MODERN WEB APPLICATIONS (ELECTIVE –II)

B TECH (COMPUTER SCIENCE AND BUSINESS SYSTEMS)
SEM - VI

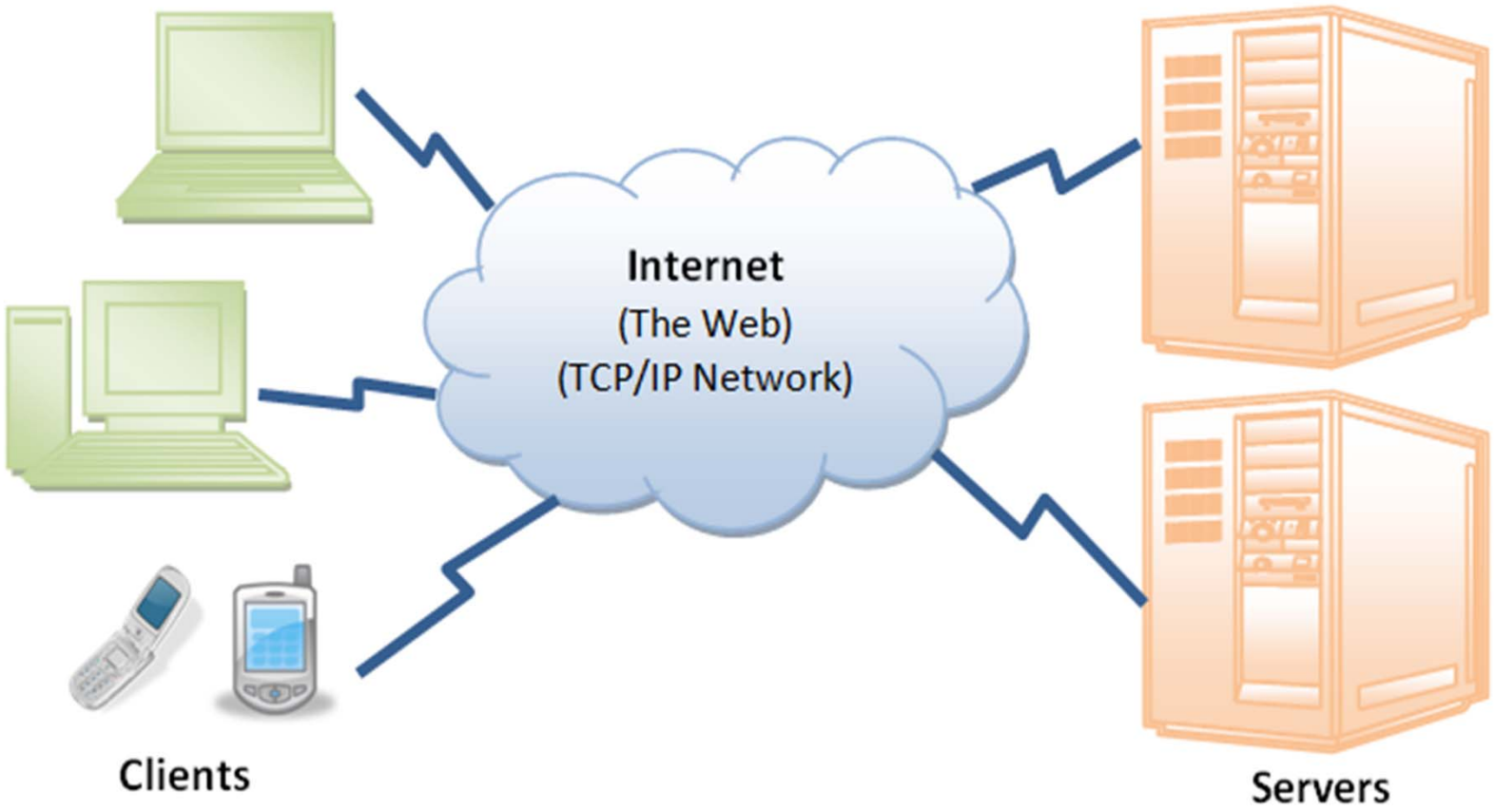
Prerequisite: Fundamentals of Programming and Networking

INTRODUCTION

What is World Wide Web?

- World Wide Web (WWW) - a lot of interconnected computers (via phone lines, cables, or satellites).
- Server Computers
- Client Computers
- Do not confuse with the WWW and Internet.
  - *Internet*: email, telnet, ftp, protocols (communications infrastructure) as well as the Web.
  - *WWW*: Just one component of the Internet.

