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01IT0602-Web Technology

Unit-1 Introduction and Web Design

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Outline

- World wide web and Internet
- Terms related to internet
- Basic service of internet
- Web browser architecture
- Web2.0
- Web hosting
- Web design principle
- HTTP

World Wide Web

- The World Wide Web is abbreviated as WWW and is commonly known as the web.
- World Wide 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 based on several different technologies: Web browsers, Hypertext Markup Language (HTML) and Hypertext Transfer Protocol (HTTP).
- The World Wide Web was originally designed in 1991 by Tim Berners-Lee.

Internet

- The Internet is a massive network of networks, a networking infrastructure.
- It connects millions of computers together globally, forming a network in which any computer can communicate with any other computer as long as they are both connected to the Internet.
- The information travelling over the Internet uses a variety of languages known as protocols. So, we can say that Internet is network of computer which connect to together and any computer communicate with any other computer.
- Use the standard Internet Protocol suite(TCP/IP) for communication.

Difference between Internet and WWW

Internet	WWW
Internet is a means of connecting a computer to any other computer anywhere in the world.	World Wide Web which is a collection of information which is accessed via the Internet.
Internet is infrastructure.	Web is a service on top of that infrastructure.
Internet can be viewed as a big book-store.	Web can be viewed as collection of books on that store.
Internet is hardware-based.	Web is software oriented.
Internet uses IP address.	WWW uses HTTP

ICANN

- It stands for Internet corporation for assigned names and numbers.
- It is an non profit organization responsible for domain name and IP address registration.
- Anytime you register a domain on the Internet, you go through a domain name registrar, who pays a small fee to ICANN to register your domain as part of the domain registration process.

Some Terms related to network

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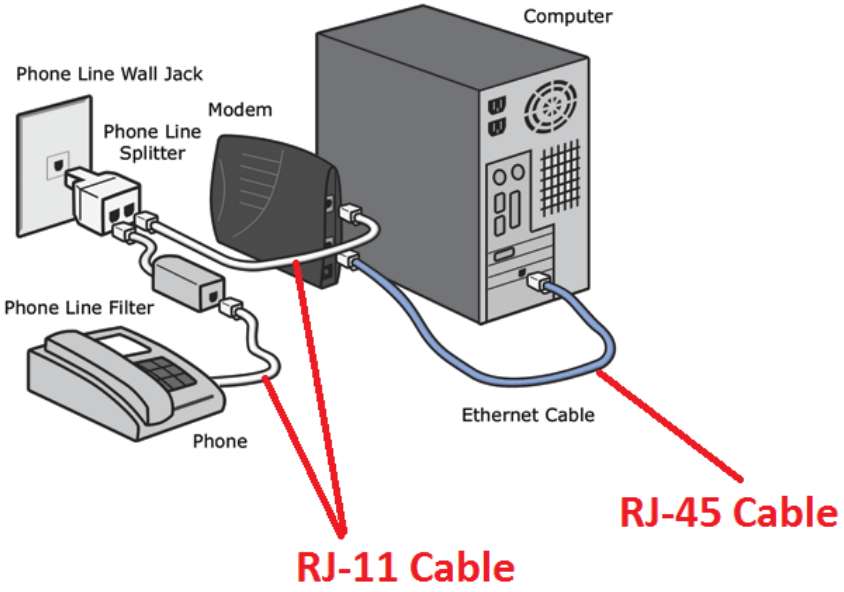
Modem:-

- It is a device that enables computer to transmit data over telephone lines.
- Computer information is stored digitally, whereas information transmitted over telephone line is transmitted in the form of analog.
- It performs modulation and demodulation.
- At sender side digital signal is converted into analog is called modulation.
- At receiver side analog signal is converted into digital signal is called demodulation.
- Modem can transmit maximum data at 56kbps.
- Modem can be connected to telephone line using RJ11 connector.



LAN:-

- LAN stands for Local area network.
- In a LAN, one computer become server all the remaining computers called clients.
- A local area network is a network that connects computers and device in a limited geographical area.
- LAN provides high speed data communication.
- LANs are designed to allow resources to be shared between personal Local Area Network requires a LAN Administrator because, there are problems of software installations or hardware failures or cable fault.
- The data of all network users can be saved on hard disk of the server computer.

Example: -Mobile hotspot

WAN:-

- Connecting two different LAN in two different cities which has distance more than 100km is WAN.
- WAN covers the country or even a whole world.
- A WAN connects more than one LAN and is used for larger geographical areas.
- WAN transfer data at lower speed. They exist in an unlimited geographical area.
- This type of networking requires a full-time administrative check.
- Failure can lead to massive data loss or theft.
- A Wide Area Network is widely used in the field of Business, government, and education.

