Basics of Web development - Components - Part – 1

(Exploring the core building blocks of modern web applications)

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HARDWARE vs SOFTWARE

HARDWARE

Hardware refers to the physical parts of a computer or device — the things you can touch and see.
Examples: Keyboard, Mouse, Monitor, CPU, Printer, Hard Drive.

SOFTWARE

Software refers to the programs and instructions that run on the hardware. It tells the hardware what to do.
You can’t touch software — it's digital.
Examples: Microsoft Word, Windows, Google Chrome, Games, Apps.

FEATURE	HARDWARE	SOFTWARE
What is it?	Physical parts of a computer	Programs and instructions
Can you touch it?	Yes	No
Examples	Keyboard, Monitor, CPU, Mouse	Windows, MS Word, Chrome, Games
Function	Performs tasks and operations	Tells hardware what to do
Lifespan	Can wear out over time	Doesn’t wear out but can be updated or deleted

NETWORK

WHAT IS A COMPUTER NETWORK & ARCHITECTURE?

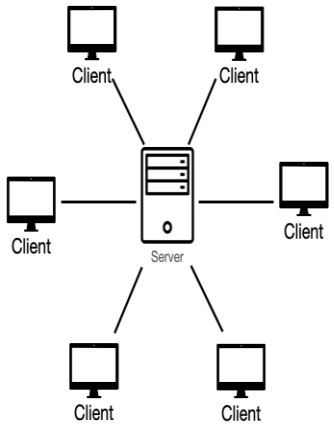
1. A network is a group of interconnected computers that share:
   - Resources (e.g., printers, files, storage)
   - Data and applications
   - Communication tools
2. Connection Methods:
   - Cables, Telephone lines, Wi-Fi, Satellites, Infrared signals
3. Network Speed is measured in Mbps (Megabits per second)
4. A computer not connected to a network is called a standalone computer

NETWORK ARCHITECTURE TYPES

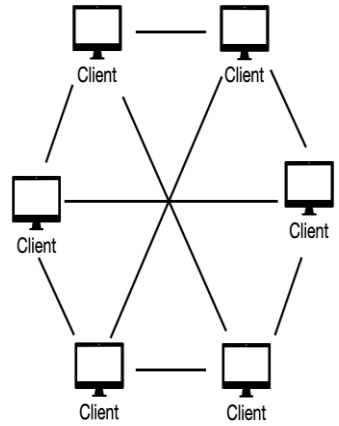
1. Peer-to-Peer (P2P):
   - Each computer acts as both client and server
   - Equal status among all computers
   - No central server
   - Ideal for homes or small offices (less than 12 computers)
2. Client-Server:
   - One computer serves as the central server
   - Other devices are clients requesting data/services
   - Provides centralized storage, security, and management
   - Suitable for medium to large networks

Types of Networks by Size

1. **PAN (Personal Area Network):** Very small, like Bluetooth devices
2. **LAN (Local Area Network):** Within a room/building
3. **MAN (Metropolitan Area Network):** Across a city
4. **WAN (Wide Area Network):** Global networks like the Internet



Client Server Architecture



P2P Architecture

INTERNET

THE INTERNET AND ITS ROLE

The Internet is one of the most important inventions of the 20th century. Today, it is a common part of everyday life and is used by people all over the world. The Internet is a big network made up of many smaller networks connected together. It connects millions of computers around the world. Because of the Internet, old ways of communication like telephone calls, radio, TV, letters, and newspapers have changed a lot. New services like email, internet calling, online TV, music apps, and digital newspapers have become popular. People also call the Internet the “Net”, which is short for “network”. In simple words, the Internet is a worldwide system that allows computers and electronic devices to connect and talk to each other.

The Internet and networks are closely connected. A network is a group of devices that share information, and when many networks from around the world are linked together, they form the Internet. In simple terms, the Internet is a "network of networks." Without individual networks, the Internet would not exist. It connects people, devices, and information globally.

Internet Services : WWW, FTP, Telnet, e-mail etc.

WWW - WORLD WIDE WEB

WWW: CONNECTING THE GLOBE

The World Wide Web (WWW) – also called the web or W3 – includes all the public websites and web pages that people can visit using the internet. These websites can have text, pictures, audio, video, and more. People can access websites from anywhere in the world using their devices, like computers, laptops, or smartphones. The web pages are connected to each other through hyperlinks, which you can click to move from one page to another. Today, the World Wide Web is the most widely used software platform in the world. Small websites keep all their web pages on one server, but large websites or companies use many servers in different countries. This helps people get information faster from a server that is closer to them.