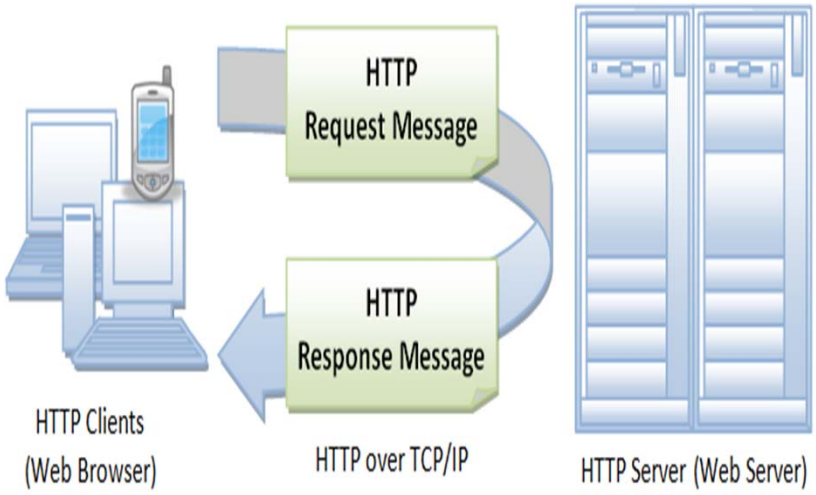
Internet / The Web

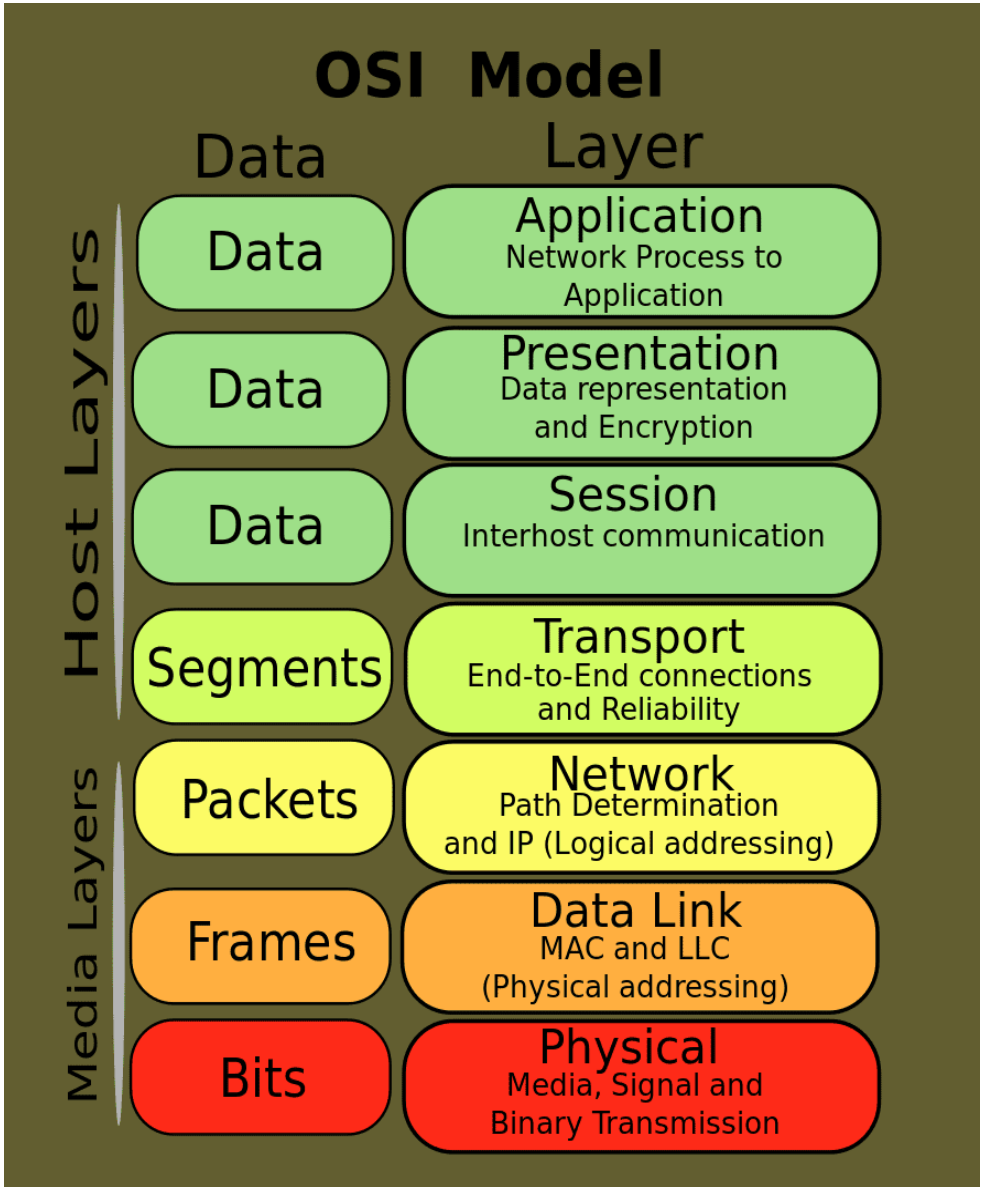


What is HTTP?

- HTTP stands for *Hypertext Transfer Protocol*. This is the protocol being used to transfer hypertext documents that makes the World Wide Web possible.

- A standard web address such as http://yahoo.com is called a *URL* and here the prefix *http* indicates its protocol


HTTP
Request Message
HTTP
Response Message
HTTP Clients
(Web Browser)
HTTP over TCP/IP
HTTP Server (Web Server)


OSI Model
Data
Layer
Host Layers
Media Layers
Data
Application
Network Process to Application
Data
Presentation
Data representation and Encryption
Data
Session
Interhost communication
Segments
Transport
End-to-End connections and Reliability
Packets
Network
Path Determination and IP (Logical addressing)
Frames
Data Link
MAC and LLC (Physical addressing)
Bits
Physical
Media, Signal and Binary Transmission

- HTTP is an **asymmetric** request-response client-server protocol.
- An HTTP client sends a request message to an HTTP server. The server, in turn, returns a response message.
- In other words, HTTP is a pull protocol, the client pulls information from the server (instead of server pushes information down to the client).
