Fundamentals of a computer System

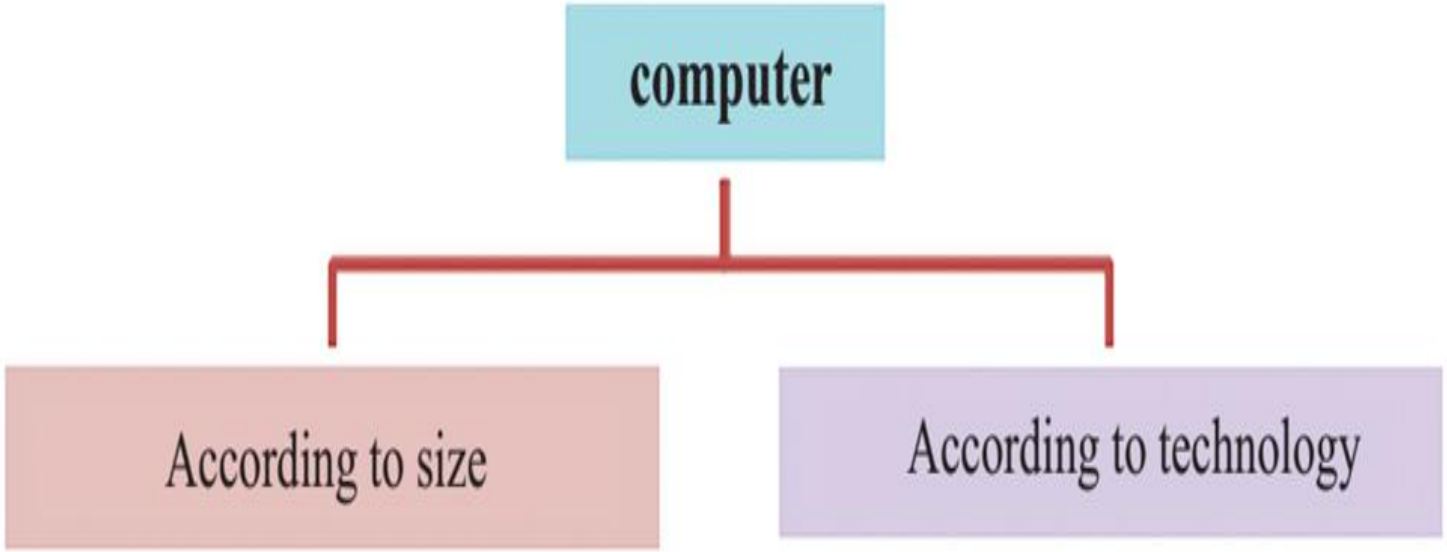
What is a computer?

- An electronic device, which accepts or collects data, processes them according to the given instructions and produces the desired output.

Features of a computer

- Speed
- Accuracy
- Efficiency
- Versatility
- Storing and Retrieving

Classification of computers

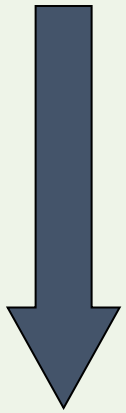
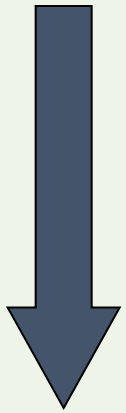
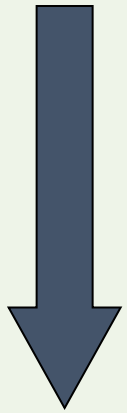
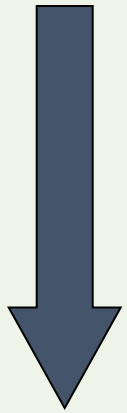


Classification according to size

- Super Computer
- Mainframe Computer
- Mini Computer
- Micro Computer

Comparison of different types of computers

- Feature Comparison

	Size	Computing Power	Speed	Cost
Super Computers				
Main frame Computers				
Mini Computers				
Micro Computers				

- Usage Comparison

Super Computers	Main frame Computers	Mini Computers	Micro Computers
Used for scientific and engineering functions and to solve complex mathematical problems	Used for business-transaction processing in large scale businesses and in e-business.	Used for business-transaction processing in small to mid-range scale businesses	Used for personal needs

Classification according to technology

- Analog Computers
- Digital Computers
- Hybrid Computers

Analog Computers

Use analog signals (speed, pressure, and temperature)
Ex. Speedometers, road
lamps with sensors

