

Web / BD

Introduction to Web Programming
2025-2026

Gérald Oster <gerald.oster@telecomnancy.eu>



Organization of this part

- 4 x 1 hour - Lectures
- 3 x 2 hours - Labs
 - Front-end: HTML / CSS
 - Back-end: Python/Flask/Database
- 1 x 2 hours – Evaluation Lab (including some Database)
 - January 2026

Motivations

```
~/s/g/o/oclif ➤ master ➤ oclicf --help
oclicf: create your own CLI

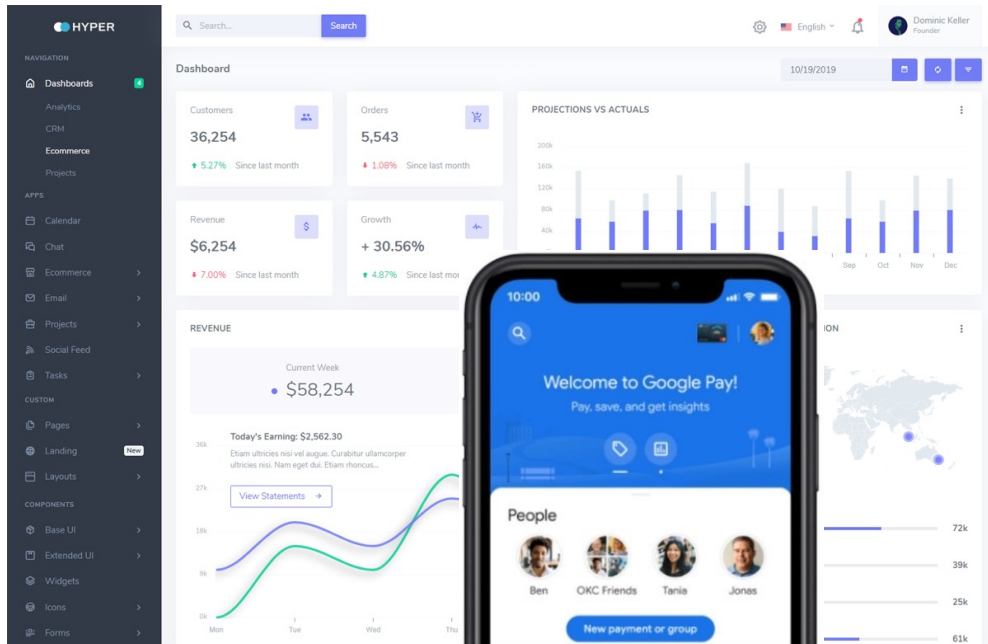
VERSION
  oclicf/1.12.1 darwin-x64 node-v10.11.0

USAGE
  $ oclicf [COMMAND]

COMMANDS
  command  add a command to an existing CLI or plugin
  help     display help for oclicf
  hook     add a hook to an existing CLI or plugin
  multi    generate a new multi-command CLI
  plugin   create a new CLI plugin
  single   generate a new single-command CLI

~/s/g/o/oclif ➤ master ➤
```

Command line interface (CLI)



