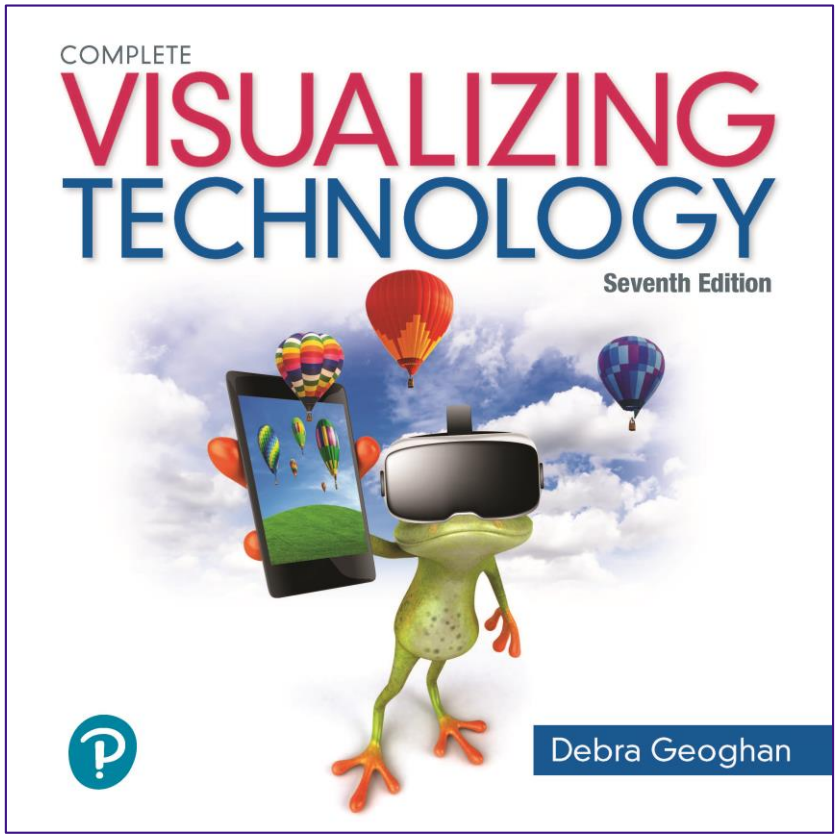
Introductory Visualizing Technology

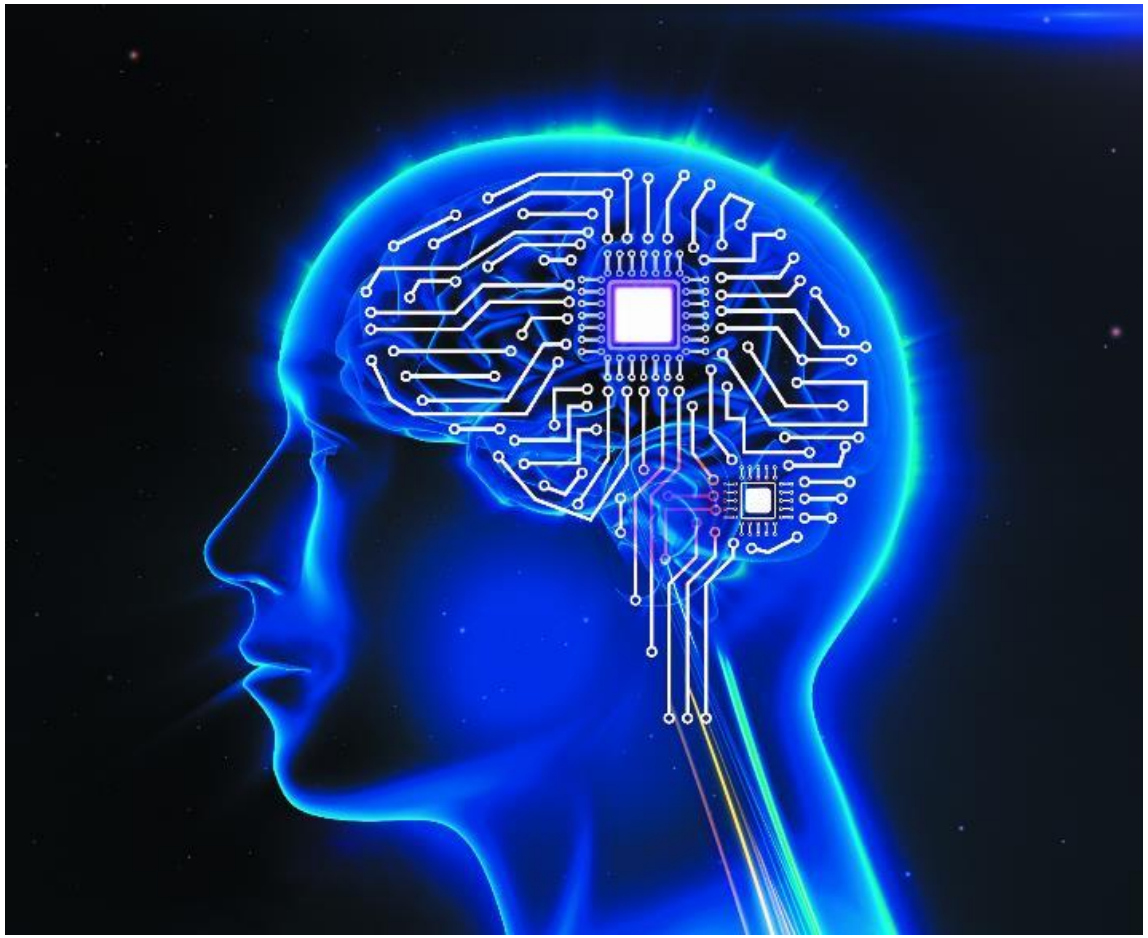
Seventh Edition



Chapter 4

Hardware

The Functions of a CPU



Functions of the CPU

- Central Processing Unit (CPU or Processor)
  - Brain of the computer; housed on the motherboard
  - Arithmetic Logic Unit (ALU)
    - Performs calculations
