Unit - 1

❖Introduction to Internet

A global computer network providing a variety of information and communication facilities, consisting of interconnected networks using standardized communication protocols.

The Internet is the global system of interconnected computer networks that use the Internet protocol suite (TCP/IP) to link devices worldwide.

It is a network of networks that consists of private, public, academic, business, and government networks of local to global scope, linked by a broad array of electronic, wireless, and optical networking technologies.

The Internet carries a vast range of information resources and services.

❖History of Internet

This marvelous tool has quite a history that holds its roots in the cold war scenario. A need was realized to connect the top universities of the United States so that they can share all the research data without having too much of a time lag. This attempt was a result of Advanced Research Projects Agency (ARPA) which was formed at the end of 1950s just after the Russians had climbed the space era with the launch of Sputnik. After the ARPA got success in 1969, it didn‘t take the experts long to understand that how much potential can this interconnection tool have. In 1971 Ray Tomlinson made a system to send electronic mail. This was a big step in the making as this opened gateways for remote computer accessing i.e.telnet.

During all this time, rigorous paper work was being done in all the elite research institutions. From giving every computer an address to setting out the rules, everything was getting penned down. 1973 saw the preparations for the vital TCP/IP and Ethernet services. At the end of 1970s, Usenet groups had surfaced up. By the time the 80s had started, IBM came up with its PC based on Intel 8088 processor which was widely used by students and universities for it solved the purpose of easy computing. By 1982, the Defense Agencies made the TCP/IP compulsory and the term —internet‖ was coined. The domain name services arrived in the year 1984 which is also the time around which various internet based marked their debut. A worm, or a rust the computers, attacked in 1988 and disabled over 10% of the computer systems all over the world. While most of the researchers regarded it as an opportunity to enhance computing as it was still in its juvenile phase, quite a number of computer companies became interested in dissecting the cores of the malware which resulted to the formation Computer Emergency Rescue Team (CERT). Soon after the world got over with the computer worm, World Wide Web came into existence. Discovered by Tim Berners-Lee, World Wide Web was seen as a service to connect documents in websites usinghyperlinks.

❖ Internet

Internet is another name for web. Internet is world-wide network of computers.

The internet is composed of thousands of smaller computer networks all around theworld that connect and communicate with each other and transfer data between eachother.

Internet is a public network.

It is not owned or administered by any central managing body.

✓ Email

The email technology allows one person to send message to another over Internet.

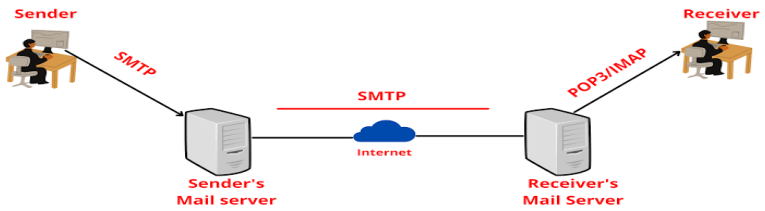
The email system allows:

Composing and sending/receiving a message.

Storing, forwarding, deleting or replying to a message.

Sending single message to more than one person.

Working :



When a user wants to write an email to another user, user creates message on his PC and send it to another user

It is first stored on its email server (senders email server). The email server is a computer with special software which handles the task of storing and distributing emails.

From senders email server, the message travels through the Internet to the email server of receiver's. It is stored in the mailbox of receiver. mailbox is storage area on the server disk which is used for storing and receiving emails.

When sender logs on, his PC is connected to the receivers server and he is notified that, there are new messages in his mailbox. Sender can read them one by one, redirect them, delete them or stored to his local PC.

Protocol used in Email system:

- SMTP
- POP and IMAP4

Email Address: Each electronic mailbox on the server has a unique email address.

This consists of two parts. The name of the user and the name of the domain separated by @.

✓ File Transfer Protocol

FTP is used to transfer file from one machine to another.

