CSC 101
# Introduction to ICT

Lecture 2

Syeda Zoupash Zahra

Looking Inside Computer System

- Most people believe that computers must be extremely complicated devices, because they perform such amazing tasks

- Computer is a collection of parts, which are categorized according to the kinds of work they do

- Glimpse inside a standard desktop computer

- How these components work together and allow you to interact with the system

Parts of the Computer System

- Computer systems have four parts
  - Hardware
  - Software
  - Data
  - User
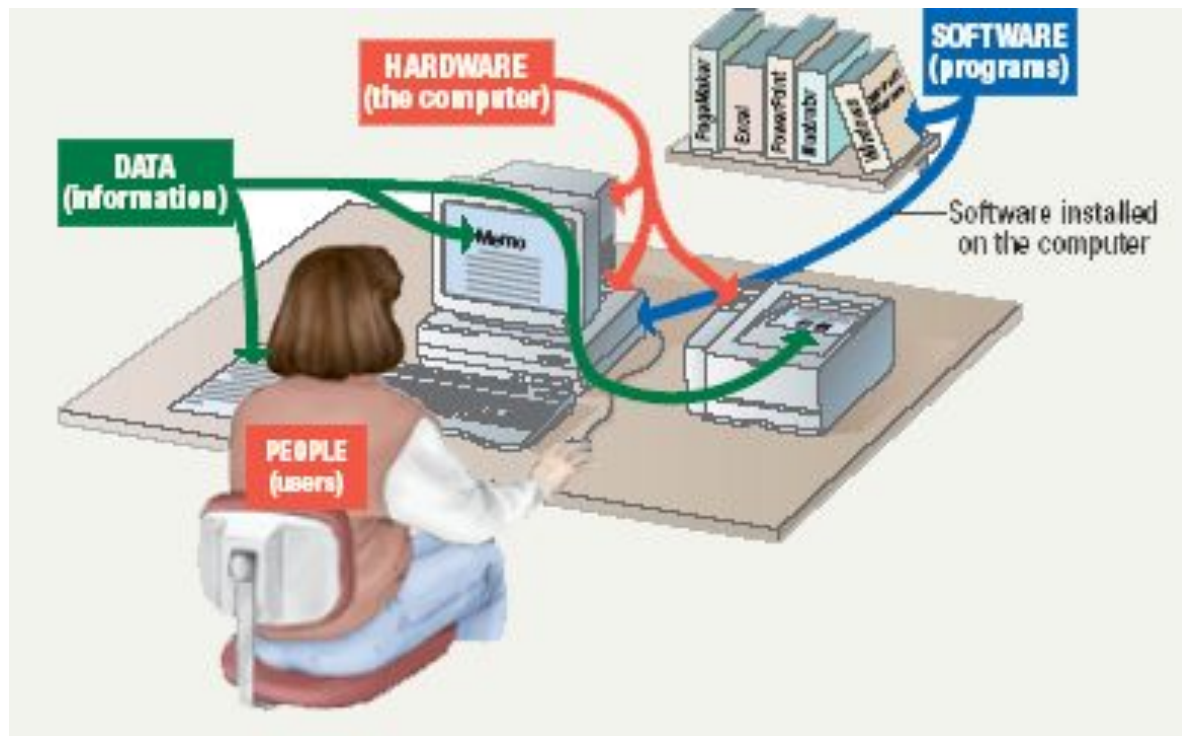
Hardware

