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INTERNET AND THE WEB

A BRIEF INTRODUCTION

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INTERNET - TCP/IP

INTERNET = **INTER**CONNECTION OF **NET**WORKS

The Internet is a global interconnection of informatics networks with different nature and extent, which is available through a suite of network protocols named **TCP/IP**.



TCP (*Transmission Control Protocol*) and the **IP** (*Internet Protocol*) are the most important protocol which allow the connection and communication between computer within internet

INTERNET - HTTP

HTTP is a request-response protocol that allows users to communicate data on the World Wide Web (WWW) and transfer hypertext and multimedia document. The protocol remains one of the primary means of using the Internet and provides users a way to interact with web resources such as HTML files by transmitting hypertext messages between clients (such as a web browser like Chrome) and a server. Essentially, it's used to load web pages using hypertext links.

It's the backbone of the WWW and **it defines the format of messages through which web browsers and web servers communicate. It also defines how a web browser should respond to a specific web request.** It's a stateless protocol which means no session information from previous requests is retained by the receiver.

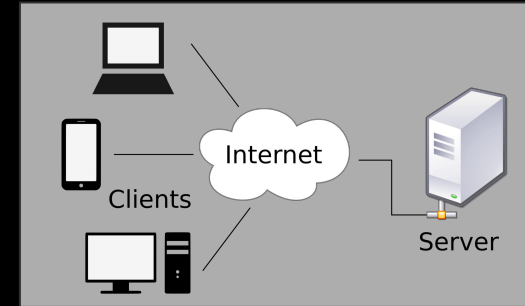


N: In the case of HTTP, before a client and server can exchange an HTTP request/response, they must establish a TCP connection first. Therefore, HTTP relies on the TCP standard in order to successfully do its job.

SERVER-CLIENT MODEL

A **server** is computer that provides functionalities (services) for other devices called **client**.

Servers can provide various functionalities, often called "services", such as sharing data or resources among multiple clients, or performing computation for a client. A single server can serve multiple clients, and a single client can use multiple servers.



Client-server systems are usually most frequently implemented by (and often identified with) the **request-response model**: a client sends a request to the server, which performs some action and sends a response back to the client, typically with a result or acknowledgment. The request-response model is accomplished by the TCP/IP protocol (and HTTP).

Servers can implement one or more services. Among many others we have:

- **Web server** → Hosts web pages. A web server is what makes the World Wide Web possible. Each website has one or more web servers. Also, each server can host multiple websites.
- **Database** → Organized collections of data with predefined properties that can be shared over the network.
- **Mail server** → Makes email communication possible.
- ...

World Wild Web (WWW) - WEB

Let's Share What We Know



World Wide Web

The **World Wide Web** (or **Web**) is a network of multimedia resources spread all over the world. Resources are contained into server (server side) and can be accessed through the Hypertext Transfer Protocol (HTTP) via internet. Users can be access the Web resources through a software application called *Web Browser* (client side).

The **URL** (*Uniform Resource Locator*) is a sequence of characters that uniquely identify the address of a web resource such a document or an image.

Web site URL

<https://www.conservatoriopollini.it/>

Database value

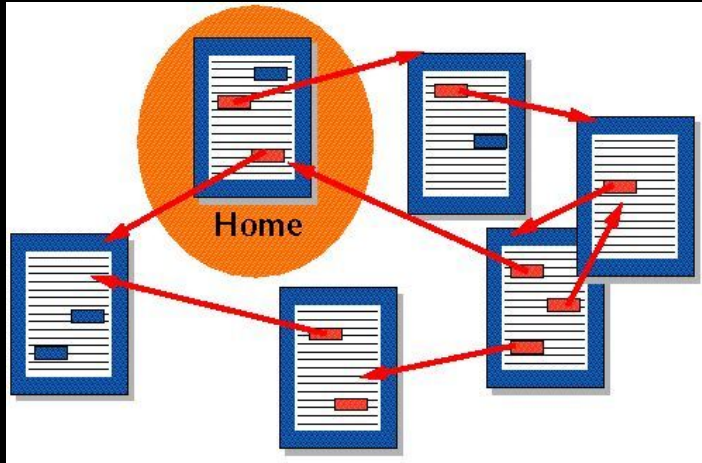
<https://gallery-audio-database.firebaseio.com/sculptures/0/color>

Freesound.org audio source

<https://freesound.org/s/439554/>

WEB PAGE

The **Web Page** is a **Hypertext document** which is contained in the Web (inside a server) and we can accede through an URL with a Browser.



The **hypertext** is a text with *references* (**hyperlink** → typically activated by a mouse click) to other text that the reader can immediately access. Hyperlink can also access multimedia resources.

A group of related web pages linked together with hypertext is called **Web Site**.

Every URL of web pages into a website are related to its **domain name** (identification string that defined the main address of the web site). The web site's main web page (the Home page) is usually addressed to the domain name.

Every web site is published on at least one web server.

