

**Chapter 1:  
An Introduction to  
Computers**

# Learning Objectives

1. Explain why it is essential to learn about computers today and discuss several ways computers are integrated into our business and personal lives.
2. Define a computer and describe its primary operations.
3. List some important milestones in computer evolution.
4. Identify the major parts of a personal computer, including input, processing, output, storage, and communications hardware.
5. Define software and understand how it is used to instruct the computer what to do.

# Learning Objectives

6. List the six basic types of computers, giving at least one example of each type of computer and stating what that computer might be used for.
7. Explain what a network, the Internet, and the World Wide Web are, as well as how computers, people, and Web pages are identified on the Internet.
8. Describe how to access a Web page and navigate through a Web site.
9. Discuss the societal impact of computers, including some benefits and risks related to their prominence in our society.

# Overview

- This chapter covers:
  - What computers are, how they work, and how they are used
  - Computer terminology
  - An overview of the history of computers
  - The basic types of computers in use today
  - An overview of networks and the Internet
  - Societal impacts of computers

# Computers in Your Life

- Why learn about computers?
  - Pervasive computing
    - Also known as ubiquitous computing
    - Computers have become an integral part of our lives
  - Basic computer literacy
    - Knowing about and understanding computers and their uses is an essential skill today for everyone

# Computers in the Home

- Computers used for a variety of tasks:
  - Looking up information and news
  - Exchanging e-mail
  - Shopping and paying bills
  - Watching TV and videos
  - Downloading music and movies
  - Organizing digital photographs
  - Playing games
  - Making vacation plans

# Computers in the Home



Goodluz/Shutterstock.com

REFERENCE AND COMMUNICATIONS



micro10w/Shutterstock.com

PRODUCTIVITY



Courtesy of Microsoft Corporation

ENTERTAINMENT

# Computers in Education

- Youth today can be called the *computing generation*
- Most students today have access to computers at school
  - Some schools integrate e-books into the curriculum
- Colleges and universities are even more integrated
  - Wireless hotspots allow usage of personal laptops to connect to the college network
  - Some colleges require a computer for enrollment
- Distance learning
  - Students participate from locations other than the traditional classroom setting using computers and Internet access



# Computers in Education



Dmitry Shinnosov/Shutterstock.com

COMPUTER LABS AND CLASSROOMS



Jenkeico/Shutterstock.com

CAMPUS WIRELESS HOTSPOTS



Denver Makie, 7th Army JMTC

DISTANCE LEARNING

# Computers on the Job

- Computers have become a universal on-the-job tool for decision-making, productivity, and communication
  - Used by all types of employees
  - Used for access control and other security measures
  - Use by service professionals is growing
  - Used extensively by the military
  - Employees in all lines of work need to continually refresh their computer skills