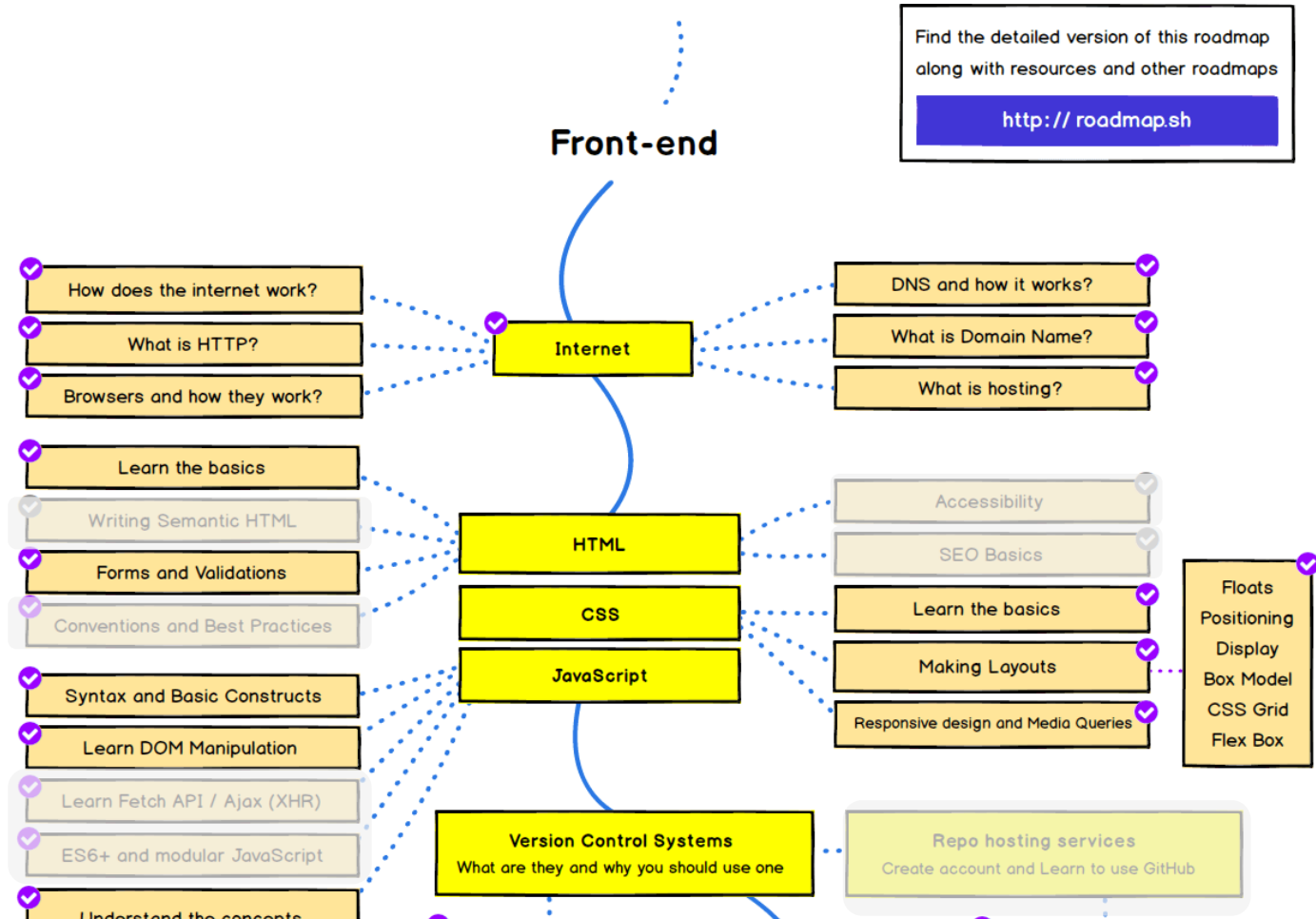
(nowadays) Applications

Disclaimer

- **NOT** a detailed course about Web Programming
- Demystification of Internet/Web
- Learn the concepts and the basics of web programming

This is just an introduction...