- Mechanical devices in the computer
- Anything that can be touched
  - e.g. printer, keyboard, PDA etc.
- consists of interconnected electronic devices that you can use to control the computer's operation, input, and output.
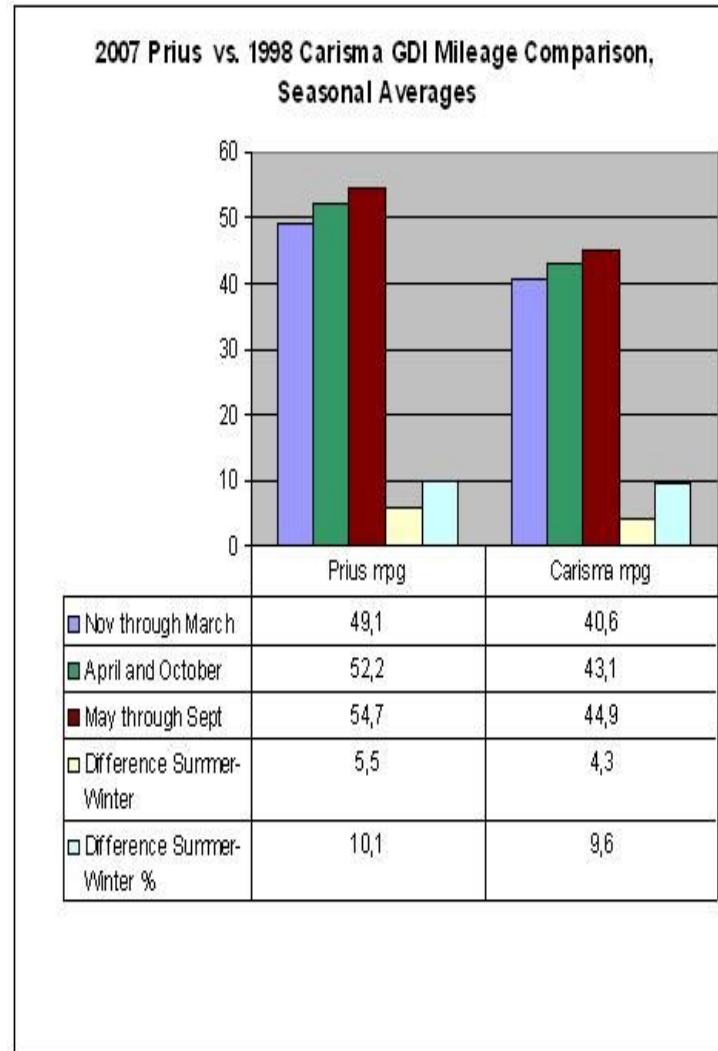- generic term **device** refers to any piece of hardware

Software

- Set of instructions that makes the computer perform tasks
- Tell the computer what to do
- Also called a program
- Thousands of programs exist
  - Some for computer's own use
  - Some for the service of the user
- Reason majority of the people would want to purchase a computer
  - E-mail, type letters, play games etc.

Data

- Pieces of information / individual facts
- By themselves do not make much sense
- Computers organize and present data

2007 Prius vs. 1998 Carisma GDI Mileage Comparison, Seasonal Averages

|	Prius mpg	Carisma mpg
Nov through March	49,1	40,6
April and October	52,2	43,1
May through Sept	54,7	44,9
Difference Summer-Winter	5,5	4,3
Difference Summer-Winter %	10,1	9,6

Users

- People operating the computer

- Most important part

- Tell the computer what to do
  - Userless computers?
  - people still design, build, program, and repair computer systems.

