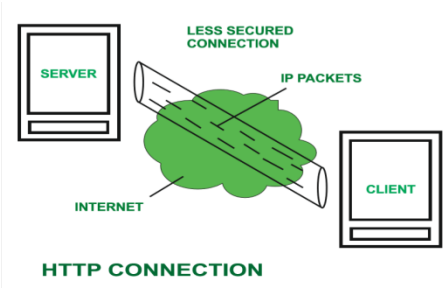
HTTP:

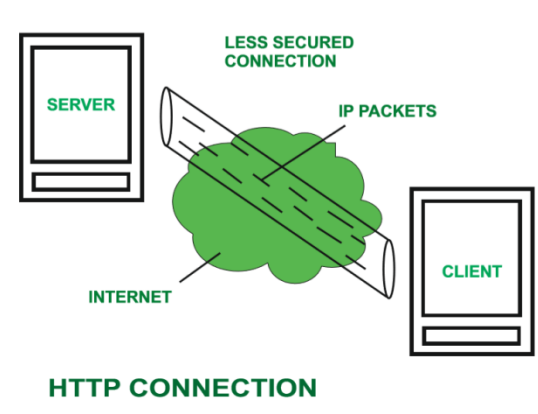
- HTTP stands for **Hyper Text Transfer Protocol**.
- It is a protocol used to access the data on the World Wide Web (www).
- The HTTP protocol can be used to transfer the data in the form of plain text, hypertext, audio, video, and so on.
- This protocol is known as Hyper Text Transfer Protocol because of its efficiency that allows us to use in a hypertext environment where there are rapid jumps from one document to another document.
- HTTP is similar to the FTP as it also transfers the files from one host to another host. But, HTTP is simpler than FTP as HTTP uses only one connection, i.e., no control connection to transfer the files.
- HTTP is used to carry the data in the form of MIME-like format.
- HTTP is similar to SMTP as the data is transferred between client and server. The HTTP differs from the SMTP in the way the messages are sent from the client to the server and from server to the client. SMTP messages are stored and forwarded while HTTP messages are delivered immediately.



Features of HTTP:

- **Connectionless protocol:** HTTP is a connectionless protocol. HTTP client initiates a request and waits for a response from the server. When the server receives the request, the server processes the request and sends back the response to the HTTP client after which the client disconnects the connection. The connection between client and server exist only during the current request and response time only.
- **Media independent:** HTTP protocol is a media independent as data can be sent as long as both the client and server know how to handle the data content. It is required for both the client and server to specify the content type in MIME-type header.

- **Stateless:** HTTP is a stateless protocol as both the client and server know each other only during the current request. Due to this nature of the protocol, both the client and server do not retain the information between various requests of the web pages.



HTTP - Working

The working of the HTTP protocol explained step by step as follows:

Step 1: **Establishing a TCP/IP connection by the client.**

The first step is initiating a TCP connection with the server by the client. Once the connection established, the browser and the server access TCP through their socket interfaces.

Step 2: **Initiating an HTTP GET request to the server by the client.**

The http request first line of the message is called the request line. The lines below the request line are known as header lines.

The request line has three fields- method, URL, and version. Method field can take several values like GET, POST, HEAD, PUT and DELETE, etc. The GET method used when the browser requests an object, with the requested object identified in the URL field.

The meaning of all these values is:

GET: it retrieves those documents which identified in the URL.

POST: it will give information to the server.

HEAD: it retrieves the meta-information about the document identified in the URL.

PUT: it stores those documents which are under specified URL.

DELETE: it deletes the specified URL.

TRACE: it will loop back the request message.

Step 3: **HTTP Server Response to an HTTP GET request.**

HTTP response message has three sections- status line, header lines, and an entity-body. Further, the status line has 3 fields- version, status code, and phrase. After then, header lines are there. In the end, there is the entity-body, which contains the requested message itself.

