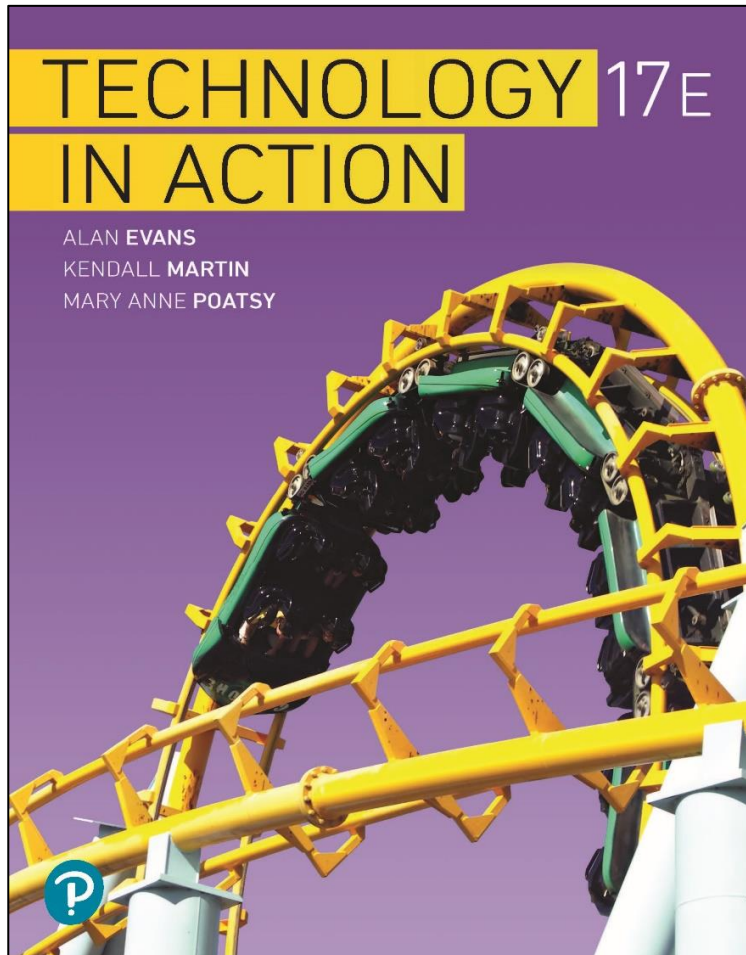# Technology in Action

Seventeenth Edition

Chapter 2

Looking at Computers:

Understanding the Parts

Learning Objectives (1 of 3)

2.1 Describe the four main functions of a computer system and how they interact with data and information.

2.2 Define bits and bytes, and describe how they are measured, used, and processed.

2.3 List common types of computers and discuss their main features.

2.4 Identify the main types of keyboards and touch screens.

2.5 Describe the main types of mice and pointing devices.

Learning Objectives

2.6 Explain how images, sounds, and sensor data are input into computing devices.

2.7 Describe options for outputting images and audio from computing devices.

2.8 Describe various types of printers and explain when you would use them.

2.9 Describe the functions of the motherboard and RAM.

2.10 Explain the main functions of the CPU.

Learning Objectives (3 of 3)

