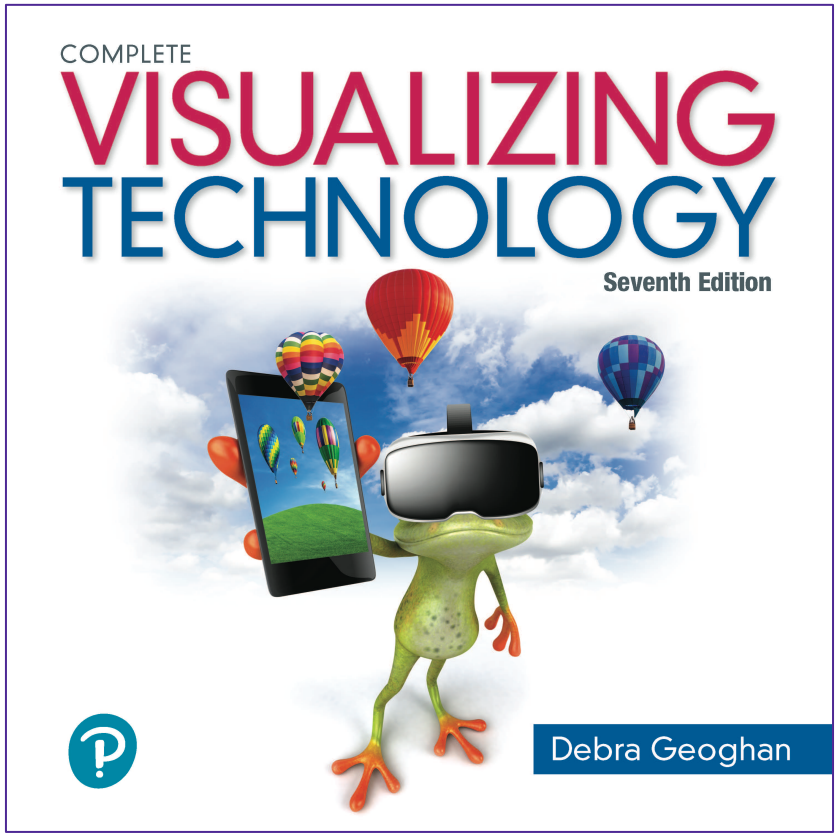
Introductory Visualizing Technology

Seventh Edition



Chapter 4

Hardware

Learning Objectives

4.1 Explain the Functions of a CPU

4.2 Identify the Parts of a System Unit and Motherboard

4.3 Compare Storage Devices

4.4 List and Describe Common Input Devices

4.5 List and Describe Essential Video and Audio Output Devices

4.6 Compare Various Types of Printers

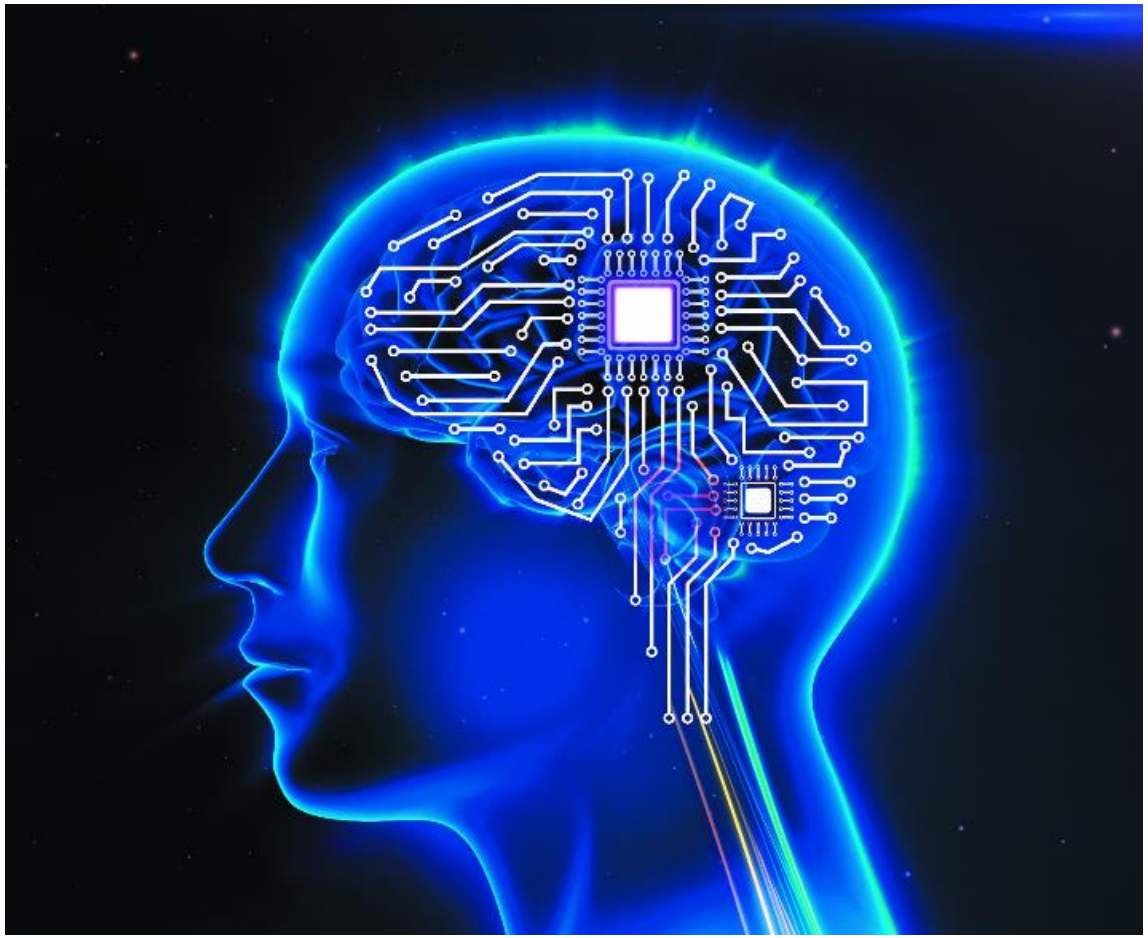
4.7 Explain and Provide Examples of Adaptive Technology

