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History Of the Internet

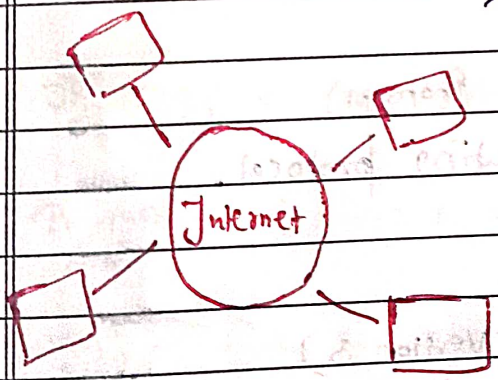
(1) **Internet :** It is the collection of computers and other peripherals.

(2) **WWW :** Collection of software and corresponding protocols that are used to access a resource over a network.

(3) **Internet Evaluation :**

USA DOD → 1969 (ARPANET)
↳ support Military research

ARPANET
↳ USENET (Users Network)
↳ CSNET (Computer Science Network)
↳ BITNET
↳ NSFNET (National Science foundation)
↳ WWW (World wide web)
↳ NREN (Nation research & Educn)
↳ Intranet
(within an organization)



(4) **Protocols :** Rules specifying the format of the messages to be exchanged among the nodes present over the Internet.

(i) **Syntax :** Structure of data & control message.

(ii) **Semantics :** → Set of control msg.
↳ Actions
↳ Response.

(iii)- Timing : Order of the event execution.

Types Of Protocols

(1) Http : It is a request/response standared between client and server. (Hypertext Transfer Protocol)

(2) ICMP : (Internet Control Message Protocol)
It is used by network Computer operating system to send error messages. If there is some problem over the network, then ICMP will send error message to the concerned authority.

(3) OSPF : (Open Shortest Path first)
It is a routing protocol which is used to find the shortest distance between nodes present over the Internet.

(4) RIP : (Routing Information Protocol)
It is a dynamic routing protocol.

(5) Pop3 : (Post Office Protocol version 3)
Use mainly by Email clients to retrieve Email from server.

(6) TCP/IP : (Transmission Control Protocol) (Internet Protocol)
It is a Communication protocol and used to establish a Connection b/w two nodes.
Eg : Before Communicating with the server, we have to establish the Connection with the server & it is done by IP.

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(7) UDP : (User Datagram Protocol)

It is used to send messages in the form of data gram.

(8) MIME : (Multipurpose Internet Mail Extension)

It extends the format of email to support diff types of char set other than ascii. It includes attached.

World Wide Web Consortium (WWW)

→ father of www : Tim-Berners Lee

→ In 1989 proposed web as a communication medium among scientists.

→ In 1990, : First text only browser.

→ In 1991 : Conferences were held about web across the globe.

→ 1993 : Only 50 website world wide & operation browser was Mosaic

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HTTP (Hypertext Transfer Protocol)

It is a protocol (set of rules) originally designed for transmitting hypermedia.

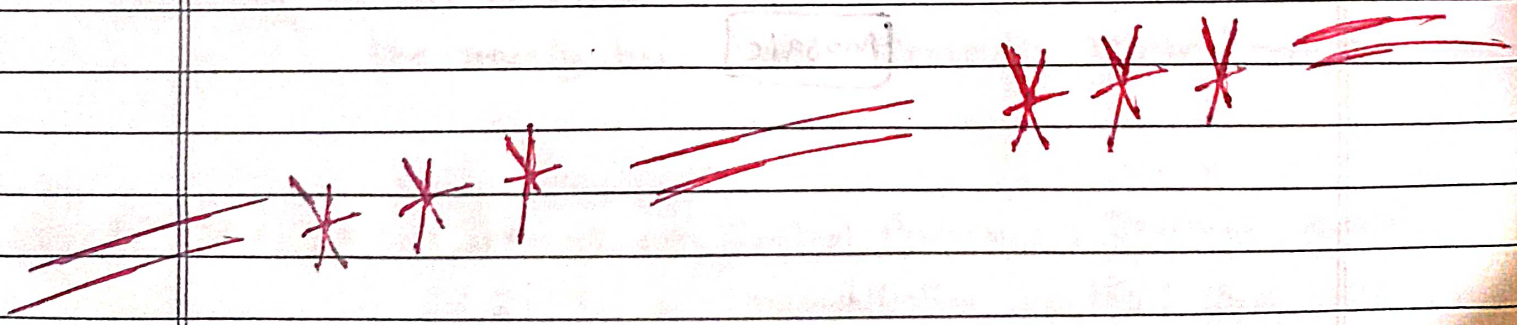
→ It also supports transmission of any file type.
→ Application layer protocol.

