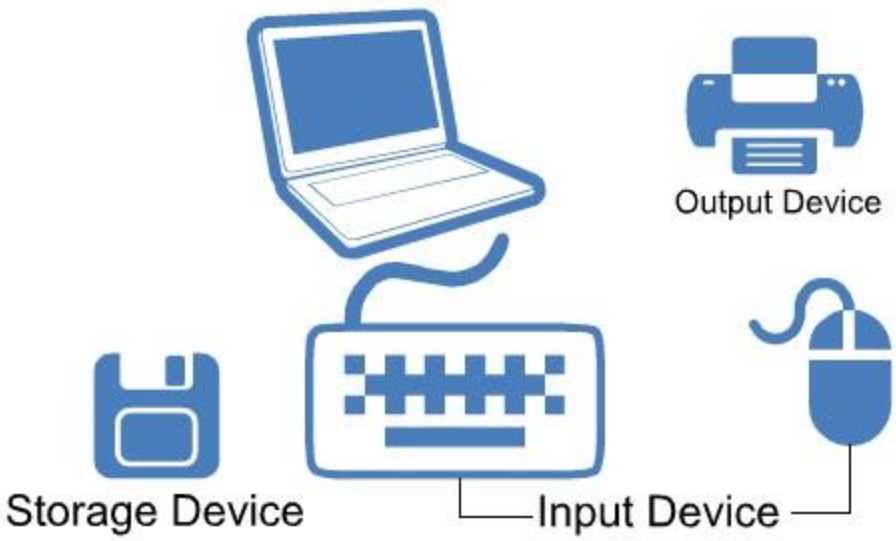
Computer meaning:

- The word **compute** is derived from the Latin word '*computer*', was meaning "arithmetic, accounting".
- The *Computer meaning* is the digital device that stores information in memory using input devices and manipulate information to produce output according to given instructions.
- The actual machinery, the physical parts of a computer system refer to as Computer hardware;
- The instruction (a **program**) that tells the computer what to do or how to do, that is called **Computer software** (often called just software).



Types of Computer

The computer can be of *five* types:

1) Supercomputer

- Supercomputers are the biggest and fastest computers. They are designed to process huge amount of data.
- A supercomputer can process trillions of instructions in a second. It has thousands of interconnected processors.
- Supercomputers are particularly used in scientific and engineering applications such as weather forecasting, scientific simulations and nuclear energy research.
- First supercomputer was developed by Roger Cray in 1976.

2) Mainframe computer

- Mainframe computers are designed to support hundreds or thousands of users simultaneously.

- They can support multiple programs at the same time. It means they can execute different processes simultaneously.
- These features of mainframe computers make them ideal for big organizations like banking and telecom sectors, which need to manage and process high volume of data.

3) Miniframe computer

- It is a midsize multiprocessing computer. It consists of two or more processors and can support 4 to 200 users at one time.
- Miniframe computers are used in institutes and departments for the tasks such as billing, accounting and inventory management.

4) Workstation

- Workstation is a single user computer that is designed for technical or scientific applications.
- It has faster microprocessor, large amount of RAM and high speed graphic adapters.
- It generally performs a specific job with great expertise; accordingly, they are of different types such as graphics workstation, music workstation and engineering design workstation.

5) Microcomputer

- Microcomputer is also known as personal computer. It is a general purpose computer that is designed for individual use.
- It has a microprocessor as a central processing unit, memory, storage area, input unit and output unit. Laptops and desktop computers are examples of microcomputers.

Advantages of computers :

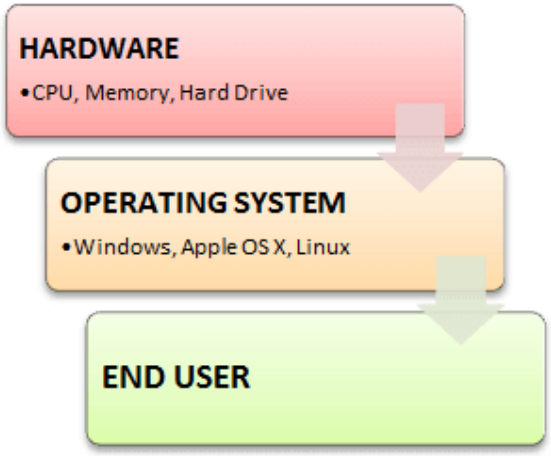
- Speed
- Accuracy
- Stores huge amount of data
- Online trading
- Online education | Distance Learning
- Research
- Forecasting weather,and predicting earthquakes ,volcano eruptions
- Produce Employement
- Internet
- In Business