INTERNET vs WWW

The terms Internet and World Wide Web (WWW) are often used as if they mean the same thing, but they are different. The Internet is a global network that connects millions of computers and devices using cables, routers, satellites, and other equipment. It allows us to share information and use services like email, messaging, and file sharing. On the other hand, the World Wide Web is just one of the services provided by the Internet. It is a collection of web pages linked through hyperlinks and URLs that we can access using web browsers. When you open a website like google.com, you are using the Web, but when you send an email or chat online, you are using the Internet. In simple words, the Internet is the connection, and the Web is one way we use that connection.

INTERNET vs WORLD WIDE WEB

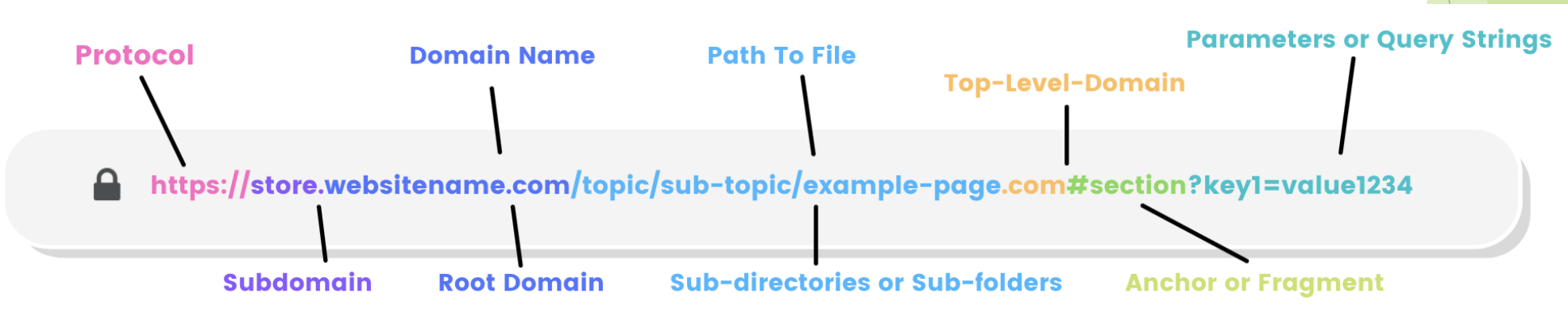
Think of the Internet as a bookstore and the World Wide Web as a collection of books inside that store. The Web is just one part of what the Internet offers.

ASPECT	INTERNET	WORLD WIDE WEB (WWW)
Origin	Originated in the late 1960s	Invented by Tim Berners-Lee
Nature	Hardware – includes devices and physical infrastructure	Software – consists of information and resources
Components	Routers, cables, servers, satellites, towers	Text, images, audio, video accessed through the Internet
Governed By	Internet Protocol (IP)	HyperText Transfer Protocol (HTTP)
Dependency	Works independently of WWW	Depends on the Internet to function
Role	Acts as the infrastructure	Is a service built on top of the Internet
Analogy	Can be viewed as a giant library	Books and content in that library are websites
Identification	Devices identified by IP addresses	Web resources identified by URLs (Uniform Resource Locators)
Regulation	Unregulated	Some regulations in place
Usage Statistics (2022)	5 billion users worldwide	1.9 billion websites; ~3 new websites created every second