2.11 Describe the various means of storing data and information with computing devices.

2.12 Describe common types of ports used today.

**2.13** Describe how to manage power consumption on computing devices.

2.14 Define ergonomics and discuss the ideal physical setup for using computing devices.

Understanding Your Computer
Computers are Data Processing Devices (Objective 2.1)
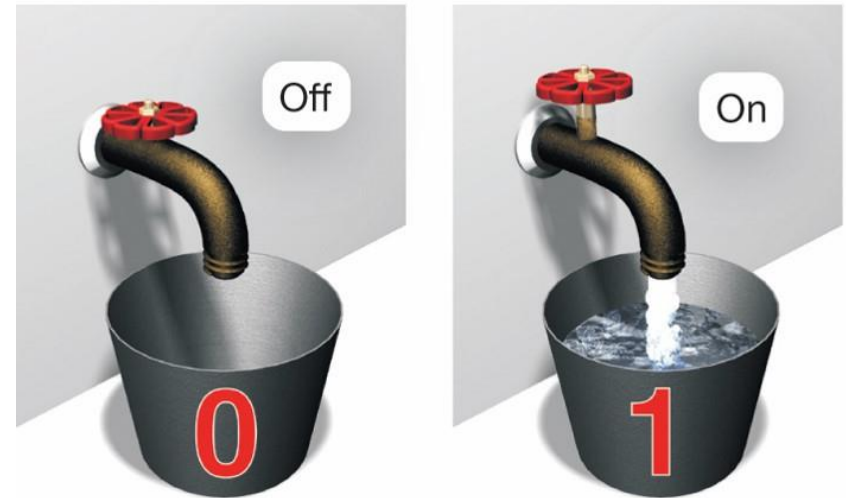
Computer performs four major functions

1. Input: Gathers data, allows entering data
2. Process: Manipulates, calculates, or organizes data
3. Output: Displays data and information
4. Storage: Saves data and information
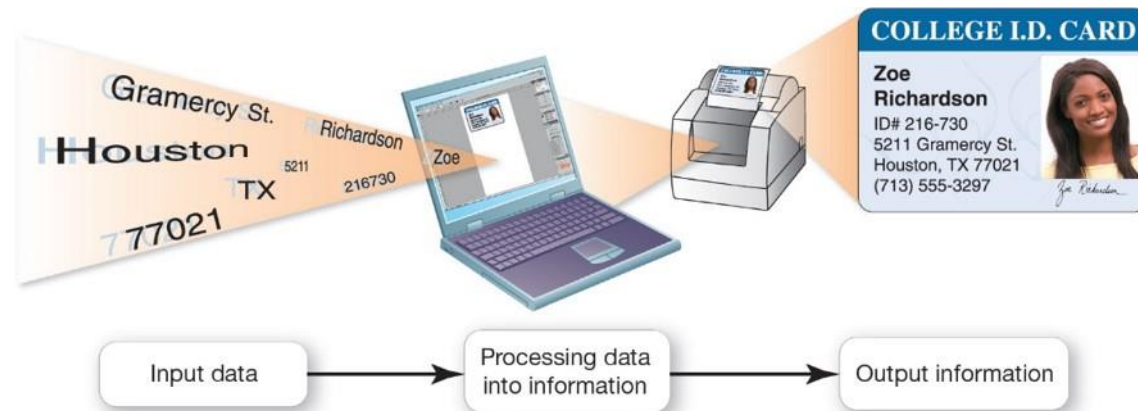
Understanding Your Computer

Binary: The Language of Computers (Objective 2.2)

- Bit
  - Binary digit
  - 0 or 1

- Byte
  - Unique combinations of 8 bits of 0s and 1s

- Kilobytes, megabytes, gigabytes, terabytes, and petabytes

1 Byte (B)
= a single letter
= a single wood block
1-inch cube

1 tweet = 280 Bytes
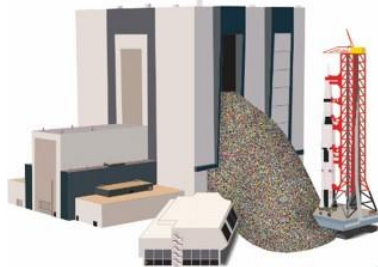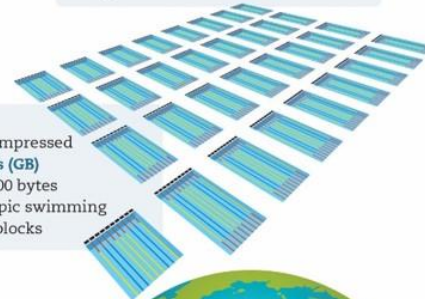= a shoebox of blocks
(Source: Twitter)