  - Control Unit: Manages data movement through the CPU
    - Executes instructions
    - Makes decisions

CPU Performance

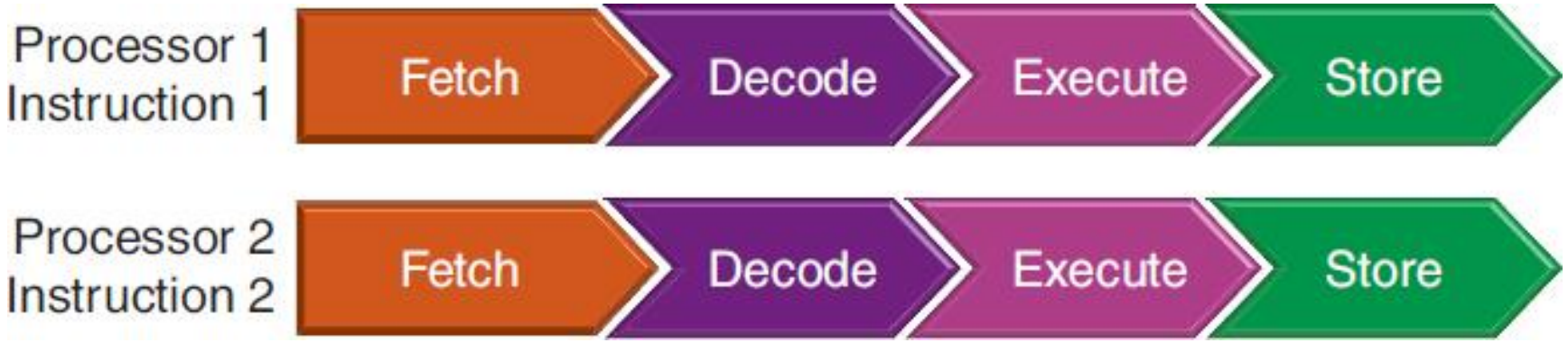
- CPU performance is measured in:
  - Clock speed
    - Speed at which the processor executes the machine cycles
    - Overclock
  - Gigahertz (GHz)
    - Billions of cycles per second