# Computers on the Job



© STEVEDELICAS/Shutterstock.com



Courtesy of Motion Computing



Goodluz/Shutterstock.com



Courtesy of Ingersoll Rand

**OFF-SITE COMMUNICATIONS**

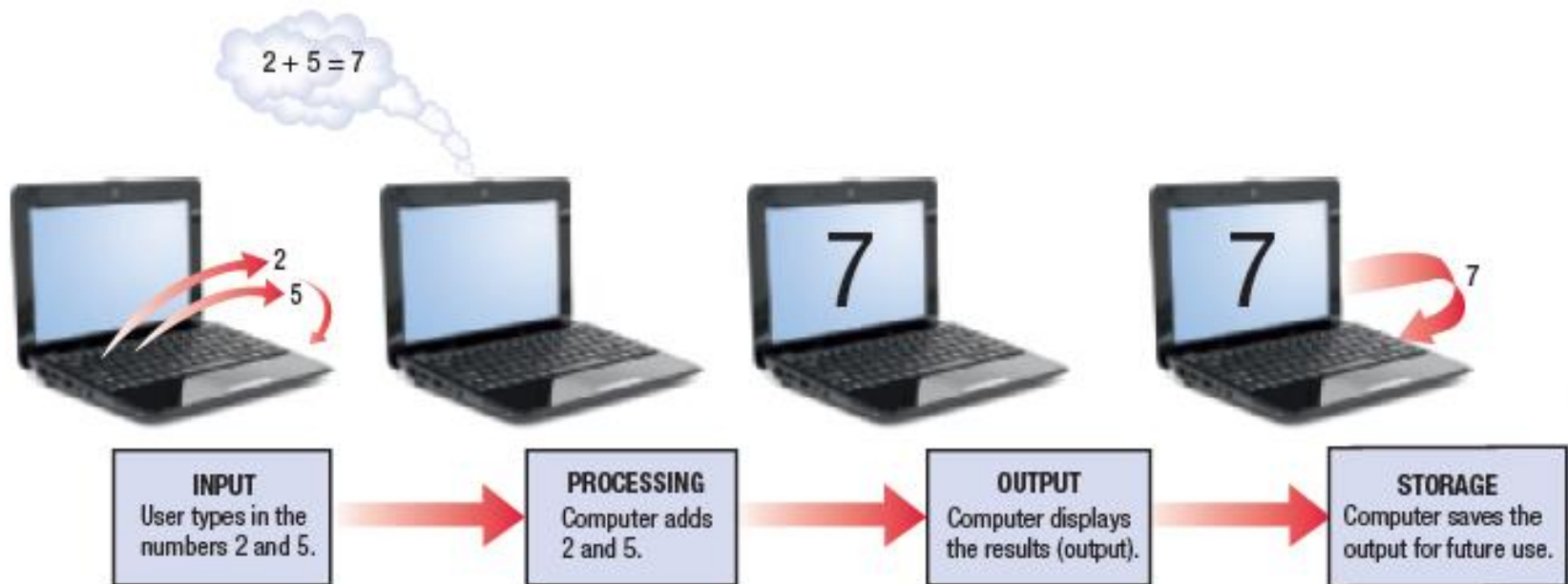
**AUTHENTICATION**

## Understanding Computers in a Changing Society, 5th Edition

# What Is a Computer and What Does It Do?

- Computer
  - A programmable, electronic device that accepts data, performs operations on that data, and stores the data or results as needed
  - Computers follow instructions, called programs, which determine the tasks the computer will perform
- Basic operations
  - Input: Entering data into the computer
  - Processing: Performing operations on the data
  - Output: Presenting the results
  - Storage: Saving data, programs, or output for future use
  - Communications: Sending or receiving data

# What Is a Computer and What Does It Do?



**FIGURE 1-6**  
The information processing cycle.

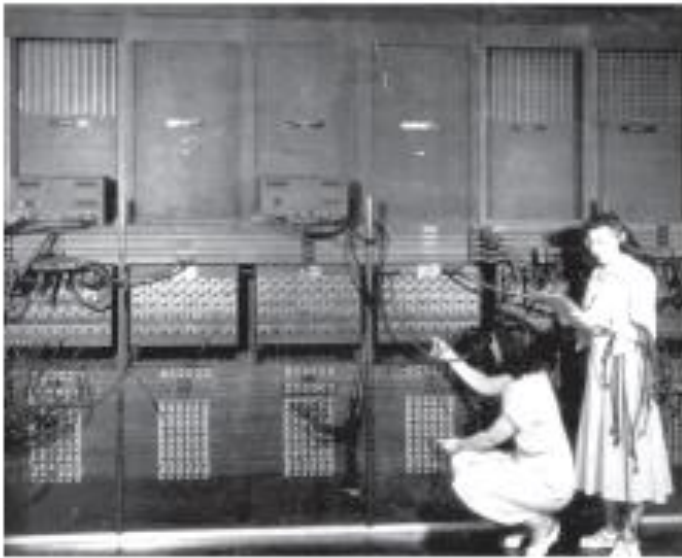
# Data vs. Information

- Data
  - Raw, unorganized facts
  - Can be in the form of text, graphics, audio, or video
- Information
  - Data that has been processed into a meaningful form
- Information processing
  - Converting data into information

