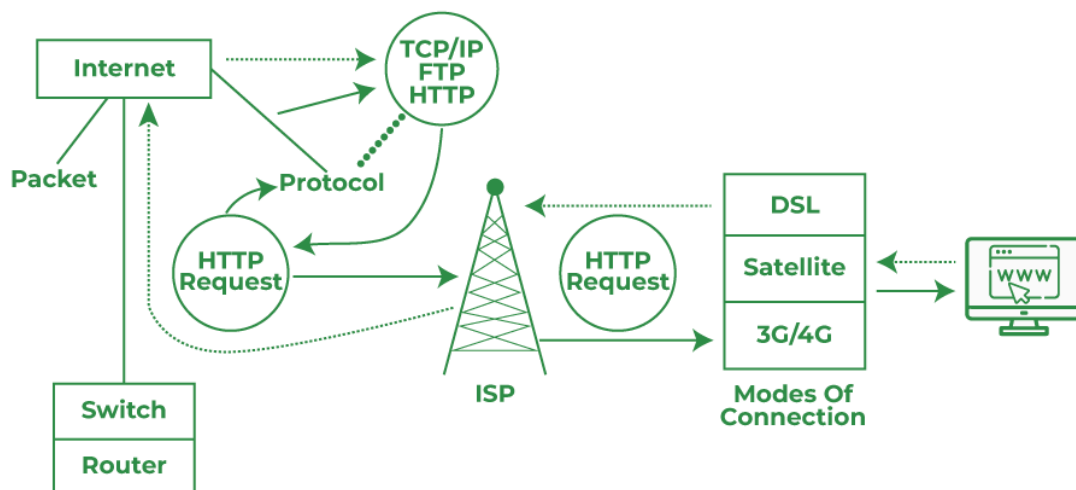# Assignment 1

1. How does the internet work?

- Largest computer network scattered all over the world
- Global network of networks connecting millions of computers
- It uses standard TCP/IP protocol

Working of Internet

There are two main concepts that are fundamental to the way the Internet functions: *packets* and *protocols*.

1. Firstly, connect your system or PC with any router or modem to establish a connection. This connection is the base of the internet connection.
2. Open the browser and start typing "www.google.com", then the system will push a query command to your ISP (Internet Service Provider) that is connected with other servers that store and process data.
3. Now, the web browser will start indexing the URL that you've entered and will fetch the details in numeric format (in their language to identify the address *(unique)* that you're trying to reach.

4. Next, now your browser will start sending the HTTP request where you're trying to reach and send a copy of the website on the user's system. **Note:** *The server will send data in the form of small packets (from the website to the browser)*

5. Once all the data (of small packets) is received at the user's end (PC/Laptop), the browser will start arranging all those small packets and later will form a collective file (here, the browser will gather all the small packets and rearrange them just like a puzzle) and then you'll be able to see the contents of that website

2. How Browsers Work?
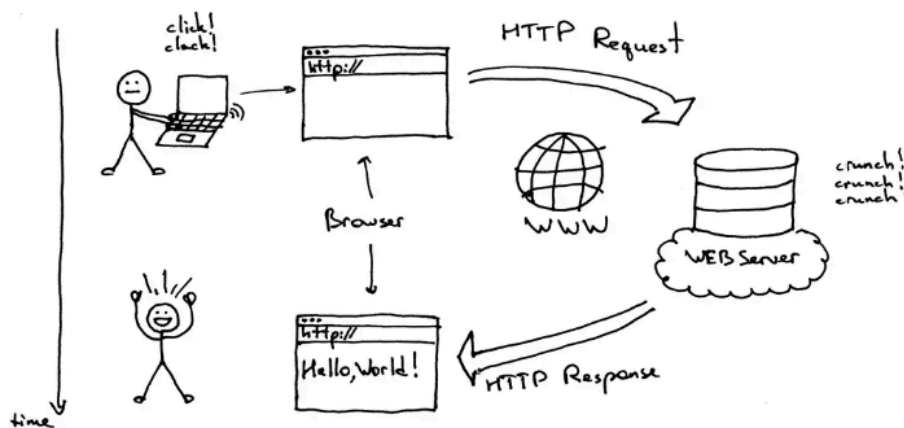
The process begins with Domain Name System (DNS) resolution, where the browser translates the domain name into an IP address to locate the server where the web page is stored.