Advantages :

- Memory usage and CPU usage are low because of less simultaneous connections.
- Since there are few TCP connections hence network congestion are less.
- Since handshaking is done at initial connection stage, then latency is reduced because there is no further need of handshaking for subsequent requests.
- The error can be reports without closing connection.
- HTTP allows HTTP pipe-lining of request or response.

Disadvantages :

- HTTP requires high power to establish communication and transfer data.
- HTTP is less secure, because it does not uses any encryption method like https use TLS to encrypt normal http requests and response.
- HTTP is not optimized for cellular phone and it is too gabby.
- HTTP does not offer genuine exchange of data because it is less secure.

Uniform Resource Locator (URL)

- A client that wants to access the document in an internet needs an address and to facilitate the access of documents, the HTTP uses the concept of Uniform Resource Locator (URL).
- The Uniform Resource Locator (URL) is a standard way of specifying any kind of information on the internet.
-
- The URL defines four parts: method, host computer, port, and path.

- **Method:** The method is the protocol used to retrieve the document from a server. For example, HTTP.
- **Host:** The host is the computer where the information is stored, and the computer is given an alias name. Web pages are mainly stored in the computers and the computers are given an alias name that begins with the characters "www". This field is not mandatory.
- **Port:** The URL can also contain the port number of the server, but it's an optional field. If the port number is included, then it must come between the host and path and it should be separated from the host by a colon.
- **Path:** Path is the pathname of the file where the information is stored. The path itself contain slashes that separate the directories from the subdirectories and files.

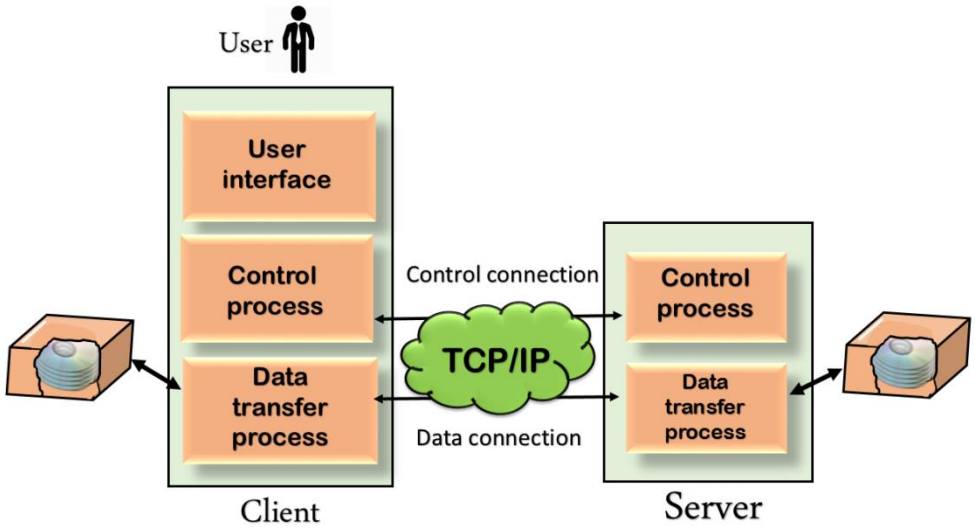
FTP

- 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.

Objectives of FTP

- It provides the sharing of files.
- It is used to encourage the use of remote computers.
- It transfers the data more reliably and efficiently.

Mechanism of FTP



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:

- **Speed:** One of the biggest advantages of FTP is speed. The FTP is one of the fastest way to transfer the files from one computer to another computer.
- **Efficient:** It is more efficient as we do not need to complete all the operations to get the entire file.
- **Security:** To access the FTP server, we need to login with the username and password. Therefore, we can say that FTP is more secure.
- **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.

Disadvantages of FTP

The standard requirement of the market is that all FTP transmissions should be encrypted. However, not all FTP providers are equal and not all provider's support encryption. FTP serves two operations, such as sending and receiving huge files on a network. The size limit of the file is 2GB that can transmit.

