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FULLSTACK WEB DEVELOPMENT

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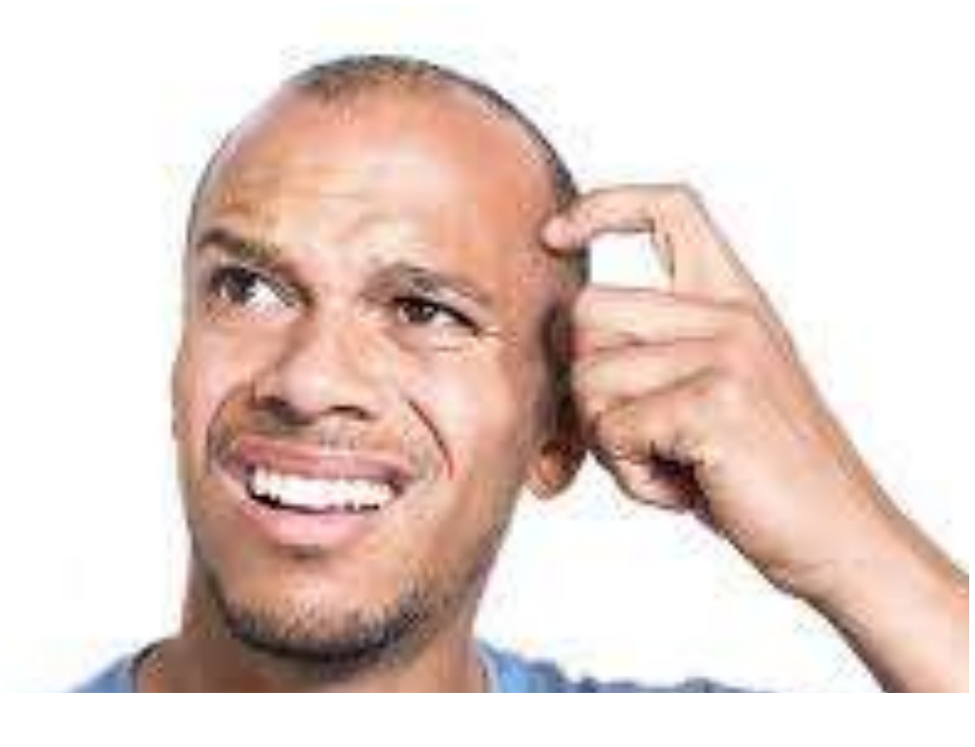
FSWB

LESSON 01

Computer & Web basics

What we will cover

- How computers work?
- How does the web work?
  - How do web browsers work?
  - Anatomy of url?
  - HTTP & HTTPS
  - How do web servers work?
  - How does cdn work?
- How the internet works?