Information Processing Cycle

- Converts data into information
- Data
  - The raw facts and figures that are processed into information
- Information
  - Data that has been summarized or otherwise manipulated for use in decision making
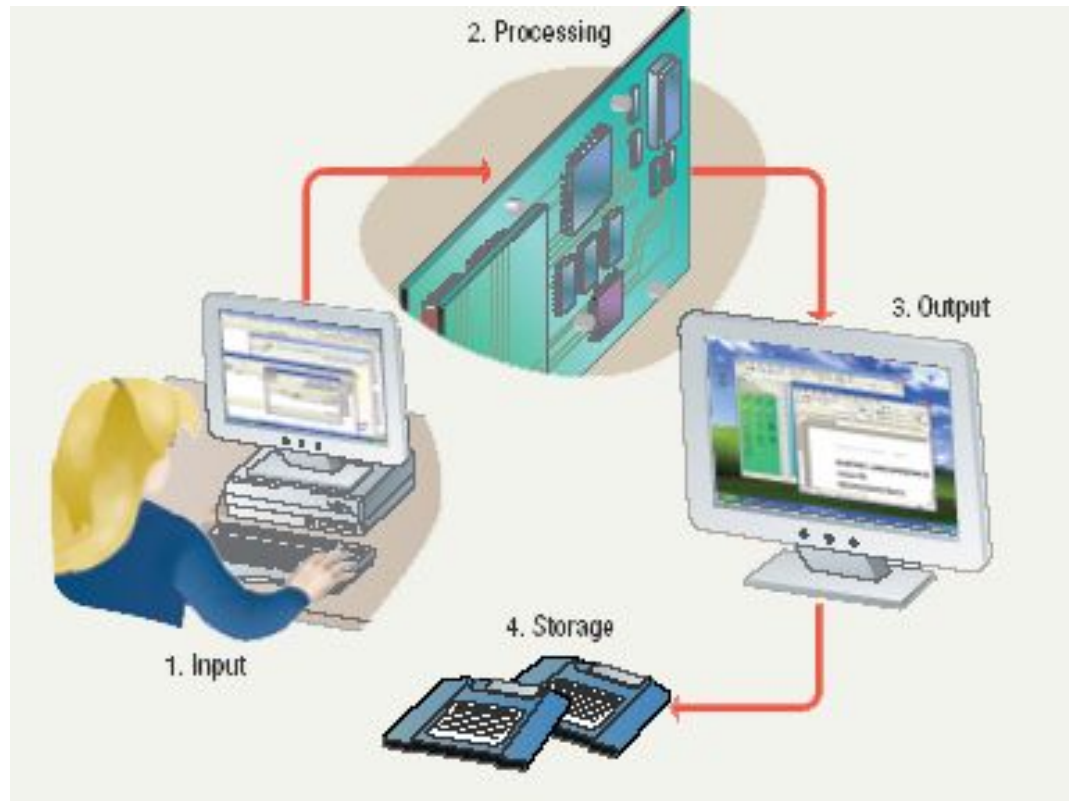
Input	→	Processing / Computation	→	Output
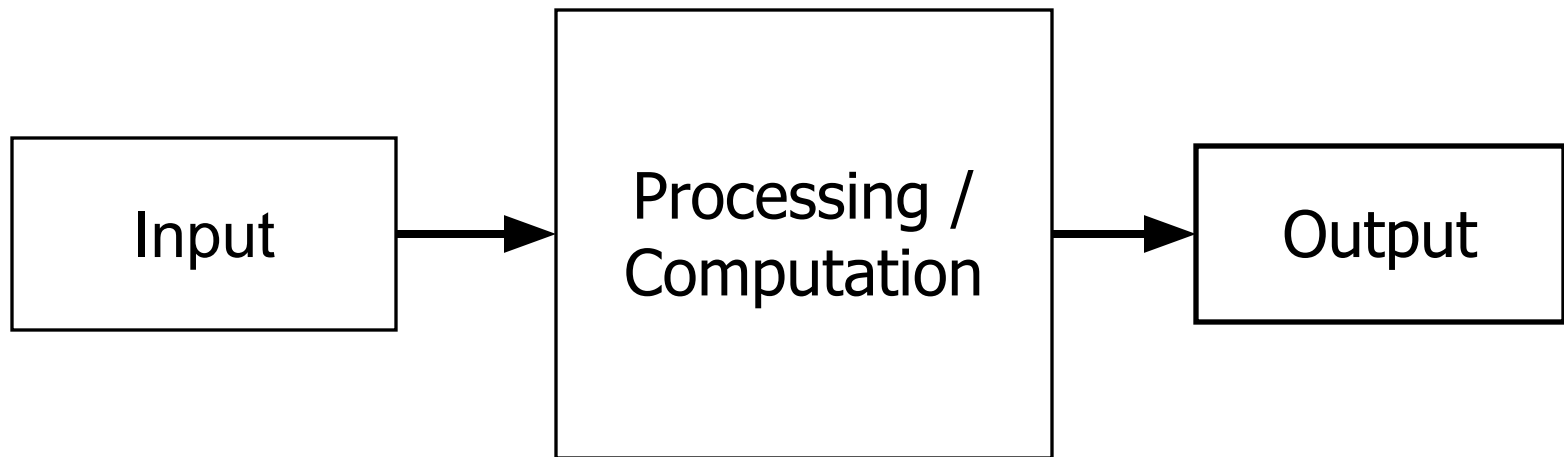
Steps to Process Data

