

CS54

Introduction to Web Programming
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Motivations

```
~/s/g/o/oclif ➜ ⌘ master ➔ oclif --help  
oclif: create your own CLI
```

VERSION

oclif/1.12.1 darwin-x64 node-v10.11.0

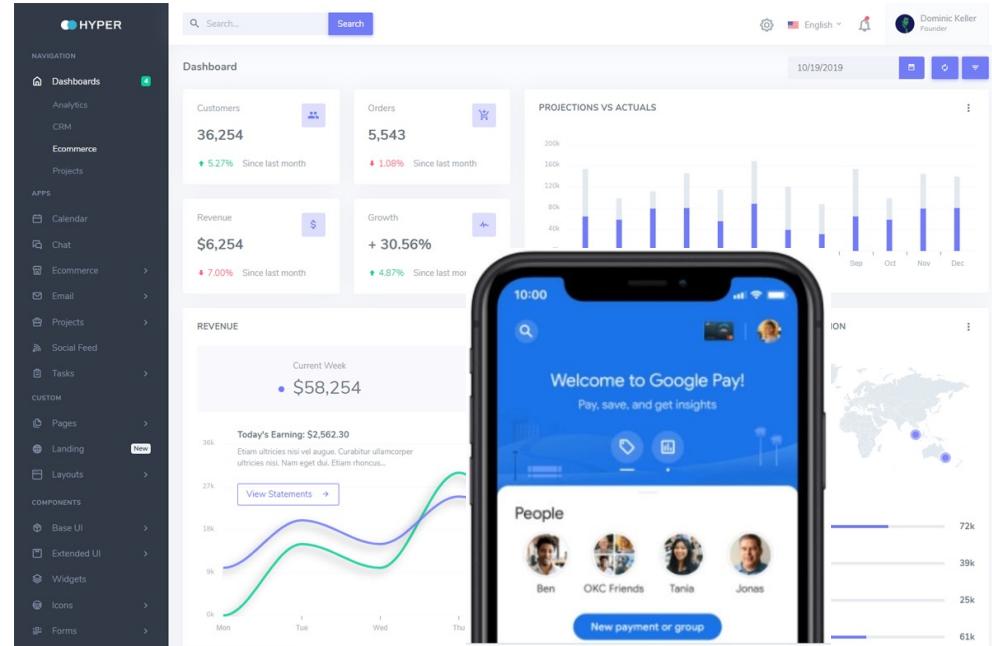
USAGE

```
$ oclif [COMMAND]
```

COMMANDS

command	add a command to an existing CLI or plugin
help	display help for oclif
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)

