Printers:-

A printer is an output device makes a hardcopy from a softcopy.

Parameters or Criteria to Evaluate a Printers

A printer can be evaluated by **four criteria**:

1. Resolution: Printing resolution means the quality of image in a print. It is usually measured in dots per inch (dpi). The more dots a printer can print in one inch area, the picture quality is more high. A medium quality printer can print 300 dpi or 600 dpi.

2. Speed: Printing speed means how fast a printer can print. It is usually measured in page per minute (ppm). For some printer it is measured in character per second (cps). A graphics can take longer printing time than a text or character. The speed can be 6 to 20 ppm.

3. Initial Cost: Initial cost means the price of a new printer. The cost of a new printer is dramatically fallen in recent years.

4. Cost of Operation: The cost of operation means the cost of ink or toner and maintenance. The cost of operation increases with the quality of printing.

Classification of Printers…….+++++++

Printers are classified according to following criteria:

1. According to Printing Capability: Printing capability means how much a printer can print at a time. Under this classification printers are following three types:

(a) Character Printer: A character printer can print one character (text) at a time. Example, Dot matrix printer, Ink jet printer etc.

(b) Line Printer: A line printer can print one line of characters (texts) at a time. Printing quality (resolution) is not high but high speed printing (up to 3000 lines of text per minute). Example, Chain printer.

(c) Page Printer: A page printer can print one page of characters (texts) at a time. Printing quality (resolution) is high and high speed printing (up to 3000 lines of text per minute). Example, Chain printer.

2. According to Printing Mechanism: Printing mechanism means how a printer print a character. Under this classification printers are following two types:

(a) Impact Printer: Impact printer uses print head to generate the shape of a character. The head is used to strike on a ribbon against a paper to make a carbon-copy of a character. Example: Dot matrix printer, Daisy wheel printer etc.

(b) Nonimpact Printer: Nonimpact printer does not use any head to generate the shape of characters. Instead of that, it uses ink spraying or light falling mechanism to generate the characters on paper. Example: Ink jet printer, Laser printer etc.

Dot Matrix Printer A dot matrix printer is a character type impact printer. Its printing mechanism can be compared with a type writing machine.

This printer uses a head with tiny (short) pins. The pins are arranged in row by column form like a matrix. This arrangement of pins can make any shape of characters. When a character is needed to take print, then only those pins of the matrix which are associated to generate the shape of that character are move forward from the head. The head then strikes on the ribbon against a paper and only the forwarded pins touches the ribbon. As a result a shape of the desired character is generated on the paper like a carbon copy. At the end of a line the page is scrolled up and the print

head starts to take print of the next line.

As this is an impact type printer it produces bad noise during print. It is a slower printer because the mechanical movement of head is needed.

Figure. Printing mechanism of dot matrix printer.

Ink Jet Printers :- Ink jet printers create an image directly on the paper by spraying ink through tiny nozzles. Many ink jet printers use one cartridge for color printing and a separate black-only cartridge for black-white printing.
Color ink jet printers have four ink nozzles; cyan (blue), magenta (red), yellow and black. These four colors are used in almost all color printing because it is possible to combine them to create any color in the visible spectrum. The color model of ink jet printer used in color printing is CMYK and it follows subtractive rule of color combination. This printing is also called four-color printing.
Compared to the laser printers, the operating cost of an ink jet printer is relatively low. Maintenance cost is also low. Only the routine replacement of cartridge is needed.

Laser Printers:- Laser printers are most expensive than ink jet printers and their printing quality is higher. Here a laser plays the key role of printing. A separate CPU and memory are built into the printer. These printers can be used to share in LAN.
In laser printer a drum with embossed of all characters is used. During a print a laser light is fallen on the target characters of the drum from a laser source. Then the targeted characters are positively charged. A toner of tiny particles are used as ink powder. These toners are oppositely charged and they sticks only to the positively charged characters. A paper is passed under the drum and using pressure and heat, the toner is transferred off the drum onto the paper. Finally, the drum is cleaned by air and get ready to take print for the next page.
For color printing, a laser printer uses for colors (cyan, magenta, yellow, and black) of toners and the process is repeated four times to make the final combination of colors. Here, each pass is treated as a single-color model.
The speed of single-color (black) laser printers are 4 to 16 ppm. The resolution can be 300 dpi for low quality, 600 dpi for medium quality, 1200 dpi for high quality, 1800 dpi for very high quality printing.

Computer Buses

Question: Define computer bus and discuss different types of computer buses.

Computer Bus:

Computer buses are fine conducting wires used to carry electrical signals between two units in a computer system.
Computer buses are three types such as:

(1) Data Bus (2) Address Bus (3) Control Bus

Data Bus: Data buses are 8, 16, 32, 64, or 128 parallel lines used to carry data signal between two units in a computer system. Data buses are bidirectional lines.

Figure 1: An 8-bit data bus.

Address Bus: Address buses are 16, 32, 64, 128, or 256 parallel lines used to carry address signal between processor and other units in a computer system. Address buses are unidirectional lines.