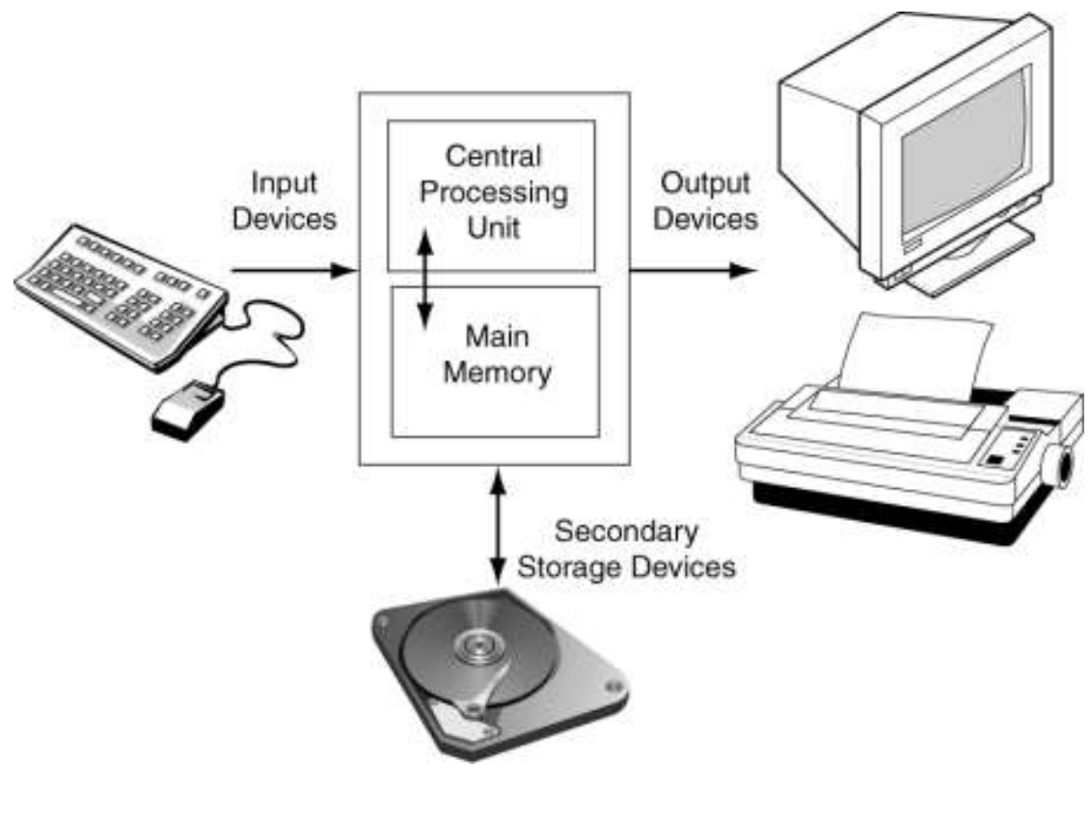


How Computers work?

Computer is a programmed device with a set of instruction to perform specific tasks and generate results at a very high speed.

Every computer operation can be divided into **four** parts:

1. **Input**
2. **CPU (processing)**
3. **Output**
4. **Storage**



Input - Is what you put into the computer as a command or data.

- **Clicking the mouse**
- **Typing on the keyboard**
- **Touching the touch screen**
- **Plugging an headset**

CPU - Stands for centeral proccessing unit
It is referred as the brains of the computer.
It fetches program instructions from RAM (Input), interprets and processes it and then send back the computed results for viewing or storage.

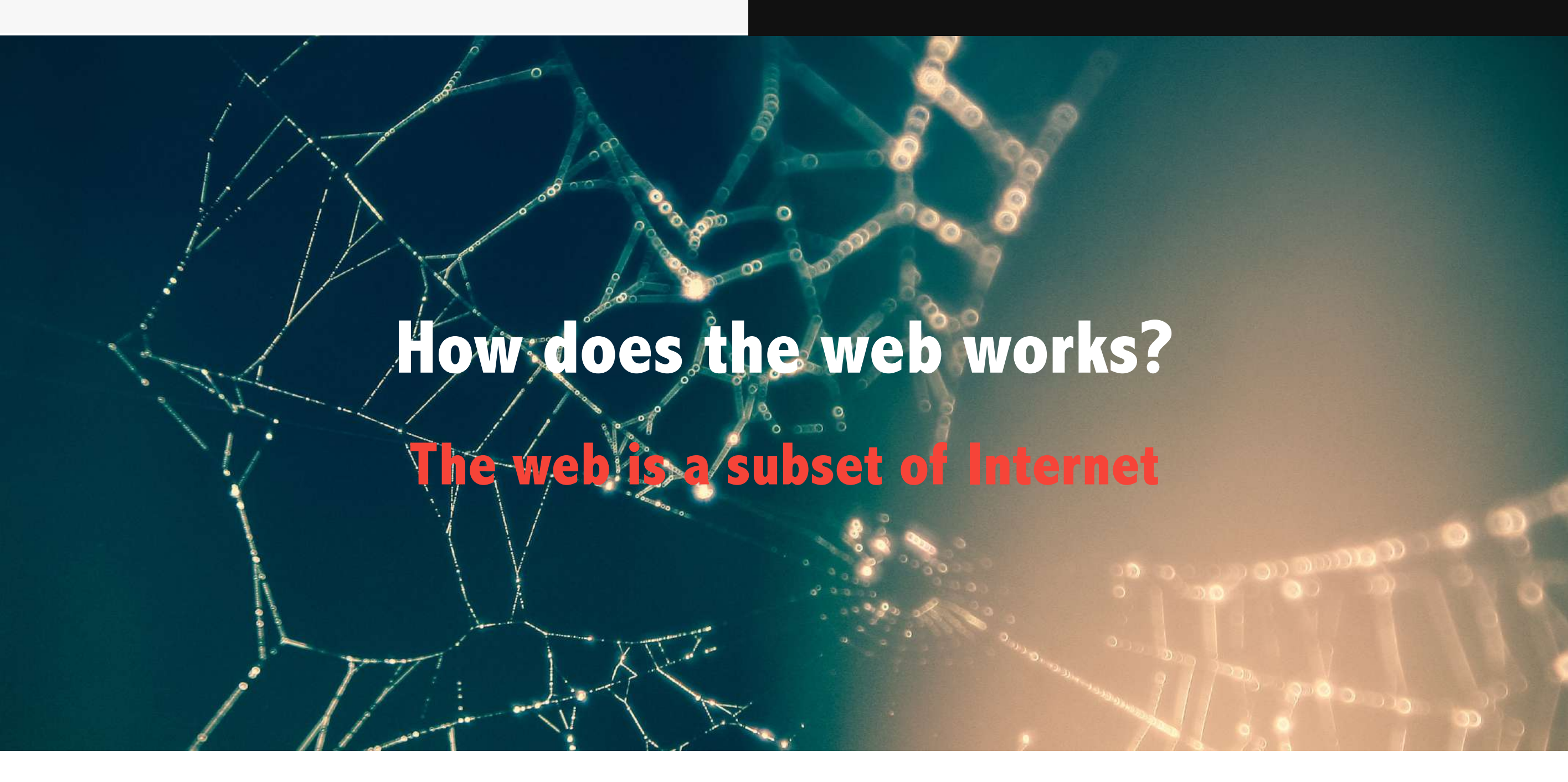
- **Run programs**
- **Manipulate and calculate data**