Procedure:

1. Establishing a connection, between 2 computers.
2. Request for a document to be sent.
3. Sending the document.
4. Closing the connection.

HTTPS

↳ Secure (file trasfer is encrypted).



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① ARPANET : Advanced Research project agency of Us Dept of defence. It started in 1969.

→ The internet evolved from basic idea of ARPANET for interconnecting comp. Initially research organization & universities use it to share & exchange files.

→ In 1989, Internet available for commercial purpose.

Basic Services Provided by Internet

① Electronic mail (E-mail)

E-mail service enable internet user to send a message to another Internet user in any part of the world. It takes few second to several mintes to reach its destination.

② File Transfer Protocol (FTP)

FTP enables an internet user to move a file from computer to another on the Internet. It contain any type of digital information like text, data, image, movie, sw etc.

→ FTP services also provides restricted file access features. (Password protected)

(3.) Telnet

Telnet service enables an internet user to log in to another computer on the Internet from his/her local computer.

Eg: A user can execute the telnet command on his/her local comp to start a login session on remote comp. This is also called "remote login".

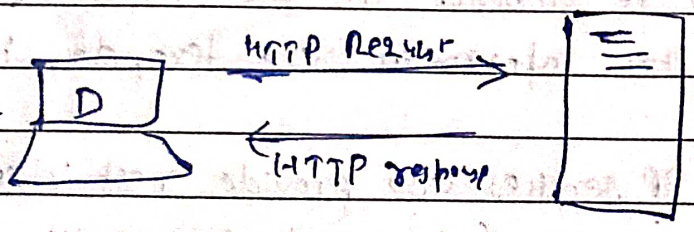
(4.) Usenet .News

This service enables a group of internet users to exchange their views/ideas/information on some common topic of interest with all members belonging to the group.

Eg: A newsgroup named comp.security.misc consists of users having interest in computer security issues.

(5.) HTTP (HyperText Transfer Protocol)

A set of rules for exchanging files such as text, graphic images, sound, video & other multimedia files on web



→ Web browser send HTTP req for webpages & their associated files.
→ Web servers send HTTP response back to web browser.

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(6) Transmission Control Protocol (TCP)

→ Purpose is to ensure the integrity of communication.

→ Breaks files and messages into individual units called packets.

WWW

(1) It is a huge collection of pages of information linked to each other around the globe.

(2) Every phase is a combination of text, picture, audio, video, animation & hyper link.

(3) Berners Lee is the father of www.

Web Pages

(1) It is a collection of normal text pictures, video clip, audio clip & hyperlink.

(2) It can be designed with html, xml, javascript etc.

HTML → It develop design structure like boxes, buttons etc.

Javascript → It validate the field.

XML → It is advance version of html.

Website

(1) It is a collection of interlink webpages.

(2) Website is accessed through URL.

(3) URL is a global address of web document on www.

(4) URL's are unique in nature, may don't have copy.

(5) There are 2 parts in URL-

- Protocol
- Resource Name

http://www.google.com

- http → Protocol
- www.google.com → Resource name

(6) Types of website are.

