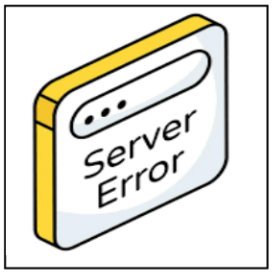
# Lecture 2

## 1- introduction to Internet Protocol

The first computer networks did not have a standard way to communicate with each other. In the 1970s, Vinton Cerf and Robert Kahn established the first communications protocol called Transfer Control Protocol/Internetwork Protocol (TCP/IP) include set of rules to allow different kinds of computers on different networks to communicate to each other.,

Network protocols determine how data can be sent and received by computers on the network, and how these computers can identify each other. The protocol also manages the problems and errors that may occur when data is sent or received, such as resending data or cannot dealing with data and network overload.




In 1983 (TCP/IP) became the standard protocol. Later other network protocols invented such as:

- HTTP (Hypertext Transfer Protocol) used to transfer data over the web. It's the protocol that allows exchange of almost all types of files.
- FTP (File Transfer Protocol) which is the standard mechanism provided by TCP/IP for copying a file from one host to another.
- SMTP (Simple Mail Transfer Protocol) used to transfer the message from the sending mail server to the receiving mail server.

## 2 – Introduction to Web Design

The World Wide Web (web) is a system of interlinked documents that are accessed over the internet, linked together by hyperlinks and URLs. In 1989, *Tim Berners-Lee*, invented the Web as a way for scientists to share information more easily. Then it developed to be popular by the users to get information from the internet. In 1990, *Tim Berners-Lee,* wrote the first web client and server and wrote the first web page, he also invented HTML markup language, the URL system and HTTP protocol. ***Tim*** established the web on **three** fundamental technologies, which are:

1. URL, an address system that keeps track of Web documents

2. HTTP, a transfer protocol to find documents when given their URLs
3. HTML, a document format allowing for embedded *hyperlinks*

The **Web (World Wide Web)** links different websites around the world, the Web pages are linked together using hyperlinks which are written in Hyper Text Markup Language (HTML) that consists of markup symbols or codes used to create and structure the Web pages contains that is displayed by the browser.

To access the Web the users, need the following:

1- Software called web browser, the **browser** loads a web page to help the user open and transfer files (text, image, video) from their devices to a remote computer. Google Chrome, Microsoft Edge, Mozilla Firefox, and Safari are examples of web browsers

2- Hypertext Transfer Protocol (HTTP) used **to transmit webpages** and transfer data between web servers and browsers. HTTP is the backbone of the World Wide Web (WWW).

3- URLs (Uniform Resource Locators) is unique address for locating a specific web page. For example, https://www.example.com.

4- HTML (Hypertext Markup Language) Webpages are created using HTML, which determines how content is displayed, including text, images, links, and multimedia.

5- Web Servers that store website data and respond to requests from web browsers, delivering the requested content to users.

The Web follows the client-server model, Servers on the web are called web servers, the users access the web through a **browser** which represent the web client. The client and the server communicate using a protocol, which defines the format, and sequence of the messages exchanged.

**Example to get a service from the server**: a browser (client) sends a request (e.g. open web page) to the server; the server processes the request, such as get the web file from the disk, then sends a response back to the client (browser) and display the page on the screen.


An illustration of links in a web page on one web server that reference items on other servers.

The power of the Web arises from the ability of the hyperlink to pass multiple servers, a page on one server can contain a link to a page on another server. Browsing systems that use hyperlinks among pages on multiple servers are known as hypertext systems.

### 3- Types of Links

HTML links are hyperlinks (internal or external). Hyperlinks are the primary method used to navigate between pages and Web sites, can point to other web pages, web sites, graphics, files, sounds, e-mail addresses, and other locations on the same web page (internal link). There are four types of ***hyperlinks***.

- Text hyperlink – Uses a word or phrase to take visitors to another page, file or document.
- Image hyperlink – Uses an image to take visitors to another page, file or document.
- Bookmark hyperlink – Uses text or an image to take visitors to another part of a web page.
- E-mail hyperlink – Allows users to send an e-mail message to an e-mail address.

### 3-1- Hyper Linking across pages

The first web pages contain (text) named hypertext to work as a hyperlink, the **browser** highlights any text that corresponds to a link allowing a user to navigate from one page to another by clicking on a link which is usually underlined and appears in different color,

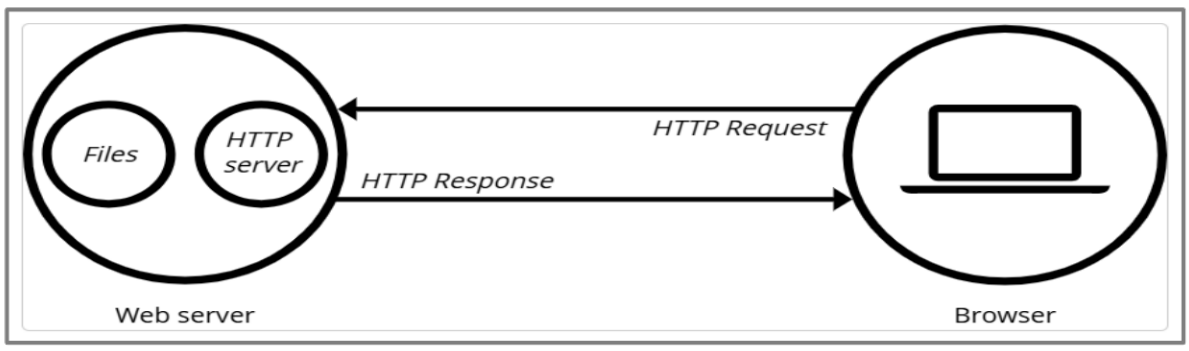
**Recently** the term **hypermedia** became the extension of **hypertext**, the term **hypermedia** means a web page can reference multiple forms of media (e.g., a link can reference a graphics image on a server). The current web technologies allow links that reference a variety of items, including:

| | |
|---|---|
| Text | Various fonts, sizes, and colors |
| Images | Various types, shapes, and sizes |
| Audio clips | Play automatically or manually |
| Video clips | Play automatically or manually |
| Streams | Audio or video that play continuously |

