Chapter Topics

• Understanding Your Computer
• Input Devices and Output Devices
• Processing, Memory, and Storage
• Ports and Power Controls
• Setting It All Up
Understanding Your Computer: Computers are Data Processing Devices

- Perform four major functions
  - Input: Gathers data, enter data
  - Process: Manipulates, calculates, or organizes data
  - Output: Displays data and information
  - Storage: Saves data and information
Understanding Your Computer: Computers are Data Processing Devices

- Data
- Information
- Processing
Understanding Your Computer:
Bits and Bytes: The Language of Computers

• Bit
  – Binary digit
  – 0 or 1

• Byte
  – Unique combinations of 8 bits of 0s and 1s
Understanding Your Computer: Bits and Bytes: The Language of Computers

<table>
<thead>
<tr>
<th>Name</th>
<th>Abbreviation</th>
<th>Number of Bytes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Byte</td>
<td>B</td>
<td>1 byte</td>
</tr>
<tr>
<td>Kilobyte</td>
<td>KB</td>
<td>1,024 bytes (2(^{10}))</td>
</tr>
<tr>
<td>Megabyte</td>
<td>MB</td>
<td>1,048,576 bytes (2(^{20}) bytes)</td>
</tr>
<tr>
<td>Gigabyte</td>
<td>GB</td>
<td>1,073,741,824 bytes (2(^{30}) bytes)</td>
</tr>
<tr>
<td>Terabyte</td>
<td>TB</td>
<td>1,099,511,627,776 bytes (2(^{40}) bytes)</td>
</tr>
<tr>
<td>Petabyte</td>
<td>PB</td>
<td>1,125,899,906,842,62 bytes (2(^{50}) bytes)</td>
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<tr>
<td>Exabyte</td>
<td>EB</td>
<td>1,152,921,504,606,846,976 bytes (2(^{60}) bytes)</td>
</tr>
<tr>
<td>Zettabyte</td>
<td>ZB</td>
<td>1,180,591,620,717,411,303,424 bytes (2(^{70}) bytes)</td>
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</tbody>
</table>
Understanding Your Computer: 
Bits and Bytes: The Language of Computers

• A combination of hardware and software processes data
  – Hardware
  – Software
    • Application software
    • System software
      – Operating system (OS)
Understanding Your Computer: Types of Computers

• Two basic designs of computers
  – Portable
    • Tablet computers
    • Laptop or notebook computers
    • Netbooks
    • Ultrabooks
    • Tablet (convertible) PCs
  – Stationary
    • Desktop computers
    • All-in-one computers
Understanding Your Computer: Types of Computers

• Mainframe
  – Many users simultaneously

• Supercomputer
  – Complex calculations

• Embedded
  – Self-contained
  – Example: electronic thermostat

• Smartphone
Input Devices

- Enter data and instructions
- Examples of input devices
  - Keyboards
  - Mouse
  - Microphone
  - Scanner
  - Digital camera
  - Stylus
Input Devices: Keyboards

- Touch screen keyboards
- QWERTY layout
- Wireless keyboards
- Bluetooth technology
- Alternative keyboards
Input Devices:

Mice and Other Pointing Devices

• Optical mouse
• Wireless mouse
• Touch pad or trackpad
Input Devices:
Mice and Other Pointing Devices

• Game controllers
  – Joysticks
  – Game pads
  – Steering wheels

• Most are wireless
Input Devices: Image Input

- Digital cameras, camcorders, cell phones
- Scanners
- Webcams
Input Devices:

Sound Input

• Microphone (mic)

• Types of microphones
  – Close talk
  – Omnidirectional
  – Unidirectional
  – Clip-on (lavalier)
Output Devices

• Send data out of the computer
  – Text
  – Pictures
  – Sounds
  – Video
• Examples
  – Monitors
  – Printers
  – Speakers and earphones
Output Devices: Monitors

- Liquid crystal display (LCD)
- Light-emitting diode (LED)
- Organic light-emitting diode (OLED)
Output Devices: Monitors

• How LCD monitors work
  – Made up of pixels
  – Two or more sheets of material
  – Liquid crystal solution
  – Crystals block or let light through
Output Devices:

Monitors

• Quality of an LCD
  – Aspect ratio
  – Resolution
  – Contrast ratio
  – Viewing angle
  – Brightness
  – Response time
Output Devices:

Monitors

• 27-inch monitor
  – 2560 1440 pixels

• 21.5-inch monitor
  – 1680 1050 pixels

• Blu-ray movies
  – Require at least 1920 1080 pixels
Output Devices:

Monitors

• Built-in features
  – Speakers
  – Webcams
  – Microphones
  – Multiformat memory card reader
  – USB ports
Output Devices:

Monitors

• Projectors
  – Entertainment projectors
Output Devices: Printers

- Inkjet printers
- Laser printers
- Nonimpact printers have replaced impact printers almost entirely
Output Devices:
Printers

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

• Laser
  – Faster printing speed
  – Higher quality printouts
  – More expensive
Output Devices:
Printers

• Wireless printer
  – No wires
  – Print to same printer from different places
  – Two types
    • WiFi
    • Bluetooth
  – Print from portable devices
Output Devices: Printers

- All-in-one printer
  - Printer, scanner, copier, and fax
- Plotter
  - Prints oversize images
- Thermal printer
Output Devices: Printers

• Selecting a printer
  – Primary printing need first
    • Speed (pages per minute)
    • Resolution (dots per inch)
    • Color output
    • Cost of consumables
Sound Output

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

• Headphones or earbuds
What exactly is a computer, and what are its four main functions?

Computers are devices that process data. They help organize, sort, and categorize data to turn it into information.

A computer’s four major functions:

• Input: Gather data, or allow users to enter data.
• Process: Manipulate, calculate, or organize that data.
• Output: Display data and information in a form suitable for the user.
• Storage: Save data and information for later use.
Check Your Understanding

What is the difference between data and information?

• Data is a representation of a fact or idea
  – The number 3 and the words *televisions* and *Sony* are pieces of data

• Information is data that has been organized or presented in a meaningful fashion
What are bits and bytes, and how are they measured?

- Computers use *binary language*, consisting of two numbers: 0 and 1
- Each 0 and each 1 is a binary digit, or bit
- Eight bits equals one byte
Check Your Understanding

What devices can I use to get data into the computer?

• Input devices enter data (text, images, and sounds) and instructions (user responses and commands) into a computer
  – Keyboard
  – Mouse
  – Touch screens
  – Stylus
  – Scanners
  – Digital cameras
  – Camcorders
  – Webcams
  – Microphones
What devices can I use to get information out of the computer?

- Output devices enable you to send processed data out of your computer
  - Text, pictures, sounds, or video
  - Monitors
  - Printers
    - Inkjet
    - Laser
    - All-in-ones
    - Plotters
    - Thermal printers
  - Speakers
Processing and Memory on the Motherboard

- Motherboard
- CPU
- ROM, RAM, and cache
- Slots for expansion cards
- Network interface card (NIC)
Memory

**RAM**
Random access memory
- Stores instructions and data
- Series of several memory cards or modules
- Temporary (volatile) storage

**ROM**
Read-only memory
- Stores startup instructions
- Permanent (nonvolatile) storage
Processing and Memory on the Motherboard: Processing

• Central Processing Unit
  – CPU or processor
  – “Brains” of the computer
  – Controls all functions of the computer’s components
  – Processes all commands and instructions
  – Billions of tasks per second
• CPU Performance Measures
  – Processor speed measured in hertz (Hz)
    • Megahertz (MHz) or gigahertz (GHz)
  – Number of cores
    • Single
    • Dual
    • Quad
    • Eight
Storing Data and Information: 
Hard Drives

• Primary device for permanent storage
• Stored programs and data
  – Internal hard drive
Storing Data and Information: Hard Drives

• External hard drive
  – Outside the system
  – USB or FireWire port

• Solid-State Drive (SSD)
  – No moving parts
  – No noise
  – Emits little heat
  – Requires little power
  – Less likely to fail

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Storing Data and Information: Hard Drives

• Internal drive bays
• External drive bays
  – House DVD or Blu-ray drives
  – Notebook expansion
    • Attach external drive
Storing Data and Information: Cloud Storage

• Types of Cloud Storage
  – Dropbox
  – OneDrive
  – iCloud
  – Google Drive
Storing Data and Information: Flash Storage

• External hard drives
  – Large portable storage needs
  – Small and lightweight
  – USB port
Storing Data and Information: 
Flash Storage

- Flash drive—jump drive, USB drive, thumb drive
  - Solid-state flash memory
  - No moving parts
  - Significant storage capacity
  - USB
  - Appears as another disk drive

- Wireless flash drives
Storing Data and Information: Flash Memory

• Flash memory card
  – Convenient
  – Portable
  – Solid-state flash memory
  – Transfer data between devices
Storing Data and Information: Optical Storage

• Compact discs (CDs)
  – Audio files
• Digital video discs (DVDs)
  – Store more data than CDs
• Blu-ray discs (BDs)
Connecting Peripherals to the Computer