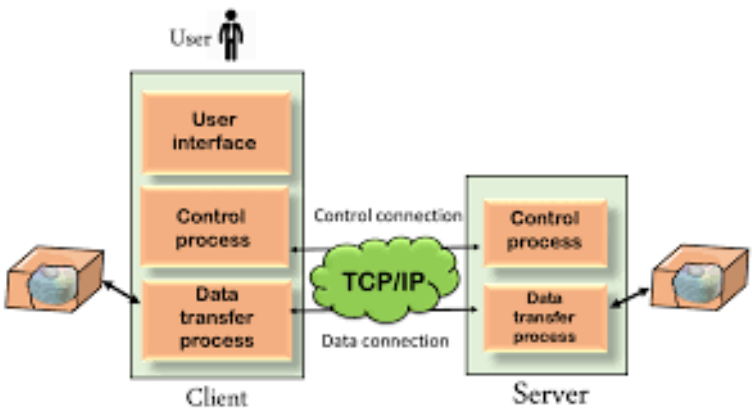
Transferring files from one system to another has some problems:

- Two systems may use different file name conventions.
- Two systems may have different ways to represent text and data.
- Two systems may have different directory structures.

These problems have been solved by FTP.

FTP uses two TCP connections i.e. port 21 is used for the control connection and port 20 for the data connection.

• FTP Components:



The client has three components: user interface, client control process, and the client data transfer process.

The server has two components: the server control process and the server data transfer process.

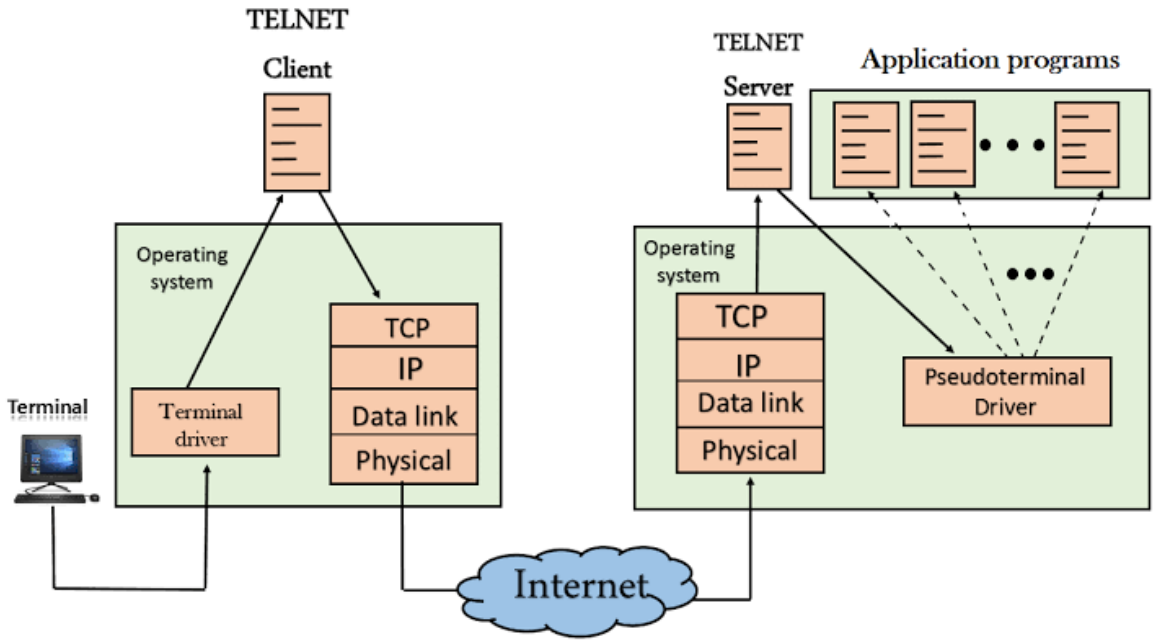
The control connection is made between the control processes. The data connection is made between the data transfer processes.

When sending multiple files, the data connection is opened and then closed for each file. Whereas control connection remains open for entire session

✓Telnet

TELNET stands for Terminal Network use to access an application program stored on remote computer by remote logging.

Working :



1. The command and character typed by user are sent to client operating system.

2. The local OS sends these command and characters to the TELNET client program located on same local computer.

3. The TELNET client transforms these characters into universally agreed format known as Network Virtual Terminal (NVT).

4. This NVT character set then travel from local TCP/IP stack to remote TCP/IP stack via internet.

5. The NVT format then travel from the client computer to the TCP/IP stack of server via Internet.

6. The TELNET server program converts these commands from NVT format to the

format understood by Remote computer.

