Introduction to Computer Network & Internet

4.1 Definition of Network
4.2 Types of Network: - LAN, MAN, WAN
4.3 Data Transmission Modes
4.4 OSI Model
4.5 E-Mail
4.6 File Transfer Protocol
4.7 Web Browser
4.8 Types of Web Browser

Question

1. What is network? Explain types of network.
2. Explain the Data Transmission mode?
3. Explain OSI model?
4. What is E-Mail? Explain Advantages of E-mail.
5. What is Web Browser? Explain types of web browser.
6. Write short notes
1. FTP

4.1 Definition of Network

- A **network** is a collection of computers, servers, mainframes, network devices, peripherals, or other devices connected to one another to allow the sharing of data

- A group of interconnected (via cable and/or wireless) computers and peripherals that is capable of sharing software and hardware resources between many users.

- Network is a series of interconnected nodes that can transmit, receive and exchange data, voice and video traffic

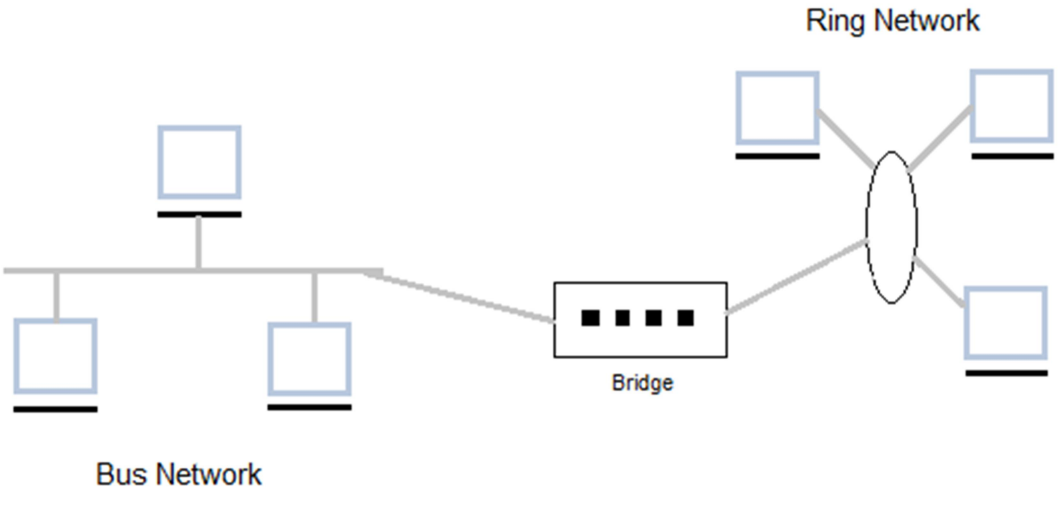
- A network is defined as a group of two or more computer systems linked together

4.2 Types of Network: - LAN, MAN, WAN

It is also called LAN and designed for small physical areas such as an office, group of buildings or a factory. LANs are used widely as it is easy to design and to troubleshoot. Personal computers and workstations are connected to each other through LANs. We can use different types of topologies through LAN; these are Star, Ring, Bus, Tree etc.

LAN can be a simple network like connecting two computers, to share files and network among each other while it can also be as complex as interconnecting an entire building.

LAN networks are also widely used to share resources like printers, shared hard-drive etc.



(Different Topologies interconnected in a Local Area Network)

Characteristics of LAN

- LAN's are private networks, not subject to tariffs or other regulatory controls.
- LAN's operate at relatively high speed when compared to the typical WAN.
- There are different types of Media Access Control methods in a LAN, the prominent ones are Ethernet, Token ring.
- It connects computers in a single building, block or campus, i.e. they work in a restricted geographical area.