- Personal
- Commercial
- Government

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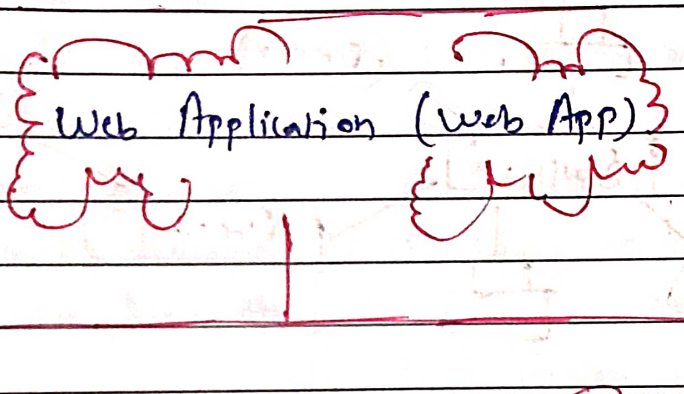
Category Of Websites

- (i) Static : Information Site
- (ii) Dynamic : Interactive Site

They have complete information on their web pages & do not retreive from any database. Eg : Blog website

They have to retreive the info from some database. Eg : Aadhar Details.



(1) It is used to implement web services.	(1) It provide client side services
(2) It is coded using CSI, JSP, ASP	(2) They are coded using HTML, XML, Javascript- eh..

when combined them they form the dynamic website.

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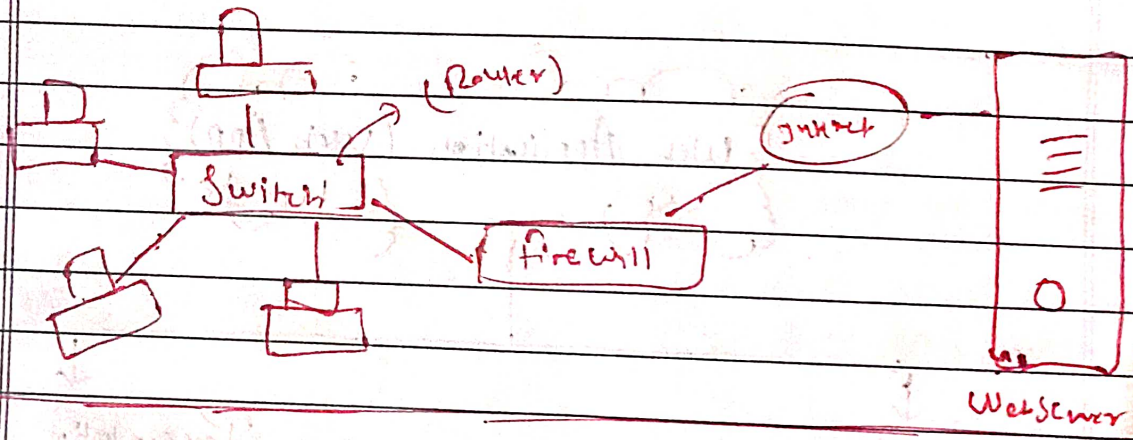
Web Architecture

1. It follows 2 tier architecture.
2. It is a combination of web server & web client.
3. Web Server produce & deliver information.
4. Web client retrieve & display info.



W3C

↳ World Wide Web Consortium.

1. W3C is an international community where member organizations, and the public work together to develop web standards.
2. W3C is primary activity is to develop rules & guidlines that ensure long term growth for the web.

Web Server	Web Browsers
(1) Web pages are created using HTML syntax. These pages must be organized & stored at a central computer.	(1) To access information stored in the form of web pages, users must connect to a web server.
(2) Computers which stores web pages in the form of directories & files and provide these files to be read are called servers.	(2) Computer that offer the facility to read information, stored in web pages are called web client.
(3) Example: Internet Information Server (IIS), Netscape Server, Apache web Server etc.	(3) Web clients run special software called brawser that allows them to (i) Connect to appropriate server (ii) Query to server for info to be read. (iii) Provide an interface to read information returned by the server. Ex: Chrome, Firefox etc...

Web Technologies

(1) Client Side : HTML, CSS, Javascript...

(2) Server Side : PHP, MySQL etc...

(3) Multimedia : flash etc...

Web 2.0

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(1.) **Web 2.0** : It is the improved version of the web 1.0, characterized specifically by the change from static to dynamic or user-generated content & also growth of social media.

Examples

(1.) Interactive social media like fb, Twitter.

(2.) Blogs like blogger, wordpress, wix etc...