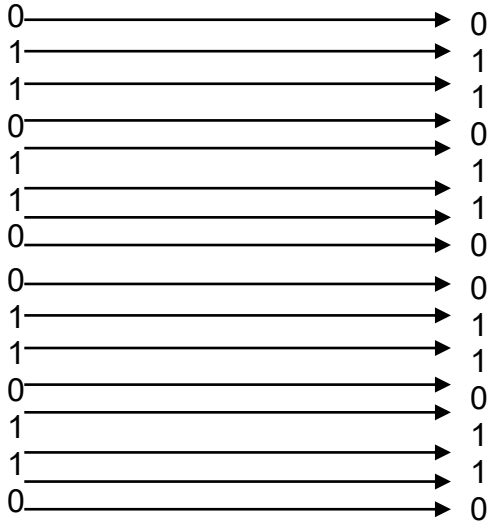


Figure 2: A 16-bit address bus.

Control Bus: Control bus is a single line used to carry control signal between processor and other units in a computer system. Control bus is unidirectional lines. The possible control signals are MEMR, MEMW, IOR, and IOW.

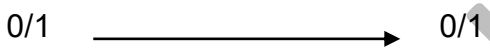
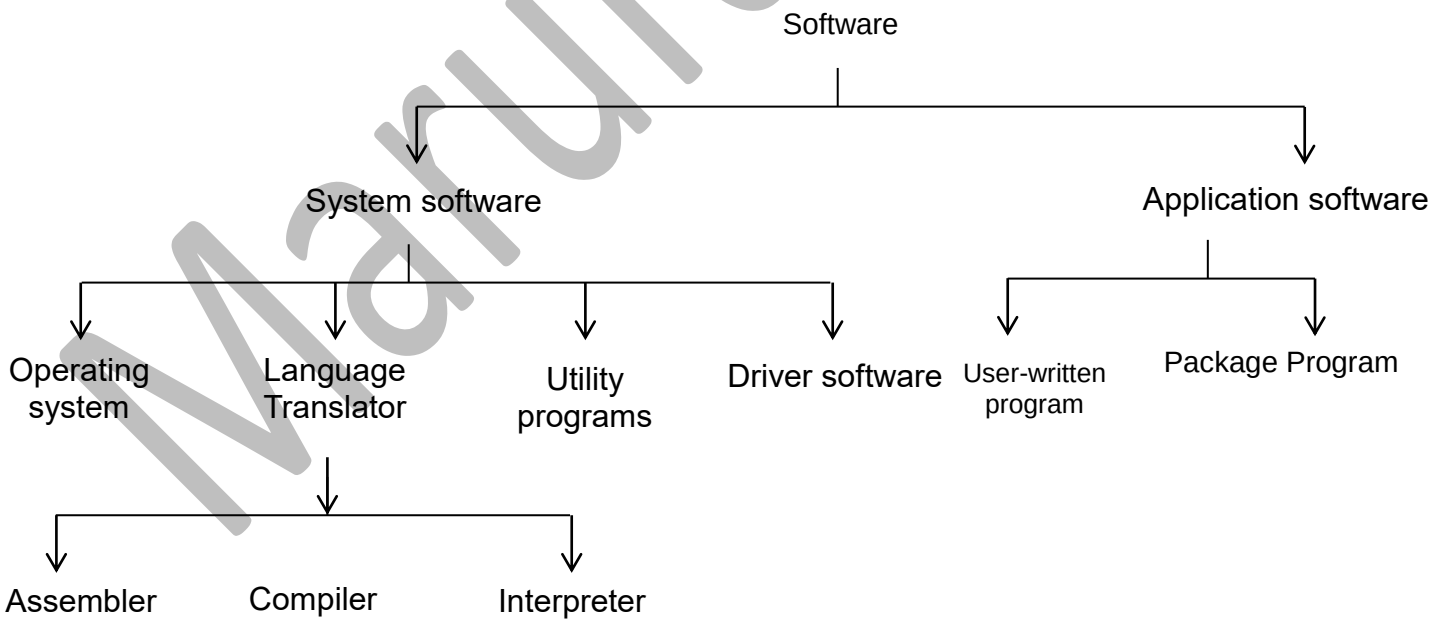


Figure 3: A control bus.

Computer Software:

Software: Software is one or more computer programs. Computer programs are set of instructions given to a computer to perform some predefined tasks. Example: Windows 7, MS Office 2010, Matlab 7, AutoCAD etc.

Classification of Computer Software: Computer software can be classified as a tree like or hierarchical classification:



System Software:

A system software is one or more generalized programs used by the computer system to provide necessary helps to the computer users. Example: Windows 7, Vista, Linux etc.

Application Software: An application software is one or more specialized programs used by the computer users to solve their daily life problems. Example: MS Office 2010, AutoCAD etc.