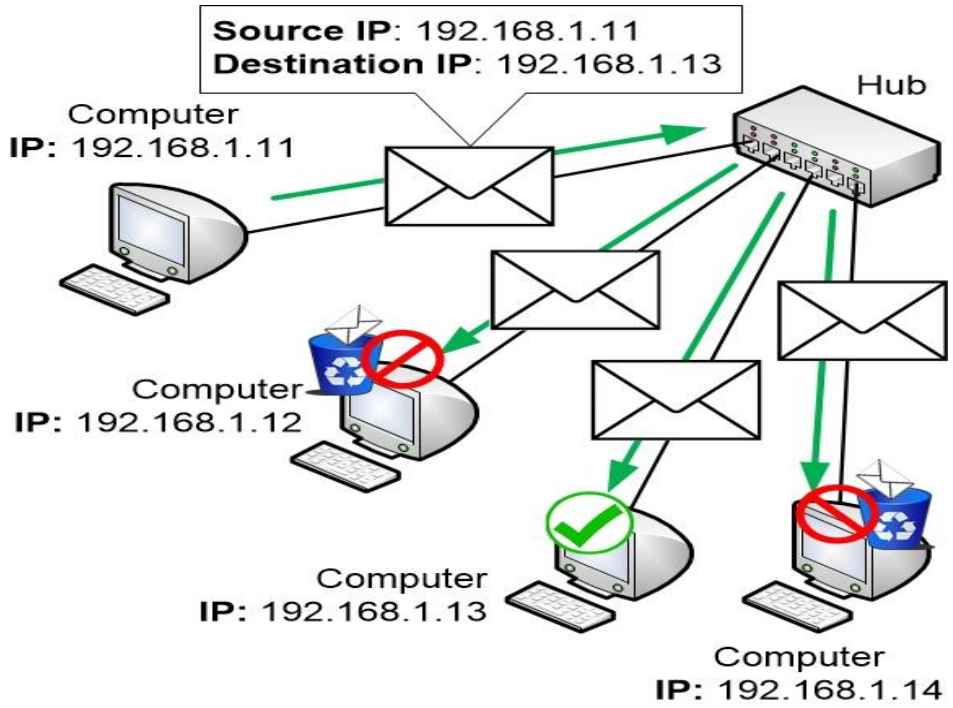
Example:

Mobile broadband: A 4G network is widely used across a country.

Banking: -It is used in banking where hundreds of branches in different cities are connected to each other.

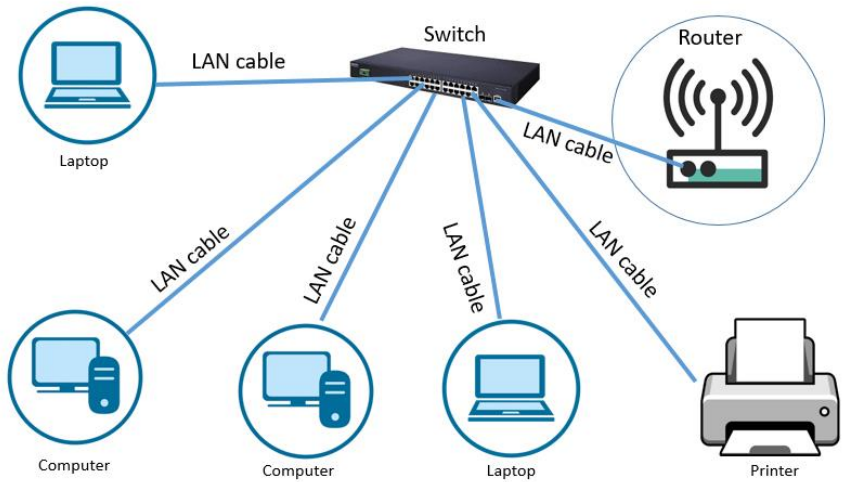
Hub:-

- Hub is the most basic networking device that connects multiple computers together.
- A network hub is a node that broadcasts data to every computer on network.
- Hub offers speed from 10-100mbps.
- Lower price
- No security
- Hubs operate in half-duplex.
- It does not operate in full duplex mode.



Switch:-

- Switch is a computer networking device that connects network segments.
- A switch must be able to read the MAC address of each frame it receives.
- It is used in Mid to large size organization.
- It is a device which physically connect device together.
- It is multiport networking device(48,96 port)
- It maintains a MAC address table.
- Process and forward data.
- Faster communication
- Security



Local Area Network

Router:-

- Routers are small electronic devices that connect multiple computer networks together.
- Routers contain a processor (CPU), several kinds of digital memory, and input-output (I/O) interfaces.
- Compared to general-purpose OS products like Microsoft Windows or Apple Mac OS,router contain Cisco Internetwork Operating System(IOS).
- A router will have at least two network cards (NICs), one physically connected to one network and the other physically connected to another network.
- routers are commonly used in home networks to share a single Internet connection between multiple computers.