Digital Computers

Use digital signals, using electricity
Ex. Personal Computers

Hybrid Computers

Use both analog and digital signals
Ex. ECG machine

Function of a Computer System

Main functions of a computer system

- Input data
- Process data
- Store data
- Produce information

A Computer System

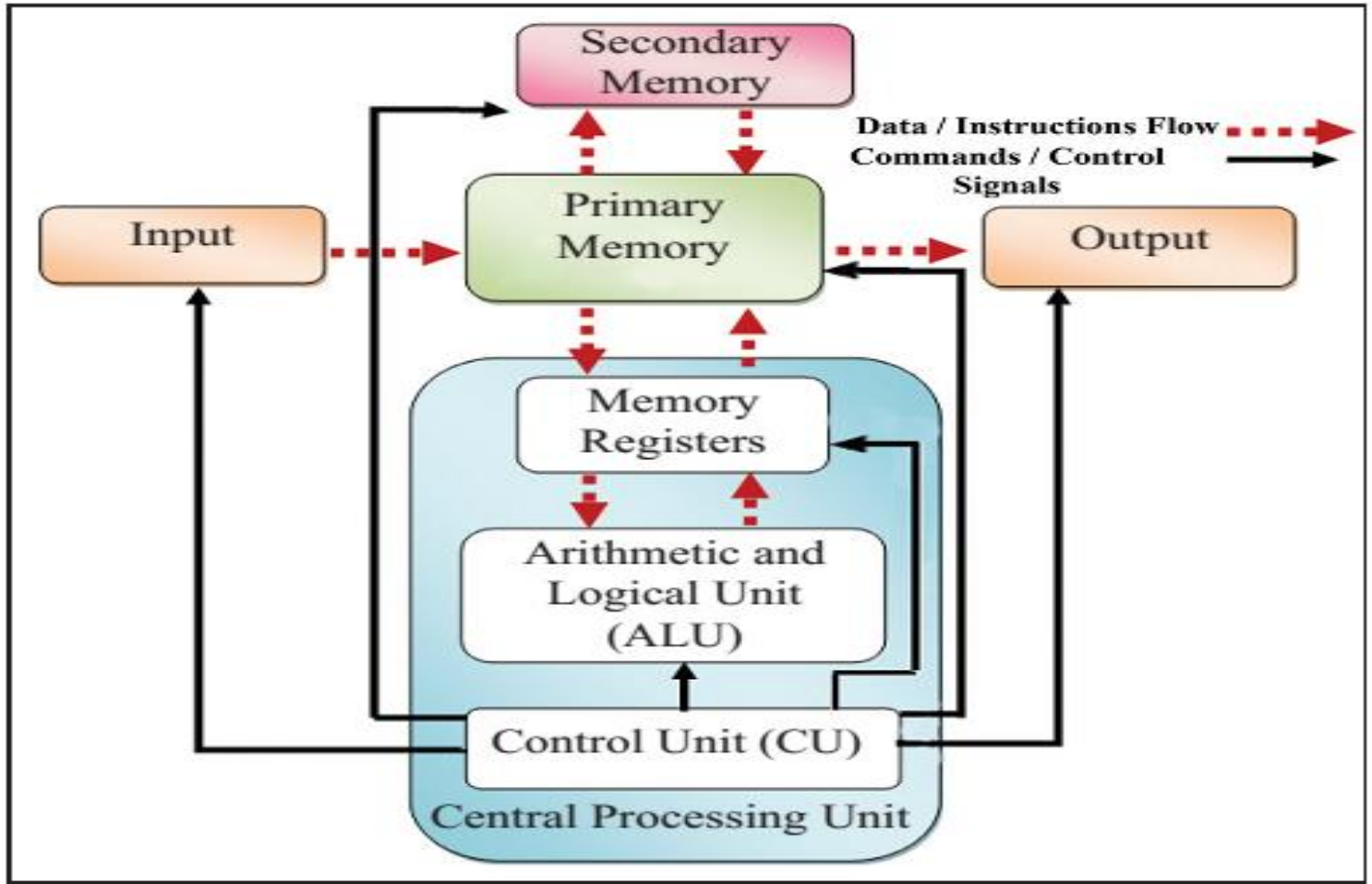


Figure 2.10 - A Computer System

- Data and instructions are entered to the computer system via input devices.
- These data and instructions are stored in the primary memory and sent to the CPU for processing.
- The processed data are sent back to the Primary Memory as information.
- This information is then sent to the Secondary Storage device to be stored or to an output device attached to the computer system.
- All these operations are controlled by the Control Unit by sending control signals to attached devices.

Basic Components of a computer system

- Input Devices
- Output Devices
- Central Processing Unit – CPU
- Computer Memory
- Computer Ports

Input Devices

1) Keyboard

- Comes in two sizes.
  - 101/102 keys
  - 104/108 keys

- Has different types of keys for different functions
  - Typing keys
  - Numeric keys
  - Control keys
  - Special keys
  - Function keys
  - Arrow keys

