lenovo

ThinkCentre
User Guide

ThinkThinkThink**ThinkCentre**Think

Machine Types: 3656, 7061, 7090, 9353, 9421, 9485, 9623, 9625, 9705, 9795, 9935, 9946, and 9953

ThinkCentre
User Guide

> **Note**
>
> Before using this information and the product it supports, be sure to read and understand the *ThinkCentre Safety and Warranty Guide* and "Notices," on page 77.

Contents

Important safety information

CAUTION:
Before using this manual, be sure to read and understand all the related safety information for this product. Refer to the *ThinkCentre Safety and Warranty Guide* **that you received with this product for the latest safety information. Reading and understanding this safety information reduces the risk of personal injury and or damage to your product.**

If you no longer have a copy of the *ThinkCentre Safety and Warranty Guide*, you can obtain a Portable Document Format (PDF) version from the Lenovo® Support Web site at:
http://www.lenovo.com/support

Chapter 1. Product overview

This chapter provides an introduction to the features and options that are available for your computer. You can expand the capabilities of your computer by adding memory modules, drives, or PCI cards. When installing or replacing an option, use these instructions along with the instructions that come with the option.

Important: Before you install or replace any option, be sure to read and understand the "Important safety information" first. These precautions and guidelines will help you work safely.

Note: Use only computer parts provided by Lenovo.

Features

This section provides an overview of the computer features and preinstalled software.

> **System information**
>
> The following information covers a variety of models. For information about your specific model, use the Setup Utility. See Chapter 4, "Using the Setup Utility," on page 59.

Microprocessor
- AMD Athlon™ microprocessor
- AMD Phenom™ microprocessor
- AMD Sempron™ microprocessor
- Internal cache (size varies by model type)

Memory
- Supports up to four DDR2 DIMMs
  (double data rate 2 dual inline memory modules)
- Flash memory for system programs (varies by model type)

Internal drives
- Diskette drive or card reader (varies by model type)
- Serial Advanced Technology Attachment (SATA) internal hard disk drive
- Optical drive (some models)

Video subsystem
- Integrated graphics controller for a VGA (Video Graphics Array) connector and a Digital Visual Interface (DVI) connector (dual display supported)
- PCI Express x16 graphics card slot on the system board

Audio subsystem
- High Definition (HD) with Realtek ALC662
- Microphone connector and headphone connector on the front panel

- Audio line-in connector, audio line-out connector, and microphone connector on the rear panel
- Mono internal speaker

Connectivity
- 10/100/1000 Mbps integrated Ethernet controller
- Peripheral Component Interconnect (PCI) V.90 Data/Fax modem (some models)

System management features
- Ability to store power-on self-test (POST) hardware test results
- ASF 2.0 (Alert Standard Format Specification)
- Automatic power-on startup
- Preboot Execution Environment (PXE) and Dynamic Host Configuration Protocol (DHCP)
- Remote Administration
- System Management (SM) BIOS and SM software
- Wake on LAN
- Wake on Ring (in the Setup Utility program, this feature is called Serial Port Ring Detect for an external modem)

Input/Output (I/O) features
- 25-pin Extended Capabilities Port (ECP)/Extended Parallel Port (EPP)
- 9-pin serial port (some models)
- DVI monitor connector
- Eight USB (Universal Serial Bus) connectors (two on the front panel and six on the rear panel)
- Ethernet connector
- One external Serial Advanced Technology Attachment (eSATA) connector through PCI bracket (some models)
- PS/2® keyboard connector
- PS/2 mouse connector
- Three audio connectors (audio line-in connector, audio line-out connector, and microphone connector) on the rear panel
- Two audio connectors (microphone connector and headphone connector) on the front panel
- VGA monitor connector

Expansion
- Three drive bays
- Two 32-bit PCI card slots
- One PCI Express x1 card slot
- One PCI Express x16 graphics card slot

Power
- 280-watt auto-sensing power supply (some models)
- Automatic 50/60 Hz input frequency switching
- Advanced Configuration and Power Interface (ACPI) support

Security features
- Cover presence switch (also called intrusion switch) (some models)
- Diskette and hard disk drive I/O control
- Keyboard with fingerprint reader (some models)
- Startup sequence control
- Startup without diskette drive, keyboard, or mouse
- Serial port and parallel port I/O control
- Support for the addition of an integrated cable lock (Kensington lock)
- User and administrator passwords for BIOS access
- Unattended start mode

Preinstalled software
Your computer might come with preinstalled software. If it does, an operating system, device drivers to support built-in features, and other support programs are included.

Operating system, preinstalled
- Microsoft® Windows® 7
- Microsoft Windows Vista®
- Microsoft Windows XP Professional
  (preinstalled through downgrade rights in Windows 7 Professional, Windows Vista Business, or Windows Vista Ultimate)

Operating system(s), certified or tested for compatibility[1] (varies by model type)
- Linux®

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1. The operating system(s) listed here are being certified or tested for compatibility at the time this publication goes to press. Additional operating systems might be identified by Lenovo as compatible with your computer following the publication of this manual. This list is subject to change. To determine if an operating system has been certified or tested for compatibility, check the Web site of the operating system vendor.

Specifications

This section lists the physical specifications for your computer.

Dimensions

Width: 175 mm (6.9 inches)

Height: 402 mm (15.8 inches)

Depth: 440 mm (17.3 inches)

Weight

Maximum configuration as shipped: 11 kg (24 lbs)

Environment

Air temperature:

Operating: 10° to 35°C (50° to 95°F)

Non-operating: -40° to 60°C (-40° to 140°F)

Humidity:

Operating: 10% to 80% (10% per hour, non condensing)

Non-operating: 10% to 90% (10% per hour, non condensing)

Maximum altitude:

Operating: -50 to 10 000 ft (-15.2 to 3 048 m)

Non-operating: -50 to 35 000 ft (-15.2 to 10 668 m)

Electrical input

Input voltage:

Low range:

Minimum: 100 V ac

Maximum: 127 V ac

Input frequency range: 50/60 Hz

Voltage-selection switch setting: 115 V ac

High range:

Minimum: 200 V ac

Maximum: 240 V ac

Input frequency range: 50/60 Hz

Voltage-selection switch setting: 230 V ac

Software overview

The computer comes with a preinstalled operating system and several preinstalled applications.

Software provided with your Windows operating system

This section describes the Windows applications provided with your computer.

Software provided by Lenovo

The following software applications are provided by Lenovo to help you improve productivity and reduce the cost associated with maintaining your computer. Software provided with your computer may vary depending on your model type.

Lenovo ThinkVantage Tools: The Lenovo ThinkVantage® Tools program guides you to a host of information sources and provides easy access to various tools to help you work more easily and securely. For more information, see "Lenovo ThinkVantage Tools" on page 73.

Note: The Lenovo ThinkVantage Tools program is only available on computers with the Windows 7 operating system from Lenovo.

ThinkVantage Productivity Center: The ThinkVantage Productivity Center program guides you to a host of information and tools to help you set up, understand, maintain, and enhance your computer.

Note: The ThinkVantage Productivity Center program is only available on computers preinstalled with the Windows Vista operating system or the Windows XP operating system from Lenovo.

Lenovo Welcome: The Lenovo Welcome program introduces you to some innovative built-in features of Lenovo and guides you through a few important setup tasks to help you make the most of your computer.

Note: The Lenovo Welcome program is only available on computers preinstalled with the Windows 7 operating system from Lenovo.

ThinkVantage Rescue and Recovery: The ThinkVantage Rescue and Recovery® (RnR) program is a one button recovery and restore solution that includes a set of self-recovery tools to help you diagnose computer problems, get help, and recover from system crashes quickly, even if the primary operating system could not start.

ThinkVantage Client Security Solution: The ThinkVantage Client Security Solution program is available on select Lenovo computers. It helps protect your information, including vital security information like passwords, encryption keys, and electronic credentials, while guarding against unauthorized user access to data.

Note: The ThinkVantage Client Security Solution program is only available on computers preinstalled with the Windows Vista operating system or the Windows XP operating system from Lenovo.

Password Manager: The Password Manager program helps you automatically capture and fill in authentication information for Windows applications and Web sites.

Note: The Password Manager program is only available on computers preinstalled with the Windows 7 operating system from Lenovo.

Power Manager: The Power Manager program provides convenient, flexible, and complete power management for your ThinkCentre® computer. By using the Power Manager program, you can adjust your power settings to achieve the best balance between system performance and power saving.

Factory Recovery: The Factory Recovery program enables you to restore the contents of the hard disk drive to the factory default settings.

ThinkVantage System Update: The ThinkVantage System Update (TVSU) program helps you keep the software on your computer up-to-date by downloading and installing software packages (ThinkVantage applications, device drivers, BIOS updates, and other third party applications). Some examples of software that you should keep updated are programs provided by Lenovo, such as the Rescue and Recovery program and the ThinkVantage Productivity Center program.

Fingerprint Software: The integrated fingerprint reader provided on some keyboards works with the Fingerprint Software program to enable you to enroll your fingerprint and associate it with your Windows password. As a result, fingerprint authentication can replace your password and enable simple and secure user access. A fingerprint reader keyboard is available with certain computers or can be purchased for computers that support this option.

Lenovo ThinkVantage Toolbox

The Lenovo ThinkVantage Toolbox program helps you maintain your computer, improve computing security, diagnose computer problems, get familiar with the innovative technologies provided by Lenovo, and get more information about your computer. See "Lenovo ThinkVantage Toolbox" on page 68 for detailed information.

Note: The Lenovo ThinkVantage Toolbox program is only available on computers preinstalled with the Windows 7 operating system from Lenovo.

Lenovo System Toolbox

The Lenovo System Toolbox program is preinstalled on your computer. This diagnostic program works through the Windows operating system to diagnose hardware problems and report operating-system-controlled settings that can cause hardware failures. See "Lenovo System Toolbox" on page 69 for more information.

Note: The Lenovo System Toolbox program is only available on computers preinstalled with the Windows Vista operating system or the Windows XP operating system from Lenovo.

PC-Doctor for Rescue and Recovery

The PC-Doctor for Rescue and Recovery diagnostic program is preinstalled on your ThinkCentre computer as part of the Rescue and Recovery workspace. It helps you diagnose hardware problems and report operating-system-controlled settings that can cause hardware failures. Use the PC-Doctor for Rescue and Recovery program if you are unable to start the Windows operating system. For more information, see "PC-Doctor for Rescue and Recovery" on page 69.

Adobe Reader

The Adobe Reader program is a tool used to view, print, and search PDF documents.

See "Online Books folder" on page 73 for more information about accessing the online books and the Lenovo Web site.

Antivirus software

Your computer comes with antivirus software that you can use to detect and eliminate viruses. Lenovo provides a full version of antivirus software on your computer with a free 30-day subscription. After 30 days, you must renew the license to continue receiving the antivirus software updates.

For more information about how to use your antivirus software, refer to the help system of your antivirus software.

Locations

This section provides information to help you locate your computer connectors, components, parts on the system board, and internal drives.

Locating connectors on the front of your computer

Figure 1 shows the location of the connectors on the front of your computer.
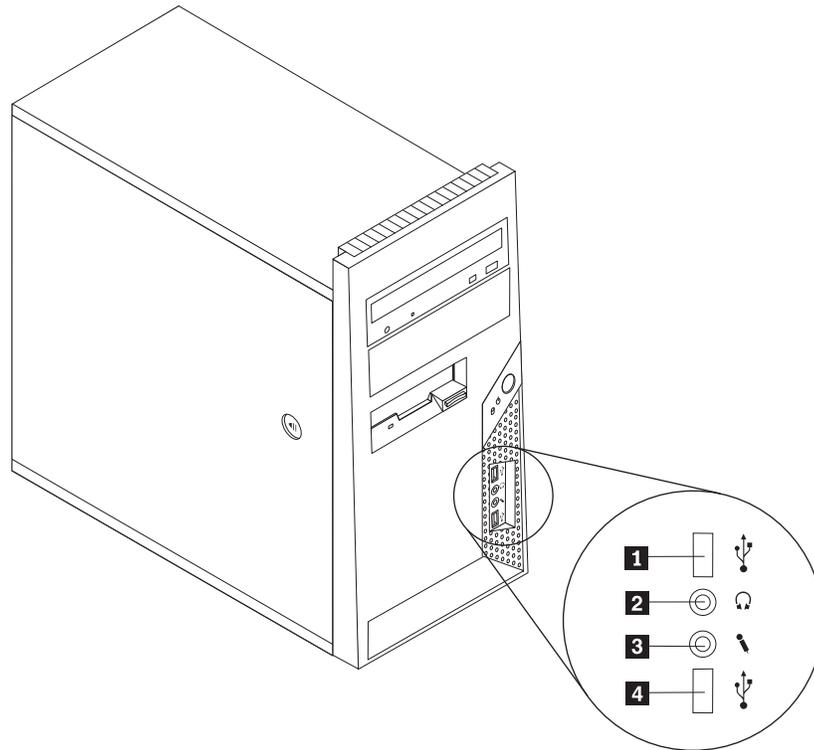
Figure 1. Front connector locations

1 USB connector		**3** Microphone connector	
2 Headphone connector		**4** USB connector	

Locating connectors on the rear of your computer

Figure 2 shows the location of the connectors on the rear of your computer. Some connectors on the rear of your computer are color-coded to help you determine where to connect the cables on your computer.
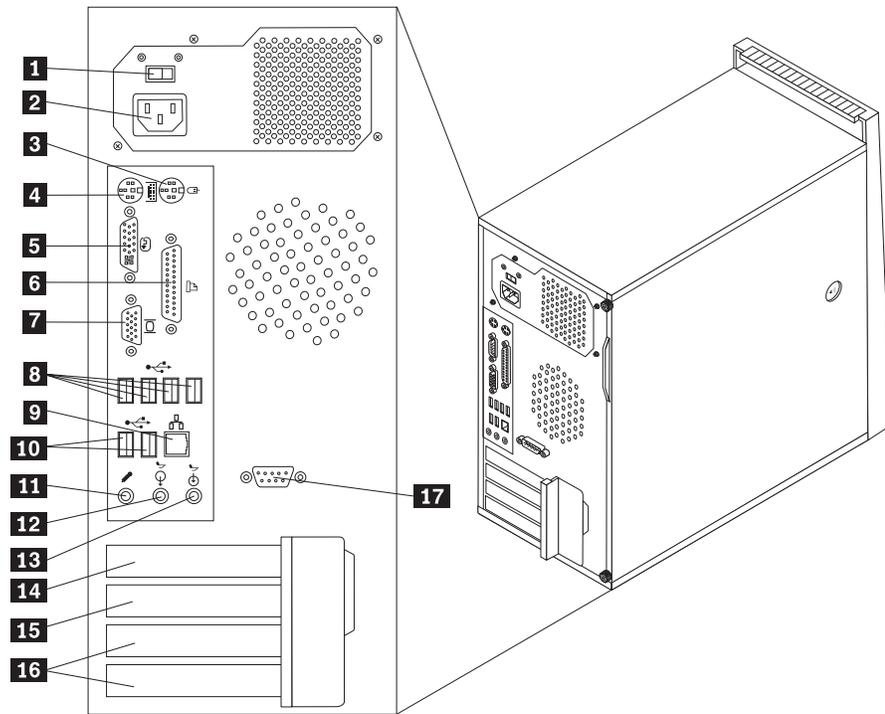
Figure 2. Rear connector locations

1	Voltage selection switch (some models)	**10**	USB connectors (2)
2	Power cord connector	**11**	Microphone connector
3	PS/2 mouse connector	**12**	Audio line-out connector
4	PS/2 keyboard connector	**13**	Audio line-in connector
5	DVI monitor connector	**14**	PCI Express x1 card slot
6	Parallel port	**15**	PCI Express x16 graphics card slot
7	VGA monitor connector	**16**	PCI card slots (2)
8	USB connectors (4)	**17**	Serial port (some models)
9	Ethernet connector		

Connector	Description
Audio line-in connector	Used to receive audio signals from an external audio device, such as a stereo system. When you attach an external audio device, a cable is connected between the audio line-out connector of the device and the audio line-in connector of the computer.
Audio line-out connector	Used to send audio signals from the computer to external devices, such as powered stereo speakers (speakers with built-in amplifiers), headphones, multimedia keyboards, or the audio line-in connector on a stereo system or other external recording devices.
DVI monitor connector	Used to attach a DVI monitor or other devices that use a DVI monitor connector.
Ethernet connector	Used to attach an Ethernet cable for a local area network (LAN). **Note:** To operate the computer within FCC Class B limits, use a Category 5 Ethernet cable.
Microphone connector	Used to attach a microphone to your computer when you want to record sound or if you use speech-recognition software. This connector might be located on the front of the computer.
Parallel port	Used to attach a parallel printer, a parallel scanner, or other devices that use a 25-pin parallel port.
Serial port	Used to attach an external modem, a serial printer, or other devices that use a 9-pin serial port.
PS/2 keyboard connector	Used to attach a keyboard that uses a PS/2 keyboard connector.
PS/2 mouse connector	Used to attach a mouse, trackball, or other pointing devices that use a PS/2 mouse connector.
USB connector	Used to attach a device that requires a Universal Serial Bus (USB) connector, such as a USB keyboard, a USB mouse, a USB scanner, or a USB printer. If you have more than eight USB devices, you can purchase a USB hub, which you can use to connect additional USB devices.
VGA monitor connector	Used to attach a VGA monitor or other devices that use a VGA monitor connector.