- Input
- Processing
- Output
- Storage

Steps to Process Data

- Input
  - Computer accepts data from some source
- Processing
  - Computers processing components perform actions on the data based on instructions from user or program
- Output
  - Computer conveys result to user.
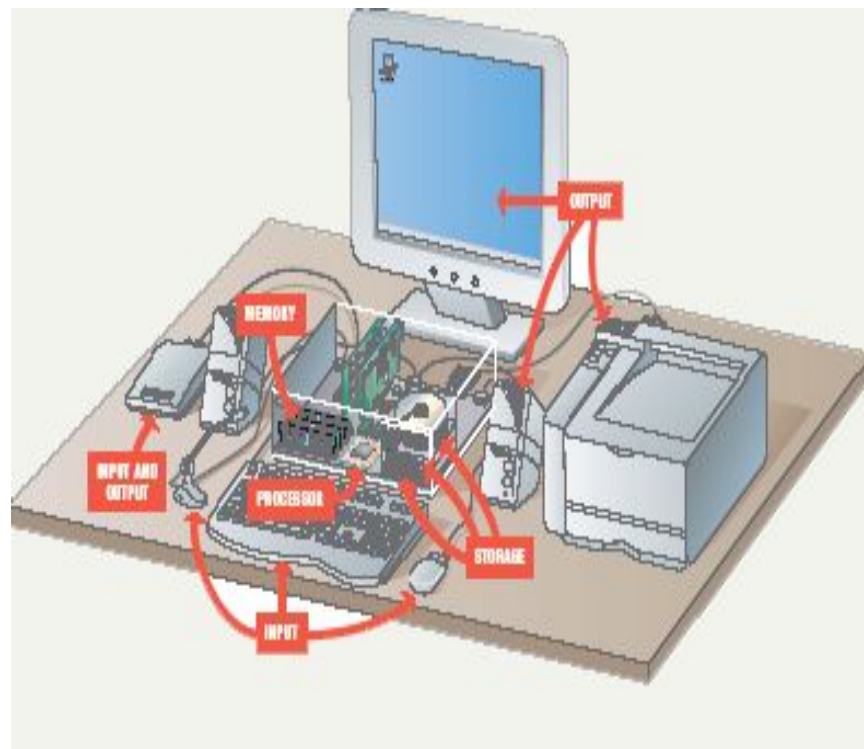 - Text, numbers, graphic, image, video, sound
  - Optional
- Storage
  - Permanently store result on some medium
  - Optional

Essential Computer Hardware

- Computers use the same basic hardware
- Hardware categorized into four types
  - Processor
  - Memory
  - Input and Output
  - Storage

Processing Devices

- ## Processing
  - The procedure that transforms raw data into useful information

- ## To perform this transformation, the computer uses two components:
  - The Processor and
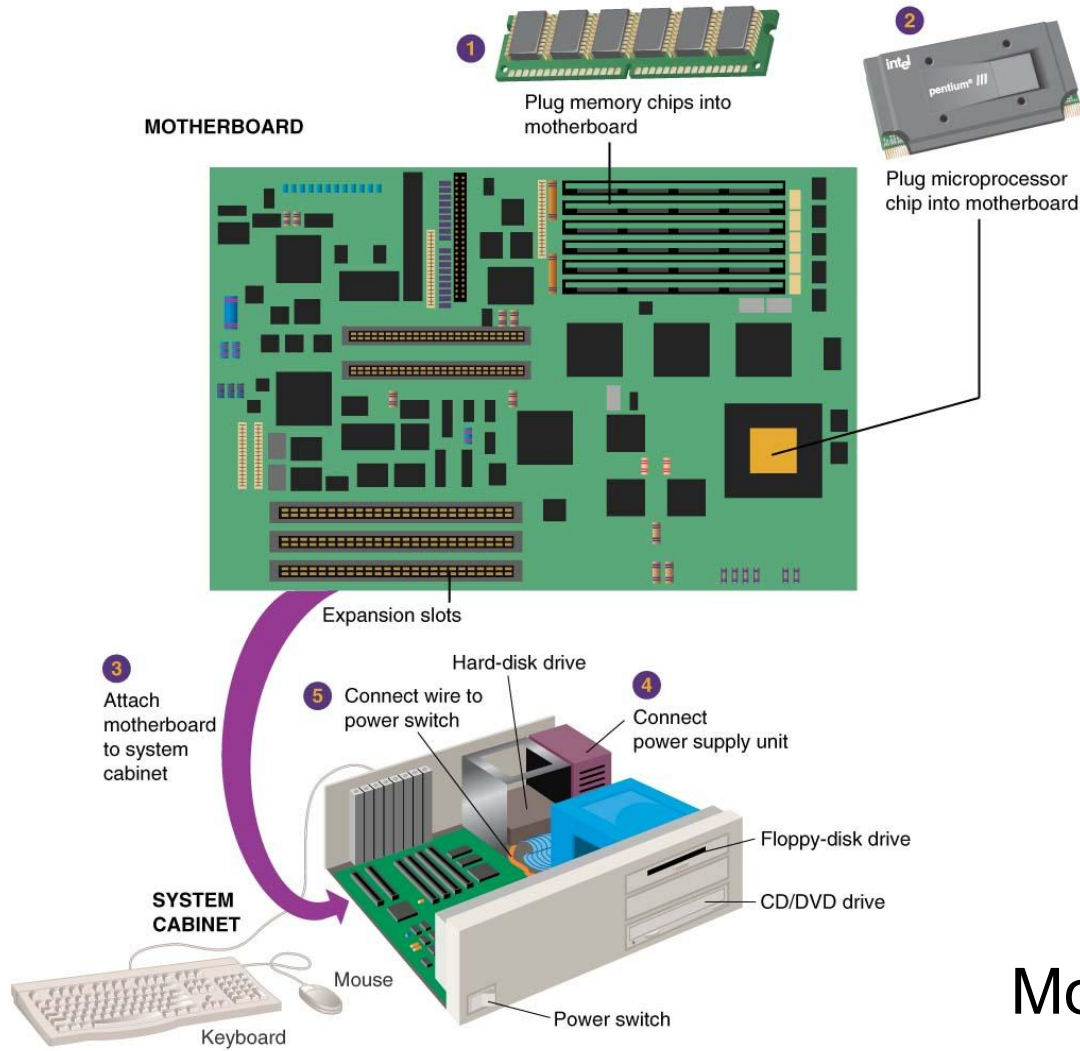 - Memory