Storage - This is where it stores data effectively and effeciently for later use.
There are two types of storage units

1. **Primary (short term) -** holds temporary data & instructions for CPU.
   Ex - RAM (Random Access Memory)
2. **Secondary (long term) -** It stores data & program permanently.
   Ex - Hard drive, cd-rom

Output - Once the computer has processed the request, the output unit accept it and convert the result into human readable form.

- **Display images, texts, and video on a computer device screen.**
- **Print content through a printer**
- **Playing sound through speakers**



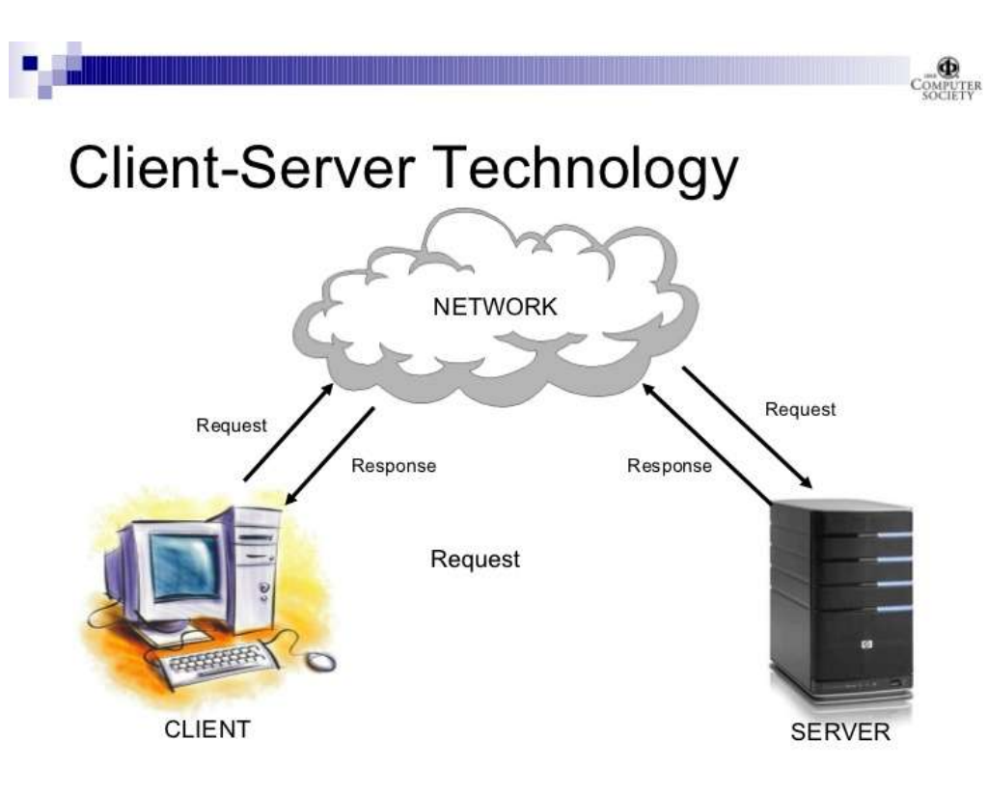
How does the web works?