4.8 Discuss Communication Devices

Learning Objective 4.1

- Explain the Functions of a CPU

Explain the Functions of a CPU

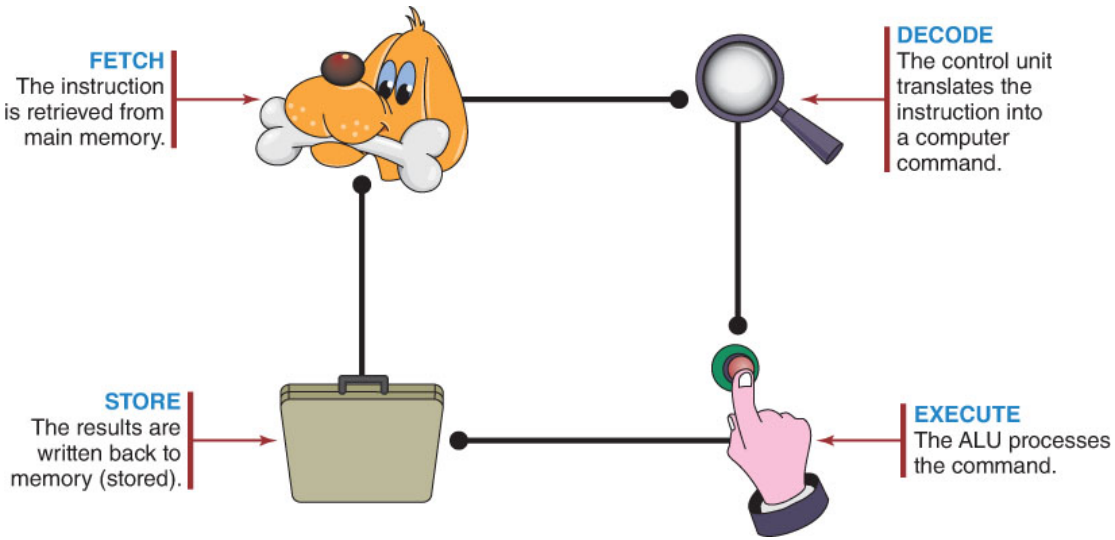


Functions of the CPU

- 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

Instruction Cycle

- There are four steps in the instruction cycle
  - Fetch
    - An instruction is retrieved from main memory
  - Decode
    - Translates the instruction into a computer command
  - Execute
    - ALU processes the command
  - Store
    - Results are written back to memory



CPU Performance (1 of 4)

- 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 (2 of 4)

