Explorin Academy

Master Dev

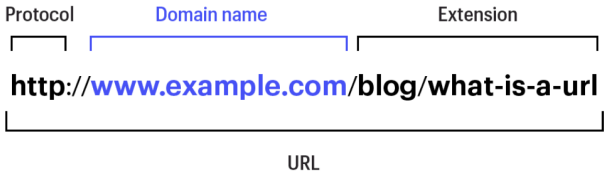
Day 1 Notes

Internet

The internet is a **global network** of linked computers, servers, phones, and smart appliances that communicate with each other using the transmission control protocol (TCP) standard to enable the fast exchange of information and files, along with other types of services.

- The Internet is made up of multiple interconnected networks (ISP networks, data centers, servers, etc.).
- Data is transmitted in the form of packets across these networks.
- It relies on TCP/IP protocols for communication.

Basic Structure of an URL



Protocol: A set of rules that govern how data is transmitted and received between devices over a network, ensuring proper communication.

Domain Name: A human-readable web address that maps to an IP address, allowing users to access websites easily.

What is an IP address ?

An IP address is a unique numerical label assigned to each device connected to a network that uses the Internet Protocol (IP) for communication. It acts as an identifier for devices on the internet or local networks.

Role of an IP Address

- Identifies a device on a network.
- Helps in routing data between sender and receiver.
- Works with DNS (Domain Name System) to map domain names to IP addresses.

- Example: When you visit www.google.com, your browser retrieves Google's IP address using DNS, then sends a request to that IP to load the webpage.

What is DNS?

DNS (Domain Name System) is a decentralized system that translates human-readable domain names (e.g., www.google.com) into machine-readable IP addresses (e.g., 142.250.183.206). It acts as the phonebook of the internet, allowing users to access websites without remembering numerical IP addresses.

What is an ISP ?

An Internet Service Provider (ISP) is a company or organization that provides individuals and businesses with access to the Internet and related services. ISPs act as intermediaries between users and the global internet infrastructure.

Functions of an ISP

- Provides Internet Access – Connects users to the internet via fiber, broadband, DSL, satellite, or mobile networks.
- Assigns IP Addresses – Allocates public and private IP addresses to devices.
- Domain Name Resolution – Operates DNS servers to convert domain names into IP addresses.
- Manages Network Traffic – Controls data flow, bandwidth allocation, and network security.
- Offers Additional Services – Provides hosting, email, cloud storage, and cybersecurity services..

What Happens When You Type www.google.com in Your Browser?

- DNS Resolution: The browser checks cache or queries a DNS server to get Google's IP address.
- TCP Handshake: The browser and server establish a secure a TCP/IP connection.
- Sending an HTTP Request: The browser sends a request to the received IP of the Google's webpage.
- Server Processing & Response: The server processes the request and sends back HTML, CSS, JavaScript, and images.
- Graphical Presentation: The browser interprets the files and renders the page.

- User Interaction: JavaScript runs for interactivity (like search suggestions).

Difference between TCP & UDP .

TCP (Transmission Control Protocol)

✔ Reliable, connection-oriented protocol that ensures data delivery using the 3-way handshake.

✔ Used for applications requiring accuracy, like web browsing, email, and file transfers (HTTP, HTTPS, FTP, SMTP, etc.).

UDP (User Datagram Protocol)

✔ Faster but unreliable, connectionless protocol that does not guarantee delivery or order of packets.

✔ Used for real-time applications like video streaming, gaming, VoIP (DNS, DHCP, RTP, etc.).

TCP	UDP
Keeps track of lost packets. Makes sure that lost packets are re-sent	Doesn't keep track of lost packets
Adds sequence numbers to packets and reorders any packets that arrive in the wrong order	Doesn't care about packet arrival order
Slower, because of all added additional functionality	Faster, because it lacks any extra features
Requires more computer resources, because the OS needs to keep track of ongoing communication sessions and manage them on a much deeper level	Requires less computer resources
Examples of programs and services that use TCP: - HTTP - HTTPS - FTP - Many computer games	Examples of programs and services that use UDP: - DNS - IP telephony - DHCP - Many computer games

What is 3-way handshake in TCP ?