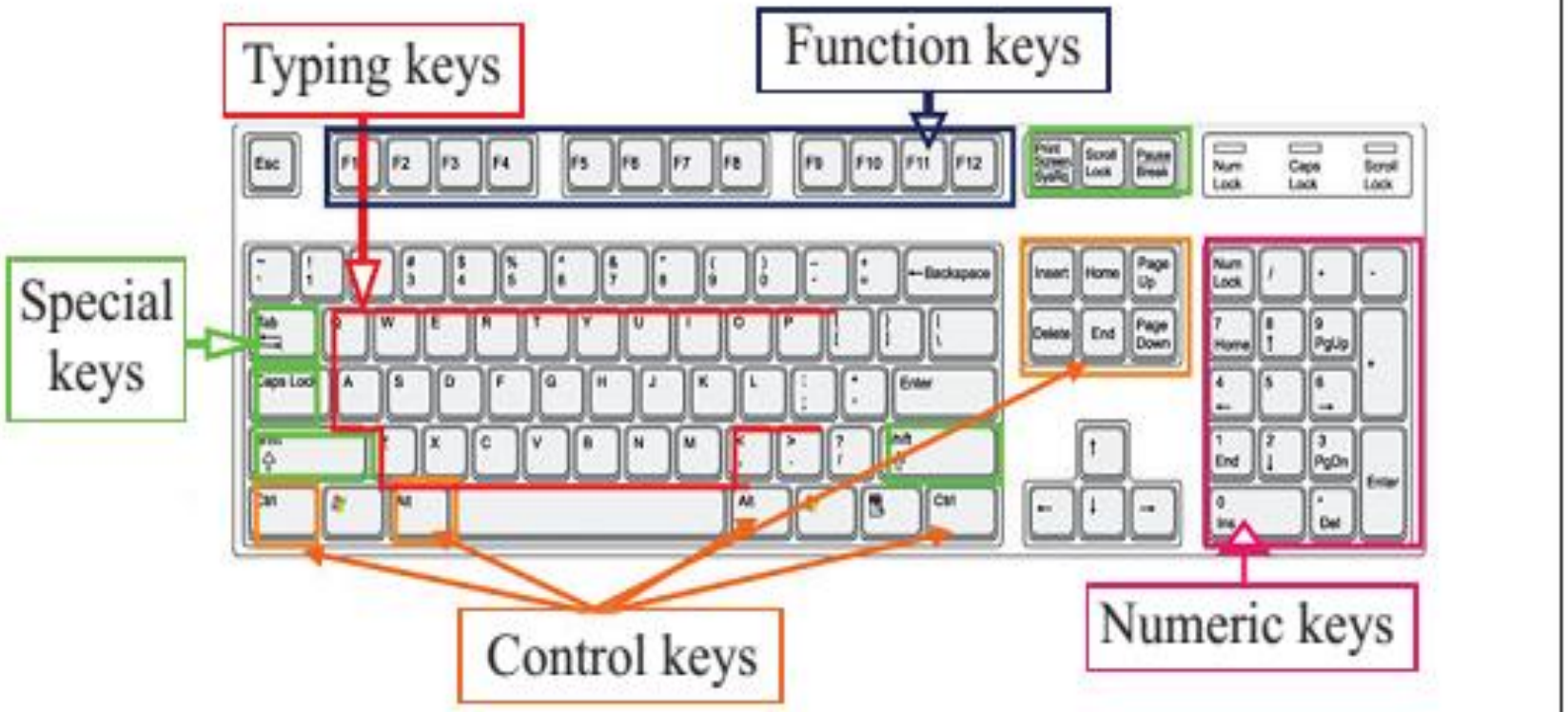


Figure 2.11 - Keyboard

2. Pointing Devices

I. Mouse
II. Touch screen
III. Joy Stick
IV. Light pen

3. Imaging and Video Input Devices

I. Digital Camera
II. Webcam
III. Closed Circuit TV (CCTV)

4. Scanners
    I. Flatbed Scanners
    II. Bar Code Reader
    III. Magnetic Ink Character Reader – MICR
    IV. Optical Character Recognition – OCR
    V. Optical Mark Recognition – OMR
    VI. Automated Teller Machine – ATM

5. **Microphone**

Activity 1

Write down the answers for the following questions in your exercise book.

1. What is the built-in pointing device in laptop computers?
2. Name the pointing device which is specially designed for computer games?
3. What is the use of a webcam?
4. What is the input device used for correcting MCQs of exam papers?
5. How can a microphone be used as an input device?

Output Devices

Several methods are used to output the processed information by a computer system. They are,

I. Soft copy - The output on the screen
II. Hard copy – The tangible computer outputs
III. Sound

Soft copy output devices

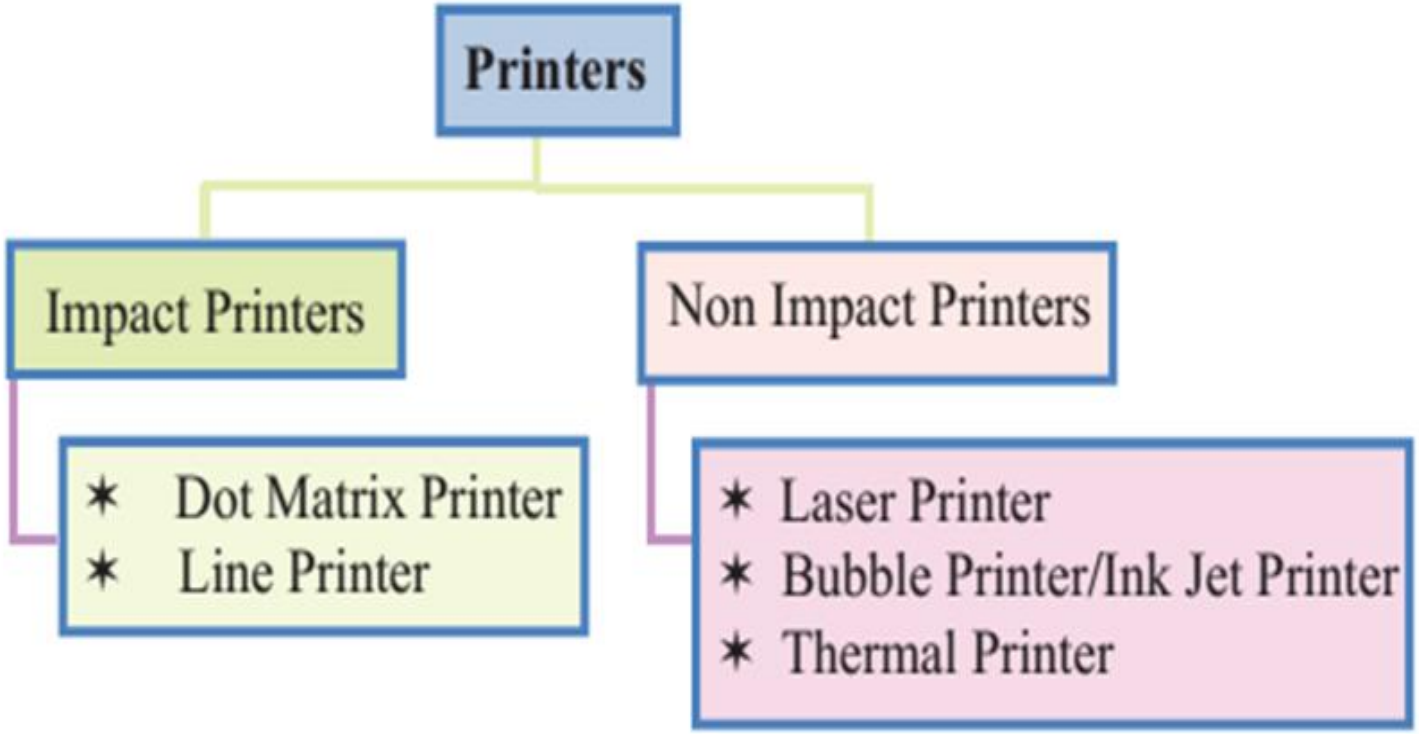
1. Monitor/ Screen (Visual Display Unit)
    I. Cathode Ray Tube (CRT) Monitor
    II. Liquid Crystal Display – LCD
    III. Light Emitting Diode – LED

2. Multimedia Projector

    Gets information output to a wider screen.

Hard copy output devices

1. Printers



Difference between Impact and Non-impact printers

Impact printer / Dot-matrix Printer	Non impact Printer / Laser Printer
1. It prints characters or images by striking print hammer or wheel against an inked ribbon.	1. It prints characters and images without striking the papers.
2. Its speed is slower.	2. Its speed is faster.
3. Its printing quality is lower.	3. Its printing quality is higher.
4. It normally uses continuous paper sheet.	4. Its normally uses individual paper sheet.
5. It generates noise during printing.	5. It does not generate noise during printing.
6. It uses inked ribbon for printing.	6. It uses toner or cartridge for painting.
7. It is less expensive.	7. It is more expensive.

2. Plotter

Commonly used in computer-aided design for printing vector graphics.

Sound output devices

1. Speakers

Central Processing Unit – CPU

The brain of the computer that manages the operating system and application software.