*... you will have to **learn by yourself at lot more***

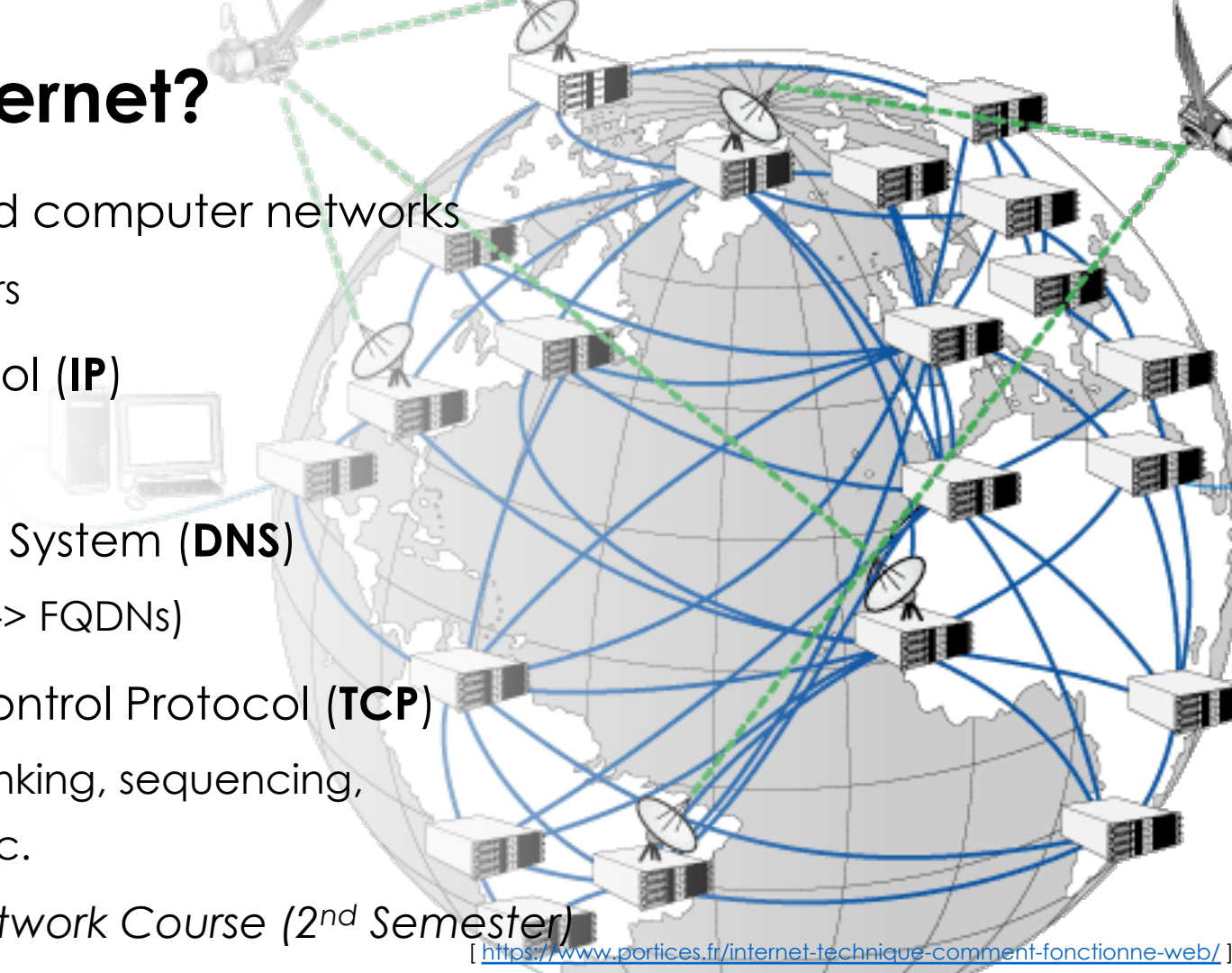


[<https://roadmap.sh/backend>]

What is Internet?

- Interconnected computer networks
 - Clients/Servers
- Internet Protocol (**IP**)
 - Routing
- Domain Name System (**DNS**)
 - Naming (IP <-> FQDNs)
- Transmission Control Protocol (**TCP**)
 - Packets: chunking, sequencing, resending, etc.

MORE details in the Network Course (2nd Semester)



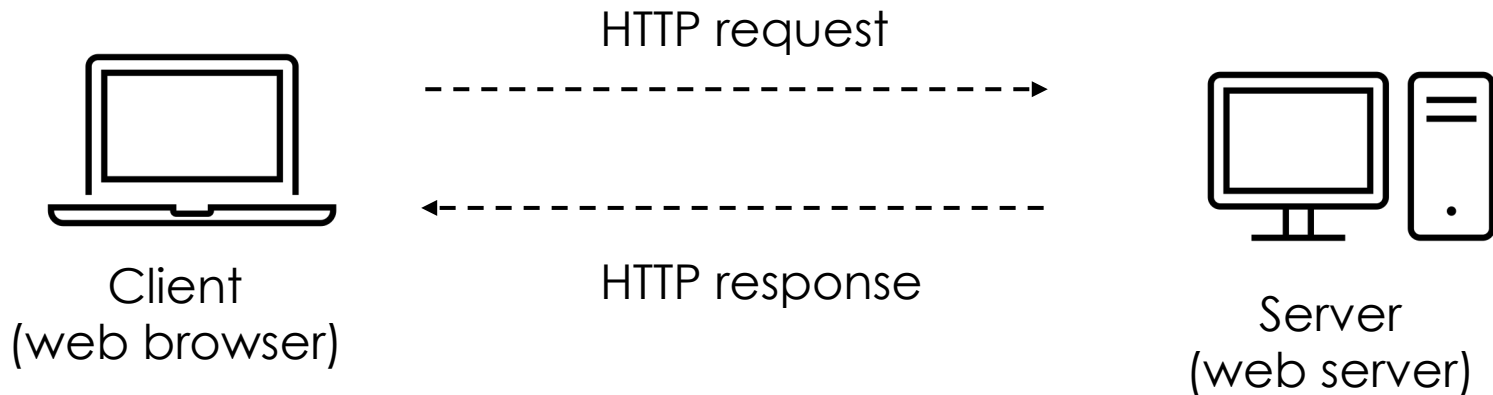
What is the Web?