Advantages of LAN

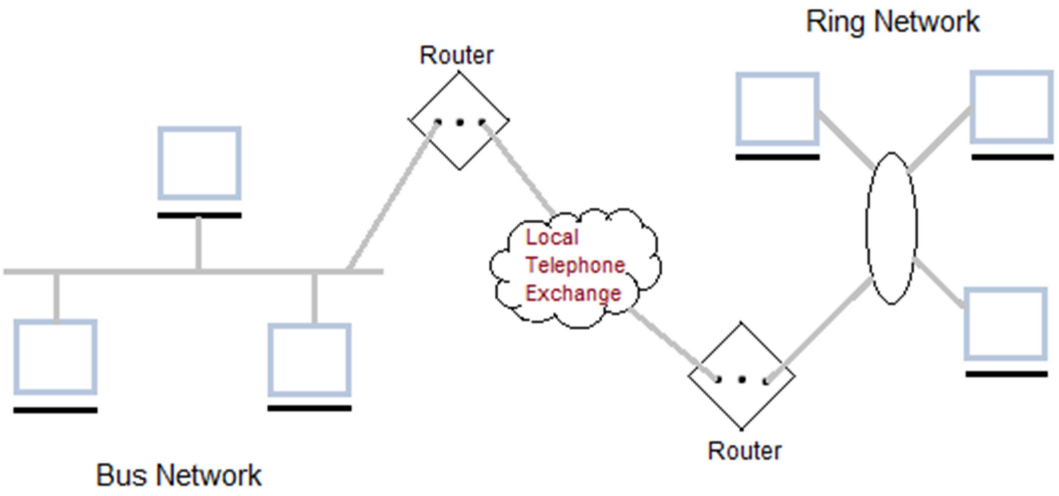
- **Resource Sharing**: Computer resources like printers, modems, DVD-ROM drives and hard disks can be shared with the help of local area networks. This reduces cost and hardware purchases.
- **Software Applications Sharing:** It is cheaper to use same software over network instead of purchasing separate licensed software for each client a network.
- **Easy and Cheap Communication:** Data and messages can easily be transferred over networked computers.
- **Centralized Data:** The data of all network users can be saved on hard disk of the server computer. This will help users to use any workstation in a network to access their data. Because data is not stored on workstations locally.
- **Data Security:** Since, data is stored on server computer centrally, it will be easy to manage data at only one place and the data will be more secure too.
- **Internet Sharing:** Local Area Network provides the facility to share a single internet connection among all the LAN users. In Net Cafes,

single internet connection sharing system keeps the internet expenses cheaper

MAN

It was developed in 1980s.It is basically a bigger version of LAN. It is also called MAN and uses the similar technology as LAN.

It is designed to extend over the entire city. It can be means to connecting a number of LANs into a larger network or it can be a single cable. It is mainly hold and operated by single private company or a public company.



Characteristics of MAN

- It generally covers towns and cities (50 km)
- Communication medium used for MAN are optical fibers, cables etc.

- Data rates adequate for distributed computing applications

Advantages of MAN

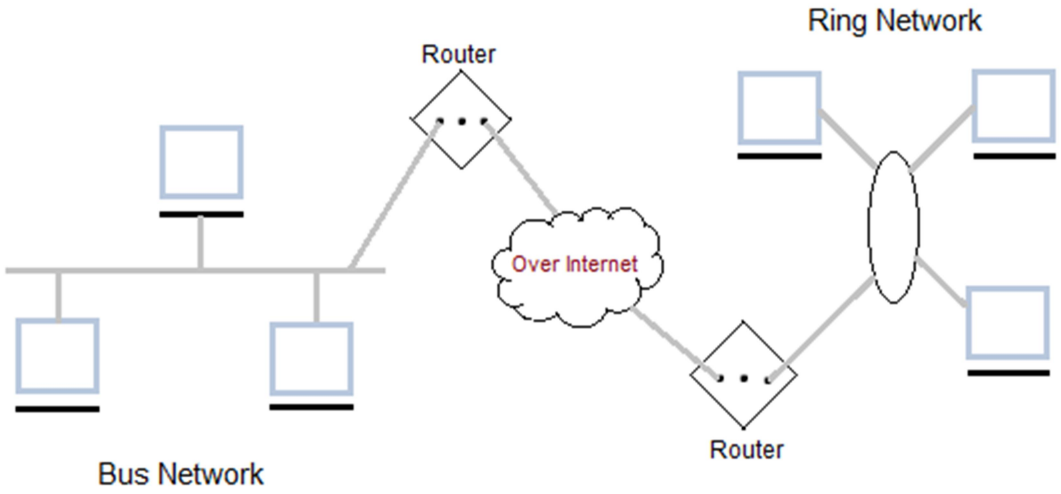
- Extremely efficient and provide fast communication via high-speed carriers, such as fiber optic cables.
- It provides a good back bone for large network and provides greater access to WANs.
- The dual bus used in MAN helps the transmission of data in both directions simultaneously.
- A MAN usually encompasses several blocks of a city or an entire city.

