Introduction to the World of Computers
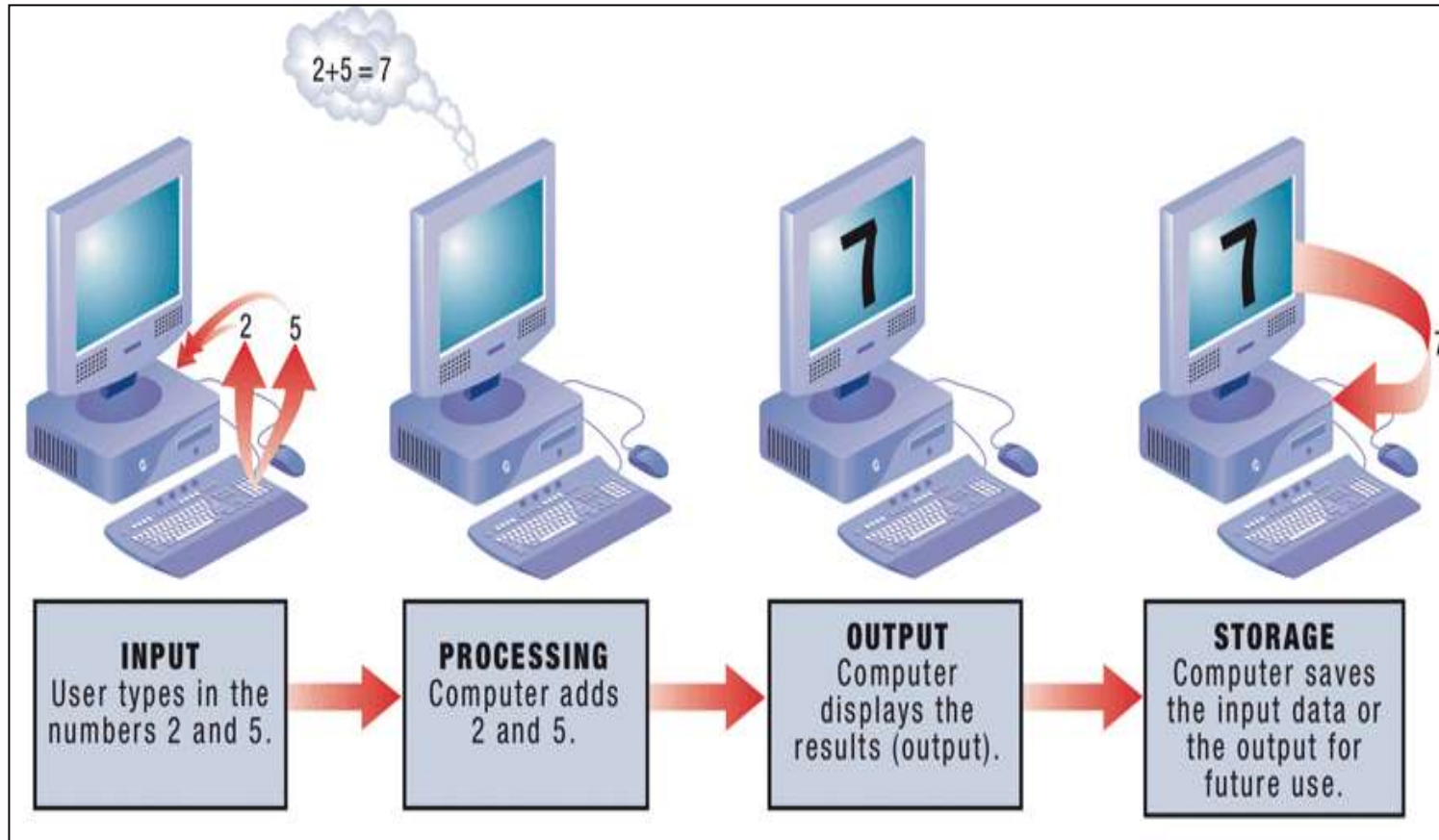
Chapter 1

101 COMP - 3

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?