The core element of a web page is one or more text files written in the **Hypertext Markup Language (HTML)**. HTML files can be coupled with **Cascading Style Sheets (CSS)** code for *presentation semantics* which allow to style formal language, and **JavaScript (JS)** code for dynamic behaviour. A Web Page can even include image, audio, video and other multimedia files.

WEB PAGE - HTML



The **HyperText Markup Language (HTML)** is the most basic build block of the Web. It is the standard *markup language* for documents designed to be displayed in a web browser.

Web browsers receive HTML documents from a web server and **render** the document into multimedia web pages. HTML describes the structure of a web page semantically and originally included cues for the appearance of the document.

HTML uses “markup” to annotate text, images, and other content for display in a Web browser. HTML markup includes special “element” such as `<head>`, `<title>`, `<body>`, `<header>`, `<footer>`, `<article>`, `<section>`, `<p>`, `<div>`, ``, ``, `<aside>`, `<audio>`, `<canvas>`, `<datalist>`, `<details>`, `<embed>`, `<nav>`, `<output>`, `<progress>`, `<video>`, ``, ``, ``

An HTML element is set off from other text in a document by “tags” (“<” and “>”)

```
<!DOCTYPE html>
<html>

<head>
  <title>Page Title</title>
</head>

<body>
  <h2>Heading Content</h2>
  <p>Paragraph Content</p>
</body>

</html>
```

WEB PAGE - CSS

CSS



Cascading Style Sheet (CSS) is a *style sheet language* used for describing the presentation ("how it looks") of a document written in a *markup language*. CSS describes how element should be rendered on screen.

The CSS was designed to enable the separation of presentation and content, including layout, colors and font.

CSS has a simple syntax and uses a number of English keywords to specify the names of various style properties. A style sheet consist of a list of rules. Each rule or rule-set consists of one or more selector, and a declaration block.

Selectors declare the part of the markup to apply the style (element, id, class).

Declaration block consists of e list of declarations (*property* : *value* ;) in braces.

```
@charset "UTF-8";  
/* CSS Document */  
body  
{  
  background-color:#d0e4fe;  
}  
h1  
{  
  color:orange;  
  text-align:center;  
}  
p  
{  
  font-family:"Times New Roman";  
  font-size:20px;  
}
```

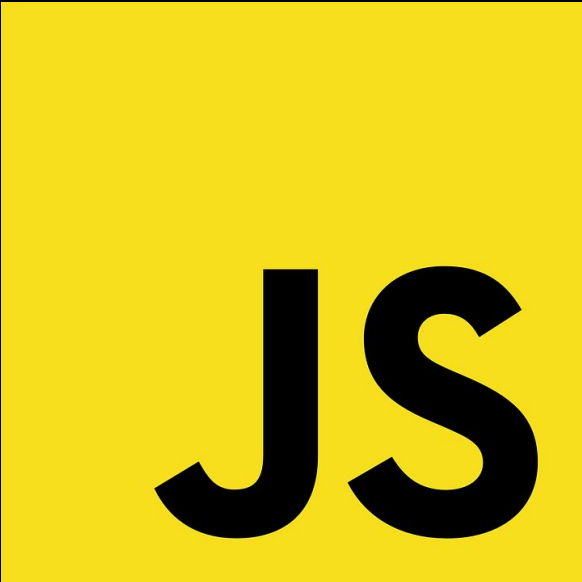

WEB PAGE - JS

JavaScript (JS) is high-level object-oriented programming language best known as the scripting language for Web pages (it is even used in many non-browser environments as well).

JavaScript runs on the client side of the web. All major web browser have a dedicated JavaScript engine to execute the code on users' device.

JavaScript is used for define web page behaviour and dynamicity and design / program the web page response on the occurrence of an event (user interaction).

```
1 var button = document.getElementById("enter");
2 var input = document.getElementById("userinput");
3 var ul = document.querySelector("ul");
4
5 function inputLength() {
6     return input.value.length;
7 }
8
9 function createListElement() {
10     var li = document.createElement("li");
11     li.appendChild(document.createTextNode(input.value));
12     ul.appendChild(li);
13     input.value = "";
14 }
15
16 function addListAfterClick() {
17     if (inputLength() > 0) {
18         createListElement();
19     }
20 }
21
22 function addListAfterKeypress(event) {
23     if (inputLength() > 0 && event.keyCode === 13) {
24         createListElement();
25     }
26 }
27
28 button.addEventListener("click", addListAfterClick);
29
30 input.addEventListener("keypress", addListAfterKeypress);
```

A large, bold, black 'JS' logo is centered on a solid yellow background. The letters are thick and stylized, with the 'J' and 'S' having rounded, modern shapes.