Wide Area Network (WAN)

It is also called WAN. WAN can be private or it can be public leased network.

It is used for the network that covers large distance such as cover states of a country.

It is not easy to design and maintain. Communication medium used by WAN are PSTN or Satellite links. WAN operates on low data rates



Characteristics of WAN

- It generally covers large distances (states, countries, continents).
- Communication medium used are satellite, public telephone networks which are connected by routers.
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Advantages of WAN

1. Covers large geographical area:

Covers a large geographical area so long distance business can connect on the one network.

2. **Centralized data**

All data are synchronized with all other office branches.

3. **Get updated files and data:**

Software companies work over the live server to exchange updated files. So all the coders and office staff get updated version of files within seconds.

4. **Sharing of software and resources:**

Shares software and resources with connecting workstations.

5. **Global business:**

Now everyone with computer skills can do business on the internet and expand his business globally. There are many types of business like a shopping cart, sale, and purchase of stocks etc.

6. Messages can be sent very quickly to anyone else on the network. These messages can have picture, sounds or data included with them(called attachments).

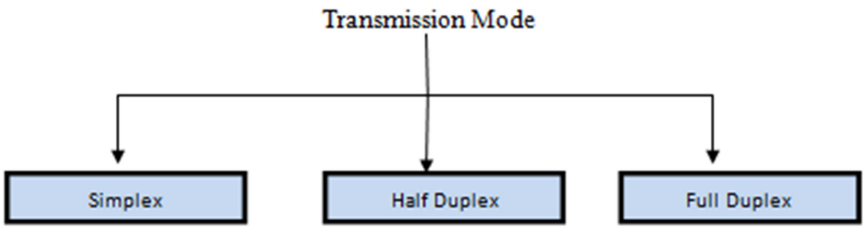
7. Expensive things (such as printers or phone lines to the internet) can be shared by all the computers on the network without having to buy a different peripheral for each computer.

- Everyone on the network can use the same data. This avoids problems where some users may have older information than others.

4.3 Data Transmission Modes

Transmission mode refers to the mechanism of transferring of data between two devices connected over a network. It is also called Communication Mode. These modes direct the direction of flow of information. There are three types of transmission modes. They are:

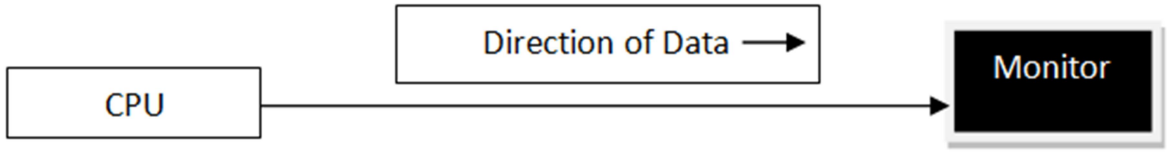
1. Simplex Mode
2. Half duplex Mode
3. Full duplex Mode



SIMPLEX Mode

In this type of transmission mode, data can be sent only in one direction i.e. communication is unidirectional. We cannot send a message back to the sender. Unidirectional communication is done in Simplex Systems where we just need to send a command/signal, and do not expect any response back.

