Sofascore Frontend Academy Lecture 01,
February, 2024

Frontend. Browser. HTML. CSS.

Alen Murtić

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About Sofascore academy and your teachers

Sofascore academy

- Sofascore started student education relatively early
    - Some of the first employees were students
    - Student courses with 3-4 lessons from late 2015 to 2017
    - Summer internships in 2018 and 2019
    - Sofascore academy in this format from 2020 (this is 5th edition)
        - Great for sharing knowledge, expanding community and potentially expanding Sofascore team

Your teacher - Alen Murtić

- Started student job at Sofascore in 2017
    - Backend developer with potential switch to data analytics (did not switch :D)
- Lead Symfony portion of Sofascore backend academy in 2020 & 2021
- Switched teams to frontend in 1/2021, attended 2021 frontend academy
- Lead 2022 and 2023 frontend academy

Assistants - Darjan Baričević and Petar Ćorluka

- Frontend devs working at Sofascore since 2022
- Reviewers for homeworks
- Darjan will probably teach one or two lessons

Planned curriculum

1. Frontend. Browser. HTML. CSS. ||| Hw: Init git repo and solve CSS quiz.
2. Responsive web. JavaScript. ||| Hw: Solve various JS tests.
3. Typescript. Promises. Fetching data. Event propagation. ||| Hw: Simple web app || I-O script
4. React.js ||| Hw: Some kind of simple React app.
5. CSS in JS (Styled components/sth else). Next.js basics. ||| Hw: Review previous homework.
6. More of Next.js. Zeplin/Figma. ||| Hw: Init final project, one project page
7. Context. Router. More hooks. ||| Hw: Review previous homework.
8. SWR. Client vs server. Routing. ||| Hw: complete final project with one checkpoint.
9. RSC and app folder in Next.js
10. Redux - optional lesson

Curriculum changes from last year

- No more Advanced CSS lecture - that will be taught via different methods
    - Student’s attention was relatively poor and it took up a lecture week
- Early start to Next.js framework
- Homeworks will be the starting point for final project
- Additional Next.js lecture about React Server Components and app folder
- Possibly a Redux lesson at the end

02

Web applications and browser

Web application

- Wikipedia: link
    - "A web application (or web app) is application software that runs on a web server"
    - "Web applications are accessed by the user through a web browser with an active network connection"
    - "These applications are programmed using a client–server modeled structure"
- Simply: it consists of **Frontend (client)** and **Backend (server)**

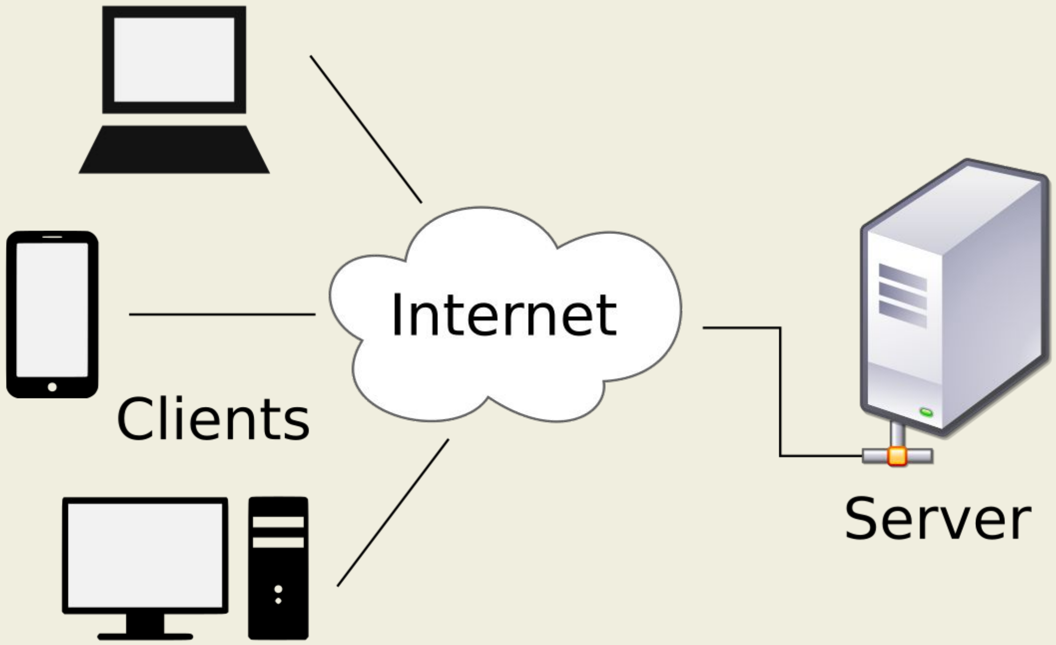
Client - Server Architecture

- Core principle of web communication
  - Client asks the server for a resource, server responds
  - Resource: HTML document, formatted data, image, video,...