# Computers Then and Now

- First-generation computers (1946-1957)
  - Enormous and powered by vacuum tubes
  - Used a great deal of electricity and generated a lot of heat
  - ENIAC and UNIVAC
- Second-generation computers (1958-1963)
  - Used transistors
  - Computers were smaller, more powerful, cheaper, more energy-efficient, and more reliable
  - Punch cards and magnetic tape were used to input and store data

# Computers Then and Now



## FIRST-GENERATION COMPUTERS

First-generation computers, such as ENIAC shown here, were large and bulky, used vacuum tubes, and had to be physically wired and reset to run programs.



## SECOND-GENERATION COMPUTERS

Second-generation computers, such as the IBM 1401 mainframe shown here, used transistors instead of vacuum tubes so they were smaller, faster, and more reliable than first-generation computers.



# Computers Then and Now

- Third-generation computers (1964-1970)
  - Used integrated circuits (ICs)
  - Keyboards and monitors introduced
- Fourth-generation computers (1971-present)
  - Use microprocessors
  - IBM PC, Apple Macintosh
  - Use keyboards, mice, monitors, and printers
  - Use magnetic disks, flash memory, and optical disks for storage
  - Computer networks, wireless technologies, Internet introduced

# Computers Then and Now



## THIRD-GENERATION COMPUTERS

Third-generation computers used integrated circuits which allowed the introduction of smaller computers, such as the IBM System/360 mainframe shown here.



## FOURTH-GENERATION COMPUTERS

Fourth-generation computers, such as the original IBM PC shown here, are based on microprocessors. Most of today's computers fall into this category.

# Computers Then and Now

- Fifth-generation (now and the future)
  - Infancy stage
  - No precise classification
  - May be based on artificial intelligence (AI)
  - Will likely use voice and touch input
  - May be based on optical computers and utilize nanotechnology

# Hardware

- **Hardware: The physical parts of a computer**
  - Internal hardware
    - Located inside the main box (system unit) of the computer
  - External hardware
    - Located outside the system unit
    - Connect to the computer via a wired or wireless connection
  - Hardware devices are associated with all five computer operations

# Hardware

- Input devices
  - Used to input data into the computer
  - Keyboards, mice, scanners, cameras, microphones, joysticks, touch pads, touch screens, fingerprint readers, etc.
- Processing devices
  - Perform calculations and control computer's operation
  - Central processing unit (CPU) and memory
- Output devices
  - Present results to the user
  - Monitors, printers, speakers, projectors, etc.

# Hardware

---

- Storage devices
  - Used to store data on or access data from storage media
  - Hard drives, CD/DVD discs and drives, USB flash drives, etc.
- Communications devices
  - Allow users to communicate with others and to electronically access remote information
  - Modems, network adapters, etc.

# Hardware



**FIGURE 1-9**  
Typical computer hardware.

# Software

- **Software**
  - The programs or instructions used to tell the computer hardware what to do
- **System software**
  - Operating system starts up the computer and controls its operation
  - Without OS, computer cannot function
  - Boots the computer and launches programs at the user's direction
  - Most use a GUI to interact with the user via windows, icons, menus, buttons, etc.
  - Windows, Mac OS, Linux, etc.



# Software

**WINDOWS DESKTOP**  
Provides the backdrop for icons, windows, and other objects.

**ICONS**  
Represent folders, documents, or other items that can be opened.

**WINDOWS**  
Rectangular areas containing programs, documents, or other data. The active window is the one currently being used.