- HTTP is a stateless protocol. In other words, the current request does not know what has been done in the previous requests.

What is URL?

- URL stands for **U**niform **R**esource **L**ocator
- A URL will have the following format −

  protocol://hostname/other_information

- The protocol specifies how information is transferred from a link.
- Protocols: HTTP, FTP, telnet, newsgroups, and Gopher.
- Two slashes : domain name
- Single forward slashes : directories & sub-directories

What is Website?

- *svmit.ac.in*
- Collection of number of pages written in *HTML*
- Each page is called *web page*
- First page of website is called *home page*

What is Web Server?

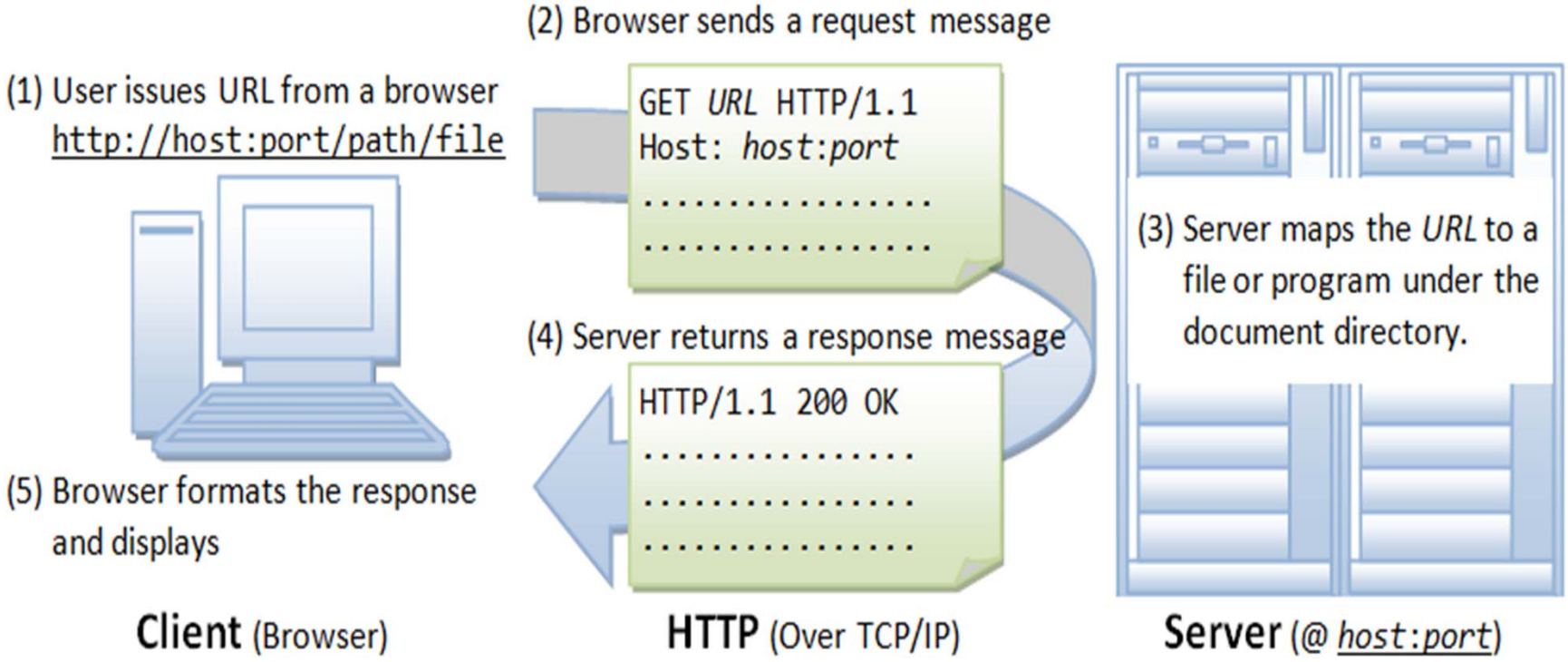
- Every website sits on a computer known as a *Web server*.
- This server is *always connected* to the internet.
- Have unique IP address: e.g. *68.178.157.132* or *68.122.35.127*
- When we register a web address, also known as a *domain name*, such as *svmit.ac.in*, we have to specify the IP address of the Web server that will host the site.
- Examples : Apache, IIS, lighttpd, Sun Java, Jigsaw