    E.g. What is the score in a match? Give me team logo...
- THE protocol: **HTTP** (Hypertext Transfer Protocol)
  - What is HTTP (Cloudflare)?
  - Later created: Websockets - to improve efficiency

Client - Server architecture

- Basically: clients pull data from server or push it to server via Internet
- Communication protocol: HTTP



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Frontend

- Interface with which a user (person or a script) interacts (sees, clicks, ...)
    - "Visible" part of the web application
    - In a general meaning - any client which has UI - Android, iOS, KaiOS apps
    - We use the term "Frontend" as a shorthand for **web frontend**

Web frontend

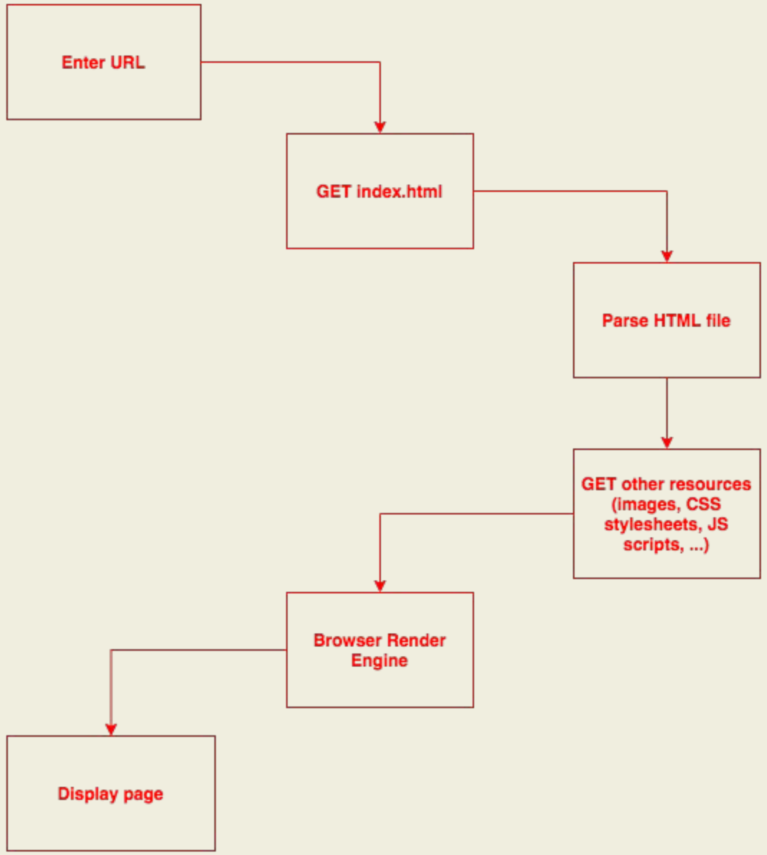
- Visual application that is displayed by web browser
- Source written in HTML, CSS, JavaScript
- Source can be in WebAssembly 😱 - Binary (compiled) [mostly JavaScript] for higher performance
  - [Writing WebAssembly By Hand]
  - Personal opinion: not a fan of writing code directly in WASM

Browser

- A tool to navigate the web, display web applications and provide interactivity
- Core component: render engine
  - MSHTML, EdgeHTML - deprecated, used by Internet Explorer and early Edge
  - Gecko - Firefox
  - WebKit - Safari and early Chrome
  - Blink - Chromium project, fork of WebKit
  - Chrome, current Edge, Brave, Opera, Vivaldi, Samsung Internet, ...
- 2023: For desktop I would recommend Firefox -> reason: Manifest V3
  - Link 1 and link 2 why, Vivaldi and Brave try to fight it, Edge doesn't
- For mobile it's a little bit murkier, but the Android Firefox is getting better, on iOS everything is repackaged Safari (for now)

Browser flow

- Example of client - server architecture
- Browser (+user) = client
- Detailed description: how browsers work