ISP:-

- ISP stands for internet service provider. An Internet service provider (ISP) is a company that provides customers with Internet access.
- ISP provides internet access through fiber-optic cable.

IP address:-

- Computer somewhere in the world need to communicate with another computer somewhere else in the world. Computer communicate through the internet. For communication we need IP address.
- IP stands for Internet protocol address. IP address are 32 bit in length.
- IPv4 addresses are unique. Two device on the internet can never have same address at same time.
- IP address is also known as global address or logical address or IPV4 address. Because IP addresses are logical, they can change.
- IP addresses are managed by the Internet Assigned Numbers Authority (IANA), which has overall responsibility for the Internet Protocol (IP) address.

IP ADDRESS CLASS

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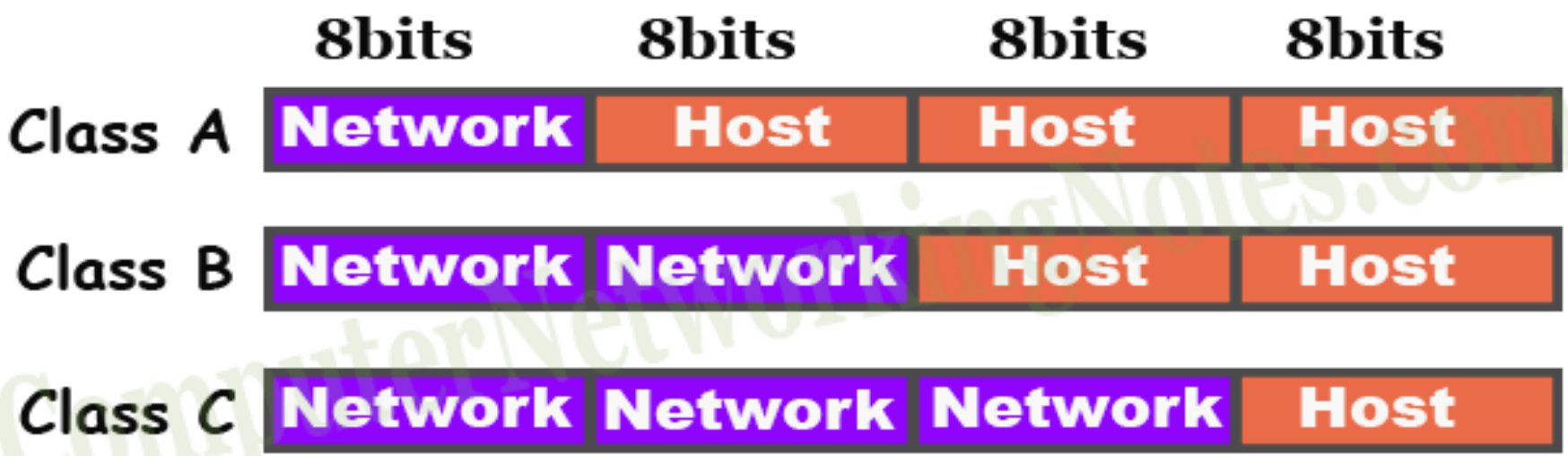
Class	Starting Address	Ending Address	Subnet mask
A	0.0.0.0	127.255.255.255	255.0.0.0
B	128.0.0.0	191.255.255.255	255.255.0.0
C	192.0.0.0	223.255.255.255	255.255.255.0
D	224.0.0.0	239.255.255.255	255.255.255.255
E	240.0.0.0	255.255.255.255	255.255.255.255



Special IP address

- IP addresses which are reserved for network testing and troubleshooting. These IP addresses cannot be assigned to an end device or an interface.
- **0.0.0.0**:- This is the first IP address of IP addresses. It represents all networks.
- **127.0.0.0 to 127.255.255.255**:-Reserved for IP protocol testing and troubleshooting. Virtual interfaces such as loopback adaptor use this IP range for addressing.
- **255.255.255.255**:- This is the last IP address of IP addresses. It represents all hosts.

