Full Stack Development Using Javascript-1

Unit-1 Introduction to Web and Web design

Basics of WWW

WWW stands for World Wide Web. A technical definition of the World Wide Web is: all the resources and users on the Internet that are using the Hypertext Transfer Protocol (HTTP). Web is a platform to share and access multimedia and text file over a ubiquitous environment.

In the late 1960, one of the authors H.M. Deitel of the book was a graduate student at MIT. His research at MIT's project laboratory for computer science was funded by ARPA (Advance Project Research Agency) of department of defense. During the conference, ARPA proceeded to implement ARPANET, which eventually become today's internet. At this time internet was only used for "E-mail".

In 1989, Tim Berners Lee began to develop a technology for sharing information via hyperlinked text documents.

In October-1994 Tim Berners Lee founded an organization called W3C (World Wide Web Consortium) devoted to developing technologies for www. His invention called HTML (Hypertext Markup Language) and the communication protocol HTTP (Hypertext Transfer Protocol) used to send information over the web. (Year-2014-HTML5)

HTTP Protocol: Request and Response

- HTTP stands for HyperText 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.

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 can handle any type of data over the internet. 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 Messages

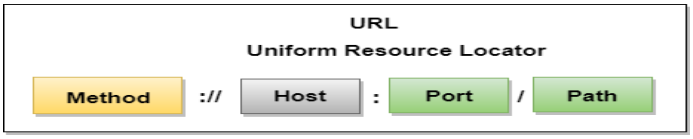
HTTP messages are of two types:

Request and Response. Both follows same message format.

Request Message: The request message is sent by the client that consists of a request line, headers, and sometimes a body.

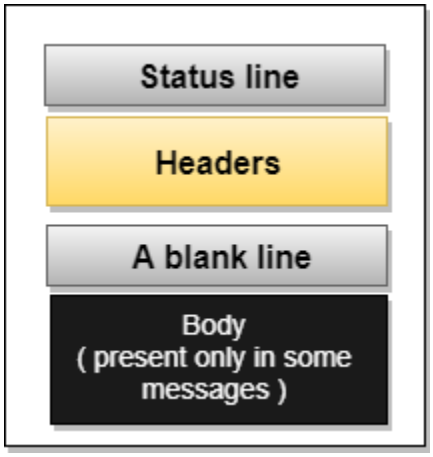
Uniform Resource Locator (URL)

- 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.

Response Message: The response message is sent by the server to the client that consists of a status line, headers, and sometimes a body.

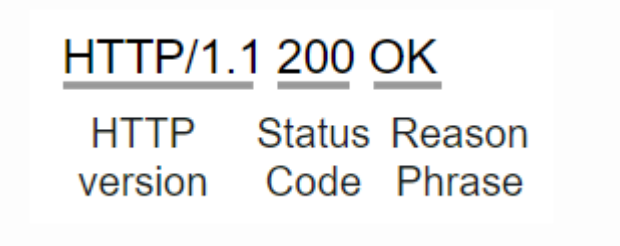


In the response message, the status line is the first line. The status line contains three items:

a) HTTP Version Number

b) Status Code

c) Reason Phrase

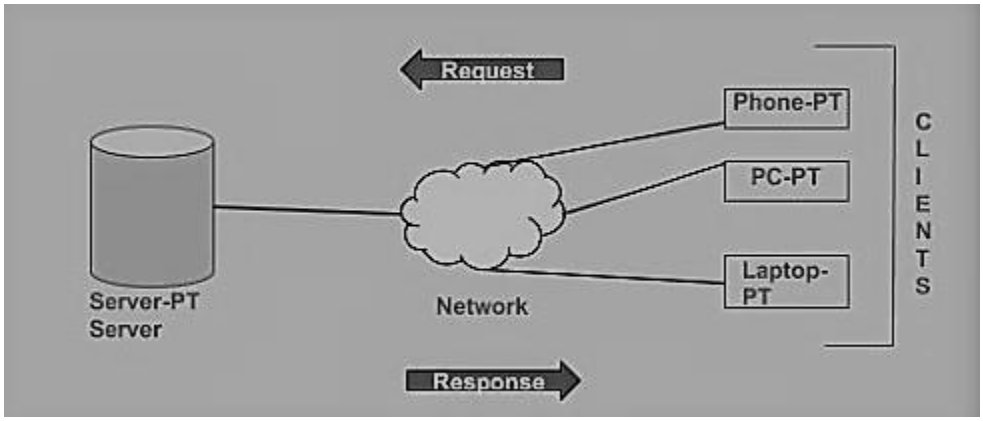


Client Server architecture

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, it's 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?