**DIALOG BOX**  
Displayed when needed to request information from the user.

**MENU BAR**  
Opens menus that can be used to issue commands.

**TOOLBAR**  
Contains buttons or icons that can be used to issue commands.

**START BUTTON**  
Opens the Start menu that is used to launch programs.

**PINNED PROGRAMS**  
Represent programs that can be opened directly from the taskbar.

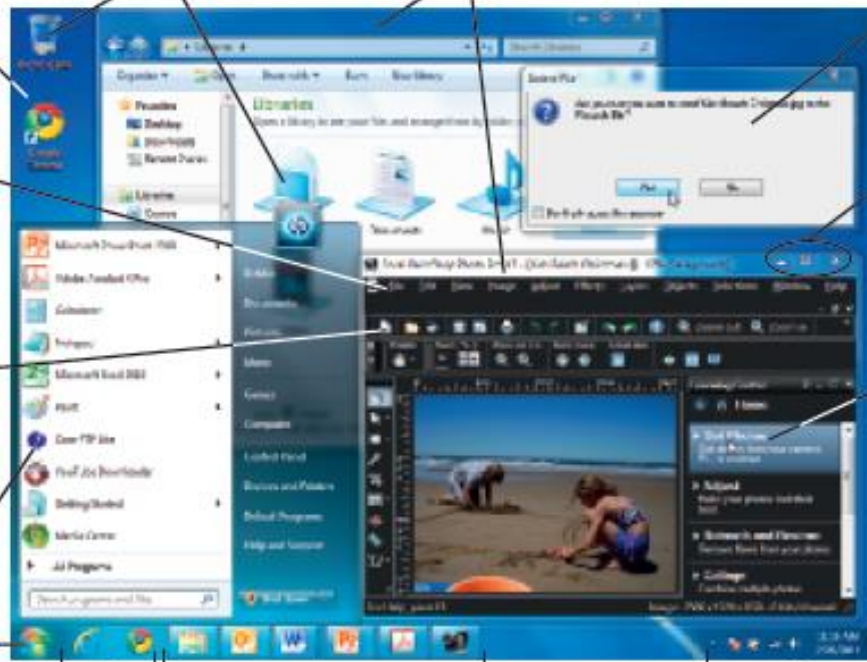
**TASKBAR BUTTONS**  
Correspond to open windows; can be used to preview thumbnails of open windows, as well as to change the active window.

**SIZING BUTTONS**  
Resize or close a window.

**HYPERLINK**  
Issues a command to the computer when clicked.

**TASKBAR**  
Usually located at the bottom of the desktop.

**NOTIFICATION AREA**  
Shows the clock and other indicators.



**FIGURE 1-10**  
The Windows desktop.

# Application Software

- **Application software**
  - Performs specific tasks or applications
    - Creating letters, budgets, etc.
    - Managing inventory and customer databases
    - Editing photographs
    - Scheduling appointments
    - Viewing Web pages
    - Sending and receiving e-mail
    - Recording/playing CDs and DVDs
    - Designing homes
    - Playing games

# Application Software



## WORD PROCESSING PROGRAMS

Allow users to create written documents, such as reports, letters, and memos.



## MULTIMEDIA PROGRAMS

Allow users to play music or videos and transfer content to CDs and DVDs.

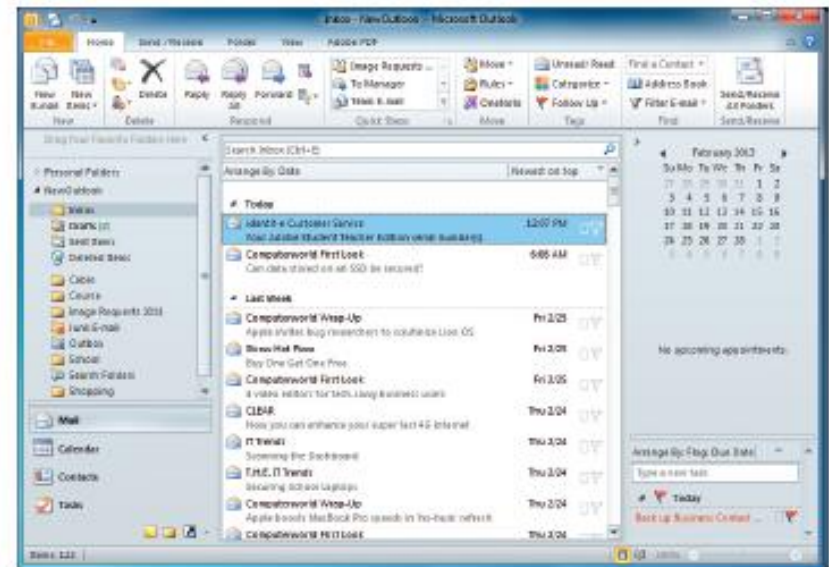
**FIGURE 1-11**  
Examples of  
application  
software.