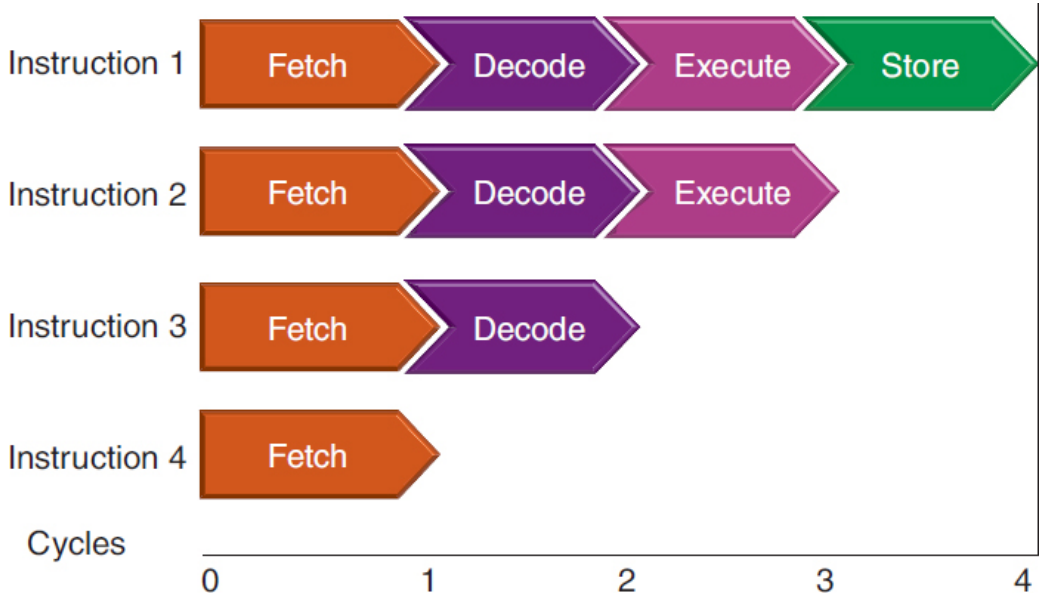
- Multi-core processor
  - Two or more processors integrated on a single chip
    - Increases processing speed
    - Reduces energy consumption
  - GPU (graphics processing unit)
    - A video card that has its own processor

CPU Performance (3 of 4)

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

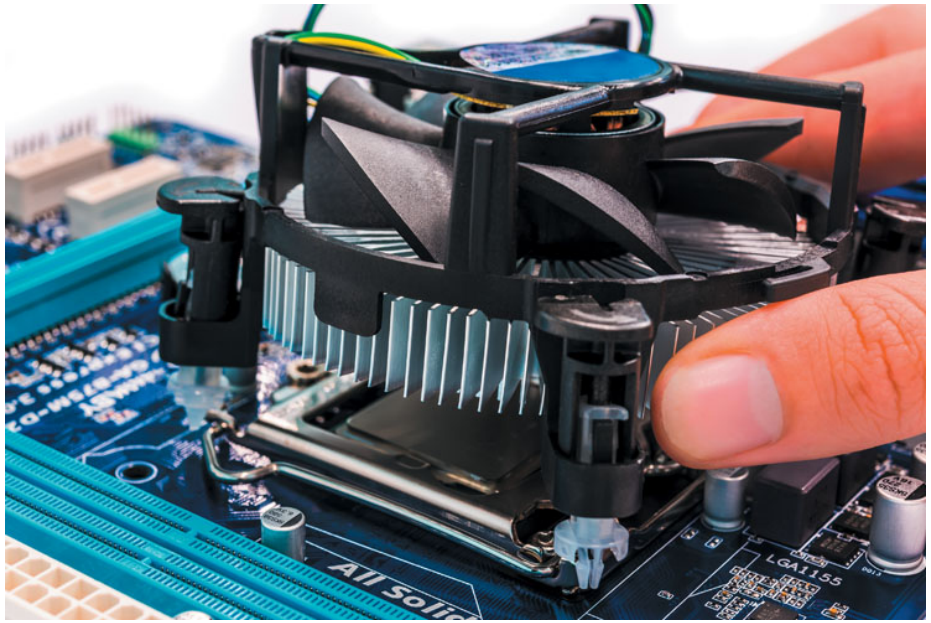
CPU Performance (4 of 4)