Disadvantages :

- Health Issues.
- Spread of pornography
- Virus and hacking attacks
- Computer can not take their own decision NO IQ
- Negative effect on Environment
- Crashed networks
- Computer can not work on itself
- Spread of violence,hatred
- Online Cyber Crimes
- Data and Information violation

Operating System

- An **Operating system (OS)** is a software which acts as an interface between the end user and computer hardware.
- The Every computer must have at least one OS to run other programs. An application like Chrome, MS Word, Games, etc.
- It is **not** possible for the user to use any computer or mobile device without having an operating system.



Types of Operating system

- Batch Operating System
- Multitasking/Time Sharing OS
- Multiprocessing OS
- Real Time OS
- Distributed OS
- Network OS
- Mobile OS

Batch Operating System

- Some computer processes are very lengthy and time-consuming.
- To speed the same process, a job with a similar type of needs are batched together and run as a group.
- The user of a batch operating system never directly interacts with the computer. In this type of OS, every user prepares his or her job on an offline device like a punch card and submit it to the computer operator.

Multi-Tasking/Time-sharing Operating systems

- Time-sharing operating system enables people located at a different terminal(shell) to use a single computer system at the same time.
- The processor time (CPU) which is shared among multiple users is termed as time sharing.

Real time OS

A real time operating system time interval to process and respond to inputs is very small. Examples: Military Software Systems, Space Software Systems.

Distributed Operating System

Distributed systems use many processors located in different machines to provide very fast computation to its users.

Network Operating System

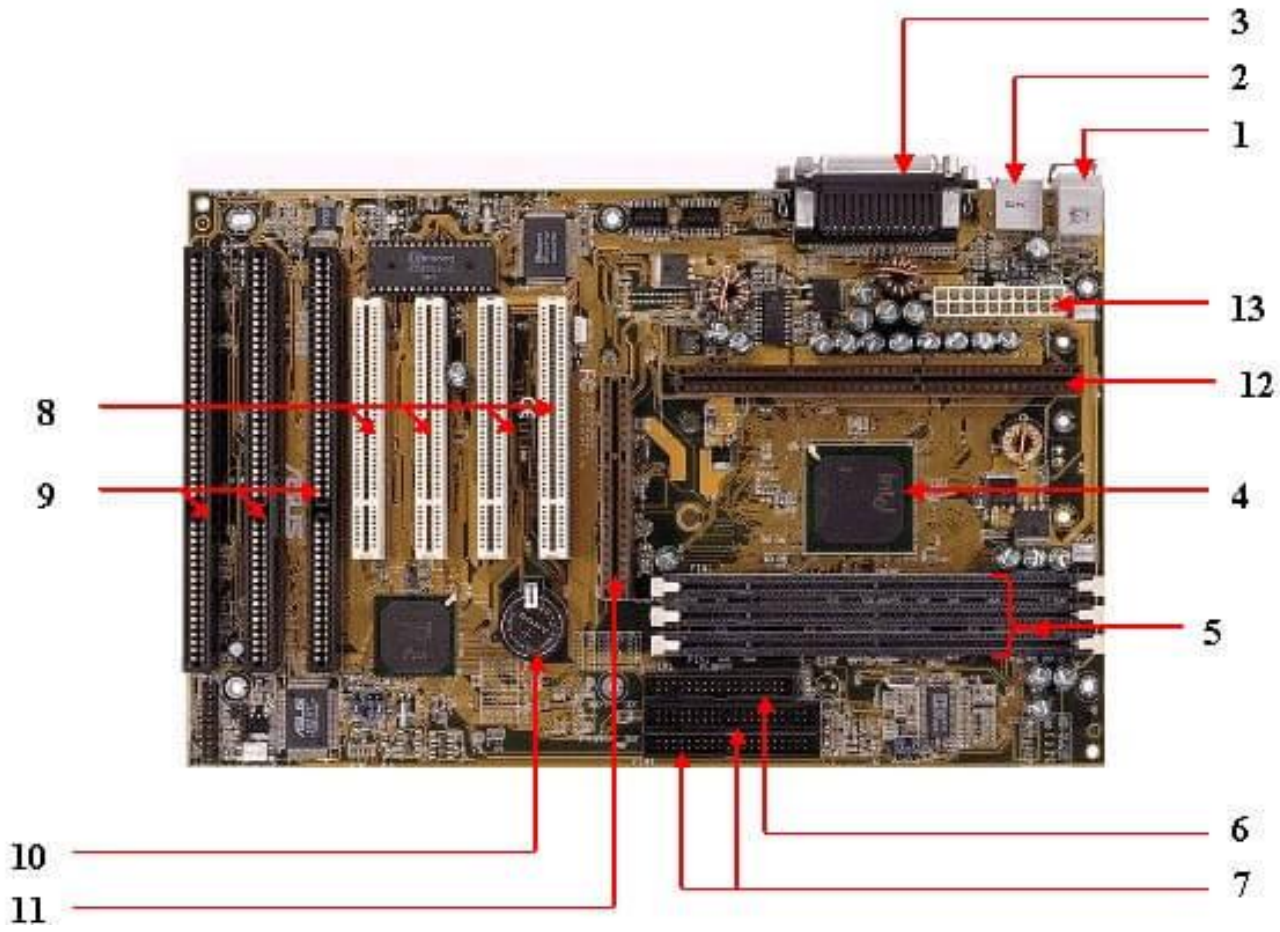
- Network Operating System runs on a server.
- It provides the capability to serve to manage data, user, groups, security, application, and other networking functions.