ANATOMY OF URL

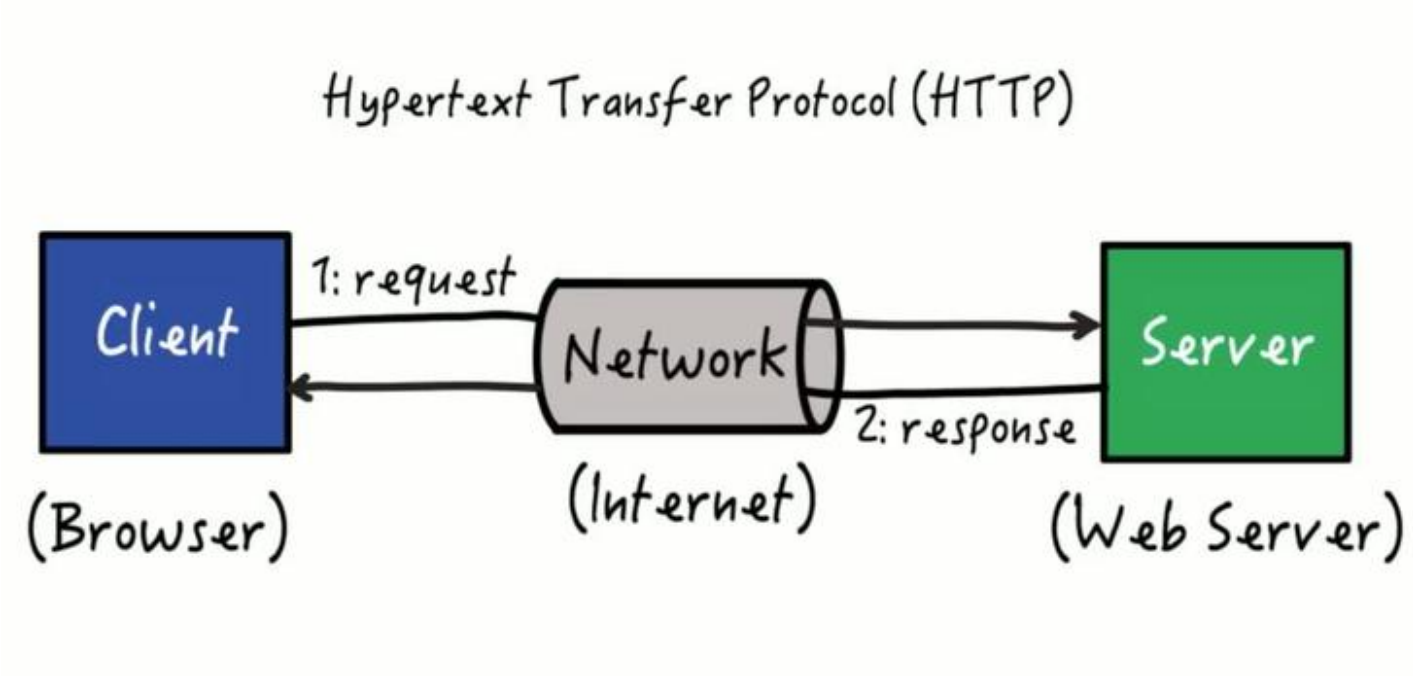
URL

A URL (Uniform Resource Locator) is the address used to find something on the internet. It’s also called a web address. A URL has different parts, like the protocol and the domain name, which tell the web browser how to reach the website or file. For example, in the URL http://example.com, "http" is the protocol and "example.com" is the domain name. URLs help us find things like web pages, pictures, and music online. They were invented in 1994 by Tim Berners-Lee and the Internet Engineering Working Group.