Passwords and file text are sent in clear text that enables unwanted eavesdropping. Therefore, it is quite possible that attackers can carry out the brute force attack by trying to guess the FTP password.

It is not compatible with every system.

Electronic Mail :

Electronic mail is often referred to as E-mail and it is a method used for **exchanging digital messages**.

- Electronic mail is mainly designed for **human use**.
- It allows a message to includes **text, image, audio** as well as **video**.
- This service allows one message to be **sent to one or more than one recipient**.
- The E-mail systems are mainly based on the **store-and-forward model** where the E-mail server system accepts, forwards, deliver and store the messages on behalf of users who only need to connect to the infrastructure of the Email.
- The Person who **sends the email** is referred to as **the Sender** while the person who receives an email is referred to as **the Recipient**.

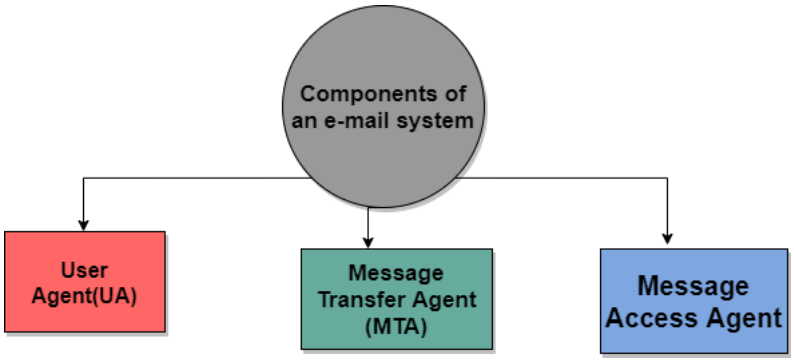
Need of an Email

By making use of Email, we can send any message at any time to anyone.

- We can send the same message to several peoples at the same time.
- It is a very fast and efficient way of transferring information.
- The email system is very fast as compared to the Postal system.
- Information can be easily forwarded to coworkers without retyping it.

Components of E-mail System

The basic Components of an Email system are as follows:



User Agent(UA)

It is a program that is mainly used to send and receive an email. It is also known as an email reader. User-Agent is used to compose, send and receive emails.

- It is the first component of an Email.
- User-agent also handles the mailboxes.
- The User-agent mainly provides the services to the user in order to make the sending and receiving process of message easier.

Given below are some services provided by the User-Agent:

1.Reading the Message

2.Replying the Message

3.Composing the Message

4.Forwarding the Message.

5.Handling the Message.

Message Transfer Agent

The actual process of transferring the email is done through the Message Transfer Agent(MTA).

- In order to send an Email, a system must have an MTA client.
- In order to receive an email, a system must have an MTA server.
- The protocol that is mainly used to define the MTA client and MTA server on the internet is called SMTP(Simple Mail Transfer Protocol).
- The SMTP mainly defines how the commands and responses must be sent back and forth

Message Access Agent

In the first and second stages of email delivery, we make use of SMTP.

- SMTP is basically a Push protocol.
- The third stage of the email delivery mainly needs the pull protocol, and at this stage, the message access agent is used.
- The two protocols used to access messages are POP and IMAP4.