Mobile OS

- Mobile operating systems are those OS which is especially that are designed to power smartphones, tablets, and wearables devices.
- Some most famous mobile operating systems are Android and iOS, but others include BlackBerry, Web, and watchOS.

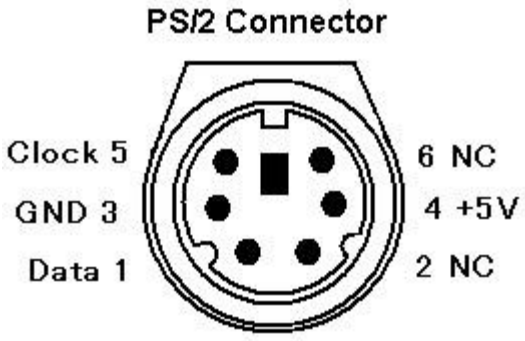
Components of Motherboard

The important components of a Motherboard are given below:



1. Mouse & keyboard :

There are two types of keyboard and mouse connectors. First type is called PS/2 and second one is called USB.



2. USB (Universal serial bus) :

- USB is **Universal serial bus.** It is used for connection for PC.
- There are different devices which is used to connect with USB port such as mouse, keyboards, scanners, cameras, and even printers.
- USB connector is used to connect computer motherboard and a peripheral device. it can insert or remove peripheral device connect by USB connector without restarting your system.

3. Parallel port:

Most of old printers are used to connect by parallel port.

Parallel port used more than one wire for sending or receiving multiple bits of data at once, while serial port uses only one wire. Parallel ports use a 25-pin female DB connector.

4. CPU Chip :

CPU refers to a processor, the central processing unit, also called the microprocessor performs all the task that take place inside a computer system.It is also know as brain of computer.

5. RAM slots :

RAM slots is for attaching RAM on it in general desktop we can see two slot of RAM but in server motherboard we can see 4+ slot of RAM.RAM comes in different size(memory).

6. Floppy controller :

In old motherboard the floppy drive connects to the computer via a 34-pin ribbon cable, one end of ribbon cable is connect to floppy drive and other is connected to the motherboard.

