

Chapter 1: Overview of Internet and Web Technology

Course: Web applications

1.1 Overview of Internet

What is Internet and Web Technology

<u>Internet</u> is a collection of various types of networks, located in the web servers.

Web technology is defined as the technology through which we can develop or create various types of web pages.



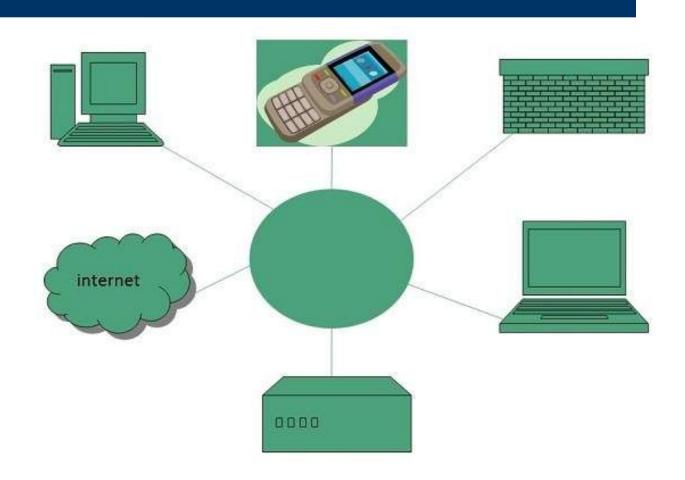
1.1.1 Introduction to Internet

What do you mean by a web page?

A web page is a document or resource of information is usually written in HTML that is suitable for the world wide web(WWW)

What do you mean by World Wide Web(WWW)?

World wide web is a system, based on the hypertext and HTTP, for providing, organizing, and accessing a wide variety of resources.



Internet is defined as an Information super Highway, to access information over the web. However, It can be defined in many ways as follows:

- Internet is a world-wide global system of interconnected computer networks.
- Internet uses the standard Internet Protocol (TCP/IP).
- Every computer in internet is identified by a unique IP address.
- IP Address is a unique set of numbers (such as 110.22.33.114) which identifies a computer location.
- A special computer DNS (Domain Name Server) is used to give name to the IP
 Address so that user can locate a computer by a name.
- For example, a DNS server will resolve a name http://www.tutorialspoint.com to a particular IP address to uniquely identify the computer on which this website is hosted.
- Internet is accessible to every user all over the world

The concept of Internet was originated in 1969 and has undergone several technological & Infrastructural changes as discussed below:

- The origin of Internet devised from the concept of Advanced Research Project Agency Network (ARPANET).
- ARPANET was developed by United States Department of Defense.
- Basic purpose of ARPANET was to provide communication among the various bodies of government.
- Initially, there were only four nodes, formally called Hosts.
- In 1972, the ARPANET spread over the globe with 23 nodes located at different countries and thus became known as Internet.
- By the time, with invention of new technologies such as TCP/IP protocols, DNS, WWW, browsers, scripting languages etc., Internet provided a medium to publish and access information over the web.

Social Networking

Education and technology

Internet Advantages

Entertainment

Online services

Threat to personal information

Spamming

Internet Disadvantages

Cyber Crime

Virus Attacks

Difference between Web and Internet:

Internet	Web
The Internet is the network of networks and the network allows to exchange of data between two or more computers.	The Web is a way to access information through the Internet.
It is also known as the Network of Networks.	The Web is a model for sharing information using the Internet.
The Internet is a way of transporting information between devices.	The protocol used by the web is HTTP.
Accessible in a variety of ways.	The Web is accessed by the Web Browser.
Network protocols are used to transport data.	Accesses documents and online sites through browsers.

What is a markup language?

It is a language which is used to format the text inside the HTML document. So that the look and feel of a webpage will increase.

What is the format of HTML document?

```
<html>
<head>
<title>Title of the page</title>
</head>
<body>
// Body of the Web page
</body>
</html>
```

How many types of tags present in HTML?

- Two types.
 - (i) <u>paired tag</u>:- The tag is said to be paired if it is along with a companion tag and they have an opening and ending tag.
 - (ii) <u>singular tag</u>:- The tag is said to be singular if it does not have a companion tag and they have only one opening tag.

What is the required HTML code for linking?

The required HTML code for linking is

Click here to go

What is the difference between Java and JavaScript?

- Java is an object oriented programming language where as JavaScript is more of a scripting language. JavaScript is used to make the web page more interactive. However, Java can be used not only to make interactive web pages but can also be used to create server site applications and standalone programming.

What can a JavaScript do?

- JavaScript gives HTML designer a programming tool. It can reach to event. It can read and write HTML documents. It can put dynamic text into an HTML page. It can be use to validate data.

Write down the JavaScript code for Print "HELLO WORLD".

```
<html>
<head>
<script language="JavaScript">
function display()
{
   document.write("HELLO WORLD");
}
</script>
</head>
</html>
```

What is the difference between programming language and markup language?

programming language is an artificial language designed to communicate instruction to a machine, particularly a computer, where as markup language is a language that is used to format the text inside the HTML document, so that the look and feel of a web page will increase. Programming languages can be used to create programs that control the behavior of a machine and/or to express algorithm precisely. The term Markup means the only particular text will change that is specified within the opening and closing tag. For instance, the
tag instructs a browser to display the text that comes after it in bold text. To end the bold text, the tag is inserted.