- 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

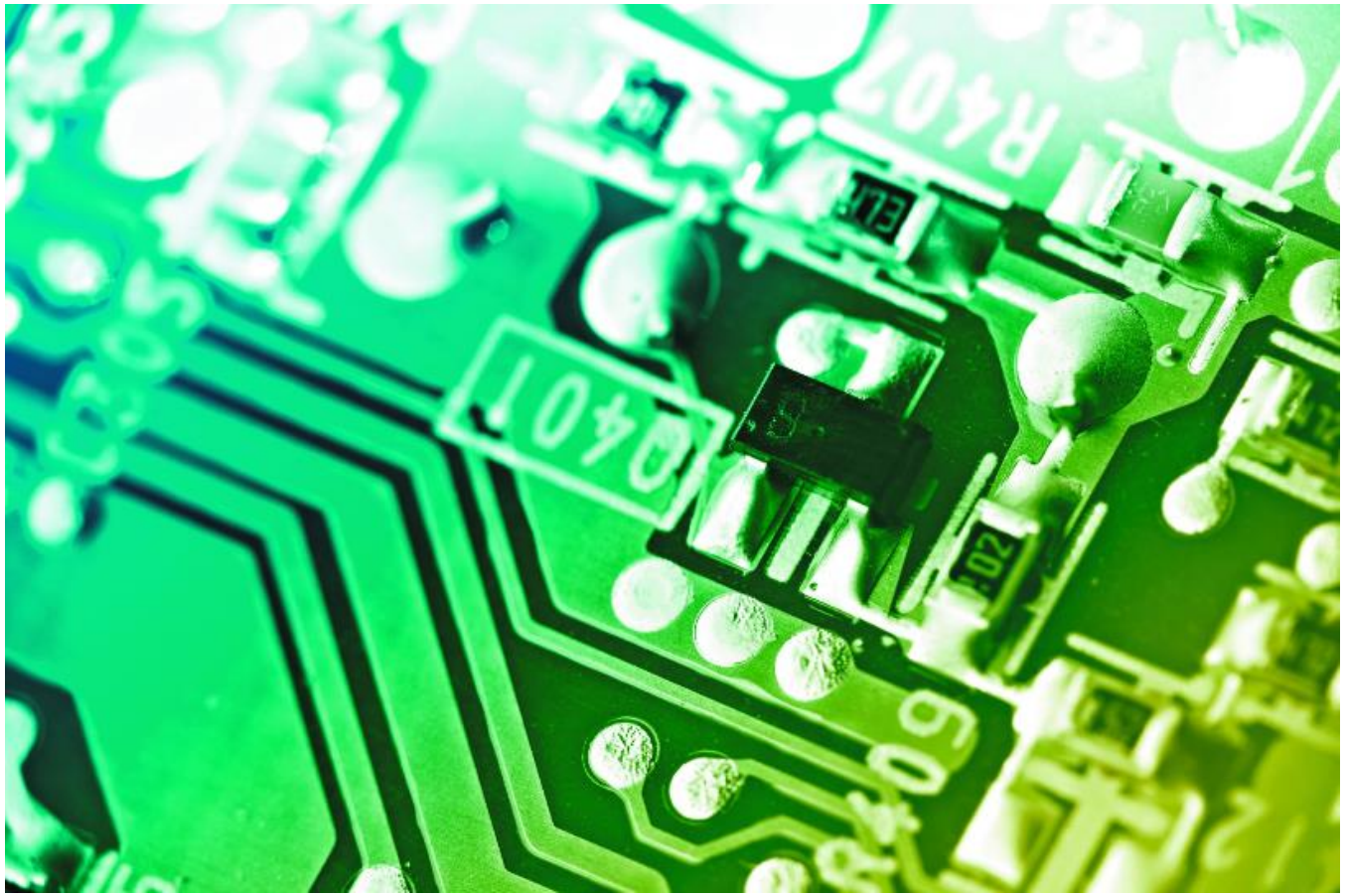
- Processing generates heat
  - To prevent overheating, the CPU uses:
    - Heat sink – draws heat away from the processor
    - Cooling fan – positioned above the processor
  - System units have at least one system fan