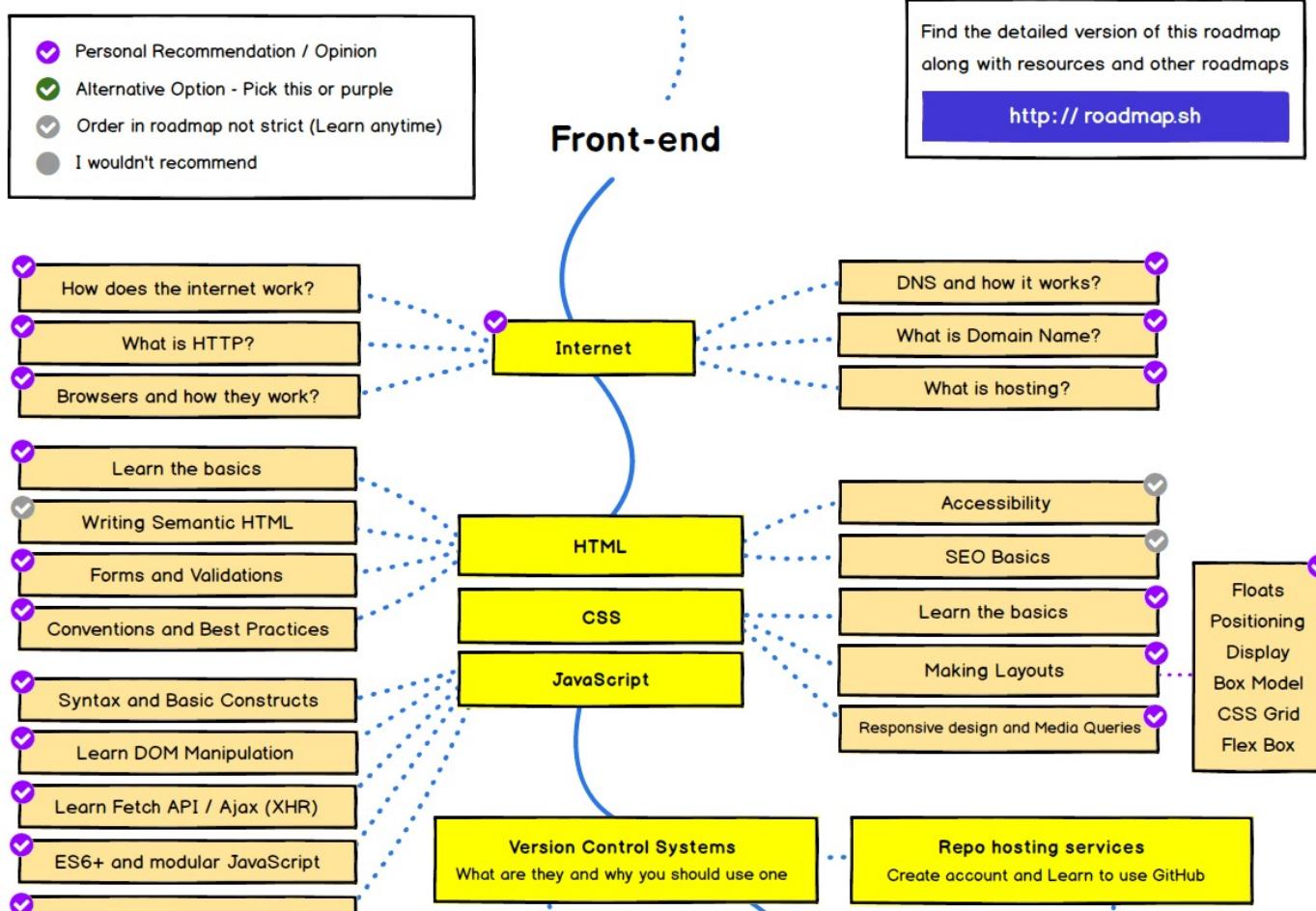
(nowadays) Applications

Disclaimer

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

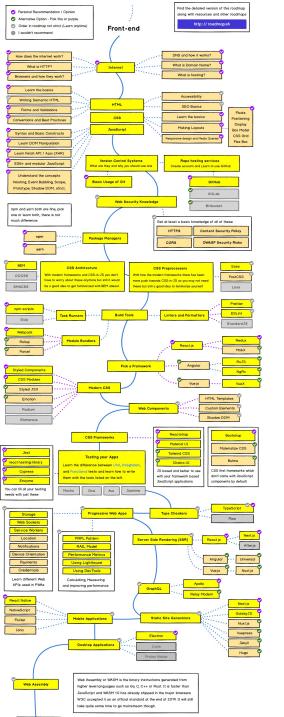
This is just an introduction...