● The browser then sends an HTTP request to the server, specifying the path and parameters of the requested resource.

● Once the server receives the request, it sends an HTTP response to the browser containing the requested resource in HTML, CSS, and JavaScript code.

● The browser's rendering engine interprets and renders the code to display the web page on the user's device.

● The CSS stylesheets are applied to format the web page's content, including fonts, colors, and layout.

● The browser may also execute JavaScript code on the web page to add interactivity and dynamic behavior.

● As new content is loaded or changes are made to the web page, the browser updates the display accordingly.

3. What is a Server?

A server is a system that provides resources, data, services, or programs to other computers, known as clients, over a network.

The machine (computer- along with its software) that serves other computers is called the server.
The machine (computer -along with its software) that requests service from the above computer is called client.
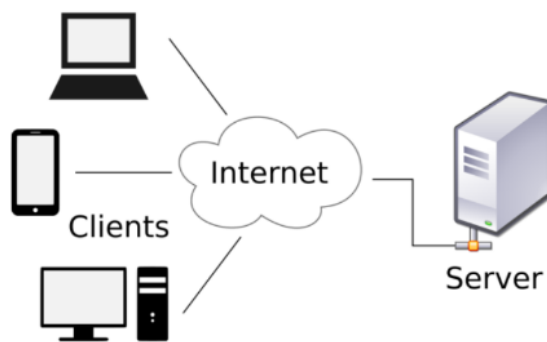
4. What are the types of server available?

There are different types of servers:

1. **Web Server:** This is the most common type of server. It delivers web pages and content to users' web browsers when they request them.
2. **Database Server**: This server stores, manages, and retrieves data for applications.
3. **Email Server:** This server handles sending, receiving, storing, and forwarding emails.
4. **File Server:** This server stores and shares files with users on a network.
5. **Application Server:** This server runs applications and makes them accessible to users over a network.
6. **Print Server:** This server manages print jobs and allows users to share printers on a network.
7. **Proxy Server**: This server acts as an intermediary between a client and the internet. It can improve security, performance, and anonymity.

8. **DNS Server:** This server translates domain names (like "[invalid URL removed]") into IP addresses (like "142.250.67.158") that computers can understand.

9. **FTP Server:** This server allows users to upload and download files over a network using the File Transfer Protocol (FTP).

5. What is SEO? Importance of SEO?

SEO is the practice of increasing the quantity and quality of traffic to your website through organic search engine results. A higher rank when someone searches a term in your industry increases your brand's visibility online. The increase in visibility will drive more organic traffic to your site, and this, in turn, gives you more opportunities to convert qualified prospects into customers.

 Importance of SEO

Visibility and Rankings: SEO improves search result rankings, increasing visibility and click-through rates, building brand familiarity even without immediate conversions.

Web Traffic: SEO increases organic traffic, leading to more visitors and potential sales, thereby enhancing conversion opportunities.

Trustworthiness: High rankings boost visibility and trust, as users consider top search results more credible.

User Experience: SEO enhances user experience by ensuring clear information and easy navigation, which also positively affects search rankings.

Growth: SEO drives brand growth by increasing organic traffic, customers, and sales, and encourages social media sharing for broader reach.

6. What is Accessibility?

Accessibility is the practice of making your websites usable by as many people as possible.Accessibility ensures that websites, applications, and digital documents are usable

by everyone, including those with disabilities such as visual, auditory, motor, and cognitive impairments.

Key Aspects of Accessibility

- **Screen Readers:** Software that reads the text displayed on the screen aloud, used by individuals with visual impairments.
- **Voice Recognition Software:** Allows users to control their devices and input text using their voice, helpful for those with motor disabilities.
- **Alt Text for Images:** Providing descriptive text alternatives for images to convey the same information to users who cannot see them.
- **Color Contrast:** Using sufficient contrast between text and background colors to make content readable for users with visual impairments.

