BCom-VI Paper

Information Systems And E-Commerce

Computer

A computer is a programmable electronic device that accepts raw data as input and processes it with a set of instructions (a program) to produce the result as output. It renders output just after performing mathematical and logical operations and can save the output for future use. It can process numerical as well as non-numerical calculations. The term "computer" is derived from the Latin word "computare" which means to calculate.

The basic parts without which a computer cannot work are as follows:

- **Processor:** It executes instructions from software and hardware.
- **Memory:** It is the primary memory for data transfer between the CPU and storage.
- **Motherboard:** It is the part that connects all other parts or components of a computer.
- **Storage Device:** It permanently stores the data, e.g., hard drive.
- **Input Device:** It allows you to communicate with the computer or to input data, e.g., a keyboard.
- **Output Device:** It enables you to see the output, e.g., monitor.

Computers are divided into different types based on different criteria. Based on the size, a computer can be divided into five types:
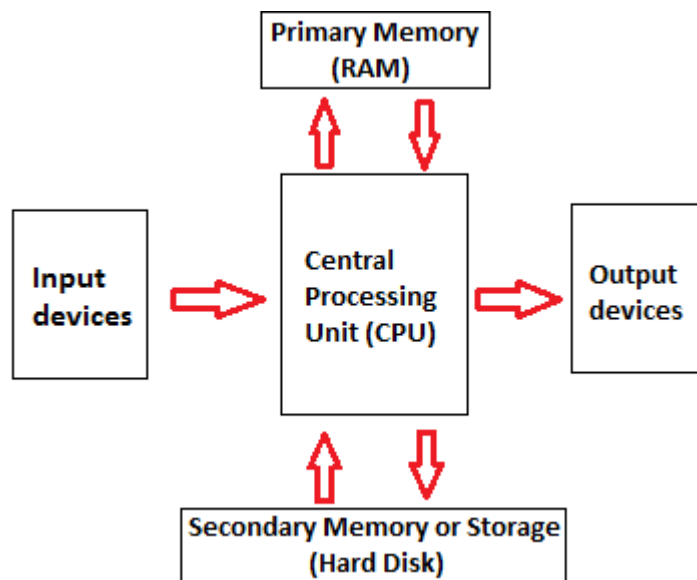
1. Micro Computer
2. Mini Computer
3. Mainframe Computer
4. Super Computer
5. Workstations

Computer Components

There are 5 main computer components that are given below:

- Input Devices
- CPU
- Output Devices

- o Primary Memory
- o Secondary Memory

The operations of computer components are given below:

1) Inputting: It is the process of entering raw data, instructions and information into the computer. It is performed with the help of input devices.

2) Storing: The computer has primary memory and secondary storage to store data and instructions. It stores the data before sending it to CPU for processing and also stores the processed data before displaying it as output.

3) Processing: It is the process of converting the raw data into useful information. This process is performed by the CPU of the computer. It takes the raw data from storage, processes it and then sends back the processed data to storage.

4) Outputting: It is the process of presenting the processed data through output devices like monitor, printer and speakers.

5) Controlling: This operation is performed by the control unit that is part of CPU. The control unit ensures that all basic operations are executed in a right manner and sequence.

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)
10. Digital Camera
11. Touch Pad
12. Remote
13. Touch screen
14. VR
15. Webcam
16. Biometric Devices

Output Devices

The output device displays the result of the processing of raw data that is entered in the computer through an input device. There are a number of output devices that display output in different ways such as text, images, hard copies, and audio or video.

Some of the popular output devices are:

1. Monitor
    - CRT Monitor
    - LCD Monitor
    - LED Monitor
    - Plasma Monitor

2. Printer
   - Impact Printers
     - A. Character Printers
       - i. Dot Matrix printers
       - ii. Daisy Wheel printers
     - B. Line printers
       - i. Drum printers
       - ii. Chain printers
   - Non-impact printers
     - A. Laser printers
   - B. Inkjet printers
3. Projector

Central Processing Unit (CPU)

A Central Processing Unit is also called a processor, central processor, or microprocessor. It carries out all the important functions of a computer. It receives instructions from both the hardware and active software and produces output accordingly. It stores all important programs like operating systems and application software. CPU also helps Input and output devices to communicate with each other. Owing to these features of CPU, it is often referred to as the brain of the computer.

