. If the system-error LED on the system LED panel on the front or rear of the BladeCenter unit is lit, one or more error LEDs on the BladeCenter unit components also might be lit. These LEDs help identify the cause of the problem.

Notes:
- View the system event log in the BladeCenter management module.
- Before you have the blade server serviced, verify that you provide a Serial over LAN (SOL) connection to the blade server. To do this, you must configure the SOL feature on the blade server and start an SOL session as described in the *IBM BladeCenter Serial over LAN Setup Guide*.
- You can also configure the service processor IP address by using the management module, and set up a SOL connection to the service processor.

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you.

This information describes where to go for additional information about IBM and IBM products, what to do if you experience a problem with your BladeCenter product or optional device, and whom to call for service, if it is necessary.

Call Home support

You can also install the Electronic Service Agent™ (ESA) to report runtime hardware and firmware problems directly to IBM over an Internet connection.

ESA supports call forwarding to an instance of ESA on another server, so that you can configure a call home focal point for larger implementations. Call forwarding is supported on AIX or Linux systems. IBM provides the ESA client program for downloading from the Internet. An installation wizard collects the necessary contact information.

You can use call home support for sending or receiving the following types of information:
- Problem data to IBM support
- Extended error data to IBM support
- Dumps to IBM support
- RETAIN® PMH close of call information to IBM support
- Engineering requested data to IBM support
- Health check information to IBM support
- VPD for configuration changes to the JS22 blade
- Firmware code fixes to the JS22 blade

In addition to calling IBM support when the system detects a serviceable event, Call Home can also notify you of the event. Remote customer notification methods include:
- E-mail
- Pager
- Cell phone

The ESA client code notifies the customer contact list based on methods that you select when you install the client. Information included with a call includes:
- Problem description
- System impact (recoverable, fatal, loss of redundancy, or other impacts)
- Corrective recovery action

ESA reports serviceable events to second level IBM support by automatically opening a PMH in RETAIN.

Before you call

Try to solve the problem yourself 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 online information and the *Problem Determination and Service Guide* on the IBM *Documentation* CD that comes with your system.
- Go to www.ibm.com/systems/support/ and click **BladeCenter** to check for information to help you solve the problem.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the documentation that is provided with your IBM product. The documentation that comes with BladeCenter systems also describes the diagnostic tests that you can perform.

Most BladeCenter 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 software.

Using the documentation

Information about your IBM BladeCenter 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.

See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to www.ibm.com/jct01004c/systems/support/supportsite.wss/brandmain?brandind=5000020 and follow the instructions. Also, some documents are available through the IBM Publications Center at www.elink.ibmlink.ibm.com/publications/servlet/pbi.wss.

Getting help and information from the Web

Information about your IBM BladeCenter system is available on the Web.

The IBM Web site has up-to-date information about IBM BladeCenter systems, optional devices, services, and support at www.ibm.com/systems/support/.

Calling IBM for service

Call IBM for service after you collect as much as possible of the following information.

Before calling for service, collect as much as possible of the following available information:

- Machine type and model
- Hard disk drive upgrades
- Failure symptoms:
  - Does the blade server fail the diagnostic programs? If so, what are the error codes?
  - What occurs? When? Where?
  - Is the failure repeatable?
  - Has the current server configuration ever worked?
  - What changes, if any, were made before it failed?
  - Is this the original reported failure, or has this failure been reported before?
- Diagnostic program type and version level
- Hardware configuration (print screen of the system summary)
- Firmware level
- Operating-system type and version level

You can solve some problems by comparing the configuration and software setups between working and nonworking blade server. When you compare blade servers to each other for diagnostic purposes, consider them identical only if all the following factors are exactly the same in all of the blade servers:

- Machine type and model
- Firmware level
- Adapters and attachments, in the same locations
- Address cabling
- Software versions and levels
- Diagnostic program type and version level
- Configuration option settings
- Operating-system control-file setup

See Appendix A, "Getting help and technical assistance," on page 53 for information about how to call IBM for service.

Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with BladeCenter products.

For information about which products are supported by Support Line in your country or region, see www.ibm.com/services/sl/products/.

For more information about Support Line and other IBM services, see www.ibm.com/services/, or see www.ibm.com/planetwide/ for support telephone numbers. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

Hardware service and support

You can receive hardware service through IBM Services or through your IBM reseller, if your reseller is authorized by IBM to provide warranty service.

See www.ibm.com/planetwide/ for support telephone numbers, or in the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

In the U.S. and Canada, hardware service and support is available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9 a.m. to 6 p.m.

IBM Taiwan product service

You can contact IBM Taiwan if you are in Taiwan.

台灣 IBM 產品服務聯絡方式：
台灣國際商業機器股份有限公司
台北市松仁路 7 號 3 樓
電話：0800-016-888

IBM Taiwan product service contact information:
  IBM Taiwan Corporation
  3F, No 7, Song Ren Rd.
  Taipei, Taiwan
  Telephone: 0800-016-888

Appendix B. Notices

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Active PCI-X	Open Power	TechConnect
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Alert on LAN	POWER5	Tivoli Enterprise
BladeCenter	POWER6	Update Connector
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Important notes

View important assumptions about terminology and claims.

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 IBM.

Maximum memory might require replacement of the standard memory with an optional memory module.

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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.

IBM encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed. IBM offers a variety of product return programs and services in several countries to assist equipment owners in recycling their IT products. Information on IBM product recycling offerings can be found on IBM's Internet site at http://www.ibm.com/ibm/environment/products/prp.shtml.

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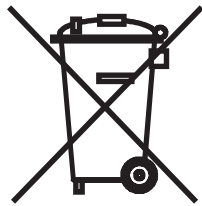
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This appliance is labeled in accordance with European Directive 2002/96/EC concerning waste electrical and electronic equipment (WEEE). The Directive determines the framework for the return and recycling of used appliances as applicable throughout 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。

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Battery return program

This product might contain a sealed lead acid, nickel cadmium, nickel metal hydride, 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 of batteries outside the United States, go to http://www.ibm.com/ibm/environment/products/index.shtml or contact your local waste disposal facility.

In the United States, IBM has established a return process for reuse, recycling, or proper disposal of used IBM sealed lead acid, nickel cadmium, nickel metal hydride, and battery packs from IBM equipment. For information on proper disposal of these batteries, contact IBM at 1-800-426-4333. Have the IBM part number listed on the battery available prior to your call.

For Taiwan: Please recycle batteries.

For the European Union:
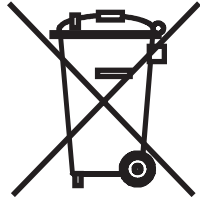
Notice: This mark applies only to countries within the European Union (EU).

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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 vigueur 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.

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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.

Electronic emission notices

This section of the documentation includes electronic emission notices for various countries.

Federal Communications Commission (FCC) statement

The JS22 blade server complies to FCC rules.

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

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. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a nonrecommended modification of the product, including the fitting of non-IBM 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.

European Community contact:
- IBM Technical Regulations
- Pascalstr. 100, Stuttgart, Germany 70569
- Telephone: 0049 (0)711 785 1176
- Fax: 0049 (0)711 785 1283
- E-mail: tjahn@de.ibm.com

Taiwanese Class A warning statement

This is the Taiwanese 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。

Chinese Class A warning statement

View the Chinese 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。

Japanese Voluntary Control Council for Interference (VCCI) statement

View the Japanese VCCI statement.

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Part Number: 44W2358

Printed in USA