# Application Software



## WEB BROWSERS

Allow users to view Web pages and other information located on the Internet.



## E-MAIL PROGRAMS

Allow users to compose, send, receive, and manage electronic messages sent over the Internet or a private network.

**FIGURE 1-11**  
Examples of application software.

# Computer Users and Professionals

- Computer users (end users)
  - People who use a computer to obtain information
- Computer professionals include:
  - Programmers
    - Write programs computers use
  - Systems analysts
    - Design computer systems
  - Computer operations personnel
    - Manage day-to-day computer operations
  - Security specialists
    - Secure computers and networks against hackers

# Computers To Fit Every Need

- **Six basic categories of computers:**
  - Embedded computers
  - Mobile devices
  - Personal computers
  - Midrange servers
  - Mainframe computers
  - Supercomputers

# Embedded Computers

- Embedded computer
  - Embedded into a product and designed to perform specific tasks or functions for that product
  - Cannot be used as general-purpose computers
  - Often embedded into:
    - Household appliances
    - Thermostats
    - Sewing machines
    - A/V equipment
    - Answering machines
    - Cars

FIGURE 1-12



A camera located under the mirror detects moving vehicles in the driver's blind spot.

A light indicates that a moving vehicle is in the driver's blind spot.

# Mobile Devices

- Mobile device
  - A very small device with some type of built-in computing or Internet capability
  - Often based on a mobile phone
  - Typically have small screens and keyboards
  - Examples:
    - Smartphones
    - Handheld gaming devices
    - Portable digital media players
    - Mobile tablets



# Personal Computers

- Personal computer
  - Small computer designed to be used by one person at a time
  - Also called a microcomputer
  - Available in different sizes and shapes
- Desktop computers
  - Fit on or next to a desk
  - Can use tower case, desktop case, or all-in-one
  - Can be PC-compatible or Macintosh
  - Not designed to be portable



PC-COMPATIBLE TOWER COMPUTERS



MAC ALL-IN-ONE COMPUTERS

**FIGURE 1-14**  
Desktop computers.

# Portable Computers

- Portable Computers
  - Designed to be carried around easily
  - Fully functional computers
  - Notebook (laptop) computers
    - Typically use a clamshell design
  - Tablet Computers
    - Usually use a digital pen/stylus or touch screen
    - Can be slate or convertible tablets

# Portable Computers

## – Netbooks

- Smaller, lighter, and less expensive than conventional notebooks
- Longer battery life
- Good for students and business travelers

**FIGURE 1-15**  
Portable computers.



**NOTEBOOKS**



**TABLETS**



**NETBOOKS**

# Thin Client and Internet Appliances

- Thin client or network computer (NC)
  - Device designed to access a network for processing and data storage
  - Lower cost, increased security and easier maintenance
  - Limited or no local storage
  - Not able to function as a computer if network is down
- Internet appliance
  - Specialized network computer designed for Internet access and/or e-mail exchange
  - Some designed to be used in the home

# Thin Client and Internet Appliances

- Can be built into another product such as a refrigerator or telephone console
- Can be a stand-alone device
- Can include Internet-enabled gaming consoles

**FIGURE 1-16**  
Thin clients and Internet appliances.



Courtesy of NIComp uting

**THIN CLIENTS**



Courtesy of Sony Ele tronics, Inc.

**STAND-ALONE INTERNET DEVICES**



By one Fire nes/Shutterstock.com

**INTERNET-ENABLED GAMING CONSOLES**

# Midrange Servers

- Midrange server
  - A medium-sized computer used to host programs and data for a small network
  - Sometimes referred to as a microcomputer
  - Users connect via a network with a computer, thin client, or dumb terminal
  - May consist of a collection of individual circuit boards called blades
  - Virtualization
    - Creating virtual rather than actual environments (often used to share a server for increased efficiency)



**FIGURE 1-17**  
Midrange servers.

The user connects to the server using a computer, thin client, or dumb terminal.