Subnet Mask

- Subnet mask is used to identify the network bits and host bits in the IP address.
- 255 represent the network and 0 represent the host.
- Every class A,B and C has their default subnet mask.
- Performing a bitwise logical AND operation on the IP address with the subnet mask produces the network address.

```
IP:   1101 1000 . 0000 0011 . 1000 0000 . 0000 1100  (216.003.128.012)
Mask: 1111 1111 . 1111 1111 . 1111 1111 . 0000 0000  (255.255.255.000)
      ---------------------------------------------
      1101 1000 . 0000 0011 . 1000 0000 . 0000 0000  (216.003.128.000)
```

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Class A
Subnet Mask

Netwok	Host	Host	Host
255	0	0	0

Class B
Subnet Mask

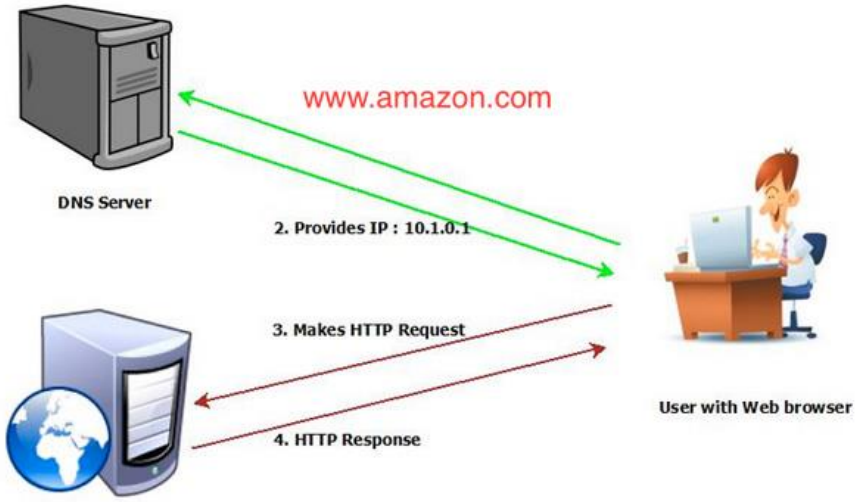
Netwok	Network	Host	Host
255	255	0	0

Class C
Subnet Mask

Netwok	Network	Network	Host
255	255	255	0

DNS

- DNS stands for domain name server. DNS is used to convert domain names into IP address
- Domain names are alphabetic. Computer understands only binary (0 & 1) or numbers. So It is necessary to convert domain name into IP address.
- DNS helps us to convert the domain name into IP address that the computer can understand.
- DNS is a protocol for how computer exchange data on the internet. Domain name server is managed by different organization and mainly located in USA.



Web Pages and Web Site

Web Pages:-

- It is a document written in HTML.
- Web page contains text, graphics, video etc.
- Each page has unique address known as URL.

Example:-http://www.visityatri.com/home.php

- http is a protocol which is used for communication of web server and web browser,visityatri is server address and home.php is a resource that user wants.

Web Sites:-

- A website (often shortened to just site) is collection of one or more pages.
- The first page is called the home page.
- From the home page, you can click hyperlinks to access other web pages.

Web Server

- Web servers are computers (hardware) that deliver (serves up) Web pages.
- Every Web server has an IP address and possibly a domain name. For example, if you enter the URL http://www.webopedia.com/index.html in your browser, this sends a request to the Web server whose domain name is webopedia.com.
- The server then fetches the page named index.html and sends it to your browser.If requested webpage is not found server responds with error message.
- Any computer can be turned into a Web server by installing server software and connecting the machine to the Internet.
- Web servers can sometimes be slowed down when a greater number of requests being received in too short a time.
- Leading web server include apache tomcat(java),apache(php , python, perl),IIS(internet information server)(asp) , nginx (pronounced engine X),Google Web Server.
- The communication between client and server takes place using the Hypertext Transfer Protocol (HTTP).

Basic Service of Internet

Email:-

- Allow user to send a mail (message) to another internet user in any part of the world.

SMTP:-

- It stands for Simple mail transfer protocol.
- It is a communication protocol for sending email messages on the internet.
- Email software uses SMTP for sending and Post office protocol3 for receiving.
- SMTP uses port number 25 for communication.
- In order to send a mail, SMTP is used two times: one between the sender and the sender's mail server, and the other between the two mail servers.

POP3:-

- POP3 is used for receiving emails.
- It works on port 110.

- When SMTP send a mail to receiver's server such as yahoo POP3 server store messages for each user until the user login. Once the email is downloaded from the server, POP3 deletes it from the server.
- To overcome this limitation IMAP(Internet message access protocol) comes into picture. With IMAP we can access our mail from multiple computers.

FTP:-

- Allow user to move a file from one computer to another on the internet.
- FTP uses port 20,21.
- To transfer a file ftp uses two connection: control connection and data connection.

What is control connection:-

- For sending information like username, password control connection is used.
- Control connection use port number 21.

What is data connection:-

- For sending file(downloading) FTP use data connection.
- Data connection use port number 20.

Telnet:-Allow a user to login to another computer somewhere on the internet.