Processing Devices

Processor

- Brain of the Computer
- Processor chip
  - A tiny piece of silicon that contains millions of miniature electronic circuits.
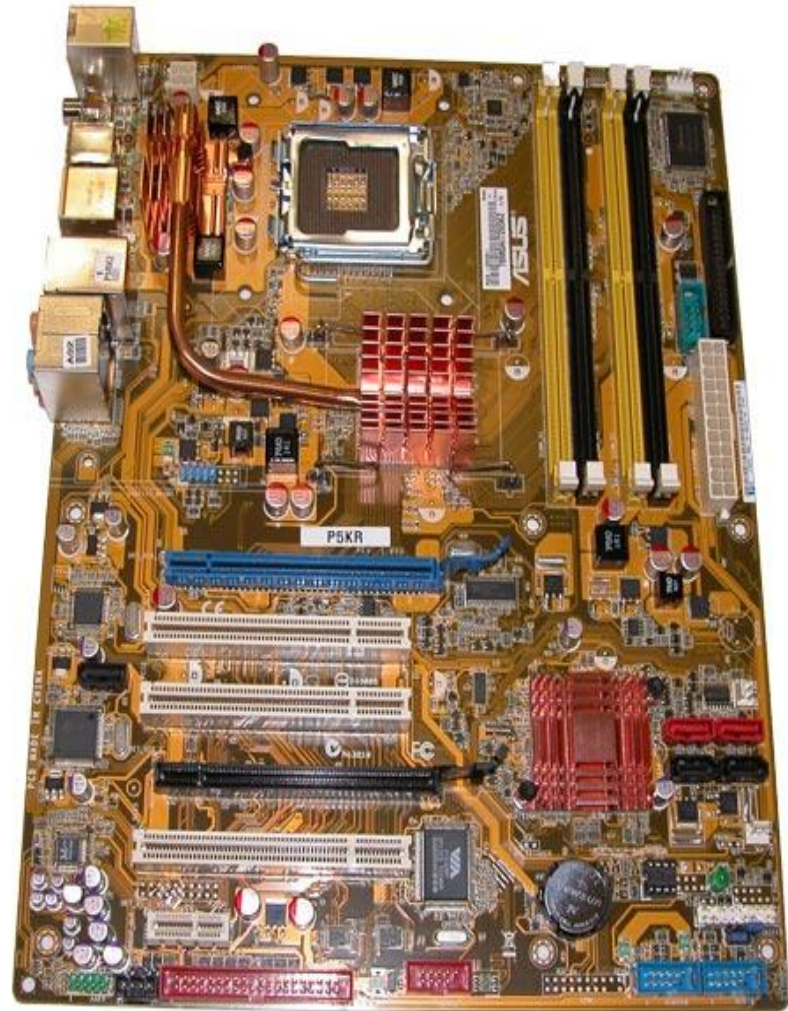

Processor chip

How does everything connect?

MOTHERBOARD

1. Plug memory chips into motherboard

2. Plug microprocessor chip into motherboard

Expansion slots

3. Attach motherboard to system cabinet

5. Connect wire to power switch

Hard-disk drive

4. Connect power supply unit

Floppy-disk drive

CD/DVD drive

SYSTEM CABINET

Mouse

Keyboard

Power switch

Motherboard

Motherboard

- Main printed circuit board in the computer

- Everything connects to the motherboard

- Expansion slots - "plugs" on the motherboard for expanding the PC's capabilities via additional circuit boards

Processor

- Carries out instructions from the program
- Manipulate the data
- Most computers have several processors
- Central Processing Unit (CPU)
- Secondary processors
- Processors made of silicon and copper

Memory

- memory is one or more sets of chips that store data and/or program instructions, either temporarily or permanently.