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
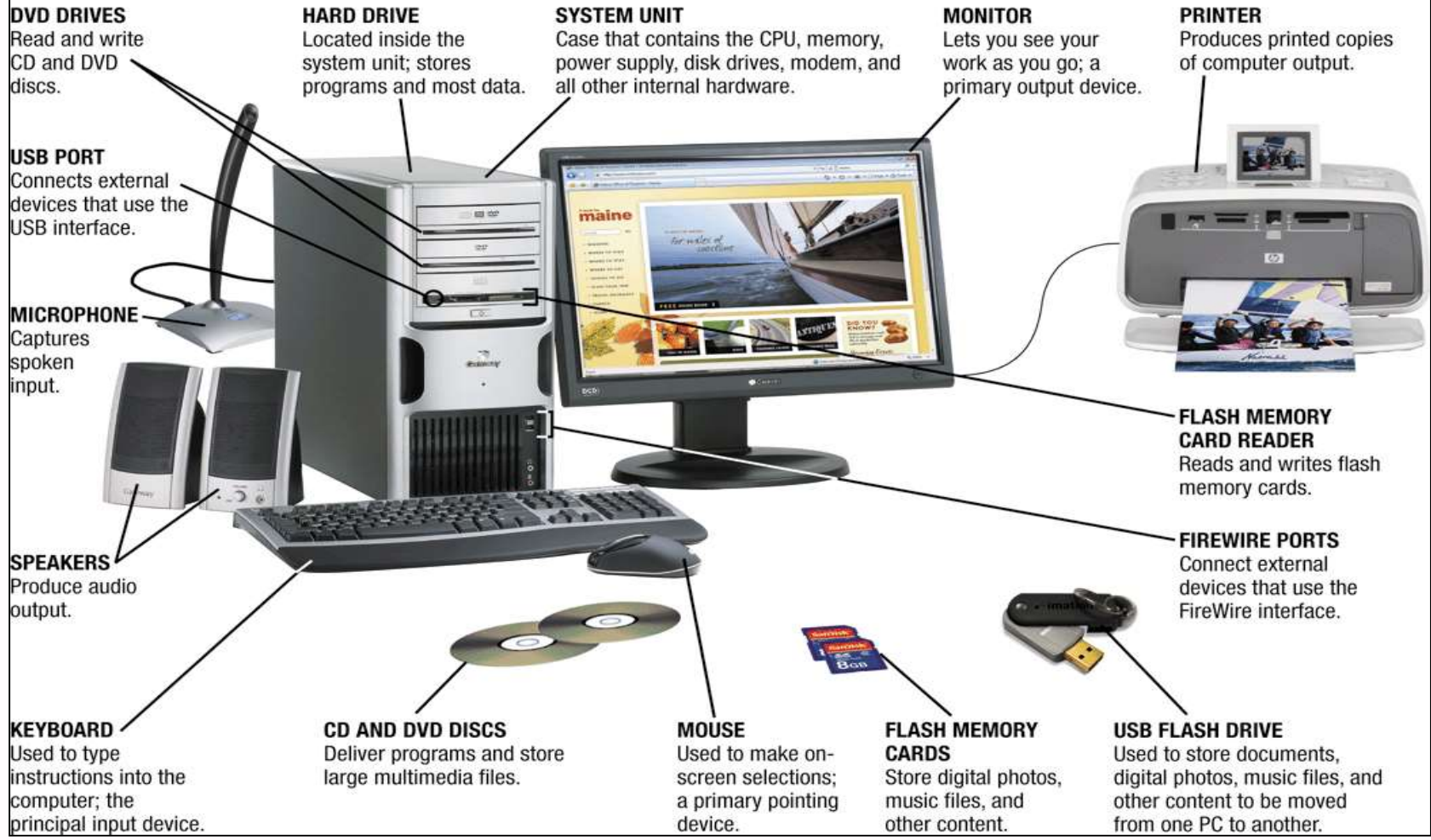
Hardware

- 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 and plug into ports located on the exterior of the system unit

  - Hardware associated with all five computer operations

Hardware

FIGURE 1-8
Typical computer hardware.

DVD DRIVES
Read and write CD and DVD discs.

USB PORT
Connects external devices that use the USB interface.

MICROPHONE
Captures spoken input.

SPEAKERS
Produce audio output.

KEYBOARD
Used to type instructions into the computer; the principal input device.

HARD DRIVE
Located inside the system unit; stores programs and most data.

CD AND DVD DISCS
Deliver programs and store large multimedia files.

SYSTEM UNIT
Case that contains the CPU, memory, power supply, disk drives, modem, and all other internal hardware.

MOUSE
Used to make on-screen selections; a primary pointing device.

MONITOR
Lets you see your work as you go; a primary output device.

FLASH MEMORY CARDS
Store digital photos, music files, and other content.