Main Components of CPU

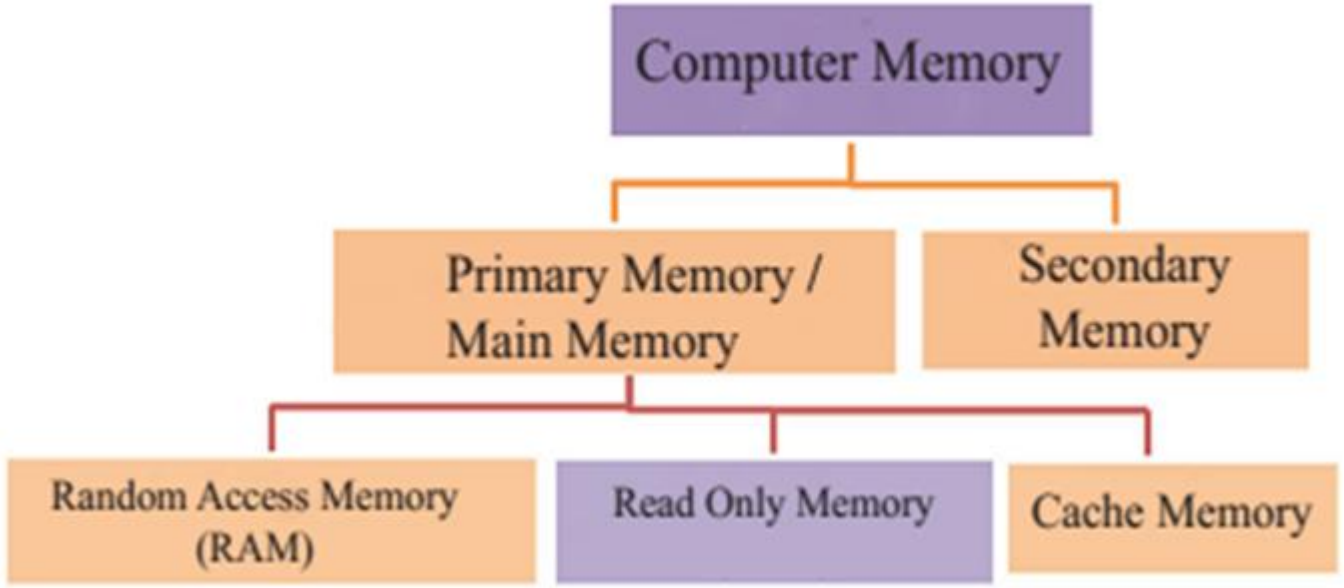
1. Arithmetic and Logical Unit (ALU)	Perform all mathematical and logical functions.
2. Control Unit (CU)	Controls all devices of a computer system.
3. Memory Registers	Positioned in the Central Processing Unit. Temporarily stores data needed for the function of ALU.

Computer Speed / The clock rate

- Measured in hertz (Hz).
- Modern processors often run so fast, so Megahertz (MHz) or Gigahertz (GHz) is used to measure the Speed.

Computer Memory

Computer memory is the storage space in computer where data is to be processed and instructions required for processing are stored.



Primary Memory

- The memory that can be directly accessed by the Central Processing Unit.
- 3 types of Primary Memory.
    1. Random Access Memory (RAM)
    2. Read Only Memory (ROM)
    3. Cache Memory

RAM Vs. ROM

Comparison chart

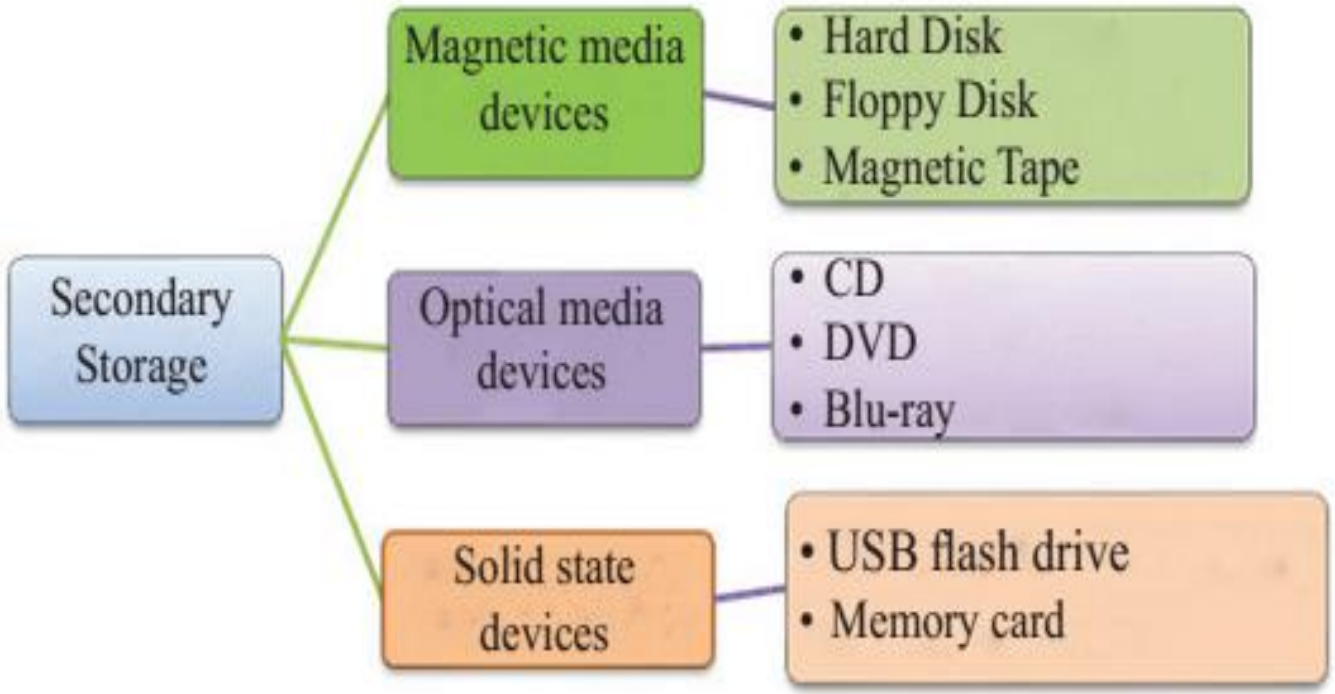
	RAM	ROM
Stands for:	Random Access Memory	Read-only memory
Volatility:	RAM is volatile i.e. its contents are lost when the device is powered off.	It is non-volatile i.e. its contents are retained even when the device is powered off.
Types:	The two main types of RAM are static RAM and dynamic RAM.	The types of ROM include PROM, EPROM and EEPROM.
Use:	RAM allows the computer to read data quickly to run applications. It allows reading and writing.	ROM stores the program required to initially boot the computer. It only allows reading.