7. What is Markup Language?

A markup language is a set of rules that defines how the layout and presentation of text and images should appear in a digital document. It allows structuring documents, adding formatting, and specifying how different elements should be displayed (or "rendered") on webpages.While several markup language exists, the two most popular are HTML and XML

8. What is HTML?

- HTML stands for Hyper Text Markup Language
- HTML is the standard markup language for creating Web pages
- HTML describes the structure of a Web page
- HTML consists of a series of elements
- HTML elements tell the browser how to display the content
- HTML elements label pieces of content such as "this is a heading", "this is a paragraph", "this is a link", etc.

9. What is a browser engine?

A **browser engine** (also known as a **layout engine** or **rendering engine**) is a core software component of every major web browser. The primary job of a browser engine is to transform HTML documents and other resources of a web page into an interactive visual representation on a user's device.

10. What is a rendering engine? share the available rendering engine?

- Rendering engine is responsible for displaying the requested web resources by parsing the contents. By default it can parse html, xml, and images. It uses different plugins and/or extensions to display other type of data such as flash, PDF, etc.
- Every browser has its own unique rendering engine. Rendering engines might also differ for different browser versions. The list below mentions browser engines used by a few common browsers - Google Chrome and Opera v.15+: **Blink ,** Internet Explorer: **Trident,** Mozilla Firefox: **Gecko and** Chrome for iOS and Safari: **WebKit**

11. What is JavaScript Engine? share the available JS engine? Purpose of JS Engine?

A JavaScript engine is a computer program that executes JavaScript code and converts it into computer understandable language.

List of JavaScript Engines:

Browser	Name of Javascript Engine
Google Chrome	V8
Edge (Internet Explorer)	Chakra
Mozilla Firefox	Spider Monkey
Safari	Javascript Core Webkit

Purpose of JavaScript Engine

The primary purposes of a JavaScript engine include:

1. **Parsing:** The engine parses the JavaScript code, transforming it from human-readable syntax into an Abstract Syntax Tree (AST)
2. **Compilation/Interpretation**
3. **Execution:** The engine executes the compiled or interpreted code, handling various tasks like:
   - Manipulating the Document Object Model (DOM)
   - Handling events (e.g., clicks, form submissions)
   - Performing calculations and processing data
4. **Optimization:** JavaScript engines include optimizations to improve performance, such as:**Inline caching & Garbage collection**

12. How does the website work?
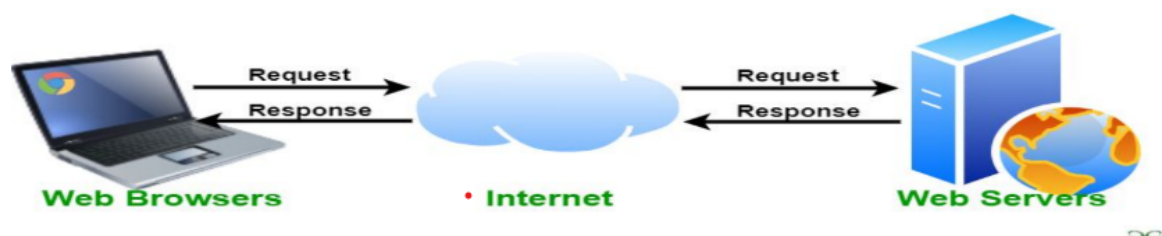
- The browser is communicated with domain name server to translate server name
- "www.abc.com" into IP address to connect to server machine
- HTTP protocol sends GET request to server requesting for the file
- The server finds for the requested file on hard disk then responds to browser
- Browser reads tags and formats the page
- Browser determine the display of web page not the server
- Request and response is fast due to HTTP the set of rules to transfer data overthe internet

13. What is Data Structure?

A **data structure** is a storage that is used to store and organize data. It is a way of arranging data on a computer so that it can be accessed and updated efficiently.