Role of System Software in Computer System

Operating System:

An operating system is a system software. It is an intermediary program in between computer user and computer hardware. It provides an environment in which a user can use the computer system effectively, efficiently, and conveniently.

Example: Windows 7, Vista, Linux etc.

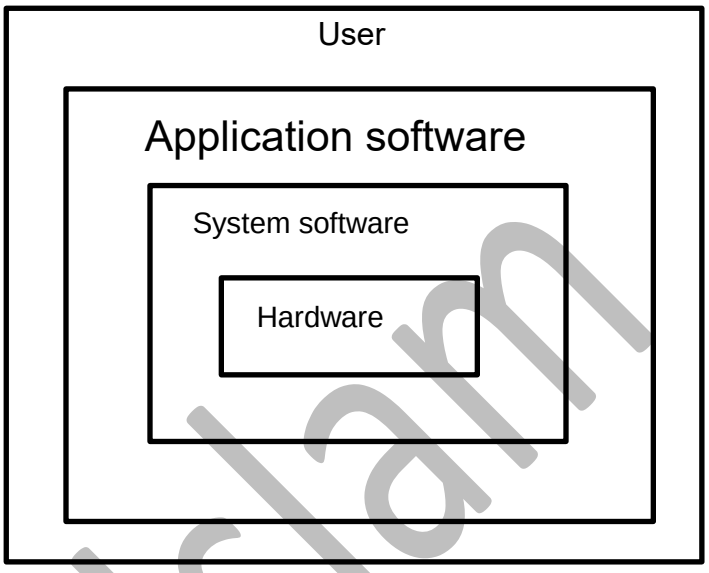


Fig. Role of system software in computer system

Types of Operating System (OS):

An operating system can be any one of the following major types:

1. Batch Processing OS. Ex. DOS.
2. Multi-tasking OS. Ex. Windows.
3. Multi-programming OS.
4. Time sharing OS. Ex. Unix.
5. Real Time OS.
6. Multiprocessing OS.

Functions of Operating System (OS):

An operating system performs following functions:

1. CPU Scheduling.
2. Memory Management.
3. Input/Output Control.

Difference between DOS and Windows:

DOS	Windows
1. Text or command based OS.	1. GUI or graphics based OS.
2. Not user friendly OS.	2. User friendly OS.
3. Mouse is not used here.	3. Mouse is used here.

Language Translators

Historical Evolution of Programming Languages:

2+3

10 00 11 ➔ Machine or Binary language

ADD 2,3 ➔ Mnemonics based Symbolic language or Assembly language.

SUB 7,2

MUL 5,4

DIV 6,3

2+3 ➔ High-Level Language (HLL) or English Like Language (ELL)

First Generation Language (1GL) ➔ Machine Language

Second Generation Language (2GL) ➔ Assembly Language → Low Level Language (LLL)

Third Generation Language (3GL) ➔ High-Level Language

Language Translator: A language translator is a computer program used to translate another computer program into machine or binary language. Here, source program can be written in any language other than machine language but after translating the destination program must be in machine language instructions. That is,

A program written other than machine language (source program) —Language Translators→ Machine language instructions (destination program)

Assembler: An assembler is a language translator used to translate an assembly language program into machine language instructions. That is,

An assembly language program —Assembler→ Machine language instructions

Ex. ADD 2,3 → 10 00 11

Compiler: A compiler is a language translator used to translate a high-level language program into machine language instructions. That is,

A high-level language program —Compiler→ Machine language instructions

Ex. 2+3 → 10 00 11

Interpreter: An interpreter is a language translator used to translate a high-level language instruction into machine language instruction and then executes it. That is,

A high-level language instruction —Interpreter→ Machine language instruction

Ex. 2+3 → 10 00 11

Differences between Compiler and Interpreter:

Compiler	Interpreter
1. Translate entire program at a time.	1. Translate one instruction at a time.
2. Only translation, no execution is done.	2. Both translation and execution are done.
3. Faster in operation.	3. Slower in operation.

Utility Programs

Qu: Define utility program. Mention some utility programs with their tasks.

Utility Programs: Utility programs are some special programs which are used to enhance the efficiency of a computer system. Some utility programs and their tasks are mentioned below:

Utility Program	Task
Scan Disk	To find and repair system files errors.

Disk Defragmenter	To make computer system faster.
Disk Cleanup	To remove temporary (.tmp) files from computer.
Winzip/Pk Zip (Zip programs)	To compress files or programs.
Data Recovery	To recover deleted files or programs.
Anti-virus	To scan, clean/delete/vault virus programs.

All Programs ➔ Accessories ➔ System Tools ➔ Disk Defragmenter ➔ Disk Cleanup

Qu: What is a user-written program? Mention some name of programming languages that can be used to develop a user-written program.

User-written Program: A user-written program is written by computer user to solve their daily life problems. Here, the user must have some programming knowledge and he or she must use some high level programming language to develop that program.