What do you mean by Web server?

- A web browser is a software that runs on a computer and responds to the requests made by other computers on the network. The web browser, an application program sends request to a web server and accepts response from the server.

A web server manages the web sites, accepts a client's request and responds to a client request by sending required information.

The Apache HTTP server commonly referred to as Apache, is a web server notable for playing a key role in the initial youth of the world wide web. Apache was the first viable alternative to the Netscape communications corporation web server. The first version of Apache web server was created by Robert McCool, who was involved with the National Center of Super computing Applications web server, known as NCSAHTTP.

1.1.2 Protocols

What do you mean by protocol? Describe different types of protocols.

Protocol means the set of rules by which more than one network can be connected with each other. Different types of protocols are described below.

Transmission Control Protocol(TCP) is responsible for verifying the correct delivery of data from client to server. It adds support to detest errors or lost data and to trigger re transmission until the data is correctly and completely received.

1.1.2 Protocols (cont.)

What do you mean by protocol? Describe different types of protocols.

Internet Protocol(IP) is responsible for verifying the correct delivery of data from client to server. It forwards each packet based on a four byte destination address(IP number).

File Transfer Protocol(FTP) is used for transferring files from one computer to another typically from your computer to a web server.

Hyper Text Transfer Protocol(HTTP) governs the transfer of hypertext between two or more computers in hypertext or hypermedia environment.

URI stands for 'Uniform Resource Identifier'. A URI can be a name, locator, or both for an online resource whereas a URL is just the locator. URLs are a subset of URIs. A URL is a human-readable text that was designed to replace the numbers (IP addresses) that computers use to communicate with servers.

1.1.3 Domain

What is domain?

Specific to the internet, the term domain can refer to how the internet is structured, and domain also refers to how an organization's network resources are organized. In general, a domain is an area of control or a sphere of knowledge.

What is an internet domain?

An internet domain is an administrative structure for organizing, delivering and accessing services on the internet. The terms "domain" and "domain name" are often used interchangeably (in context of the internet) because the domain structure is associated with how domains are named.

1.1.3 Domain (cont.)

Internet domains are set up in accordance with the Domain Name Service (<u>DNS</u>), an application layer protocol and service used on networks to translate host names to their associated <u>IP</u> addresses. DNS is an essential component of the internet. It is implemented as a decentralized, <u>hierarchical</u> system that's distributed globally across a conglomeration of DNS servers. The service acts as a giant directory for resolving domain names to IP addresses and IP addresses to domain names, irrespective of where the domains are located.

The DNS system allows internet users to access content by remembering a name rather than an IP address. For example, DNS makes it possible for users to type techtarget.com in a browser to connect to the TechTarget website, without knowing the associated IP address.

1.1.3 Don

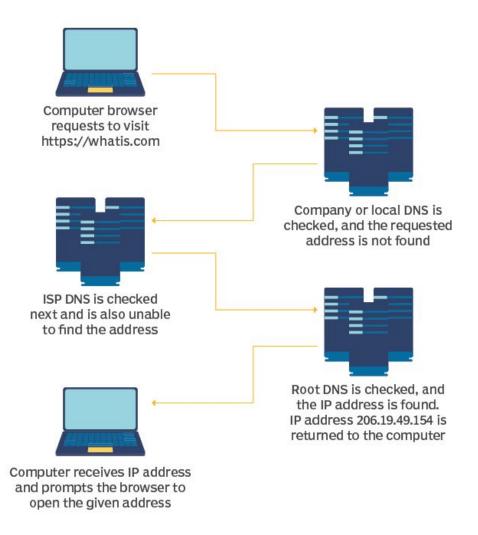
Youtube

video:

https://youtu.be/9

d0iu2Q6iMU

How DNS works



ICONS: MAGLARA/ADOBE STOCK

Web Technology refers to the various tools and techniques that are utilized in the process of communication between different types of devices over the internet.

A web browser is used to access web pages. Web browsers can be defined as programs that 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.

Web Technology can be classified into the following sections:

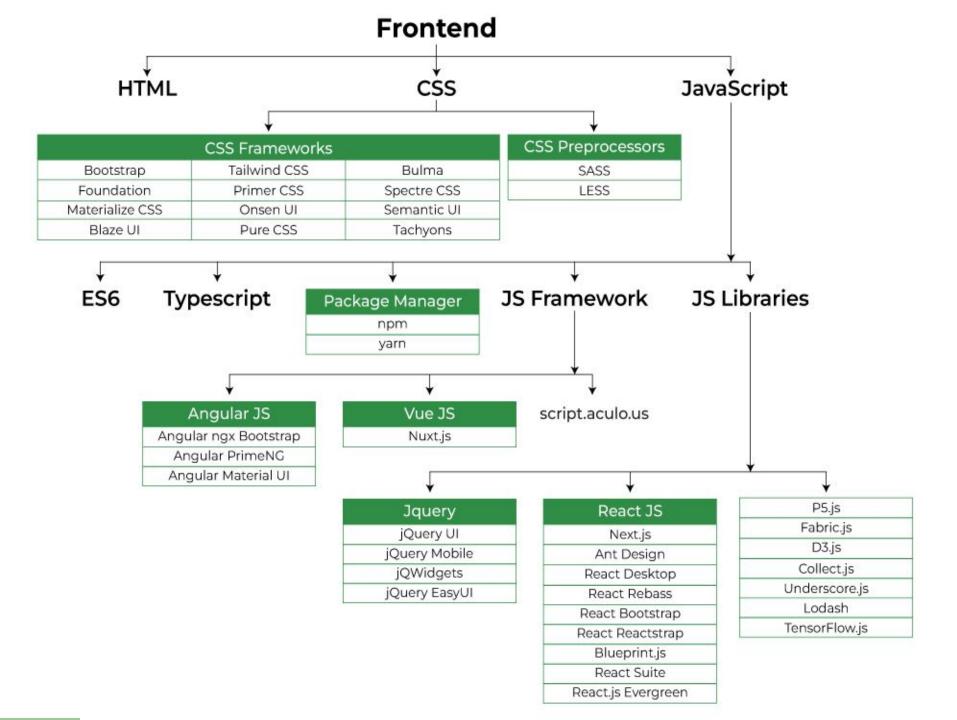
- World Wide Web (WWW): The World Wide Web is based on several different technologies: Web browsers, Hypertext Markup Language (HTML) and Hypertext Transfer Protocol (HTTP).
- Web Browser: The web browser is an application software to explore www (World Wide Web). It provides an interface between the server and the client and requests to the server for web documents and services.
- Web Server: Web server is a program which processes the network requests of the users and serves them with files that create web pages. This exchange takes place using Hypertext Transfer Protocol (HTTP).

Web Technology can be classified into the following sections: (cont.)

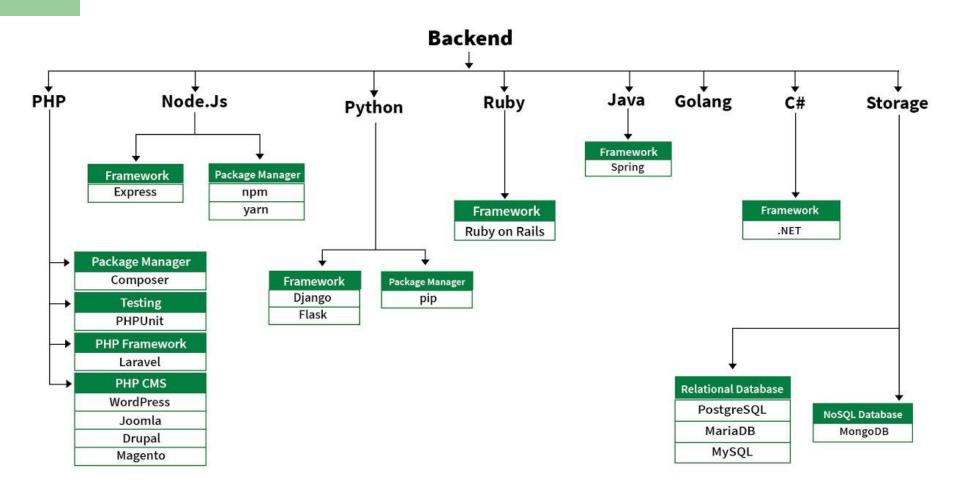
- Web Pages: A webpage is a digital document that is linked to the World Wide Web and viewable by anyone connected to the internet has a web browser.
- Web Development: Web development refers to the building, creating, and maintaining of
 websites. It includes aspects such as web design, web publishing, web programming, and
 database management. It is the creation of an application that works over the internet i.e.
 websites.
- Web Development can be classified into two ways:
 - Frontend Development: The part of a website that the user interacts directly is termed as front end. It is also referred to as the 'client side' of the application.
 - Backend Development: Backend is the server side of a website. It is the part of the website that users cannot see and interact. It is the portion of software that does not come in direct contact with the users. It is used to store and arrange data.

Web Technology can be classified into the following sections: (cont.)

Web Development can be classified into two ways:



Web Technology can be classified into the following sections: (cont.)



1.2.1 World Wide Web

World Wide Web (WWW), byname the Web, the leading information retrieval service of the Internet (the worldwide computer network). The Web gives users access to a vast array of documents that are connected to each other by means of hypertext or hypermedia links—i.e., hyperlinks, electronic connections that link related pieces of information in order to allow a user easy access to them.

A hypertext document with its corresponding text and hyperlinks is written in HyperText Markup Language (HTML) and is assigned an online address called a Uniform Resource Locator (URL).