Examples of simplex Mode are loudspeakers, television broadcasting, television and remote, keyboard and monitor etc

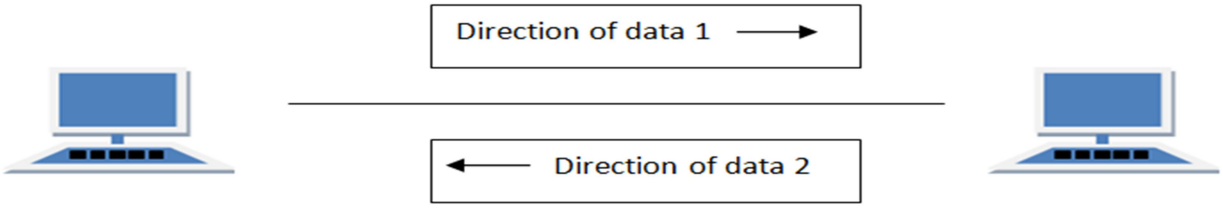


HALF DUPLEX Mode

Half-duplex data transmission means that data can be transmitted in both directions on a signal carrier, but not at the same time.

For example, on a local area network using a technology that has half-duplex transmission, one workstation can send data on the line and then immediately receive data on the line from the same direction in which data was just transmitted. Hence half-duplex transmission implies a bidirectional line (one that can carry data in both directions) but data can be sent in only one direction at a time.

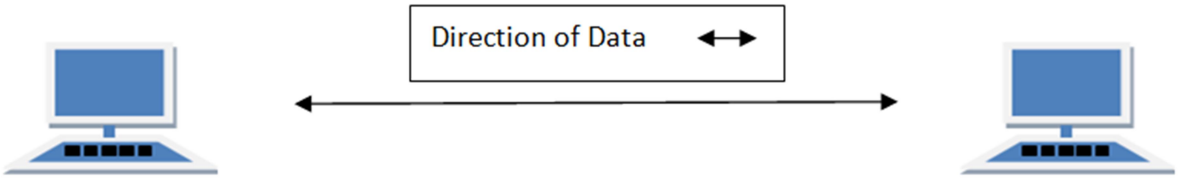
Example of half duplex is a walkie- talkie in which message is sent one at a time but messages are sent in both the directions.



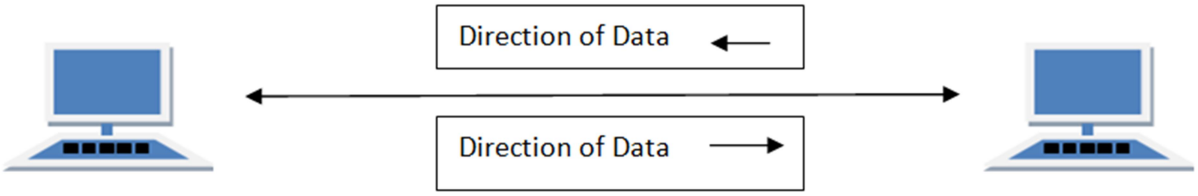
FULL DUPLEX Mode

In full duplex system we can send data in both the directions as it is bidirectional at the same time in other words, data can be sent in both directions simultaneously.

Example of Full Duplex is a Telephone Network in which there is communication between two persons by a telephone line, using which both can talk and listen at the same time.



In full duplex system there can be two lines one for sending the data and the other for receiving data.



4.4 OSI Model

OSI or Open System Interconnection model was developed by International Standards Organization (ISO).

OSI stands for **Open System Interconnection** is a reference model that describes how information from a software application in one computer moves through a physical medium to the software application in another computer.