The server is typically stored in a nearby closet or other out-of-the-way place.

Courtesy Ergotron Inc., Courtesy Dell Inc.

# Mainframe Computers

- Mainframe computer
  - Powerful computer used by many large organizations to manage large amounts of centralized data
  - Standard choice for hospitals, universities, large businesses, banks, government offices
  - Located in climate-controlled data centers and connected to the rest of the company computers via a network
  - Larger, more expensive, and more powerful than midrange servers
  - Usually operate 24 hours a day
  - Also called high-end servers or enterprise-class servers

# Mainframe Computers



Courtesy of IBM Corporation

**FIGURE 1-18**  
Mainframe  
computers.



# Supercomputers

- Supercomputer
  - Fastest, most expensive, most powerful type of computer
  - Generally run one program at a time, as fast as possible
  - Commonly built by connecting hundreds of smaller computers, supercomputing cluster
  - Used for space exploration, missile guidance, satellites, weather forecast, oil exploration, scientific research, complex Web sites, decision support systems, 3D applications, etc.

# Supercomputers



Courtesy of NVIDIA

**FIGURE 1-19**  
The Tianhe-1A  
supercomputer.

# Computers and Society

- The vast improvements in technology over the past decade have had a distinct impact on daily life, both at home and at work
- Many benefits of a computer-oriented society
  - Ability to design products before construction leads to safer products
  - Earlier medical diagnoses and more effective treatment
  - Devices that allow physically and/or visually challenged individuals to perform job tasks
  - Documents e-mailed or faxed in moments
  - Download information, music, programs, movies, and more on demand

# Computers and Society

- Computer-oriented society also has risks
  - Stress and health concerns
  - Spam
  - Computer viruses and malware
  - Identity theft and phishing
  - Privacy issues
    - How data is collected
    - How secure is the collected data

# Computers and Society

- Differences in online communications
  - Less formal than traditional
  - Netiquette
    - Be polite and considerate of others
    - Refrain from offensive remarks
  - Abbreviations (acronyms) and emoticons
    - Acronyms such as BTW (by the way)
    - Illustrations of faces-- 😊

# Computers and Society

<b>RULE</b>	<b>EXPLANATION</b>
Use descriptive subject lines	Use short, descriptive subject lines for e-mail messages and online posts. For example, "Question regarding MP3 downloads" is much better than a vague title, such as "Question."
Don't shout	<b>SHOUTING REFERS TO TYPING YOUR ENTIRE E-MAIL MESSAGE OR ONLINE POST USING CAPITAL LETTERS.</b> Use capital letters only when it is grammatically correct to do so or for emphasizing a few words.
Watch what you say	Things that you say or write online can be interpreted as being sexist, racist, ethnocentric, xenophobic, or in just general bad taste. Also check spelling and grammar—typos look unprofessional and nobody likes wading through poorly written materials.
Avoid e-mail overload	Don't send spam, which is unsolicited bulk e-mail and the Internet equivalent of junk mail. The same goes for forwarding e-mail chain letters or every joke you run across to everyone in your address book.
Be cautious	Don't give out personal information—such as your real name, telephone number, or credit card information—to people you meet online.
Think before you send	Once you send an e-mail or text message or post something online, you lose control of it. Don't send messages that include content (such as compromising photos) that you would not want shared with others.

**FIGURE 1-30**  
**Netiquette.** Use these netiquette guidelines and common sense when communicating online.

# Computers and Society

- The Anonymity Factor
  - Gives many individuals a sense of freedom
  - Can also be abused
- Information Integrity
  - Use common sense when evaluating online content
  - Check your source--not all information on the Internet is accurate

# Summary

---

- Computers in Your Life
- What is a Computer and What Does It Do?
- Computers to Fit Every Need
- Computers and Society