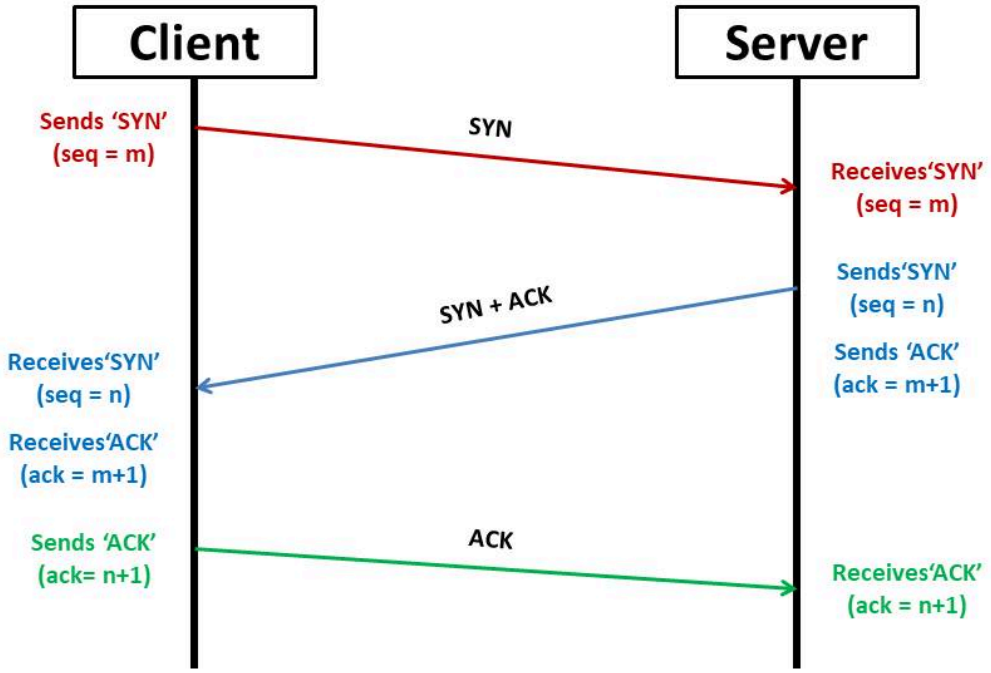
The TCP 3-way handshake is a process used to establish a reliable connection between a client and a server before data transfer. It involves three steps:

SYN (Synchronize) → The client sends a SYN request to the server to initiate a connection.

SYN-ACK (Synchronize-Acknowledge) → The server responds with a SYN-ACK, acknowledging the request.

ACK (Acknowledge) → The client sends an ACK, confirming the connection is established.

This handshake ensures both parties are ready and synchronized before communication starts.



What is WWW ?

The World Wide Web (WWW) is a system of interlinked web pages and resources that are accessed through the internet using web browsers. It was invented by Tim Berners-Lee in 1989.

Key Components of WWW:

- Web Pages – Documents written in HTML, CSS, and JavaScript.
- URLs (Uniform Resource Locators) – Unique addresses to access web pages.
- Web Browsers – Software like Chrome, Firefox, or Edge to display web pages.
- HTTP/HTTPS – Protocols that allow data transfer between web servers and clients.

The WWW is different from the Internet - the Internet is the global network, while the WWW is a service that runs on it.

The difference between Web1, Web2 & Web3 .

The evolution of the web is categorized into Web1 (Static Web), Web2 (Social/Web Apps), and Web3 (Decentralized Web).

Web1 (1989 – early 2000s) – "Read-Only Web"

✔ Static websites with only text and images.

✔ No interaction—users could only read content.

✔ No login, commenting, or user-generated content.

✔ Example: Early websites like Yahoo, AOL, and personal blogs.

Just like a digital newspaper—just for reading.

Web2 (Early 2000s – Present) – "Read-Write Web"

✔ Interactive & Social – Users can create content (YouTube, Facebook).

✔ Dynamic Websites – AJAX, JavaScript, and APIs enable real-time updates.

✔ Centralized Platforms – Big tech companies (Google, Meta, Amazon) control most data.

✔ Monetization & Ads – Businesses track user behavior for targeted advertising.

Like a marketplace—users buy, sell, and interact.

Web3 (Emerging) – "Read-Write-Own Web"

✔ Decentralization – Uses blockchain to remove reliance on big corporations.

✔ User Ownership – NFTs, cryptocurrencies, and smart contracts enable digital ownership.

✔ Privacy & Security – No need for centralized servers, reducing data breaches.

✔ Examples – Decentralized apps (dApps) like Ethereum, IPFS, and DAOs.

Like a digital economy—users control their own data and transactions.