7. IDE controller :

IDE that is **Integrated Drive Electronics**,also called as **ATA** or Parallel **ATA (PATA)**.IDE controller is responsible for controlling the hard drive. Today's computers no longer come with a IDE controller.

8. PCI slot :

PCI stands for Peripheral Component Interface, PCI slot allows you to insert expansion cards into your computer. PCI used to connect additional PCI device like network cards, sound cards,modems,video cards.Some of today's computers no longer come with a PCI expansion slot.Its connect audio, video and graphics.

9. ISA slot :

ISA stands for Industry Standard Architecture, It is the standard architecture of the Expansion bus.Its connect modem and input devices.

10. CMOS Battery :

CMOS is complementary metal-oxide-semiconductor is used to store BIOS setting in computer motherboard. CMOS Battery also store date and time.

11. AGP slot :

The Accelerated Graphics Port (**AGP**) is a high-speed point-to-point channel for attaching a video card to a computer system, If you have a modern motherboard, you will almost certainly notice a single connector that looks like a PCI slot.A fast port for a graphics card

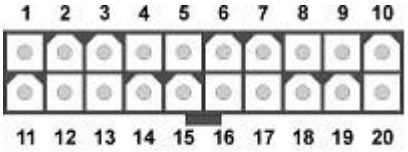
12. CPU slot :

The processor socket (also called a CPU socket) is the connector on the motherboard that connect a CPU.

13. Power supply plug in :

The Power supply provides the necessary electrical power to make the computer system operate. The power supply takes standard 110-V AC power and converts into +/-12-Volt, +/-5-Volt, and 3.3-Volt DC power.

The power supply connector has 20-pins, and the connector can go in only one direction.



Computer Network Types

- A computer network is a group of computers linked to each other that enables the computer to communicate with another computer and share their resources, data, and applications.
- A computer network can be categorized by their size.

A **computer network** is mainly of **four types**:

- LAN(Local Area Network)
- PAN(Personal Area Network)
- MAN(Metropolitan Area Network)
- WAN(Wide Area Network)

LAN(Local Area Network)

- Local Area Network is a group of computers connected to each other in a small area such as building, office.

- LAN is used for connecting two or more personal computers through a communication medium such as twisted pair, coaxial cable, etc.
- It is less costly as it is built with inexpensive hardware such as hubs, network adapters, and Ethernet cables.
- The data is transferred at an extremely faster rate in Local Area Network.
- Local Area Network provides higher security.

PAN(Personal Area Network)

- Personal Area Network is a network arranged within an individual person, typically within a range of 10 meters.
- Personal Area Network is used for connecting the computer devices of personal use is known as Personal Area Network.
- **Thomas Zimmerman** was the first research scientist to bring the idea of the Personal Area Network.
- Personal Area Network covers an area of **30 feet**.
- Personal computer devices that are used to develop the personal area network are the laptop, mobile phones, media player and play stations.

There are two types of Personal Area Network:

- Wired Personal Area Network
- Wireless Personal Area Network

Wireless Personal Area Network: Wireless Personal Area Network is developed by simply using wireless technologies such as WiFi, Bluetooth. It is a low range network.

Wired Personal Area Network: Wired Personal Area Network is created by using the USB.

MAN(Metropolitan Area Network)

- A metropolitan area network is a network that covers a larger geographic area by interconnecting a different LAN to form a larger network.
- Government agencies use MAN to connect to the citizens and private industries.
- In MAN, various LANs are connected to each other through a telephone exchange line.
- The most widely used protocols in MAN are RS-232, Frame Relay, ATM, ISDN, OC-3, ADSL, etc.
- It has a higher range than Local Area Network(LAN).

WAN(Wide Area Network)

- A Wide Area Network is a network that extends over a large geographical area such as states or countries.
- A Wide Area Network is quite bigger network than the LAN.
- A Wide Area Network is not limited to a single location, but it spans over a large geographical area through a telephone line, fibre optic cable or satellite links.
- The internet is one of the biggest WAN in the world.
- A Wide Area Network is widely used in the field of Business, government, and education.