Examples of Data Structures are Arrays, Linked Lists, Stack, Queue, Trees, etc

14. Explain Tree Data Structure?

Tree data structure is a specialized data structure to store data in hierarchical manner. It is used to organize and store data in the computer to be used more effectively. It consists of a central node, structural nodes, and sub-nodes, which are connected via edges.

ed using pointers.
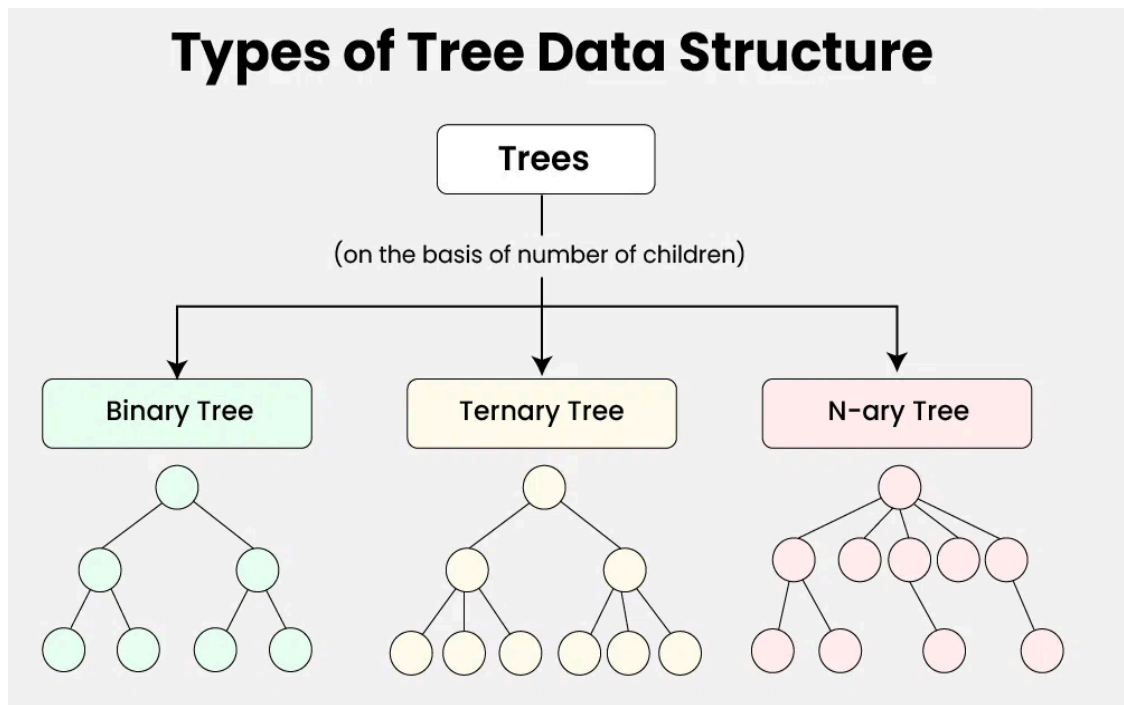
Binary Tree: Each node has a maximum of two children. Common types include full, complete, balanced, and degenerate binary trees.

Ternary Tree: Each node has at most three children, typically distinguished as left, mid, and right.

N-ary Tree: Each node can have multiple children, with nodes storing addresses of several other nodes, forming a more generalized tree structure.

15. What is a user agent? Share the list and its purpose?

The User-Agent (UA) string is contained in the **HTTP headers** and is intended to identify devices requesting online content. The User-Agent tells the server what the visiting device is (among many other things) and this information can be used to determine what content to return.

A user agent typically includes:

- Browser name and version (like Chrome 109)
- Operating system (like Windows 10)
- Device type (like desktop or mobile)

Purpose of User Agent:

- **Deliver the right content:** A server can send a mobile-friendly version of a website to a phone and a full-sized version to a computer.
- **Improve compatibility:** Knowing the browser and device helps the server ensure the website works correctly.
- **Security:** Sometimes, servers can restrict access based on user agent. For instance, they might block known bots that scrape websites.