CPU is installed or inserted into a CPU socket located on the motherboard. Furthermore, it is provided with a heat sink to absorb and dissipate heat to keep the CPU cool and functioning smoothly.

Generally, a CPU has three components:

- ALU (Arithmetic Logic Unit)
- Control Unit
- Memory or Storage Unit
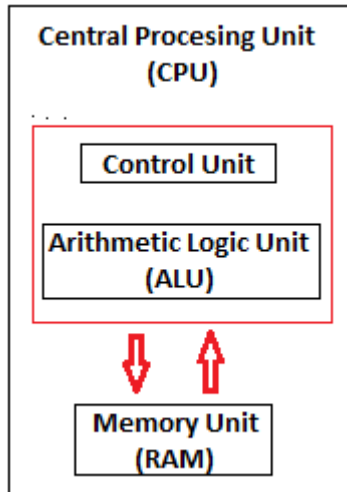
Control Unit: It is the circuitry in the control unit, which makes use of electrical signals to instruct the computer system for executing already stored instructions. It takes instructions from memory and then decodes and executes these instructions. So, it controls and coordinates the functioning of all parts of the computer. The Control Unit's main task is to maintain and regulate the flow of information across the processor. It does not take part in processing and storing data.

ALU: It is the arithmetic logic unit, which performs arithmetic and logical functions. Arithmetic functions include addition, subtraction, multiplication division, and comparisons. Logical functions mainly include selecting, comparing, and merging the data. A CPU may contain more than one ALU. Furthermore, ALUs can be used for maintaining timers that help run the computer.

Memory or Storage Unit/ Registers: It is called Random access memory (RAM). It temporarily stores data, programs, and intermediate and final results of processing. So, it acts as a temporary storage area that holds the data temporarily, which is used to run the computer.

Types of computer software

Software is used to control a computer. There are different types of software that can run on a computer: system software, utility software, and application software.

1. System software
If you think of software as being in layers, the system software is the bottom layer: it sits between the hardware and the application software.

Operating systems like Windows, macOS, Android and iOS are examples of system software. Operating systems are loaded into RAM when the device starts up, and have access to the hard drive.

2. Utility software

Utility software is part of the system software and performs specific tasks to keep the computer running. Utility software is always running in the background. Examples of utility software are security and optimisation programs.

Security programs include anti-virus software that scans and removes viruses. Most computers will include some sort of anti-virus software, but you can add your own.

Optimisation programs can include tools for system clean-up, disk defragmentation, and file compression. These tools are typically installed as part of the operating system. They have access to the hard drive to keep it tidy.

3. Application software

This is everything else! Anything that is not an operating system or a utility is an application or app. So a word processor, spreadsheet, web browser, and graphics software are all examples of application software, and they can do many specific tasks.

You can remove and add applications on your computer using the operating system.

Application software like a word processor regularly directs the operating system to load and save files from and to the hard drive. When you are working on a file, it is saved temporarily in the RAM. It is only when you choose to save it that it is written to the hard drive.

This is why, if the computer crashes while you're working on a file, you may lose any changes you didn't save. Data stored in the RAM is volatile. The data is lost when the RAM loses power.

Computer Network

A network set up by connecting two or more computers and other supporting hardware devices through communication channels is called a computer network. It enables computers to communicate with each other and to share commands, data, etc., including the hardware and software resources.

Uses of Computer Network:

- o It allows you to share resources such as printers, scanners, etc.
- o You can share expensive software and database among network users.
- o It facilitates communications from one computer to another computer.
- o It allows the exchange of data and information among users through a network.

