Chapter:1 Introduction to Web and Web design

Basics of WWW

World Wide Web, which is also known as a Web, is a collection of websites or web pages stored in web servers and connected to local computers through the internet. These websites contain text pages, digital images, audios, videos, etc. Users can access the content of these sites from any part of the world over the internet using their devices such as computers, laptops, cell phones, etc. The WWW, along with internet, enables the retrieval and display of text and media to your device.

The World Wide Web is abbreviated as WWW and is commonly known as the web. The WWW was initiated by CERN (European library for Nuclear Research) in 1989. WWW can be defined as the collection of different websites around the world, containing different information shared via local servers(or computers).

History:

It is a project created, by Timothy Berner Lee in 1989, for researchers to work together effectively at CERN. is an organization, named the World Wide Web Consortium (W3C), which was developed for further development of the web. This organization is directed by Tim Berner's Lee, aka the father of the web.

Features of WWW:

- HyperText Information System
- Cross-Platform
- Distributed
- Open Standards and Open Source
- Uses Web Browsers to provide a single interface for many services
- Dynamic, Interactive and Evolving.
- "Web 2.0"

Components of the Web: There are 3 components of the web.

1. **Uniform Resource Locator (URL):** serves as a system for resources on the web.

2. **HyperText Transfer Protocol (HTTP):** specifies communication of browser and server.
3. **Hyper Text Markup Language (HTML):** defines the structure, organisation and content of a webpage.

Working of WWW:

The World Wide Web is based on several different technologies: **Web browsers, Hypertext Markup Language (HTML) and Hypertext Transfer Protocol (HTTP).**

Web Browser:-

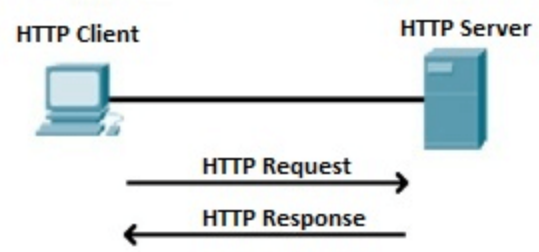
A Web browser is used to access web pages. Web browsers can be defined as programs which display text, data, pictures, animation and video on the Internet. Hyperlinked resources on the World Wide Web can be accessed using software interfaces provided by Web browsers. Initially, Web browsers were used only for surfing the Web but now they have become more universal. Web browsers can be used for several tasks including conducting searches, mailing, transferring files, and much more. Some of the commonly used browsers are Internet Explorer, Opera Mini, and Google Chrome.

HTML:-

HTML is a standard markup language which is used for creating web pages. It describes the structure of web pages through HTML elements or tags. These tags are used to organize the pieces of content such as 'heading,' 'paragraph,' 'table,' 'Image,' and more. You don't see HTML tags when you open a webpage as browsers don't display the tags and use them only to render the content of a web page. In simple words, HTML is used to display text, images, and other resources through a Web browser.

HTTP:-

Hyper Text Transfer Protocol (HTTP) is an application layer protocol which enables WWW to work smoothly and effectively. It is based on a client-server model. The client is a web browser which communicates with the web server which hosts the website. This protocol defines how messages are formatted and transmitted and what actions the Web Server and browser should take in response to different commands. When you enter a URL in the browser, an HTTP command is sent to the Web server, and it transmits the requested Web Page.



When we open a website using a browser, a connection to the web server is opened, and the browser communicates with the server through HTTP and sends a request. HTTP is carried over TCP/IP to communicate with the server. The server processes the browser's request and sends a response, and then the connection is closed. Thus, the browser retrieves content from the server for the user.

HTTP Request:

Once the connection is established using the Http protocol between client and server, the client then sends a request in the form of binary data to the server asking to access specific files or information from the server.

Every HTTP request contains three elements which are:- Request Line, Request Header, Body of Request(optional).

Request line:-

1. It specifies the method, which tells the server what to do with the information or resource.
2. It contains the URL of the request which is used to find the resource on the server.
3. It also specifies HTTP protocol version being used (Ex. HTTP/ 1.0 or HTTP/1.1)

Request Header:-

It consists of 0 or more headers.