Programming Language	Full meaning
BASIC	Beginners All purposes Symbolic Instruction Codes
COBOL	Common Business Oriented Language
Fortran	Formula Translators
Matlab	Matrix Laboratory
Prolog	Programming in Logic
Lisp	List Processing

➔ Some programming languages which have no full meaning are:
C, C++, C#, Java etc.

Qu: Define package program. Mention the major programs available in MS office package.

Package Program: A package program is commercially developed for common computer users. These programs are developed to use as very much user-friendly.

The major programs which are available in MS office package are below:

Program	Task
MS Word	Documentary
MS Excel	Spread Sheet Analysis
MS Access	DBMS (Database Management System)
MS PowerPoint	Presentation

Computers networks

Question: What is a computer network? Why is a computer network created?

Computer Network:

A computer network is an arrangement of two or more computers and there may be some peripherals (I/O devices) according to some physical and logical structures.

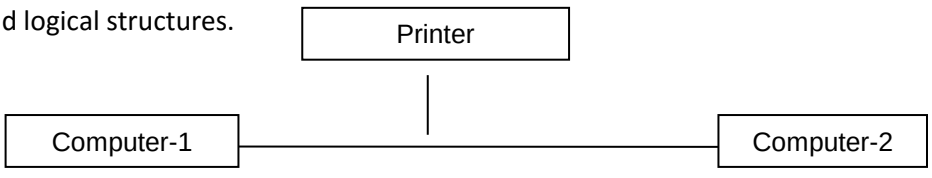


Fig.1: Block diagram of a computer network.

Reasons or Purposes to Create a Computer Network:

A computer network is created to serve following purposes:

1. For communication to exchange information:

Make a communication between two computers for sending and receiving information (Fig. 1). The different ways of information exchange are:

(i) E-mail
(ii) Chatting
(iii) VOIP
(iv) Video conferencin

2. For resource sharing:

The resource sharing are following two types:

(a) Hardware resource sharing: Hardware resource sharing means printer, scanner, plotter etc. hardware devices sharing among different computers (Fig. 1).

(b) Software resource sharing: Software resource sharing means program or file sharing among different computers.

Types of Computer Networks

According to geographical distance computer networks are following major types:

(i) Local Area Network (LAN)
(ii) Metropolitan Area Network (MAN)
(iii) Wide Area Network (WAN)

Local Area Network (LAN):

In LAN two computers are positioned in a room, or in two different rooms, or in two different buildings in a campus. The maximum distance of a LAN is 1 k.m.

Example: Intranet.

Metropolitan Area Network (MAN):

In MAN two computers are positioned in two corners of a small city, or in two adjacent corners of two cities in a country.

Example: Extranet.

Wide Area Network (WAN):

In WAN two computers are positioned in two corners of a mega city, or in two cities in a country, or in two cities in two different countries, finally all over the world.

Example: Internet.

Network Topology

Question: What is network topology? Discuss different types of network topologies?

Network Topologies or LAN Topology:

The physical structure of a computer network is called network topology or LAN topology.That is,network topology tells how a computer in a network is connected to another computer.There are different types of network topologies suchas-

(i) Star topology or Star network
(ii) Bus topology or Bus network
(iii) Ring topology or Ring network
(iv) Tree topology or Tree network
(v) Mesh topology or Mesh network

Star Topology or Star Network:

In a star topology there is a central switching device called hub. The hub plays a vital role during message exchange between two computers. When a computer wants to send a message (data with address) to another computer, at first the message is sent to the hub. The hub is then check the address part of the message and delivery it to the target computer (Fig.1).

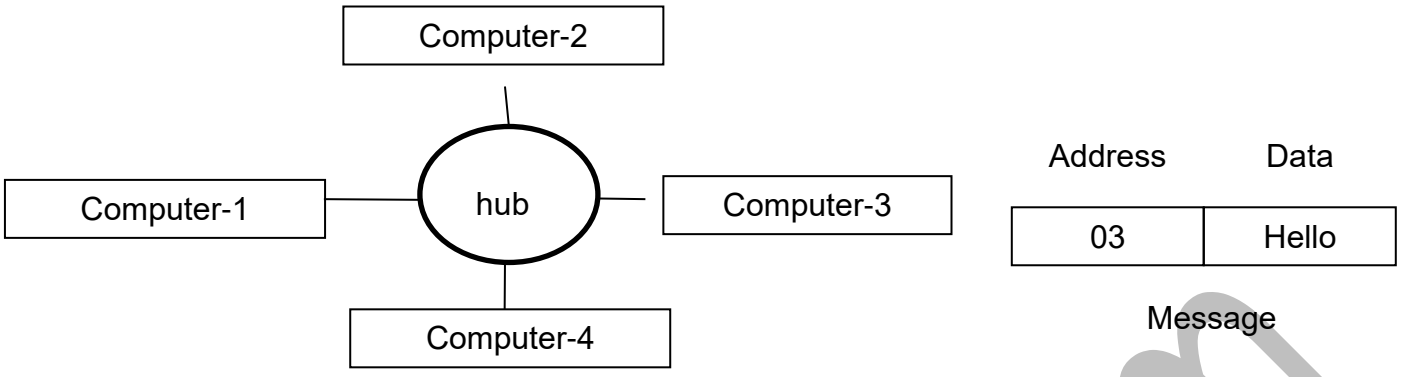


Fig.1: Block diagram of a star topology or star network.