Popular Computer Networks:

- o Local Area Network (LAN)
- o Metropolitan Area Network (MAN)
- o Wide Area Network (WAN)

Local Area Network (LAN):

As the name suggests, the local area network is a computer network that operates in a small area, i.e., it connects computers in a small geographical area like within an office, company, school, or any other organization. So, it exists within a specific area, e.g. home network, office network, school network, etc.

A local area network may be a wired or wireless network or a combination of both. The devices in a LAN are generally connected using an Ethernet cable, which offers an interface to connect multiple devices like router, switches, and computers. For example, using a single router, few Ethernet cables, and computers, you can create a LAN at your home, office, etc. In this network, one computer may act as a server and other computers, which are part of the network, may serve as clients.

Topologies of LAN:

Topology: It refers to the arrangement of computers (nodes) in a computer network. The main topologies of a local area network are as follows:

Ring Topology:
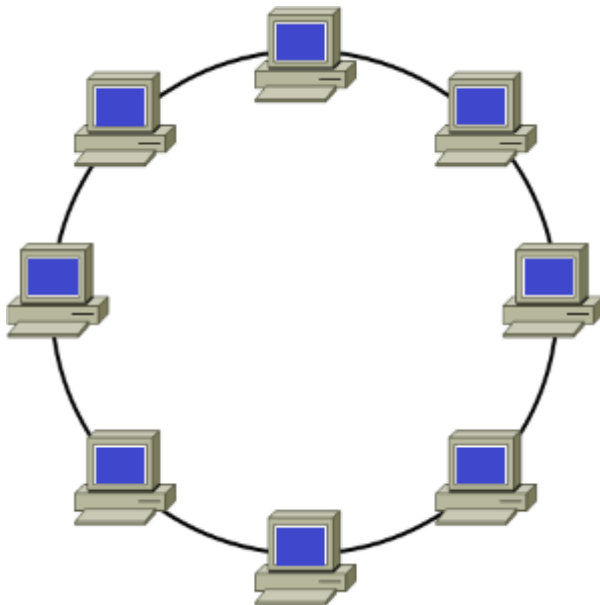
As the name suggests, in a ring topology, the computers are connected in a circular and closed loop. The message in this topology moves only in one direction around the ring from one node to another node and is checked by each node for a matching destination address. So, the data keeps moving until it reaches its destination. All nodes are equal; a client-server relationship does not exist between them. As the nodes are in the form of a ring, if one node fails to transmit the data, the flow of communication is severed.

Star Topology:
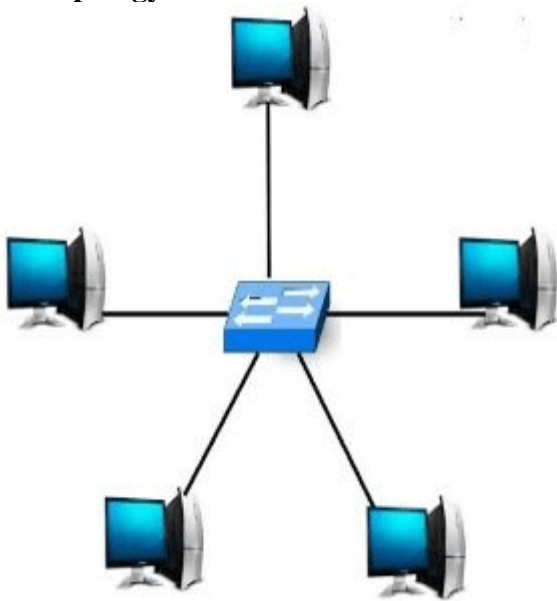
In this topology, all the computers are separately connected to a central node or connection point, which can be a server, a hub, a router, or a switch. This topology offers an advantage that if a cable does not work, only the respective node will suffer, the rest of the nodes will work smoothly. All data or messages that one node sends to another passes through the central hub.

This topology is easy to design and implement as well as it is easy to add additional nodes to the central node. The major drawback of this topology is that it is prone to bottleneck or failure at the central connection point, i.e., failure at the central node will affect the entire communication.