- 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:

1) Website can be viewed on all monitors
2) Font size should be moderate
3) Font color should be consistent
4) Navigation should be smooth
5) Page should be loaded in few seconds.
6) Web design should be compatible with all major browsers.

Symptoms of bad design:

1) Size of page is not viewable
2) Use of popups
3) Big & Unattractive color fonts
4) If user has to use horizontal scrollbars
5) Heavy use of graphics, animations and pictures

Web design issues:

Simplicity: Avoid use of lot of animations, huge amount of information etc…

Identity: Web design must be based on nature of the application

Consistency: Text formatting, font style should be same throughout all webpages of the web application. Similarly, graphics, design, color and style must be identical.

Robustness: The functionality or web page should not be missing.

Compatibility: Compatible to all browsers, operating systems

1) **Browser compatibility issues**
    - Web pages should be able to display across different browsers, including Firefox, Chrome, Edge etc.
    - To solve browser compatibility issue:
      Follow W3C standard
      Validate the code
      Know your audience
      Test your work on multiple browser and devices
2) **Bandwidth issue**
    - The users on internet have different connection speed which is also known as bandwidth. If user has low bandwidth connection and a web page contains number of images it will take additional time to load.
3) **Cache**
    - It is a temporary storage area.
    - Cache is browser's temporary storage area for web pages and images.
    - Thus browser always tries to load page from cache.
4) **Display resolution**
    - Resolution is measured in term of pixel. 1280*720 is considered to be the most suitable screen resolution for desktop website.

Look and Feel of Website:

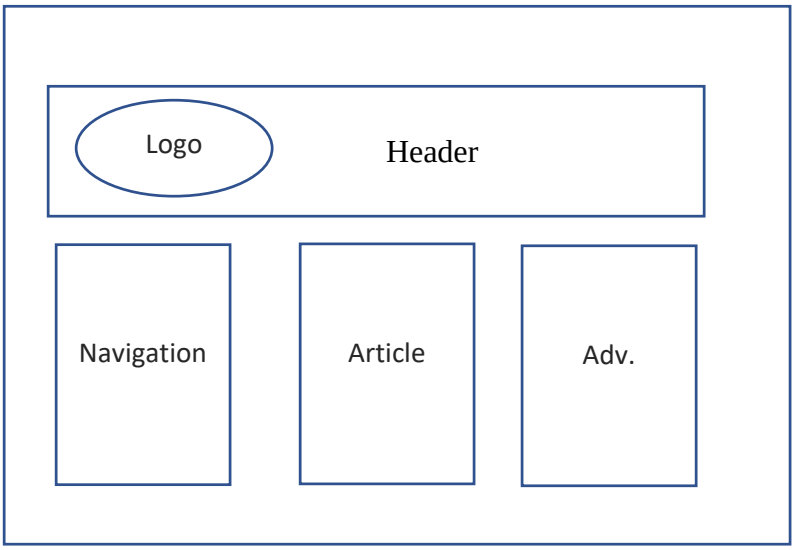
- Decoration of each webpage
- Formatting should be perfect
- Attractive designing
- Viewing multimedia

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.

<table>
<tr><td colspan="3">Header</td></tr>
<tr><td>Navigation
33%</td><td>Navigation
33%</td><td>Navigation
33%</td></tr>
</table>

- 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

- Navigation can be defined as the way to move from one page to another page in web site with the help of hyperlinks.
- **Some key points**

1) Don’t make user’s guess
2) Below the banner
3) Consistency is a key
4) Add a home button
5) Provide quality not quantity
6) Leave out unimportant stuffs
7) Links are either text based or graphical. Links should be obvious and meaningful.
8) Links should be same in entire web page. Links should be logical. Link itself direct the user about content.
9) Adjust the link according to contents which are clustered together.
10) Offer search link if required at the top of the page.
11) Give link for Home page.
12) Give the user location on web site.