1.2.1 World Wide Web (c0nt.)

Hypertext allows the user to select a word or phrase from text and thereby access other documents that contain additional information pertaining to that word or phrase. Hypermedia documents feature links to images, sounds, animations, and movies. The Web operates within the Internet's basic client-server format; servers are computer programs that store and transmit documents to other computers on the network when asked to, while clients are programs that request documents from a server as the user asks for them. Browser software allows users to view the retrieved documents.

. 1.2.2 URL address

The URL makes it possible for a computer to locate and open a web page on a different computer on the Internet. An example of a URL is https://www.ou.edu.vn, the URL for the OU website.

An example:



http:// or https://

The "HTTP" stands for Hypertext Transfer Protocol. It lets the browser know which protocol it's going to use to access the information specified in the domain.

An "HTTPS" protocol is short for "Hypertext Transfer Protocol Secure" and indicates that information transmitted over HTTP is encrypted and secure. After the HTTP or HTTPS is the colon (:) and two forward slashes (//) separate the protocol from the remainder of the URL.

A URL is not explicit to HTTP or HTTPS addresses; FTP, TFTP, Telnet, and other addresses are also considered URLs and may not follow the same syntax as our example.

www.

Next, "www" stands for World Wide Web and is used to distinguish the content. This portion of the URL is not required and **can be left out** many times. For example, typing "http://computerhope.com" would still get you to the Computer Hope website. The address portion can also be substituted for an important sub-page known as a subdomain.

url.htm

Finally, url.htm is the actual web page on the domain you're viewing. The trailing .htm is the file extension of the web page that indicates the file is an HTML file. Other common file extensions on the Internet include .html, .php, .asp, .cgi, .xml, .jpg, and .gif. Each of these file extensions performs a different function, like all the different types of files on your computer.

As you may have noticed, the protocol, domain, directories, and files are separated by forward slashes (/).

What characters are not allowed in a URL?

Most people realize that spaces are not allowed in a URL. However, it is also important to realize, as documented in RFC 1738, the URL string can only contain alphanumeric characters and the !\$-_+*'(), characters. Any other characters that are needed in the URL must be encoded.

Understanding more complex URLs and parameters

When a URL points to a script that performs additional functions, additional information (parameters) is added to the end of the URL. For example, a search engine URL pointing to a search results page includes a parameter with the search query words.

Below is an example URL that points to the Computer Hope search page, with the search query parameter of "example search".

. 1.2.2 URL address (cont.)

Understanding more complex URLs and parameters (cont.)

https://www.computerhope.com/cgi-bin/search.cgi?q=example%20search

In this URL, the script file being pointed to is *search.cgi* in the cgi-bin directory. Because this file ends with .cgi, it is assumed to be a Perl script.

After the script file name is a ? (question mark). The question mark in a URL separates the URL from all the parameters or variables sent to the script. In the example above, the parameter is q=example%20search. The "q" is a variable name, and the "example%20search" is the value for that variable. Because no spaces are allowed in a URL, the space is encoded as $\frac{\%20}{}$. In many scripts, a $\frac{1}{}$ (plus) is also used to represent a space.

. 1.2.2 URL address (cont.)

Is an IP address the same as a URL or web address?

No. An IP address is a unique number assigned to each device on a network. A domain name is assigned a unique IP address on the World Wide Web. When typed (e.g., computerhope.com), DNS translates the domain name into an IP address that routers use to find the web server. A domain name is used instead of an IP address because it's easier for humans to remember. For example, it's easier to remember "computerhope.com" than it is to remember an IP address like "216.58.216.164". See our IP address for further information about an IP.

. 1.2.2 URL address (cont.)

Is an IP address the same as a URL or web address?

. . .

You could think of a domain name like a house picture and the IP address as the house's address. The picture gives you a representation of what the house looks like, but without the address, you'd never be able to locate that house.

1.2.3 Web browser

- A web browser takes you anywhere on the internet, letting you see text, images and video from anywhere in the world.
- web browsers like Mozilla Firefox, Google Chrome, Microsoft Edge and Apple Safari ...

How does a web browser work?

A web browser takes you anywhere on the internet. It retrieves information from other parts of the web and displays it on your desktop or mobile device.

The information is transferred using the **Hypertext Transfer Protocol**, which defines how text, images and video are transmitted on the web. This information needs to be shared and displayed in a consistent format so that people using any browser, anywhere in the world can see the information.

1.2.3 Web browser (cont.)

How does a web browser work? (cont.)

When the web browser fetches data from an internet connected server, it uses a piece of software called a rendering engine to translate that data into text and images. This data is written in Hypertext Markup Language (HTML) and web browsers read this code to create what we see, hear and experience on the internet.

Hyperlinks allow users to follow a path to other pages or sites on the web. Every webpage, image and video has its own unique Uniform Resource Locator (URL), which is also known as a web address. When a browser visits a server for data, the web address tells the browser where to look for each item that is described in the html, which then tells the browser where it goes on the web page.

1.2.3 Web browser (cont.)

Cookies (not the yummy kind)

Websites save information about you in files called <u>cookies</u>. They are saved on your computer for the next time you visit that site. Upon your return, the website code will read that file to see that it's you. For example, when you go to a website, the page remembers your username and password – that's made possible by a cookie.