- Memory is a critical processing component in any computer

- Two most important types
  - Random access memory (RAM) and
  - Read-Only memory (ROM).

- work in very different ways and perform distinct functions

Random Access Memory

- Also known as RAM or memory
- Represent primary storage or temporary storage.
- Hold data before processing and information after processing.
- Volatile
- More RAM results in a faster system
- In MBs or GBs

RAM

memory chip (RAM chip)

memory chips mounted on module
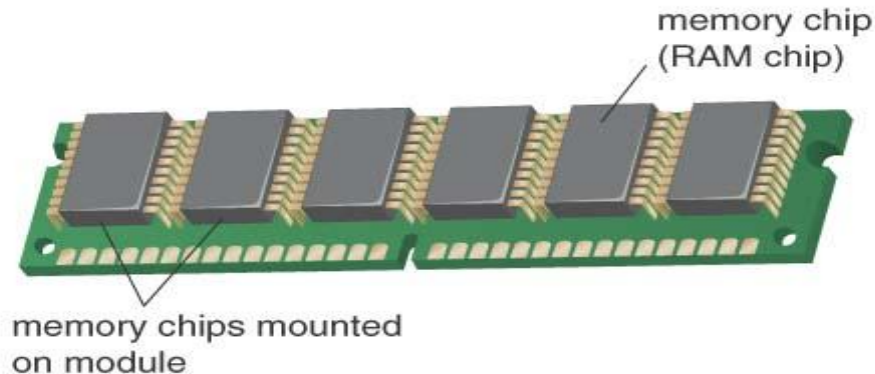
Read Only Memory

- Also called ROM
- Nonvolatile
  - Permanent storage of programs
- Holds the computer boot directions
- Typically in KBs

ROM

Input

- Input hardware - devices that allow people to put data into the computer in a form that the computer can use

- Allows the user to interact

- Input devices accept data

- Keyboard

- Mouse

Other Input Devices

- Track ball or touch pad
- Joystick
- Scanners
- Digital Camera
- Microphone
- Webcam
- Digitizer

Keyboard

Mouse

Scaner

Trackball

Digitizer

Kamera

Mic

Output

- Output devices return processed data to the user or to another computer system.
- Most common
  - Monitor
  - Printer
  - Speaker
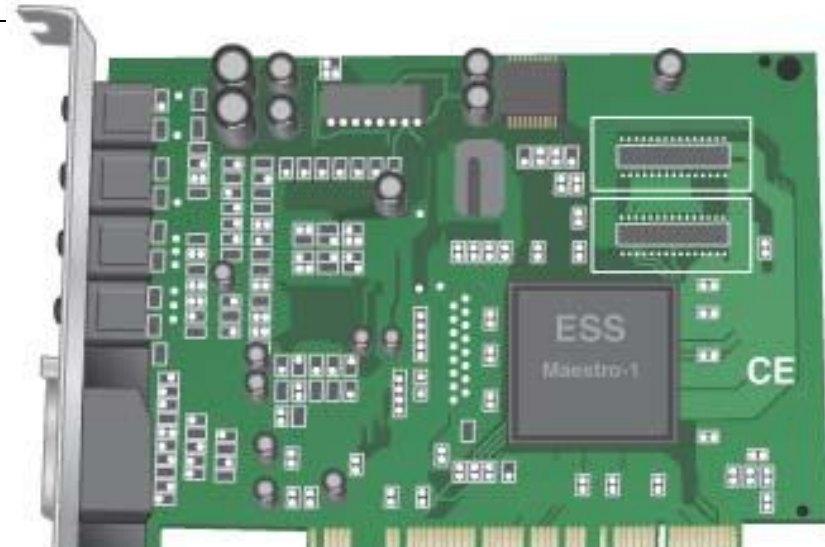- Some devices are input and output
  - Touch screens

CRT LCD

Monitor Printer

Plotter Speaker

Output

Sound Card

- Coverts audio signal from digital to analog and vice versa

- Both Input and Output device

Speakers

- the devices that play sounds transmitted as electrical signals from the sound card.
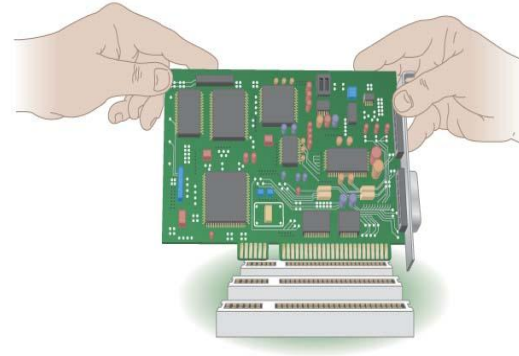
Output

Video card

- converts the processor's output information into a video signal that can be sent through a cable to the monitor

Monitor

- the display device that takes the electrical signals from the video card and forms an image using points of colored light on the screen

Communication Devices

- **Modem**
  - a device that sends and receives data over telephone lines to and from computers..