CD and DVD technology

- Uses Digital Technology to store data in binary values of Zero and One
- Uses "Pits" and "Lands" to signify binary values
- CD's Read at a Constant Linear Velocity (CLV)
- Capable of Storing Large Amounts of Data (up to 700MB)
- Uses Error Correction for reliable data retrieval even if the CD becomes lightly scratched.

Types Of Compact Disks

CD Audio – The first type of CD that was available. This allows for the storage of digital audio. These are playable in all current CD drives and car audio systems including DVD players.

CD-ROM – Computer Data is stored on these units such as games, applications, and other files. Only readable on computers.

CD-R – Allows users to write data once to a recordable Compact Disk. Can not be re-written and can be read in all current players depending on wither the disk holds Audio or Data.

CD-RW – Users Can Write and Re-Write these special disks. However because of the disk format, they cannot be read in Audio CD players or DVD players.

DVD:

- The goal of DVD was to create a "vastly increased capacity, with the ability to feature an entire movie in high-quality digital video on a single side of a disc."
- They also wanted...Brighter colors, sharper pictures, and outstanding audio quality

- The goal was a 4.7 gigabyte capacity with the ability to hold hours of full motion video and sound

The Wavelength Issue of DVD:

- DVD Players and DVD-ROM drives use a laser that emits high intensity red light at 650 and 635nm vs the 780 nanometers for CD technology
- These shorter wavelengths are better at reading the smaller, densely packed together pits and lands.
- The laser assembly has been re-engineered to produce a more tightly focused laser beam

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STORAGE MEDIA

- Storage keeps data, information and instructions for use in the future.
- All computers use storage to keep the software that makes the hardware work. The user store a variety of data and information on your computer or on storage media.
- The Storage media are the physical materials on which data, information and instructions are kept.
- The user saves information or data to a storage medium he or she is storing a file, and this process is called writing.When the file is opened the process is called reading.

Common storage media are:

Hard Drive:

This storage medium which looks like the one below, is a hard drive. This medium comes with the computer and is always inside the computer.
It stores all the programs that the computer needs to work. In addition users store their data and information on the hard drive.

Floppy Disk:

This storage medium is considered to be a portable storage medium. You put it into the computer save your information on it, take it out, and take it with you wherever you go.

CD&DVD:

These types of storage media hold much more information than a floppy disk. They are also considered portable storage. These types of storage media come in different forms. This means that there are CDs and DVDs that you can only save information on but you cannot erase the information. In addition there are those that can both save information on and erase the information you have saved.

USB Flash Drive:

This is a storage medium that is very easy to carry around and it also holds more data than a floppy disk. As you can see from the picture below it is very small when compared with the others.

Input Devices

- Input device enables the user to send data, information, or control signals to a computer.
- The Central Processing Unit (CPU) of a computer receives the input and processes it to produce the output.

Some of the popular input devices are:

1. Keyboard
2. Mouse
3. Scanner
4. Joystick
5. Light Pen
6. Digitizer
7. Microphone
8. Magnetic Ink Character Recognition (MICR)
9. Optical Character Reader (OCR)

Output Device:

- An output device is a piece of computer hardware that receives data or instructions from a computer. The computer interacts with the output device in some way.
- The most common output devices are the monitor and printer, but there are many others.
- The key distinction between an input device and an output device is that the former **sends** data to the computer, whereas the latter **receives** data from the computer.
- Input and output devices that provide computers with additional functionality are also called peripheral, or auxiliary devices.