There are also cookies that remember more detailed information about you. Perhaps your interests, your web browsing patterns, etc. This means that a site can provide you more targeted content – often in the form of ads. There are types of cookies, called *third-party* cookies, that come from sites you're not even visiting at the time and can track you from site to site to gather information about you, which is sometimes sold to other companies. Sometimes you can block these kinds of cookies, though not all browsers allow you to.

1.2.3 Web browser (cont.)

Understanding privacy

Nearly all major browsers have a private browsing setting. These exist to hide the browsing history from other users on the same computer.

Many people think that private browsing or incognito mode will hide both their identity and browsing history from internet service providers, governments and advertisers. **They don't.**

These settings just clear the history on your system, which is helpful if you're dealing with sensitive personal information on a shared or public computer.

1.2.4 Definition of Static Web and Dynamic Web

A static website is one with stable content, where every user sees the exact same thing on each individual page. On the other hand, a dynamic website is one where content is pulled on-the-fly, allowing its content to change with the user.

What is a static website?

A static website is made up of webpages created using HTML, CSS and Javascript (all examples of web development languages). Each page on a static website is stored as a single HTML file, which is delivered directly from the server to the webpage exactly as is. This content essentially becomes a part of the design on your page, and won't change unless the original HTML file is edited at a code level.

1.2.4 Definition of Static Web and Dynamic Web (c0nt.)

What is a dynamic website?

Built using server side language and technology, dynamic websites allow for the content of each page to be delivered and displayed dynamically, or on-the-fly, according to user behavior or from user-generated content.

With a dynamic website all of your data and content are organized in a database or backend Content Management System (CMS), which connects to your website pages. The way this information is arranged and connected to your site's design controls how and when its 45 content is revealed on a page.

The main differences between a static vs dynamic website

Content on a static website is stable and doesn't change. Content on a dynamic website can change according to how you want it to behave and what you want specific users to see.

Content changes on a static website need to be made page by page, on a dynamic website they can be made across hundreds of pages automatically.

Dynamic websites may take longer to initially setup but long term they can be more efficient to manage. Static websites conversely can be created fast but as they grow will require more intensive content management. Content on a static website is stored directly on the server and pulled as is. Content on a dynamic website is stored in a database or collection and delivered according to how it is organized or filtered.

A dynamic site can have its content displayed according to how a user interacts with the site, it can also have input from a user. This functionality is more limited with a static website.

1.2.5 Web Activities

Measures of online behaviors including visiting sites, uploading/downloading content, searching for information and completing tasks.

1.3 Software

Software is a set of instructions, data or programs used to operate computers and execute specific tasks. It is the opposite of hardware, which describes the physical aspects of a computer. Software is a generic term used to refer to applications, scripts and programs that run on a device. It can be thought of as the variable part of a computer, while hardware is the invariable part.

The two main categories of software are <u>application</u> software and <u>system</u> <u>software</u>. An application is software that fulfills a specific need or performs tasks. System software is designed to run a computer's hardware and provides a platform for applications to run on top of.

Other types of software include programming software, which provides the programming tools software developers need; <u>middleware</u>, which sits between system software and applications; and <u>driver</u> software, which operates computer devices and peripherals.

Early software was written for specific computers and sold with the hardware it ran on. In the 1980s, software began to be sold on floppy disks, and later on CDs and DVDs. Today, most software is purchased and directly downloaded over the internet. Software can be found on vendor websites or application service provider websites.

Watch the video: https://youtu.be/XgzwUrGi_nY

Examples and types of software

Among the various categories of software, the most common types include the following:

Application software
System software
Driver software
Middleware
Programming software

Software stack

Application (such as a CRM or ERP tool)

Middleware (applications such as a database)

OS UI

OS services

OS drivers and runtimes

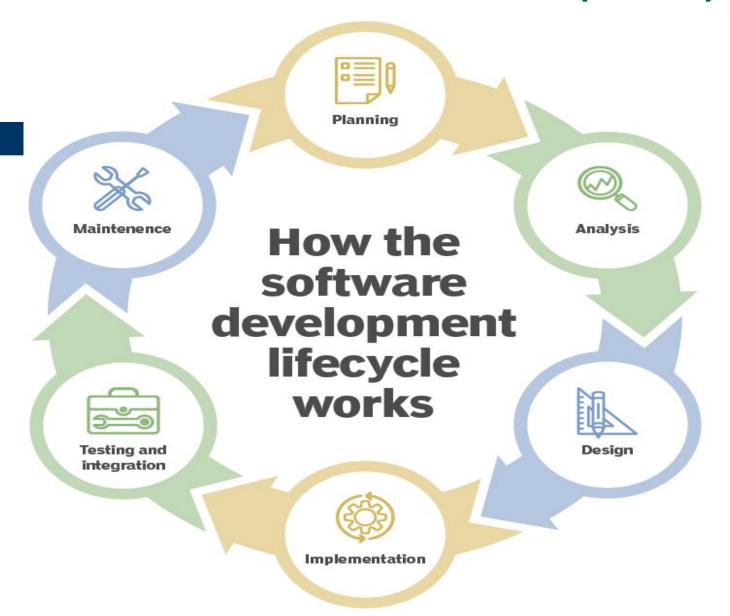
Hypervisor (optional)