Cache Memory

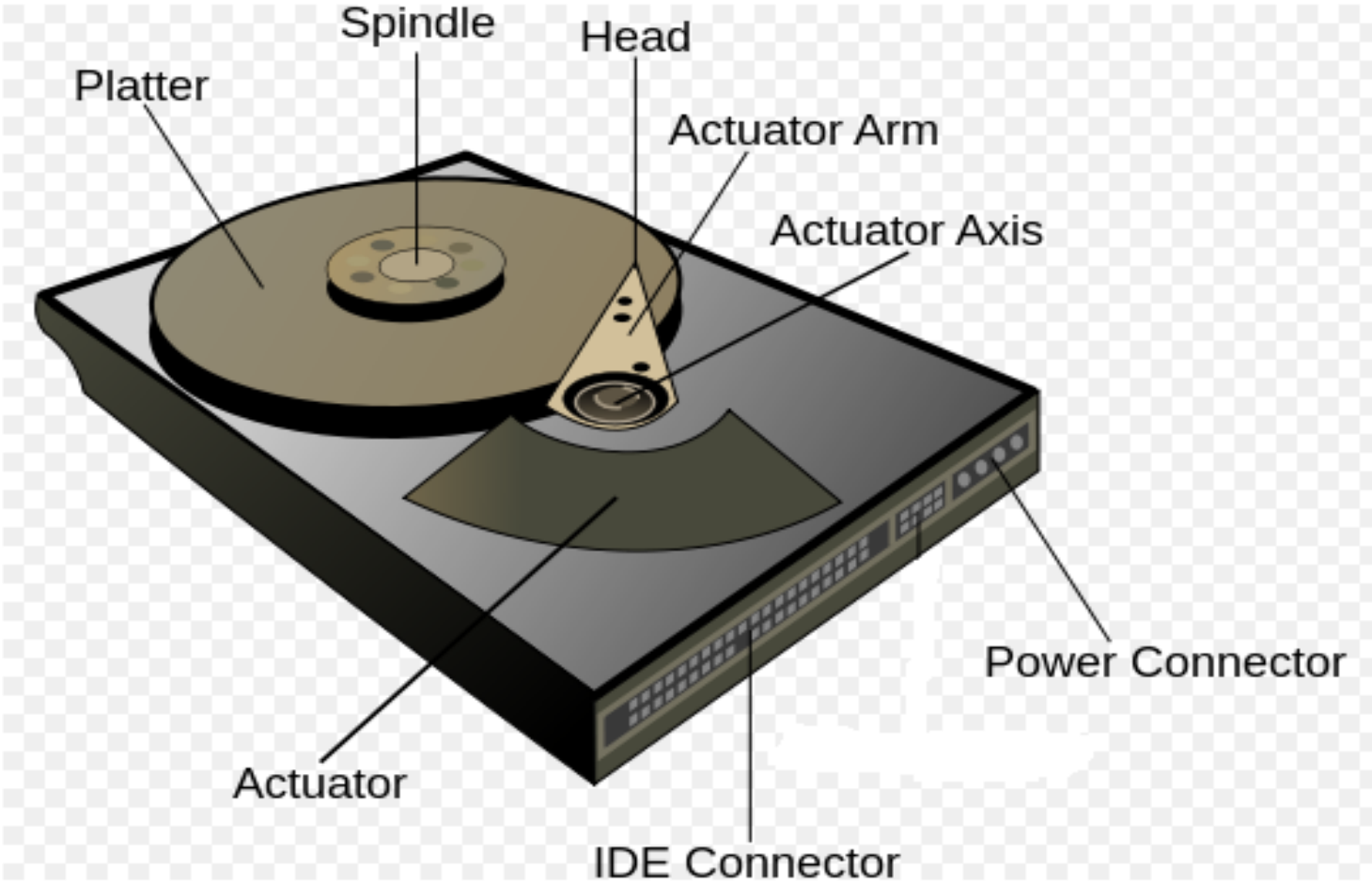
- Smaller in Size than other memory
- Faster than other memory
- Acts as the mediator between CPU and RAM

Secondary Memory

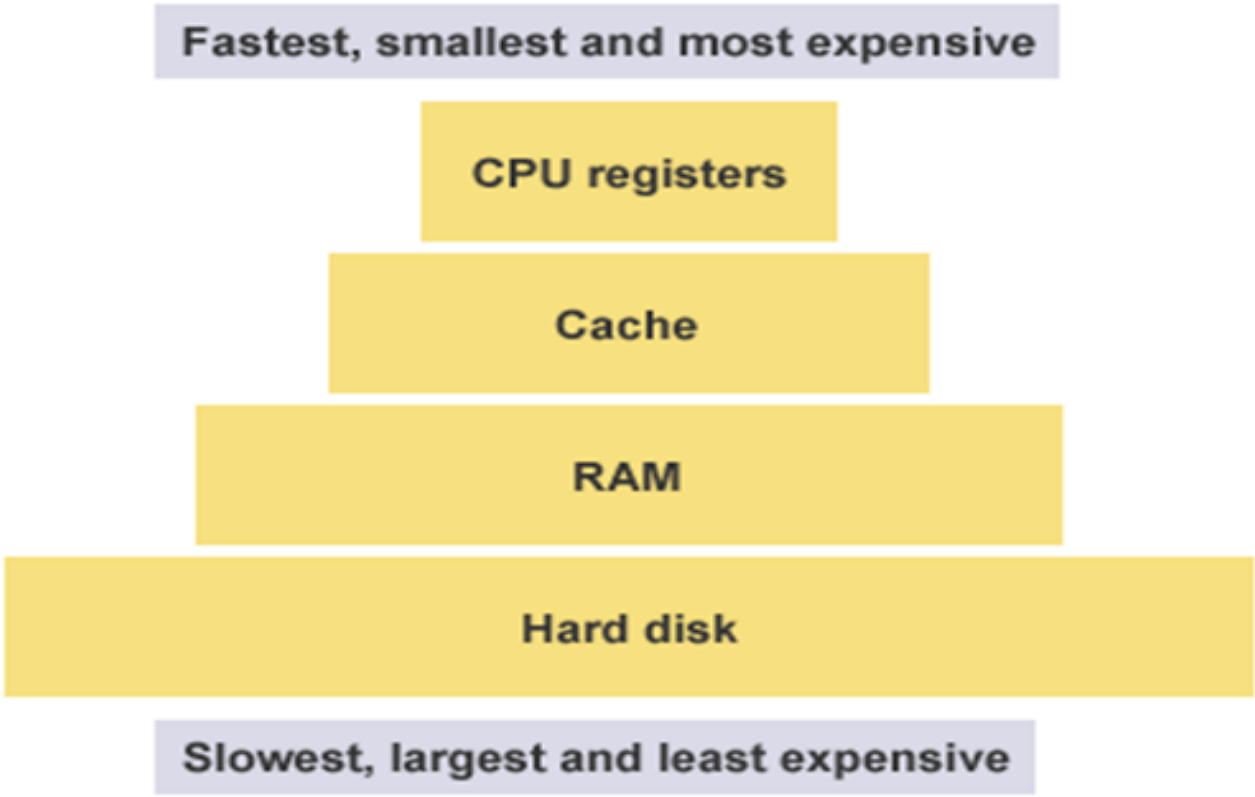
- Stores data and information permanently.