The headers are used to pass more information about the request so that using the request headers the server knows how to deal with the information the client is demanding.

I.e What should be the language of content to be displayed, what should be the content-type that client demands.

Request Body:-

This is an optional part of the HTTP request which is used to send additional data to the server.

HTTP Response

The response from the server with the target to provide the client with the desired resources is HTTP Response.

Status line:- HTTP/1.1 302 Found This is how the status line of the response header looks like. It contains the HTTP protocol version, status code, Reason phrase (known as status text).

Response Header:- There can be one or more response header lines and they are used to pass additional information to the client from the server.

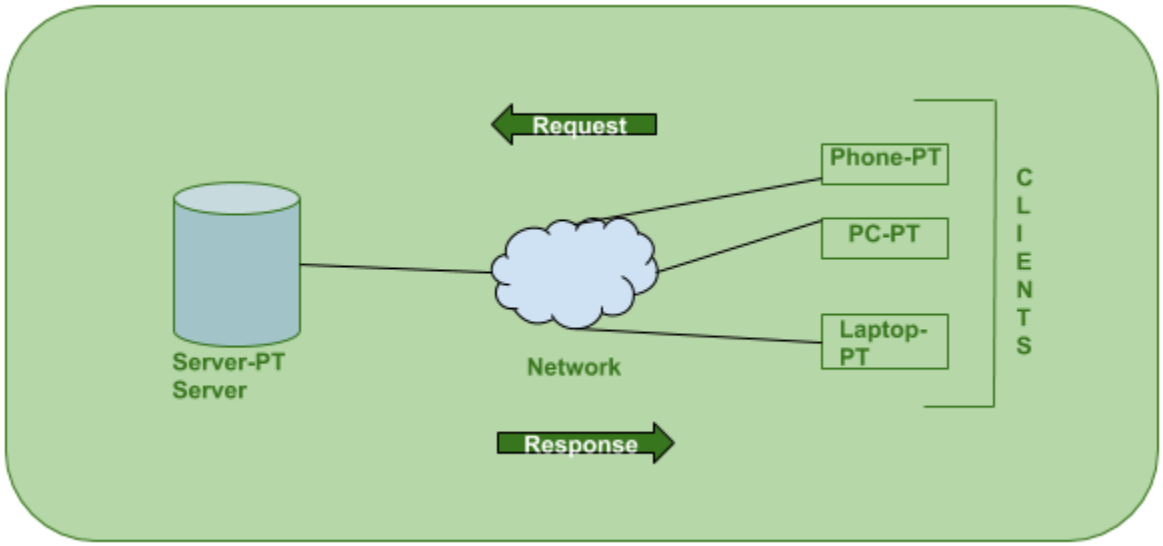
Response Body:- The response body contains the resource demanded by the client. If the request is unsuccessful then the response body contains the reason for the error, it may also contain the steps to be done by the client to complete the request successfully.

Client-Server Model

The Client-server model is a distributed application structure that partitions task or workload between the providers of a resource or service, called servers, and service requesters called clients. In the client-server architecture, when the client computer sends a request for data to the server through the internet, the server accepts the requested process and deliver the data packets requested back to the client. Clients do not share any of their resources. Examples of Client-Server Model are Email, World Wide Web, etc.

- **Client:** When we talk the word **Client**, it mean to talk of a person or an organization using a particular service. Similarly in the digital world a **Client** is a computer (**Host**) i.e. capable of receiving information or using a particular service from the service providers (**Servers**).
- **Servers:** Similarly, when we talk the word **Servers**, It mean a person or medium that serves something. Similarly in this digital world a **Server** is a remote computer which provides information (data) or access to particular services.

So, its basically the **Client** requesting something and the **Server** serving it as long as its present in the database.