PRINTER
Produces printed copies of computer output.

FLASH MEMORY CARD READER
Reads and writes flash memory cards.

FIREWIRE PORTS
Connect external devices that use the FireWire interface.

USB FLASH DRIVE
Used to store documents, digital photos, music files, and other content to be moved from one PC to another.

Hardware

- Input devices
  - Used to input data into the computer
  - Keyboards, mice, scanners, cameras, microphones, joysticks, 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, DVD disks and drives, USB flash drives, etc.

- ## Communications devices
  - Allow users to communicate with others and to electronically access information
  - Modems, network adapters, etc.

Hardware

INPUT	OUTPUT
Keyboard	Monitor
Mouse	Printer
Microphone	Speakers
Scanner	Headphones and headsets
Digital camera	Data projector
Electronic pen	**STORAGE**
Touch pad	
Joystick	Hard drive
Fingerprint reader	Floppy disk
PROCESSING	Floppy disk drive
	CD/DVD disc
CPU	CD/DVD drive
COMMUNICATIONS	Flash memory card
	USB flash drive
Modem	Flash memory card reader
Network adapter	

Software

- Software: The programs or instructions used to tell the computer hardware what to do
    - System software: Operating system allows a computer to operate
        - 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

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

WINDOWS
Rectangular areas containing programs, documents, or other data.

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

WINDOWS DESKTOP
Provides the backdrop for icons, windows, and other objects, such as the Windows Sidebar shown here.
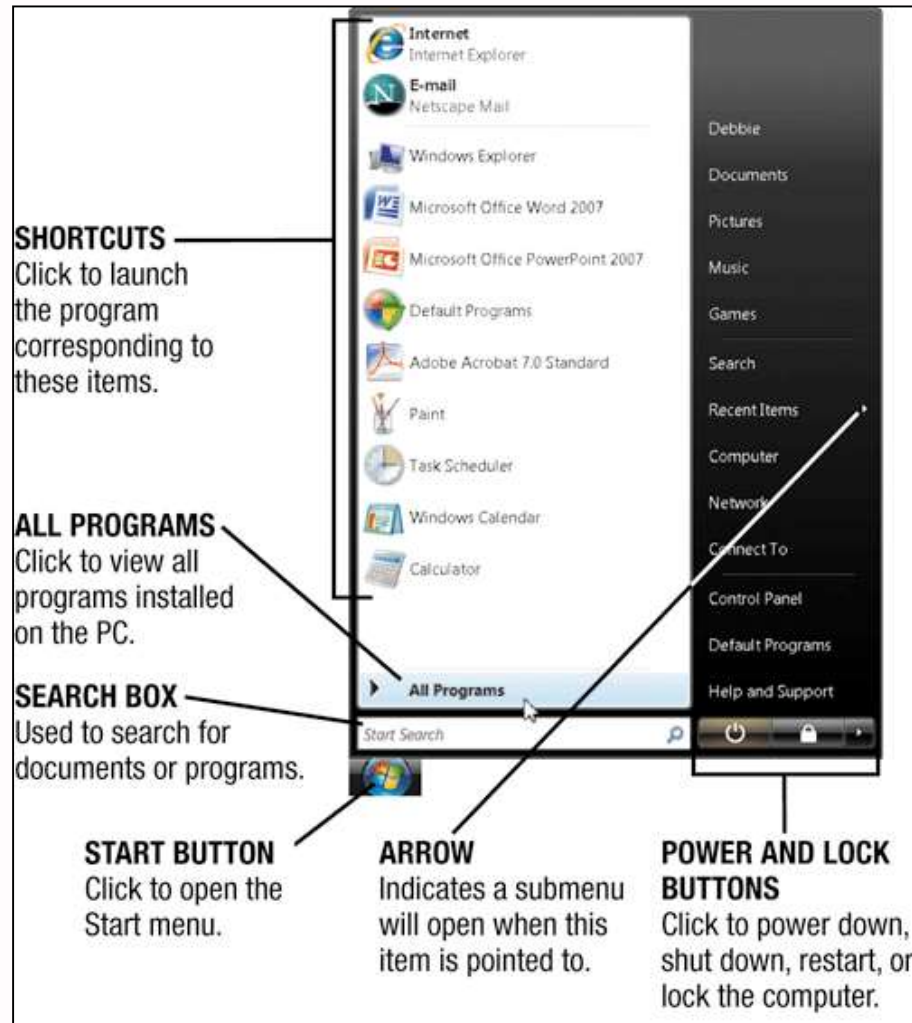
MENU BAR
Opens menus.