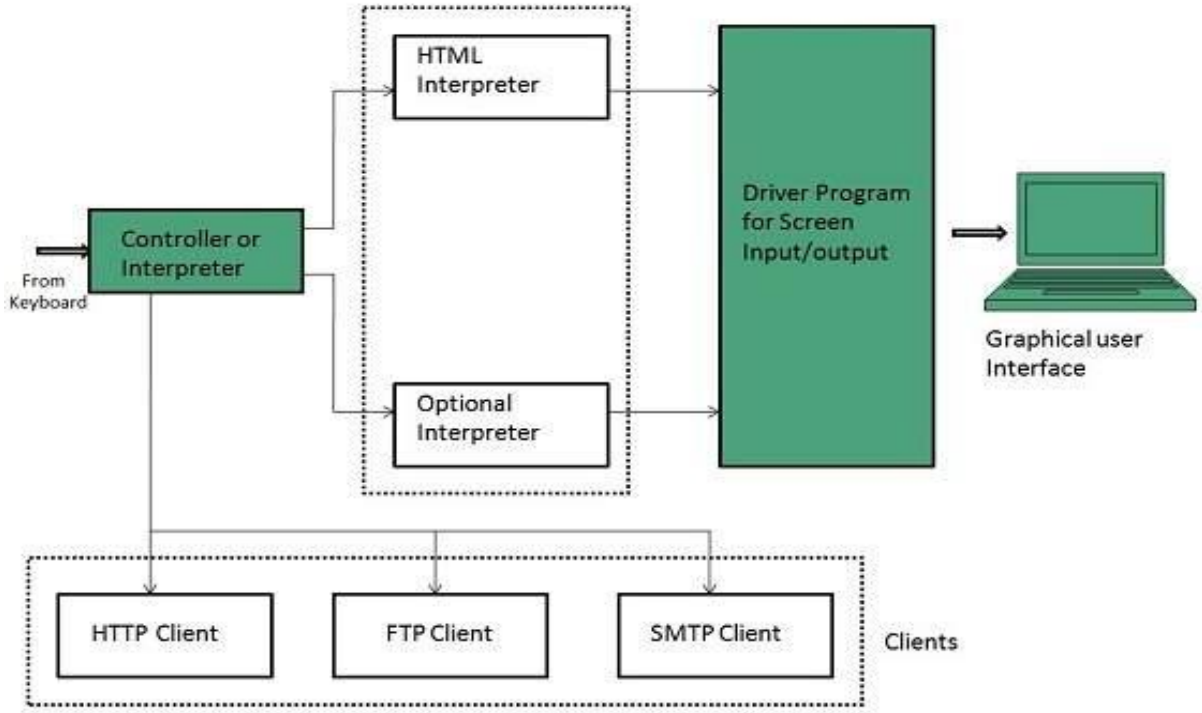
Web Browser Architecture

- There are different types of web browser available in the internet.
- The main task of web browser is to interpret and display information on the screen.
- Different browser have different capabilities & structure depending on implementation, but the most basic component that all browsers have is

  controller

  interpreter

  client program



controller:-

- It manages mouse and keyboard inputs. Based on these inputs, it calls rest of the browser component to perform specific task.
- When a user types a URL, the controller calls the HTTP client program to fetch the requested webpage from remote webserver whose address is given by the URL.
- When the web page received, it calls the HTML interpreter to interpret the tags and display the webpage on the screen.

Interpreter:-

- Interpreter receives the information from the controller & execute the instruction line by line.
- HTML interpreter program is compulsory and java interpreter is optional in web browser.
- The HTML interpreter takes an HTML document as input & produces formatted version of it for display it on screen.<b>Hello --> Hello

client program:-

- It describes the specific protocol that will be used to access a particular service.
- Commonly used client programs are HTTP,SMTP,FTP etc.
- The browser call them automatically on behalf of the user. It hides these details from the user.
- Example:-In every website there is a email link so that user can send email to the owner or technical support staff of the website to resolve any queries, obtain some information etc. When user click that link with a mouse, the controller of the browser would interpret this and then it will call email client program automatically and the user is unaware of this.

Web2.0

- Web 2.0 is a second generation of world wide web that are supposed to let people collaborate and share information online in ways that were not possible before.
- With Web 1.0,most websites consisted of static HTML pages, but with Web 2.0 websites are not only dynamic but also highly interactive.
- Web 2.0 does not refer to any specific technical upgrades to the internet. It simply refers to a shift in how the internet is used in the 21st century.
- Users were encouraged to provide content, rather than just viewing it.
- Because of Web 2.0, people could now able to publish articles and comments, and it became possible to create user accounts on different sites, therefore increasing participation.
- Web 2.0 also gave rise to web apps, self-publishing platforms like WordPress, as well as social media sites.
- Examples of Web 2.0 sites include Wikipedia, Facebook, Twitter, and various blogs.