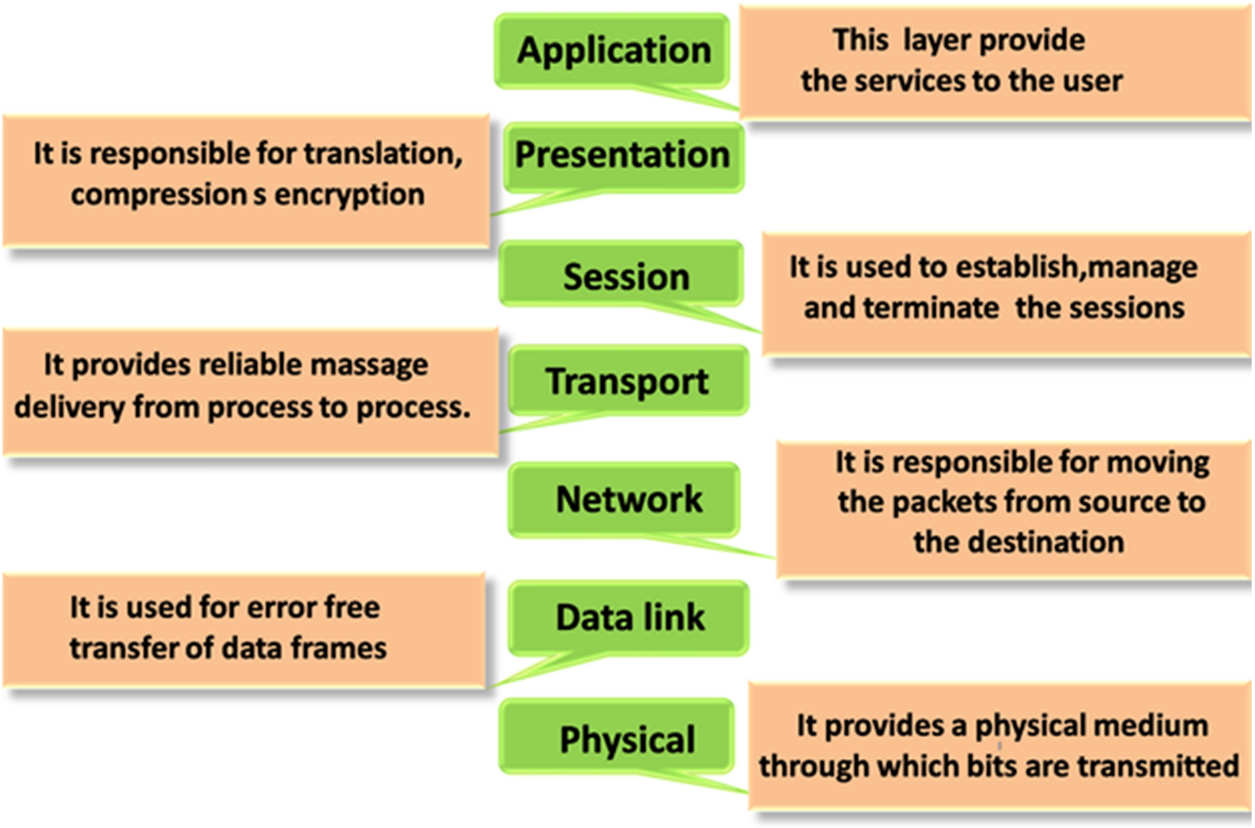
OSI model was developed by the International Organization for Standardization (ISO) in 1984, and it is now considered as an architectural model for the inter-computer communications.

OSI model divides the whole task into seven smaller and manageable tasks. Each layer is assigned a particular task.

Each layer is self-contained, so that task assigned to each layer can be performed independently.

It has seven interconnected layers. The seven layers of the OSI Model are a physical layer, data link layer, network layer, transport layer, session layer, presentation layer, and application layer, as shown in the following diagram:

Fig-OSI Reference Model



1. Physical Layer: Its function is to transmit individual bits from one node to another over a physical medium.
2. Data Link Layer: It is responsible for the reliable transfer of data frames from one node to another connected by the physical layer.
3. Network Layer: It manages the delivery of individual data packets from source to destination through appropriate addressing and routing.
4. Transport Layer: It is responsible for delivery of the entire message from the source host to destination host.
5. Session Layer: It establishes sessions between users and offers services like dialog control and synchronization.
6. Presentation Layer: It monitors syntax and semantics of transmitted information through translation, compression, and encryption.
7. Application Layer: It provides high-level APIs (application program interface) to the users.

E-Mail

Email is information stored on a computer that is exchanged between two users over telecommunications.

Electronic mail is a digital mechanism for exchanging messages through Internet or intranet communication platforms.

An *email message* is a text, typically brief and informal, that is sent or received over a computer network.