Components of a Hard Disk



Feature Comparison between Memories



Computer Ports

- The interfaces which connect a computer with its devices or with other computers.
- Activity 2
- Write down the answers for the following questions in your exercise book.

Port	Devices
PS/2 ports	
Parallel port	
HDMI port	
RJ 45 port	
Audio ports	
USB port	
Video port	
Serial ports	

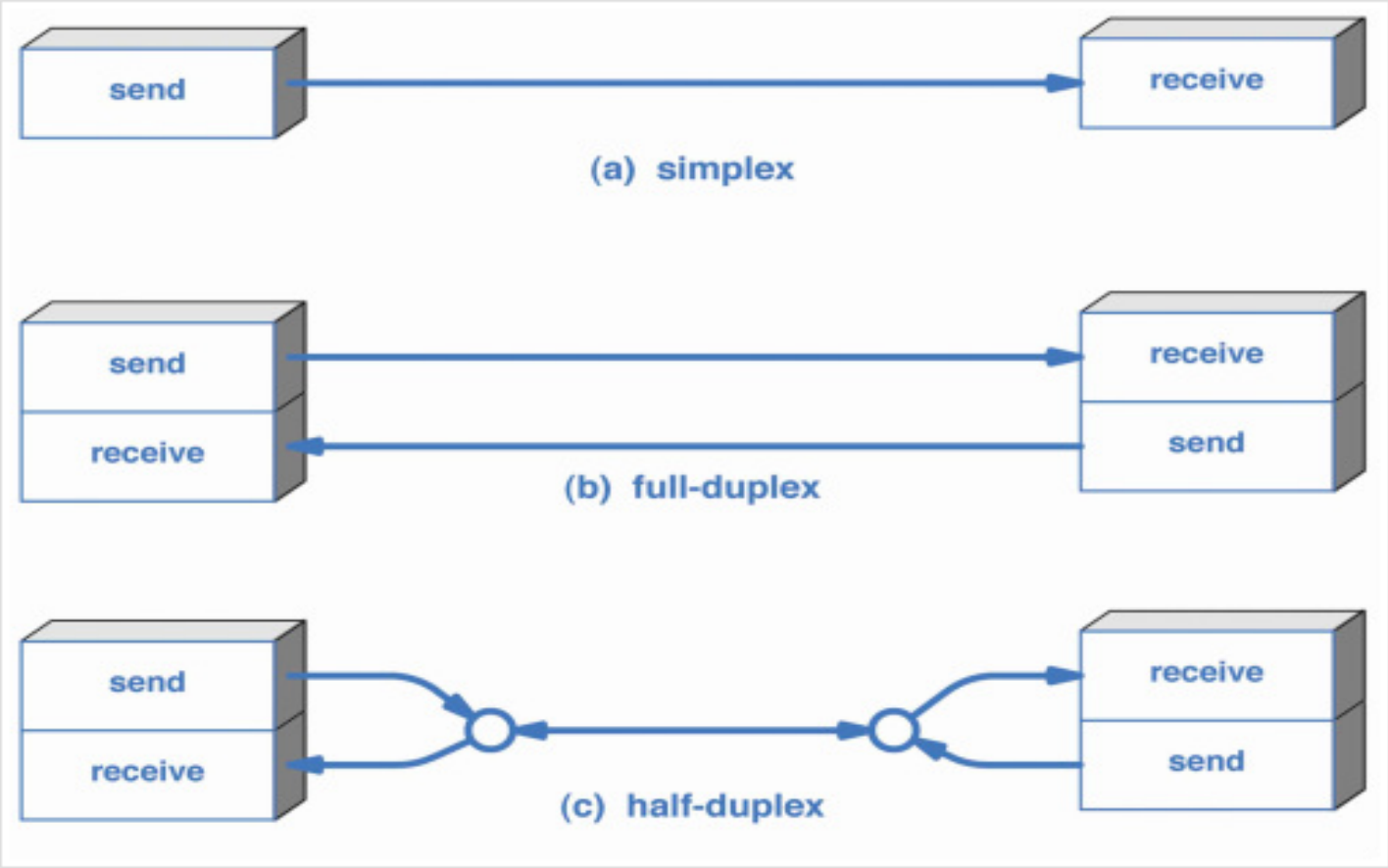
Data Communication

- Transmitting data and information between two or more communicating devices

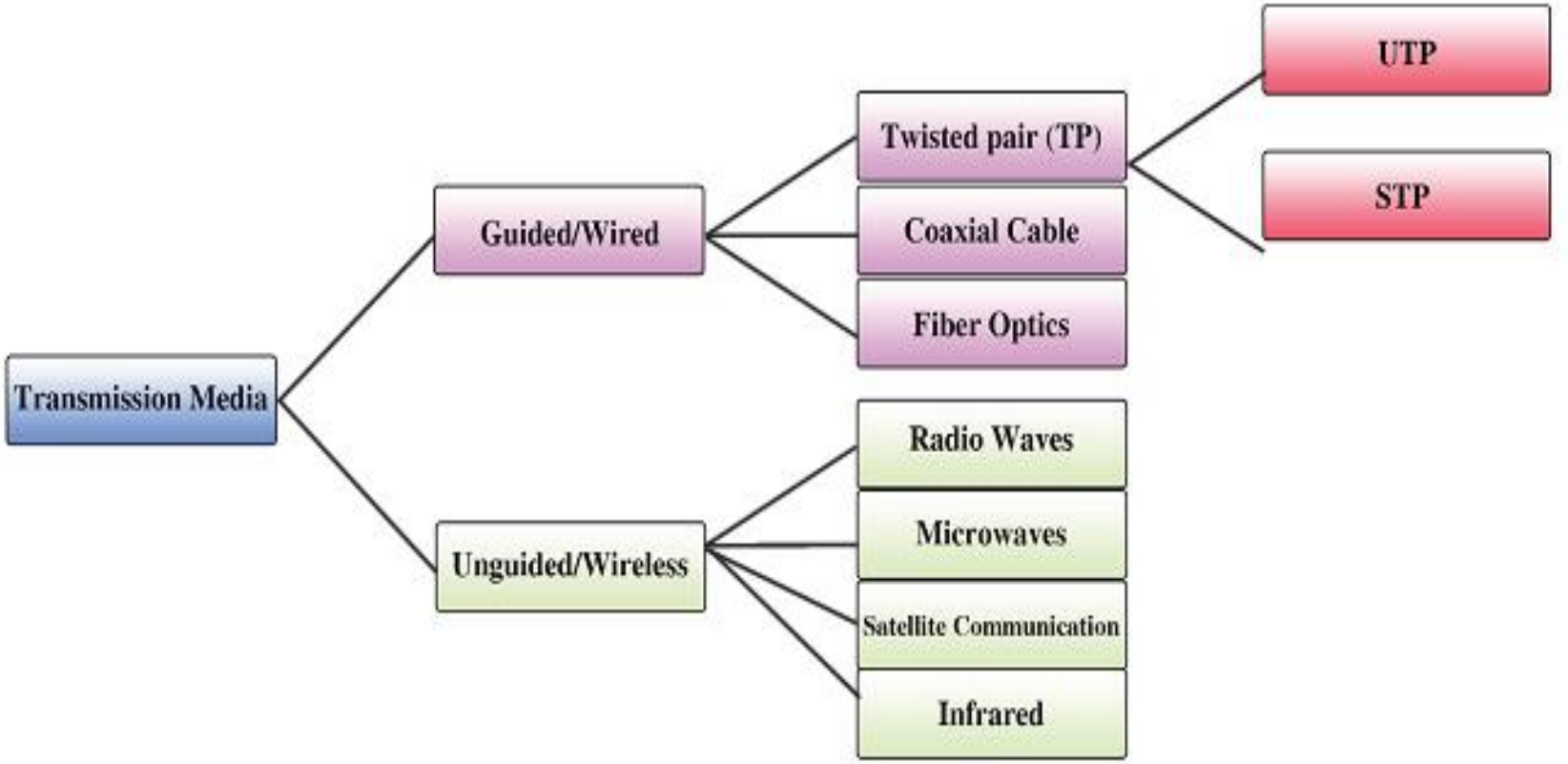
Basic components required for data communication

- Sender
- Medium
- Receiver

Data Transmission Modes



Data Transmission Media