1 small Instagram picture
≈ **50 Kilobytes (KB)**
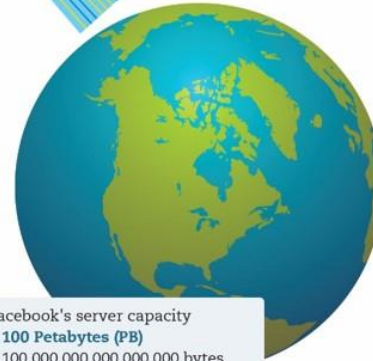≈ 50,000 bytes
≈ a typical car's cabin filled with blocks

3 minute MP3 song
≈ **5 Megabytes (MB)**
≈ 5,000,000 bytes
≈ a standard shipping container full of blocks

1 movie,
1080p HD, compressed
≈ **5 Gigabytes (GB)**
≈ 5,000,000,000 bytes
≈ 32.75 Olympic swimming pools full of blocks

Twitter's typical daily volume of
500,000,000 tweets × 280 bytes
≈ **140 Gigabytes (GB)**
≈ 140,000,000,000 bytes
≈ half-fill the Vehicle Assembly Building
at the Kennedy Space Center
(Sources: Twitter, NASA)

Wikipedia
≈ **10 Terabytes (TB)**
≈ 10,000,000,000,000 bytes
≈ a layer covering
Rhode Island 2.5 times
(June 2015, all pages with edit history, uncompressed. Source: Wikipedia)
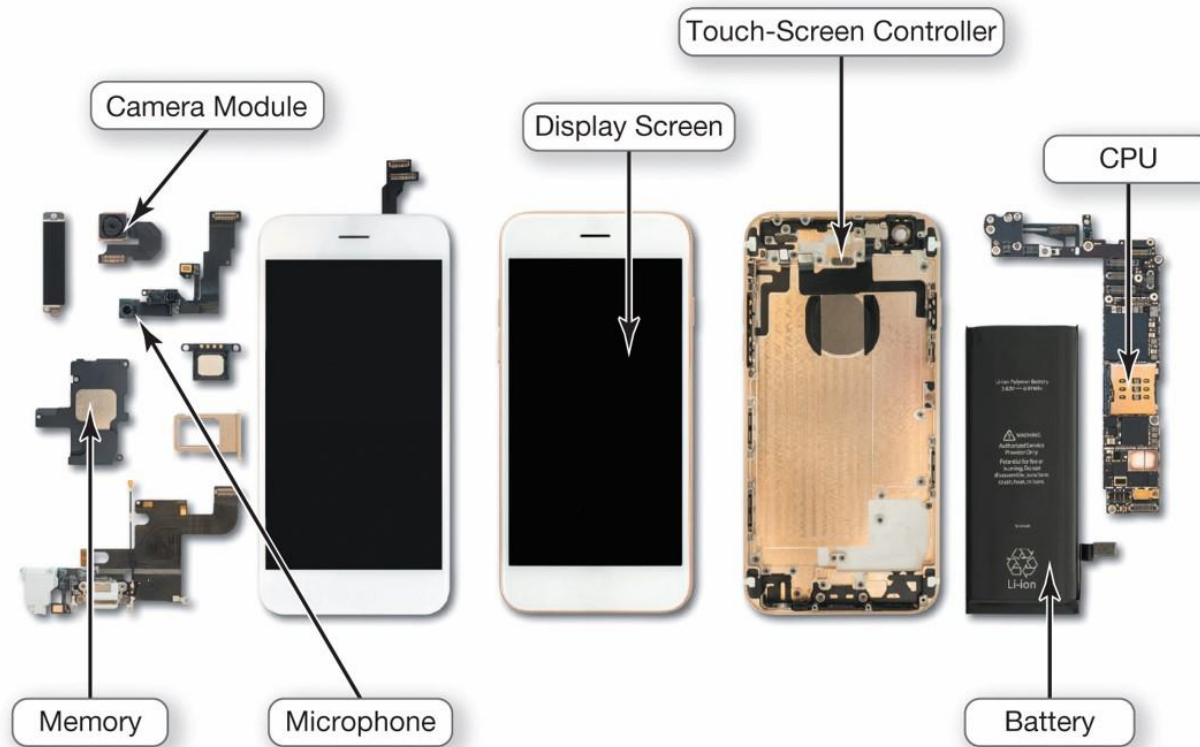
Facebook's server capacity
≈ **100 Petabytes (PB)**
≈ 100,000,000,000,000,000 bytes
≈ coating North America 2.8 times
(Media only. February 2012. Source: Facebook)