7. Then pseudo terminal driver sends these commands to OS of remote server and then remote OS invoke the requested application program

✓ E-Commerce

Electronic commerce is any type commercial transaction that involves the transfer of information across the Internet.

E-commerce is process of buying and selling products over Internet

The consumer visits merchant's web site. From there, they decide product to purchase, and move to online transaction server. Consumer provides credit information to the online transaction server, where all credit information is encrypted. Then information move through the private gateway to the processing network, where Merchant and consumer banks either complete or deny the transaction.

Advantages

- Increase sales & decrease cost.
- Reaches a large amount of customers.
- No location barrier.
- Reduce paper work
- Saves time of consumer.

Disadvantage

- Some business processes are difficult to implement through E-Commerce.
- It has challenges like bandwidth, authentication and security.

✓ E-Business

Electronic Business or e-business is managing and conducting business via the Internet.

Difference between E-business and E-commerce:

> E-business and e-commerce terms sometimes used interchangeably, but the terms are different. In both cases, the e stands for "electronic networks".e-business is much more than ecommerce. Ecommerce is just one of the subset of e-business.

E-commerce is buying and selling using an electronic medium. It is accepting

credit information over the net, doing banking transactions using the Internet,

selling products or information using the internet.

E-Business is not just about E-commerce transactions; it's about re-defining old business models, with the help of technology to maximize customer value. Thus e-business involves not only setting up the company website and accepting credit card payments or selling

products or services. It involves implementing enterprise resource planning (ERP) systems, supply chain management (SCM), customer relationship management (CRM), data ware housing (DWH), etc. For business.

E-business strategy is more complex and more focused on internal processes. It aim is to save overall business cost and improvements in productivity.

Example of E-business: Consider the case of a company that allows its customers to check the status of their orders online and allows its employees to check on their vacation time online. It also allows the suppliers to check inventory online.

One can classify e-businesses into the following categories:

- business-to-business (B2B)
- business-to-consumer (B2C)
- business-to-employee (B2E)
- business-to-government (B2G)
- government-to-business (G2B)
- government-to-government (G2G)
- government-to-citizen (G2C)
- consumer-to-consumer (C2C)
- consumer-to-business (C2B)
- online-to-offline (020)

✓ Video Conference

Video Conference is conducting a conference between two or more participants at different sites or location to transmit audio and video data by using computer networks.

• Working: Each participant has a video camera, microphone, and speakers attached on his or her computer. When two participants speak to one another, their voices captured by microphone are carried

over the network and delivered to the other's speakers, and images captured by video camera are carried over the network and delivered to other participant's monitor.

Multipoint videoconferencing allows three or more participants to sit in a virtual conference room and communicate.

The core technology used in a video conferencing system is digital compression of audio and video in real time. The hardware or software that performs compression is called a codec (coder/decoder).

Video conferencing is playing important role in business, education and media.

The other components required for a videoconferencing system include:

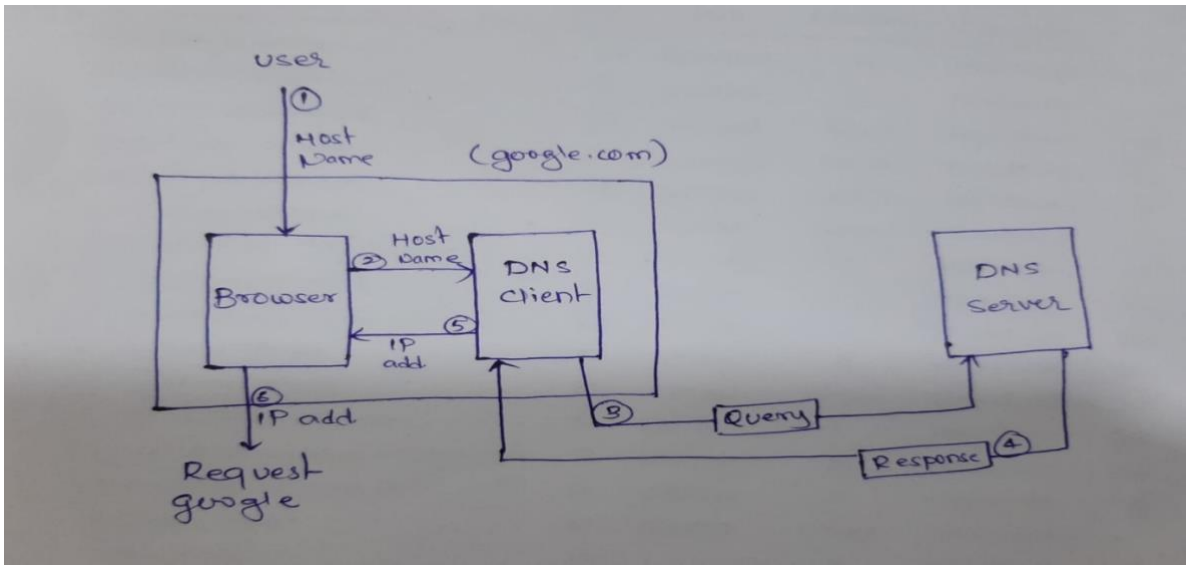
- Video input: video camera or webcam
- Video output: computer monitor, television or projector
- Audio input: microphones
- Audio output: usually loudspeakers associated with the display device or
  Telephone
- Data transfer: analog or digital telephone network, LAN or Internet
- Computer: a data processing unit that ties together the other components, does the compressing and decompressing, and maintains the data connection via the network.