Guided Transmission Media

Feature Comparison

Twisted-Pair	Coaxial	Fiber-Optic
		
Low Cost	Moderate Cost	High Cost
Best for short distances (330 ft.)	Moderate Distance (3300 ft. – thin) (8250 ft. – thick)	Long Distances (14,256 ft.)
Easy to Install	Professional Installation	Professional Installation
Low Security	Average Security	High Security
Low resistance to interference	Moderate resistance to interference	Very high resistance to interference

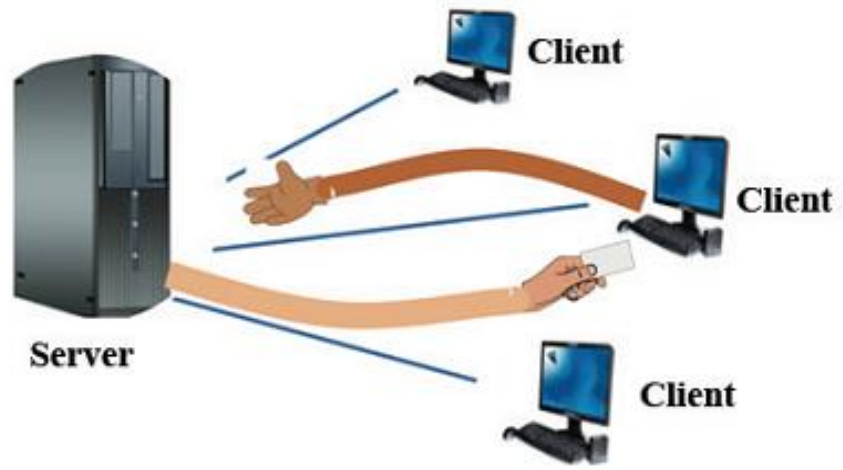
Unguided/Wireless Media

- Radio waves
  - Ex. Wi-fi and Bluetooth
- Microwaves –
  - Ex. Satellite communication
- Infrared
  - Ex. TV remote controllers, wireless keyboards and mouse