(3.) WIKIS : It allows add, delete or modify content

(2.) **Advantages :**

(1.) Availability
(2.) Variety of media like images, videos, gif etc.
(3.) Easy to use
(4.) Dynamic
(5.) Real-time discussions, Ex: Comments / forum discussion

(3.) **Tools and features :**

Internet tools that allows the user to go beyond just receiving info from website. It can be content creation and sharing. Eg: Drive, Youtube, Twitter.

→ Free classification of info
→ Rich user experience means do not need to learn coding

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→ User can be a contributor
→ Content sharing or dispersion.

(4) Web 2.0 Concepts :

(i) Rich Internet Application (RIA)
We are using graphics, forms etc.-

(ii) Web-oriented Architecture (WOA)
It means advanced in integration with other website. Ex: feeds, Rss feeds, Web services.

(iii) Social Web
User generated content. Ex: Facebook

(5) Limitation :

(i) Keyword Based : No synonym result will appear.

(ii) Time Consuming for search

(iii) Inconsistent terminologies. Eg: School, Vidyalaya, Gurukul etc.

(iv) failure to remove outdated info.

(v) Missing of intelligence.

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Classroom Notes

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→ The www is more and more used for application communication. The programmatic interfaces made available are referred to as web services.

→ A web service is a software system designed to support computer to computer interaction over the Internet. Web services are not new and usually take the form of application Programming Interface (API).

→ Network Reference model : In order for a computer to send information to another computer and for that computer to receive and understand the information, there has to exist a set of rules or standards for communication process.

These standards ensure that varying devices and products can communicate with each other over any network. This set of standards is called a network reference model.

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Question Paper

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Q.1 Differentiate b/w the following:

(a) Push Protocol and Pull Protocol

(i) In push protocols, the client opens a connection to the server and keeps it constantly active. The server will send (push) all new events to the client using that single always-on connection. Here, Server pushes new events to the client.

Example: Our cell phone is always connected to the mobile network. You can tell this by the signal bars on your phones screen. When a caller calls, the network sends the call to your cell phone via that active connection your cell phone already have. This is PUSH.

(ii) In pull protocols, the client periodically connects to the server, checks for and gets (pulls) recent events and then closes the connection and disconnects from the server. The client repeat this whole procedure to get update about new events. In this, client periodically pulls the new events from the server.

Example: When you are waiting for a specific program on your TV, you repeatedly turn it on and check if your program started and then turn it off. This is PULL.

(b) Web Service and web App.

(It is answerd on next page.

Web Service	Web Application
(1.) It is a system of software allowing diff machines to interact with each other through network.	(1.) It is an application that the users acces over the inter
(2.) It can be accessed with the help of XML, SOAP, WSDL and UDDI open standard.	(2.) It can be accessed through client web browser
(3.) It is meant for computers to read.	(3.) It is meant for humans to read.
(4.) It do not necessarily have a user Interface since it is used as a Component in an application	(4.) It is a complete application with a Graphical user interface (GUI).
(5.) Ex: Weather reports, Currency Convertors.	(5.) Ex: Web mail application, Wiki Online auctions etc...

Q2 (a) what is the "Service" view of internet ? Which set of Internet protocols Enable transfer of an e-mail ? → (SMTP)

To access/exchange a large amount of data such as a Software, audio clips, video clips, text files, Other documents etc... Data is needed which comes from internet services.

You must use an internet service to connect to the Internet. Data can be sent from internet servers to your

machine via Internet Service are:

(i) Communication Services: To exchange data / Information among individuals or organizations. Following are some of the common communication Services:

→ IRC (Internet Relay chat): Subscriber can communicate in real time by connecting numerous computer in public spaces called channels

→ VoIP (Voice Over Internet Protocol): It manages how to make and receive phone calls over Internet

→ List Server (LISTSERV): Delivers a group of email receipients content-specific emails

→ E-mail: Used to send paperless electronic mail.

→ Telnet: Used to connect remote computer that's connected to the Internet.

→ Video Conferencing.

(ii) Information Retrieval Services:

It is the procedure for gaining access to the information / data stored on the Internet. Net surfing is the process of discovering and obtaining information from the Internet. To get data, we need a piece of web browser.