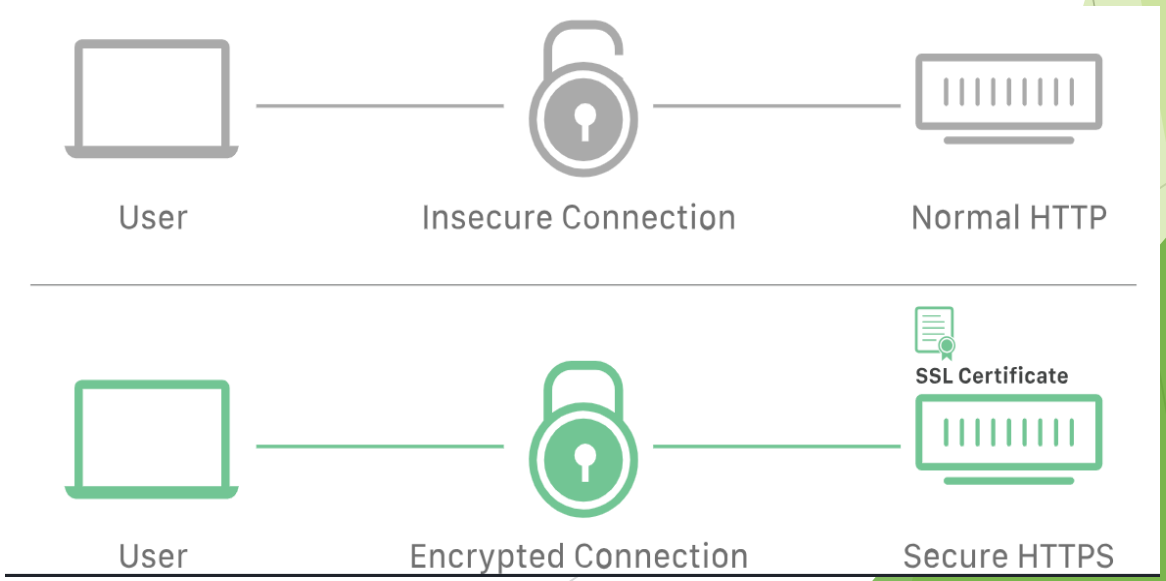
HTTP

HTTP stands for HyperText Transfer Protocol. It is the main way information is shared over the internet. HTTP is used to open websites and get data from the World Wide Web (WWW). It can send different types of content like text, web pages, audio, and video.



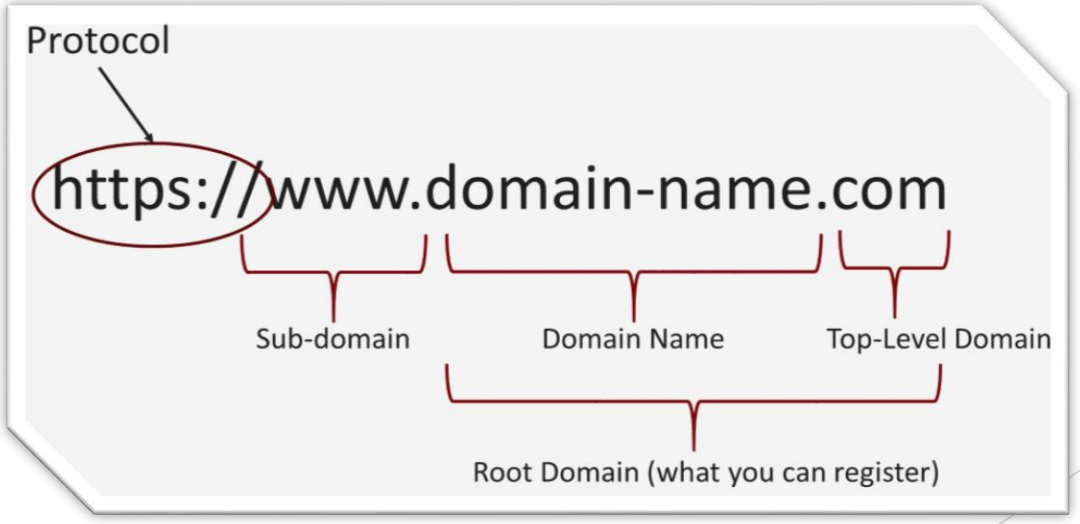
HTTP vs HTTPS

HTTP (HyperText Transfer Protocol) is not secure, while HTTPS (HyperText Transfer Protocol Secure) provides a safe and encrypted way to send and receive data. HTTP sends data through port 80, while HTTPS uses port 443, which is specially made for secure communication. HTTP works at the application layer, and HTTPS works at the transport layer, adding extra protection. One major difference is that HTTPS uses an SSL or TLS certificate, which keeps your information safe by encrypting it. This certificate must be verified by a trusted Certificate Authority (CA). Websites that use HTTPS usually show a lock icon in the address bar, letting users know that their connection is secure. This is especially important for sites that handle personal data, passwords, or payments.