Examples of Output Devices

1. Monitor
2. Printer

3. Audio Speakers
4. Headphones
5. Projector
6. GPS
7. Sound Card
8. Video Card
9. Braille Reader
10. Plotter

Memory

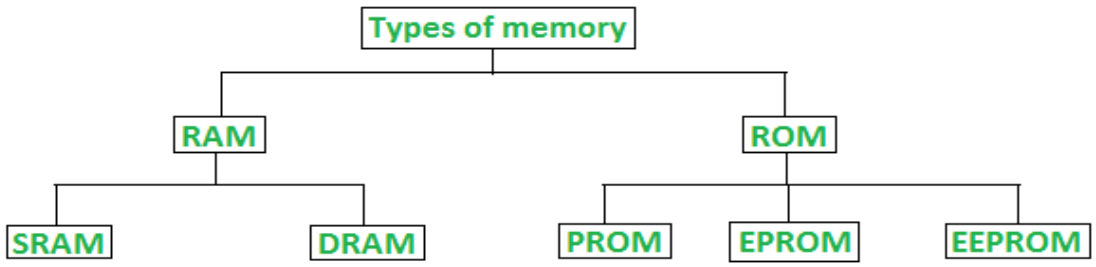
Memory is the most essential element of a computing system because without it computer can't perform simple tasks.

Computer memory is of two basic type

Primary memory(RAM and ROM) and

Secondary memory(hard drive,CD,etc.).

Random Access Memory (RAM) is primary-volatile memory and Read Only Memory (ROM) is primary-non-volatile memory.



Classification of computer memory

1. Random Access Memory (RAM) –

- It is also called as *read write memory* or the *main memory* or the *primary memory*.
- The programs and data that the CPU requires during execution of a program are stored in this memory.
- It is a volatile memory as the data loses when the power is turned off.
- RAM is further classified into two types- *SRAM (Static Random Access Memory)* and *DRAM (Dynamic Random Access Memory)*.

2. Read Only Memory (ROM) –

- Stores crucial information essential to operate the system, like the program essential to boot the computer.
- It is not volatile.
- Always retains its data.
- Used in embedded systems or where the programming needs no change.
- Used in calculators and peripheral devices.
- ROM is further classified into 4 types- *ROM*, *PROM*, *EPROM*, and *EEPROM*.

Types of Read Only Memory (ROM) –

1. **PROM (Programmable read-only memory)** – It can be programmed by user. Once programmed, the data and instructions in it cannot be changed.
2. **EPROM (Erasable Programmable read only memory)** – It can be reprogrammed. To erase data from it, expose it to ultra violet light. To reprogram it, erase all the previous data.
3. **EEPROM (Electrically erasable programmable read only memory)** – The data can be erased by applying electric field, no need of ultra violet light. We can erase only portions of the chip.

RAM	ROM
1. Temporary Storage.	1. Permanent storage.
2. Store data in MBs.	2. Store data in GBs.
3. Volatile.	3. Non-volatile.
4.Used in normal operations.	4. Used for startup process of computer.
5. Writing data is faster.	5. Writing data is slower.

Difference between RAM and ROM

Expand:

URL - Uniform Resource Locator Modem - modulator-demodulator

DOM - **Document Object Model** HDD - **hard disk drive** FDD - floppy disk drive

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Keyboard

- The keyboard is a basic input device that is used to enter data into a computer or any other electronic device by pressing keys.
- It has different sets of keys for letters, numbers, characters, and functions. Keyboards are connected to a computer through USB or a Bluetooth device for wireless communication.

Types of keyboards:

There can be different types of keyboards based on the region and language used. Some of the common types of keyboards are as follows:

i) QWERTY Keyboard:

- It is the most commonly used keyboard with computers in modern times.
- It is named after the first six letters of the top row of buttons and is even popular in countries that do not use Latin-based alphabet.
- It is so popular that some people think that it is the only type of keyboard to use with computers as an input device.

ii) AZERTY Keyboard:

- It is considered the standard French keyboard.
- It is developed in France as an alternative layout to the QWERTY layout and is mainly used in France and other European countries. Some countries have manufactured their own versions of AZERTY.
- Its name is derived from the first six letters that appear on the top left row of the keyboard.

- The Q and W keys in AZERTY keyboard are interchanged with A and Z keys in QWERTY keyboard. Furthermore, in AZERTY keyboard M key is located to the left of the L key.
- AZERTY keyboard differs from QWERTY keyboard not only in the placement of letters but also in many other ways, e.g., it gives emphasis on accents, which is required for writing European languages like French.

iii) DVORAK Keyboard:

- This type of keyboard layout was developed to increase the typing speed by reducing the finger movement while typing.
- The most frequently used letters are kept in a home row to improve typing.

