## What is a Web Server?

Think of a web server as the "engine" behind the internet. It's either a piece of software or hardware responsible for storing and sharing web content. When you visit a website, the web server delivers the content (like web pages, images, or videos) to your browser.

Web servers operate on **HTTP (Hypertext Transfer Protocol)**, which is the language browsers and servers use to communicate. For example, when you enter a website URL into your browser, your browser sends an HTTP request to the server. The server then sends the web page back to your browser so you can view it.

## How Does a Web Server Work?

Here's how it operates step-by-step:

1. **Finding the Website's IP Address**:
    - First, the server finds the IP address of the website you're trying to reach. This is done using cached data or by asking a DNS (Domain Name System) server to locate it.
2. **Handling the Full Request**:
    - After locating the IP address, the browser sends the full request to the web server (e.g., requesting a specific web page or file).
3. **Server Responds**:
    - If the request is successful, the server sends the requested data back to the browser. Otherwise, it sends an error message:
        - **404 (Not Found)**: The requested page doesn't exist.
        - **401 (Unauthorized)**: You don't have permission to access the content, usually due to incorrect login credentials.
4. **Browser Displays the Page**:
    - The browser takes the server's response and displays it to the user in a visually formatted way.

## Types of Web Servers

Here are four of the most common web server options:

- **Apache**:

  One of the oldest and most popular web servers. It's free, open-source, and works on various platforms like Windows, Linux, and macOS.

- **Microsoft IIS**:

  Created by Microsoft, IIS is designed for Windows-based systems. While it offers many of the same features as Apache, it's not open-source.

- **Nginx**:

  Known for its speed and ability to handle many users at the same time, Nginx is widely used by large websites.

- **LiteSpeed**:

  A high-performance, commercial server that's ideal for websites needing speed and security, especially in hosting environments.

## Common Uses of Web Servers

- **Hosting Websites**: Bringing websites online and accessible to users worldwide.
- **Running Web Applications**: Hosting apps that users access via a browser.
- **File Sharing**: Allowing secure uploads and downloads of files.
- **Content Delivery**: Using CDNs (Content Delivery Networks) to speed up the delivery of videos, images, and other media.
- **Hosting APIs**: Supporting communication between different applications via APIs (Application Programming Interfaces).

## Web Clients and Browsers

### What is a Web Client?

A **web client** is software that interacts with web servers to access and retrieve data over the internet. The most common type of web client is a **web browser** (like Chrome, Safari, or Firefox). It acts as a gateway for users to interact with websites and web applications.

## Key Features of a Web Client

1. **User Interface (UI)**:
    - Displays web content (text, images, videos, forms) in a user-friendly way.
2. **HTTP Communication**:
    - Sends requests to servers using HTTP or HTTPS (secure version).
3. **Rendering Engine**:
    - Converts HTML, CSS, and JavaScript into the visual elements you see on the screen.
4. **Caching**:
    - Saves copies of web pages locally to improve speed and reduce data usage.
5. **Cookies and Session Management**:
    - Tracks user sessions, preferences, and login details.
6. **Security Features**:
    - Implements encryption, secure cookies, and warnings for unsafe websites.
7. **Extensibility**:
    - Supports add-ons like ad blockers or password managers.

## Types of Web Clients

1. **Web Browsers**:
    - Popular ones include Chrome, Firefox, Edge, and Safari.
2. **Mobile Browsers**:
    - Optimized for touch input and smaller screens (e.g., Chrome for Android, Safari on iOS).
3. **Web Applications**:
    - Apps like Google Docs and Slack run directly in your browser.
4. **Custom Web Clients**:
    - Tailored software designed to work with specific web services or APIs.

## What is a Web Browser?

A **web browser** is the software that connects you to the internet, allowing you to view and interact with websites. Think of it as the bridge between you and the vast world of online content.

## History of Web Browsers

1. **WorldWideWeb (1990)**:
    - The first web browser, created by Tim Berners-Lee, was later renamed **Nexus**.
2. **Mosaic (1993)**:
    - The first browser to display images alongside text, making the web visually appealing.
3. **Netscape Navigator (1994)**:
    - Popularized browsing for everyday users and introduced features like cookies and JavaScript.
4. **Internet Explorer (1995)**:
    - Bundled with Windows, this browser dominated for years during the "browser wars."

## Key Features of Web Browsers

- **Tabs**: Open multiple websites simultaneously.
- **Bookmarks**: Save favorite pages for quick access.
- **Address Bar**: Enter URLs or search directly from the browser.
- **Privacy**: Features like private browsing, HTTPS, and sandboxing protect user data.
- **Extensions**: Add extra functionality like ad blockers or password managers.

## Types of Web Browsers

1. **Desktop Browsers**:
    - Examples: Google Chrome, Firefox, Microsoft Edge, Apple Safari.
2. **Mobile Browsers**:
    - Examples: Chrome for Android, Safari on iOS, and Opera Mini (for low-end devices).

## The Internet

The **internet** is a massive network connecting millions of computers and devices worldwide. It allows you to send emails, browse websites, watch videos, and connect with people globally. Without the internet, you wouldn't be able to access social media, online services, or apps.

### History of the Internet

- **1960s**:
  The internet began as **ARPANET**, a project that connected multiple computers to share information. The first message was sent in 1969.
- **Today**:
  The internet has evolved into a global resource, enabling instant communication, cloud computing, and streaming services.