DOMAIN NAME

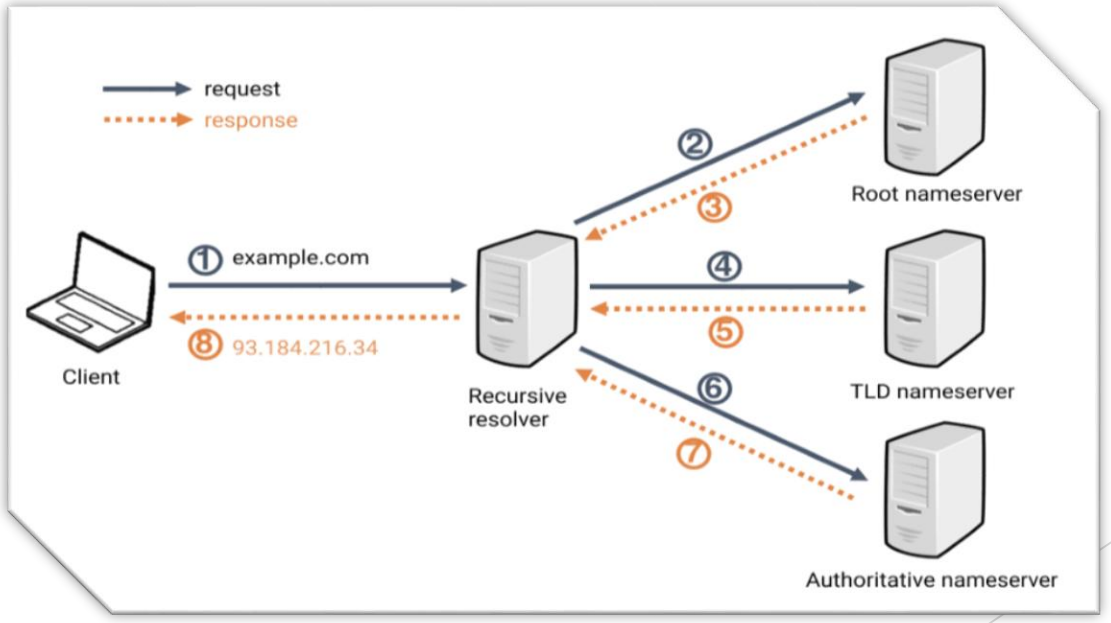
A domain name is the web address that people type into their browser to visit a website. It's like the online version of a home address. A domain name has two parts – the name and the extension (like .com or .org). For example, ovhcloud.com is a domain name. Each domain name is unique, which means no two websites can have the same one. Domain names are an important part of how the internet works, helping users find websites easily.



DNS

The Domain Name System (DNS) works like the phonebook of the internet. It automatically changes a domain name (like google.com) into its matching IP address (like 142.250.64.110).

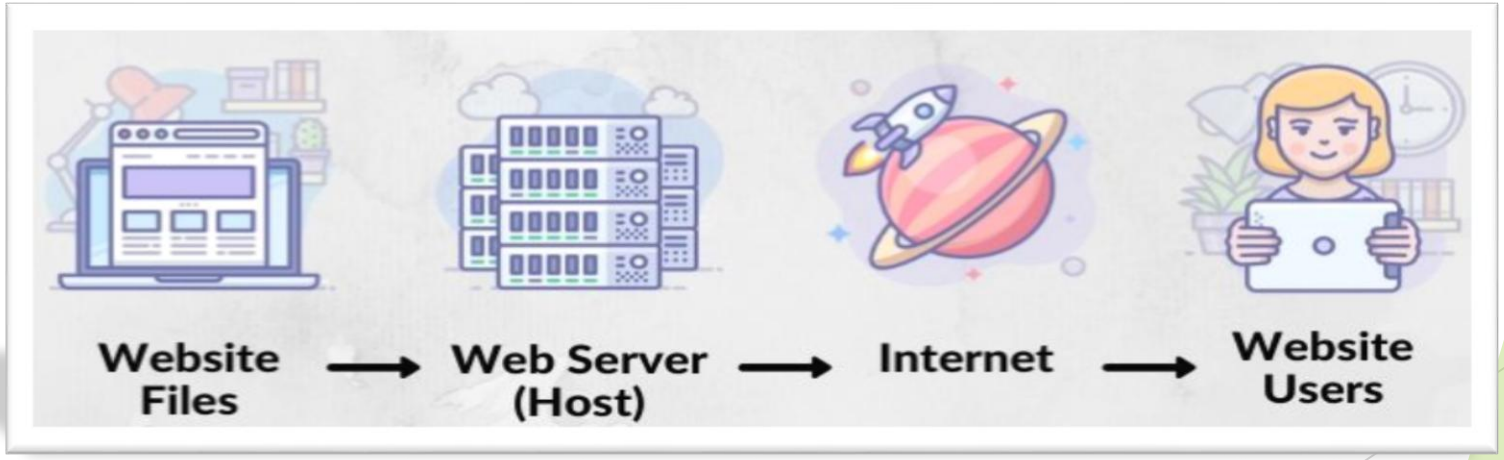
Web browsers need these IP addresses to find and load the correct web pages. DNS helps your device know exactly which website to show when you type a name into the browser.



What is Web Hosting?

WEB HOSTING

A web hosting service is a type of internet service that allows people or businesses to store their websites online. It provides the tools and space needed to create, manage, and keep a website running. Once hosted, the website becomes available to everyone on the World Wide Web. Companies that offer this service are called web hosts.



HOW WEB HOSTING WORKS