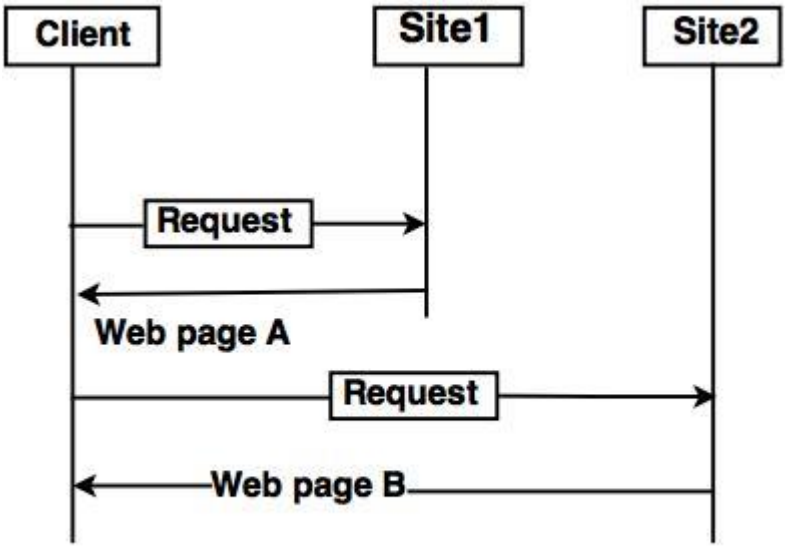
Advantages of Email

There are various advantages of email, which are as follows:

- It is a cost-effective service to transmit with others as there are various email services available to individuals and organizations for complimentary of cost. Once a customer is online, it does not contain any additional charge for the services.
- Email supports a simple user interface and allows users to categorize and filter their messages. This can help us to identify unwanted emails such as junk and spam mail.
- Emails are beneficial for broadcasting products. As email is a form of transmission, organizations can involve many people and inform them quickly.
- Email exchanges can be saved for future retrieval, which allows users to keep essential conversations or confirmations in their data and can be searched and retrieved when needed quickly.
- Emails are beneficial for advertising products. An email is a form of transmission. Organizations or companies can interact with many people and inform them in a short time.

World Wide Web

- The World Wide Web (WWW) is a collection of documents and other web resources which are identified by URLs, interlinked by hypertext links, and can be accessed and searched by browsers via the Internet.
- World Wide Web is also called the Web and it was invented by Tim Berners-Lee in 1989.
- Website is a collection of web pages belonging to a particular organization.
- The pages can be retrieved and viewed by using browser.



Architecture of WWW

Let us go through the scenario shown in above fig.

- The client wants to see some information that belongs to site 1.
- It sends a request through its browser to the server at site 2.
- The server at site 1 finds the document and sends it to the client.

Client (Browser):

- Web browser is a program, which is used to communicate with web server on the Internet.
- Each browser consists of three parts: a controller, client protocol and interpreter.
- The controller receives input from input device and use the programs to access the documents.
- After accessing the document, the controller uses one of the interpreters to display the document on the screen.

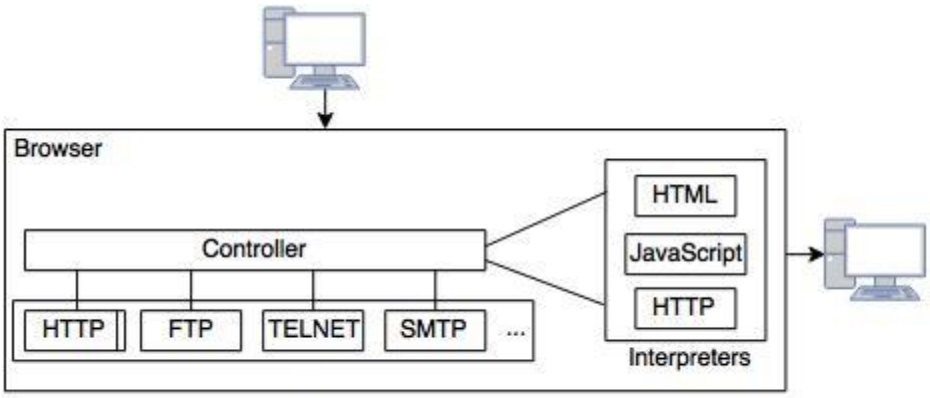


Fig: CIlient (Browser)

Server:

- A computer which is available for the network resources and provides service to the other computer on request is known as server.
- The web pages are stored at the server.
- Server accepts a TCP connection from a client browser.
- It gets the name of the file required.
- Server gets the stored file. Returns the file to the client and releases the top connection.