Week 1 - Session 1 - Assignment 1

## What is a protocol stack, and how is it used in web development?

**Internet is just a lot of devices connected to each other directly or indirectly and it consists of billions of devices, ranging from an arduino setup to full scale cloud service provider facility the very essential feature is ability to communicate. To establish this communication, we need to have some globally recognized mechanism or rule to so that messages can be exchanged in a secure manner, these rules are called Protocol.**

**Protocol stack is set of rules defined in a manner to so that a connection among two devices can be established and security can be provided.**

**Protocol stack have different layers to it, each layer have their own responsibility as defined below-**

**Link layer- Link layer is physical layer, like a Ethernet cable or a Wi-Fi. This layer makes possible for a system to come online or get connected to a network**

**Network layer- This layer is responsible for dealing with unique address each device have in a network i.e IP address, this layer helps in recognizing which device in network should receive the data or from which device data is requested.**

**Transport layer- Transport layer as name suggest help in transporting data over the network by maintaining a bi-directional connection between sender and receiver and helps in arranging data at receiver end.**

**Application layer- This is the top most layer and responsible for security of data, this layer wraps the data packet using an encryption**

## What are the different types of web servers, and how do they differ in terms of functionality and performance?

**Below are different type of web servers-**

**Database Server- A database server is a type of hardware that runs database software. Database software helps users or companies store, manage, retrieve, update or change files, information logs and other forms of digital data. The two primary components of database servers are back-end functions and client-facing services.**

**Email Server- an email server is a software program that sends and receives email. Often, it is used as a blanket term for both mail transfer agents (MTA) and mail delivery agents (MDA), each of which perform a slightly different function. Mail servers play a crucial role in the email delivery process. Without them, users would have no way of transferring those messages to and from other mail clients.**

**DNS Server- DNS is responsible for finding the correct**[**IP address**](https://www.cloudflare.com/learning/dns/glossary/what-is-my-ip-address/)**for those sites. Browsers then use those addresses to communicate with**[**origin servers**](https://www.cloudflare.com/learning/cdn/glossary/origin-server/)**or**[**CDN edge servers**](https://www.cloudflare.com/learning/cdn/glossary/edge-server/)**to access website information. This all happens thanks to DNS servers: machines dedicated to answering DNS queries.**

**FTP Server- FTP servers allow users to upload and download files.** **An FTP server is a computer that has a**[**file transfer protocol (FTP)**](https://www.techopedia.com/definition/1872/file-transfer-protocol-ftp)**address and is dedicated to receiving an FTP connection. FTP is a protocol used to transfer files via the internet between a server (sender) and a client (receiver)**. **An FTP server is a computer that offers files available for download via an FTP protocol, and it is a common solution used to facilitate remote data sharing between computers.**

**Print Server- print server works is a pretty straightforward process. They may be either a software or a separate, physical server with enough processing power to handle a high volume of requests. The server connects with computers over a network and allows them to communicate with available printers. The print server helps printers avoid overloads. It queues print jobs and manages their distribution to devices to ensure orderly operation and to avoid overloading printer hardware**

**Web Server- A web server is software and hardware that uses HTTP (Hypertext Transfer Protocol) and other protocols to respond to client requests made over the World Wide Web. The main job of a web server is to display website content through storing, processing and delivering webpages to users.**

**Cloud Server- A cloud server is powerful physical or virtual infrastructure that delivers applications, processes information or provides data storage. Some cloud servers are created using**[**virtualization**](https://www.ibm.com/in-en/topics/virtualization)**software that divides a single physical (bare metal) server into multiple virtual servers.**

## What is web hosting, and what are the different types of hosting services available for websites?

**Web hosting is making the website public access, when we develop a website we have in development server means accessible to group of certain user or in a certain network, now to make it publicly accessible we have to host it on a server under a domain name.**

**These hosting servers can be of different nature depending on requirement of business, two important factors would be security and uptime.**

**Shared Hosting- Shared Web Hosting is an entry-level type of web hosting where one physical server hosts multiple websites, since different user have a section of that individual server where they can host their website files, this keeps costs low. Here users share system resources on-demand, receiving a percentage of databases, disk space, CPU and RAM**

**Cloud Hosting- cloud hosting is a great option if your site needs a more powerful hosting solution compared to shared hosting. It is also very powerful and flexible. It provides you with autoscaling option which adds more resources to the server upon traffic spikes.**

**Managed Hosting- In managed hosting we host our website on a server but the services for that website are provided by third party as per contract**

**VPS Hosting- A VPS—or virtual private server—is a virtual machine that provides virtualized server resources on a physical server that is shared with other users. With VPS hosting, you get dedicated server space with a reserved amount of resources, offering greater control and customization than shared hosting.**

**Dedicated Hosting- In Dedicated hosting the user setups their own server and bear all cost and is responsible for its security as well.**

## What is scaling, and why is it important for web applications? How does scaling differ for vertical and horizontal scaling?

**Scaling is a process of expanding or contracting the size of computational resources. While hosting a website some amount of resources are allocated for smooth functioning of the website but as the website / web-application expands or the number of user increase we need to allocate more resources to the application or else the application will crash resulting in downtime.**

**There are two types of scaling vertical and horizontal, vertical scaling means expanding the resource allocation until the server is at its max utilization but even after that if more resources are required then we go for horizontal scaling meaning we borrow resources from other available servers.**

## What is SEO (Search Engine Optimization), and how can web developers optimize their websites for better search engine rankings?

**SEO stands for search engine optimization. search engine optimization means taking a piece of online content and optimizing it so search engines like Google show it towards the top of the page when someone searches for something.**

**Following factors help in improving rank of a website-**

**Keywords- Keywords are phrases or words that explain what your website content is all about. They are the words or phrases that prospective customers will type into Google to find the products or services you offer.**

**META Tags- META tags are bits of HTML code in the header of a webpage. They are vital for SEO. They help search engines understand the content of the webpage.**

**Page Load Time- search engines penalise websites that load slowly. All things being equal, they will rank a faster website above a slower one.**

**Responsive Website - March 2018 Google has been rolling out Mobile First Indexing. This basically means that that they now use the mobile version of a webpage for indexing and ranking purposes. If the mobile version of your webpage doesn’t cut it, your rankings will suffer.**

**Content- Creating new content is necessary to build a loyal base of customers and followers. Remember, there are other competitive websites offering similar products. You need to stand out and be perceived as a thought leader within your industry.**