Locating components

To remove the computer cover, see "Removing the computer cover" on page 16.

Figure 3 shows the location of the various components in your computer.
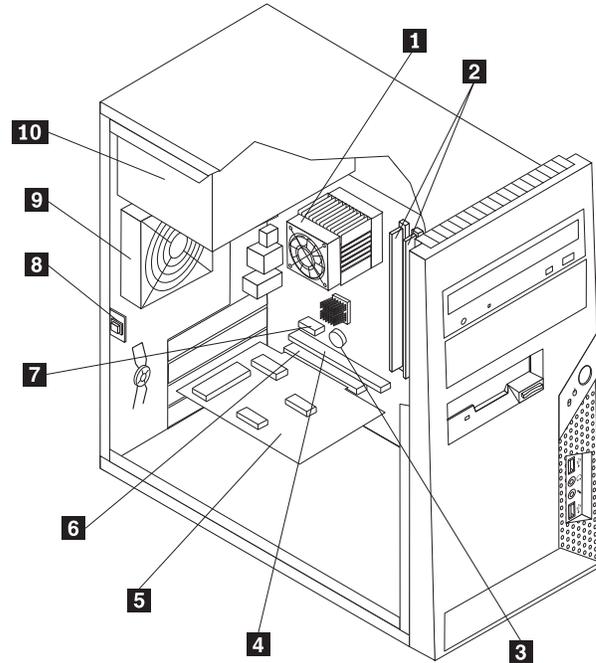
Figure 3. Component locations

1 Heat sink and fan assembly	**6** PCI card slot
2 Memory modules	**7** PCI Express x1 card slot
3 Battery	**8** Cover presence (Intrusion) switch
4 PCI Express x16 graphics card slot	**9** Rear fan assembly
5 PCI card (installed in some models)	**10** Power supply assembly

Locating parts on the system board

Figure 4 shows the location of the parts on the system board.
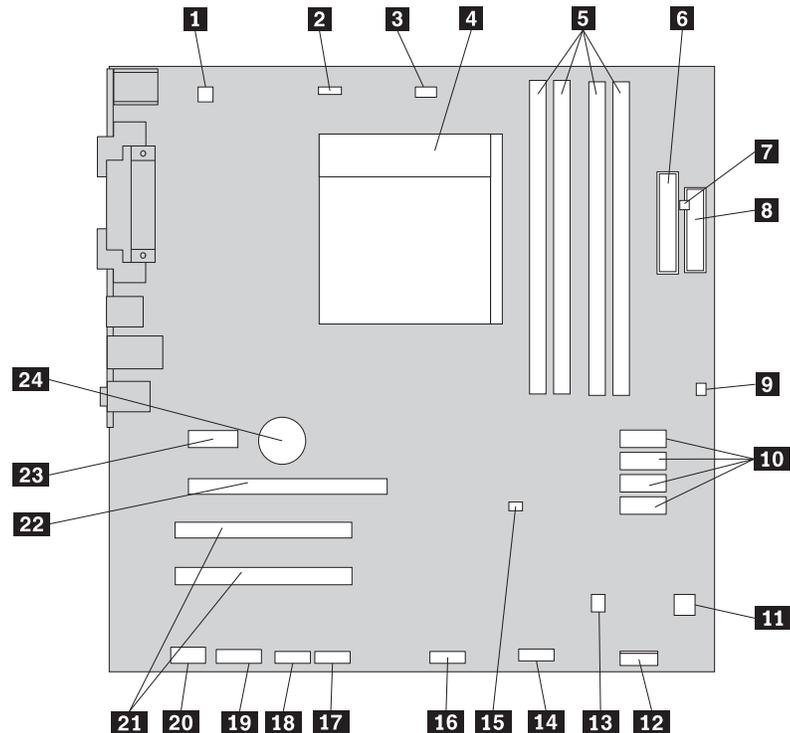
Figure 4. System board parts locations

1	4-pin power connector	**13**	Internal speaker connector
2	System fan connector	**14**	Front USB connector 2
3	Microprocessor fan connector	**15**	Clear CMOS (Complementary Metal-Oxide Semiconductor)/Recovery jumper
4	Microprocessor and heat sink	**16**	Front USB connector 1
5	Memory slots (4)	**17**	Serial (COM2) connector
6	24-pin power connector	**18**	Serial (COMl) connector
7	Thermal sensor connector	**19**	CD-IN connector
8	Diskette drive connector	**20**	Front audio connector
9	Cover presence (Intrusion) switch connector	**21**	PCI card slots (2)
10	SATA connectors (4)	**22**	PCI Express x16 graphics card slot
11	Power fan connector	**23**	PCI Express x1 card slot
12	Front panel connector	**24**	Battery

Locating internal drives

Internal drives are devices that your computer uses to read and store data. You can add drives to your computer to increase storage capacity and enable your computer to read other types of media. Internal drives are installed in bays. In this manual, the bays are referred to as bay 1, bay 2, and so on.

When installing or replacing an internal drive, it is important to note the type and size of the drive that you can install or replace in each bay and correctly connect

the cables to the drive installed. Refer to the appropriate section in Chapter 2, "Installing or replacing hardware," on page 15 for instructions on how to install or replace internal drives for your computer.

Figure 5 shows the locations of the drive bays.

Figure 5. Drive bay locations

1 Bay 1 - Optical drive bay (with an optical drive installed)
2 Bay 2 - Optical drive bay
3 Bay 3 - Diskette drive or card reader (available in some models)
4 Bay 4 - Primary SATA hard disk drive bay (with a 3.5-inch SATA hard disk drive installed)
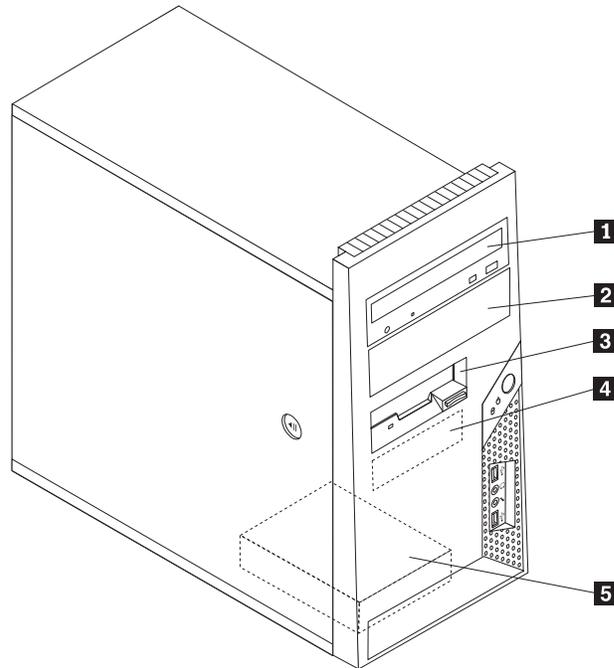**5** Bay 5 - Secondary SATA hard disk drive bay (with a 3.5-inch SATA hard disk drive installed in some models)

Chapter 2. Installing or replacing hardware

This chapter provides instructions on how to install or replace hardware for your computer.

Handling static-sensitive devices

Do not open the static-protective package containing the new part until the defective part has been removed from the computer and you are ready to install the new part. Static electricity, although harmless to you, can seriously damage computer components and parts.

When you handle parts and other computer components, take these precautions to avoid static-electricity damage:

- Limit your movement. Movement can cause static electricity to build up around you.
- Always handle parts and other computer components carefully. Handle adapter cards, memory modules, system boards, and microprocessors by the edges. Never touch any exposed circuitry.
- Prevent others from touching the parts and other computer components.
- Before you replace a new part, touch the static-protective package containing the part to a metal expansion-slot cover or other unpainted metal surface on the computer for at least two seconds. This reduces static electricity in the package and your body.
- When possible, remove the new part from the static-protective packaging, and install it directly in the computer without setting the part down. When this is not possible, place the static-protective package that the part came in on a smooth, level surface and place the part on it.
- Do not place the part on the computer cover or other metal surface.

Installing or replacing hardware

This section provides instructions on how to install or replace hardware for your computer. You can expand the capabilities of your computer by adding memory modules, PCI cards, or drives, and maintain your computer by replacing the failing hardware.

Notes:

1. Use only computer parts provided by Lenovo.
2. When installing or replacing an option, use the appropriate instructions in this section along with the instructions that come with the option.

Installing external options

External speakers, a printer, or a scanner can be connected to your computer. For some external options, you must install additional software in addition to making the physical connection. When installing an external option, see "Locating connectors on the front of your computer" on page 8 and "Locating connectors on the rear of your computer" on page 9 to identify the required connector, and then use the instructions that come with the option to help you make the connection and install any software or device drivers that are required for the option.

Removing the computer cover

Attention

Do not open your computer or attempt any repair before reading and understanding the "Important safety information" in the *ThinkCentre Safety and Warranty Guide* that came with your computer. To obtain a copy of the *ThinkCentre Safety and Warranty Guide*, go to: http://www.lenovo.com/support

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This section provides instructions on how to remove the computer cover.

CAUTION:

Turn off the computer and wait three to five minutes to let the computer cool before removing the computer cover.

To remove the computer cover:
1. Remove any media from the drives, shut down your operating system, and turn off all attached devices and the computer.
2. Unplug all power cords from electrical outlets.
3. Disconnect the cables attached to the computer. This includes power cords, Input/Output (I/O) cables, and any other cables that are connected to the computer. See "Locating connectors on the front of your computer" on page 8 and "Locating connectors on the rear of your computer" on page 9.
4. Remove any locking devices, such as a cable lock that secures the computer cover.
5. If there are thumbscrews that secure the computer cover, remove them.

6. Press the cover-release button on the side of the computer cover and slide the computer cover to the rear to remove.
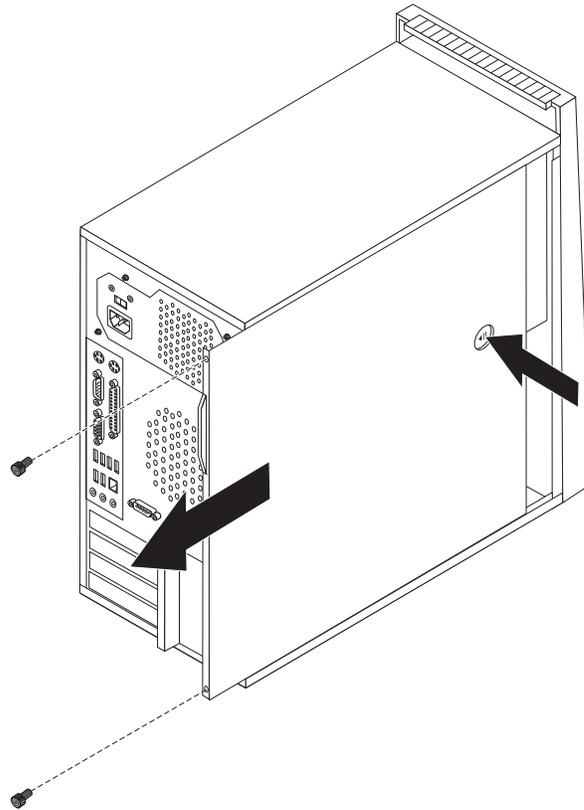
Figure 6. Removing the computer cover

Removing and reinstalling the front bezel

This section provides instructions on how to remove and reinstall the front bezel.

To remove and reinstall the front bezel:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 16.
3. Remove the front bezel by releasing the three plastic tabs on the left side and pivoting the front bezel outward. Carefully set the front bezel to the side without disconnecting the power switch and LED assembly cable.
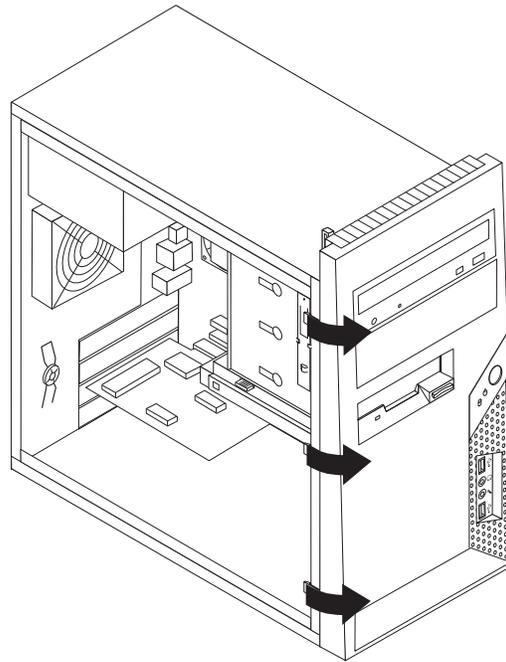
Figure 7. Removing the front bezel

4. To reinstall the front bezel, align the plastic tabs on the right side of the front bezel with the corresponding holes in the chassis, then pivot the front bezel inward until it snaps into position on the left side.
5. To complete the installation, go to "Completing the parts replacement" on page 45.

Installing or replacing a PCI card

> **Attention**
>
> Do not open your computer or attempt any repair before reading and understanding the "Important safety information" in the *ThinkCentre Safety and Warranty Guide* that came with your computer. To obtain a copy of the *ThinkCentre Safety and Warranty Guide*, go to: http://www.lenovo.com/support

This section provides instructions on how to install or replace a PCI card. Your computer has two standard PCI card slots, one PCI Express x1 card slot, and one PCI Express x16 graphics card slot.

To install or replace a PCI card, do the following:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.

2. Remove the computer cover. See "Removing the computer cover" on page 16.

3. At the rear of the computer, press the release button **1** to open the PCI card latch **2** and remove the slot cover.
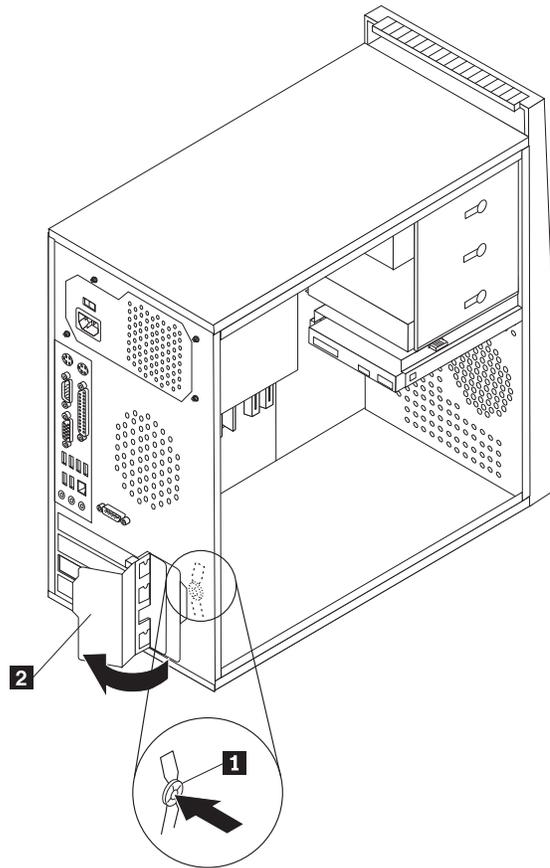
Figure 8. Opening the PCI card latch

4. If you are installing a PCI card, remove the appropriate PCI card slot cover. If you are replacing a PCI card, locate the appropriate PCI card slot on the system board and remove the old PCI card that is currently installed.