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



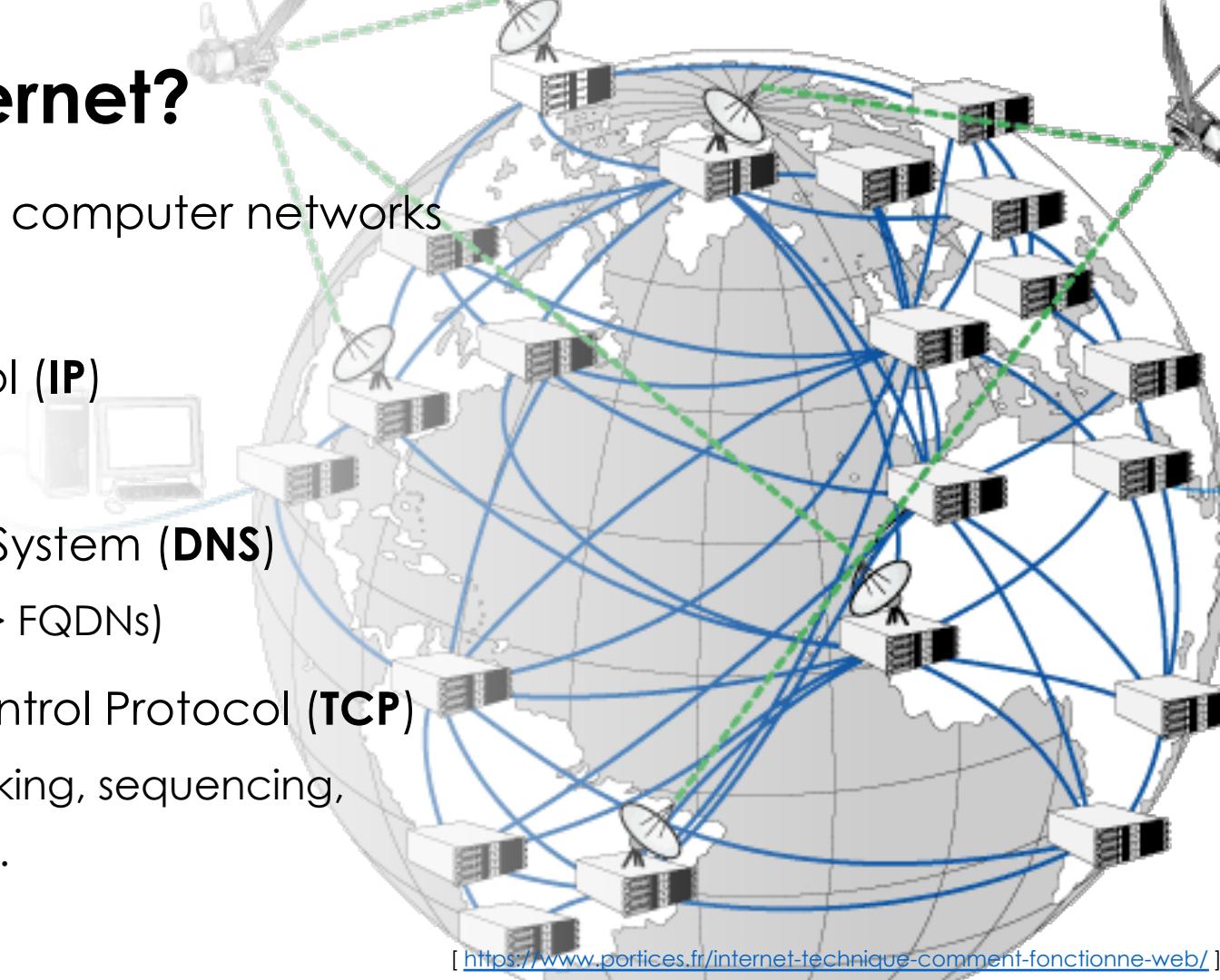
[<https://roadmap.sh/frontend>]

[<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.



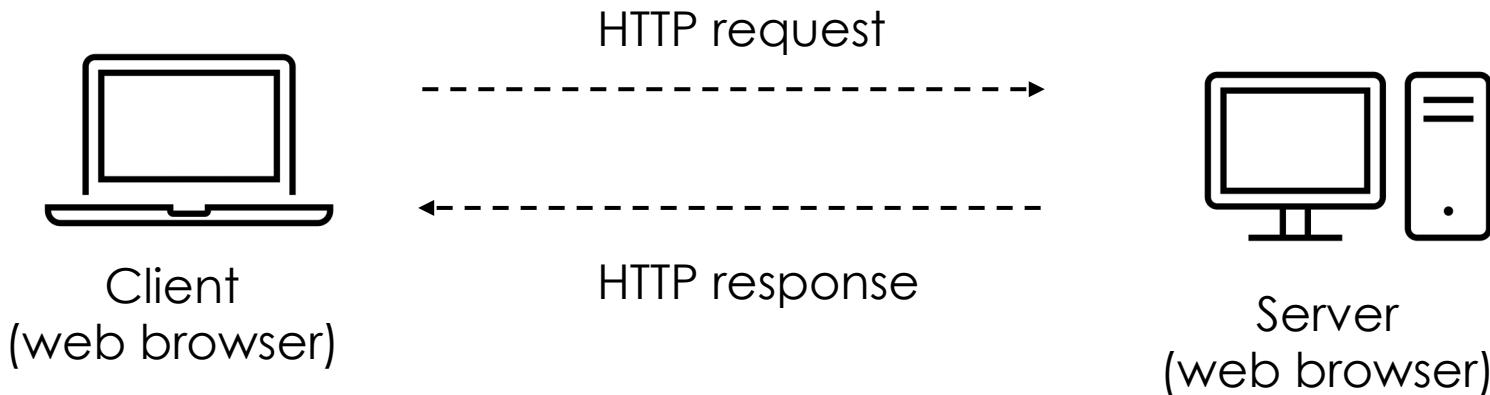
What is the Web?