Features of Web2.0

Dynamic and interactive:-

- Interactivity of Web2.0 website is made possible by AJAX(Asynchronous javascript and xml).
- AJAX makes it possible for the web browser to connect to the webserver and download small amount of information in the background.

Blogs:-

- These allows user to post thoughts, knowledge and updates about their life on the web.

Social Networking:-

- User can easily share information with each other. Sites like facebook allows users to build and customize their own profile and communicate with friends.

Network as platform:-

- User can deliver information through web browser.

Example:-google docs and spreadsheets a service provided by google allows users to create word processing document and spreadsheets online.

User participation:-

- In Web1.0 the content are only provided by website owner or company but in web2.0 the user participate in content sourcing(called as crowd sourcing)

Example:-Wikipedia,Youtube

Rich User Experience:-

- Web1.0 are built with HTML,CSS CGI, but Web2.0 uses AJAX presenting a dynamic and rich user experience to users.
- Some of the most interactive websites are google maps, yahoo maps and google suggests.

Difference between Web1.0,Web2.0 and Web3.0

Web1.0	Web2.0	Web3.0
1996-2004	2004-2016	2016+
The Hypertext web	The Social web	The Semantic web
Tim Berners Lee	Tim O'Reilly and Dale Dougherty	Tim Berners Lee
Read Only	Read and write	Portable and personal
Millions of User	Billions of User	Trillions+ of Users
Company Focus	Community focus	Community focus
Home pages	Blogs/wiki	Live stream
Web and File Servers, HTML, and Portals are technologies connected to Web 1.0	AJAX, JavaScript, CSS, and HTML5 are examples of related technology.	Web 3.0 technologies include blockchain, artificial intelligence, and decentralized protocols.

Web Hosting

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- Web hosting is an online service that enables you to publish our website.
- When you decide to start a new website, you need to find a hosting company (GoDaddy HostGator) who provides you with the server space.
- Our webhost stores all the files on the server. When someone types our domain name into the address bar of their browser our host transfers the entire file necessary to serve the request.
- Your web host is responsible for keeping the server up and running transferring your content (text, images, files) from the server to your visitors' browsers.
- In fact, web hosting works similarly to housing rentals, you have to pay the rent regularly in order to keep the server running continuously.

Types of Web Hosting

shared hosting:-

- Company give a server to one or more customers and that's how a server is shared and this type of hosting is called shared hosting.
- Website hosted on the same server share all its resources such as memory, computing power, disk space etc.

Prons:-

- Low cost
- Beginner friendly
- User friendly control panel

Cons:-

- Little or no control on server configuration
- slow speed

Virtual private server hosting:-

- In VPS hosting company provide you fixed space to place your website.
- Company give a server to one or more customer and that's how a server is shared but fixed space divide to everyone.

Prons:-

- Dedicated server space
- Better speed

Cons:-

- Expensive compare to shared hosting
- Technical or server management knowledge is required.

Dedicated hosting:-

- It means that we have our own physical server that is dedicated to our site.
- We can configure our server, choose the operating system and software we want to use and set up the whole hosting environment according to our own needs.

Prons:-

- Full control over server configuration
- High reliability
- security

Cons:-

- Super high cost
- Expert level of technical and server management knowledge is required

Cloud hosting:-

- It is currently the most reliable solution on the market.
- With cloud hosting, your host provides you with a cluster of servers. Your files and resources are replicated on each server. When one the cloud server is busy or has any problems, your traffic is automatically routed to another server in the cluster.

Prons:-

- Little to no downtime
- Server failures brings no effect
- more scalable
- pay as you go pricing model

Cons:-

- Root is always not provided
- Hard to estimate the cost

Web Design

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- Web Design is a concept of planning, creating, and maintaining websites.
- Besides the creation and updating, this concept also involves taking care of the user interface, the architecture of information present, the layout, the colors, content, navigation, as well as the designs of the various icons.
- When web designers work on a website, they incorporate not just those elements that add a visual appeal to it but also try to make it highly responsive, functional, quick and useful.
- In order to create a highly usable and effective website, designers follow certain principles that act as thumb rules or standard points to keep in mind.

Web design principle

- Basic principle means rules and regulations which you have to take care while developing your website.
- Benefit of applying principle is that our website will became effective, user friendly, interactive etc

1.purpose:-

- Each page of website should have a clear purpose, which fulfills the needs of your website users.

2.Well structured:-

- Organize the information using headlines and sub headlines using bullet and points instead of long windy sentences.