❖How DNS in internet works? Explain with suitable example.

Domain Name System is a client/server application which is used to map a domain name into IP address and vice versa.

It is always easy to say, send message to surya's computer, rather than saying send it to 150.20.90.101; because we can more remember name than numbers. This simple idea to identify computer on networks by name is the basis for Domain Name System.

Working :



The user knows server name, such as google.com. However, the TCP/IP stack needs the IP address of the Google to make the connection. The following six steps converts domain name to an IP address.

1. The user passes the domain name to the browser.

2. The browser passes the domain name to the DNS client.

3. The DNS client sends a query message to a DNS server to resolve server name into IP address.

4. The DNS server responds with the IP address of the server.

5. The DNS client passes the IP address to the browser.

6. The browser now uses the received IP address to access google server.

• DOMAIN NAME SPACE

The internet is divided into hundreds of top level domain. Each of these domains

can be further classified into Sub-sub domain and so on.

For example, the domain name for Honda under category auto within India would be: Honda.auto.in.

The top most domains are classified into two main categories :

The generic domains are sub classified into com (commercial) gov. (government), edu (education), org (non-profit organization), mil (military) and net (network providers).

The country domain specifies one entry for each country for example in (India), uk (United Kingdom), jp (Japan) and so on.

Domain names are not case sensitive. Thus com & COM are same. A full path can be up to 255 characters and each component within it can be up to 63 characters.

❖What is role of ISP (Internet Service Provid in Internet?

An Internet Service Provider is also known as an ISP or even as an IAP, internet access provider.

An ISP is a company that provides access to the internet. For example: Reliance, Airtel, Jio.

This internet service provider maintains large runs of cabling and maintains network to provide internet to consumers who are paying the subscription fee.

An ISP arranges access to the Internet for organizations and/or individuals.

Services provided by ISP's may include web hosting, e-mail, VoIP (voice over IP),

and support for many other applications.

Questions should be asked before sign up of Any ISP:

- How much does it cost?
- Does it offer discounts if you prepay for entire year at a time?
- Does it offer a free trial?
- What software does the ISP supply? What software will you need? Is there an
- extra charge if the ISP supplies the software?
- How good is the customer support?
- Does the ISP charge a "setup" fee?

❖Explain Internet / Network/ IP Addresses.

Each computer on network has assigned a unique 32 bits number called Internet Protocol (IP) address. The IP address consists of three parts:

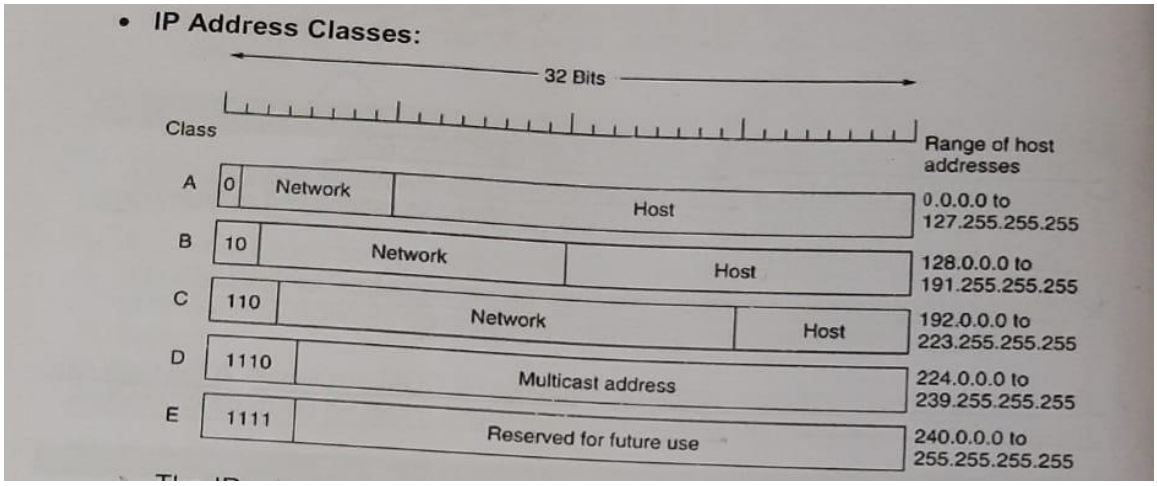
1. Class

2. Network number

3. Host number that identifies an individual computer on that network

class	Network number	Host number

Ip address classes :



The Ip address space is divided into three primary classes named A, B, C. In each class different numbers of bits are reserved for the network number and the host number

class	Network no in bits	Max no of network	Host no in bits	Max no of host
A	7	128	24	16777216
B	14	16384	16	65536
C	21	2097152	08	256

Class D is used for multicasting, which is used when single message is to be sent to a group of computer. Class E is reserved for future use.

The currently used IP address is IPv4, which is 32 bits long due to growth of Internet, the range of IP address is looking to small.

Solution: IPv6 which is 128 bits deals with this problem.

❖Introduction of WWW (World Wide Web)

The World Wide Web (abbreviated WWW or the Web) is an information space where documents and other web resources are identified by Uniform Resource Locators (URLs), interlinked by hypertext links, and can be accessed via the Internet. English scientist TimBerners-Lee invented the World Wide Web in 1989. He wrote the first web browser computerprogram in 1990 while employed at CERN in Switzerland. The Web browser was released outside CERN in 1991, first to other research institutions starting in January 1991 and to the general public on the Internet in August 1991.

The World Wide Web has been central to the development of the Information Age and is the primary tool billions of people use to interact on the Internet. Web pages are primarily text documents formatted and annotated with Hypertext Markup Language (HTML). In addition to formatted text, web pages may contain images, video, audio, and software components that are rendered in the user's web browser as coherent pages of multimedia content.

Embedded hyperlinks permit users to navigate between web pages. Multiple web pages with a common theme, a common domain name, or both, make up a website. Website content can largely be provided by the publisher, or interactively where users contribute content or the content depends upon the users or their actions. Websites may be

mostly informative, primarily for entertainment, or largely for commercial, governmental, or non-governmental organizational purposes

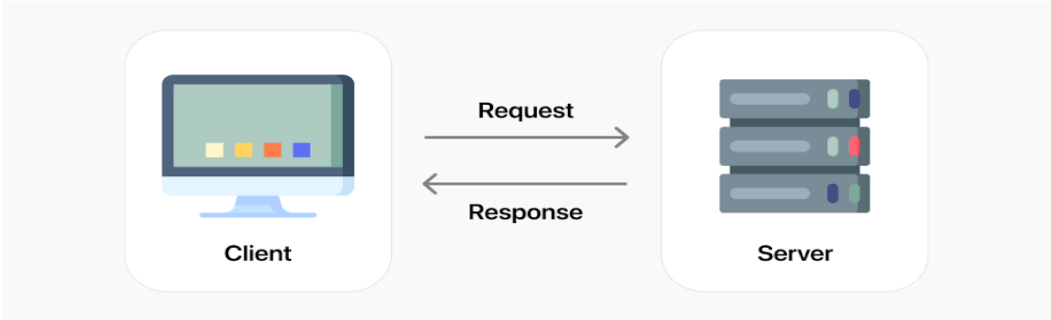
WWW is another example of client/server computing. Each time a link is followed, the client is requesting a document (or graphic or sound file) from a server (also called a Web server) that's part of the World Wide Web that "serves" up the document. The server uses a protocol called HTTP or Hyper Text Transport Protocol. The standard for creating hypertext documents for the WWW is Hyper Text Markup Language or HTML. HTML essentially codes plain text documents so they can be viewed on the Web.