Bus Topology:
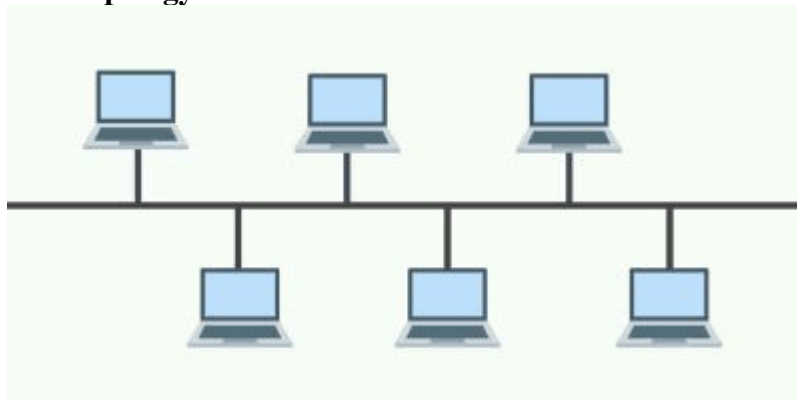
In this arrangement, the nodes (computers) are connected through interface connectors to a single communication line (central cable) that carries the message in both the directions. The central cable to which all the nodes are connected is the backbone of the network. It is called a bus. The signal in this arrangement travels in both directions to all the machines until it finds the recipient machine. It is easy to set up than other topologies as it uses only a single central cable to establish the network.

Benefits of LAN:
  o It offers a higher operating speed than WAN and MAN.
  o It is less expensive and easy to install and maintain.
  o It perfectly fulfills the requirement of a specific organization, such as an office, school, etc.
  o It can be wired or wireless or a combination of both.
  o It is more secure than other networks as it is a small set up that can be easily taken care of.

Primary Functions of LAN:

  o **Sharing of files:** It allows you to share or transfer files from one computer to another computer within the LAN. For example, in a bank, it can be used to send a file with the details of transactions of a customer from the server to clients.

  o **Sharing of printers:** It also allows shared access to a printer, file servers, etc. For example, ten computers that are connected through LAN can use a single printer, file server, fax machine, etc.

  o **Sharing of Computational capabilities:** It allows the clients to access to the computational power of a server, e.g., an application server as some applications which run on clients in a LAN may require higher computational capabilities.

  o **Mail and message related services:** It allows sending and receiving mails between computers of a LAN. You are required to have a mail server for this.

  o **Database services:** It also allows storing and retrieving data with the help of a database server.

Metropolitan Area Network (MAN):
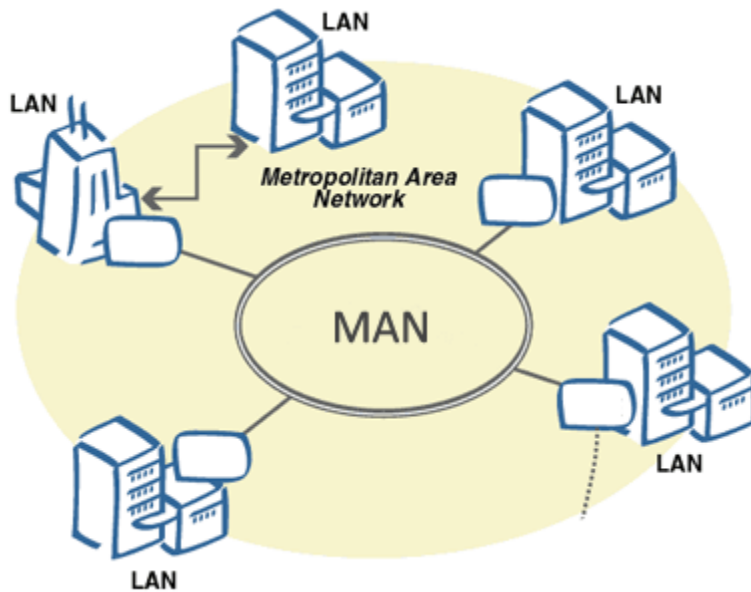
MAN is a high-speed network that spreads over a large geographical area such as a metro city or town. It is set up by connecting the local area networks using routers and local telephone exchange lines. It can be operated by a private company, or it may be a service provided by a company such as a local telephone company.