The web is a subset of Internet

The Web (world wide web) - Is the way of transferring data over the internet using http protocol and html. It is a serious of interaction b/n two systems. Clients & servers.

Clients - are devices that makes requests and receives responses from the server in the form of html files, images, text files, and other data.
Ex - browsers, mobile apps, content aggregators

Servers - are applications that delivers web content to clients. These applications are normally active 24/7 listening for queries from any client who make a request.



Tim Berners-Lee

The invention of the world wide web is usually attributed to the British Tim Berners-Lee. who along with the Belgian Robert Caillliau. In late 1994, he helped found the World Wide Web Consortium (W3C), which would soon become the international standards organization that would oversee the growth of the web.

Core features of the web

Berners-Lee developed the main features of the web:

- **A URL to uniquely identify a resource on the WWW.**
- **The HTTP protocol to describe how requests and responses operate.**
- **A software program (later called web server software) that can respond to HTTP requests.**
- **HTML to publish documents.**
- **A program (later called a browser) to make HTTP requests from URLs and that can display the HTML it receives.**

Server Types

A server is rarely just a single computer
Most real-world web sites are typically not serverd from a single server machine, but by many servers.
It is a common approach to split the functionality of a web site between several different types of servers.

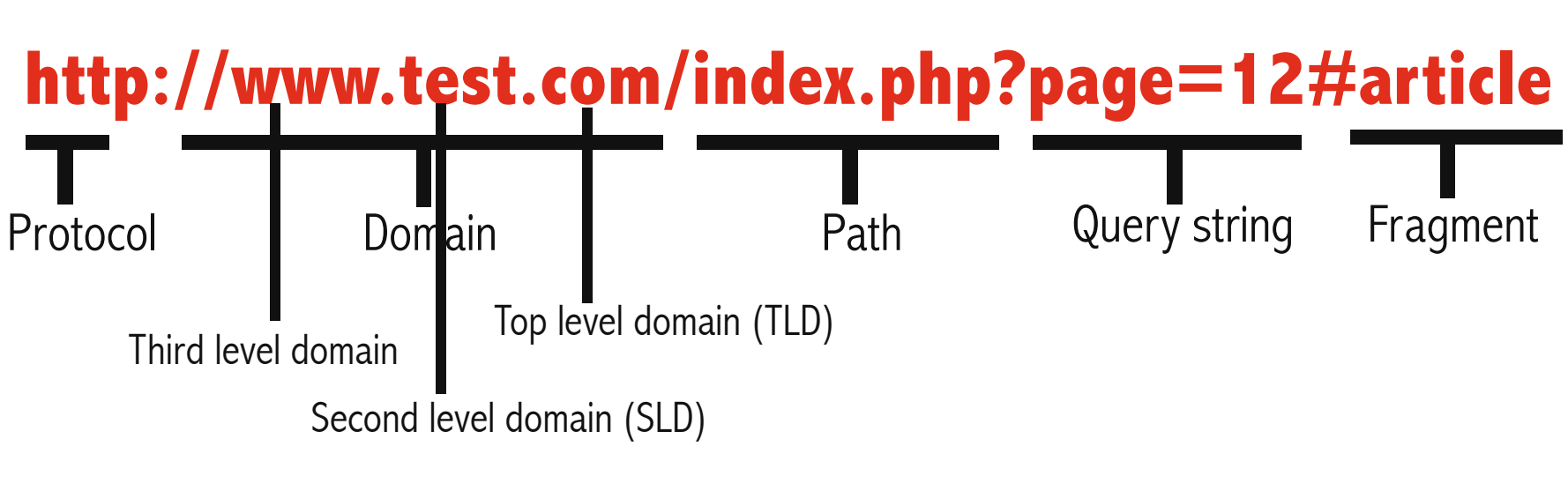
Most common server types are:

- Data Server
- Application Server
- Authentication Server
- Web Server
- Email Server

URL components

URL - Stands for a uniform resource locator.