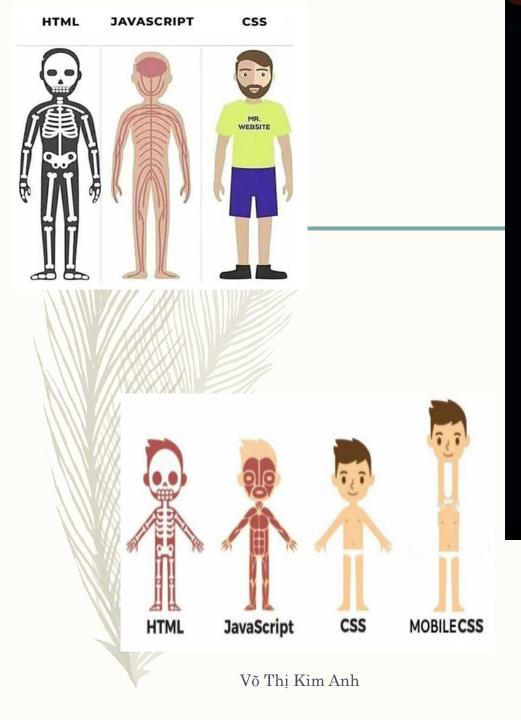
Firmware (BIOS)

Hardware

System software vs. application software

System software	Application software
General-purpose software that manages basic system resources and processes	Software that performs specific tasks to meet user needs
Written in low-level assembly language or machine code	Written in higher-level languages, such as Python and JavaScript
Must meet specific hardware needs; interacts closely with hardware	Does not take hardware into account and doesn't interact directly with hardware
Installed at the same time as the OS, usually by the manufacturer	User or admin installs software when needed
Runs any time the computer is on	User triggers and stops the program
Works in the background and users don't usually access it	Runs in the foreground and users work directly with the software to perform specific tasks
Runs independently	Needs system software to run
Is necessary for the system to function	Isn't needed for the system to function



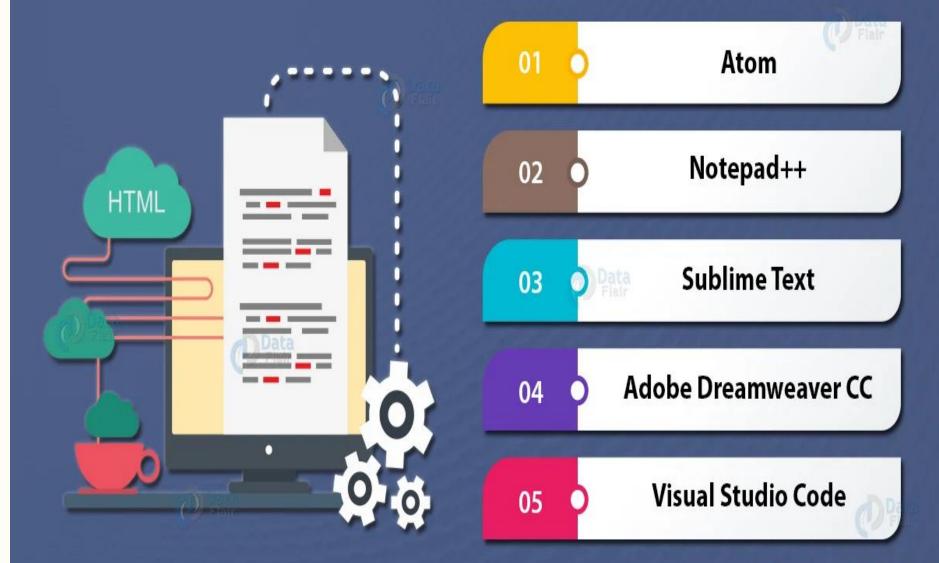


HTML — for structure. **CSS** — for style. JavaScript — for fun. React for — work. **C** — for dinosaurs. C++ — for college. **C#** — for games. Swift — for UI. **Ruby** — for rails. PHP — for \$. **jQuery** — for legacy. **Python** — for science. **TypeScript** — for safety.

Java — for 3 billion devices.



HTML Editors



Foundations







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Types of HTML Editors





https://data-flair.training/blogs/html-editors/

FEATURES	DREAMWEAVER	SUBLIME
OVERALL RATING	90%	80%
TOOL SELECTION	90%	80%
INTERFACE	80%	80%
FOR BEGINNERS	80%	90%
MOBILE APP	70%	100%
FUNCTIONALITY	90%	70%
CUSTOMER SUPPORT	70%	60%
WORK SPEED	80%	80%
SUPPORT FORMATS	80%	70%
PRICING	100%	70%

Foundations

Installation: IDE and related environment (online/offline)







Set-up free hosting

1.3.1 Notepad ++



Notepad++ is a free, open-source, multi-language code editor which was initially developed for Windows-based computers. It uses 'Scintilla' as the editing component and is written in C++.