What is Web Browser?

- Web Browsers are software installed on our PC.
- To access the Web you need a web browsers, such as

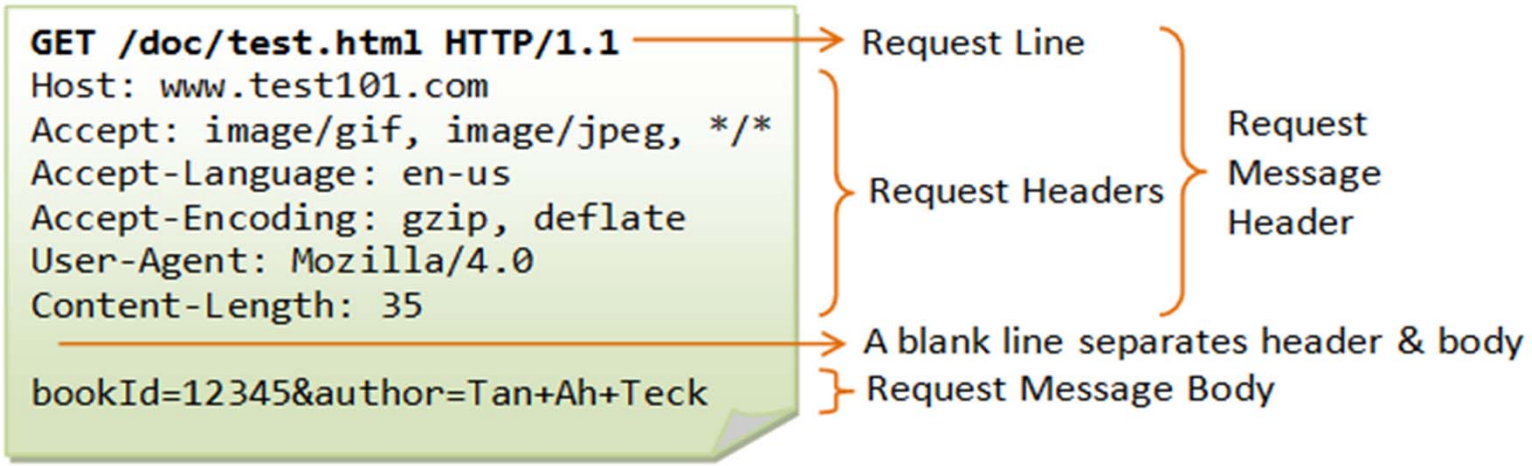
  Chrome, Netscape Navigator, Microsoft Internet Explorer or Mozilla Firefox.
- *browsing* or *surfing*.