   Notes:
   a. The PCI card fits tightly into the PCI card slot. If necessary, alternate moving each side of the PCI card a small and equal amount until it is completely removed from the PCI card slot.

b. If the PCI card is secured in place by a retaining latch **1**, press the retaining latch to release the PCI card from the latch. Then, grasp the PCI card by the edges and carefully pull it out of the slot.
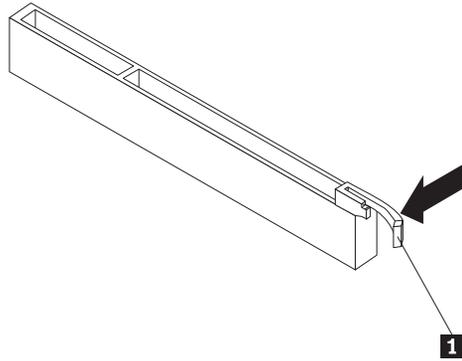
5. Remove the PCI card from its static-protective package.
6. Install the new PCI card into the appropriate PCI card slot on the system board. Then, pivot the PCI card latch to the closed position to secure the PCI cards.
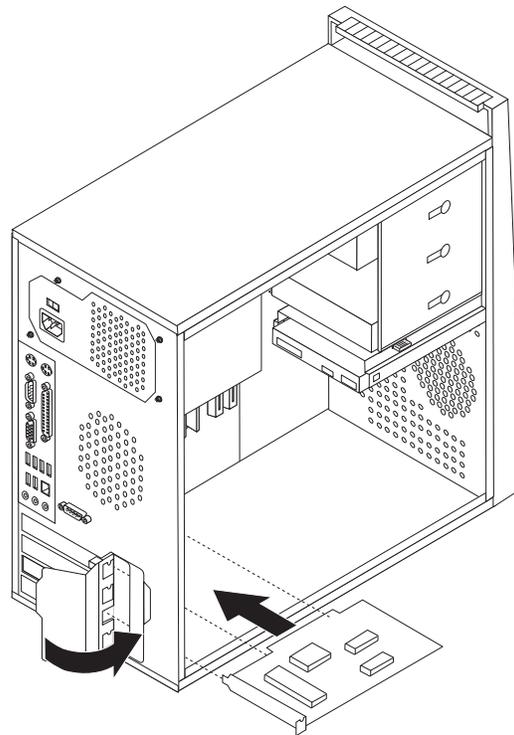
Figure 9. Closing the PCI card latch

7. Reinstall all parts and reconnect all cables that have been removed.

What to do next:

- To work with another option, go to the appropriate section.
- To complete the installation, go to "Completing the parts replacement" on page 45.

Installing or replacing a memory module

Attention

Do not open your computer or attempt any repair before reading and understanding the "Important safety information" in the *ThinkCentre Safety and Warranty Guide* that came with your computer. To obtain a copy of the *ThinkCentre Safety and Warranty Guide*, go to: http://www.lenovo.com/support

This section provides instructions on how to install or replace a memory module.

Your computer has four slots for installing or replacing DDR2 DIMMs (double data rate 2 dual inline memory modules) that provide up to a maximum of 8 GB of system memory.

When installing or replacing memory modules, use the following guidelines:
- Use 1.8 V, 240-pin DDR2 SDRAM (double data rate 2 synchronous dynamic random access memory).
- Use 512 MB, 1 GB, or 2 GB memory modules in any combination up to a maximum of 8 GB.

Note: Only DDR2 SDRAM DIMMs can be used.

To install or replace a memory module:
1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 16.
3. Remove any parts that might prevent access to the memory slots.
4. Locate the memory slots. See "Locating parts on the system board" on page 12.
5. Open the retaining clips.
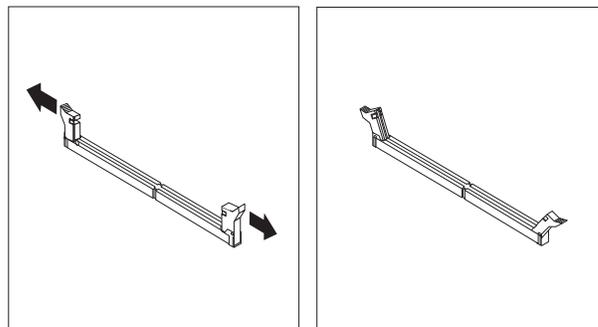
Figure 10. Opening the retaining clips

If you are replacing an old memory module, open the retaining clips and remove the memory module being replaced as shown.
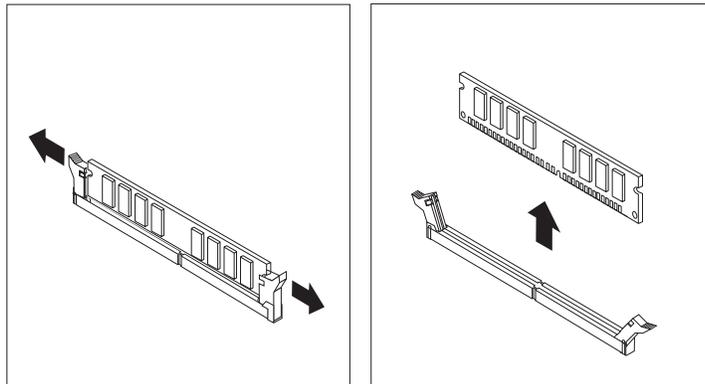
Figure 11. Removing the memory module

6. Position the memory module over the memory slot. Make sure that the notch 1 on the memory module aligns correctly with the slot key 2 on the system board. Push the memory module straight down into the slot until the retaining clips close.
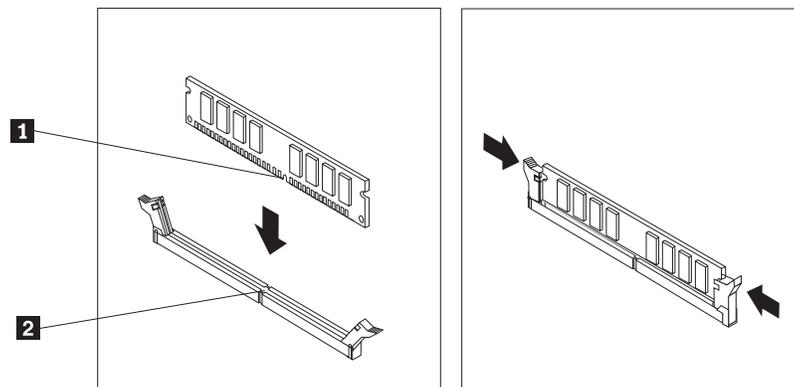
Figure 12. Installing the memory module

What to do next:

- To work with another option, go to the appropriate section.
- To complete the installation, go to "Completing the parts replacement" on page 45.

Replacing the battery

Attention

Do not open your computer or attempt any repair before reading and understanding the "Important safety information" in the *ThinkCentre Safety and Warranty Guide* that came with your computer. To obtain a copy of the *ThinkCentre Safety and Warranty Guide*, go to: http://www.lenovo.com/support

This section provides instructions on how to replace the battery.

Your computer has a special type of memory that maintains the date, time, and settings for built-in features, such as parallel-port assignments (configuration). A battery keeps this information active when you turn off the computer.

The battery normally requires no charging or maintenance throughout its life; however, no battery lasts forever. If the battery fails, the date, time, and configuration information (including passwords) are lost. An error message is displayed when you turn on the computer.

Refer to the "Lithium battery notice" in the *ThinkCentre Safety and Warranty Guide* for information about replacing and disposing of the battery.

To replace the battery:
1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 16.
3. Locate the battery. See "Locating parts on the system board" on page 12.
4. Remove the old battery.
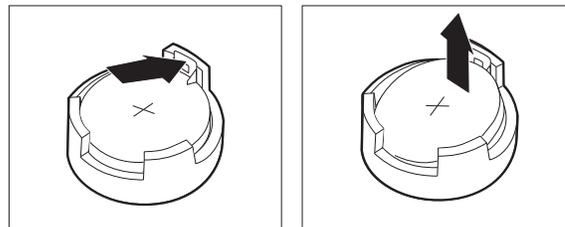
Figure 13. Removing the old battery

5. Install a new battery.
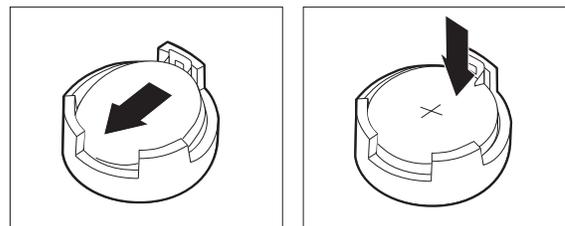
Figure 14. Installing a new battery

6. Reinstall the computer cover and connect the cables. See "Completing the parts replacement" on page 45.

    Note: When the computer is turned on for the first time after replacing the battery, an error message might be displayed. This is normal after replacing the battery.
7. Turn on the computer and all attached devices.
8. Use the Setup Utility program to set the date, time, and any passwords. See Chapter 4, "Using the Setup Utility," on page 59.

Replacing the power supply assembly

Attention

Do not open your computer or attempt any repair before reading and understanding the "Important safety information" in the *ThinkCentre Safety and Warranty Guide* that came with your computer. To obtain a copy of the *ThinkCentre Safety and Warranty Guide*, go to: http://www.lenovo.com/support

This section provides instructions on how to replace the power supply assembly.

To replace the power supply assembly:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 16.
3. Disconnect the power supply assembly cables from the system board and all drives. See "Locating parts on the system board" on page 12.
4. Lay the computer on its side and remove the four screws at the rear of the chassis that secure the power supply assembly.
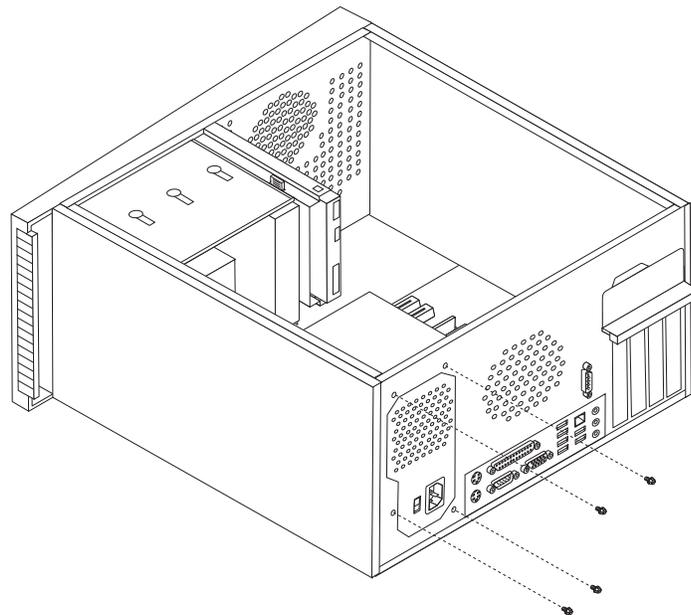
Figure 15. Removing the retaining screws for the power supply assembly

5. Remove the power supply assembly from the chassis.
6. Ensure that the power supply assembly is the correct replacement. Some power supply assemblies automatically sense the voltage, some power supply

assemblies are voltage specific, and some power supply assemblies have a voltage-selection switch. If your computer has a voltage-selection switch, ensure that you set the voltage-selection switch of the new power supply assembly to match the voltage available at your electrical outlet. If necessary, use a ballpoint pen to slide the voltage-selection switch to a different position.

- If the voltage supply range in your local country or region is 100–127 V AC, set the voltage-selection switch to 115 V.
- If the voltage supply range in your local country or region is 200–240 V AC, set the voltage-selection switch to 230 V.

7. Install the new power supply assembly into the chassis so that the screw holes in the power supply assembly align with those in the chassis.
8. Install the four screws to secure the power supply assembly.

    Note: Use only screws provided by Lenovo.
9. Reconnect the power supply assembly connectors to the system board.
10. Reconnect a power supply assembly connector to each of the drives.
11. Go to "Completing the parts replacement" on page 45.

What to do next:

- To work with another option, go to the appropriate section.
- To complete the installation, go to "Completing the parts replacement" on page 45.

Replacing the heat sink and fan assembly

Attention

Do not open your computer or attempt any repair before reading and understanding the "Important safety information" in the *ThinkCentre Safety and Warranty Guide* that came with your computer. To obtain a copy of the *ThinkCentre Safety and Warranty Guide*, go to: http://www.lenovo.com/support

This section provides instructions on how to replace the heat sink and fan assembly.

CAUTION:

The heat sink and fan assembly might be very hot. Turn off the computer and wait three to five minutes to let the computer cool before removing the computer cover.

To replace the heat sink and fan assembly:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 16.
3. Lay the computer on its side.
4. Locate the heat sink and fan assembly. See "Locating parts on the system board" on page 12.

5. Disconnect the heat sink and fan assembly cable from the microprocessor fan connector on the system board.
6. Pivot the handle **1** to release the heat sink and fan assembly clamp and then disengage the clamp from the plastic retention bracket.
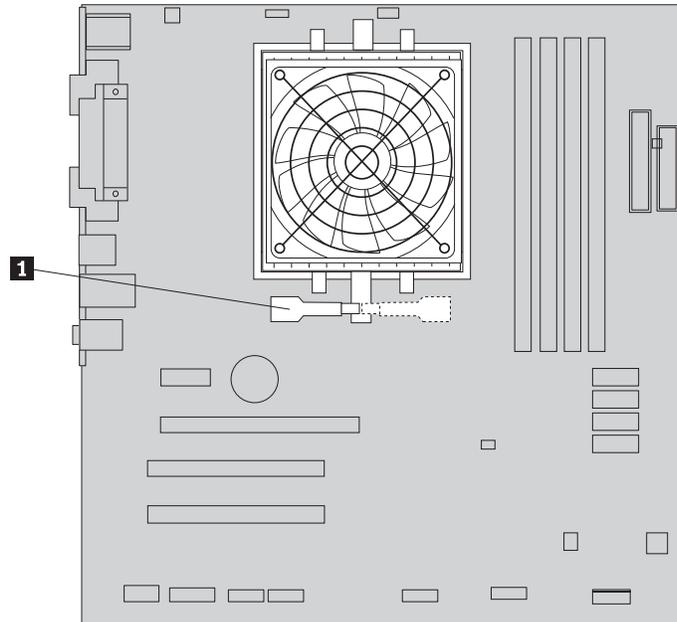
Figure 16. Removing the heat sink and fan assembly

> **Note:** You might have to gently twist the heat sink and fan assembly to free it from the microprocessor.

7. Lift the failing heat sink and fan assembly off the system board.

8. Position the new heat sink and fan assembly on the microprocessor socket and then position the clamp on the plastic retention bracket. Pivot the handle **1** to clamp the heat sink and fan assembly to the plastic retention bracket.
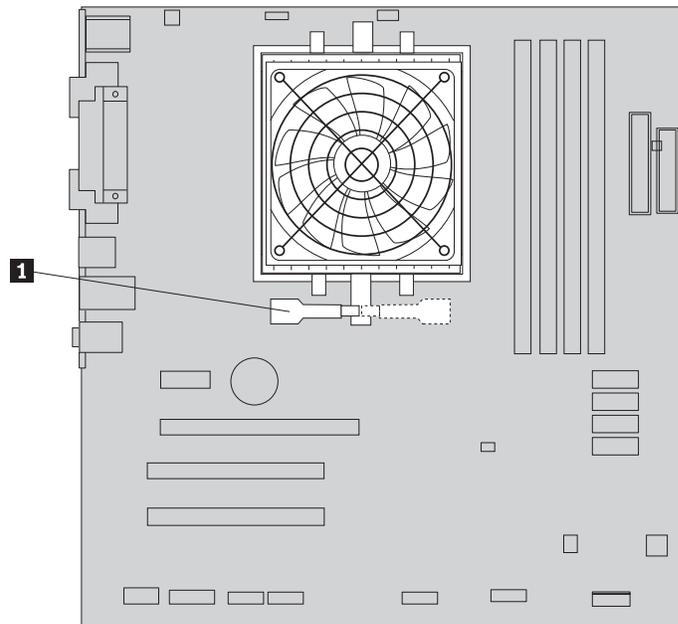
Figure 17. Replacing the heat sink and fan assembly

9. Connect the heat sink and fan assembly cable to the microprocessor fan connector on the system board.
10. Go to "Completing the parts replacement" on page 45.

What to do next:
- To work with another option, go to the appropriate section.
- To complete the installation, go to "Completing the parts replacement" on page 45.

Replacing the primary hard disk drive

Attention

Do not open your computer or attempt any repair before reading and understanding the "Important safety information" in the *ThinkCentre Safety and Warranty Guide* that came with your computer. To obtain a copy of the *ThinkCentre Safety and Warranty Guide*, go to: http://www.lenovo.com/support

This section provides instructions on how to replace the primary hard disk drive.

To replace the primary hard disk drive:
1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 16.

3. Locate the primary hard disk drive. See Figure 5 on page 13.
4. Disconnect the signal and power cables from the hard disk drive.
5. Press the blue release tab **1** down, slide the hard disk drive cage **2** back, and pivot it outward.

Figure 18. Removing the primary hard disk drive

6. Remove the hard disk drive cage from the chassis by simply sliding it outward.
7. Pull on the blue handle **3** to release and remove the hard disk drive from the drive cage.
8. Remove the hard disk drive from the blue plastic bracket by flexing the sides of the bracket enough to slide it free from the hard disk drive.

9. To install a new hard disk drive into the blue bracket, flex the bracket and align pin **1**, pin **2**, pin **3**, and pin **4** on the bracket with the holes in the hard disk drive. Do not touch the circuit board **5** on the bottom of the hard disk drive.

Figure 19. Installing the primary hard disk drive into the bracket

10. Slide the new hard disk drive into the drive cage until it snaps into position.

11. Align the drive cage pivot pin with the slot **1** in the upper drive cage and slide the hard disk drive cage into the chassis.