• Port
  – Attaches peripherals
Connecting Peripherals to the Computer: High-Speed and Data Transfer Ports

• Thunderbolt Ports
  – Developed by Intel
  – Fiber optic technology
  – Transfer speeds up to 10 GB/s
Connecting Peripherals to the Computer: High-Speed and Data Transfer Ports

- Universal serial bus (USB)
- USB 3.0 standard port
  - Transfer speeds of 4.8 Gbps
Connecting Peripherals to the Computer: High-Speed and Data Transfer Ports

- FireWire 800
  - Doubles rate to 800 Mbps
- Declining in popularity
Connecting Peripherals to the Computer: Connectivity and Multimedia Ports

• Connectivity port
  – Access to networks and the Internet
    • Ethernet port

• Audio ports
  – Connect headphones, microphones, speakers
Connecting Peripherals to the Computer: Connectivity and Multimedia Ports

- Video ports
  - Connect monitors and multimedia devices
  - HDMI
Connecting Peripherals to the Computer:
Adding Ports: Expansion Cards and Hubs

- Expansion cards
  - New port standards
- Expansion hubs
  - Connect several devices to a port
Power Controls

- Power supply
- Cold boot

![Power Button and Lid Settings](image)

Select the power settings for your computer. Changes you make apply to all power plans:

- **Power button and lid settings**
  - **On battery**
    - When I press the power button: Hibernate, Sleep
    - When I close the lid: Sleep, Sleep
  - **Plugged in**
    - Hibernate, Sleep

**Password protection on wakeup**

- (Recommended) Require a password
  - When your computer wakes from sleep, no one can access your data without the correct password to unlock the computer. [Create or change your user account password](#)

- Don't require a password
  - When your computer wakes from sleep, anyone can access your data because the computer isn't locked.
Power Controls

• Turning off your computer
  – Stress on computer vs. wasting electricity
  – Power-management settings
  – Windows 8 power-management options
Power Controls

• Sleep Mode
  – Documents, applications, data remain in RAM

• Hibernate
  – Similar to Sleep
  – Data stored on hard drive
  – Computer is powered off

• Warm boot
Setting It All Up

• Ergonomics

• Guidelines to follow
  – Monitor position
  – Adjustable chair
  – Proper position while typing
  – Take breaks
  – Adequate lighting
Setting It All Up

- Mobile computing and injury prevention

<table>
<thead>
<tr>
<th>Preventing Injuries While on the Go</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SMARTPHONE REPETITIVE STRAIN INJURIES</strong></td>
</tr>
<tr>
<td>Repetitive strain injuries (such as DeQuervain's tendonitis) from constant typing of instant messages</td>
</tr>
<tr>
<td>Restrict length and frequency of messages, take breaks, and perform other motions with your thumbs and fingers during breaks to relieve tension.</td>
</tr>
</tbody>
</table>
Setting It All Up

- Devices for People with Disabilities
  - Voice recognition
  - Larger key keyboards
  - Display screen keyboards
  - Specialized input consoles
  - Keyboards designed for one hand
  - Special trackballs
  - Head-mounted pointing devices
Check Your Understanding

What’s on the motherboard?

- Motherboard - the main circuit board, contains:
  - CPU
    - Performance of a CPU is affected by:
      - Speed of the processor (measured in GHz)
      - Amount of cache memory
      - Number of processing cores
  - RAM
  - ROM
  - Slots for expansion cards
Check Your Understanding

Where are information and programs stored?

- Permanent Storage Devices
  - Hard drive
  - Flash drive
  - DVD drive
  - Cloud storage
Check Your Understanding

How are devices connected to the computer?

• Ports
  – Thunderbolt
  – USB
  – FireWire
  – Ethernet
  – HDMI
  – Audio (microphones, speakers, headphones)
Check Your Understanding

What’s the best way to turn my computer on and off and when should it be done?

• Cold boot - power on your computer from a completely turned-off state

• With the power-management options of Windows 8, you only need to shut down your computer completely when you need to repair or install hardware in the system unit or move it to another location

• If you use your computer only for a little while each day, it would be best to power it off completely after use (to save electricity)
Check Your Understanding

How do I set up my computer to avoid strain and injury?

• *Ergonomics* refers to how you arrange your computer and equipment to minimize your risk of injury or discomfort
  – Appropriate monitor position
  – Adjustable chair
  – Assuming a proper position while typing
  – Adequate lighting
  – Do not stare at the screen for long periods
  – Take frequent breaks
  – Ergonomic keyboards