Microprocessor:

- Microprocessor is a controlling unit of a micro-computer, fabricated on a small chip capable of performing ALU (Arithmetic Logical Unit) operations and communicating with the other devices connected to it.
- Microprocessor consists of an ALU, register array, and a control unit.
- ALU performs arithmetical and logical operations on the data received from the memory or an input device.
- Register array consists of registers identified by letters like B, C, D, E, H, L and accumulator.
- The control unit controls the flow of data and instructions within the compute

BIOS:

- **BIOS** (basic input/output system) is the program a personal **computer's** microprocessor uses to get the **computer** system started after you turn it on.
- It also manages data flow between the **computer's** operating system and attached devices such as the hard disk, video adapter, keyboard, mouse and printer.

CPU

- CPU (*pronounced as separate letters*) is the abbreviation for c*entral* p*rocessing* u*nit*.
- The CPU is the brains of the computer where most calculations take place.

- In terms of computing power, the CPU is the most important element of a computer system.

Components of a CPU

The two typical components of a CPU include the following:

- The arithmetic logic unit *(ALU)* → to perform arithmetic and logical operations.
- The control unit *(CU)* → to instructions from memory and decodes and executes them, calling on the ALU when necessary.

Troubleshooting

- Troubleshooting is the process of identifying, planning and resolving a problem, error or fault within a software or computer system.
- It enables the repair and restoration of a computer or software when it becomes faulty, unresponsive or acts in an abnormal way.

Basic tools in troubleshoot

- Speedtest.net/pingtest.net.
- Subnet and IP Calculator. ...
- PuTTY/Tera Term. ...
- Netstat. ...
- Nslookup. ...
- Ipconfig/ifconfig. ...
- Tracert/traceroute. .

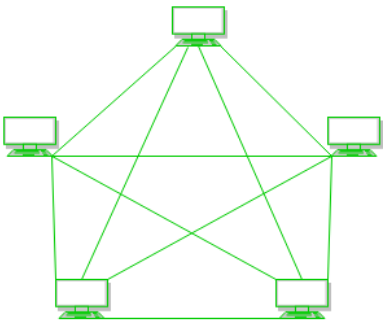
Types of Network Topology

The arrangement of a network which comprises of nodes and connecting lines via sender and receiver is referred as network topology.

The various network topologies are:

a) Mesh Topology:

- In mesh topology, every device is connected to another device via particular channel.



b) Star Topology :

- In star topology, all the devices are connected to a single hub through a cable.
- This hub is the central node and all others nodes are connected to the central node.
- The hub can be passive in nature i.e. not intelligent hub such as broadcasting devices, at the same time the hub can be intelligent known as active hubs. Active hubs have repeaters in them.

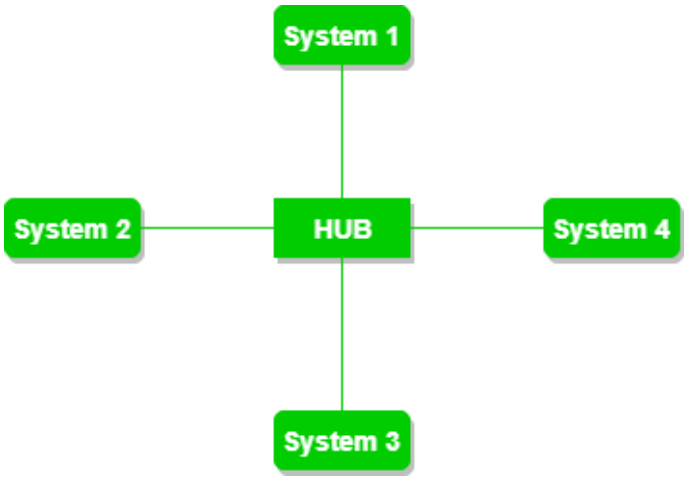


Figure 2 : A star topology having four systems connected to single point of connection i.e. hub.

c) Bus Topology:

- Bus topology is a network type in which every computer and network device is connected to single cable.
- It transmits the data from one end to another in single direction. No bi-directional feature is in bus topology.

