Essential Computer Concepts
Objectives

• Compare the types of computers and the components of a computer system
• Learn how data is represented to a computer and how it is transmitted
• Learn about processing hardware
• Understand memory and storage
• Describe peripheral devices and understand how to connect them
• Learn about the hardware and software used to establish a network connection
Objectives, cont.

- Explain how Internet access, email, and the Word Wide Web affect the use of computers
- Describe potential security threats to computers and protection methods
- Discuss the types of system software and their functions
- Identify popular application software
- Learn about cloud computing
Computer Advertisement

Our award-winning computers offer strong performance at a reasonable price. MicroPlus computers feature superior engineering, starting with a processor and a motherboard designed specifically to take advantage of the latest technological advancements. Of course, you are covered by our one-year parts and labor warranty.

The monitor, keyboard, and mouse are peripheral devices, which are hardware components that are not part of the CPU or motherboard.

The motherboard, CPU, hard disk, and cards that expand the capabilities of the motherboard are inside the tower in a desktop computer or in the monitor in an all-in-one computer.

Output is the results of the computer processing input. The monitor is the device that displays the output from a computer.

Input is data or instructions you type into the computer. The keyboard is the most frequently used input device.

Pointing devices control the pointer, which is a small arrow or other symbol displayed on the monitor that you use to select commands and manipulate text or graphics. The most popular pointing device for a desktop computer is a mouse.

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This desktop PC is powerful enough to meet your most demanding computing needs.

**SPECIFICATIONS**

- Processor: Dual-core 2nd generation Intel® Core™ i3-2130 (3MB cache, 3.4GHz)
- Memory: 4GB DDR3 SDRAM (expandable to 16 GB)
- Graphics: Integrated graphics processor
- Hard drive: 1TB SATA
- Monitor: MicroPlus 20-inch LED monitor with built-in speakers
- Keyboard: MicroPlus USB ergonomic keyboard
- Mouse: Wireless optical mouse
- DVD/CD drive: Dual layer 16X DVD +/-RW drive
- Network card: Integrated 10/100/1000 Ethernet
- Operating system: Microsoft Windows 8, 64-bit
- USB ports: 6 USB ports
- Speakers: Built into monitor
- Video: HDMI, DVI, and VGA ports
- Digital media card reader: 6-in-1 (Secure Digital, Secure Digital High Capacity, SDXC, Memory Stick, Memory Stick PRO, and MultiMediaCard)
- Printer (not shown): Wireless MicroPlus PhotoPlus color inkjet printer and scanner
- Installed software: 90-day trial of Microsoft Office 2013 and 30-day trial of Norton AntiVirus

**The central processing unit (CPU) or processor is mounted on the motherboard and is responsible for executing instructions to process data.**

**Memory** is a set of storage locations on the motherboard.

A **hard disk drive** (also called a hard drive or a hard disk) is the most common magnetic storage device.

A **DVD** is an optical storage device that can store 4.7 GB of data in a single layer on one side of the device and up to 17.1 GB of data in dual layers on both sides. A **CD** is an optical storage device that can store up to 700 MB in a single layer on one side.

**A port** is an opening on a computer connected to a card or to an appropriate place on the motherboard into which you can plug a connector. A **USB** (Universal Serial Bus) port is a high-speed port that allows multiple connections at the same port.

HDMI (high-definition multimedia interface) ports transmit video and audio digitally, DVI (digital video interface) ports transmit video digitally, and VGA (video graphics array) ports transmit analog video.
What is a Computer?

• A computer is an electronic device that accepts information and instructions from a user, manipulates the information according to the instructions, displays the information in some way, and stores the information for retrieval later.
Types of Computers

- Desktop computers
- Laptops (aka Notebooks)
- Netbooks
- Tablets
- Convertibles
- Smartphones
- Mainframe computers
- Midrange computers (aka Minicomputer)
- Supercomputers
Types of Computers

Figure 1  Personal computers

Figure 2  Tablets

Figure 3  Smartphones

Figure 4  Supercomputer

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Computer Systems

- Includes computer hardware and software
  - **Hardware** refers to the physical components of a computer
  - **Software** refers to the intangible components of a computer system, particularly the *programs*, or *applications* which are lists of instructions the computer needs to perform a specific task
- The hardware and software of a computer work together to process data and *commands*, the instructions to the computer on how to process the data.
Processing Hardware

- Processing tasks occur on the **motherboard**, which contains the processing hardware and is located inside the computer.

  - Circuit Board

- The **CPU** consists of transistors and electronic circuits on a silicon **chip**, mounted on the motherboard.
Processing Hardware cont.

- **Cards** (aka *expansion cards*) are removable circuit boards inserted into **slots** on the motherboard to expand the capabilities of the motherboard.
  - **Sound** cards translate the digital audio information from a computer into analog sounds that the human ear can hear and direct the sound to the speakers.
  - **Graphics** cards and **Video** cards control the visual displays on the monitor.
Input Devices

- **Input devices**, such as a keyboard or a mouse are used to input data and issue commands.
  - **Keyboard**
    - Ergonomic
  - **Pointing devices**
    - Mouse
      - Scroll Wheel
    - Trackball
    - Touchpad
  - **Touchscreen**
  - **Scanner**
Output Devices

Output devices store or show your output.