Key Features of Notepad++

- It is a lightweight software i.e. smaller program size. It is also available as an application on mobiles and its source code is available on GitHub.
- Since it is an open-source code editor, it is extendable and the users can add functionalities as per their needs or add plugins from different communities.
- ☐ It is customizable thus allowing the users to personalize the features as per their preferences.



it.

Development Environment – Notepad++ has a familiar environment as most of the windows' software's and has a minimalist interface. It supports changing themes and color-coding. We can easily Download Notepad++ and use

Perks to the Developers

- It is a super lightweight editor with color-coding.
- Developers can customize its interface according to their preference.
- ☐ Due to its extensibility, developers can add plug-ins and create their own.

1.3.2 Sublime Text



It is a cross-platform editor with Python API. Its latest version was released on 29 January 2013.

Key Features of Sublime Text

- It has the provision of simultaneous editing i.e. it is possible to apply changes to several domains at a particular time.
- It provides many actions such as- command palette, file switching, goto symbols, multi-edit, alignment, bracket-highlighter, etc.
- ☐ Sublime falls under the category of freemium software i.e. we need to pay additional money to enjoy all its features.

☐ Some of the packages of sublime are open-source and



Development Environment – Sublime text provides a sophisticated and aesthetic development environment which can also be customized by the developers.

Perks to the Developers

- The 'Goto Anything' feature enables developers to open files with just a few keystrokes and immediately go to words, lines or symbols.
- The feature of multiple selections enables developers to make many changes at the same time such as manipulate many lines at once.
- Split Editing permits editing of files side-by-side which escalates the rate of development.

1.3.3 Adobe Dreamweaver



Adobe Dreamweaver CC has been developed by Adobe Inc. However, it is a closed-source software and works well only within an Adobe ecosystem.

Key Features of Sublime Text

- It has proven to be an important tool in the domain of web-designing using the aesthetic cloud libraries of Adobe promoting colors, graphics, layers, etc.
- It can be used as a text as well as WYSIWYG(what you see is what you get) editor i.e. code can be edited with or without a visual guide.
- ☐ This gives the developers additional features of previewing the end results of the code.
- □/₀ ៅ្សស្នេត្តful for full-stack development.



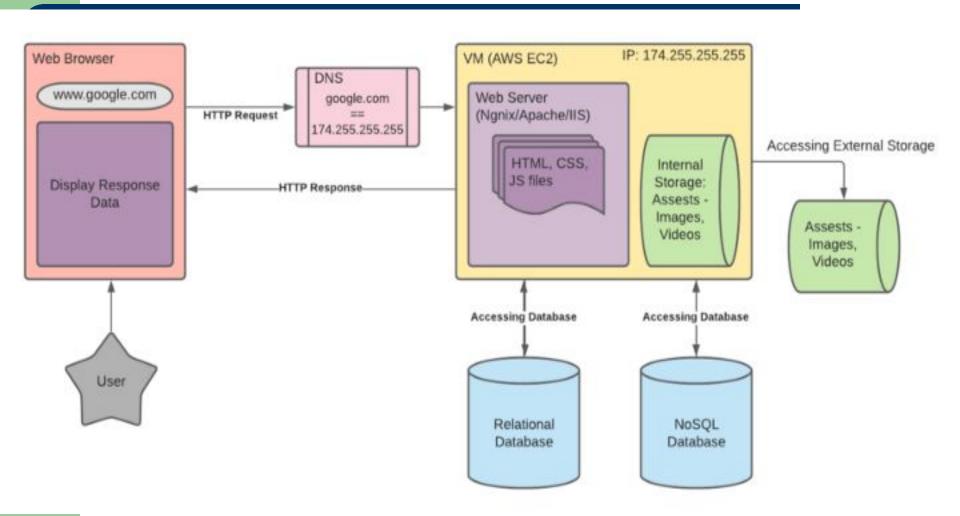
Development Environment – Created by Adobe,
Dreamweaver cc provides a magnificent design
and layout for the workspace. Anyone can easily

Download Dreamweaver CC and use it.

- Perks to the Developers
 - Adobe Dreamweaver provides a dynamic display and builds web-pages that can fit on any screen.
 - The feature of preview enables the developers to know how exactly their web page would look, before publishing it.
 - ☐ The workspace is customizable, enabling the developers to see only the tools they need in order to code.
 - view web pages on multiple monitors.