CPU Performance

- Multi-core processor
  - Two or more processors integrated on a single chip
    - Increases processing speed
    - Reduces energy consumption
  - GPU (graphics processing unit)
    - A video card that has its own processor

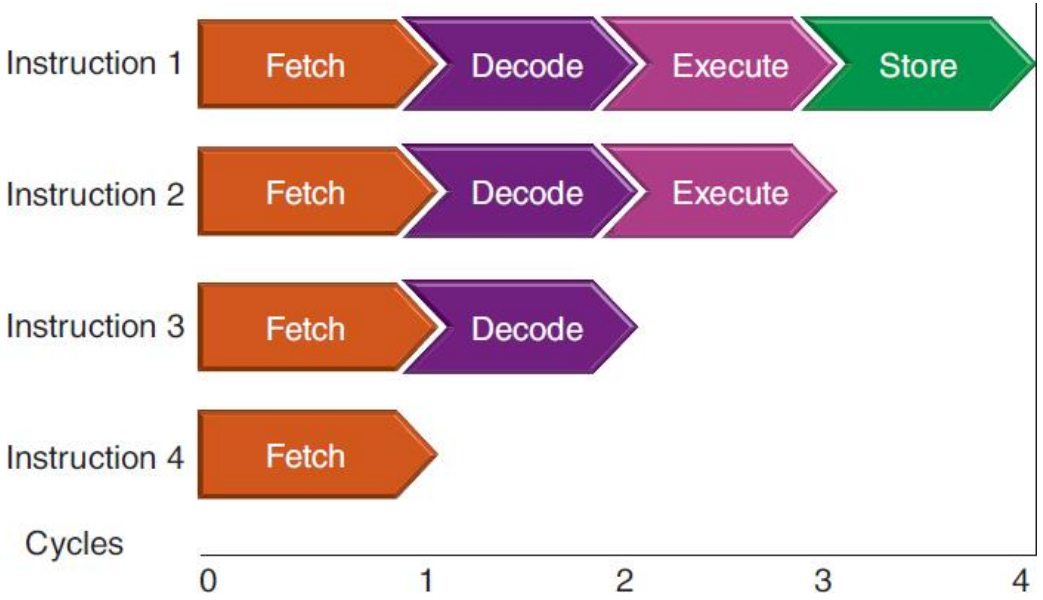
CPU Performance

- Parallel processing
  - Uses multiple processors, or multi-core processors, to divide up processing tasks
  - Each processor can use pipelining to further boost processing efficiency