Advantages: Easy to make a network.

Disadvantages: If hub is crashed the thorough network is destroyed.

Bus Topology or Bus Network:

The another name of bus topology is broadcasting network. In a bus network, when a computer wants to send a message (data with address) to another computer, the same messages is copied into two identical (replication) messages and sent to two opposite directions. During transmission, when a computer gets the message, at first it checks the address par of it and tries to make a match the address of the message with it's own address. If the addresses are matched, the computer receives the message, otherwise, it releases the message for the next computer (Fig.2).

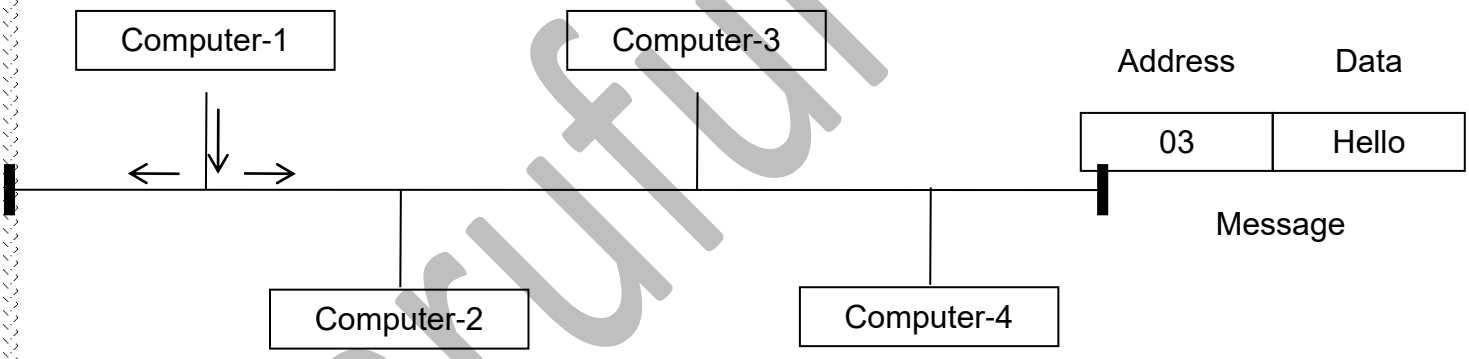


Fig.2: Block diagram of a bus topology or bus network.

Advantages:

(a) Easy to make a network.

(b) Cheaper network.

Disadvantages: Slower and minimum capability.

Internet, Intranet, and Extranet

Question: What is Internet? Mention some uses of Internet.

Internet: Internet is a network of networks. When two or more Metropolitan Area Networks (MANs) are connected then a bigger network is produced which is called a Wide Area Network (WAN) and that is the Internet. The other names of Internet are information superhighway or cyber space or simply net.

Some important uses of Internet are:

(i) E-mail

(ii) Chatting (Text based Messaging)

(iii) VOIP (Voice Over Internet Protocol`)

(iv) Video conferencing

(v) Browsing information and so on.

Question: What are browser and search engine? Give some examples.

Browser: A browser is a software used to browse or search information on the net. To search any information using a browser a user needs to know the actual web site address (URL) of his/her required information.

Example: Internet Explorer, Google Chrome, Mozilla Firefox, Opera etc.

Search Engine: A search engine is a software used to search information on the net. To search any information using a search engine a user does not need to know the actual web site address (URL) of his/her required information. Instead of that he/she needs to write some relevant words (keywords) of his/her required information in a predefined place and then make a search. The output of a search engine is some links of web sites of his/her required information.

Example: Google, Yahoo, Bing etc.

Question: What do you mean by protocol? Mention some protocols.

Protocol: Protocol is a set of rules and procedures established between two computers prior to exchange data between them. ……. Some protocols and their full meanings are below:

Protocols	Full meanings
HTTP	Hyper Text Transfer Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
FTP	File Transfer Protocol
SMTP	Simple Message Transfer Protocol
WAP	Wireless Application Protocol

Question: What do you mean by intranet and extranet?

Intranet:

An intranet is a private network of an organization. It is the smallest network than Internet and extranet. It is highly secured network and only the employees of the organization can access here using valid password. Like Internet, an intranet can also be browsed using a browser but only the internal data of the organization.