12. Connect the signal and power cables to the rear of the new hard disk drive.

13. Press down on the metal latch **2**, pivot the drive cage into place, and then slide it forward until it snaps into position.

   Note: There are two arrows, one on the upper drive cage and one on the hard disk drive cage. The arrows are aligned when the hard disk drive is in the proper position.
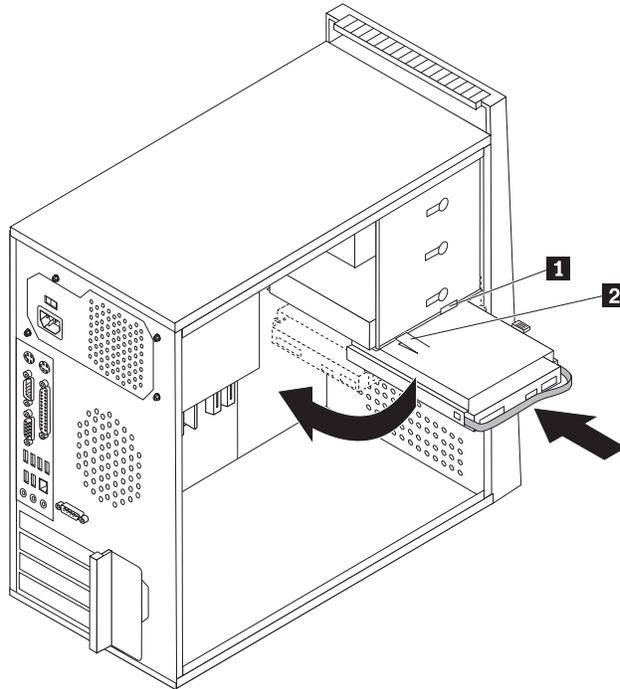
Figure 20. Installing the primary hard disk drive and bracket

14. Go to "Completing the parts replacement" on page 45.

What to do next:
- To work with another option, go to the appropriate section.
- To complete the installation, go to "Completing the parts replacement" on page 45.

Replacing the secondary hard disk drive

Attention

Do not open your computer or attempt any repair before reading and understanding the "Important safety information" in the *ThinkCentre Safety and Warranty Guide* that came with your computer. To obtain a copy of the *ThinkCentre Safety and Warranty Guide*, go to: http://www.lenovo.com/support

This section provides instructions on how to replace the secondary hard disk drive.

To replace the secondary hard disk drive:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.

2. Remove the computer cover. See "Removing the computer cover" on page 16.

3. Locate the secondary hard disk drive. See Figure 5 on page 13.

4. Disconnect the signal and power cables from the hard disk drive.

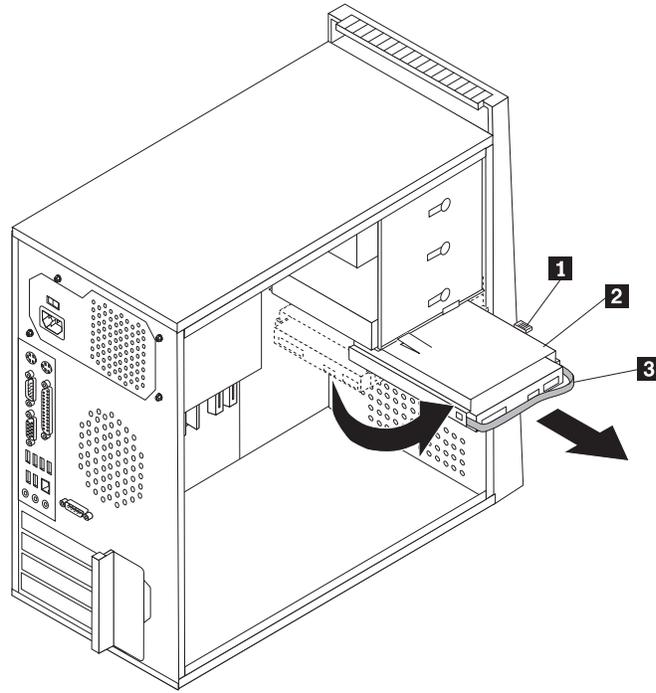5. Press the blue release button to release the hard disk drive cage from the chassis.
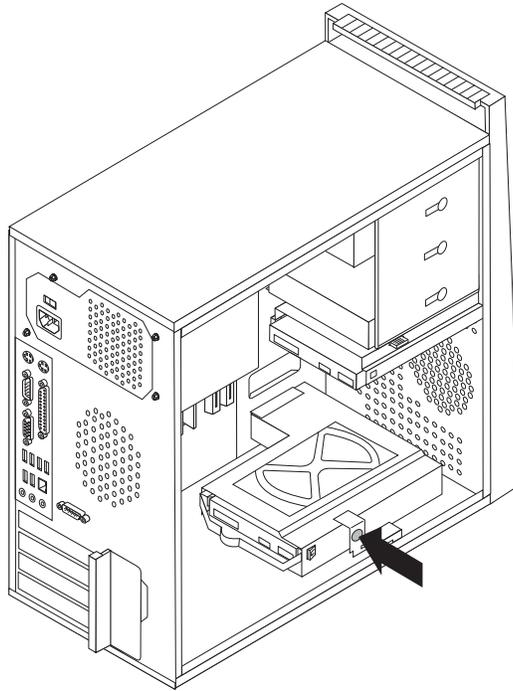
Figure 21. Removing the secondary hard disk drive

6. Remove the hard disk drive cage from the chassis by simply sliding it outward.

7. Pull on the blue handle to release and remove the hard disk drive from the hard disk drive cage.

8. Remove the hard disk drive from the blue plastic bracket by flexing the sides of the bracket enough to slide it free from the hard disk drive.

9. To install a new hard disk drive into the blue bracket, flex the bracket and align pin **1**, pin **2**, pin **3**, and pin **4** on the bracket with the holes in the hard disk drive. Do not touch the circuit board **5** on the bottom of the hard disk drive.
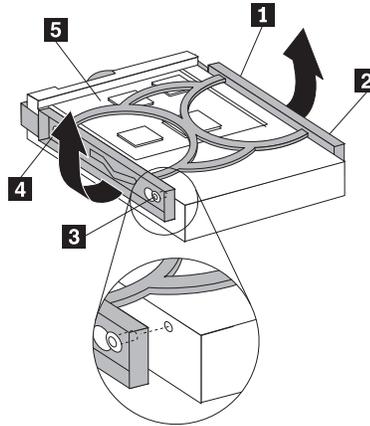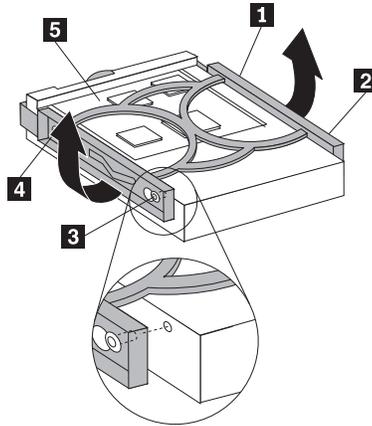
Figure 22. Installing the secondary hard disk drive into the bracket

10. Slide the new hard disk drive into the hard disk drive cage until it snaps into position.
11. Install the hard disk drive cage into the chassis until it snaps into position underneath the metal tab. Make sure that the hard disk drive cage is secured in the chassis.
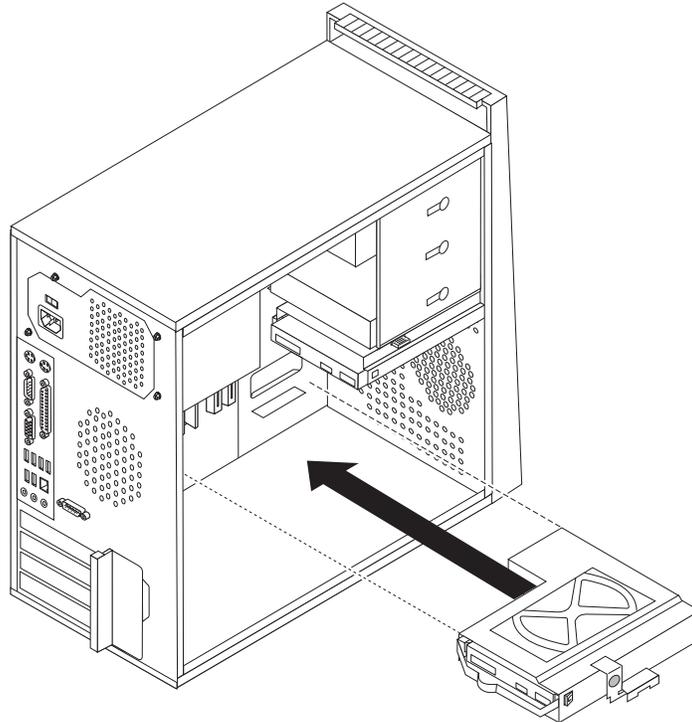
Figure 23. Installing the secondary hard disk drive and drive cage

12. Connect the signal and power cables to the rear of the new hard disk drive.
13. Go to "Completing the parts replacement" on page 45.

What to do next:
- To work with another option, go to the appropriate section.
- To complete the installation, go to "Completing the parts replacement" on page 45.

Replacing the optical drive

Attention

Do not open your computer or attempt any repair before reading and understanding the "Important safety information" in the *ThinkCentre Safety and Warranty Guide* that came with your computer. To obtain a copy of the *ThinkCentre Safety and Warranty Guide*, go to: http://www.lenovo.com/support

This section provides instructions on how to replace the optical drive.

To replace the optical drive:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 16.
3. Disconnect the signal and power cables from the rear of the optical drive.
4. Press the blue release button and remove the optical drive out of the front of the computer.

   Note: There is a spare retainer bracket **1** attached to the side of the upper drive cage.
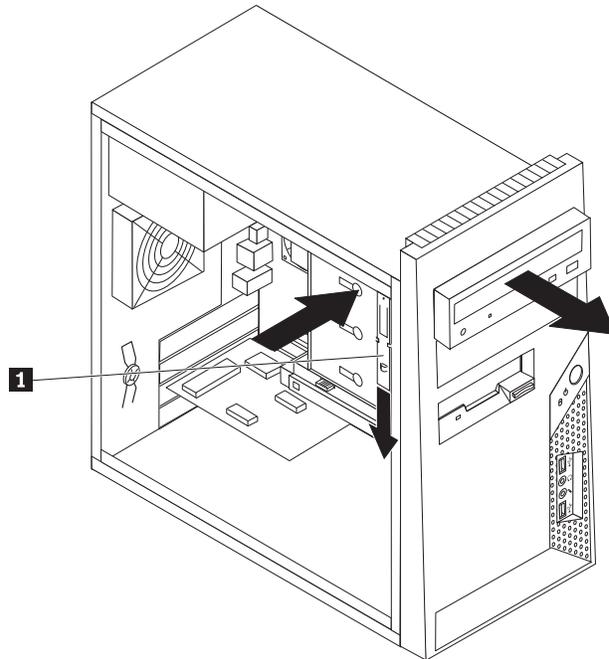
Figure 24. Removing the optical drive

5. Remove the retainer bracket from the drive being replaced and install it on a new drive.
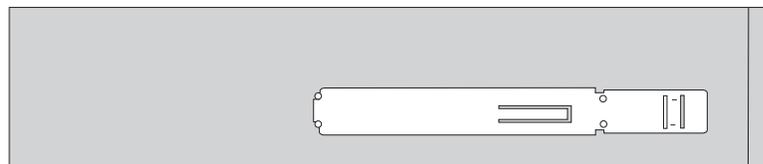
Figure 25. Retainer bracket for optical drive

6. Slide the new optical drive into the bay from the front until it snaps into position.
7. Connect the signal and power cables to the drive.
8. Go to "Completing the parts replacement" on page 45.

> **What to do next:**
> - To work with another option, go to the appropriate section.
> - To complete the installation, go to "Completing the parts replacement" on page 45.

Replacing the diskette drive or card reader

> **Attention**
>
> Do not open your computer or attempt any repair before reading and understanding the "Important safety information" in the *ThinkCentre Safety and Warranty Guide* that came with your computer. To obtain a copy of the *ThinkCentre Safety and Warranty Guide*, go to: http://www.lenovo.com/support

This section provides instructions on how to replace the diskette drive or card reader. Depending on your model type, your computer might have a diskette drive or a card reader installed.

The artwork in this section shows how to replace the diskette drive. To replace the card reader, the procedure is almost the same as replacing the diskette drive.

To replace the diskette drive or card reader:
1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 16.
3. Remove the front bezel. See "Removing and reinstalling the front bezel" on page 18.
4. Disconnect the signal and power cables from the rear of the diskette drive or card reader.

5. Press the release button and slide the diskette drive or card reader out of the front of the computer.
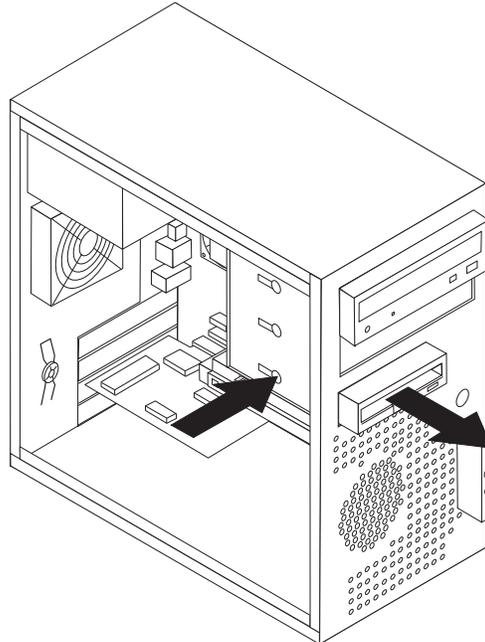
Figure 26. Removing the diskette drive or card reader

6. Remove the retainer bracket from the failing diskette drive or card reader and install it on a new diskette drive or card reader.
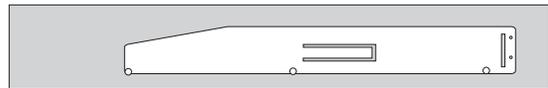
Figure 27. Retainer bracket for diskette drive or card reader

7. Slide the new diskette drive or card reader into the drive bay until it snaps into position.
8. Connect the flat cable to the new diskette drive or card reader.
9. Reinstall the front bezel.
10. Go to "Completing the parts replacement" on page 45.

What to do next:

- To work with another option, go to the appropriate section.
- To complete the installation, go to "Completing the parts replacement" on page 45.

Replacing the front fan assembly

Attention

Do not open your computer or attempt any repair before reading and understanding the "Important safety information" in the *ThinkCentre Safety and Warranty Guide* that came with your computer. To obtain a copy of the *ThinkCentre Safety and Warranty Guide*, go to: http://www.lenovo.com/support

This section provides instructions on how to replace the front fan assembly.

To replace the front fan assembly:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 16.
3. Remove the front bezel. See "Removing and reinstalling the front bezel" on page 18.
4. Disconnect the front fan assembly cable from the power fan connector on the system board. See "Locating parts on the system board" on page 12.
5. The front fan assembly is attached to the chassis by four rubber mounts. Remove the front fan assembly by breaking or cutting the rubber mounts and gently pulling the front fan assembly out of the chassis.

Figure 28. Removing the front fan assembly

6. Install the new front fan assembly by aligning the new rubber mounts of the new front fan assembly with the holes on the chassis and push the rubber mounts through the holes.

   Note: The new front fan assembly you received will have four new rubber mounts attached.

7. Pull on the tips of the rubber mounts until the fan assembly is in place.
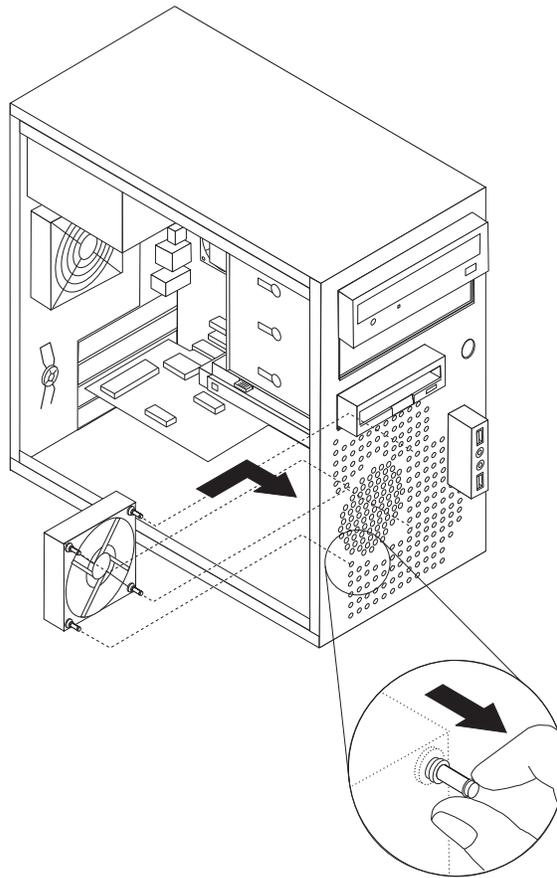
Figure 29. Installing the front fan assembly

8. Connect the front fan assembly cable to the power fan connector on the system board.
9. Go to "Completing the parts replacement" on page 45.