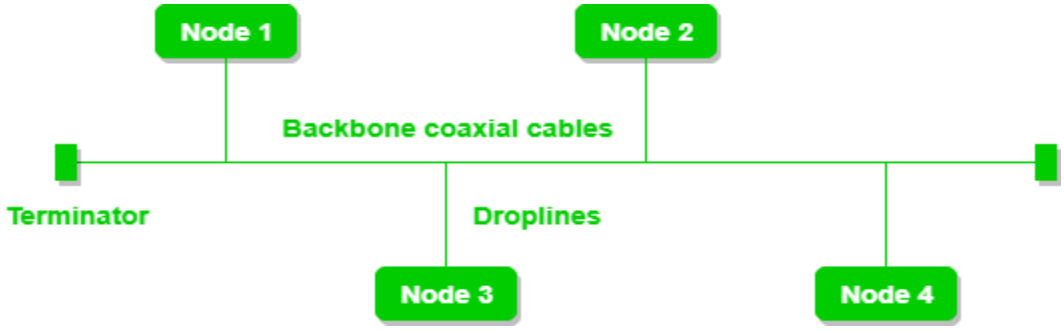


Figure 3: A bus topology with shared backbone cable. The nodes are connected to the channel via drop lines.

d) Ring Topology:

In this topology, it forms a ring connecting a devices with its exactly two neighboring devices.

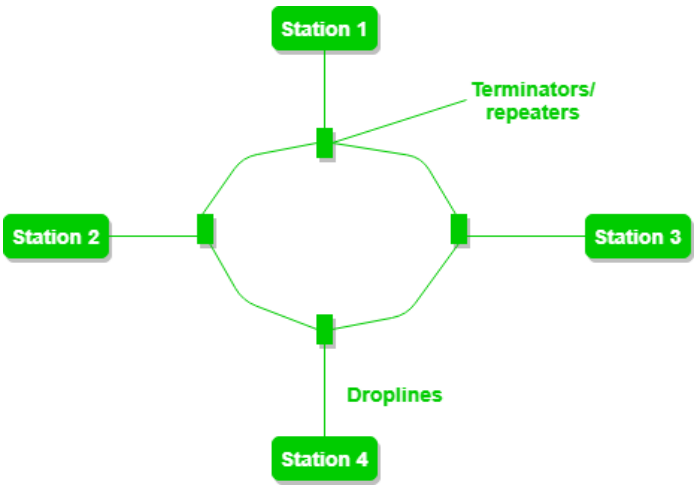


Figure 4 : A ring topology comprises of 4 stations connected with each forming a ring..

e) Hybrid Topology:

- This topology is a collection of two or more topologies which are described above.
- This is a scalable topology which can be expanded easily. It is reliable one but at the same it is a costly topology.

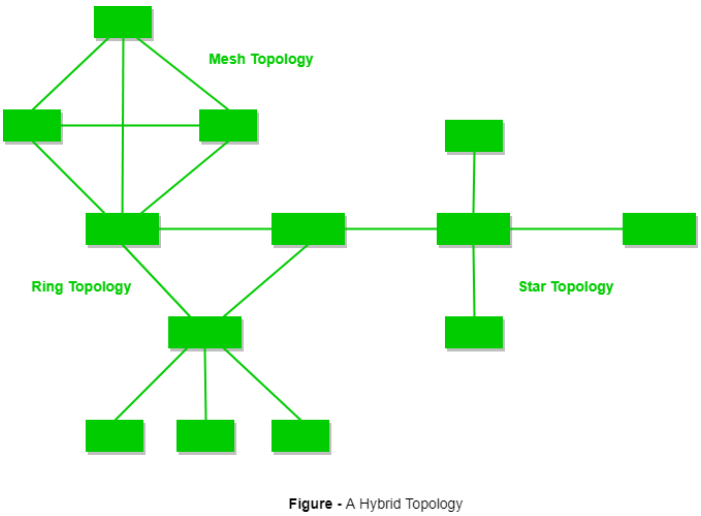


Figure - A Hybrid Topology

Figure 5 : A hybrid topology which is a combination of ring and star topology.