16. What is Hypertext?

"Hypertext" refers to links that connect web pages to one another, either within a single website or between websites. Links are a fundamental aspect of the Web. By uploading content to the Internet and linking it to pages created by other people, you become an active participant in the World Wide Web.

17. What are HTML Tags?

HTML tags are essential building blocks that define the structure and content of a webpage. HTML tags are composed of an opening tag, content, and a closing tag. The content is the information or structure that falls between the opening and closing tags.

Syntax : <tagname> Content... </tagname>

Different tags have different purposes. Some common examples include:

- <h1> to <h6> tags define headings of different sizes.

- `<p>` tag defines a paragraph of text.
- `<b>` and `<i>` tags format text as bold and italic respectively.
- `<img>` tag inserts an image.

18. What are HTML Attributes?

HTML attributes provide additional information about elements within an HTML document. Every HTML element can have attributes. Attributes are always defined in the start tag**.** They are specified using a name/value pair format, where the attribute name defines the property, and its value provides specific details, like **name=”value”**. These attributes impact content display and interaction on web pages.

Example:-

- `<img src="image.jpg" alt="A beautiful sunset">` - It has two attributes: src specifies the image file and alt provides alternative text for accessibility.

19. What are HTML Elements?

An **HTML Element** is a collection of start and end tags with the content inserted between them. HTML elements are building blocks of web pages, representing different types of content such as **headings**, **paragraphs**, **links**, and **images**.

Example : `<h1>This is a heading</h1>`

20. How do convert elements to tree?

Converting HTML elements to a tree structure is a process that involves representing the hierarchical relationships between elements using a tree data structure.
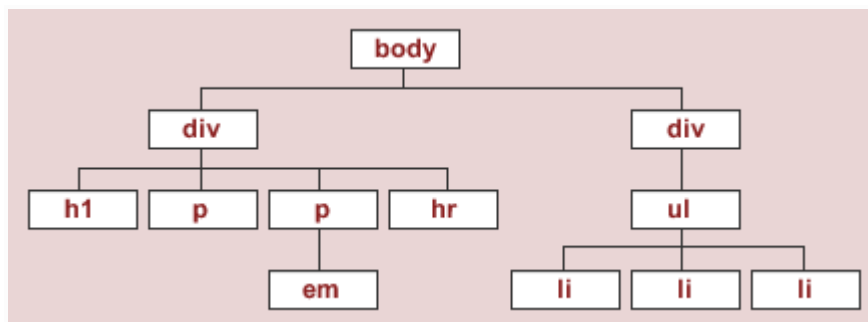
Working -
Start with the root element
Each HTML element becomes a node in the tree.
An element's parent node is the element that directly contains it.
Child nodes are the elements nested within a parent element.

Example :-

```html
<body>
 <div id="content">
   <h1>Heading here</h1>
   <p>Lorem ipsum dolor sit amet.</p>
   <p>Lorem ipsum dolor <em>sit</em> amet.</p>
   <hr>
 </div>
 <div id="nav">
   <ul>
     <li>item 1</li>
     <li>item 2</li>
     <li>item 3</li>
   </ul>
 </div>
</body>
```


21. What is DOCTYPE?

- <!DOCTYPE html>: This declaration defines the document as an HTML5 document. It's a standard instruction to the web browser about what version of the HTML language the page is written in.

22. What are the ways we can save html file?

Text Editor: Use software like Notepad (Windows), TextEdit (Mac), Sublime Text, or Visual Studio Code. Write or paste HTML code, then save with a .html extension.

Web Development IDE: Tools such as Visual Studio, WebStorm, or Dreamweaver allow creation and saving of HTML files within their environments, typically through a "Save" option.

Browser: Open the HTML file in a web browser (e.g., Chrome, Firefox, Safari), then use the browser's "Save As" function to save the webpage locally with a .html extension.

Command Line: Navigate to the directory via terminal, use text editors like nano or vim to create/edit HTML files, and save with commands (Ctrl + O in nano, :wq in vim).