The **World Wide Web** -- commonly referred to as WWW, W3, or the Web -- is an **interconnected system of public webpages** accessible through the **Internet**.

The Web is not the same as the Internet: the Web is one of many applications built on top of the Internet.

[https://developer.mozilla.org/en-US/docs/Glossary/World_Wide_Web]

World Wide Web (WWW)



Uniform Resource Locator (URL):

<https://www.telecomnancy.univ-lorraine.fr/index.html>

Protocol Domain and subdomains Top Level Domain (TLD) Path

HyperText Transfer Protocol (HTTP)

- Protocol that defines:
 - Methods Request / HTTP Verbs : **GET**, **POST**, PUT, DELETE, HEAD, ...

Method Path Protocol Version

GET /index.html HTTP/1.1

Headers

Host: cs54.telecomnancy.univ-lorraine.fr

Accept-Language: fr

...

HyperText Transfer Protocol (HTTP) [cont.]

- Protocol that defines:
 - HTTP Responses

Version Status Code Status Message

HTTP/1.1	200	OK
----------	-----	----

Headers

Server: nginx/1.18.0

Date: Thu, 07 Oct 2021 15:00:07 GMT

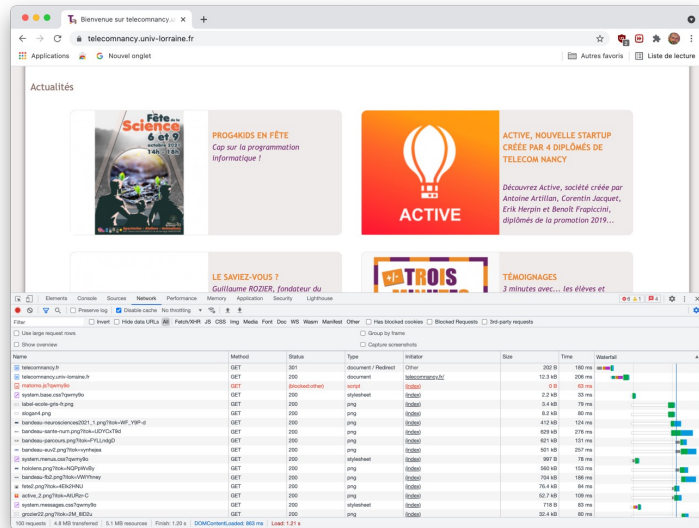
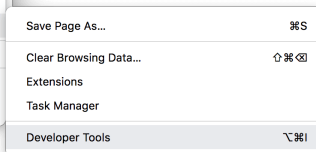
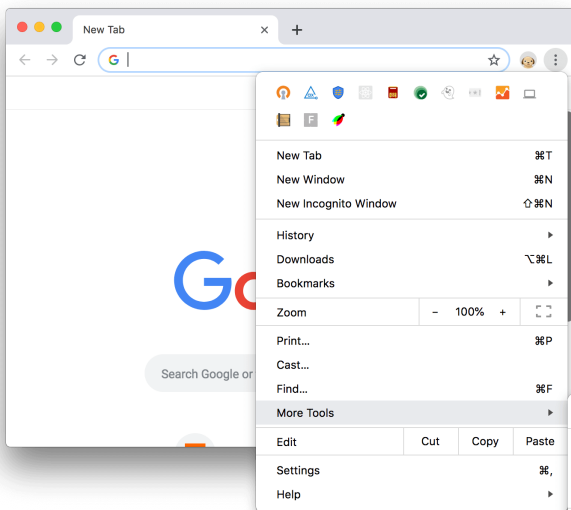
Content-Type: text/html

Content-Length: 6238

...

Web Developers Tools (demo)

- cURL : `$ curl -I http://www.google.fr/teapot`
- (Chrome) Web Developers Tools



HTTP Status Code

200 OK

301 Moved Permanently

302 Not Found

304 Not Modified

307 Temporary Redirect

401 Unauthorized

403 Forbidden

404 Not Found

418 I'm a Teapot

500 Internal Server Error

503 Service Unavailable

Information

Redirection

Client Errors

Server Errors

[<https://datatracker.ietf.org/doc/html/rfc2616>]

[<https://developer.mozilla.org/en-US/docs/Web/HTTP/Status>]

URL Parameters

GET /search?q=cats HTTP/1.1
Host: www.google.com

? : separator between path/parameters
parameter_name = parameter_value

GET /search?q=olivier+festor&tbm=isch HTTP/1.1
Host: www.google.com

& : separator between parameters

Names and values are *URL encoded*!