3.Typefaces:-

- Mostly Sans Serif fonts are used to write the content of website as it is easy to read.
- Some Sans serif fonts are Times new roman, Arial and verdana.

- Sans serif fonts are simple looked fonts without any decorative finishes.
- For online reading 16px is ideal font size and it is considerable to use maximum 3 typefaces.

4.Colors:-

- Use Contrasting colors for text and background to make your website content easier to read.
- For button and other focusing thing vibrant color is preferable.
- White space is very effective for website.

5.Images:-

- In order to improve ranking of website and to connect with target audience it is necessary to use right images for website.
- It is preferable to add caption to image which helps in improving google ranking.

6.Navigation:-

- Navigation is about how easy it is for people to take action and move around your website.
- Some tactics for effective navigation include a logical page hierarchy, using bread crumbs, designing clickable buttons, and following the ‘three click rule’ which means users will be able to find the information they are looking for within three clicks.

7.Grid based layouts:-

- Placing content randomly on your web page can end up with a haphazard appearance that is messy.
- Grid based layouts arrange content into sections, columns and boxes that line up and feel balanced, which leads to a better looking website design.

8."F" pattern design:-

- Eye tracking studies have identified that people scan computer screens in an “F” pattern.
- Most of what people see is in the top and left of the screen and the right side of the screen is rarely seen.
- Rather than trying to force the viewer’s visual flow, effectively designed websites will work with a reader’s natural behavior and display information in order of importance (left to right, and top to bottom).

9.Load time:-

- Everybody hates a website that takes large time to load the content.
- It is suggested that make page whose load time is less and more effective which can be achieve by optimizing image sizes, make use of centralized CSS or javascript file it reduces HTTP requests.

10.Mobile friendly or responsive design:-

- It is now commonplace to access websites from multiple devices with multiple screen sizes, so it is important to consider if your website is mobile friendly.
- If your website is not mobile friendly, you can either rebuild it in a responsive layout or or you can build a dedicated mobile site.

HTTP

- HTTP means HyperText Transfer Protocol.
- HTTP is used by the World Wide Web and this protocol.
- It defines how messages are formatted and transmitted, and what actions Web servers and browsers should take in response to various commands.
- When you enter a URL in your browser, this actually sends an HTTP command to the Web server directing it to fetch and transmit the requested Web page.
- Stateless protocol.

Basic Features

- There are three basic features that make HTTP a simple but powerful protocol:

HTTP is connectionless:-The HTTP client, i.e., a browser initiates an HTTP request and after a request is made, the client waits for the response. The server processes the request and sends a response back after which client disconnect the connection. So client and server knows about each other during current request and response only. Further requests are made on new connection like client and server are new to each other.

HTTP is media independent: It means, any type of data can be sent by HTTP as long as both the client and the server know how to handle the data content. It is required for the client as well as the server to specify the content type using appropriate MIME-type.

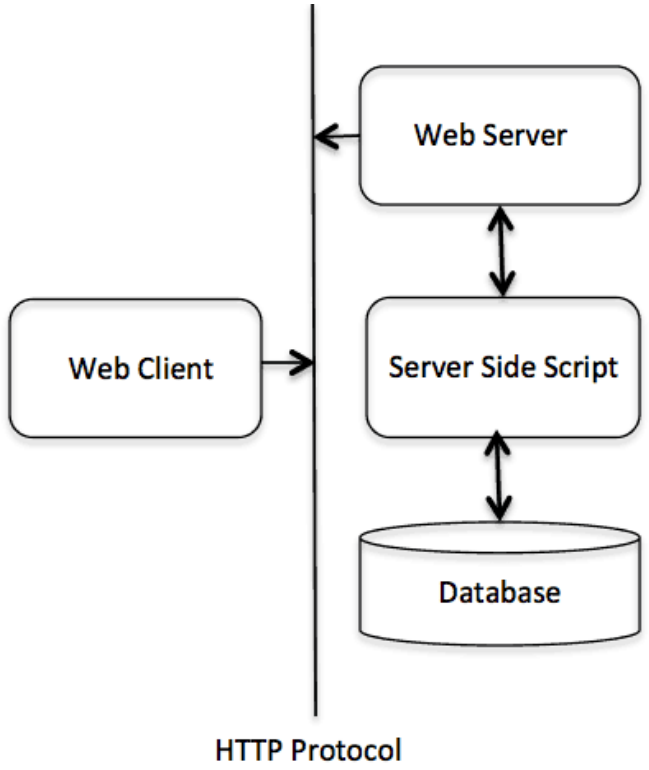
HTTP is stateless: As mentioned above, HTTP is connectionless and it is a direct result of HTTP being a stateless protocol. The server and client are aware of each other only during a current request. Afterwards, both of them forget about each other. Due to this nature of the protocol, neither the client nor the browser can retain information between different requests across the web pages.