### How Does the Internet Work?

1. **Clients and Servers**:
   - Your device (client) connects to servers, which host websites and services.
2. **DNS (Domain Name System)**:
   - Translates human-readable URLs (like www.boharsingh.in) into machine-readable IP addresses.
3. **Information Flow**:
   - When you request a webpage, the server processes it and sends the content back to your browser for display.

## Key Internet Concepts

1. **Protocols**:
   - **HTTP/HTTPS**: Used for web browsing.
   - **FTP**: For transferring files.
   - **SMTP**: For sending emails.
2. **Domain Names**:
   - Easy-to-remember names (like http://www.boharsingh.in) that map to server IP addresses.
3. **Infrastructure**:

- Includes servers, data centers, and ISPs (Internet Service Providers) that keep the internet running.

## World Wide Web (WWW)

The **World Wide Web** (WWW) is the collection of all web pages and multimedia content that you can access on the internet. It's made possible by the use of **URLs (Uniform Resource Locators)**, which act like digital addresses for websites.

### Key Features

- **Hyperlinks**: Links that connect related content, making it easy to navigate between pages.
- **Hypertext**: Text that links to other documents or information.

### History of the Web

- **1989**: Tim Berners-Lee invented the World Wide Web while at CERN.
- **1991**: The first website went live, explaining the basics of the WWW.

## URLs (Uniform Resource Locators)

### What is a URL?

A **URL** (Uniform Resource Locator) is the address you type in your browser to find a specific web page or resource on the internet. Think of it like a digital home address for websites, files, and online services.

### Structure of a URL

A URL has multiple parts, each serving a purpose. Here's an example: **https://www.example.com:443/blog/article?docid=720&hl=en#section1**

1. **Scheme**:
    - Example: https://
    - Indicates the protocol used (e.g., HTTP or HTTPS for secure communication).
2. **Subdomain**:

- Example: www.
- Specifies the section of the website (e.g., blog.example.com for blogs).

3. **Domain Name**:
   - Example: example.com
   - Identifies the website's name.
4. **Top-Level Domain (TLD)**:
   - Example: .com, .org, .net
   - Indicates the type of organization or geographical area.
5. **Port Number**:
   - Example: :443
   - Specifies the service used (default for HTTPS is 443).
6. **Path**:
   - Example: /blog/article
   - Points to a specific resource like a page or file.
7. **Query String**:
   - Example: ?docid=720&hl=en
   - Contains parameters for searches or database queries.
8. **Fragment**:
   - Example: #section1
   - Refers to a specific part of the page, like a heading or section.

## Intranet and Extranet

### What is an Intranet?

An **intranet** is like a private version of the internet, designed for internal use within an organization. It helps employees communicate, collaborate, and access shared resources securely.

### Key Features of an Intranet

1. **Restricted Access**: Only employees can access it using login credentials.
2. **Internal Communication**: Includes tools like messaging, forums, and announcements.
3. **Resource Sharing**: Centralized access to company documents, policies, and tools.
4. **Collaboration**: Shared calendars, project management apps, and workspaces.

### What is an Extranet?

An **extranet** is like an intranet that extends access to **external parties** such as partners, vendors, or clients. It allows secure collaboration with these stakeholders.

### Key Features of an Extranet

1. **Controlled Access**: Only authorized external users can log in.
2. **Business Collaboration**: Ideal for sharing data and working on projects with external partners.
3. **Secure Data Sharing**: Ensures sensitive information is protected.

### Comparison of Intranet vs. Extranet

| Feature | Intranet | Extranet |
|---|---|---|
| **Access** | Employees only | Authorized external users |
| **Purpose** | Internal communication & sharing | Collaboration with external partners |
| **Use Cases** | HR portals, employee resources | Supplier portals, customer support |

## Internet vs. World Wide Web

### What's the Difference?

- **Internet**:
  - A vast network connecting computers worldwide.
  - Example: Sending emails, streaming videos, or accessing social media apps.
- **World Wide Web**:
  - A system of interlinked web pages and multimedia content accessed via the internet.
  - Example: Browsing websites like www.wikipedia.org.

## Key Concepts of the Internet

1. **Protocols**:
   - **HTTP/HTTPS**: For web browsing.

    - **FTP**: For file transfers.
    - **SMTP**: For sending emails.
2. **Infrastructure**:
    - **Servers**: Store and serve data.
    - **ISPs**: Provide internet access.
3. **Services**:
    - **Email**: Communication via messages.
    - **Streaming**: Watch or listen to media in real-time (e.g., YouTube).
    - **Cloud Computing**: Access files and applications online.

## Full Forms in the Document

1. **HTTP**: Hypertext Transfer Protocol
2. **HTTPS**: Hypertext Transfer Protocol Secure
3. **DNS**: Domain Name System
4. **IP**: Internet Protocol
5. **TCP/IP**: Transmission Control Protocol / Internet Protocol
6. **FTP**: File Transfer Protocol
7. **SMTP**: Simple Mail Transfer Protocol
8. **URL**: Uniform Resource Locator
9. **API**: Application Programming Interface
10. **CDN**: Content Delivery Network
11. **WWW**: World Wide Web
12. **ARPANET**: Advanced Research Projects Agency Network
13. **ISP**: Internet Service Provider
14. **TLD**: Top-Level Domain