Types of Computers (Objective 2.3)

- Cell phones

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Understanding Your Computer

Types of Computers (Objective 2.3)

- Tablets

- Laptops and their variants
  - Ultrabook
  - Chromebook
  - 2-on-1

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- Stationary computers
  - All-in-one computer

System Unit

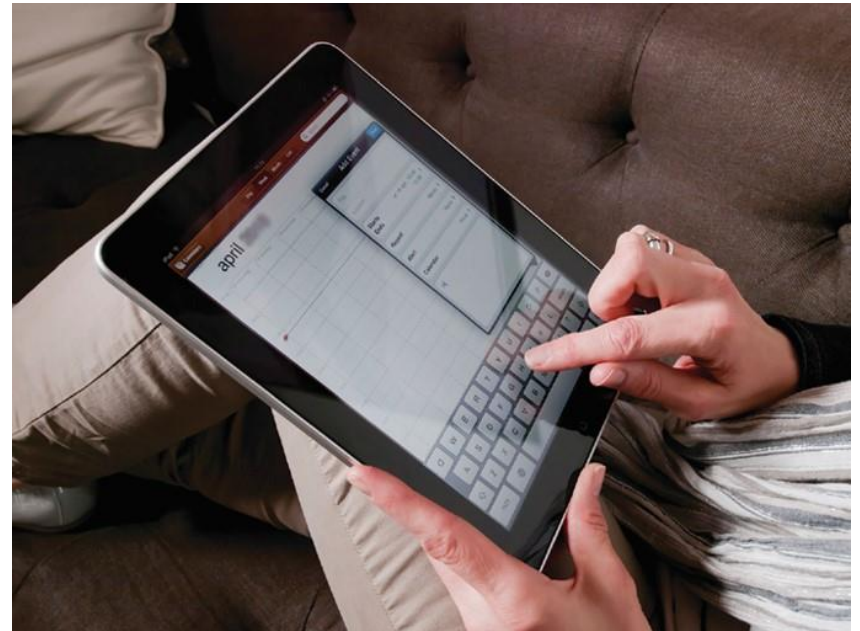**Types of Computers (Objective 2.3)**

- Other types of computers
  - Mainframe computer
  - Supercomputer
  - Embedded computer

Input Devices

Physical Keyboards and Touch Screens (Objective 2.4)

- Used to enter data and instructions

- Examples
    - Keyboard
    - Touch screen
    - Stylus
    - Virtual keyboard

Input Devices

Mice and Other Pointing Devices (Objective 2.5)

- Mouse

- Touch pad (trackpad)

- Game controllers

Input Devices (1 of 2)
Image, Sound, and Sensor Input (Objective 2.6)

- Popular for images
  - Digital cameras
  - Camcorders
  - Mobil device cameras
  - Flatbed scanners
  - Webcams

- Popular for sound
  - Microphone with voice recognition software

Input Devices

Image, Sound, and Sensor Input (Objective 2.6)

- Magnetometer

- Proximity sensor

- Light sensor

- Accelerometer

- Gyroscope

- Barometer

- Thermometer

- Pedometer

- Fingerprint sensor

- Heart rate monitor

- Send data out of the computer in the form of:
  - Text
  - Pictures
  - Sounds
  - Video

- Examples
  - Monitors
  - Printers
  - Speakers and headphones/earbuds

- Types of display screens
  - Liquid crystal display (LCD)
  - Light-emitting diode (LED)
  - Organic light-emitting diode (OLED)

- How they work
  - Pixels
  - Aspect ratio
  - Resolution

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- Large group displays
  - Projectors
  - Interactive whiteboards

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- Speaker
  - Output device for sound
  - Surround-sound speakers
  - Wireless speaker systems

- Headphones or earbuds
  - Hearing might be damaged by excessive volume when using earbuds

Output Devices
Printers (Objective 2.8)