❖What is WWW? What are the components of WWW.

The WWW is an application that runs on the Internet. Internet is worldwide network of computers.

The WWW project was developed by CERN (European Laboratory for Particle Physics) to share data necessary for scientific research.

Architecture:



The WWW is a distributed client-server architecture, in which a client using a browser can access a service from a server.

>These services are distributed over many sites.

> Each of these sites holds one or more documents, called Web pages.

> Server respond by sending this web page to client.

Components of WWW

> Hypertext: Hypertext document contains link to another document. This link can be clicked to retrieve the other document.

> Web Client (Browser): It interprets and displays a Web document. For example: Chrome.

> Web Server: The Web page is stored at the server. For example: Apache Server, IIS.

> Uniform Resource Locator (URL): A client access a Web page by specifying unique address of web page known as URL.

> Web Documents: The documents in the WWW can be Static, dynamic or active documents.

Protocol of the WWW

HTTP: HTTP is used to transmit hypertext over the networks.

FTP: Transmit files between an FTP server and a computer.

SMTP: Transmit electronic mails between client and mailbox.

VoIP: Allow delivery of voice over IP network. For example, IP phone calls.

ADVANTAGES

Provides easy way to communicate between two machines with the help of wired or wireless network.

Allow easy access to multimedia file, html documents, images etc.

❖Web Browser

Web browser is software used to locate, retrieve and display content on the World Wide Web, including Web pages, images, video and other files.

Web browser is also known as web client that contacts the Web server and requests information. The Web server sends the information back to the Web browser.

Different Web browsers:

1. Internet Explorer

Internet Explorer (IE) is a product of 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. Netscape

Netscape is one of the original Web browsers. Microsoft designed Internet Explorer to compete against Netscape. Netscape was introduced in 1994.

3. Mozilla

Mozilla is an open-source Web browser, designed for standard performance and portability. Browsers based on Mozilla code is the second largest browser family

on the Internet today.

4. 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.

5. Opera

Opera is smaller and faster than most other browsers. Fast, user-friendly, with keyboard interface, multiple windows, zoom functions, and more. Java and non- Java-enabled versic s available.

6. Google Chrome

Crome is a freeware web browser developed by Google. The first beta version released for Microsoft Windows on September 2, 2008. Stable public version released on December 11, 2008.

Features of Web browser:

1. Themes: Users can install themes to alter the appearance of the browser.

2. Automatic web page translation: Browser automatically translates the page if it detects foreign language other than set language.

3. Privacy and security: Allows user to delete private data, such as cookies, browsing history, items in cache and passwords with the click of a button. This lets users erase personal data after browsing from a shared computer.

4. Navigation Button: Refresh button is used to go back and forward while browsing.

5. Refresh button: Refresh buttons is used to force web browser to reload webpage.

6. Stop: Very useful to stop malicious sites from loading if accidentally entered.

7. Integrated Search: It allows selecting search engine and doing a quick search.

8. Tabbed Browsing: Browser tabs allow opening many websites on a single web

browser's window - very helpful when reading several websites at the same time.

9. Bookmark Button: Allow user to store URL for later retrieval of chosen websites.

❖Web Servers

Web servers can refer to either the hardware or software that helps to serve web pages which is accessed through the internet.

Web server has an IP address and possibly a domain name. For example, if you enter the URL http://www.abcd.com/home.html in your browser, this sends a request to the web server whose domain name is abcd.com. The server then fetches the page named home.html and sends it to your browser.

Any computer can be turned into a web server by installing server software and connecting the machine to the internet.

Common features :

Virtual hosting : serves many web sites using one IP address.

Large file support : serves files whose size is greater than 2GB.

Bandwidth controlling : to serve more clients.

Server-side scripting : to generate dynamic web pages.

1.Apache Server

Apache is a public-domain open source Web server developed in 1995.

The original version of Apache was written for UNIX, but there are now versions that run under Windows and other platforms.

Apache Web server is developed by group of about 20 programmers, called the Apache Group. However, because the source code is freely available, anyone can modify the server for specific needs.