What to do next:
- To work with another option, go to the appropriate section.
- To complete the installation, go to "Completing the parts replacement" on page 45.

Replacing the rear fan assembly

Attention

Do not open your computer or attempt any repair before reading and understanding the "Important safety information" in the *ThinkCentre Safety and Warranty Guide* that came with your computer. To obtain a copy of the *ThinkCentre Safety and Warranty Guide*, go to: http://www.lenovo.com/support

This section provides instructions on how to replace the rear fan assembly.

To replace the rear fan assembly:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.

2. Remove the computer cover. See "Removing the computer cover" on page 16.

3. Locate the rear fan assembly. See "Locating components" on page 11.

4. Disconnect the rear fan assembly cable from the system fan connector on the system board. See "Locating parts on the system board" on page 12.

5. The rear fan assembly is attached to the chassis by four rubber mounts. Remove the rear fan assembly by breaking or cutting the rubber mounts and gently pulling the rear fan assembly out of the chassis.
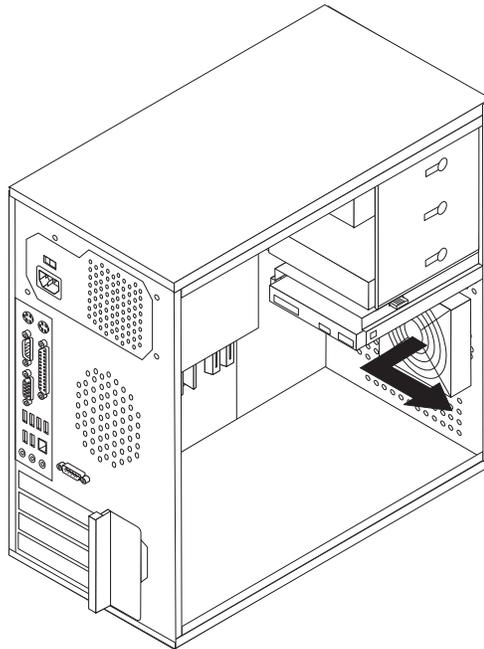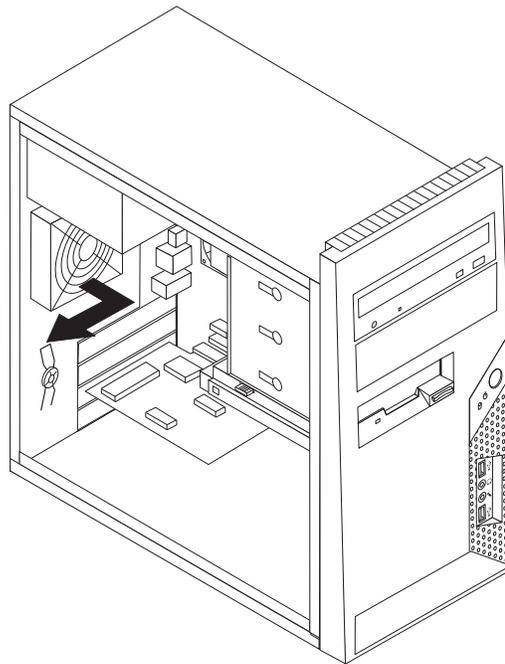

Figure 30. Removing the rear fan assembly

6. Install the new rear fan assembly by aligning the new rubber mounts of the new rear fan assembly with the holes on the chassis and push the rubber mounts through the holes.

   Note: The new rear fan assembly you received will have four new rubber mounts attached.

7. Pull on the tips of the rubber mounts until the rear fan assembly is in place.
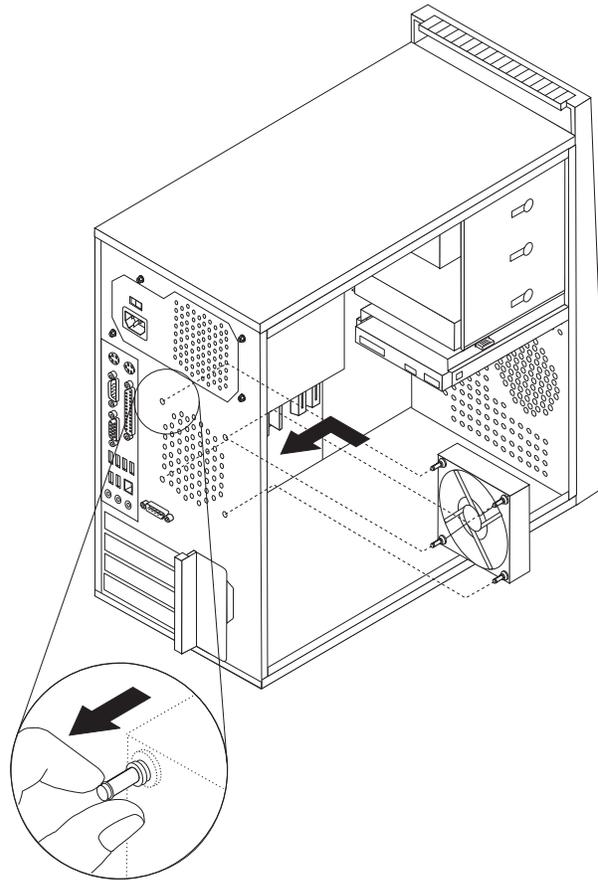
Figure 31. Installing the rear fan assembly

8. Connect the rear fan assembly cable to the system fan connector on the system board.
9. Go to "Completing the parts replacement" on page 45.

What to do next:

- To work with another option, go to the appropriate section.
- To complete the installation, go to "Completing the parts replacement" on page 45.

Replacing the front audio and USB assembly

Attention

Do not open your computer or attempt any repair before reading and understanding the "Important safety information" in the *ThinkCentre Safety and Warranty Guide* that came with your computer. To obtain a copy of the *ThinkCentre Safety and Warranty Guide*, go to: http://www.lenovo.com/support

This section provides instructions on how to replace the front audio and USB assembly.

To replace the front audio and USB assembly:
1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 16.
3. Remove the front bezel. See "Removing and reinstalling the front bezel" on page 18.
4. Disconnect the front audio and USB assembly cables from the system board. See "Locating parts on the system board" on page 12.
5. Note the front audio and USB assembly cables routing and remove the screw that secures the front audio and USB assembly to the chassis.
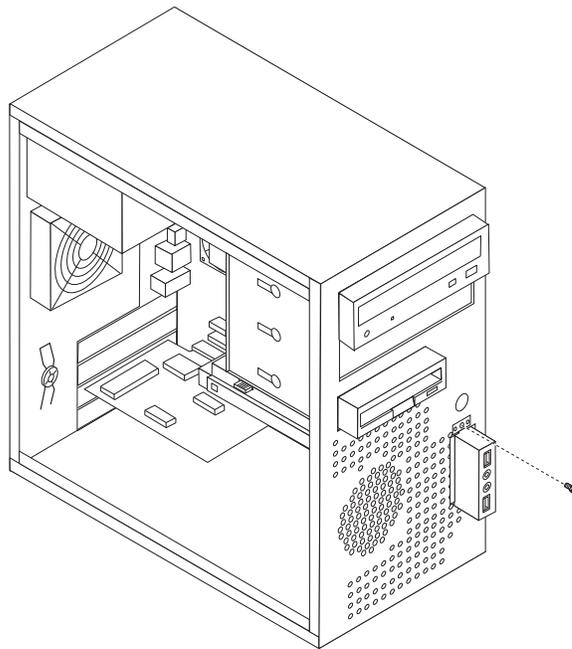
Figure 32. Removing the front audio and USB assembly

6. Remove the front audio and USB assembly.
7. Route the cables for the new front audio and USB assembly through the hole in the chassis to the system board.
8. Install the new front audio and USB assembly into the chassis and secure it with the screw.
9. Connect the new front audio and USB assembly cables to the system board. See "Locating parts on the system board" on page 12.
10. Reinstall the front bezel.
11. Go to "Completing the parts replacement" on page 45.

What to do next:
- To work with another option, go to the appropriate section.
- To complete the installation, go to "Completing the parts replacement" on page 45.

Replacing the internal speaker

> **Attention**
>
> Do not open your computer or attempt any repair before reading and understanding the "Important safety information" in the *ThinkCentre Safety and Warranty Guide* that came with your computer. To obtain a copy of the *ThinkCentre Safety and Warranty Guide*, go to: http://www.lenovo.com/support

This section provides instructions on how to replace the internal speaker.

To replace the internal speaker:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 16.
3. Locate the internal speaker connector on the system board. See "Locating parts on the system board" on page 12.
4. Disconnect the internal speaker cable from the system board.
5. Push the metal tab on the top of the internal speaker outward and slide the internal speaker upward to completely remove it from the chassis.
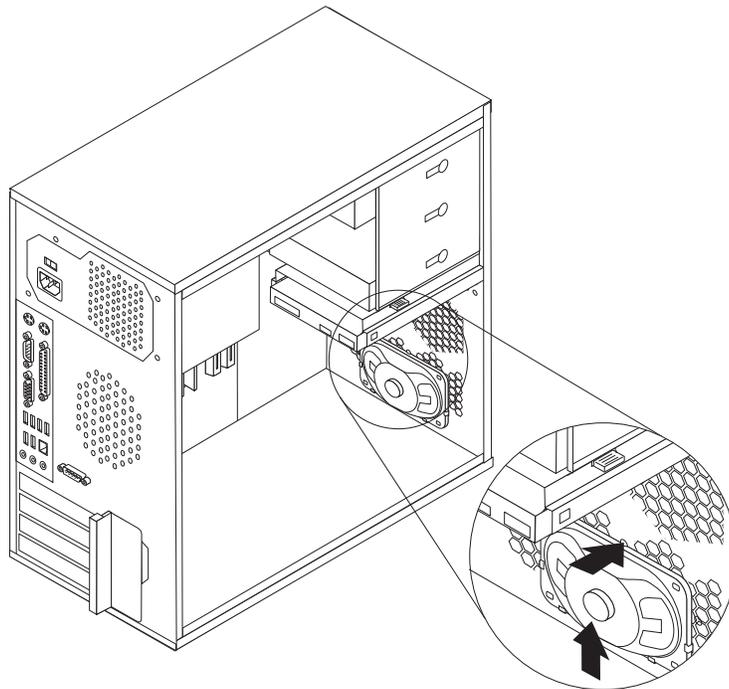
Figure 33. Removing the old internal speaker

6. Position a new internal speaker into the metal clips and push downward on the internal speaker until it snaps into position.
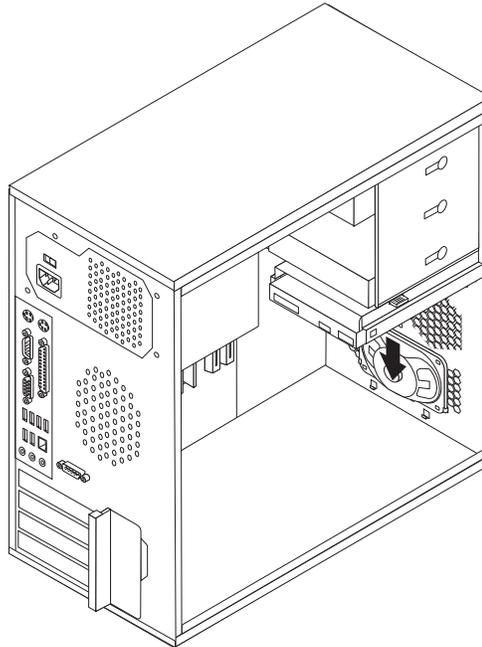
Figure 34. Installing a new internal speaker

7. Connect the speaker cable to the system board. See "Locating parts on the system board" on page 12.
8. Go to "Completing the parts replacement" on page 45.

What to do next:
- To work with another option, go to the appropriate section.
- To complete the installation, go to "Completing the parts replacement" on page 45.

Replacing the keyboard

Attention

Do not open your computer or attempt any repair before reading and understanding the "Important safety information" in the *ThinkCentre Safety and Warranty Guide* that came with your computer. To obtain a copy of the *ThinkCentre Safety and Warranty Guide*, go to: http://www.lenovo.com/support

This section provides instructions on how to replace the keyboard.

To replace the keyboard:
1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Locate the keyboard connector.

Note: Your keyboard might be connected to a PS/2 keyboard connector **1** or a USB connector **2** . Depending on where your keyboard is connected, see "Locating connectors on the rear of your computer" on page 9 or "Locating connectors on the front of your computer" on page 8.
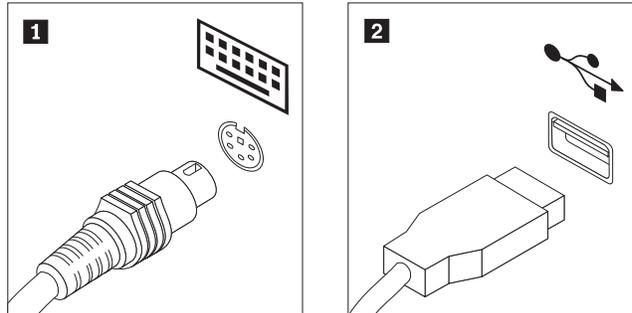
Figure 35. Keyboard connectors

3. Disconnect the failing keyboard cable from the computer.
4. Connect a new keyboard to the appropriate connector on the computer.
5. Go to "Completing the parts replacement" on page 45.

Replacing the mouse

> **Attention**
>
> Do not open your computer or attempt any repair before reading and understanding the "Important safety information" in the *ThinkCentre Safety and Warranty Guide* that came with your computer. To obtain a copy of the *ThinkCentre Safety and Warranty Guide*, go to: http://www.lenovo.com/support

This section provides instructions on how to replace the mouse.

To replace the mouse:
1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Locate the connector for the mouse.

    Note: Your mouse might be connected to a PS/2 mouse connector **1** or a USB connector **2** . Depending on where your mouse is connected, see "Locating connectors on the rear of your computer" on page 9 or "Locating connectors on the front of your computer" on page 8.
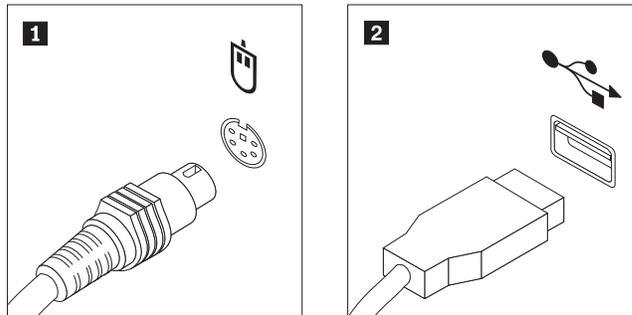
Figure 36. Mouse connectors

3. Disconnect the failing mouse cable from the computer.
4. Connect a new mouse cable to the appropriate connector on the computer.
5. Go to "Completing the parts replacement."

Completing the parts replacement

After completing all parts replacements, you need to reinstall the computer cover and reconnect cables, including telephone lines and power cords. Depending on the parts replaced, you might need to confirm the updated information in the Setup Utility program. Refer to Chapter 4, "Using the Setup Utility," on page 59.

To reinstall the computer cover and reconnect cables to your computer:
1. Ensure that all components have been reassembled correctly and no tools or loose screws are left inside your computer. See "Locating components" on page 11 for the location of various components.

2. Position the computer cover on the chassis so that the rail guides on the bottom of the computer cover engage the rails. Then push the computer cover closed until it snaps into position.
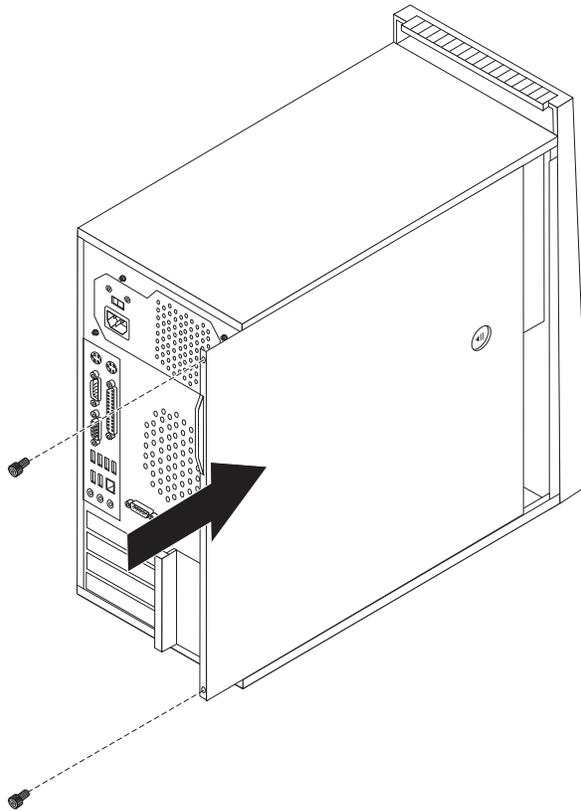
Figure 37. Reinstalling the computer cover

3. If the computer cover is secured with thumbscrews, install them.
4. If a cover lock is installed, lock the cover.
5. Reconnect the external cables and power cords to the computer. See "Locating connectors on the rear of your computer" on page 9.
6. To update your configuration, see Chapter 4, "Using the Setup Utility," on page 59.