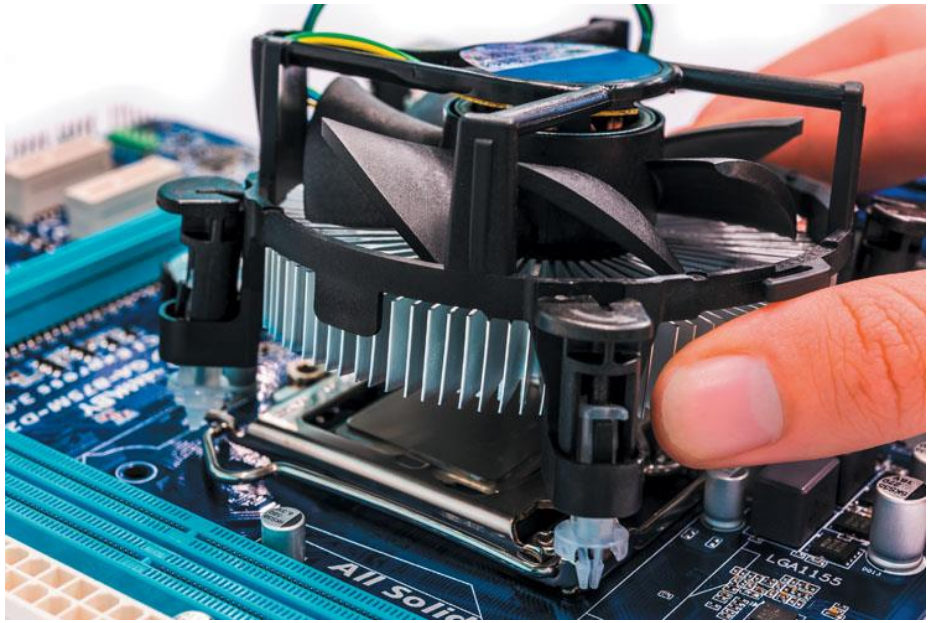
CPU Performance

- Pipelining
  - Used by a single processor
  - When the first instruction moves from stage 1 to stage 2 of the machine cycle, the next instruction moves into stage 1—like an assembly line