Since April 1996 Apache became most popular HTTP server. In 2009 it became the first web server to surpass the 100 million website milestone. As of July 2016, Apache was expected to serve 46.41% of all active websites and 43.18% of the top million websites.

Features of Apache:

- Compression methods to reduce the size of web pages served over HTTP.
- Apache is reliable, free, and relatively easy to configure.
- Virtual hosting allows one Apache installation to serve many different actual
- websites.
- It supports password authentication and digital certificate authentication.
- Apache has a built in search engine.
- It supports HTTPS, FTP, FTPS, SMTP.

2. Internet Information Services

IIS is Microsoft's Internet server.

In October 2011, IIS is the second most used server in the world, after Apache Server. As of June 2016, IIS was expected to serve approximately 20% of all active websites.

Features of Apache:

- Compression methods to reduce the size of web pages served over HTTP.
- IIS is reliable, and relatively easy to configure.
- Virtual hosting allows one IIS installation to serve many different actual websites.
- It supports several graphical user interfaces (GUIS).

- It supports password authentication and digital certificate authentication.
- It supports HTTPS, FTP, FTPS, SMTP.

❖Uniform Recourse Locator

An URL specifies the full, unique path of any file on the Internet. For example:

http:/www.abcd.com/admission

Protocol Domain name File Name

Here http indicates the protocol. admission is the name of the file, which is stored on web server whose domain name is suryainfoedge.com. Because it is www application, it also has www prefix. URL's are not case sensitive. A full path can be up to 255 characters and each component within it must be up to 63 characters.

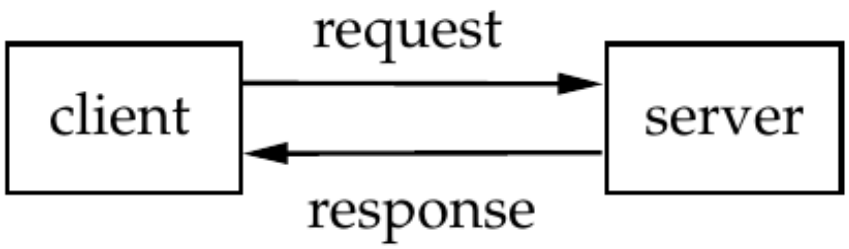
❖Hypertext Transfer Protocol (HTTP).

• The Hypertext Transfer Protocol (HTTP) is used to transfer hypertext data to and from a Web server. HTTP provides a simple and fast communication between client and server.

• HTTP defines how client request data from the server and how the server response to it

HTTP is used to deliver virtually all resources on the World Wide Web. These resources may be HTML files, image files, query results, or anything else.

Working of HTTP.



> HTTP functions as a request-response protocol.

➤ The client submits an HTTP request to the server using web client (browser) to access services.

➤ The server, which stores web pages performs other functions on behalf of the client and then returns a response message to the client.

• Three important things about HTTP:

1. HTTP is connectionless: After a request is made, the client disconnects from the server and waits for a response. The server must re-establish the connection after it processes the request.

2. HTTP is media independent: Any type of data can be sent by HTTP.

3. HTTP is stateless: HTTP does not use to maintain user state because HTTP is stateless protocol. But we can use cookies or session to maintain user states.

Hypertext Transfer Protocol Secure (HTTPS)

HTTPS is a combination of Hypertext Transfer Protocol with SSL protocol. It provides encrypted and secure communication. HTTPS connections are often used for payment transactions.

❖Search engines

- Search engines is designed to search information on the world wide web and FTP servers.
- The Search results are displayed in a list called as “search engine results pages”
- The information may consist of web pages, images, videos or any other types of files.
- Search engines searches documents for specified keywords and returns a list of the documents where the keywords were found.
- Search engines like Google, Bing, Alta Vista, and Excite etc. Enable users to search for documents on the WWW.

Working of Search engines :

- Spider : Web search engines work by storing information about many web pages. These pages are fetched by a web crawler or spider which is an automated web browser which follows every link on the site.
- Indexer : Indexer then reads these documents and creates an index based on the words contained in each document. For example, words are extracted from the titles headings, or special fields called meta tags.
- Searching : Each search engine uses a program that receives your search request, compares it to the entries in the index, and returns meaningful results using ranking algorithm.