E-mail is a message that may contain text, files, images, or other attachments sent through a network to a specified individual or group of individuals.

Email is a service which allows us to send the message in electronic mode over the internet. It offers an efficient, inexpensive and real time mean of distributing information among people.

E-Mail Address

Each user of email is assigned a unique name for his email account. This name is known as E-mail address. Different users can send and receive messages according to the e-mail address.

E-mail is generally of the form username@domainname. For example, ravindra.madarse@gmail.com is an e-mail address where ravindra.madarse is username and gmail.com is domain name.

- The username and the domain name are separated by @ (at) symbol.
- E-mail addresses are not case sensitive.
- Spaces are not allowed in e-mail address.

E-mail Message Components

E-mail message comprises of different components: E-mail Header, Greeting, Text, and Signature.

Advantages

E-mail has proved to be powerful and reliable medium of communication. Here are the benefits of E-mail:

1. Reliable

Many of the mail systems notify the sender if e-mail message was undeliverable.

2. Convenience

There is no requirement of stationary and stamps. One does not have to go to post office. But all these things are not required for sending or receiving an mail.

3. Speed

E-mail is very fast. However, the speed also depends upon the underlying network

4. Inexpensive

The cost of sending e-mail is very low.

5. Printable

It is easy to obtain a hardcopy of an e-mail. Also an electronic copy of an e-mail can also be saved for records.

6. Global

E-mail can be sent and received by a person sitting across the globe.

7. Generality

It is also possible to send graphics, programs and sounds with an e-mail.

Disadvantages

Apart from several benefits of E-mail, there also exist some disadvantages as discussed below:

1. Forgery

E-mail doesn't prevent from forgery, that is, someone impersonating the sender, since sender is usually not authenticated in any way.

2. Overload

Convenience of E-mail may result in a flood of mail.

3. Misdirection

It is possible that you may send e-mail to an unintended recipient.

4. Junk

Junk emails are undesirable and inappropriate emails. Junk emails are sometimes referred to as spam.

5. No Response

It may be frustrating when the recipient does not read the e-mail and respond on a regular basis.

4.6 File Transfer Protocol

FTP stands for File transfer protocol.FTP is a standard internet protocol provided by TCP/IP used for transmitting the files from one host to another.

It is mainly used for transferring the web page files from their creator to the computer that acts as a server for other computers on the internet. It is also used for downloading the files to computer from other servers.

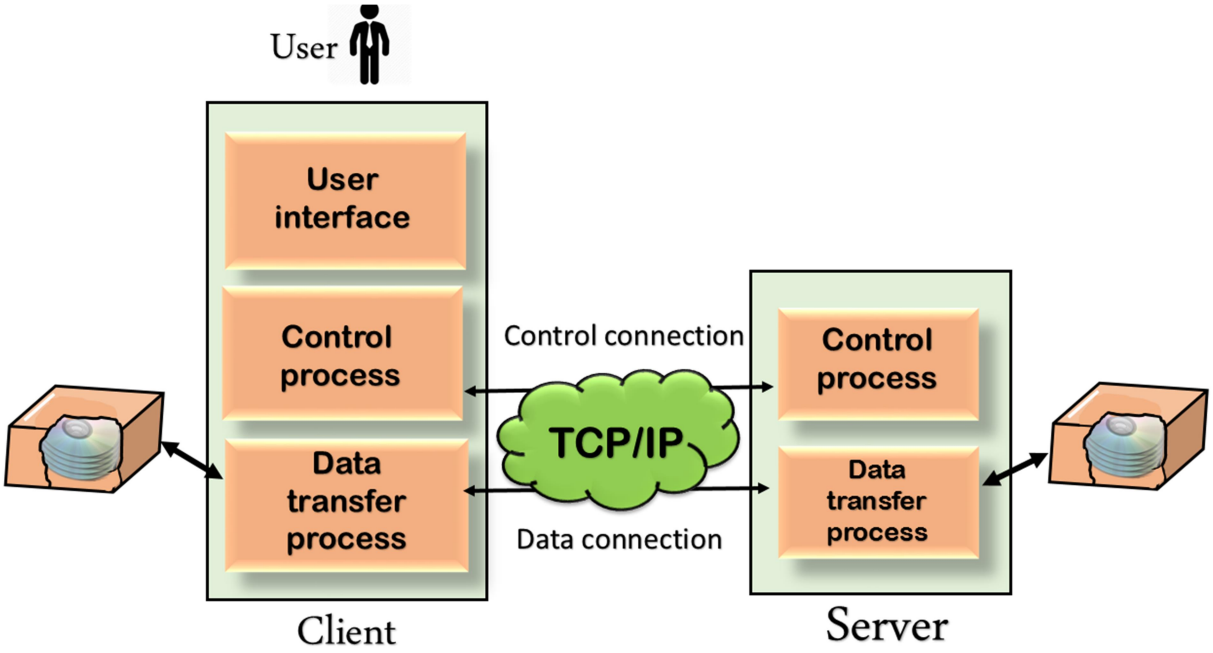
File Transfer Protocol (FTP) is a standard Internet protocol for transmitting files between computers on the Internet over TCP/IP connections. FTP is a client-server protocol where a client will ask for a file, and a local or remote server will provide it.