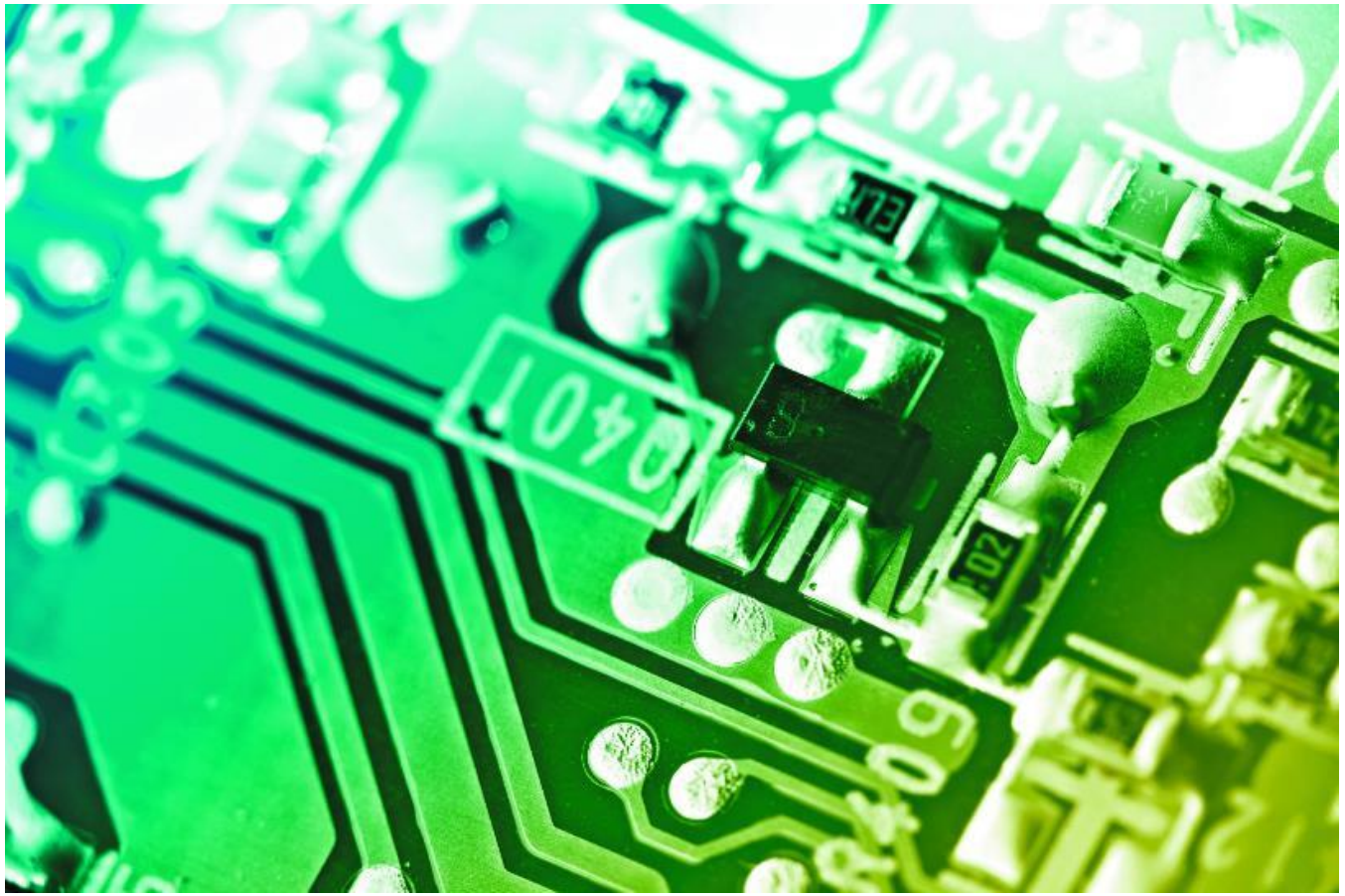


CPU Performance and Cooling

- Processing generates heat
  - To prevent overheating, the CPU uses:
    - Heat sink – draws heat away from the processor
    - Cooling fan – positioned above the processor
  - System units have at least one system fan

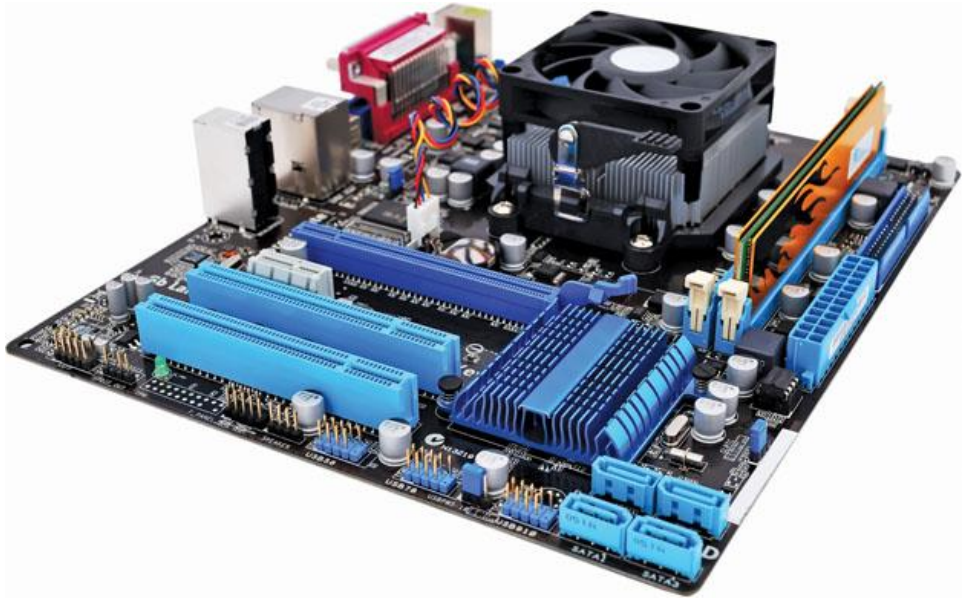


Identify the Parts of a System Unit and Motherboard



The Motherboard—the Main Circuit Board of the Computer

- This system unit contains:
  - The CPU or processor (under the cooling fan)
  - The power supply
  - Motherboard (mostly obscured by other components)
  - Memory



Ports and Connectors—Connect Peripherals to the Motherboard

- Ports connect peripherals to the motherboard
  - Audio
  - Video
  - Ethernet
  - Bluetooth

Ports and Connectors—Connect Peripherals to the Motherboard

- Ports connect peripherals to the motherboard
  - USB
  - Thunderbolt

Memory (Primary Storage)

- Temporary Storage that holds instructions and data
- Types of memory used by computers
  - Random access memory (RAM)
    - Volatile memory that holds the OS, programs, and data the computer is currently using
  - Cache memory—very fast memory used to store frequently accessed information
    - Level 1 (L1)
    - Level 2 (L2)
    - Level 3 (L3)