Learning Objective 4.2

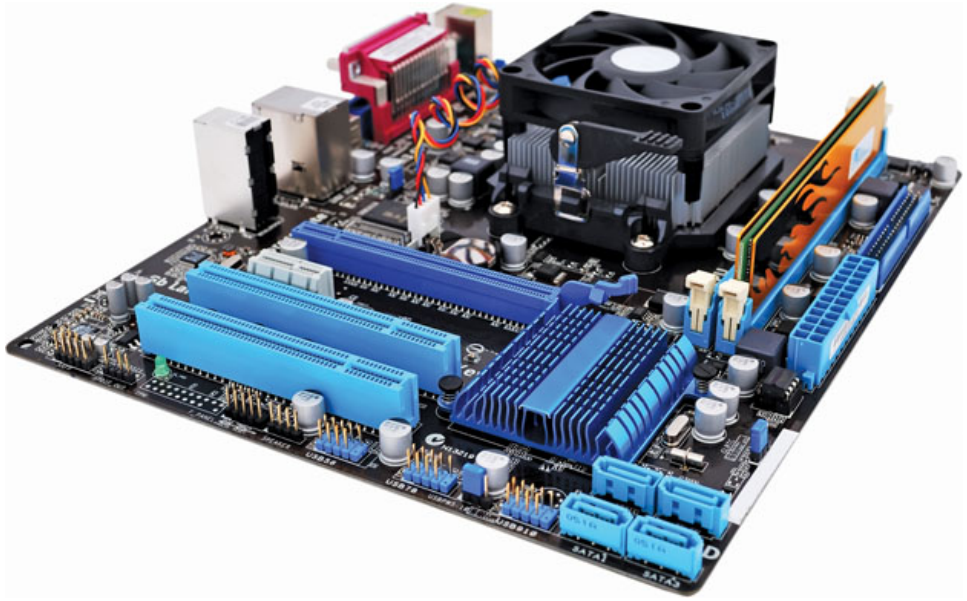
- Identify the Parts of a System Unit and Motherboard

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 (1 of 2)

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

Ports and Connectors—Connect Peripherals to the Motherboard (2 of 2)

- 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)

Learning Objective 4.3

- Compare Storage Devices

Compare Storage Devices

Storage Devices (1 of 2)

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

Storage Devices (2 of 2)

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

Learning Objective 4.4

- List and Describe Common Input Devices

List and Describe Common Input Devices

Input Devices—Devices Used to Get Data into the Computer (1 of 3)

- Keyboard
- Mouse

Input Devices—Devices Used to Get Data into the Computer (2 of 3)

- Keypad
- Touchpad
- Stylus

Input Devices—Devices Used to Get Data into the Computer (3 of 3)

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

Learning Objective 4.5

- List and Describe Essential Video and Audio Output Devices

List and Describe Essential Video and Audio Output Devices

Video Output Devices—Monitors (1 of 2)

- 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 (2 of 2)

- 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

Learning Objective 4.6

- Compare Various Types of Printers

Compare Various Types of Printers

Printers (1 of 4)

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

Printers (2 of 4)

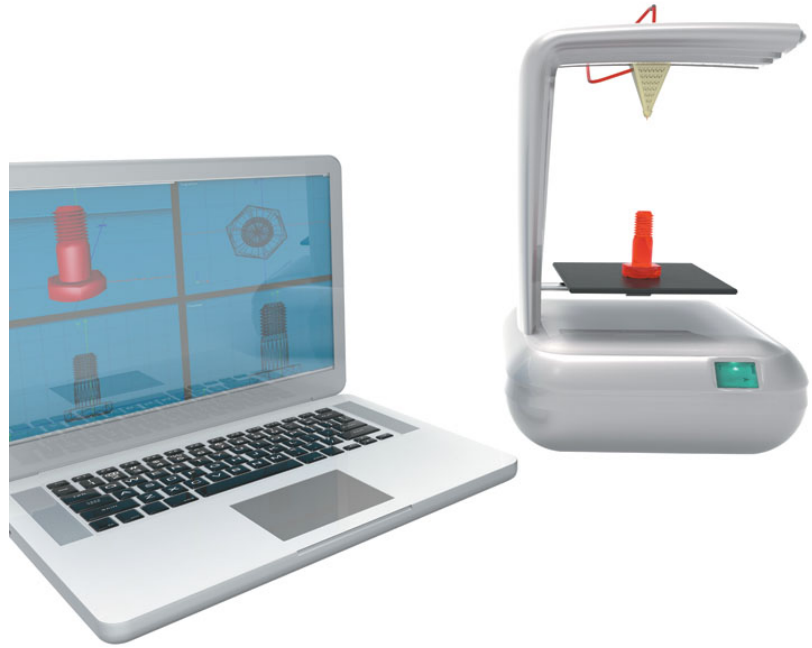
- Dye-sublimation printer
  - Uses heat to turn solid dye into a gas that is then transferred to special paper
- Thermal printer
  - Heats specially coated heat-sensitive paper, which changes color when heat is applied