Cha%C3%A9ne%20pas%20tr%C3%A8s%20lisible%20%3B%29

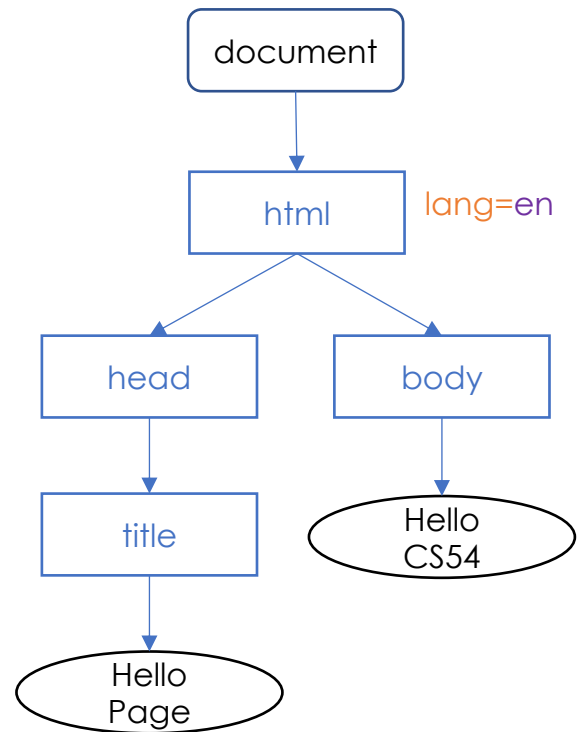
Hyper Text Markup Language (HTML)

- Markup language:
 - Tags: `<html> ... </html>`
 - Attributes: `<html lang="fr"> ... </html>`
- Anatomy of basic web page

```
<!DOCTYPE html>
<html lang="en">
  <head>
    <title>Hello Page</title>
  </head>
  <body>
    Hello CS54
  </body>
</html>
```

Hyper Text Markup Language (HTML) [cont.]

```
<!DOCTYPE html>  
<html lang="en">  
  <head>  
    <title>Hello Page</title>  
  </head>  
  <body>  
    Hello CS54  
  </body>  
</html>
```



Document Object Model (DOM)

Hyper Text Markup Language (HTML) [cont.]

- Live coding:
 - Local coding:
 - `file://` protocol
 - HTTP Server:
 - `python3 -m http.server 8080`
 - Visual Studio Code
 - IDE + **Live Server Extension**

Hyper Text Markup Language (HTML) [cont.]

- Paragraphs: `<p>...</p>`
- Headings: `<h1>, <h2>, ...`
- Lists (unordered / ordered): `, , , ...`
- Table (rows, data): `<table>, <tr>, <td>, ...`
- Images ``

``

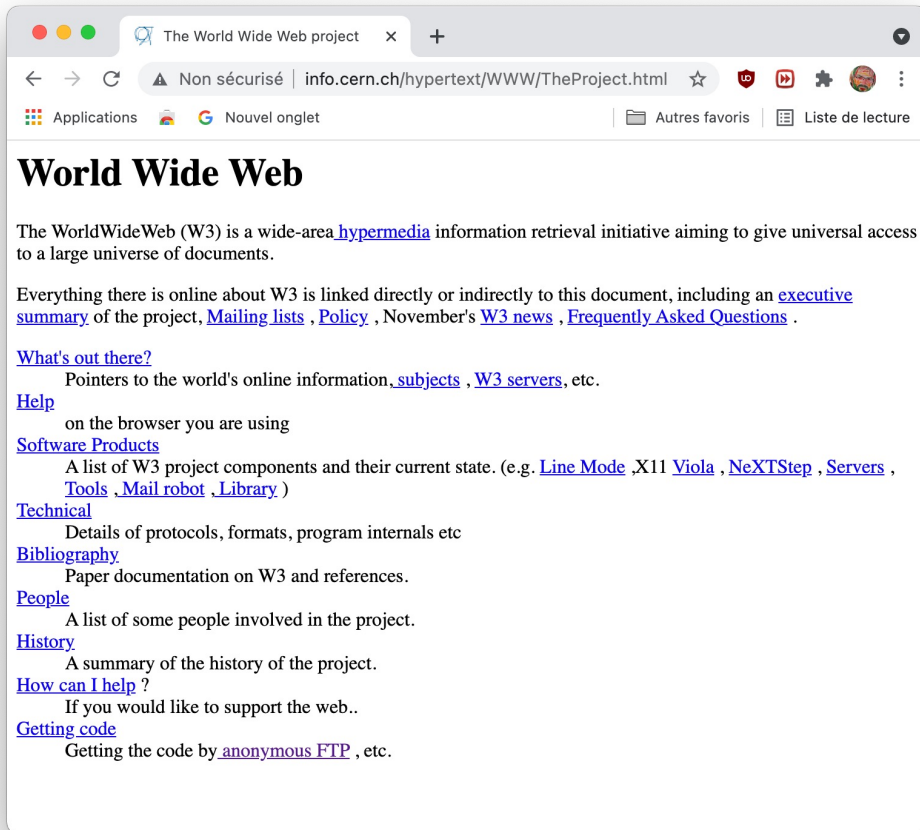
- **Links (relative / absolute + protocol)** `<a>`

