



Chapter 11: Advanced Personal Computers



IT Essentials: PC Hardware and Software v4.0

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Computer Technicians

When training to become a computer technician, develop the following skills:

- Building and upgrading computers
- Performing installations
- Installing, configuring, and optimizing software
- Performing preventive maintenance
- Troubleshooting and repairing computers
- Communicating clearly with the customer
- Documenting customer feedback and the steps involved in finding the solution to a problem

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Field, Remote, and Bench Technicians



- A **field technician** needs troubleshooting skills and customer service skills, because they work on-site, are in regular contact with customers and work on a wide variety of hardware and software.

- A **remote technician** may work at a help desk answering calls or e-mails from customers who have computer problems and need good communication skills.



- A **bench technician** may not work directly with customers. Bench technicians are often hired to perform computer warranty service in a central depot or work facility.

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High Voltage Computer Components

The following dangerous, high-voltage computer components should only be serviced by authorized personnel:

- **Power supplies** - Most broken or used power supplies are replaced.
- **Display monitors** - The internal electronic parts of a display monitor cannot be repaired, but they can be replaced.
- **Laser printers** - It is more cost effective to fix broken printers by repairing or replacing broken parts. Laser printers use high voltages and may have very hot surfaces inside.


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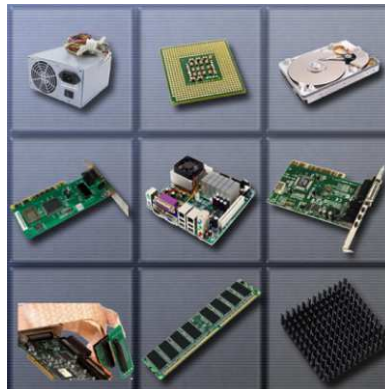
Environmental Issues



- A **computer recycling warehouse** is a place where discarded computer equipment can be taken apart.
- Computer parts that are still usable can be recycled for repairing other equipment.
- Many organizations have policies that define disposal methods for the hazardous components found in electronic equipment.

Computer Replacement Components

Situations that require the replacement of computer components include the repair of broken parts or an upgrade for functionality.



Select a Case and Power Supply

- Determine the customer's needs before making any purchases or performing upgrades.
- The computer case holds the power supply, motherboard, memory, and other components.
- When purchasing a new computer case and power supply separately, ensure that all of the components will fit into the new case and that the power supply is powerful enough to operate all of the components.



Select a Motherboard

- When you select a replacement motherboard, make sure it supports the CPU, RAM, video adapter, and other adapter cards.
- The socket and chip set on the motherboard must be compatible with the CPU.
- The motherboard must accommodate the existing heat sink/fan assembly.
- The existing power supply must have connections that fit the new motherboard.
- The number and type of expansion slots must match the existing adapter cards.
- The new motherboard must physically fit into the current computer case.



Select CPU and Heat Sink/Fan Assembly

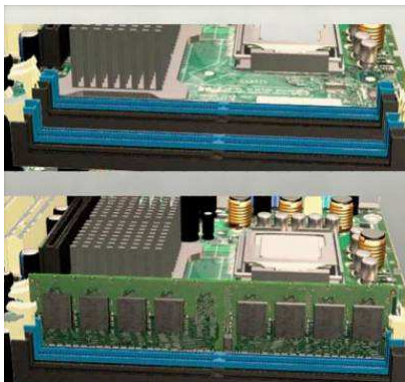
Replace the CPU when it fails or is no longer adequate for the current applications.

Make sure the CPU is compatible with the existing motherboard:

- The new CPU must use the same socket type and chip set.
- The BIOS must support the new CPU.
- The new CPU may require a different heat sink/fan assembly.
- Make sure the correct voltage is maintained.
- Use manufacturers' websites to investigate the compatibility between CPUs and other devices.

Select RAM

- New RAM may be needed when an application locks up or the computer displays frequent error messages.



- When selecting new RAM, check the compatibility with the current motherboard.
- The speed of the new RAM must be the same or faster than the existing RAM.

Select Adapter Cards

- Adapter (or expansion) cards, add extra functionality to a computer. Before purchasing an adapter card, check:

Is there an open expansion slot?

Is the adapter card compatible with the open slot?



- If the motherboard does not have compatible expansion slots, external devices may be an option:

Are USB or FireWire versions of the external device available?

Does the computer have an open USB or FireWire port?

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Scenario: Adapter Card Upgrade

- A customer requires a wireless card to connect to the network.