MAN is ideal for the people of a relatively large area who want to share data or information. It provides fast communication via high-speed carriers or transmission media such as copper, fiber optics, and microwaves. The commonly used protocols for MAN are X.25, Frame Relay, Asynchronous Transfer Mode (ATM), xDSL (Digital Subscriber Line), ISDN (Integrated Services Digital Network), ADSL (Asymmetrical Digital Subscriber Line), and more.

The area covered by MAN is larger than the LAN but smaller than a WAN. Its network ranges from 5 to 50 km. Furthermore, it also provides uplinks for connecting LANs to WANs and the internet. An organization can use a MAN to connect all of its LANs located at its different offices across the city.

Examples of MAN:

- o Cable TV Network
- o Telephone service provides that provide high-speed DSL lines
- o IEEE 802.16 or WiMAX
- o Connected fire stations in a city
- o Connected branches of a school in a city

Advantages of MAN:

- o **Less Expensive:** It is less expensive to set up a MAN and to connect it to a WAN.

- o **High Speed:** The speed of data transfer is more than WAN.

- o **Local Emails:** It can send local emails fast.

- o **Access to the Internet:** It allows you to share your internet connection, and thus multiple users can have access to high-speed internet.

- o **Easy to set up:** You can easily set up a MAN by connecting multiple LANs.

- o **High Security:** It is more secure than WAN.

Wide Area Network (WAN):
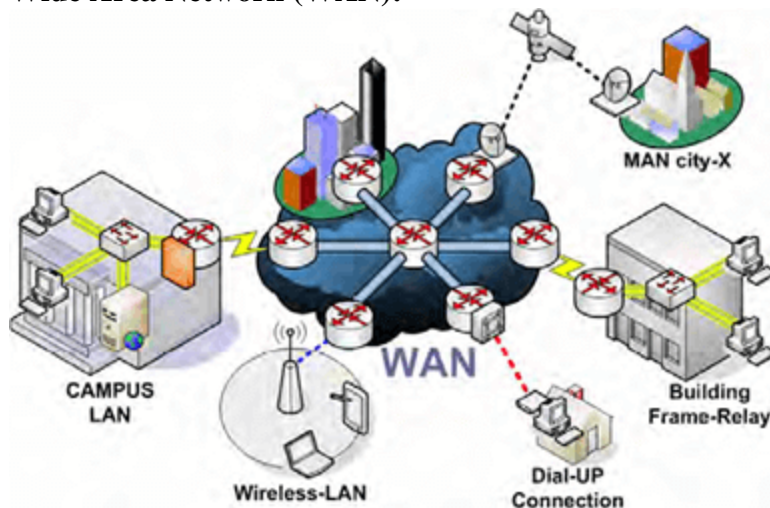
WAN extends over a large geographical area. It is not confined within an office, school, city, or town and is mainly set up by telephone lines, fiber optic, or satellite links. It is mostly used by big organizations like banks and multinational companies to communicate with their branches and customers across the world. Although it is structurally similar to MAN, it is different from MAN in terms of its range, e.g., MAN covers up to 50 Kms, whereas WAM covers distances larger than 50 Km, e.g., 1000km or more.

A WAN works by using TCP/IP protocol in combination with networking devices such as switches, routers, firewalls, and modems. It does not connect individual computers; rather, they are designed to link small networks like LANs and MANs to create a large network. The internet is considered the largest WAN in the world as it connects various LANs and MANs through ISPs.

The computers are connected to the wide area network through public networks, such as telephone systems, leased lines or satellites. The users of a WAN do not own the network as it is a large setup connecting the remote computer systems. However, they are required to subscribe to a service provided by a telecommunication provider to use this network.