In order to allow clients to request particular resources from the server, a naming mechanism is required so that the client knows how to ask server for the file.
For the web that naming mechanism is the Uniform Resource Locator (URL).



http://www.test.com/index.php?page=12#article

DNS (Domain Name System) - is called the phone book of the internet. It translates domain names to IP addresses so browsers can load internet resources.

HTTP

HTTP - stands for hypertext transfer protocol. It is the standard protocol for transferring resources on the web. A protocol is a standardized format for transmitting data between two devices. In this case your browser is an HTTP client while the web server that hosts the requested site is an HTTP server. The browser sends an HTTP request explaining which resources that it requires. The server waits for the request, and then responds with a response code, headers and an optional message (files).

The HTTP protocol defines several different types of requests, each with a different intent and characterstics . The most common requests are the **GET, POST, PUT, & DELETE**.

HTTP is called a **stateless** protocol because each command is executed independently, without any knowledge of the commands that came before it.

HTTPS - stands for Hyper Text Transfer Protocol Secure. It is the secure version of HTTP. Communication between browser and website are encrypted by transport layer secrurity (TLS).

Besides HTTP other common web protocols are:

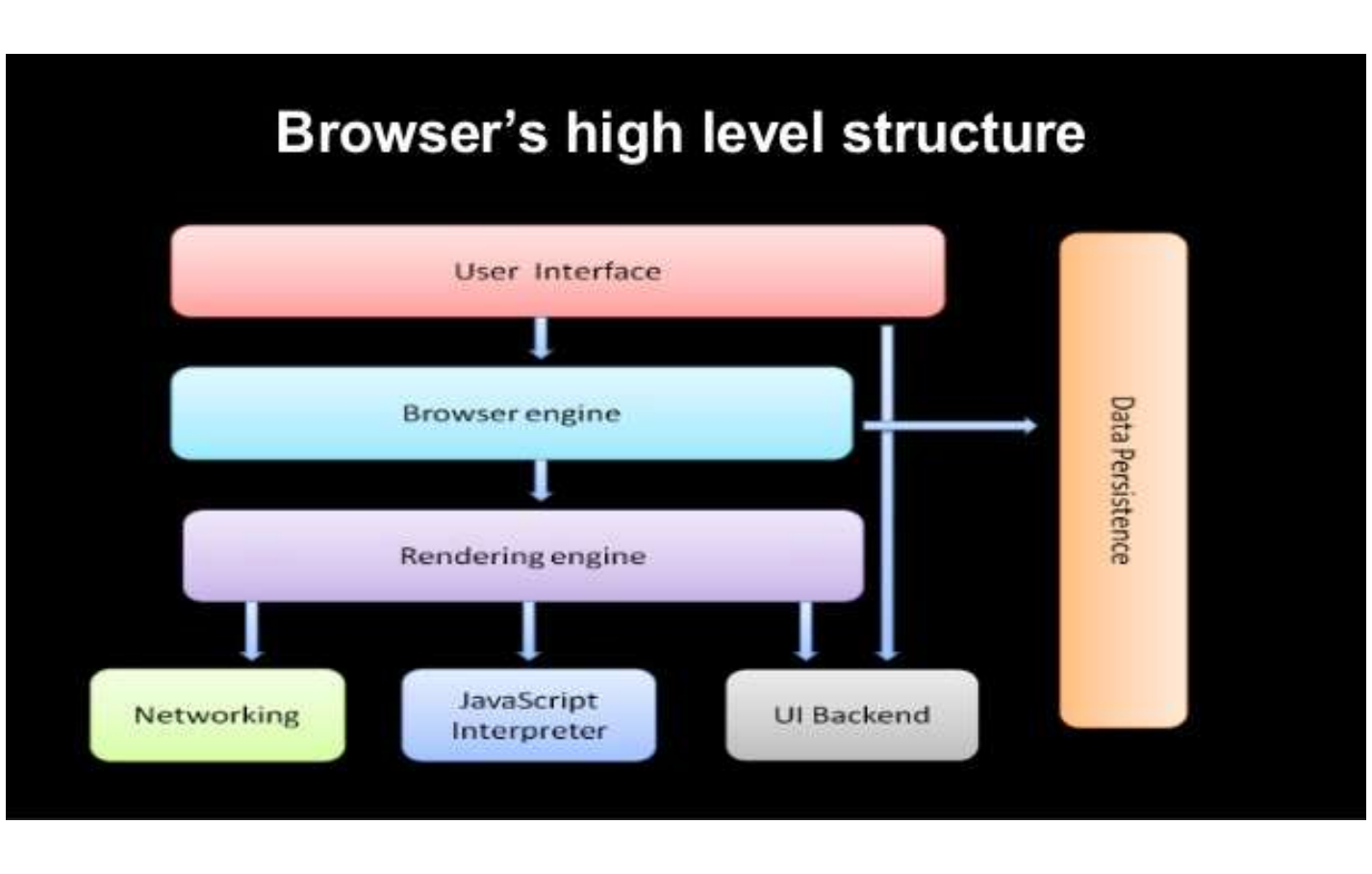
- **FTP** - File Transfer Protocol, enables transfer of large files
- **SMTP** - Simple Mail Transfer Protocol, used send mail
- **RTP** - Real-time transfer protocol, standard for audio and video