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)



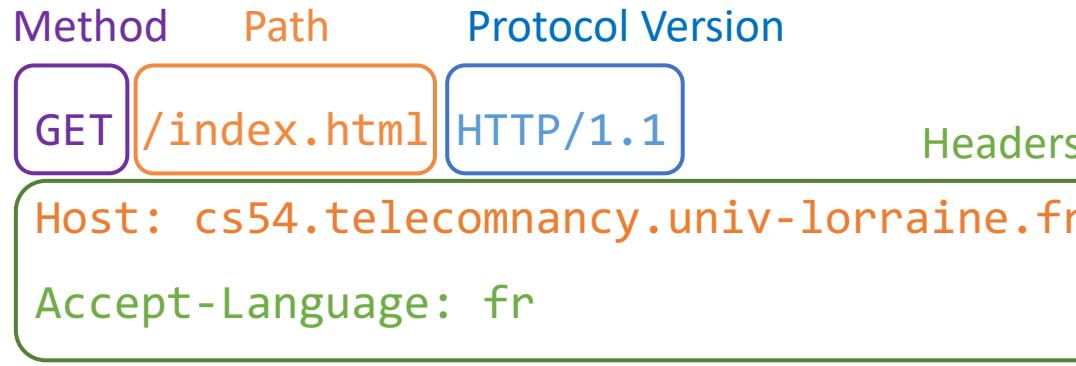
Uniform Resource Locator (URL):

`https://www.telecommancy.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, ...



HyperText Transfer Protocol (HTTP) [cont.]

- Protocol that defines:
 - HTTP Responses

Version	Status Code	Status Message	Headers
HTTP/1.1	200	OK	
<code>Server: nginx/1.18.0</code>			
<code>Date: Thu, 07 Oct 2021 15:00:07 GMT</code>			
<code>Content-Type: text/html</code>			
<code>Content-Length: 6238</code>			

...

Web Developers Tools (demo)

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

The screenshot shows the Google Chrome browser window. A context menu is open over a page, with the "More Tools" option expanded, revealing "Developer Tools". Below the menu, a "Save Page As..." dialog is visible. To the right of the browser, the developer tools interface is displayed, showing the Network tab with a list of requests and their details.

Name	Method	Status	Type	Initiator	Size	Time	Waterfall
telecomancy.fr	GET	301	document	Redirec...	300 B	160 ms	[Waterfall]
telecomancy.univ-lorraine.fr	GET	200	document	telecomancy.fr	12.3 kB	206 ms	[Waterfall]
index.html	GET	200	document	telecomancy.fr	1.9 kB	30 ms	[Waterfall]
system.base.css?rmpy0d0	GET	200	stylesheet	ligh...	2.2 kB	30 ms	[Waterfall]
label-ecole-prix-rolling	GET	200	png	ligh...	3.4 kB	79 ms	[Waterfall]
label-ecole-prix-rolling	GET	200	png	ligh...	3.4 kB	84 ms	[Waterfall]
berceau-reconnaissance021_1.png?h=400_VIP-d	GET	200	png	ligh...	414 kB	124 ms	[Waterfall]
berceau-serie-01.png?h=400_VIP-d	GET	200	png	ligh...	829 kB	278 ms	[Waterfall]
berceau-serie-02.png?h=400_VIP-d	GET	200	png	ligh...	829 kB	283 ms	[Waterfall]
berceau-serie-03.png?h=400_VIP-d	GET	200	png	ligh...	501 kB	257 ms	[Waterfall]
berceau-serie-04.png?h=400_VIP-d	GET	200	png	ligh...	501 kB	257 ms	[Waterfall]
system.messages.css?rmpy0d0	GET	200	stylesheet	ligh...	297 kB	100 ms	[Waterfall]
berceau-001.png?h=400_VIP-d	GET	200	png	ligh...	563 kB	100 ms	[Waterfall]
berceau-002.png?h=400_VIP-d	GET	200	png	ligh...	704 kB	106 ms	[Waterfall]
berceau-003.png?h=400_VIP-d	GET	200	png	ligh...	764 kB	84 ms	[Waterfall]
berceau-004.png?h=400_VIP-d	GET	200	png	ligh...	103 kB	10 ms	[Waterfall]
system.messages.css?rmpy0d0	GET	200	stylesheet	ligh...	718 B	10 ms	[Waterfall]
process22/reconnaissance021_1.png?h=400_VIP-d	GET	200	png	ligh...	32.4 kB	300 ms	[Waterfall]