Storage Devices

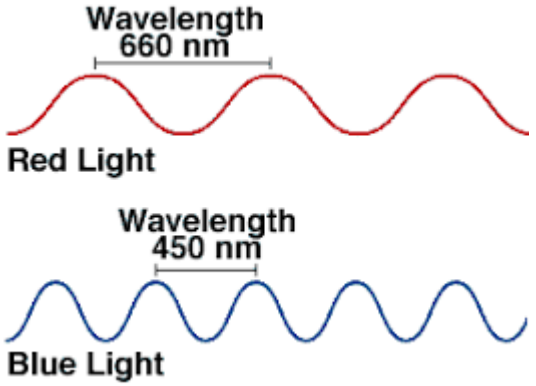
Storage Devices

- Optical discs
  - CDs
  - DVDs
  - Blu-ray
- Solid-state storage
  - Flash drives
  - Memory cards
  - Mobile devices

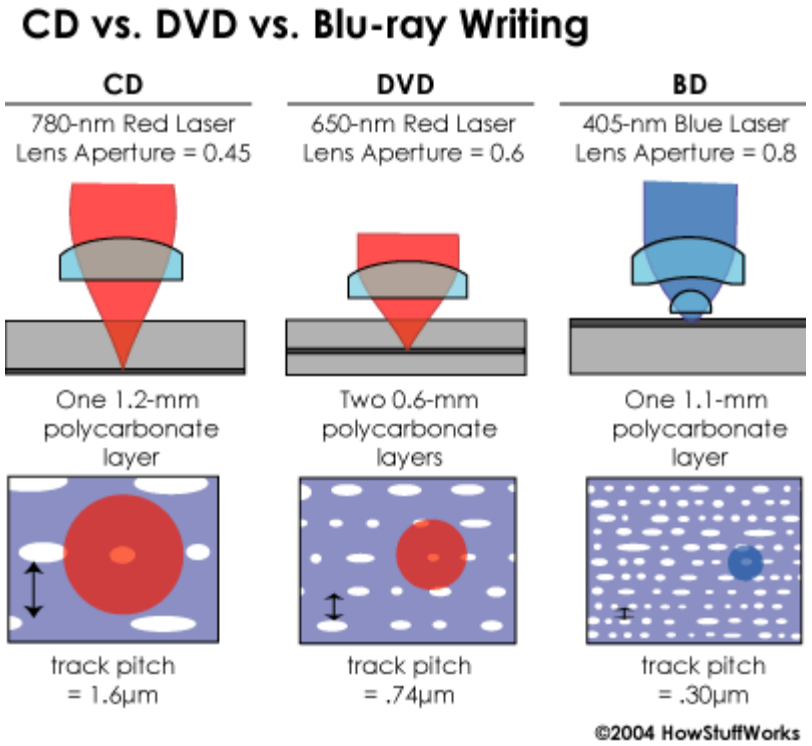
What is the difference between DVD and Blu Ray?

The track pitch (distance between tracks) is much smaller, Blu-ray is 0.32 microns and DVD is 0.74 microns

What is the difference between DVD and Blu Ray?



What is the difference between DVD and Blu Ray?



Storage Devices

- Magnetic storage
  - Hard drive
  - Primary mass-storage device in most computers

Common Input Devices

Input Devices—Devices Used to Get Data into the Computer

- Keyboard
- Mouse

Input Devices—Devices Used to Get Data into the Computer

- Keypad
- Touchpad
- Stylus

Input Devices—Devices Used to Get Data into the Computer

- Digital cameras and webcams
- Optical scanners
- QR code readers
- Near field communication (NFC) devices
- Magnetic strip readers
- Biometric scanners
- Joysticks

Essential Video and Audio Output Devices

Video Output Devices—Monitors

- Work by lighting pixels (picture elements) on the screen
  - CRT
    - Cathode ray tube; considered legacy technology
  - LCD
    - Liquid crystal display; popular in desktops and notebooks
  - Plasma
    - Larger in size; mostly used with media center systems or in conference rooms