23. What is charset? Why do we need to use this?

HTML Charset is also called HTML Character Sets or HTML Encoding.The term "charset" refers to the character encoding scheme used to map character codes (such as ASCII or Unicode) to actual characters that can be displayed or processed by a computer system. It determines how textual data is represented in binary form.

The HTML5 specification encourages web developers to use the UTF-8 character set, which covers almost all of the characters and symbols

Example :- <meta charset="UTF-8">

Need of charset

- **Consistent Text:** Ensures characters appear the same across different devices and software.
- **Multilingual Support:** Allows computers to represent a vast range of languages.
- **Accurate Display:** Guarantees characters on a web page or document match what you intended.
- **Universal Understanding:** Acts like a common language for computers to interpret text.

24. What is meta data? What is the purpose of it?

- Meta data means "data about data", is essentially **information that describes and explains** other data. Metadata in web development refers to hidden data in HTML that describes a webpage but isn't displayed to users.

- It includes <meta> tags specifying page details like description, keywords, authorship, and viewport settings.
- This metadata enhances search engine visibility, aids social media sharing, and improves web page accessibility.

25. Explain Web Application Architecture?

Web application architecture is a mechanism that gives us a clarification on how the connection is established between the client and the server.
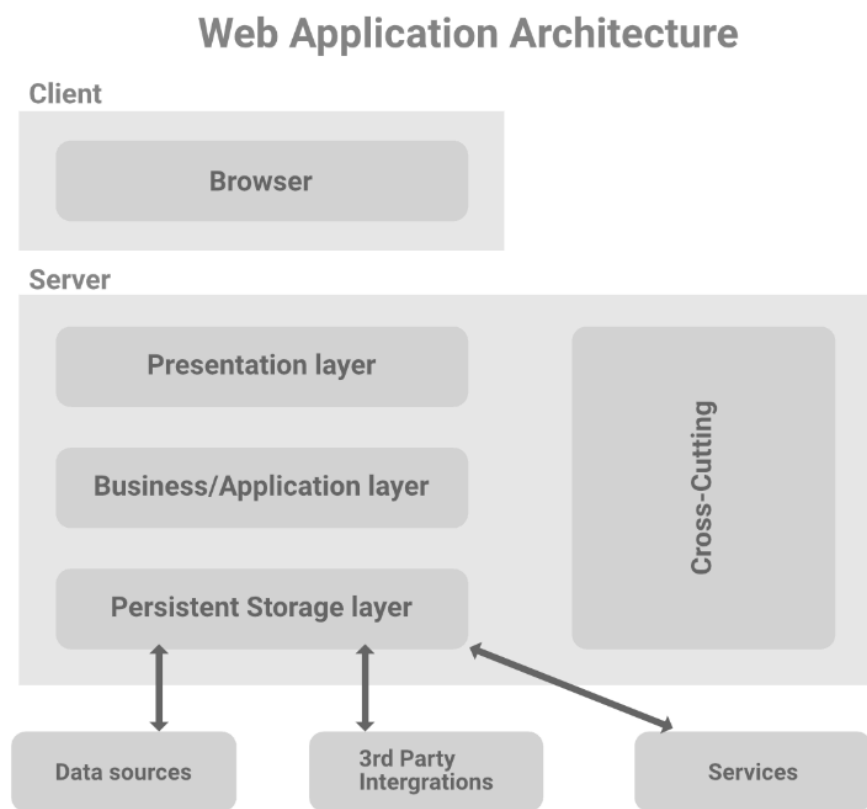
Web applications are typically built using a layered approach.It typically consists of 3 layers as follows -

1. **Presentation Layer:** This layer is accessible to the client via a browser and it includes user interface components and UI process components.
2. **Business Logic Layer:** This layer contains the core logic of the application, processing user requests, performing calculations, and interacting with the data layer.

3. **Persistence Layer:** It is also referred to as a storage or data access layer.This layer stores and manages the application's data. It can involve databases, file systems, or other data storage solutions.