109 requests - 0.8 MB transferred | 6,160 resources | First: 1.03 s | DOMContentLoaded: 660 ms | Load: 1.21 s

HTTP Status Code

200 OK

Information

301 Moved Permanently

302 Not Found

Redirection

304 Not Modified

307 Temporary Redirect

401 Unauthorized

403 Forbidden

404 Not Found

418 I'm a Teapot

Client Errors

500 Internal Server Error

Server Errors

503 Service Unavailable

[<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
Hostname: www.google.com

? : separator between path/parameters
parameter_name = parameter_value

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

& : separator between parameters

Names and values are *URL encoded!*

Cha%C3%AEne%20pas%20tr%C3%A8s%20visible%20%3B%29

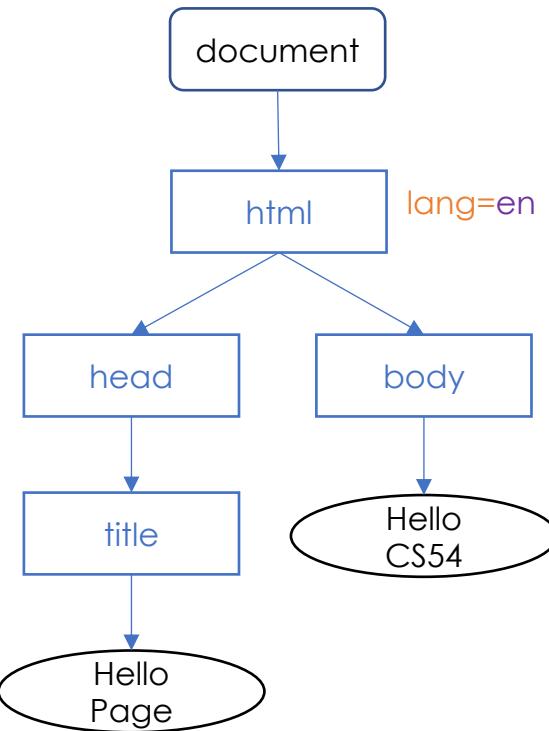
Hyper Text Markup Language (HTML)

- 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>

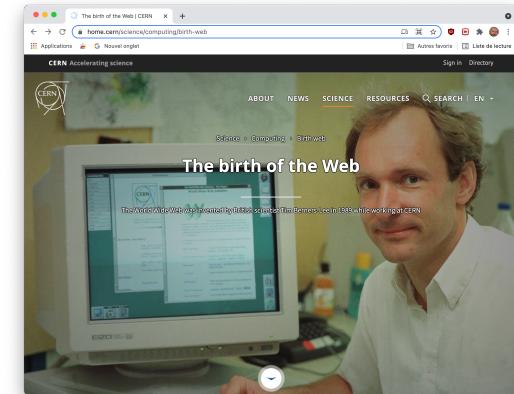
```
<a href="anotherworld.html"/>
```

```
<a href="https://thispersondoesnotexist.com/image"/>
```

- Warning: Phishing issues

The First Web Site (1989)

The screenshot shows a Mac OS X-style window titled "The World Wide Web project". The address bar says "Non sécurisé | info.cern.ch/hypertext/WWW/TheProject.html". Below the address bar are standard browser controls: back, forward, search, and others. Underneath the controls are links for "Applications" and "Nouvel onglet". The main content area has a large title "World Wide Web" and a paragraph about W3 being a wide-area [hypermedia](#) information retrieval initiative. It lists various links like "executive summary", "Mailing lists", "Policy", "W3 news", and "Frequently Asked Questions". There are sections for "What's out there?", "Help", "Software Products", "Technical", "Bibliography", "People", "History", and "How can I help?". Each section contains a brief description and a link.



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"`

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

Cookies