Computer network devices

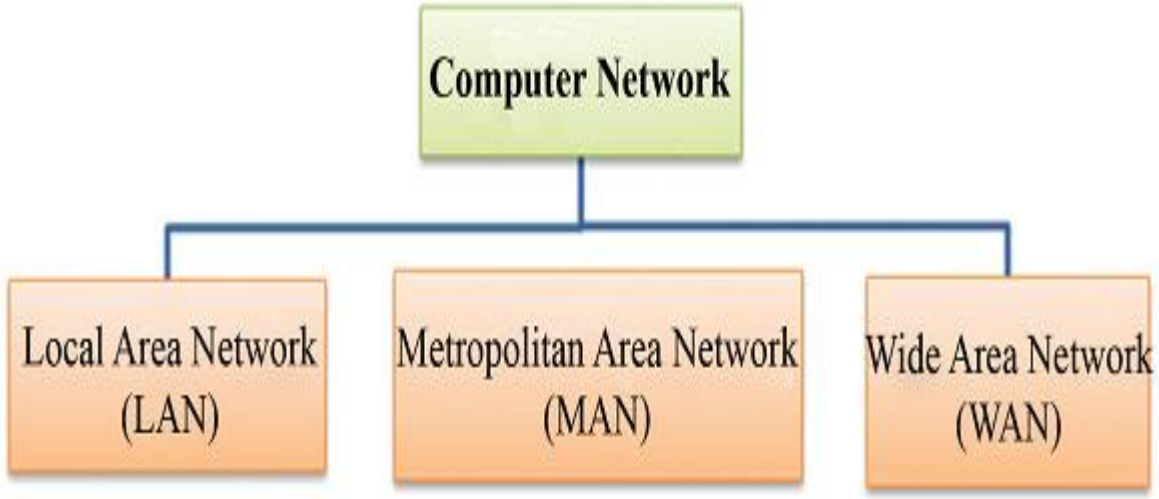
1. Network Interface Card (NIC)
2. Switch/Hub
3. Wireless Fidelity - Wi-Fi
4. Router
5. Modem
6. Firewall

Client/Server network



Client - Requests data or information
Server – Provides requested data and information

Types of Computer Network



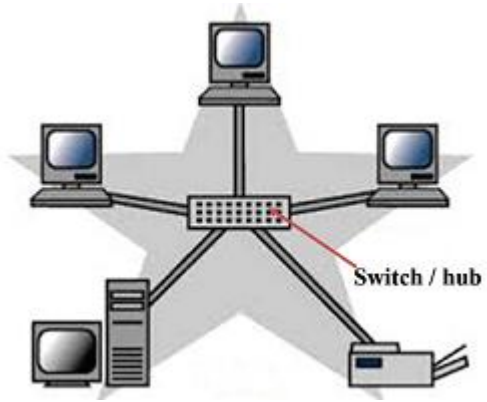
Difference between LAN,WAN,MAN

BASIS OF COMPARISON	LAN	MAN	WAN
Expands to	Local Area Network	Metropolitan Area Network	Wide Area Network
Meaning	A network that connects a group of computers in a small geographical area.	It covers relatively large region such as cities, towns.	It spans large locality and connects countries together. Example Internet.
Ownership of Network	Private	Private or Public	Private or Public
Design and maintenance	Easy	Difficult	Difficult
Speed	High	Moderate	Low
Used for	College, School, Hospital.	Small towns, City.	Country/Continent.

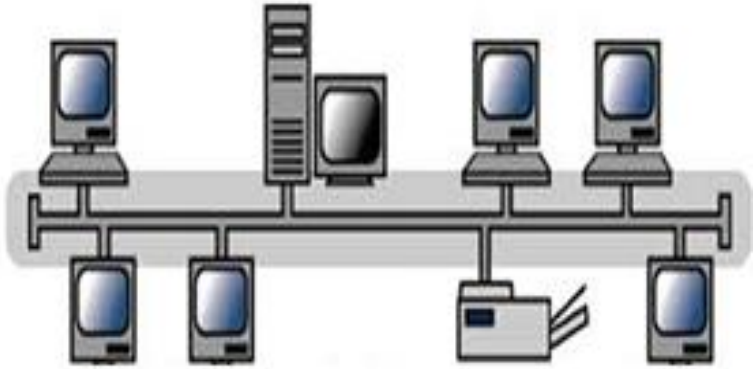
Network Topology

The pattern of connection in designing computer network.

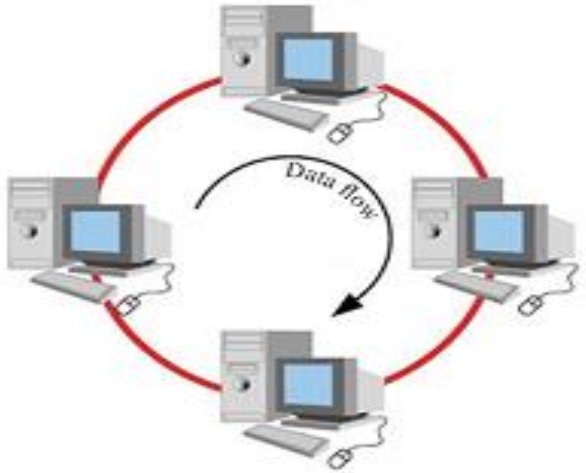
1. Star Topology



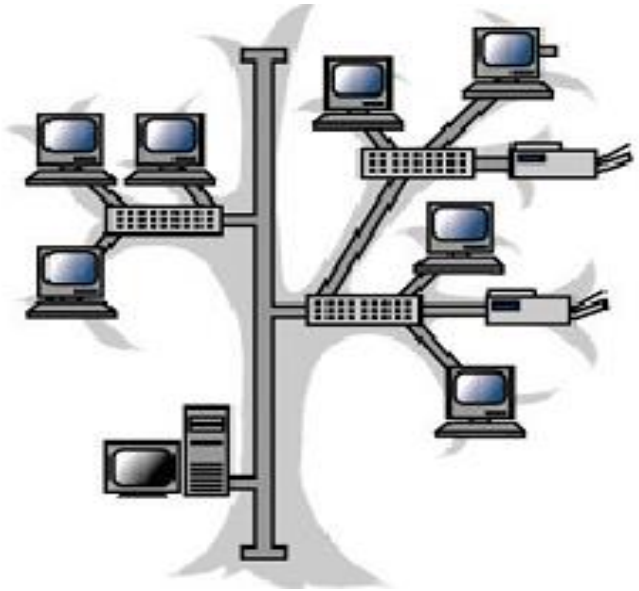
2. Bus Topology



3. Ring Topology



4. Tree Topology



5. Mesh Topology

Benefits of Networking

- Data and information can be shared between computers.
- Less storage space
- Ability to share resources
- Ability to control central software
- Ability to connect at any where and at any time
- Security
- Electronic mail

Disadvantages of Networking

- Possible security issues
- Breakdown of network
- Virus
- Computer break downs
- Training requirements