- **Network Interface Cards (NIC)**
  - Controls the flow of data on a network link

Storage Devices

- Hold data and programs permanently
- Electronic file cabinet
- Difference between storage and memory
  - More capacity in storage
  - Contents are retained in storage even the power is off
  - Storage is much cheaper
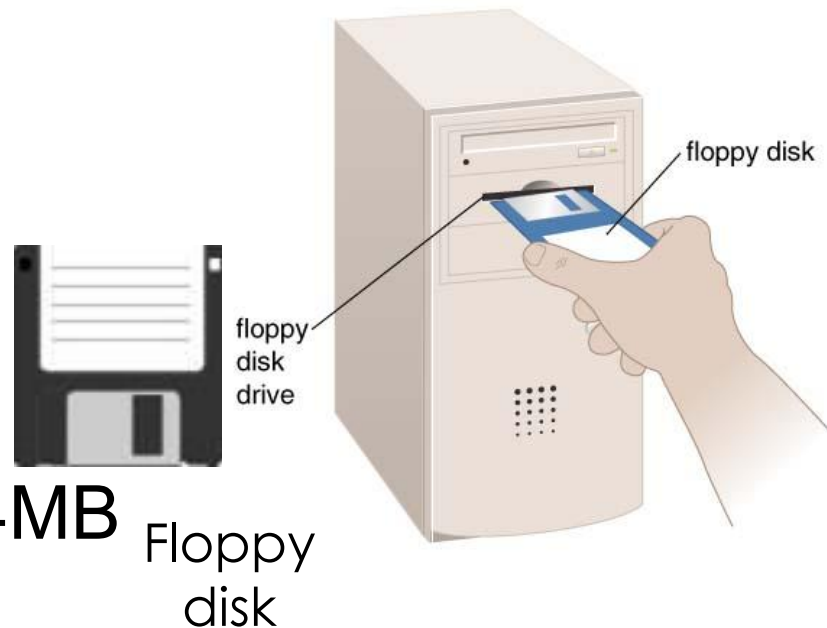 - Access speed is slow

Types of Storage Devices

- Magnetic storage

- Optical storage

Magnetic Storage

- Most common
- Floppy disk
  - ❑ stores data on removable 3.5-inch-diameter diskettes.
  - ❑ Typical Capacity 1.4MB
- Zip Disk
  - ❑ stores data on floppy-disk cartridges with 70-170 times the capacity of the standard floppy
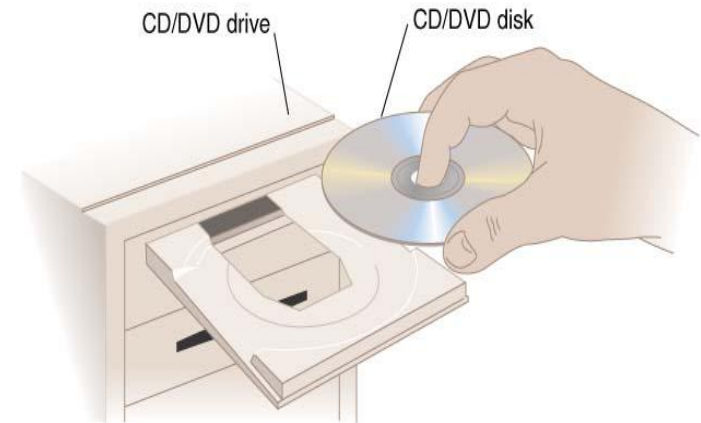
Floppy disk

Zip disk

Hard disk drive

- Storage device that stores billions of characters of data on a non-removable disk platter.

- Capacity 40GB-750GB or even more in TBs

Optical Storage

- CD (Compact Disk) drive

  - a storage device that uses laser technology to read data from optical disks.