- Inkjet
  - Affordable
  - High-quality color
  - Quick and quiet

- Laser
  - Faster printing speed
  - Higher-quality printouts
  - More expensive

Output Devices

Printers (Objective 2.8)

- All-in-one printer
  - Printer, scanner, copier, and fax

- Large format printer
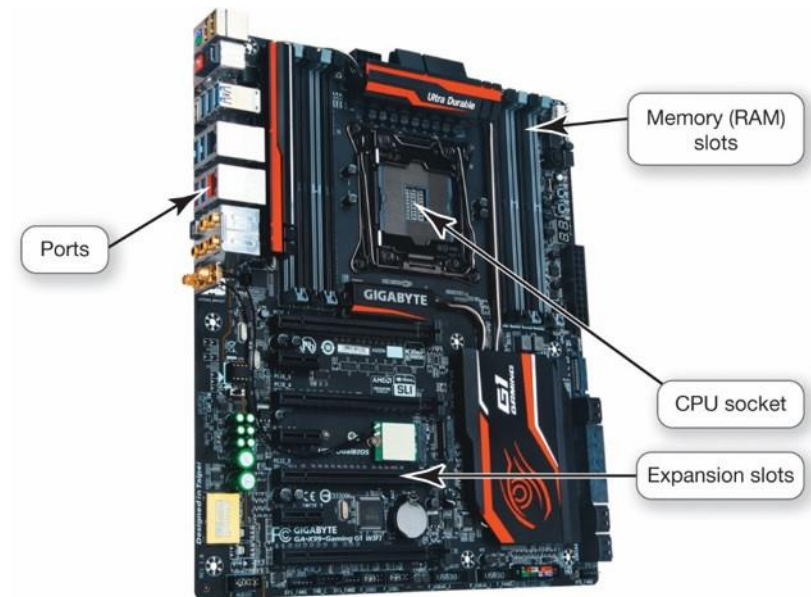 - Prints oversize images

- 3D printer

Processing and Memory on the Motherboard
The Motherboard and Memory (Objective 2.9)

- Motherboard
  - CPU
  - ROM, RAM, and cache
  - Slots for expansion cards
  - Sound/video cards
  - Network interface card

Memory (RAM) slots

Ports

CPU socket

Expansion slots

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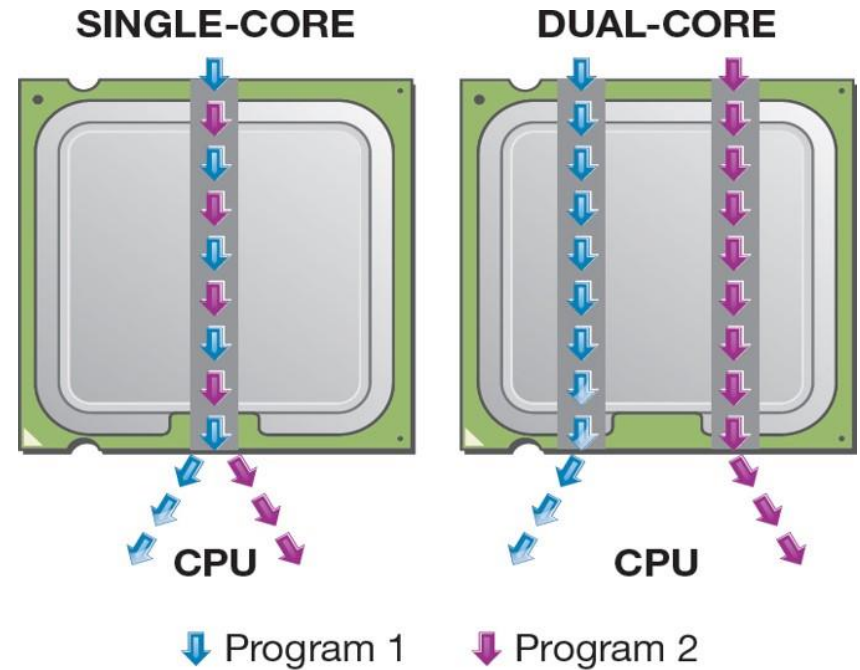
- Central processing unit (CPU) or processor
  - "Brains" of the computer
  - Controls all functions of the computer's components
  - Processes all commands and instructions
  - Gigahertz (billions of tasks per second)