Investigate wireless NICs before you purchase one.

1. Is the new wireless NIC compatible with the 802.11 wireless standard (a, b, or g) used on the wireless network?
2. Does the computer have an available expansion slot or an open USB port?
3. Identify which adapter cards are compatible?
4. Now, consider cost, warranty, brand name, and availability to select one of the compatible adapter cards for purchase.

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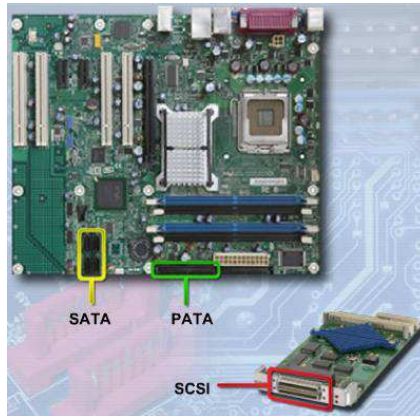
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Hard Drive Failures

The signs that a hard drive is failing and should be replaced as soon as possible:

- Unusual noises
- Error messages
- Corrupt data or applications



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Hard Drive Connectors

- **PATA (Parallel ATA)** hard drives

Originally, called **ATA (Advanced Technology Attachment)**.

With the introduction of SATA, ATA was renamed to PATA.

Can use a 40-pin / 80-conductor cable or a 40-pin / 40-conductor cable.

- **SATA (Serial ATA)** hard drives

Connect to the motherboard using a serial interface.

Have a higher data-transfer rate than PATA drives.

Smaller data cable allows for improved airflow.

- **SCSI (Small Computer Systems Interface)** hard drives

More advanced interface controller than PATA or SATA.

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Select Input and Output (I/O) Devices

- An input device transfers information into a computer:
Mouse, keyboard, scanner, camera, process control sensor, MIDI interface, and microphone
 - An output device transfers information out of a computer:
Display monitor, projector, printer, process-control equipment, and speaker
1. Find out what the customer wants
 2. Research possible solutions
 3. Determine which devices the customer needs
 4. Determine how to connect the devices to the computer

Types of I/O Device Interfaces

- USB 1.1
Transfers data up to 12 Mbps
- USB 2.0
Transfers data up to 480 Mbps
- IEEE 1394 (FireWire)
Transfers data at 100, 200, or 400 Mbps
- Parallel (IEEE 1284)
Transfers data up to 3 MBps
- Serial (RS-232)
Early versions: less than 20 Kbps. Now: up to 1.5 Mbps
- SCSI (Ultra-320 SCSI)
Connects as many as 15 devices at 320 MBps



Upgrade Components and Peripherals



Computer systems need periodic upgrades:

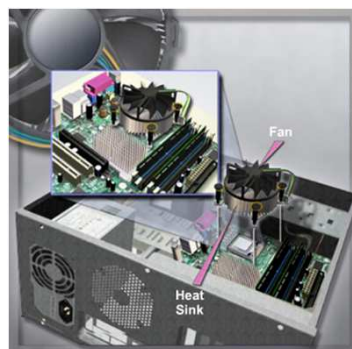
- User requirements change
- Upgraded software packages require new hardware
- New hardware offers enhanced performance

Research the effectiveness and cost for both upgrading and replacing.



Upgrade and Configure CPU

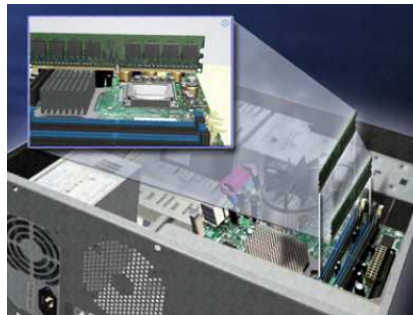
- **CAUTION:** Always work on an antistatic mat and wear a wrist strap when installing and removing CPUs.
- Remove the existing CPU by releasing it from the socket using the zero insertion force lever.
- Insert the new CPU into place.
- Excessive force may damage the CPU or its socket.



Upgrade and Configure RAM

CAUTION: Work on an antistatic mat. Wear a wrist strap.

1. Remove the existing RAM by freeing retaining clips that secure it. Pull it from the socket.
2. Insert the new RAM, and lock it into place with the retaining clips.
3. The RAM should be discovered by the system.
4. If the BIOS does not indicate the presence of the correct amount of RAM, troubleshoot.



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