Printers (3 of 4)

- 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 (4 of 4)

- 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



Learning Objective 4.7

- Explain and Provide Examples of Adaptive Technology

Explain and Provide 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

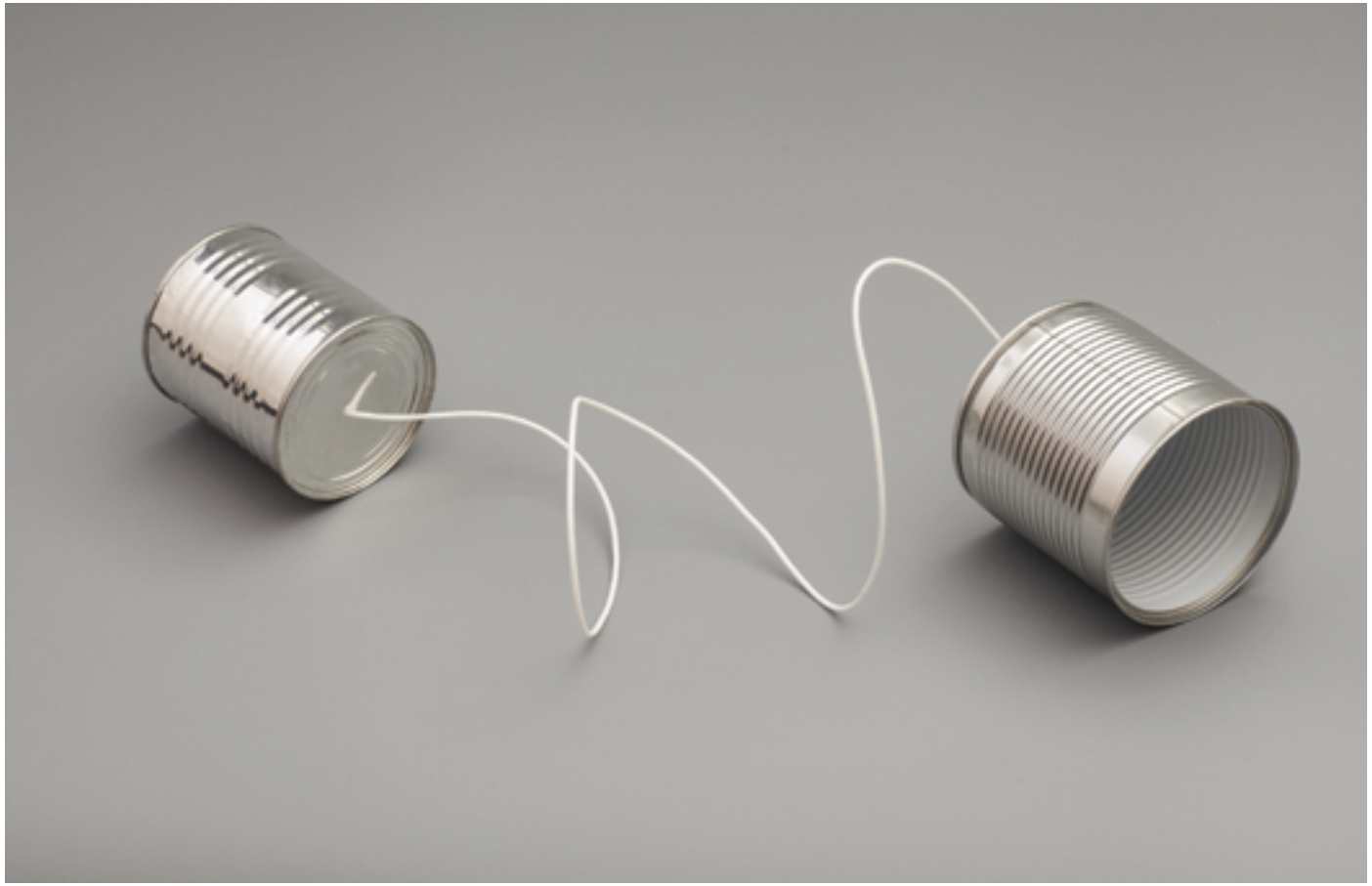
Adaptive Technology—Output Devices

- 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

Learning Objective 4.8

- Discuss Communication Devices

Discuss Communication Devices



Communication Devices—Network Adapters, Modems, and Fax Devices (1 of 3)

- 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 (2 of 3)

- 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 (3 of 3)

- 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

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