Note: In most areas of the world, Lenovo requires the return of the defective CRU. Information about this will come with the CRU or will come a few days after the CRU arrives.

Obtaining device drivers
You can obtain device drivers for operating systems that are not preinstalled at: http://www.lenovo.com/support
Installation instructions are provided in readme files with the device driver files.

Installing security features

To help prevent hardware theft and unauthorized access to your computer, several security options are available. In addition to physical locks, unauthorized use of your computer can be prevented by a software lock that locks the keyboard until a correct password is typed in.

Make sure that any security cables you installed do not interfere with other computer cables.

Integrated cable lock

An integrated cable lock (sometimes referred to as the Kensington lock) can be used to secure your computer to a desk, a table, or other non-permanent fixture. The cable lock attaches to a security slot at the rear of your computer and is operated with a key. See Figure 38. The cable lock also locks the buttons used to open the computer cover. This is the same type of lock used with many notebook computers. You can order a security cable directly from Lenovo by searching on *Kensington* at:
http://www.lenovo.com/support
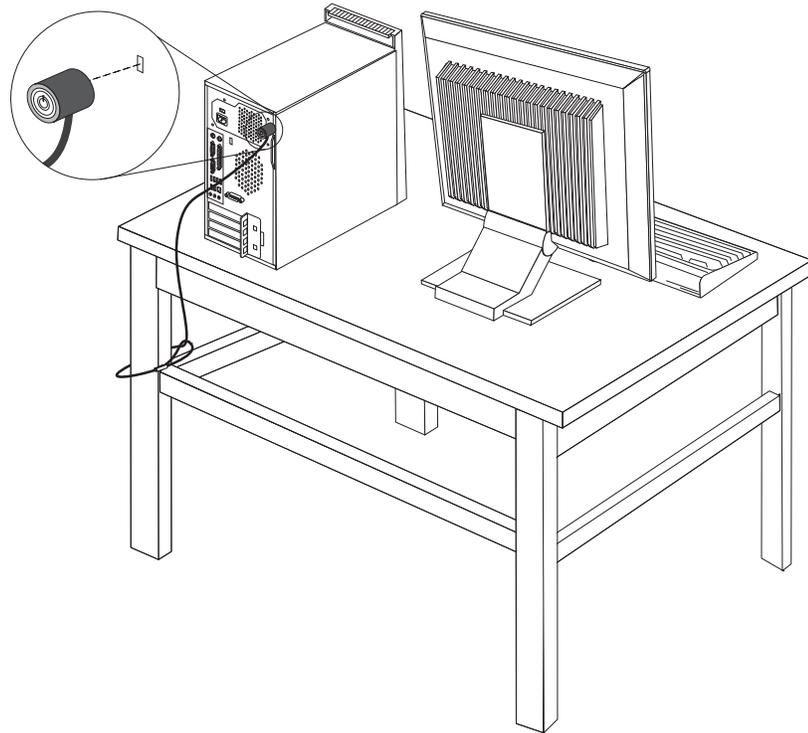
Figure 38. Integrated cable lock

Padlock

Your computer is equipped with a padlock loop so that the computer cover cannot be removed when a padlock is installed.
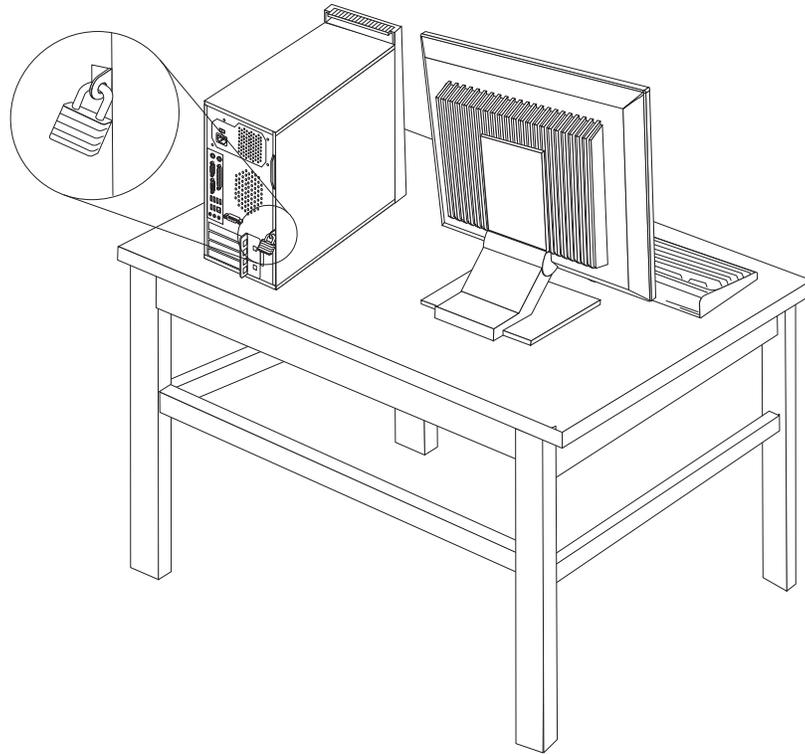
Figure 39. Installing a padlock

Password protection

To deter unauthorized use of your computer, you can use the Setup Utility program to set a password. When you turn on your computer, you are prompted to type the password to unlock the keyboard for normal use. Refer to Chapter 4, "Using the Setup Utility," on page 59 for more information.

What to do next:

- To work with another option, go to the appropriate section.
- To complete the installation, go to "Completing the parts replacement" on page 45.

Erasing lost or forgotten passwords (clearing CMOS)

This section provides instructions on how to erase lost or forgotten passwords, such as a user password.

To erase a lost or forgotten password, do the following:

1. Remove the computer cover. See "Removing the computer cover" on page 16.
2. Locate the Clear CMOS/Recovery jumper on the system board. See "Locating parts on the system board" on page 12.
3. Move the jumper from the standard position (pin 1 and pin 2) to the maintenance or configure position (pin 2 and pin 3).

4. Reinstall the computer cover and connect the power cord. See "Completing the parts replacement" on page 45.

5. Restart the computer, leave it on for approximately 10 seconds. Turn off the computer by holding the power switch for approximately five seconds.

6. Repeat step 1 and step 2.

7. Move the Clear CMOS/Recovery jumper back to the standard position (pin 1 and pin 2).

8. Reinstall the computer cover and connect the power cord. See "Completing the parts replacement" on page 45.

Chapter 3. Recovery information

This chapter will help you get familiar with recovery solutions provided by Lenovo. This chapter explains when and how to use the following recovery methods:

- Creating and using recovery media
- Performing backup and recovery operations
- Using the Rescue and Recovery workspace
- Creating and using rescue media
- Creating and using a recovery repair diskette
- Installing or reinstalling device drivers
- Setting a rescue device in the startup sequence
- Solving recovery problems

Notes:

1. There are a variety of methods to choose from when considering how to recover in the event of a software- or hardware-related problem. Some methods vary depending on the type of your operating system.

2. The product on the recovery media may be used only for the following purposes:
   - Restore the product preinstalled on your computer
   - Reinstall the product
   - Modify the product using the Additional Files

Creating and using recovery media

Recovery media enable you to restore the hard disk drive to the factory default settings. Recovery media are useful if you transfer the computer to another area, sell the computer, recycle the computer, or put the computer in an operational state after all other methods of recovery have failed. As a precautionary measure, it is important to create recovery media as soon as possible.

Note: The recovery operations you can perform using recovery media vary depending on the operating system from which they are created. Your Microsoft Windows license permits you to create only one data medium, so it is important that you store the created recovery medium in a safe place.

Creating recovery media

This section provides instructions on how to create recovery media on different operating systems.

Note: On the Windows 7 operating system, you can create recovery media using discs or external USB storage devices. On the Windows Vista operating system and the Windows XP operating system, you can create recovery media using discs only.

- To create recovery media on the Windows 7 operating system, click **Start → All Programs → Lenovo ThinkVantage Tools → Factory Recovery Disks**. Then, follow the instructions on the screen.

- To create Product Recovery discs on the Windows Vista operating system, click **Start → All Programs → ThinkVantage → Create Product Recovery Media**. Then, follow the instructions on the screen.
- To create Product Recovery discs on the Windows XP operating system, click **Start → All Programs → ThinkVantage → Create Recovery Media**. Then, follow the instructions on the screen.

Using recovery media

This section provides instructions on how to use recovery media on different operating systems.

- To use recovery media on the Windows 7 operating system or the Windows Vista operating system, do the following:

  Attention: When you use recovery media to restore the computer to the factory default settings on the Windows 7 operating system or the Windows Vista operating system, all the files currently on the system drive or the hard disk drive will be deleted and replaced by the factory default settings.

  1. Depending on the type of your recovery media, connect your boot medium (memory key or USB hard disk drive) to your computer, or insert the boot disc into your CD or DVD drive.
  2. Restart your computer.
  3. Repeatedly press and release the F12 key when turning on the computer. When the Please select boot device window opens, release the F12 key.
  4. Depending on the type of your recovery media, select the proper startup device and press Enter. After a short delay, the Product Recovery program opens.
  5. Follow the instructions on the screen.

     After restoring the computer to the factory default settings, you might have to reinstall some software programs or device drivers. See "Installing or reinstalling device drivers" on page 57 for details.

- To use Product Recovery discs on the Windows XP operating system, do the following:

  Attention: When you use Product Recovery discs to restore the computer to the factory default settings on the Windows XP operating system, all the files currently on the hard disk drive will be deleted and replaced by the factory default settings. During the restore process, you will be given the option to save one or more files currently on the hard disk drive to other media before the data is deleted.

  1. Insert the boot disc into your CD or DVD drive.
  2. Restart your computer.
  3. Repeatedly press and release the F12 key when turning on the computer. When the Please select boot device window opens, release the F12 key.
  4. Select the CD or DVD drive as the startup device and press Enter. After a short delay, the Rescue and Recovery workspace opens.
  5. From the **Rescue and Recovery** menu, click **Restore your system**.
  6. Follow the instructions on the screen.

Performing backup and recovery operations

The Rescue and Recovery program enables you to back up all your hard disk drive contents including the operating system, data files, software programs, and personal settings. You can designate where the Rescue and Recovery program stores the backup:

- On a protected area of your hard disk drive
- On a secondary hard disk drive installed in your computer
- On an attached external USB hard disk drive
- On a network drive
- On recordable CDs or DVDs (a recordable CD or DVD drive is required for this option)

After you have backed up the contents on the hard disk drive, you can restore the complete contents of the hard disk drive, restore only the selected files, or restore only the Windows operating system and applications.

Performing a backup operation

This section provides instructions on how to perform a backup operation using the Rescue and Recovery program on different operating systems.

- To perform a backup operation using the Rescue and Recovery program on the Windows 7 operating system, do the following:
  1. From the Windows desktop, click **Start → All Programs → Lenovo ThinkVantage Tools → Enhanced Backup and Restore**. The Rescue and Recovery program opens.
  2. From the Rescue and Recovery main window, click the **Launch advanced Rescue and Recovery** arrow.
  3. Click **Back up your hard drive** and select backup operation options. Follow the instructions on the screen.
- To perform a backup operation using the Rescue and Recovery program on the Windows Vista operating system or the Windows XP operating system, do the following:
  1. From the Windows desktop, click **Start → All Programs → ThinkVantage → Rescue and Recovery**. The Rescue and Recovery program opens.
  2. From the Rescue and Recovery main window, click **Launch advanced Rescue and Recovery → Back up your hard drive**, and select backup operation options.
  3. Follow the instructions on the screen.

Performing a recovery operation

This section provides instructions on how to perform a recovery operation using the Rescue and Recovery program on different operating systems.

- To perform a recovery operation using the Rescue and Recovery program on the Windows 7 operating system, do the following:
  1. From the Windows desktop, click **Start → All Programs → Lenovo ThinkVantage Tools → Enhanced Backup and Restore**. The Rescue and Recovery program opens.
  2. From the Rescue and Recovery main window, click the **Launch advanced Rescue and Recovery** arrow.
  3. Click the **Restore your system from a backup** icon.

4. Follow the instructions on the screen.
- To perform a recovery operation using the Rescue and Recovery program on the Windows Vista operating system or the Windows XP operating system, do the following:
  1. From the Windows desktop, click **Start** → **All Programs** → **ThinkVantage** → **Rescue and Recovery**. The Rescue and Recovery program opens.
  2. From the Rescue and Recovery main window, click **Launch advanced Rescue and Recovery**.
  3. Click the **Restore your system from a backup** icon.
  4. Follow the instructions on the screen.

For more information about performing a recovery operation from the Rescue and Recovery workspace, see "Using the Rescue and Recovery workspace."

Using the Rescue and Recovery workspace

The Rescue and Recovery workspace resides in a protected, hidden area of your hard disk drive that operates independently from the Windows operating system. This enables you to perform recovery operations even if the Windows operating system cannot be started. You can perform the following recovery operations from the Rescue and Recovery workspace:

- Rescue files from your hard disk drive or from a backup

  The Rescue and Recovery workspace enables you to locate files on your hard disk drive and transfer them to a network drive or other recordable media, such as a USB device, a disc, or a diskette. This solution is available, even if you did not back up your files or if changes were made to the files since your last backup operation. You can also rescue individual files from a Rescue and Recovery backup located on your local hard disk drive, a USB device, or a network drive.

- Restore your hard disk drive from a Rescue and Recovery backup

  If you have backed up your hard disk drive using the Rescue and Recovery program, you can restore the hard disk drive from a Rescue and Recovery backup, even if you cannot start the Windows operating system.

- Restore your hard disk drive to the factory default settings

  The Rescue and Recovery workspace enables you to restore the complete contents of your hard disk drive to the factory default settings. If you have multiple partitions on your hard disk drive, you have the option to restore the factory default settings to the C: partition and leave the other partitions intact. Because the Rescue and Recovery workspace operates independently from the Windows operating system, you can restore the factory default settings even if you cannot start the Windows operating system.

Attention: If you restore the hard disk drive from a Rescue and Recovery backup or restore the hard disk drive to the factory default settings, all files on the primary hard disk drive partition (usually drive C:) will be deleted in the recovery process. If possible, make copies of important files. If you are unable to start the Windows operating system, you can use the Rescue files feature in the Rescue and Recovery workspace to copy files from your hard disk drive to other media.

To start the Rescue and Recovery workspace, do the following:
1. Make sure the computer is turned off.
2. Repeatedly press and release the F11 key when turning on the computer.

3. When you hear beeps or see a logo screen, release the F11 key.
4. If you have set a Rescue and Recovery password, type your password when prompted. The Rescue and Recovery workspace opens after a short delay.

   Note: If the Rescue and Recovery workspace fails to open, see "Solving recovery problems" on page 58.
5. Do one of the following:
   - To rescue files from your hard disk drive or from a backup, click **Rescue files** and follow the instructions on the screen.
   - To restore your hard disk drive from a Rescue and Recovery backup or to restore your hard disk drive to the factory default settings, click **Restore your system** and follow the instructions on the screen.

For more information about the features of the Rescue and Recovery workspace, click **Help**.

Notes:

1. After restoring a hard disk drive to the factory default settings, you might have to reinstall device drivers for some devices. See "Installing or reinstalling device drivers" on page 57.
2. Some computers come with Microsoft Office or Microsoft Works preinstalled. If you need to recover or reinstall your Microsoft Office or Microsoft Works applications, you must use the *Microsoft Office CD* or *Microsoft Works CD*. These CDs are provided only with computers preinstalled with Microsoft Office or Microsoft Works.

Creating and using rescue media

With rescue media, such as a disc or a USB hard disk drive, you can recover the computer from failures that prevent you from gaining access to the Rescue and Recovery workspace on your hard disk drive.

Notes:

1. The recovery operations you can perform using rescue media vary depending on the operating system.
2. The rescue discs can be started in any type of CD or DVD drive.
3. You can also run the PC-Doctor for Rescue and Recovery diagnostic program, after using a rescue medium to recover the computer from failures and gaining access to the Rescue and Recovery workspace.

Creating rescue media

This section provides instructions on how to create rescue media on different operating systems.