1.4 How to create and deploy a Web application

http://mariechatfield.com/tutorials/web-app/



1.4.1 Create Web application

How to Create a Web Application [Step by Step Guide]

Step 2

Research about Current Market Step 4

Design & Develop an MVP Step 6

Get Feedback of MVP Web App













Step 1

Validate Your Web App Step 3

& Choose the Right
Developer

Step 5

Test & Launch an MVP



1. Find a Genuine App Idea

9. Deploy Your App







2. Market Research

8. Host Your Application on the Web



WEB APPLICATION DEVELOPMENT PROCESS



3. Define Functionality

7. Choose Your Technology





6. Time to Start Validating

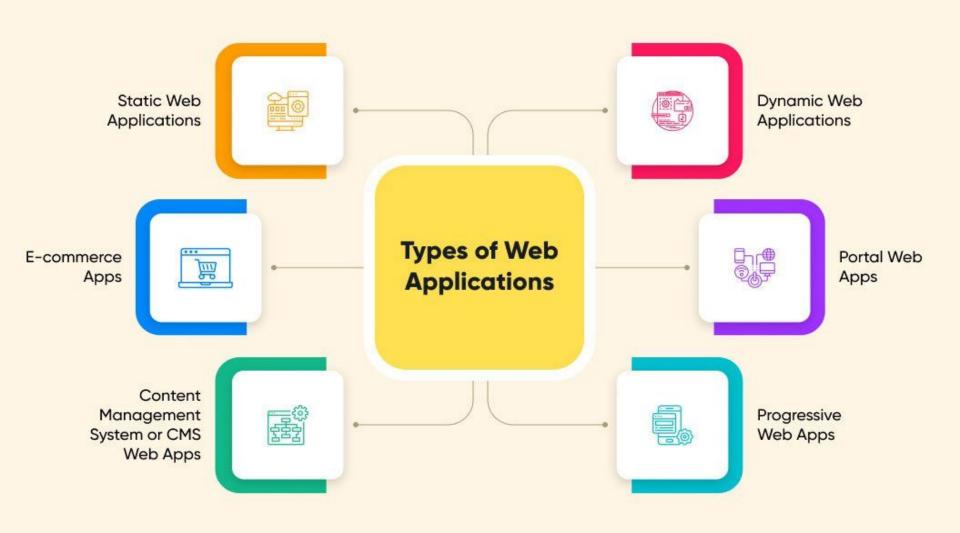


5. Wireframes & Prototypes



4. Sketch Your Web App Design

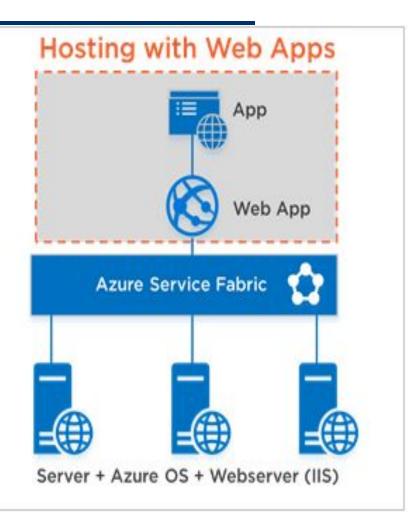




net solutions

1.4.2 Deploy the Web application to the host

Traditional Webhosting App Server + OS + Webserver (IIS)



Referenced
Azure Services Azure Web App

Azure SQL

Cosmos DB

Azure BLOB Storage

Azure DNS

Application Gateway

Azure CDN

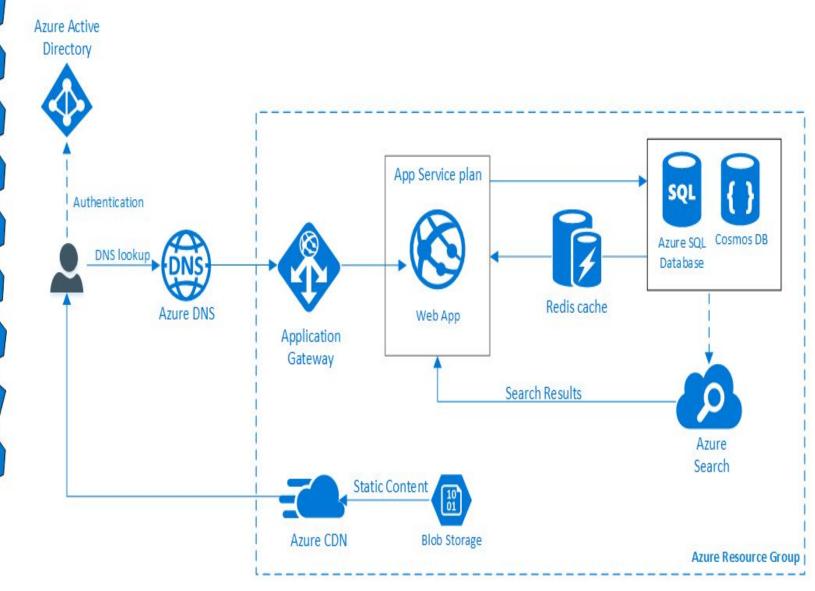
Azure Active

Directory

Azure Search

Azure Web Application

Web Application architecture with improved scalability and performance using Azure Web App, Redis, NoSQL, Content Delivery Network and Search.







Write down the HTML code for Create the following Table.

Name	Branch
Ram	CSE
Hari	ETC
Binod	MECH

Write down the HTML code for Create the following Table (c0nt.)

```
<html>
<body>
NameBranch
RamCSE
HariETC
BinodMECH
</body>
</html>
```

References Chapter 1

Check the course materials.