(iii) File Transfer :

The exchange of data files across computer systems is referred to as file transfer. To share, transfer or send a file or logical data items across several users and/or machines, both locally and remotely, we use file transfer.

Data file includes - documents, multimedia, pictures, text and PDFs, and they can be shared by uploading or downloading them.

Ex: Gopher, FTP, Archie.

(iv) Web Services :

Web Services are software that use defined messaging protocols and are made accessible for usage by a client or other web-based programs through an application services provided web server. Web services allow info to be exchanged across web based applications.

(v) World Wide Web :

The internet is a vast network of inter connected computers. Using this network, you can connect to the world wide web and can access the collection of web pages.

(vi) Directories Services : It is a set of software that keeps tracks of info about your company, customers or both. Network resource names are mapped to network address

by directory services. It includes:

→ DNS (Domain Number System): The mappings of computer hostnames and other types of domain names to IP Addresses are stored on a DNS Server.

→ LDAP (Lightweight Directory Access Protocol)

(vii) Automatic Network Address Configuration:

It assigns a unique IP address to every system in a network.

(viii) Network Management Services:

It aid in the prevention, analysis, diagnosis and resolution of network connection problems

(ix) E-commerce: Electronic Commerce is a business concepts that allows businesses and individuals to buy and sell goods through the internet. Ex: Amazon, Flipkart

Q.3 What is FTP? How does it work?

The protocol/rules that allows users to move data from one computer to another connected with the internet.

It allows users to upload/download the files from/to their computer to/from a website.

→ The data trasfer is more secure and efficient.
→ It facilitates people to use distant computers.
→ It is easy to set up and utilize.
→ Because of its uniformity, it has a universal application and so is popular to use.

→ Using ftp, users of all operating systems (window, linux etc..) can connect to the server without difficulty.

Q.4 What is SMTP?

Ans. SMTP is Simple mail Trasfer Protocol. It is responsible for trasfering email.

→ It is application level protocol.
→ It is Connection oriented protocol.
→ It is text based protocol.
→ It also provides notification regarding incoming mail.

Q.5 Differentiate b/w static webpage & dynamic webpage.

Ans.

Static Webpage:	Dynamic webpage:
(i) Content of web pages can not be change at runtime.	(i) Content of web pages can be changed.
(ii) No interaction with database.	(ii) Interaction with database.
(iii) It is faster to load.	(iii) It is slower to load.

(iv)	Cheaper developments cost.	(iv) More development costs.
(v)	No feature of content management system.	(v) Feature of content management system.
(vi)	HTML, CSS, Javascript is used for developing the website.	(vi) Server side languages such as PHP, Node.js are used.

Q.6 Differentiate b/w persistent and non-persistent http.

	Non-Persistent HTTP	Persistent HTTP
(i)	Requires 2 RTT per object.	(i) Server leaves connection open after sending response.
(ii)	OS overhead for each TCP connection.	(ii) Subsequent HTTP messages b/w same client/server client over open connection.
(iii)	Browsers often open parallel TCP connections to fetch referenced objects.	(iv) Client sends requests as soon as it encounters a referenced object.
		(v) As little as one RTT for all referenced objects.

Q.7 fetching something over the network is both slow and expensive. What can be done to improve the Quality of Service (QoS) of the web servers?