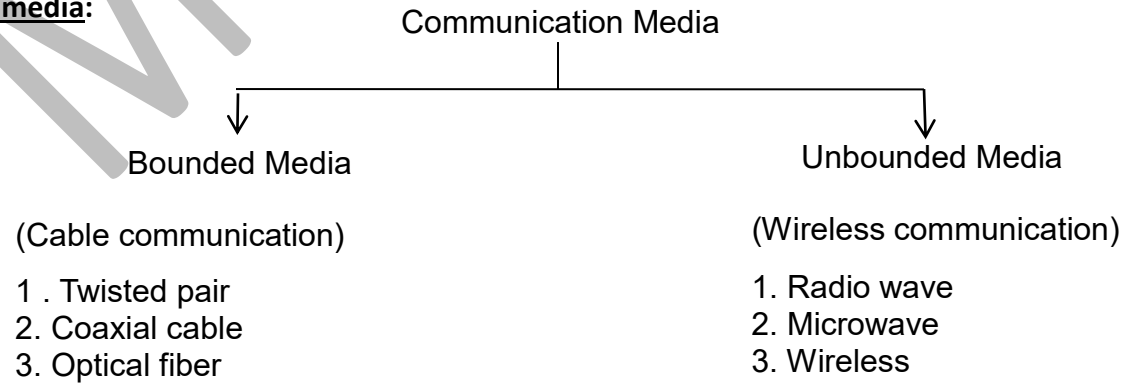
Extranet:

An extranet is a private network of two or more organizations. It is smaller network than Internet but larger than intranet. When the intranets of two or more organizations are connected to each other to share resources and ideas then a bigger network is produced which is still private and called an extranet. It is a secured network and only the employees of the organizations can access here using valid password. Like Internet and intranet, an extranet can also be browsed using a browser but only the internal data of the organizations.

Communication Media or Communication Channels

Communication media or communication channels are those media through which data can be sent or travelled from one place to another place in the communication network.

Types of media:



Twisted Pair Cable: In twisted pair cable communication two copper wires are twisted. The wires are separated by covering them insulated plastic materials (casing or jacket).

Types:

1. UTP (UnshieldedTwisted Pair)
2. STP (Shielded Twisted Pair)

Advantages:

1. Available in local market.
2. Low price.
3. Easy to installation.

Disadvantages:

1. Low bandwidth (kbps-mbps)
2. Short distance communication. (maximum 100 meter)

Applications: Telephone line, LAN etc.

Coaxial Cable: In coaxial cable communication a single heavy copper wire is used. The wire is covered with insulated plastic foam. Then a net of wires are used to surround the plastic insulation. Finally a heavy plastic casing or jacket is used to protect the inner two layers from external harm.

Types:

1. Thinnet coaxial cable (light and flexible with low bandwidth)
2. Thicknet coaxial cable (heavy and non-flexible with high bandwidth)

Advantages:

1. Available in local market.
2. Medium price.
3. Medium bandwidth. (mbps-gbps)

Disadvantages:

1. A bit costly.
2. Medium distance communication. (maximum 1 k.m)

Applications: Cable TV line, MAN etc.

Optical Fiber Cable:

In optical fiber cable communication a fiber or strand (straw or narrow pipe) is used. The inner side of the fiber is coated with glass (core glass). Then the fiber is covered with another protection of plastic or glass which is called cladding. Finally a heavy plastic or metallic casing or jacket is used to protect the inner two layers from external harm.

Types:

1. Step index fiber (equal refraction angle in all places)
2. Graded index fiber (refraction angle is higher in center than periphery)
3. Singlemode fiber (laser light is fallen in a single direction or angle)
4. Multimode fiber (laser light is fallen in multiple direction or angle)

Advantages:

1. High bandwidth (gbps-tbps).
2. High distance communication.

Disadvantages:

1. Costly.
2. Installation is complex.

Applications: WAN, Submarine cable etc.

Optical Fiber Communication System

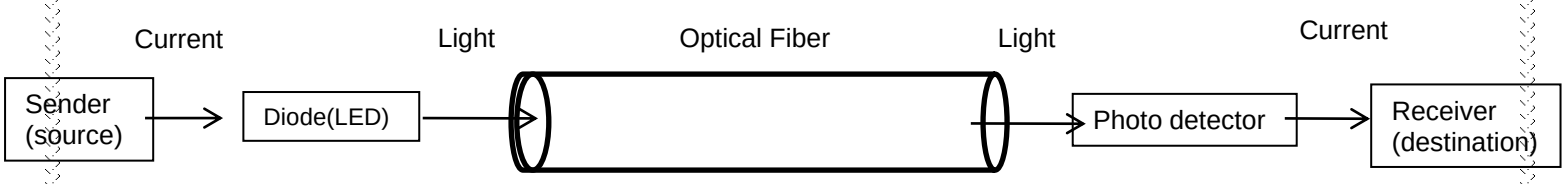


Figure: Optical Fiber communication system.

Modem

Application of Modem in Data Communication

Different means of data communication: Pigeon, Postal media etc.