- CPU performance measures
  - Processor speed measured in hertz (Hz)
    - Gigahertz (GHz)
  - Number of cores
    - Single
    - Dual
    - Quad
    - Ten

Storing Data and Information

Storage Options on Computing Devices (Objective 2.11)

- Local storage devices
  - Hard disk drive
    - Primary storage device
    - Nonvolatile storage
    - Internal drive
    - External hard drive
  - Solid-state drive (SSD)

Storing Data and Information (2 of 3)

Storage Options on Computing Devices (Objective 2.11)

- Portable storage options
  - Portable external drives
  - Flash drive
  - Flash memory card

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Storing Data and Information

Storage Options on Computing Devices (Objective 2.11)

- Cloud storage
  - Files stored on the Internet
  - Some amount is free
  - Can purchase additional storage

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Connecting Peripherals to the Computer
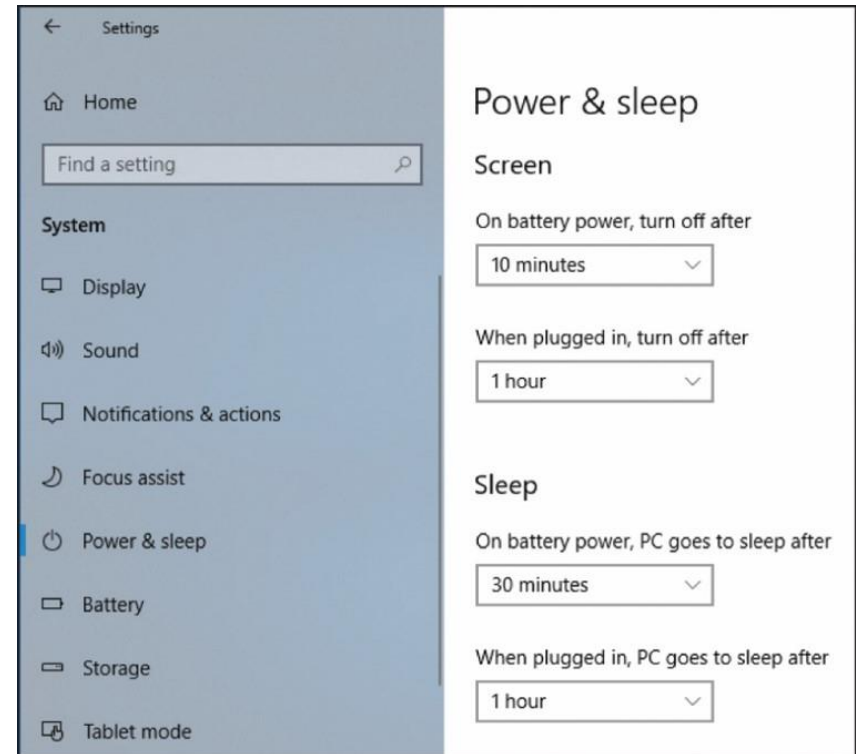## Computer Ports (Objective 2.12)

- Thunderbolt
    - Transfer speeds up to 40 Gbps

- Universal serial bus (USB) port
    - Transfer speeds of 10 Gbps

- Connectivity port
    - Ethernet port
    - Up to 10,000 Mbps

- HDMI port

Power Management and Ergonomics
Power Controls and Power Management (Objective 2.13)

- Battery drain

- Power supply

- Sleep mode

- Warm/cold boot

- Hibernate

Setting It All Up: Ergonomics (Objective 2.14)

- Ergonomics

- Guidelines
  - Monitor position
  - Adjustable chair
  - Proper typing position
  - Breaks
  - Adequate lighting

Power Management and Ergonomics
Setting It All Up: Ergonomics (Objective 2.14)

- Assistive (adaptive) technologies
  - Voice recognition or special keyboards for visually impaired
  - Special trackballs for users with motor control issues

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