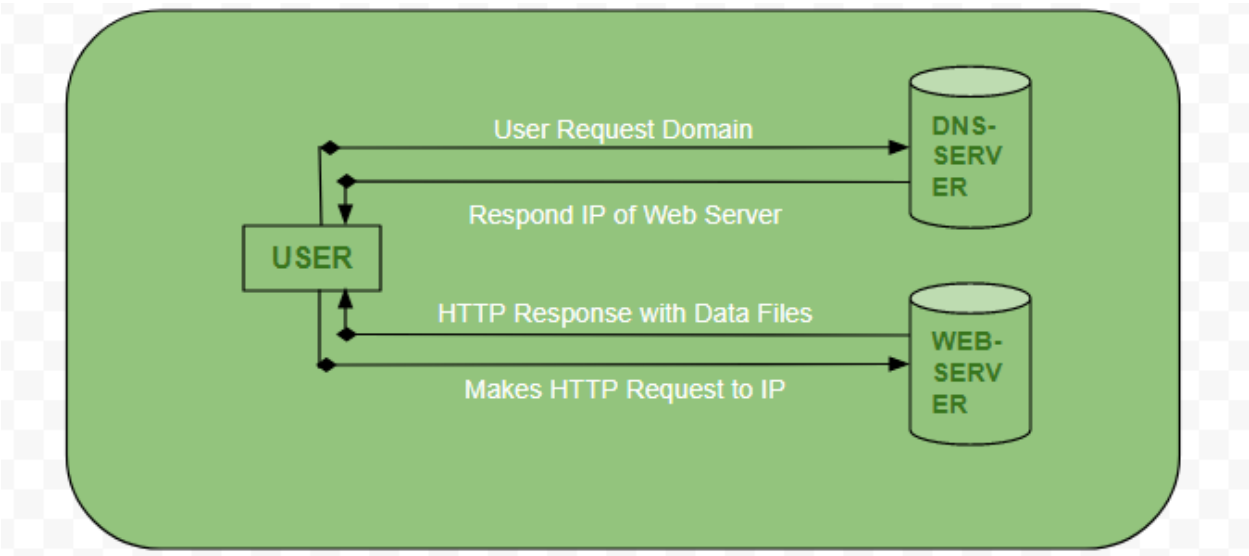


How the browser interacts with the servers ?

There are few steps to follow to interacts with the servers a client.

- User enters the **URL**(Uniform Resource Locator) of the website or file. The Browser then requests the **DNS**(DOMAIN NAME SYSTEM) Server.
- **DNS Server** lookup for the address of the **WEB Server**.

- **DNS Server** responds with the **IP address** of the **WEB Server**.
- Browser sends over an **HTTP/HTTPS** request to **WEB Server's IP** (provided by **DNS server**).
- Server sends over the necessary files of the website.
- Browser then renders the files and the website is displayed. This rendering is done with the help of **DOM** (Document Object Model) interpreter, **CSS** interpreter and **JS Engine** collectively known as the **JIT** or (Just in Time) Compilers.



Concepts of effective web design :

- Website can be viewed on all monitors
- Font size should be moderate
- Font color should be consistent
- Navigation should be smooth i.e. page should redirect smoothly
- Page should be loaded in few seconds [Animation must be less so it takes less time to load the page]
- Should be compatible with all web browsers

Symptoms of bad design:

- Too Much Text.
- No Whitespace.
- No Clear User Journey.
- Your Website is Not Mobile-Friendly.
- High Bounce Rate.
- Low Monthly Website Visitors.
- Poor Ranking for Organic Keywords.
- Use of pop-ups [Less ads must be rendered]
- Big and unattractive color fonts
- Avoid use of horizontal scrollbar
- Avoid use of heavy graphics

Web design issues:

Browser Compatibility:-

- The different browsers and their versions greatly affect the way a page is rendered, as different browsers sometimes interpret the same HTML tag in a different way.
- Different versions of HTML also support different sets of tags.
- Same browser may work slightly different on different operating systems and hardware platforms.
- To make a web page portable, test it on different browsers on different operating systems.
- Validate your HTML doc using W3C validator.