- **Monitors**
  - Flat panel
  - LCD
  - LED

- **Printers**
  - Laser
  - Inkjet

- **Speakers**
Connecting Peripheral Devices

- Peripheral devices connect to the computer either via a cable or wirelessly.
- Cables connect to ports in the computer.
  - PS/2 (USB)
  - Ethernet
Data Representation

• **Data** refers to the words, numbers, figures, sounds, and graphics that describe people, events, things, and ideas

• **Binary digits (bits)**

• A series of eight bits is called a **byte**
  – A **Kilobyte (KB or K)** is about a thousand bytes
  – A **Megabyte (MB)** is about a million bytes
  – A **Gigabyte (GB)** is about one billion bytes
  – A **Terabyte (TB)** is about one trillion bytes
  – A **Petabyte (PB)** is about 1000 terabytes
Memory

- Random access memory (RAM)
  - Volatile memory
  - DDR SDRAM
- Cache memory (RAM cache or CPU cache)
- Read-only memory (ROM)
  - BIOS
  - Boot process
  - Nonvolatile memory
- Complementary metal oxide semiconductor (CMOS)
  - Semipermanent memory
Storage Media

- **Storage** is where the data you create and the instructions you use remain when you are not using them.
- A **file** is a named collection of stored data.
- An **executable file** contains the instructions that tell a computer how to perform a specific task.
- A **data file** is created by a user.
- **Magnetic storage media** store data as magnetized particles on a surface.
Storage Media

- **Optical storage devices** (CDs and DVDs) store data as a trail of tiny pits or dark spots on the surface.
- **Flash memory cards** are small portable cards to which data can be written and rewritten.

![Figure 15](image1.png)

> **Figure 15** How data is stored on an optical disc

- Areas that are not pits or darkened have a reflective surface.
- When a DVD or CD is manufactured, a laser burns pits or creates dark spots in the reflective surface. These pits become dark, nonreflective areas of the disc.
- When the DVD or CD drive reads the data on the disk, it uses a laser beam. When the beam strikes a pit or a darkened spot, no light is reflected.
- When the laser strikes a reflective surface, light bounces back into the read head. The patterns of dark spots and light spots represent data.

![Figure 17](image2.png)

> **Figure 17** USB flash storage device

- Courtesy of Kingston Technology Company, Inc.

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Networks

• A **network** connects one computer to other computers and peripheral devices, enabling you to share data and resources with others.
  – Network adapters.
  – Network software

• **Network types:**
  – Client/server
  – Peer-to-peer
  – LAN
  – WAN
  – WLAN
  – PAN
Data Communications

- The transmission of data from a computer to a peripheral device or from one computer to another is called **data communication**.
- The four essential components of a data communications are:
  - **Sender** (sends message)
  - **Receiver** (receives message)
  - **Channel** (cable, microwave or radio signal, optical fibers)
  - **Protocol** (rules for the orderly transfer of data)
Data Communications cont.

- Data can be transmitted via a wired or wireless connection.
- Wired connection requires a cable connection between the computer and the peripherals.
- Bluetooth, Certified Wireless USB, ultra wideband (USF), Wireless HD (WHD) and Transferjet are standards for short distance wireless connections.
- WIMAX (Worldwide Interoperability for Microwave Access) is a standard for long distance wireless connections.
- 3G, 4G and LTE (long-term evolution) are standards used by cell companies to transmit data.
The Internet

- The **Internet** is the largest network in the world
  - Email
  - World Wide Web
    - Web page
    - Website
    - Hyperlink
Security Threats

• It is essential to protect a computer connected to a network from threats that could steal information or cause malicious damage.
  – Malware
  – Spyware
  – Antivirus software
  – Anti-spyware software
  – Firewalls
  – Adware
  – Spoofed sites
  – Phishing
System Software

- **System Software** manages the computer’s fundamental operations
  - Operating system
    - System resources
    - Multitasking
    - Storage
    - Security
  - Utilities
  - Device Drivers
  - Programming Languages
  - Operating environments
    - Graphical user interface (GUI)
Application Software

- **Application software** enables you to perform specific computer tasks, such as document production, spreadsheet calculations, and database management.
  
  - Documentation production software
Application Software cont.

- **Spreadsheet software**
  - numerical analysis

- **Presentation Software**
  - slide presentations
Application Software cont.

- **Database management software**
  - collect and manage data.
- **Information management software**
  - track schedules, contacts, and to-do lists.

*Figure 25 Microsoft Outlook 2013 program window*
Application Software cont.

• There are many other types of application software:
  – Photo editing
  – Video editing
  – Graphics
  – Website creation and management
  – Multimedia authoring
  – Accounting
Computing in the Cloud

• Cloud computing means that data, applications and resources are stored on servers accessed over the Internet.
  – Microsoft Office WebApps
  – Google Docs
  – Office 365
  – SkyDrive

Figure 26  SkyDrive start page