The most common is the text hypermedia is (hypertext). When adding a text or image as a hyperlink, it jumps from the current site (A), and open in a new window. This allows users to easily come back to the site (A) without having to use the back button on their browser. **Example** of hypermedia is e-commerce site for products where a click on any product will open the specific product page. So here the link is embedded to the image.

### 3-2 Hyper Linking web server

A web server is a computer hosting one or more websites. Hosting" means that all the web pages and their supporting files are available on that computer. The web server will send any web page from the website it is hosting to any user's browser request. A browser ((client)) sends a request to (e.g. open a file) that is hosted on a web server, the browser requests the file via HTTP. When the request reaches the correct (hardware) web server, the (software) HTTP server processes the request, finds the requested document, then sends it back to the browser, (also through HTTP) and display the page on the screen.
(If the server doesn't find the requested document, it returns a 404 response instead.)



**The following is a list of all the main types of servers:**

1. Web server: Web servers store web site information, when the user request information the server sends it to the browser via a **HTTP**. This is one of the most widely used types of servers.

2. File server: A file server stores data files. This is a basic type of server used commonly by organizations where lots of users need access to files that are more conveniently and safely stored on a server than a personal computer.

3. Database server: is large storage spaces that organizations use and access to run multiple programs to meet their needs.

4. Mail server: A mail server stores and delivers mail for clients through email service platforms. The users can access their email without running any systems through their own devices.

5. Domain name system (DNS) server: These servers transform readable computer domain names into computer language IP addresses. The DNS server takes search data from a user and finds the requested address to deliver to the client device.

6. Proxies server: is a gateway that pass the data between the internet and users, provide security to protect the computer from internet threats, such as prevent the identification of the client's IP address when the client makes a request.

7. Gaming server: large gaming networks use servers to connect users from around the world. These servers host multi-player online games.

## 4- Web Design Languages

Creating visually appealing and fascinating websites is very important in web development. To build a comprehensive efficient and attractive website, a seamless integration of three fundamental layers is required:


1- Structure (HTML)

The HTML provides the foundational structure and the content organization.

2- Style (CSS)

Presents the visually appealing layout and style of the website

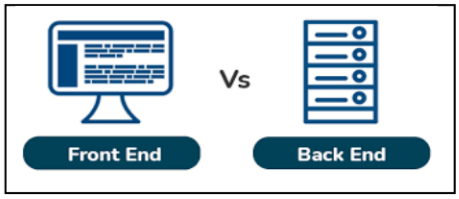
3- Behavior (JavaScript),

JavaScript adds interactivity and dynamic elements, enhancing user engagement. This layered approach ensures websites are well-organized, efficient, and adaptable with any digital landscape.

Two parts generally are applied to make up a website:

- Front end
- Back end

Both depend on each other, the back-end related to the server side gives information and data to the front end to display it to the user. The front end then provides information entered by the user to the back end which stores it for later use.




1- **Front end Languages:** The front-end portion of the website is built by using programming languages such as:

- HTML (Hyper Text Markup Language): use the hypertext to link between the web pages, and the markup language is used to refer to the text documentation within the tag that represents the structure of web pages.
- CSS (Cascading Style Sheets): defines the style of website content including layout, fonts, colors, and more.
- JavaScript: is a scripting language allows to implement complex features on the web pages used for more interactive elements such as animate images, and drop-down menus.

Beside the programming langue there are also frameworks and library used to develop complex software applications.

The **Web Application Framework** or "**web framework**" is a software designed to support the development of web applications including web services, web resources, and web APIs. The Application Programming Interface (API) is an

interface for a set of functions and subroutines, the programmers call the api function to access specific features or data.

The software designer need many libraries, but often one or two frameworks.

The following examples of Front end frameworks and library:

- **React.js:** a declarative JavaScript library used for building user interfaces. It is an open-source library used for the view layer of the application.
- **Angular:** A TypeScript-based open-source framework that is widely used for building dynamic, single-page applications.
- **Vue.js:** is a JavaScript frontend framework used for building **user interfaces** (UIs). It is a lightweight, flexible, and easy-to-learn framework that is popular among developers.
- **Bootstrap**: it is a free and open-source tool collection for developing responsive websites. It provides pre-designed CSS, JavaScript components, and utility classes to create consistent user interfaces easily.

2- **Back-End Languages**: is what happens on the server and database, some of the languages used for building back-end portion are:

- **Python:** It is a programming language that integrates systems more efficiently.
- **PHP:** a server-side scripting language, particularly for dynamic websites and web applications.
- **C#:** is a general-purpose programming language often used with the .NET framework for developing web applications and services.
- **Java:** used for web-based applications and server-side programming. Java is compatible with almost any operating system.
- **JavaScript (with Node.js):** JavaScript can also be used on the server-side with Node.js, allowing for full-stack development.
- **SQL (Structured Query Language):** The server-side scripts use SQL to fetch data from databases which back-end systems rely on and send it to the frontend, or to store data from the frontend into the database

***W.H.:*** **Write a report on 7 top website programming languages**