Web Browser

Browser - is a software program that allows a user to locate, access, and display web pages. Ex- Chrome, Firefox, Opera, Internet explorer.

A typical browser have the follwing components:

- **User interface**
- **Browser engine**
- **Rendering engine**
- **Networking**
- **Data Storage**
- **JS Interpreter**



User interface - Provides the methods with which a user inter-acts with the browser engine.
Ex - Address bar, back/forward button, bookmarking menu, etc.

Browser engine - It is like a bridge between the UI and the rendering engine.

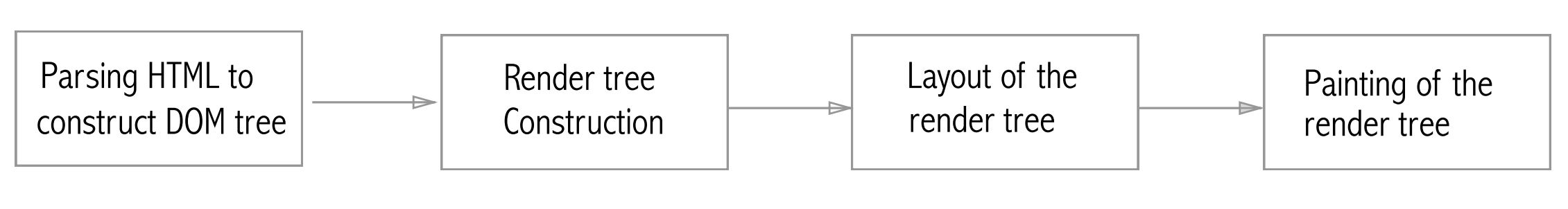
Rendering engine - Parse HTML and CSS and display parsed content on the screen.

Networking - Responsible for network calls such as http request and it's platform-dependent.

Data Storage - This is a persistence layer and save all sorts of data locally, such as bookmarks, preferences, cookies & local storage.

JS Interpreter - Used to parse and execute javascript code. Ex- V8 engine for google chrome.

Rendering Engine Flow



Internet

Internet - Is a global collection of networks that are connected together. Any computer connected to the network becomes part of a network. A home computer uses modem to connect to an Internet Service Provider (ISP) where you can connect to the network via it. But server computers are connected to network directly.

CDN

CDN - stands for Content Delivery Network. It is a system for delivering content over a distributed network of servers. Ex- Google cdn, Akamai

CDN primary goals are:

- Create replicas of content throughout the internet
- Ensure that replicas are always available
- Directly clients to replicas that will give good performance