Advantages of a WAN:

- o **Large Network Range:** It spans a large geographical area of 2000 km or more, e.g., from one country to another countries.

- o **Centralized data:** It allows your different office branches to use your head office server for retrieving and sharing data. Thus, you don?t need to buy email servers, files server and back up servers, etc.

- o **Get updated files and data:** It provides an ideal platform for companies who need a live server for their employees to exchange updated files within seconds.

- o **High bandwidth:** It offers high bandwidth than a normal broadband connection. Thus, it can increase the productivity of your company by offering uninterrupted data transfer and communication.

- o **Workload Distribution:** It helps distribute your workload to other locations. You can hire employees in different countries and assign them to work from your office.

Examples of WAN:
Internet
Stock exchanges network
Railway reservation system
Satellite systems

Internet

The Internet is a vast network that connects computers all over the world. Through the Internet, people can share information and communicate from anywhere with an Internet connection.

The Internet consists of technologies developed by different individuals and organizations. Important figures include Robert W. Taylor, who led the development of the ARPANET (an early prototype of the Internet), and Vinton Cerf and Robert Kahn, who developed the Transmission Control Protocol/Internet Protocol (TCP/IP) technologies.

The Internet works through a series of networks that connect devices around the world through telephone lines. Users are provided access to the Internet by Internet service providers. The widespread use of mobile broadband and Wi-Fi in the 21st century has allowed this connection to be wireless.

While the Internet is theoretically decentralized and thus controlled by no single entity, many argue that tech companies such as Amazon, Facebook, and Google represent a small concentration of organizations that have unprecedented influence over the information and money on the Internet. In some countries, certain parts of the Internet are blocked via censorship.

Network Devices (Hub, Repeater, Bridge, Switch, Router, Gateways)

1. Repeater – A repeater operates at the physical layer. Its job is to regenerate the signal over the same network before the signal becomes too weak or corrupted so as to extend the length to which the signal can be transmitted over the same network. An important point to be noted about repeaters is that they do not amplify the signal. When the signal becomes weak, they copy the signal bit by bit and regenerate it at the original strength. It is a 2 port device.

2. Hub – A hub is basically a multiport repeater. A hub connects multiple wires coming from different branches, for example, the connector in star topology which connects different stations. Hubs cannot filter data, so data packets are sent to all connected devices. In other words, the collision domain of all hosts connected through Hub remains one. Also, they do not have the intelligence to find out the best path for data packets which leads to inefficiencies and wastage.

3. Bridge – A bridge operates at the data link layer. A bridge is a repeater, with add on the functionality of filtering content by reading the MAC addresses of source and destination. It is also used for interconnecting two LANs working on the same protocol. It has a single input and single output port, thus making it a 2 port device.

4. Switch – A switch is a multiport bridge with a buffer and a design that can boost its efficiency (a large number of ports imply less traffic) and performance. A switch is a data link layer device. The switch can perform error checking before forwarding data, which makes it very efficient as it does not forward packets that have errors and forward good packets selectively to the correct port only. In other words, the switch divides the collision domain of hosts, but broadcast domain remains the same.

5. Routers – A router is a device like a switch that routes data packets based on their IP addresses. The router is mainly a Network Layer device. Routers normally connect LANs and WANs together and have a dynamically updating routing table based on which they make decisions on routing the data packets. Router divide broadcast domains of hosts connected through it.

Methods of Internet access

1.Mobile
2.WiFi Hotspots
3.Dial-up
4.Broadband
5.DSL
6.Cable
7.Satellite
8.ISDN

Internet Services

To access/exchange a large amount of data such as software, audio clips, videoclips, text files, other documents, etc., we need internet services. You must use an Internet service in order to connect to the Internet. Data can be sent from Internet servers to your machine via Internetservice. Some of the commonly used internet services are:

- Communication Services
- Information Retrieval Services
- File Transfer
- World Wide Web Services
- Web Services
- Directory Services
- Automatic Network Address Configuration
- Network Management Services
- Time Services
- Usenet
- NewsGroup
- E-commerce