The end-users machine is typically called the local host machine, which is connected via the internet to the remote host—which is the second machine running the FTP software.

Objectives of FTP

1. It provides the sharing of files.

2. It is used to encourage the use of remote computers.
3. It transfers the data more reliably and efficiently.



The above figure shows the basic model of the FTP. The FTP client has three components: the user interface, control process, and data transfer process. The server has two components: the server control process and the server data transfer process.

Advantages of FTP

1. Speed

One of the biggest advantages of FTP is speed. The FTP is one of the fastest ways to transfer the files from one computer to another computer.

2. Efficient

It is more efficient as we do not need to complete all the operations to get the entire file.

3. Security

To access the FTP server, we need to login with the username and password. Therefore, we can say that FTP is more secure.

4. Back & forth movement

FTP allows us to transfer the files back and forth. Suppose you are a manager of the company, you send some information to all the employees, and they all send information back on the same server

4.7 Web Browser

A web browser is a software program that allows a user to locate, access, and display web pages.

A *browser* is a software application used to locate, retrieve and display content on the World Wide Web, including webpages, images, video and other files.

Web Browser is application software that allows us to view and explore information on the web. User can request for any web page by just entering a URL into address bar.

Web browser can show text, audio, video, animation and more. It is the responsibility of a web browser to interpret text and commands contained in the web page.

Types of Web browser

1. Internet Explorer

Internet Explorer (IE) is a product from software giant Microsoft. This is the most commonly used browser in the universe. This was introduced in 1995 along with Windows 95 launch and it has passed Netscape popularity in 1998.

2. Google Chrome

This web browser is developed by Google and its beta version was first released on September 2, 2008 for Microsoft Windows. Today, chrome is known to be one of the most popular web browser with its global share of more than 50%.

3. Mozilla Firefox

Firefox is a new browser derived from Mozilla. It was released in 2004 and has grown to be the second most popular browser on the Internet.

4. Safari

Safari is a web browser developed by Apple Inc. and included in Mac OS X. It was first released as a public beta in January 2003. Safari has very good support for latest technologies like XHTML, CSS2 etc.

5. Opera

Opera is smaller and faster than most other browsers, yet it is full- featured. Fast, user-friendly, with keyboard interface, multiple windows, zoom functions, and more. Java and non Java-enabled versions available. Ideal for newcomers to the Internet, school children, handicap and as a front-end for CD-Rom and kiosks.

6. Konqueror

Konqueror is an Open Source web browser with HTML 4.01 compliance, supporting Java applets, JavaScript, CSS 1, CSS 2.1, as well as Netscape plugins. This works as a file manager as well as it supports basic file management on local UNIX filesystems, from simple cut/copy and paste operations to advanced remote and local network file browsing.

7. Lynx

Lynx is a fully-featured World Wide Web browser for users on Unix, VMS, and other platforms running cursor-addressable, character-cell terminals or emulators.