- To create a rescue medium on the Windows 7 operating system, do the following:
  1. From the Windows desktop, click **Start → All Programs → Lenovo ThinkVantage Tools → Enhanced Backup and Restore**. The Rescue and Recovery program opens.
  2. From the Rescue and Recovery main window, click the **Launch advanced Rescue and Recovery** arrow.
  3. Click the **Create Rescue Media** icon. The Create Rescue and Recovery Media window opens.

4. In the **Rescue Media** area, select the type of rescue media you want to create. You can create a rescue medium using a disc, a USB hard disk drive, or a secondary internal hard disk drive.

5. Click **OK** and follow the instructions on the screen.

- To create a rescue medium on the Windows Vista operating system or the Windows XP operating system, do the following:

   1. From the Windows desktop, click **Start → All Programs → ThinkVantage → Create Recovery Media**. The Create Rescue and Recovery Media window opens.

   2. In the **Rescue Media** area, select the type of rescue media you want to create. You can create a rescue medium using a disc, a USB hard disk drive, or a secondary internal hard disk drive.

   3. Click **OK** and follow the instructions on the screen.

Using rescue media

This section provides instructions on how to use the rescue media you have created.

Note: Make sure your rescue device (optical drive, USB device, or the secondary internal hard disk drive) is set as the first boot device in the startup device sequence before doing this procedure. See "Selecting a startup device" on page 61.

To use the rescue medium you have created, do one of the following:

- If you have created the rescue medium using a disc, make sure that your computer is turned on and insert the rescue disc. Then, restart the computer. The rescue medium starts.

- If you have created the rescue medium using a USB hard disk drive, attach the USB hard disk drive to one of the USB connectors on your computer. Then, turn on the computer. The rescue medium starts.

- If you have created the rescue medium using a secondary internal hard disk drive, set the secondary internal hard disk drive as the first boot device in the startup device sequence. Then, the rescue medium starts.

When the rescue medium starts, the Rescue and Recovery workspace opens. The help information for each feature is available from the Rescue and Recovery workspace. Follow the instructions to complete the recovery process.

Creating and using a recovery repair diskette

If you are unable to access the Rescue and Recovery workspace or the Windows environment, use a recovery repair diskette to repair the Rescue and Recovery workspace or repair a file needed to enter the Windows environment. It is important to create a recovery repair diskette as early as possible and store it in a safe place as a precautionary measure.

Note: You need to have a diskette drive for creating and using a recovery repair diskette. If you do not have an internal diskette drive, you can use an external USB diskette drive.

Creating a recovery repair diskette

This section provides instructions on how to create a recovery repair diskette.

To create a recovery repair diskette, do the following:
1. Turn on the computer, and make sure that your computer has Internet access.
2. Follow the instructions on the Web site at:

http://www.lenovo.com/think/support/site.wss/document.do?lndocid=MIGR-54483

3. After the recovery repair diskette is created, take out the diskette from the diskette drive and label it *Recovery Repair Diskette*. Then, store it in a safe place for future use.

Using a recovery repair diskette

This section provides instructions on how to use a recovery repair diskette.

To use the recovery repair diskette you created, do the following:
1. Turn off the computer.
2. Insert the recovery repair diskette into the diskette drive.
3. Turn on the computer and follow the instructions on the screen.

Notes:
1. If the repair operation completes without any error, you will be able to access the Rescue and Recovery workspace by repeatedly pressing the F11 key while you restart your computer. When you hear beeps or see a logo screen, release the F11 key. You will also be able to access the Windows environment after the repair operation completes.
2. If an error message appears during the repair operation and the repair operation cannot be completed, you might have a problem with the partition that contains the Rescue and Recovery workspace. Use a rescue medium to access the Rescue and Recovery workspace. For information about creating and using rescue media, see "Creating and using rescue media" on page 55.

Installing or reinstalling device drivers

Before installing or reinstalling device drivers, make sure that you have a preinstalled operating system and the documentation and software media for the device.

Device drivers for factory-installed devices are located in the SWTOOLS\DRIVERS subdirectory on the computer hard disk drive (usually drive C:). The latest device drivers for factory-installed devices are also available at http://www.lenovo.com/support. Other device drivers are on the software media that come with individual devices.

To install or reinstall a device driver for a factory-installed device, do the following:
1. Turn on the computer.
2. Use Windows Explorer or My Computer to display the directory structure of your hard disk drive.
3. Go to the C:\SWTOOLS directory.

4. Open the DRIVERS folder. Within the DRIVERS folder, there are several subfolders named for various devices installed in your computer, such as AUDIO or VIDEO.

5. Open the appropriate device subfolder.

6. Do one of the following:
   - In the device subfolder, look for a README.txt file or a file with the .txt extension. This file might be named after the operating system, such as WIN98.txt. The TXT file contains information about how to install the device driver. Follow the instructions to complete the installation.
   - If the device subfolder contains a file with the .inf extension and you want to install the device driver using the INF file, click **Start → Help and Support** to enter the Windows Help and Support information system for the detailed information about how to install the device driver.
   - In the device subfolder, look for a SETUP.EXE file. Double-click the file and follow the instructions on the screen.

Setting a rescue device in the startup sequence

Before you start the Rescue and Recovery program from an internal hard disk drive, a disc, a USB hard disk drive, or other external devices, you must first make sure that your rescue device is set as the first boot device in the startup device sequence in the Setup Utility program. Refer to "Selecting a startup device" on page 61 for detailed information about temporarily or permanently changing the startup sequence.

Note: If you use an external device, you must first turn off your computer before connecting the external device.

For more information on the Setup Utility program, see Chapter 4, "Using the Setup Utility," on page 59.

Solving recovery problems

If you are unable to access the Rescue and Recovery workspace or the Windows environment, do one of the following:

- Use a rescue medium to start the Rescue and Recovery workspace. See "Creating and using rescue media" on page 55.
- Use a recovery repair diskette to repair the Rescue and Recovery workspace or repair a file needed to enter the Windows environment. See "Creating and using a recovery repair diskette" on page 56.
- Use a recovery medium if you want to restore the system drive or the hard disk drive to the factory default settings. See "Creating and using recovery media" on page 51.

Note: If you are unable to access the Rescue and Recovery workspace or the Windows environment from a rescue medium, a recovery repair diskette, or a recovery medium, you might not have the rescue device, diskette drive, or recovery device set as the first boot device in the startup device sequence. For more information, see "Setting a rescue device in the startup sequence."

It is important to create a rescue medium, a recovery repair diskette, and a recovery medium as early as possible and store them in a safe place.

Chapter 4. Using the Setup Utility

The Setup Utility program is used to view and change the configuration settings of your computer, regardless of which operating system you are using. However, the operating system settings might override any similar settings in the Setup Utility program.

Starting the Setup Utility program

To start the Setup Utility program, do the following:

1. Make sure your computer is turned off.

2. Repeatedly press and release the F1 key when turning on the computer. When you hear multiple beeps or see a logo screen, release the F1 key.

   Note: If a user password or an administrator password has been set, the Setup Utility program menu is not displayed until you type your password. For more information, see "Using passwords."

The Setup Utility program might start automatically when POST detects that hardware has been removed or new hardware has been installed in your computer.

Viewing and changing settings

The Setup Utility program menu lists items that identify system configuration topics. To view or change settings, see "Starting the Setup Utility program."

When working with the Setup Utility program menu, you must use the keyboard. The keys used to perform various tasks are displayed at the bottom of each screen.

Using passwords

By using the Setup Utility program, you can set passwords to prevent unauthorized access to your computer and data. See "Starting the Setup Utility program." The following types of passwords are available:

- User Password
- Administrator Password

You do not have to set any passwords to use your computer. However, if you decide to set any passwords, read the following sections.

Password considerations

A password can be any combination of up to 12 (1 to 12) alphabetic and numeric characters (a-z and 0-9). For security reasons, it is recommended to use a strong password that cannot be easily compromised. A strong password should adhere to the following rules:

- Have at least eight characters in length and contain at least one alphabetic character and one numeric character
- Setup Utility program and hard disk drive passwords are not case sensitive
- Not be your name or your user name
- Not be a common word or a common name
- Be significantly different from your previous password

User Password

When a User Password is set, the computer cannot be used until a valid password is typed in.

Administrator Password

When an Administrator Password is set, it deters unauthorized people from changing configuration settings. If you are responsible for maintaining the settings of several computers, you might want to set an Administrator Password.

After you set an Administrator Password, a password prompt is displayed each time you try to access the Setup Utility program.

If both the user and administrator passwords are set, you can type either password. However, to change any configuration settings, you must use your administrator password.

Setting, changing, and deleting a password

To set, change, or delete a password, do the following:

Note: A password can be any combination of up to 12 (1 to 12) alphabetic and numeric characters. For more information, see "Password considerations."

1. Start the Setup Utility program (see Chapter 4, "Using the Setup Utility," on page 59).
2. From the Setup Utility program menu, select **Security**.
3. Based on your need, select **Set User Passwords** or **Set Administrator Passwords**.
4. Read the information displayed on the right side of the screen.

Enabling or disabling a device

You can enable or disable user access to a device.

SATA 1	When this feature is set to **Disable**, all devices connected to the SATA controller (such as hard disk drives or the CD-ROM drive) are disabled and will not be displayed in the system configuration.
OnBoard Floppy Controller	When this feature is set to **Disable**, the diskette drive cannot be accessed.

To set the SATA 1, do the following:

1. Start the Setup Utility program (see "Starting the Setup Utility program" on page 59).
2. From the Setup Utility program menu, select **Devices** → **SATA Drives Setup** → **SATA 1** and press Enter.
3. Select **32 Bit Data Transfer**.
4. Select the desired settings and press Enter.
5. Return to the Setup Utility program menu and select **Exit** → **Save Changes and Exit**.

   Note: If you do not want to save the settings, select **Discard Changes** or **Discard Changes and Exit**.

To set the OnBoard Floppy Controller, do the following:

1. Start the Setup Utility program (see "Starting the Setup Utility program" on page 59).
2. From the Setup Utility program menu, select **Devices** → **Floppy Drive Setup** → **OnBoard Floppy Controller**.
3. Select the desired settings and press Enter.
4. Return to the Setup Utility program menu and select **Exit** → **Save Changes and Exit**.

   Note: If you do not want to save the settings, select **Discard Changes** or **Discard Changes and Exit**.

Selecting a startup device

If your computer does not start up from a device such as the CD-ROM, diskette, or hard disk drive as expected, use one of the following procedures to select a startup device.

Selecting a temporary startup device

Use this procedure to start up from any startup device.

Note: Not all CDs, hard disk drives, and diskettes are bootable.

1. Turn off your computer.
2. Press and hold the F12 key, and then turn on the computer. When the Startup Device Menu appears, release the F12 key.

   Note: If you are using a USB keyboard and the Startup Device Menu does not display using this method, repeatedly press and release the F12 key rather than leaving it pressed when turning on the computer.

3. Select the desired startup device from the Startup Device Menu and press Enter to begin.

Note: Selecting a startup device from the Startup Device menu does not permanently change the startup sequence.

Selecting or changing the startup device sequence

To view or permanently change the configured startup device sequence, do the following:

1. Start the Setup Utility program (see "Starting the Setup Utility program" on page 59).
2. Select **Startup** and read the information displayed on the right side of the screen.
3. Select the devices for the Primary Boot Sequence, the Automatic Boot Sequence, and the Error Boot Sequence.
4. From the Setup Utility menu, select **Exit** → **Save Changes and Exit**.

If you have changed these settings and want to return to the default settings, select **Load Optimal Defaults** on the Exit menu.

Exiting from the Setup Utility program

After you finish viewing or changing settings, press Esc to return to the Setup Utility program menu (you might have to press Esc several times). If you want to save the new settings, select **Save Changes and Exit**. Otherwise, your changes will not be saved.

Chapter 5. Updating system programs

This chapter contains information about updating the POST/BIOS and how to recover from a POST/BIOS update failure.

Using system programs

System programs are the basic layer of software built into your computer. They include the power-on self-test (POST), the basic Input/Output system (BIOS) code, and the Setup Utility program. The POST is a set of tests and procedures that are performed each time you turn on your computer. The BIOS is a layer of software that translates instructions from other layers of software into electrical signals that the computer hardware can execute. You can use the Setup Utility program to view and change the configuration and setup of your computer.

Your computer system board has a module called electrically erasable programmable read-only memory (EEPROM, also referred to as flash memory). You can easily update the POST, the BIOS, and the Setup Utility program by starting your computer using a flash update diskette or disc, or by running a special update program from your operating system.

Lenovo might make changes and enhancements to the POST/BIOS. When updates are released, they are available as downloadable files at http://www.lenovo.com. Instructions for using the POST/BIOS updates are available in a TXT file that is included with the update files. For most models, you can download either an update program to create a system-program-update (flash) diskette or disc, or an update program that can be run from the operating system.

Note: You can download a self-starting bootable CD/DVD image (known as an ISO image) of the diagnostics program to support systems without a diskette drive from:
http://www.lenovo.com

Updating (flashing) the BIOS from a diskette or disc

This section provides instructions on how to update (flash) the BIOS using a diskette or disc. System program updates are available at:
http://www.lenovo.com/support

1. To update (flash) the BIOS:
   - From a diskette, make sure the computer is turned off and insert a system-program-update (flash) diskette. Then turn on the computer. The update begins.
   - From a disc, make sure the computer is turned on and insert the disc into the optical drive.
2. Turn on the computer. If it is on already, you must turn it off and back on again. The update begins.
3. Select a language when prompted by pressing the number on your keyboard that corresponds to the language and then press Enter.
4. When prompted to change the serial number, press Y.
5. Type in the seven character serial number of your computer and then press Enter.

6. When prompted to change the machine type/model, press Y.

7. Type in the seven character machine type/model of your computer and then press Enter.

8. Follow the instructions on the screen to complete the update.

Updating (flashing) the BIOS from your operating system

> **Note:** The Web page content (including the links referenced in the following procedure) is subject to change because of the constant improvements made to the Web site.

1. Go to http://www.lenovo.com/support.

2. Locate the Downloadable files for your machine type as follows:

   a. In the **Enter a product** field, type your machine type.

   b. Click **Go** → **Continue** → **Downloads and drivers**.

   c. Under the BIOS category, click the Flash BIOS update.

   d. Click the TXT file that contains the installation instructions for the flash BIOS update (flash from the operating system version).

3. Print these instructions. This is very important because they are not on the screen after the download begins.

4. From your browser, click **Back** to return to the list of files. Carefully follow the printed instructions to download, extract, and install the update.

Recovering from a POST/BIOS update failure

If the power to your computer is interrupted while the POST/BIOS is being updated (flash update), your computer might not restart correctly. If this happens, perform the following procedure which is commonly called Boot-block recovery.

1. Turn off the computer and any attached devices, such as printers, monitors, and external drives.

2. Unplug all power cords from electrical outlets, and remove the computer cover. See "Removing the computer cover" on page 16.

3. Access the system board. See "Removing and reinstalling the front bezel" on page 18.

4. Locate the Clear CMOS/Recovery jumper on the system board. See "Locating parts on the system board" on page 12.

5. Remove any cables that might prevent your access to the Clear CMOS/Recovery jumper.

6. Move the jumper from the standard position (pin 1 and pin 2) to pin 2 and pin 3.

7. Reconnect any cables that were disconnected. See "Completing the parts replacement" on page 45.

8. Reinstall the computer cover and reconnect the power cords for the computer and monitor to electrical outlets.

9. Do one of the following:

   - Insert the POST/BIOS update (flash update) diskette into the diskette drive and turn on the computer and the monitor.

   - Turn on the computer and the monitor, and then insert the POST/BIOS update (flash update) disc into the optical drive. Turn the computer off and back on again.

10. The recovery session will take two to three minutes. During this time you will hear a series of beeps. After the update session is completed, there will be no video, the series of beeps will end, and the system will automatically turn off. Immediately remove the disc from the optical drive before the computer completely turns off or remove the diskette from the diskette drive.

11. Repeat steps 2 through 5.

12. Move the jumper back to the standard position (pin 1 and pin 2).

13. Reconnect any cables that were disconnected. See "Completing the parts replacement" on page 45.

14. Reinstall the computer cover and reconnect the power cords for the computer and monitor to electrical outlets.

15. Turn on the computer to restart the operating system.

Chapter 6. Troubleshooting and diagnostics

This chapter describes some basic troubleshooting and diagnostic programs. If your computer problem is not described here, see Chapter 7, "Getting information, help, and service," on page 73 for additional troubleshooting resources.

Basic troubleshooting

The following table provides information to help you troubleshoot your computer problems.

Note: If you cannot correct the problem, have the computer serviced. For a list of service and support telephone numbers, refer to the *ThinkCentre Safety and Warranty Guide* that comes with your computer or go to the Lenovo Support Web site at http://www.lenovo.com/support/phone.