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

SIZING BUTTONS
Minimize, maximize, or close a window.

RIBBON
Replaces menus and toolbars in some programs.

TOOLBAR BUTTON
Issues a command.

HYPERLINK
Issues a command to the computer when clicked.

MENU
Contains commands.

START BUTTON
Opens the Start menu.

TASKBAR
Usually located at the bottom of the desktop.

TASKBAR TOOLBAR
Contains icons that can start programs.

TASKBAR BUTTONS
Correspond to open windows; can be used to change the active window.

SYSTEM TRAY
Shows the clock and other indicators.

Software

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

- Designing homes

- Playing games

Application Software

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

SPREADSHEET PROGRAMS
Allow users to create documents containing numbers and computations, such as budgets, expense reports, and financial statements.

GAMES
Allow both children and adults to perform educational and/or entertainment activities.

MULTIMEDIA PROGRAMS
Allow users to perform tasks, such as playing music or video clips stored on a computer, CD, or Web page; creating audio CDs; and transferring home movies to DVD discs.

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

FIGURE 1-12
Examples of application software.

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

Computer Users and Professionals

- Computer users (*end users*)

  - People who use a computer to obtain information

- Computer professionals include:

  - Programmers

  - Systems analysts

  - Computer operations personnel

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
  - Cars

Mobile Devices

- Mobile device: A very small device with some type of built-in computing or Internet capability

- Typically based on cellular phones

- Examples:
  - Smart phones
  - Smart watches
  - Handheld gaming devices
  - Portable digital media players

Personal Computers/Desktop PCs

- Personal computer: a computer system designed to be used by one person at a time
  - Also called a microcomputer
  - Can be desktop or portable computers

- Desktop PCs: 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

TOWER CASE; PC-COMPATIBLE COMPUTER   ALL-IN-ONE CASE; MACINTOSH COMPUTER

Portable PCs

- Notebook (laptop) computers
  - Typically use clamshell design
- Tablet PCs
  - Can be slate tablets or convertible

NOTEBOOK COMPUTER

SLATE TABLET PC

CONVERTIBLE TABLET PC

Portable PCs

- Handheld computers

  - Size of a paperback book or pocket calculator

  - Some include phone capabilities

  - Ultra Mobile Personal Computer (UMPC): Fully-functioning handheld

SMART PHONE CAPABILITIES
Some handheld computers can also perform the functions of a smart phone.

SLIDING KEYBOARDS
UMPCs typically have a sliding keyboard for easier input.

Portable PCs

- Most include wireless networking capabilities

- Can synch (share information) with a desktop computer as needed

- Can use a docking station or notebook stand as needed

Portable PC

Docking station

External hardware is connected to the docking station.

SYNCHING A HANDHELD AND NOTEBOOK PC
The photos stored on the handheld computer are being transferred (via Bluetooth wireless technology) to the notebook computer.

DOCKING STATIONS
Once a portable PC is connected to a docking station, the monitor and other hardware connected to the docking station can be used.

FIGURE 1-18
Synching and docking a handheld PC.

Thin Clients and Internet Appliances

- Thin client or network computer (NC): PC designed to access a network for processing and data storage

  - Lower cost 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

  - Often set-top boxes

  - Can include Internet-enabled gaming consoles

Thin Clients and Internet Appliances

THIN CLIENT

SET-TOP BOX INTERNET APPLIANCE

PORTABLE INTERNET APPLIANCE

INTERNET-ENABLED GAMING CONSOLE

Midrange Servers

- Midrange server*:* A medium-sized computer used to host programs and data for a small network

  – Users connect via a network with a computer, thin client, or dumb terminal

  – May consist of a collection of individual circuit boards called blades (blade servers)

Users connect to the server using PCs, thin clients, or dumb terminals.

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

Mainframe Computers

- Mainframe computer: Powerful computer used by several large organizations to manage large amounts of centralized data
  - Standard choice for large organizations, 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

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.
- Grid computing: Using the unused processing power of a large number of computers to work together on a single task

Supercomputers

BLUE GENE/L SUPERCOMPUTER
This supercomputer is installed at Lawrence Livermore National Laboratory.

BLUE GENE/L CIRCUIT BOARDS
Each rack holds several circuit boards; each circuit board contains four processors.