  - 700MB for CD

- DVD

  - 4.7 to 17 GB

CD/DVD drive   CD/DVD disk

Blu Ray

- optical disc storage
- high-definition video and data storage.
- same physical dimensions as standard DVDs and CDs.
  - 120 mm in diameter and
  - 1.2 mm thick
- More storage capacity
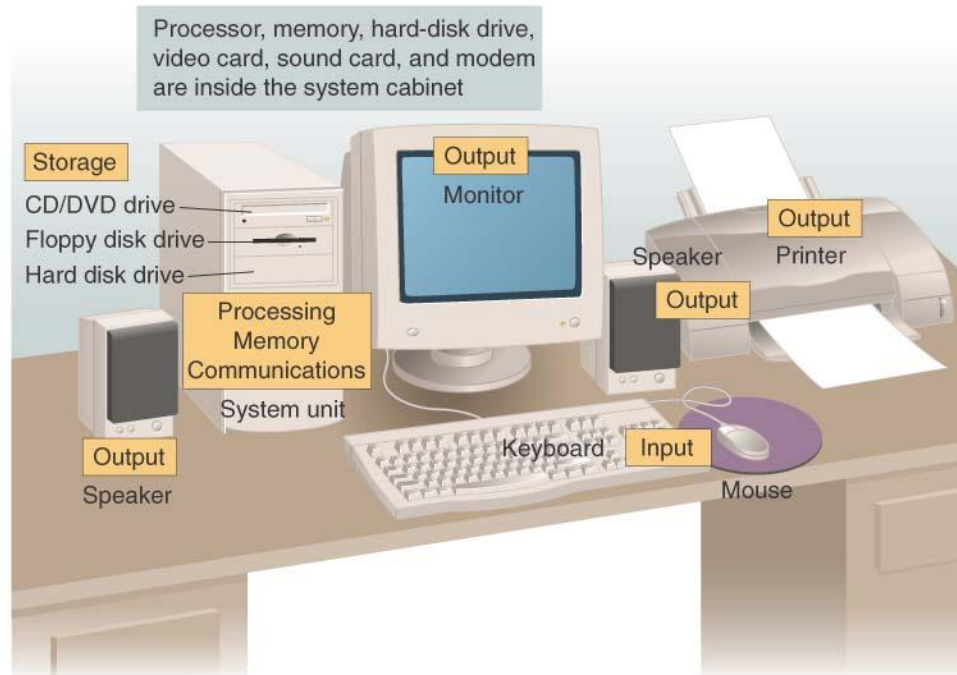 - 25 – 50 GB (single and double layer
  - 100 – 128 GB (triple and quad layer

Storage Capacity

- 1 byte - 1 character of data.

- 1 kilobyte – 2^{10} bytes/char; 1,024 characters.

- 1 megabyte - 2^{20} bytes/char 1,048,576 characters.

- 1 gigabyte - more than 1 billion characters.

- 1 terabyte - more than 1 trillion characters.

Put all the hardware together and…

Processor, memory, hard-disk drive, video card, sound card, and modem are inside the system cabinet

Storage
CD/DVD drive
Floppy disk drive
Hard disk drive

Processing
Memory
Communications
System unit

Output
Speaker

Output
Monitor

Output
Speaker

Output
Printer

Keyboard

Input
Mouse

Power

- **What is Left? Power**
  - ❑ Inside system cabinet

Software Runs The Machine

- Tells the computer what to do
- Reason people purchase computers
- Two types
  - System software
  - Application software

System Software

- Most important software
- controls the computer's hardware
- Operating system
  - tells the computer how to use its own components.
    - Windows XP
- Network operating system (OS)
  - allows computers to communicate and share data across a network
    - Windows Server 2003
- Utility
  - makes the computer system easier to use or performs highly specialized functions.
    - Norton Utilities

Application Software

- Accomplishes a specific task
- Most common type of software
  - Word processors
  - Spreadsheet
  - Database Management
  - Presentation
  - Graphics
  - Multimedia authoring
  - Entertainment and Education
  - Games
  - Web Design tools and web browsers

Computer data

- Fact with no meaning on its own
- Stored using the binary number system
- Data can be organized into files
  - A file is simply a set of data that has been given a name.
  - A file that the user can open and use is often called a document.

Computer Users

- User's Role depends on ability
- Setup the system
- Install software
- Running the Programs
- Manage files
- Maintain the system

Userless Computers

- Run with no user input
- Automated systems
  - A car's on board computer
  - Home appliances
    - Washers and dryers
  - Security systems
  - Navigation systems
- Typically controlled by their own operating systems

Summary

- Parts of the Computer System
  - Hardware, Software, Data, People
- Information Processing Cycle
  - Input, Processing, Output, Storage
- Computer Hardware
  - Processor, Memory, Motherboard
  - Input Devices Output devices
  - Storage Devices
- Computer Software
- Computer Users