Symptom	Action
The computer does not start when you press the power button.	Verify that: • The power cord is plugged into the rear of the computer and into a working electrical outlet. • If your computer has a secondary power switch on the back of the computer, make sure that it is switched on. • The power indicator on the front of the computer is on. • The voltage is set to the correct setting for your country.
The monitor screen is blank.	Verify that: • The monitor cable is securely attached to the rear of the monitor and to the rear of the computer. • The monitor power cord is plugged into the monitor and into a working electrical outlet. • The monitor is turned on and the brightness and contrast controls are set correctly. • The voltage is set to the correct setting for your country. • The monitor signal cable is securely connected to the monitor and to the monitor connector on the computer. **Note:** If your computer has two monitor connectors, verify that your monitor is connected to the option connector rather than the one in the rear of the system board. For more information, see "Connecting your computer" in the *ThinkCentre Safety and Warranty Guide*.
The keyboard does not work. The computer does not respond to the keyboard.	Verify that: • The computer is turned on. • The monitor is turned on and the brightness and contrast controls are set correctly. • The keyboard is securely connected to the keyboard connector on the computer. • No keys are stuck.

Symptom	Action
The USB Keyboard does not work.	Verify that: • The computer is turned on. • The keyboard is securely connected to a USB connector on the front or rear of the computer. • No keys are stuck.
The mouse does not work. The computer does not respond to the mouse.	Verify that: • The computer is turned on. • The mouse is securely connected to the mouse connector on the computer. • The mouse is clean. Refer to "Cleaning the mouse" on page 70 for further information.
The operating system will not start.	Verify that: • There is no diskette in the diskette drive. • The startup sequence includes the device where the operating system resides. Usually, the operating system is on the hard disk drive. For more information, see "Selecting a startup device" on page 61.
The computer beeps multiple times before the operating system starts.	Verify that no keys are stuck down.

Diagnostic programs

Diagnostic programs are used to test hardware components of your computer. Diagnostic programs are also used to report operating-system-controlled settings that interfere with the correct operation of your computer. There are two programs preinstalled on your computer to help you diagnose computer problems:

• Lenovo ThinkVantage Toolbox or Lenovo System Toolbox, depending on your operating system (used when you are running the Windows operating system)

• PC-Doctor for Rescue and Recovery (used when your Windows operating system does not start)

Notes:

1. You can also download the PC-Doctor for DOS diagnostic program from http://www.lenovo.com/support. See "PC-Doctor for DOS" on page 70 for detailed information.

2. If you are unable to isolate and repair the problem yourself after running the diagnostic programs, save and print the log files created by the diagnostic programs. You will need the log files when you speak to a Lenovo technical support representative.

Lenovo ThinkVantage Toolbox

Note: The Lenovo ThinkVantage Toolbox program is only available on computers preinstalled with the Windows 7 operating system from Lenovo.

The Lenovo ThinkVantage Toolbox program helps you maintain your computer, improve computing security, diagnose computer problems, get familiar with the innovative technologies provided by Lenovo, and get more information about your computer. You can use the Diagnostics feature of the Lenovo ThinkVantage Toolbox program to test devices, diagnose computer problems, create bootable diagnostic media, update system drivers, and view system information.

To run the Lenovo ThinkVantage Toolbox program, click **Start ➜ All Programs ➜ Lenovo ThinkVantage Tools ➜ System Health and Diagnostics**. Follow the instructions on the screen.

For additional information about running the Lenovo ThinkVantage Toolbox program, refer to the Lenovo ThinkVantage Toolbox help system.

Lenovo System Toolbox

Note: The Lenovo System Toolbox program is only available on computers preinstalled with the Windows Vista operating system or the Windows XP operating system from Lenovo.

The Lenovo System Toolbox diagnostic program works through the Windows operating system to enable you to view symptoms and solutions for computer problems, access the Lenovo troubleshooting center, update system drivers, and view system information.

To run the Lenovo System Toolbox program, click **Start ➜ All Programs ➜ Lenovo Services ➜ Lenovo System Toolbox**. Follow the instructions on the screen.

For additional information about running the diagnostic program, refer to the Lenovo System Toolbox help system.

PC-Doctor for Rescue and Recovery

The PC-Doctor for Rescue and Recovery diagnostic program is part of the Rescue and Recovery workspace on each Lenovo computer. Use the PC-Doctor for Rescue and Recovery diagnostic program if you are unable to start the Windows operating system.

To run the PC-Doctor for Rescue and Recovery diagnostic program from the Rescue and Recovery workspace, do the following:
1. Turn off the computer.
2. Repeatedly press and release the F11 key when turning on the computer. When you hear beeps or see a logo screen, stop pressing the F11 key. The Rescue and Recovery workspace opens after a short delay.
3. From the Rescue and Recovery workspace, select **Launch advanced Rescue and Recovery ➜ Diagnose hardware**. The PC-Doctor for Rescue and Recovery diagnostic program opens.
4. Select the diagnostic test you want to run. Then, follow the instructions on the screen.

For additional information about running the PC-Doctor for Rescue and Recovery diagnostic program, refer to the PC-Doctor for Rescue and Recovery diagnostic program help system.

Note: If you encounter failures that prevent you from gaining access to the Rescue and Recovery workspace, you can run the PC-Doctor for Rescue and Recovery diagnostic program after using a rescue medium to recover the computer from failures and gaining access to the Rescue and Recovery workspace. See "Creating and using rescue media" on page 55.

PC-Doctor for DOS

You can also download the latest version of the PC-Doctor for DOS diagnostic program from http://www.lenovo.com/support. The PC-Doctor for DOS diagnostic program runs independently of the Windows operating system. Use the PC-Doctor for DOS diagnostic program if you are unable to start the Windows operating system or if the two diagnostic programs preinstalled on your computer have not been successful in isolating a possible problem. You can run the PC-Doctor for DOS diagnostic program from a diagnostic disc that you created.

Creating a diagnostic disc

This section provides instructions on how to create a diagnostic disc.

To create a diagnostic disc, do the following:

1. Download a self-starting bootable CD/DVD image (known as an ISO image) of the diagnostic program from:
   http://www.lenovo.com/support
2. Use any CD/DVD burning software to create a diagnostic disc with the ISO image.

Running the diagnostic program from a diagnostic disc

This section provides instructions on how to run the diagnostic program from a diagnostic disc that you created.

To run the diagnostic program from a diagnostic disc that you created, do the following:

1. Make sure the optical drive you want to use is set as the first boot device in the startup device sequence. See "Selecting a startup device" on page 61.
2. Make sure the computer is turned on and then insert the disc into the optical drive. The diagnostic program opens.

   Note: You can insert the disc into the optical drive when you are setting the startup device sequence. However, if you insert the disc into the optical drive when you have already entered the operating system, you need to restart the computer to access the diagnostic program.
3. Follow the instructions on the screen to select the diagnostic test you want to run.

   Note: For additional help, press the F1 key.
4. Remove the diagnostic disc from the optical drive when you complete the diagnostic process.

Cleaning the mouse

This section provides instructions on how to clean an optical or non-optical mouse.

Optical mouse

An optical mouse uses a light-emitting diode (LED) and an optical sensor to navigate the pointer. If the pointer on the screen does not move smoothly with the optical mouse, you might need to clean the mouse.
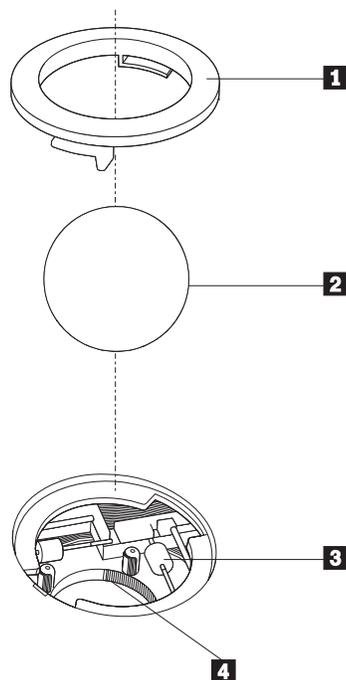
To clean the optical mouse:

1. Turn off your computer.
2. Disconnect the mouse cable from the computer.

3. Turn the mouse upside down to look at the lens.
   a. If there is a smudge on the lens, gently clean the area with a plain cotton-tipped swab.
   b. If there is debris in the lens, gently blow the debris away from the area.
4. Check the surface on which you are using the mouse. If you have a very intricate picture or pattern beneath the mouse it may be difficult for the digital signal processor (DSP) to determine changes in the mouse position.
5. Reconnect the mouse cable to the computer.
6. Turn your computer back on.

Non-optical mouse

The non-optical mouse uses a ball to navigate the pointer. If the pointer on the screen does not move smoothly with the mouse, you might need to clean the mouse.

1 Retainer ring
2 Ball
3 Plastic rollers
4 Ball cage

To clean the non-optical mouse, do the following:

Note: The following illustration might be slightly different from your mouse.
1. Turn off your computer.
2. Disconnect the mouse cable from the computer.
3. Turn the mouse upside down. Twist the retainer ring 1 to the unlocked position to remove the ball.
4. Place your hand over the retainer ring and ball 2 , and then turn the mouse right-side up, so that the retainer ring and ball fall out into your hand.
5. Wash the ball in warm, soapy water then dry it with a clean cloth.

6. Blow air carefully into the ball cage **4** to dislodge dust and lint.

7. Look for a buildup of dirt on the plastic rollers **3** inside the ball cage. This buildup usually appears as a stripe running across the middle of the rollers.

8. If the rollers are dirty, clean them by using a cotton swab soaked in isopropyl (rubbing) alcohol. Turn the rollers with your finger and continue swabbing them until all the dirt is removed. Be sure the rollers are still centered in their channels after you clean them.

9. Remove any fibers from the swab that might be remaining on the rollers.

10. Replace the ball and the retainer ring. Twist the retainer ring to the locked position.

11. Reconnect the mouse cable to the computer.

12. Turn your computer back on.

Chapter 7. Getting information, help, and service

This chapter contains information about help, service, and technical assistance for products manufactured by Lenovo.

Information resources

This section describes how to access useful resources relating to your computing needs.

Online Books folder

Note: The Online Books folder is only available on computers that have an internal hard disk drive and preinstalled software from Lenovo.

The Online Books folder preinstalled on your computer contains the *ThinkCentre User Guide*, which provides information about your computer to help you set up, use, and maintain your computer. It requires no Internet access to view the publication.

To view the publications, click **Start → All Programs → Online Books → Online Books**, then double-click the appropriate publication for your computer. The publications are also available on the Lenovo Support Web site at:
http://www.lenovo.com/support

Notes:
1. The publications are in Portable Document Format (PDF). To view the publications, you need to have the Adobe Reader program preinstalled on your computer. If the Adobe Reader program has not been installed on your computer, a message will appear when you attempt to view the PDF file and you will be guided through the Adobe Reader program installation.
2. The publications are available in other languages on the Lenovo Support Web site at:
   http://www.lenovo.com/support
3. If you want to install a different language version of the Adobe Reader program rather than the version preinstalled on your computer, download the language version you want from the Adobe Web site at:
   http://www.adobe.com

Lenovo ThinkVantage Tools

The Lenovo ThinkVantage Tools program guides you to a host of information sources and provides easy access to various tools to help you work more easily and securely.

Note: The Lenovo ThinkVantage Tools program is only available on computers with the Windows 7 operating system from Lenovo.

To access the Lenovo ThinkVantage Tools program, click **Start → All Programs → Lenovo ThinkVantage Tools**.

ThinkVantage Productivity Center

Note: The ThinkVantage Productivity Center program is only available on computers preinstalled with the Windows Vista operating system or the Windows XP operating system from Lenovo.

The ThinkVantage Productivity Center program contains information sources and tools designed to make computing easy and secure. It provides easy access to various technologies, such as:

- Rescue and Recovery
- Client Security Solution
- Factory Recovery
- System Update

To access the ThinkVantage Productivity Center program, click **Start** → **All Programs** → **ThinkVantage** →**Productivity Center**.

Lenovo Welcome

The Lenovo Welcome program introduces you to some innovative built-in features of Lenovo and guides you through a few important setup tasks to help you make the most of your computer.

Note: The Lenovo Welcome program is only available on computers preinstalled with the Windows 7 operating system from Lenovo.

Access Help

The Access Help information system provides information about getting started, doing basic tasks, customizing settings for your personal preference, protecting data, expanding and upgrading, and troubleshooting.

- To open the Access Help information system on the Windows 7 operating system, click **Start** → **Help and Support** → **Lenovo Access Help**.
- To open the Access Help information system on the Windows Vista operating system or the Windows XP operating system, click **Start** → **All Programs** → **ThinkVantage** → **Access Help**.

After you have opened the Access Help information system, use the left panel to make a selection from the **Contents** tab or the **Index** tab, or use the **Search** tab to find a particular word or phrase.

Safety and Warranty

The safety and warranty information that is provided with your computer contains information on safety, warranty, and notices. Be sure to read and understand all the safety information before using this product.

Lenovo Web site (http://www.lenovo.com)

The Lenovo Web site provides up-to-date information and services to help you buy, upgrade, and maintain your computer. You can also do the following:

- Shop for desktop and notebook computers, monitors, projectors, upgrades and accessories for your computer, and special offers.
- Purchase additional services, such as support for hardware, operating systems, application programs, network setup and configuration, and custom installations.

- Purchase upgrades and extended hardware repair services.
- Download the latest device drivers and software updates for your computer model.
- Access the online manuals for your products.
- Access the Lenovo Limited Warranty.
- Access troubleshooting and support information for your computer model and other supported products.
- Find the service and support phone number for your country or region.
- Find a Service Provider located near you.

Help and service

This section contains information about obtaining help and service.

Using the documentation and diagnostic programs

If you experience a problem with your computer, see Chapter 6, "Troubleshooting and diagnostics," on page 67. For information on additional resources to help you troubleshoot your computer problem, see "Information resources" on page 73.

If you suspect a software problem, see the documentation, including readme files and online help, that comes with the operating system or application program.

Most computers come with a set of diagnostic programs that you can use to help you identify hardware problems. For instructions on using the diagnostic programs, see "Diagnostic programs" on page 68.

Lenovo maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, follow the instructions at:
http://www.lenovo.com/support

Calling for service

During the warranty period, you can get help and information by telephone through the Customer Support Center.

These services are available during the warranty period:
- **Problem determination** - Trained personnel are available to assist you with determining a hardware problem and deciding what action is necessary to fix the problem.
- **Hardware repair** - If the problem is caused by hardware under warranty, trained service personnel are available to provide the applicable level of service.
- **Engineering Change management** - There might be changes that are required after a product has been sold. Lenovo or your reseller will make selected Engineering Changes (ECs) that apply to your hardware available.

The following items are not covered by the warranty:
- Replacement or use of parts not manufactured for or by Lenovo or non-warranted Lenovo parts
- Identification of software problem sources
- Configuration of BIOS as part of an installation or upgrade
- Changes, modifications, or upgrades to device drivers
- Installation and maintenance of network operating systems (NOS)
- Installation and maintenance of application programs

Refer to the safety and warranty information that is provided with your computer for a complete explanation of warranty terms. You must retain your proof of purchase to obtain warranty service.

For a list of service and support phone numbers for your country or region, go to http://www.lenovo.com/support and click **Support phone list** or refer to the safety and warranty information provided with your computer.

Note: Phone numbers are subject to change without notice. If the number for your country or region is not provided, contact your Lenovo reseller or Lenovo marketing representative.

If possible, be at your computer when you call. Have the following information available:
- Machine type and model
- Serial numbers of your hardware products
- Description of the problem
- Exact wording of any error messages
- Hardware and software configuration information

Using other services

If you travel with your computer or relocate it to a country where your desktop or notebook computer machine type is sold, your computer might be eligible for International Warranty Service, which automatically entitles you to obtain warranty service throughout the warranty period. Service will be performed by service providers authorized to perform warranty service.

Service methods and procedures vary by country, and some services might not be available in all countries. International Warranty Service is delivered through the method of service (such as depot, carry-in, or on-site service) that is provided in the servicing country. Service centers in certain countries might not be able to service all models of a particular machine type. In some countries, fees and restrictions might apply at the time of service.

To determine whether your computer is eligible for International Warranty Service and to view a list of the countries where service is available, go to http://www.lenovo.com/support, click **Warranty**, and follow the instructions on the screen.

For technical assistance with the installation of or questions related to Service Packs for your preinstalled Microsoft Windows product, refer to the Microsoft Product Support Services Web site at http://support.microsoft.com/directory/, or you can contact the Customer Support Center. Some fees might apply.

Purchasing additional services

During and after the warranty period, you can purchase additional services, such as support for hardware, operating systems, and application programs; network setup and configuration; upgraded or extended hardware repair services; and custom installations. Service availability and service name might vary by country or region. For more information about these services, go to:
http://www.lenovo.com

Appendix. Notices

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Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may

vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

Television output notice

The following notice applies to models that have the factory-installed television-output feature.

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