``

``

- Warning: Phishing issues

The First Web Site (1989)



The screenshot shows a web browser window with the title "The World Wide Web project". The address bar displays "Non sécurisé | info.cern.ch/hypertext/WWW/TheProject.html". The page content is titled "World Wide Web" and describes the project as a wide-area hypermedia information retrieval initiative. It lists various links for more information, including "What's out there?", "Help", "Software Products", "Technical", "Bibliography", "People", "History", "How can I help?", and "Getting code".

World Wide Web

The WorldWideWeb (W3) is a wide-area [hypermedia](#) information retrieval initiative aiming to give universal access to a large universe of documents.

Everything there is online about W3 is linked directly or indirectly to this document, including an [executive summary](#) of the project, [Mailing lists](#), [Policy](#), November's [W3 news](#), [Frequently Asked Questions](#).

[What's out there?](#)
Pointers to the world's online information, [subjects](#), [W3 servers](#), etc.

[Help](#)
on the browser you are using

[Software Products](#)
A list of W3 project components and their current state. (e.g. [Line Mode](#), X11 [Viola](#), [NeXTStep](#), [Servers](#), [Tools](#), [Mail robot](#), [Library](#))

[Technical](#)
Details of protocols, formats, program internals etc

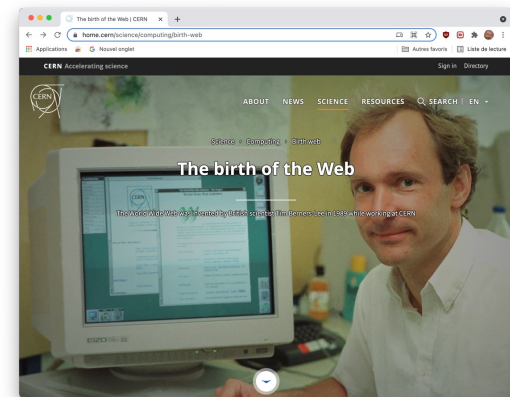
[Bibliography](#)
Paper documentation on W3 and references.

[People](#)
A list of some people involved in the project.

[History](#)
A summary of the history of the project.

[How can I help?](#)
If you would like to support the web..

[Getting code](#)
Getting the code by [anonymous FTP](#), etc.



More information at
<https://home.cern/science/computing/birth-web>

Cascading Style Sheet (CSS) 101

```
a {  
    color: blue;  
    font-size: 5em;  
}
```

```
a:hover {  
    color: red;  
    font-size: 5em;  
}
```

Cascading Style Sheet (CSS) [cont.]

- Inlined as attributes of any tag using `style`
- Included in HTML file using `<style>` tag
- Included from an external file using `<link>`
 - `<link href="style.css" rel="stylesheet"/>`

• Cascading styles

- Properties `font-size: 24px;` there exists a lot of CSS properties
- Type selectors `p { ... }` applied to all `<p>` attributes
- Class selectors `.warning { ... }` applied to tag with attribute `class="warning"`
- ID selectors `#player { ... }` applied to tag whose `id= "player"`

[<https://developer.mozilla.org/fr/docs/Web/CSS/>]

HTML Forms

Method, either `post` or `get` (more on that later)

HTML Form

```
<form action="https://music.youtube.com/search" method="get">  
  <input name="q" type="search"/>  
  <input type="submit" value="Search"/>  
</form>
```

Form Element



Coming next...

- Backend using Flask