HTTP Process



browser translated the URL http://www.test101.com/doc/index.html into the following request message

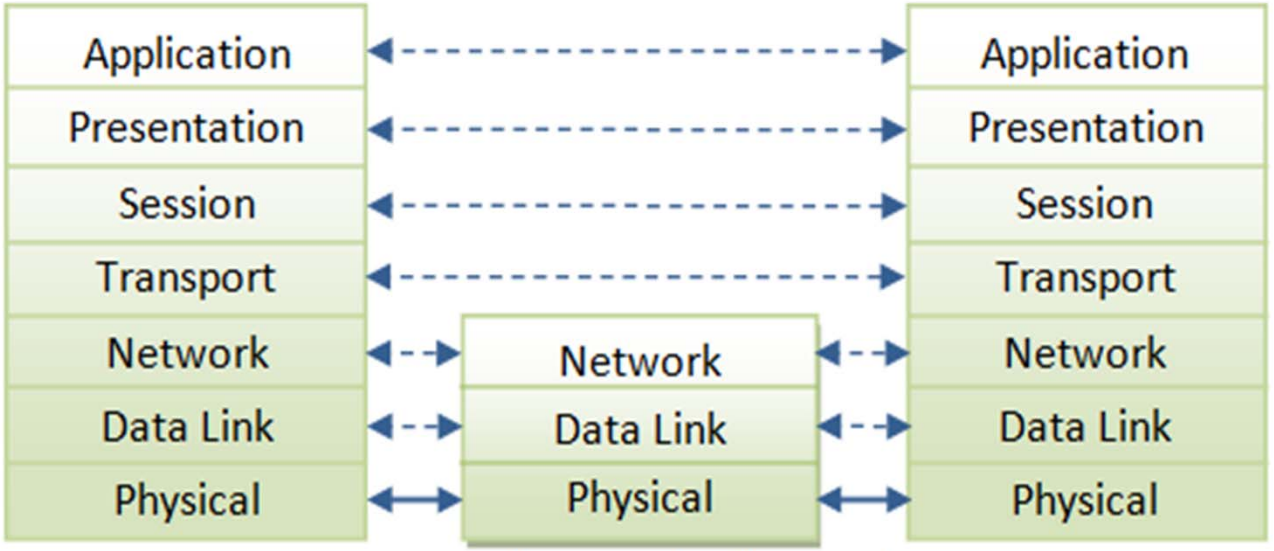
sample HTTP request message

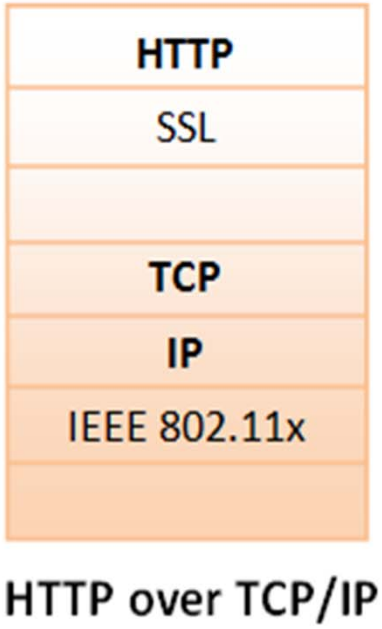


(HTTP response)

HTTP/1.1 200 OK
Date: Sun, 18 Oct 2009 08:56:53 GMT
Server: Apache/2.2.14 (Win32)
Last-Modified: Sat, 20 Nov 2004 07:16:26 GMT
ETag: "10000000565a5-2c-3e94b66c2e680"
Accept-Ranges: bytes
Content-Length: 44
Connection: close
Content-Type: text/html
X-Pad: avoid browser bug

HTTP over TCP/IP





SMTP and ISP

- SMTP : *Simple Mail Transfer Protocol*
- Emails from one server to another server

- ISP : *Internet Service Provider*
- Companies who provide internet service
  (Jio, MTNL, MTS, YOU, Hathway, Tikona)

- Buy space on a Web Server from any Internet Service Provider. This space will be used to host your Website.

Hyperlink and DNS

- *hyperlink* or simply a link is a selectable element in an electronic document that serves as an *access point* to other electronic resources

- DNS stands for *Domain Name System*.
- When someone types, *www.example.com*, browser ask the *Domain Name System* to find the *IP* that hosts the site.