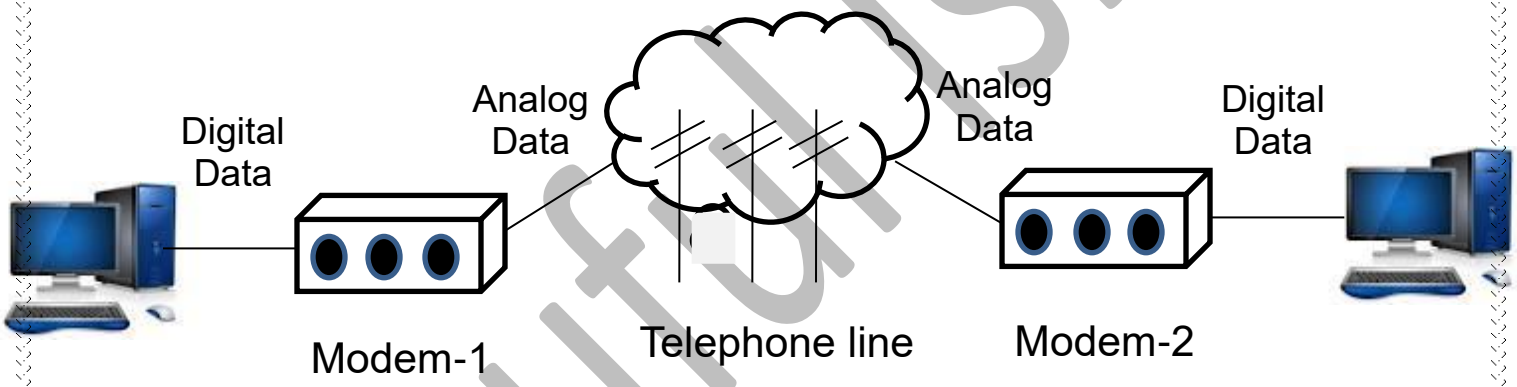


Figure-3: Function of a Modem in data communication.

Modem = Modulation + Demodulation

- Modulation = Digital to Analog Conversion (DAC)
- Demodulation = Analog to Digital Conversion (ADC)

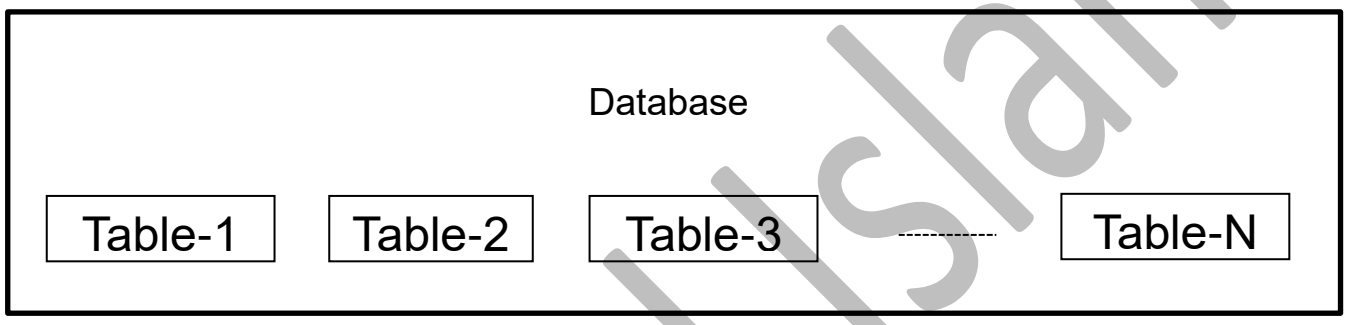
Computer-1	Modem-1	Modem-2	Computer-2
Source	Modulation (DAC)	Demodulation (ADC)	Destination
Destination	Demodulation (ADC)	Modulation (DAC)	Source

Data, Database, DBMS

Data:
Data is nothing but a fact or value of real world entities (objects or events). It may be concrete form such as a person or an abstract form such as an account number. It is the raw material of information.
Example: “Karim”, “A-101”, 6000.

Information:
Information is the processed form of data which is useful and more meaningful to the users.
Example: Result_Sheet.xls.

Database:
Database is a collection of interrelated data of a particular enterprise such as a banking database.
Example: Agrani_bank.mdb



Database: Agranibank.mdb

Table: Customer

Name	Account	Address
Karim	101	H-314
Rahim	102	H-620
Kamal	103	H-540

Table: Balance

Account	Balance
101	7000
102	5000
103	8000

Database Management System (DBMS):

A DBMS is one or more database and a set of programs (instructions) to access (manipulate) data from those database.
Example- MS Access 2007, Oracle 10g etc.

What is meant by Access or Manipulation of Data in a Database
By **Access** or **Manipulation** we mean four basic operations data in a database:

Insertion: To insert new data in a table.
Query: To Search data in a table.
Update: To update or upgrade data in a table.

Deletion: To delete existing data from a table.

Table: A table is a grouping of related data organized in columns and rows. Many tables can be stored in a single database.

Field: A field is a column in a table and it defines the data type of values in a table.
Example-
an Account table can have fields: Account_Name, Account_Number, Balance.
similarly, a Student table can have fields: Student_Name, Roll_Number, Marks.