WEB PAGE - HTML+CSS+JS+MULTIMEDIA FILES ⇒

```
<!DOCTYPE html>
<html>
<head>

  <meta charset="utf-8">
  <meta name="viewport" content="width=device-width, initial-scale=1">
  <link rel="stylesheet" type="text/css" href="style.css">
  <title> Introduction </title>

</head>
<body>

  
  <h1 class="main_text">Oscillator</h1>
  <p class="secondary_text"> Use the fader to change the volume </p>
  <script type="text/javascript" src="script.js"></script>
  <div>

    <button onclick="startOsc()">start</button>
    <button onclick="stopOsc()">stop</button>
    <input type="range" min="0" max="1" step="0.1" onchange="changeGain(this.value)">

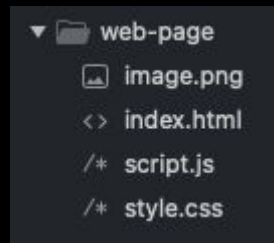
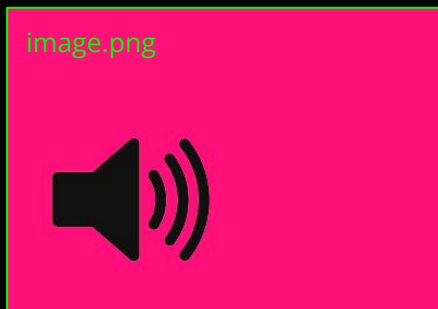
  </div>

</body>
</html>
```

index.html

```
body {
  background-color: #0aa;
}
#my_image{
  width: 100px;
}
.main_text{
  color: #00f;
}
.secondary_text{
  font-size: 10pt;
}
}
```

style.css



```
var audioContext = new AudioContext();

var osc;
var gain = audioContext.createGain();
gain.gain.value = 0.5;

function startOsc(){
  osc = audioContext.createOscillator();
  osc.connect(gain).connect(audioContext.destination);
  osc.start();
}

function stopOsc(){
  osc.stop()
}

function changeGain(value){
  var val = parseFloat(value);
  console.log(gain.gain.value)
  gain.gain.setValueCurveAtTime([gain.gain.value, val], audioContext.currentTime, 0.1);
}
```

script.js



Oscillator

Move the slider to change the volume

start

stop

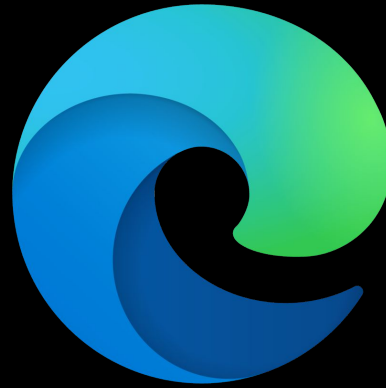


BROWSER

A web browser is application software for accessing the World Wide Web.

When a user requests a web page from a particular website, the browser retrieves the necessary content from a web server and then displays the page on the user's device.

The browser render and interprets HTML page, and therefore CSS and JS files.



DATABASE

A **database** is an organized collection of structured information, or data, typically stored electronically in a computer system. A database is usually controlled by a **database management system (DBMS)**. Together, the data and the DBMS, along with the applications that are associated with them, are referred to as a database system, often shortened to just database.

Data within the most common types of databases in operation today is typically modeled in rows and columns in a series of **tables** to make processing and data querying efficient. The data can then be easily accessed, managed, modified, updated, controlled, and organized. Most databases use **structured query language (SQL)** for writing and querying data.

SQL is a programming language used by nearly all relational databases to query, manipulate, and define data, and to provide access control.

```
INSERT INTO table name (column1, column2, column3, ...)
```

```
VALUES (value1, value2, value3, ...);
```

```
dvdrental=# select title, release_year, length, replacement_cost from film
dvdrental=#   where length > 120 and replacement_cost > 29.50
dvdrental=#   order by title desc;
```

title	release_year	length	replacement_cost
West Lion	2006	159	29.99
Virgin Daisy	2006	179	29.99
Uncut Suicides	2006	172	29.99
Tracy Cider	2006	142	29.99
Song Hedwig	2006	165	29.99
Slacker Liaisons	2006	179	29.99
Sassy Packer	2006	154	29.99
River Outlaw	2006	149	29.99
Right Cranes	2006	153	29.99
Quest Mussolini	2006	177	29.99
Poseidon Forever	2006	159	29.99
Loathing Legally	2006	140	29.99
Lawless Vision	2006	181	29.99
Jingle Sagebrush	2006	124	29.99
Jericho Mulan	2006	171	29.99
Japanese Run	2006	135	29.99
Gilmore Boiled	2006	163	29.99
Floats Garden	2006	145	29.99
Fantasia Park	2006	131	29.99
Extraordinary Conquerer	2006	122	29.99
Everyone Craft	2006	163	29.99
Dirty Ace	2006	147	29.99
Clyde Theory	2006	139	29.99
Clockwork Paradise	2006	143	29.99
Ballroom Mockingbird	2006	173	29.99

(25 rows)

DATABASE - NoSQL

A **NoSQL** (originally referring to "non-SQL" or "non-relational") database provides a mechanism for storage and retrieval of data that is modeled in means other than the tabular relations used in relational databases. Such databases have existed since the late 1960s, but the name "NoSQL" was only coined in the early 21st century, triggered by the needs of Web 2.0 companies. NoSQL databases are increasingly used in big data and real-time web applications.