- HTTP/1.0 uses a new connection for each request/response exchange, where as HTTP/1.1 connection may be used for one or more request/response exchanges.

Basic Architecture:-

- The following diagram shows a very basic architecture of a where HTTP sits:
- The HTTP protocol is a request/response protocol

based on the client/server based architecture
where web browsers, robots and search engines etc.
act like HTTP clients, and the Web server acts as a
server.



HTTP Request Method

Request message:

GET /guide/index.html HTTP/1.1

Host: www.xxxx.com

Accept: image/gif, image/jpeg, */*

Accept-Language: en-us

Accept-Encoding: gzip, deflate

User-Agent: Mozilla/4.0 (compatible; MSIE 6.0; Windows NT 5.1)

(blank line)

HTTP Request Methods

- GET
- POST
- PUT
- HEAD
- DELETE
- OPTIONS

GET Method

- used to request data from a specified resource.
- query string (name/value pairs) is sent in the URL of a GET request
- /test/demo_form.php?name1=kamal&name2=nisha

Notes

- GET requests can be cached
- GET requests remain in the browser history
- GET requests can be bookmarked
- GET requests should never be used when dealing with sensitive data
- GET requests have length restrictions

Post Method

- used to send data to a server to create/update a resource.
- data sent to the server with POST is stored in the request body of the HTTP request:

POST /test/demo_form.php HTTP/1.1

Host: w3schools.com
name1=value1&name2=value2

Notes

- POST requests are never cached
- POST requests do not remain in the browser history
- POST requests cannot be bookmarked
- POST requests have no restrictions on data length based o server configuration.

Put method:

- PUT is used to send data to a server to create/update a resource.
- The difference between POST and PUT is that PUT requests are idempotent. That is, calling the same PUT request multiple times will always produce the same result.
- In contrast, calling a POST request repeatedly have side effects of creating the same resource multiple times.

HEAD Method:

- HEAD is almost identical to GET, but without the response body. HEAD requests are useful for checking what a GET request will return before actually making a GET request like before downloading a large file or response body.

DELETE Method:-The DELETE method deletes the specified resource.

OPTIONS Method:-The OPTIONS method describes the communication options for the target resource.

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HTTP Headers

General-header: These header fields have general applicability for both request and response messages.

Client Request-header: These header fields have applicability only for request messages. This type of headers contains information about the fetched request by the client.

Server Response-header: These header fields have applicability only for response messages. This type of headers contains the location of the source that has been requested by the client.

Entity-header: These header fields define meta information about the entity-body or, if no body is present, about the resource identified by the request. This type of headers contains the information about the body of the resources like MIME type, Content-length.

HTTP Response Message

HTTP/1.1 200 OK
Date: Sun, 18 Oct 2015 08:56:53 GMT
Server: Apache/2.2.14 (Win32)
Last-Modified: Sat, 20 Nov 2015 07:16:26 GMT
Accept-Ranges: bytes
Content-Length: 44
Connection: close
Content-Type: text/html
X-Pad: avoid browser bug
<html><body><h1>Guide</h1> This is guide
on HTTP protocol </body></html>

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HTTP Response

Sr. No.	Code and Description
1	**1xx: Informational:** It means the request was received and the process is continuing.
2	**2xx: Success:** It means the action was successfully received, understood, and accepted.
3	**3xx: Redirection:** It means further action must be taken in order to complete the request.
4	**4xx: Client Error:** It means the request contains incorrect syntax or cannot be fulfilled.
5	**5xx: Server Error:** It means the server failed to fulfill an apparently valid request.

Response Methods

Status Code	Reason Phrase	Description
200	OK	Standard response for successful request
401	Unauthorized	Resources are password protected
404	Not found	Requested resource is not present currently
509	Bandwidth Limit Exceeded	The server is temporarily unable to respond your request due to the site owner reaching bandwidth limit.
500	Internal server error	Software internal failure

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Status Code	Reason Phrase	Description
101	Switching Protocols	The protocol SHOULD be switched only when it is advantageous to do so. For example, switching to a newer version of HTTP is advantageous over older versions.
200	OK	Standard response for successful request.
307	Temporary Redirect	User agent MUST NOT automatically redirect the request unless it can be confirmed by the user.
401	Unauthorized	Resources are password protected.

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Difference between http and https

http	https
Transfers data in hypertext (structured text) format	Transfers data in encrypted format
Uses port 80 by default	Uses port 443 by default
Not secure	Secured using SSL technology
Starts with `http://`	Starts with `https://`

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Thank You