Video Output Devices—Monitors

- OLED
  - Organic light-emitting diode; considered next technology of monitors
- AMOLED
  - Active matrix OLED screens; found in some mobile devices
  - Sharper and have a wider viewing angle

Video Output Devices—Projectors

- Produce larger output
- More practical for presentations
- Examples
  - DLP projectors
    - Hundreds of thousands of tiny swiveling mirrors that create an image
    - Higher contrast and deeper blacks
  - LCD projectors
    - Pass light through a prism
    - Poorer contrast and washed-out blacks

Video Cards

- Expansion cards that provide the data signal and connector for a monitor or projector
- The card can be integrated on the motherboard or connected via:
  - Expansion card
  - External USB
  - FireWire

Audio Output Devices

- Converts digital signals into sound
- Provided by:
  - Speakers
  - Headphones
- Provides audio connections for both:
  - Input devices
  - Output devices

Printers

- Inkjet printer
  - Sprays droplets of ink onto paper
- Photo printer
  - Prints high-quality photos

Printers

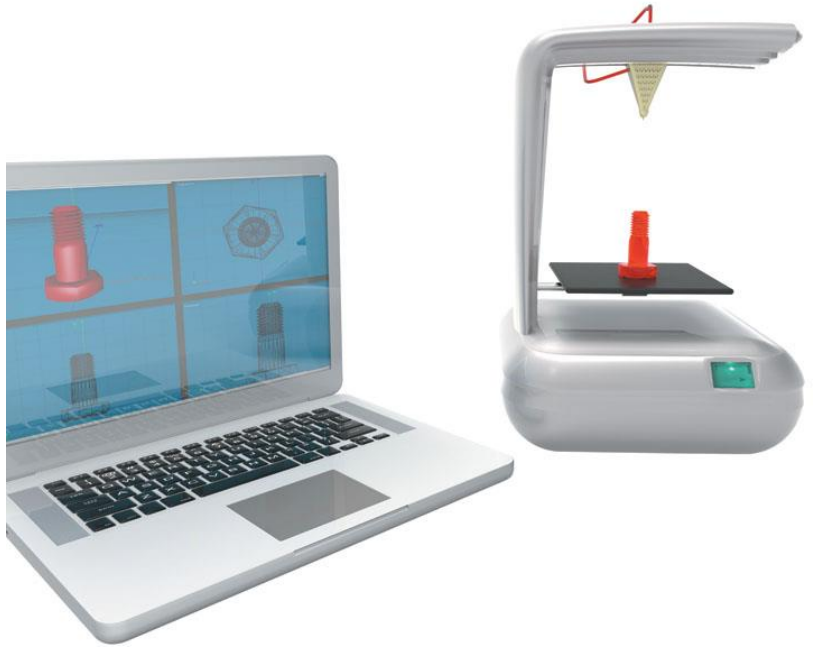
- Dye-sublimation printer
  - Uses heat to turn solid dye into a gas that is then transferred to special paper
- Thermal printer
  - Heats specially coated heat-sensitive paper, which changes color when heat is applied

Printers

- Laser printer
  - Uses a laser beam to draw an image on a drum
- Plotter
  - Uses pens to draw an image on a roll of paper
  - Used to produce very large printouts
- Multifunction device
  - Has built-in scanner, fax, copy, and print capabilities

Printers

- Three-dimensional (3D) printer
  - Creates objects such as prototypes and models by scanning an object or design using computer software
  - Creates the model by building layers of material
  - Used in:
    - Dental and medical imaging
    - Architecture



Examples of Adaptive Technology

Adaptive Technology

- Americans with Disabilities Act (ADA) -1990
  - Requires employers with 15 or more employees to make reasonable accommodations for disabled employees
- Assistive technology
  - Used by individuals with disabilities to interact with technology
  - Includes both hardware and software
  - Modern operating systems include accessibility settings

Adaptive Technology—Input Devices

- Braille-writing devices
- Eye-driven keyboards
- Keyboards with locator dots or large-print key labels
- On-screen keyboards
- Voice-recognition software