Bandwidth & Cache:-

- Connection speed plays an important role in designing web pages, if a user has low bandwidth connection and a web page contains too many images, it takes more time to download.
- Browser provides temporary memory called cache to store graphics.
- When a user gives the URL of the web page for the first time, the HTML file together with all the graphics files referred to in a page is downloaded and displayed.

Display resolution:-

- As we do not have any control on display resolution of the monitors on which the user views our pages.
- Display or screen resolution is measured in terms of pixels and common resolutions are 800 X 600 and 1024 X 786 and 1280 X 720.

Look and feel of website:-

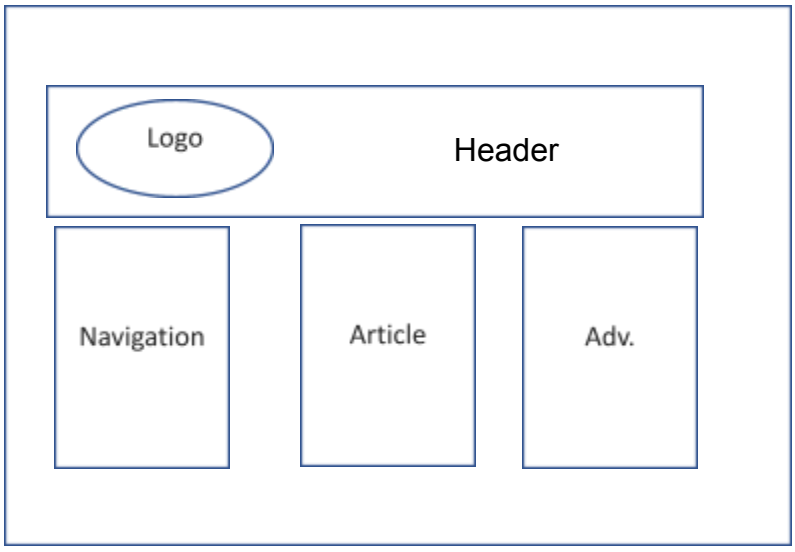
- Look and feel of the website decides the overall appearance of the website.
- It includes all the design aspects such as
    - Website theme
    - Presentation
    - Graphics
    - Visual Structure
    - Fonts, Graphics, and colors
    - Navigation

Page Layout and Linking:

Page layout describes the visual structure of the page and split the page area into various parts to present the information of changing importance.

There are two types of page layouts:

1) **Flexible page layout**
    - Also known as fluid page layout.
    - This kind of page layout works well for text based contents.
    - For ex. Wikipedia is designed with flexible layout.
    - In this layout, majority of the components have percentage widths, thus adjust with screen's resolution.
    - The main drawback is the line of text can be long at wider screen resolution & decrease readability.
    - This makes website responsive to some extent.



2) **Fixed page Layout**
    - This page has consistent width and height.
    - Regardless of user's screen resolution, the designed content remains at fixed position.
    - Fixed layouts are aligned in the center of the browser window to consistently present the same page format at multiple screen resolution.

Header		
Navigation 33%	Navigation 33%	Navigation 33%

- This kind of design works best for 1024 X 768 resolution.
- The main drawback is that smaller screen resolution may require horizontal scrollbar depending on fixed layout's width.
- For example, yahoo follows fixed page layout means the text may be invisible as it will not set according to browser's width.

Designing Effective Navigation:-

- The most important design element in web design after page layout is navigation design.
- Navigation means the ways to move from one page to another page in a web site using hyperlinks provided on the page.
- If navigation design is not proper then the user feels the problem in moving around the pages in your site in a desired manner or gets confused and leaves the site.
- Navigation links are either text based, i.e. a word phrase is used as a link, or graphical, i.e, an image, i.e. an icon or logo is used as a link.
- Navigation links should be clear and meaningful.
- It should be consistent.
- Link should be understandable.
- Organize the links such that contents are grouped logically.
- Provide a search link, if necessary, usually on the top of the page.
- Use common links such as 'About us' or 'Contact Us'.
- Provide a way to return to the first page.
- Provide the user with information regarding the location.
- Horizontal navigation bar can be provided on each page to directly jump to any section.