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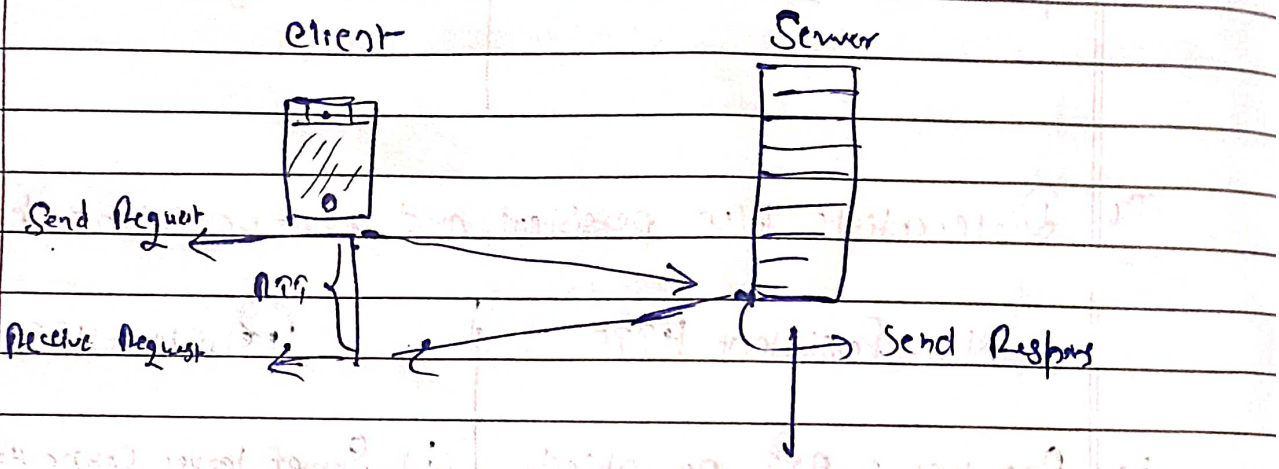
Ans. In networking, round trip time (RTT) is a metric that measures in milliseconds the amount of time it takes for a data packet to be sent plus the amount of time it takes for acknowledgement of that signal to be received. This time delay includes propogation times for the paths b/w the two communication endpoints



Quality of service (QoS) can be improved by reducing the RTT in the following ways :

(1) Reducing the no of unique hostnames from which resources are served cut down on the no of DNS resolutions that the browser has to make.

(2) Minimizing HTTPS redirects from one URL to another.

(3) Removing broken links or requests that results in 404/410 error

(4) Browser caching will cache certain resources of a website locally in order to improve RTT.

(5) Bring content closer to the User by creating a server closer to user or you can use CDN which can do this automatically for you.

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Q.8 How is ranking done in a typical search engine? What do you understand by the intrinsic "filering" measure, Tf-Idf?

Ans. (i) When someone performs a search, search engines scour their index for highly relevent content and then orders that content in the hopes of solving the searcher's query. This ordering of search results by relevance is known as ranking.

In general, you can assume that the higher a website is ranked, the more relevant the search engine believes that site is to the query.

(ii) **Tf-Idf**

→ It stands for term freguency and inverse document freguency.

→ These are the two matrices that are closely interrelated & search and figure out the relavancy of a given word to a document given a larger body of document. So, for example every article of wikipedia might have a Tf associated with it.

Every page on the web could have a term freguency associated with it for every page word that appears in that document.

→ All Tf means how often a word occured in a given document. A world that occurs frequently is probably important to that document's meaning.

→ Higher the Tf-Idf score the more relevent the term is, as a term gets less relevant, its Tf-Idf score will approach 0.

Q.9 Write a short note on server side technology?

Ans: The term 'server side technologies' can encompass a range of software solutions, mainly: server-side scripting languages; Database management systems (DBMs); web server software such as Apache; and many more technologies depending upon the application being built.

The essential combination of technologies required to build a service is known as 'software solution stack' and the original and most commonly used web service software solution stack is known as LAMP (An acronym for Linux, Apple, MySQL, & PHP).

The components of stack are interchangable & hundreds of other acronyms exist to encompass different technologies. It is worth-noting that the stack must include four components; a operating system; a web-server instance; a database management system and a server-side scripting language.

Q.10 Differentiate b/w social web & sementic web

Social web	Sementic web
(i) Centralized: Application delivery, cloud services and platforms are governed and operated by centralized authorities.	(i) Decentralized: Edge computing, peer to peer and distributed consensus increasingly become the norm in web 3.0 or sementic web.

(i) Fiat Currency : Payments and transaction occur with gov issued currency. Ex: USD	(ii) Cryptocurrency : Along with fiat currency, encrypted digital currencies will also be accepted.
(iii) Cookies : It helps to track users and provide personalization.	(iii) NFTs : User can get unique tokens that are assigned value or provide some form of item.
(iv) Css and Ajax : It is defined by layout technologies that provide more dynamic control than Web 1.0	(iv) It include AI, smarter, autonomous technology including machine learning.
(v) It uses Databases	(v) It will use Blockchain