Adaptive Technology—Output Devices

- Standard monitors can be adapted by magnifying the screen
- Speech synthesis screen-reader software and audio alerts
- Closed captions and visual notifications
- Braille embossers translate text to Braille

Communication Devices

Communication Devices—Network Adapters, Modems, and Fax Devices

- Function as both input and output devices
- Allow you to connect to other devices on a network or the Internet
- Examples
  - Network adapters
  - Modems
  - Fax machines

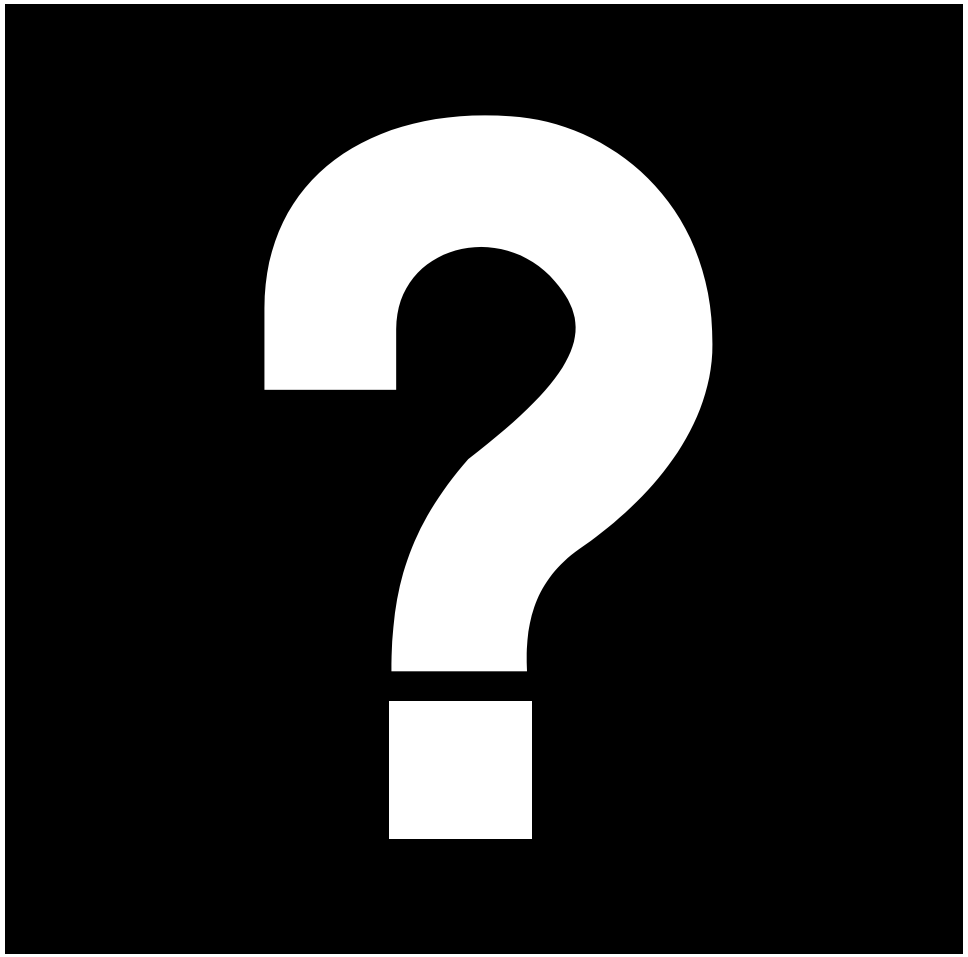
Communication Devices—Network Adapters, Modems, and Fax Devices

- Network adapters
  - Onboard expansion cards or USB devices
  - Wired or wireless
- Modems
  - Connect a computer to a telephone line
  - Used for dial-up Internet access

Communication Devices—Network Adapters, Modems, and Fax Devices

- Fax devices
  - Stand-alone or part of a multifunction device
  - Scan a document and convert it into digital format that can be transmitted over telephone lines

Questions



Copyright