Record: A record is a row in a table and it defines a set of values. Each record contains the data for one person as specified by the intersecting fields.
Example-
an Account table can have a record: Karim, A-101, 5000.
similarly, a Student table can have a record: Rahim, Raj-486, 780.

Computer Virus, Anti-Virus, Computer Hacker and Cracker

Question: Define computer virus. Why are computer viruses created? **Computer Virus** The full meaning of VIRUS is Vital Information and Resources Under Seized. A virus is a parasitic program buried within another legitimate program or stored in a special area of a disk called the boot sector. Executing the program or accessing the disk, virus becomes active without the user's knowledge. **Reasons to Create Computer Virus**

Some major reasons to create computer viruses are as follows:

1.Copy themselves to other programs.

2.Display information on the screen.

3.Destroy data files.

4.Erase an entire hard disk.

5.Lie dormant for a specified time or until a given condition is met and then becomes active.

Symptoms of Computer Virus

Question: Mention some symptoms of computer virus. Answer: Some important symptoms of computer viruses are as follows:

1.Unexplainable loss of free memory spaces.

2.Unusually long time for program loading and execution.

3.Print routines that stop working.

4.Strange "beeps".

5.Computer "freezing-up".

6.Computer reboots in the middle of a process.

7.Changes in file and program size.

8.Corrupted files.

Prevention of Infection

Question: How can we prevent our computer from virus attack? Answer: There are two ways to attack a computer by virus programs . These are:

1.**Off-line way**: In off-line way virus programs are spread out through third memory devices such as CD, DVD, pen drive etc.

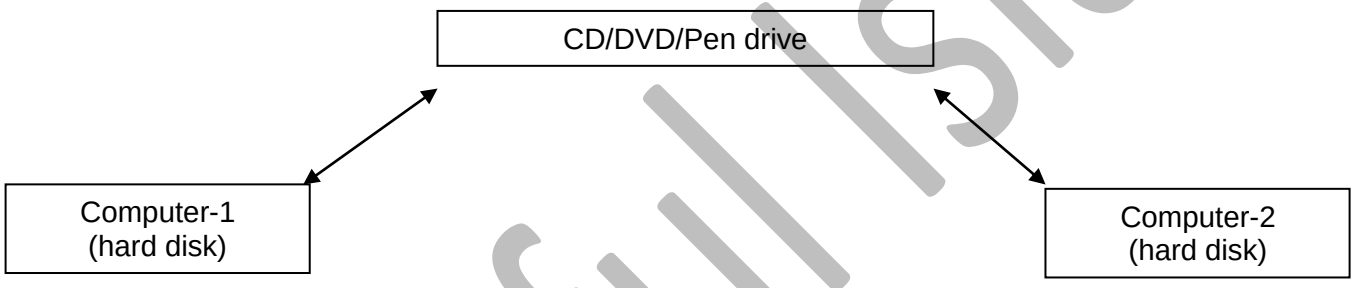


Fig. 1: Off-line way virus spreading.

2 **.On line way**: In on-line way virus programs are spread out through computer network basically Internet.
Prevention: We can prevent our computer from virus programs by installing a powerful anti-virus programs in it. The an anti-virus needs to be updated in regular basis. Before copying any file to our computer, at first we need to ensure whether the file is free from virus or not. To verify it, we need to check the file by the anti-virus program and if any virus is found then the virus must be cleaned or deleted before copying the desired file to our computer disk.

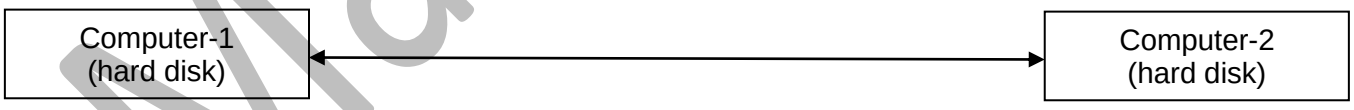


Fig. 2: On-line way virus spreading.

Anti-virus: An anti-virus is a program that acts against the virus programs. Anti-virus program is used to scan for virus program and then tries to clean, or delete, or make vault of the virus program if it is found.

Some common anti-virus programs are:

1. MacAfee
2. Kespersky
3. Norton Anti-virus

4. Bit Defender
5. Avast
6. Avg
7. Bit Defender and so on

Computer Hacker and Cracker

Question: Define computer hacker and computer cracker.
Answer:

Computer Hacker: A computer hacker is a computer skilled person who performs an unauthorized or illegal access to the computer system of an organization to know their activities or to make fun. A hacker uses computer network basically Internet to hack the computer system of an organization. A powerful fire-wall protection can make a computer system from hacking.

Computer Cracker: A computer cracker is a computer skilled person who performs an unauthorized or illegal access to the computer system of an organization to know their activities and then perform any harms to the system of the organization. A cracker uses computer network basically Internet to hack and then crack the computer system of an organization. A powerful fire-wall protection can also make a computer system from hacking and then cracking.

Maruful Islam