Summary

- A user enters a URL into a browser (for example, Google.com. This request is passed to a domain name server.
- The domain name server returns an IP address for the server that hosts the Website (for example, 68.178.157.132).
- The browser requests the page from the Web server using the IP address specified by the domain name server.
- The Web server returns the page to the IP address specified by the browser requesting the page. The page may also contain links to other files on the same server, such as images, which the browser will also request.
- The browser collects all the information and displays to your computer in the form of Web page.

Web Design Issues

a) Browser & Operating Systems
b) Bandwidth and Cache
c) Display Resolution
d) Look & Feel
e) Page Layout and Linking
f) Locating Information
g) Making Design user-Centric
h) Sitemap

a) Browser & Operating Systems

- Web pages are written using different HTML tags and viewed in browser window.
- The **different browsers** and their **versions** greatly affect the way a page is **rendered**, as different browsers sometimes interpret same HTML tag in a **different way**.
- **Different versions** of **HTML** also support different sets of tags.
- The support for different tags also varies across the different browsers and their versions.
- Same browser may work slightly different on different **operating system** and **hardware platform**.
- To make a web page portable, **test it on different browsers** on different operating systems.

b) Bandwidth and Cache

- Users have different **connection speed**, i.e. bandwidth, to access the Web sites.
- Connection speed plays an important role in designing web pages, if user has low bandwidth connection and a web page contains too many images, it takes more time to download.
- Generally, users have **no patience** to **wait** for longer time than **10-15 seconds** and move to other site without looking at contents of your web page.
- Browser provides temporary memory called **cache** to store the graphics.
- When user gives the URL of the web page for the first time, HTML file together with all the graphics files referred in a page is downloaded and displayed.

c) Display Resolution

- Display resolution is another important factor affecting the Web page design, as we do not have any control on display resolution of the monitors on which 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.
- We have three choices for Web page design.
  - Design a web page with **fixed resolution**.
  - Make a **flexible design** using HTML table to fit into different resolution.
  - If the page is displayed on a monitor with a higher resolution, the page is displayed on left hand side and some part on the right-hand side remains blank. We can use centered design to display page properly.
  - Ideally we should use some frameworks for designing like **Bootstrap/Material design**.

d) Look & Feel

- Look and feel of the website decides the overall appearance of the website.
- It includes all the design aspects such as
  - Web site theme
  - Web typography
  - Graphics
  - Visual structure
  - Navigation etc…

e) Page Layout and Linking

- Website contains of **individual web pages** that are linked together using various **navigational links.**
- Page layout defines the visual structure of the page and divides the page area into different parts to present the information of varying importance.
- Page layout allows the designer to distribute the contents on a page such that visitor can view it easily and find necessary details.

f) Locating Information

- Webpage is viewed on a computer screen and the screen can be divided into **five major areas** such as **center**, **top**, **right**, **bottom** and **left** in this particular order.
- The first major area of importance in terms of users viewing pattern is the center, then top, right, bottom and left in this particular order

g) Making Design user-Centric

- It is very difficult for any Web designer to predict the exact behavior of the Web site users.
- However, idea of general behavior of common user helps in making design of the Web site user centric.
- Users either scan the information on the web page to find the section of their interest or read the information to get details.

h) Sitemap

- A **Sitemap** is a model of a website's content designed to help both users and search engines navigate the site.
- Many a times Web sites are too complex as there are a large number of sections and each section contains many pages.
- It becomes difficult for visitors to quickly move from one part to other.
- Once the user selects a particular section and pages in that section, user gets confused about where he/she is and where to go from there.
- To make it simple, keep your hierarchy of information to few levels or provide the navigation bar on each page to jump directly to a particular section.

Planning a Website

- The most important activity in a website development is **planning**.
- To achieve **higher success** of the website in terms of user satisfaction, better planning is needed.
- Before we start developing a website, we should ask question such as
  - **Why** are we developing this website?
  - **What** do we achieve by developing this website?
  - **Who** are the people who will use this website?
  - What are the information **contents**?
  - How are these contents **organized**? What are the **possible ways**?

Effective Navigation

- The most important design element in the 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 user feels the problem in moving around the pages in your site in a desired manner or gets confused and leaves the site.

Tips for Effective Navigation

- Navigation links are either **text based**, i.e. a word or a phrase is used as a link, or **graphical**, i.e. a image, a icon or a 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 **search** link, if necessary, usually on top of the page.
- Use **common** links such as ‘about us’ or ‘Contact us’.
- Provide the way to **return** to **first page**.
- Provide the user with **information** regarding **location**
- Horizontal navigation bar can be provided on each page to **directly jump** to any section