Browser differences

- Different engines -> differences in how everything works
  - Most of things are standardized via W3C, but some browsers don't support some features
  - Can I use "navigator.share"?
  - Browsers depend on the OS for features like graphics APIs, threads, processes, ...
- Browsers work on CPU, but do mostly graphics tasks
  - Hardware acceleration -> doing some tasks on GPU (or special CPU cores)
  - Problem with HA: now your browser depends on your GPU & its driver

Reporting bugs cheatsheet

- Always report: browser, OS
- Can make a difference: ad-blocker, tracking protection, private (incognito) or normal mode
  - Also if 3rd party cookies are enabled or not
- Nice caveat: hardware acceleration
  - e.g. Chromium browsers and image scaling with hardware acceleration in versions 80-sth

03

HTML

HTML

- **H**yper**T**ext **M**arkup **L**anguage
  - HyperText -> text with references to other pages (links)
  - Markup -> standardized set of notations (tags and attributes)
    - e.g. XML, markdown (.md), TeX/LaTeX
  - Idea: How to display content
  - NOT A PROGRAMMING LANGUAGE!!!! MARKUP LANGUAGE!!!

HTML

- Created by Tim Berners-Lee to enable document sharing (text based -> links, headings, paragraphs)
  - Standardized by W3C
  - Latest and greatest: HTML5 - late 2000s, big improvements
    - Made proprietary things such as Flash obsolete
- HTML6 is coming - 4 years old article 😂
- HTML is forwards-compatible
  - Designed to treat all tags in the same way (as inert, unstyled inline elements) unless their appearance or behavior is overridden
  - i.e. 2007 browser can display 2023 plain-HTML page decently

HTML structure

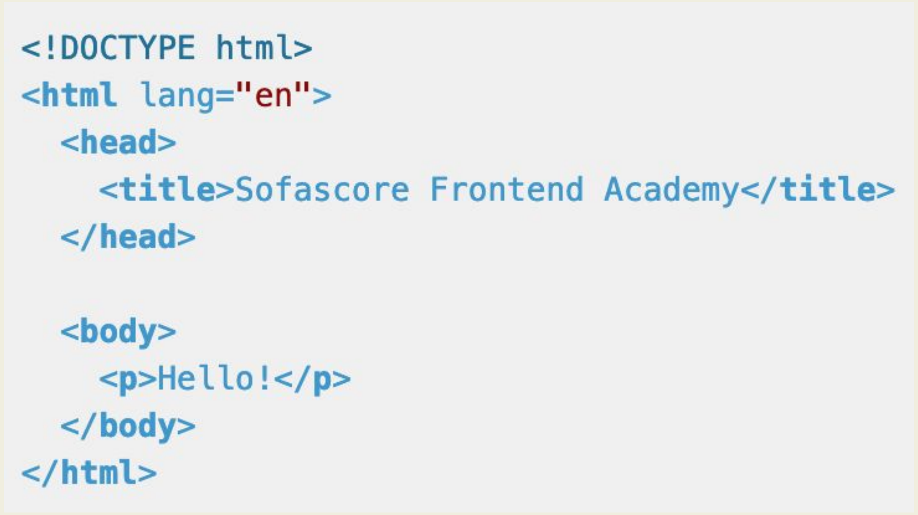
- **HTML Element: Tag + Attribute(s) + Content**
- Tag: identifies element (html, body, b, div, span)
  - opening: e.g. <div>
  - closing: </div>
  - self closing: <img/>
- Attribute: specifies properties of an element (e.g. styling, source for an image, ...)
- Content: between opening and closing tag
  - any text, HTML element, ...
  - self closing tags don't have content
- Each HTML document has **html**, **body**, **head** tags.

HTML elements examples

- `<b>This is bold text</b>`
- `<div id="atribute_example">Text and/or other element(s)</div>`
- `<img src="path_to_image" alt="Text if image fails to load" />`

HTML sample

- **HTML relations:**
- Parent - Child -> child is parent's content
- Siblings - two elements with the same parent



```
<!DOCTYPE html>
<html lang="en">
  <head>
    <title>Sofascore Frontend Academy</title>
  </head>

  <body>
    <p>Hello!</p>
  </body>
</html>
```

Semantic HTML

- The same content can be described in different ways
- Write HTML in a way it conveys meaning when read, not just in browser

Semantic HTML conveys meaning.
This help
<div>
<div> <div> <div> <div> <div> <div>
<div class="button">
KAPWING
FALSEKNEES.COM © 2016

HTML examples

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04

CSS

CSS

- **C**ascading **S**tyle **S**heets
  - How HTML elements are displayed on device
  - CSS3 specification
- Syntax: cssProperty: valueOfProperty;
  - e.g. color: blue;
- Cascading -> styles cascade (apply to lower levels) if not overridden

CSS Selectors

- CSS defines styles and can be applied to single element, or to the group of elements
- Inline styling - for single element
    - `<p style="color:blue;">Text</p>`
- Style all elements with the same tag
    - `h2 { text-transform: uppercase; }`
    - useful for resetting default browser styling (e.g. ul or button elements)
- Style all elements with the same class attribute set to className
    - `.className { background-color: tomato; }`
- Style all elements with the same id attribute
    - `#uniqueId { text-align: center; }`

CSS Selectors 02

- Selectors can be mixed
  - h2.specialHeading { padding: 8px; }
  - h2 .specialHeading { margin: 16px 8px; }
- Universal selector (*), Grouping selector (div, p { ... })
- **Specificity: Inline style > Id Styling > Class styling > Tag styling**
- Notes:
  - Id attributes should be unique for each element and should appear only once on each page
  - Same element can have multiple classes (e.g. <div class="big blue rounded" />)
  - Adding !important to value of CSS property will override a rule that can’t be overridden in any other way
    - Multiple !important values can make CSS extremely confusing

Adding CSS to HTML

- `<link rel="stylesheet" type="text/css" href="myStyleSheet.css">`
- Embedded in `<style></style>` element
- Directly on element
- It is applied in order they are linked and order in the file in which they were defined
- Do separate HTML and CSS files!

CSS Box model

- Each element is a box defined with x, y, width and height
  - x and y mark the top left edge of the box
  - width and height are applied to content part of the box
- Where are content, padding, border and margin on the cats image?

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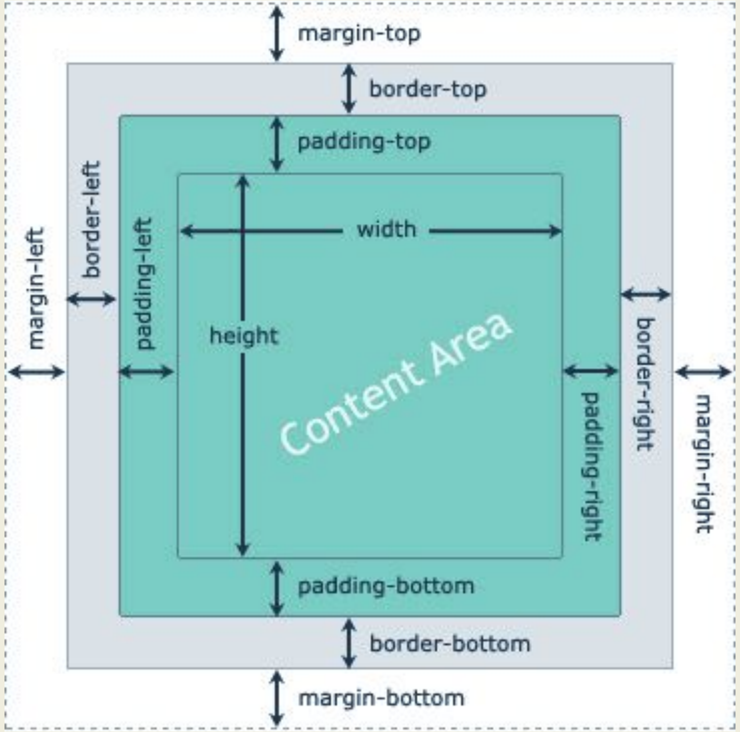
CSS Box model

- Content can be distributed in the box with padding
- Box can be spaced from other boxes with margin

  (e.g. spacing between sibling elements)

  - Margins of adjacent elements don't stack!!! They collapse. Bigger wins.
  - Rules of margins
  - Margin can be negative - a bit hackish
- Box can be made visible with border - draws line on the edge of the box



CSS Box model and box-sizing

- box-sizing property changes how browser calculates size of the element
    - Whether to border or padding included or excluded from the width
    - Default value is content-box, which includes only content
    - We at Sofascore use box-sizing: border-box -> includes content, padding and border
        - Very simple example why border-box can be superior: link

CSS examples

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Thank you for your attention!

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