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Einführung in die Webentwicklung

Montag, 26.04.2021 12:15 - 13:45 Uhr

Universität Augsburg

Software-Projekt 2021

XITASO GmbH

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Web Development

HTML, CSS, JavaScript, Server-Side Rendering, TechStacks

Web Development – Motivation

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Static Website

- Content driven
- „Home“ page

Dynamic Website

- Data / State is saved on a server
- Examples: Wikipedia, Amazon, eBay

Web Application

- Replacement for Desktop / Mobile Apps
- Enterprise Applications
- Examples: Word360 / Google Docs / Netflix / Zoom Discord / VS Code

Today: Frontends are Web Frontends

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HTML

HyperText Markup Language

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<h1>Welcome</h1>

What is HTML?

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- „HyperText Markup Language“
- HTML gives text a **structure** (using markup)
- Hypertext is text with **links** 

Hi, I'm a paragraph

- Like a „Word“ document, but
  - Images are not embedded
  - Can navigate to another document

```
<html>
 <body>
  <h1>Picture of the day</h1>
  <img src="augsburg.jpg" width="100%"/>

  <h2>Todo</h2>
  <ul>
   <li>Add picture</li>
   <li>Add <em>todo</em> list</li>
   <li>Add styles</li>
  </ul>

  Do you have any
  <a href="faq.html">questions</a>?
 </body>
</html>
```

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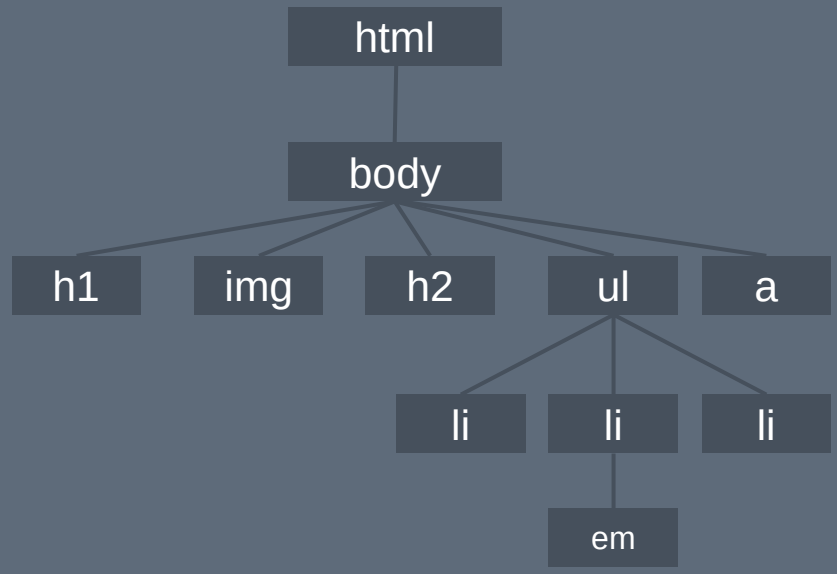
Document Object Model (DOM)



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CSS
Cascading Style Sheets

What is CSS?

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- Style for your HTML!

- Features:
  - Styling (color, font)
  - Layout / positioning 
  - Animations
  - Responsive
  - Interaction

CSS selectors

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	Prefix	Example
Tag		body
ID	#	#email
Class	.	.title
Pseudo class	:	:hover
Attribute	[ ]	input[type="text"]

...

```
h1 {
  color: red;
}
```

CSS frameworks

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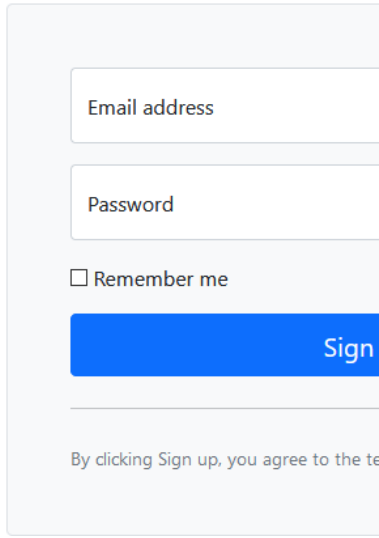
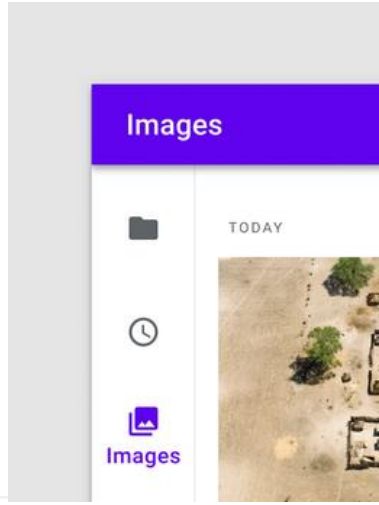
- Bootstrap by Twitter
- Material Design by Google
- … many more





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Dynamic Websites

Server-Side Rendering (SSR)

Why HTML and CSS is not enough!

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- We want to show dynamic content!
- We want to trigger changes in a database.
- We need a web server with software (e.g. PHP)
- We want mulitple users (e.g. Chat) using the same data.

Server-Side Rendering (SSR)

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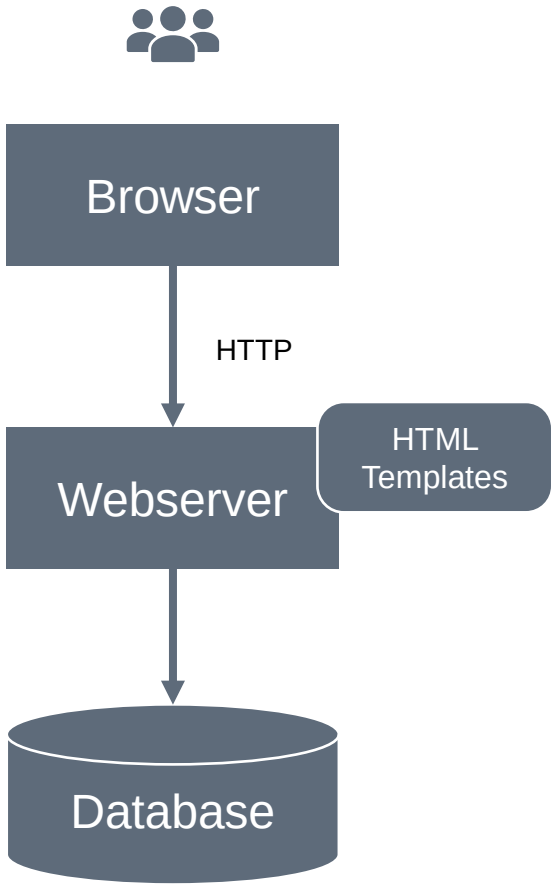
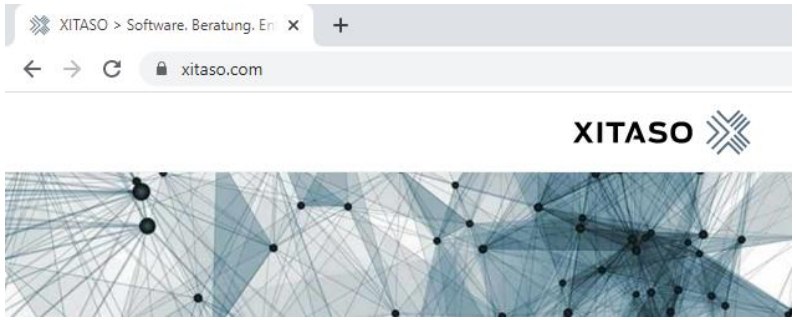
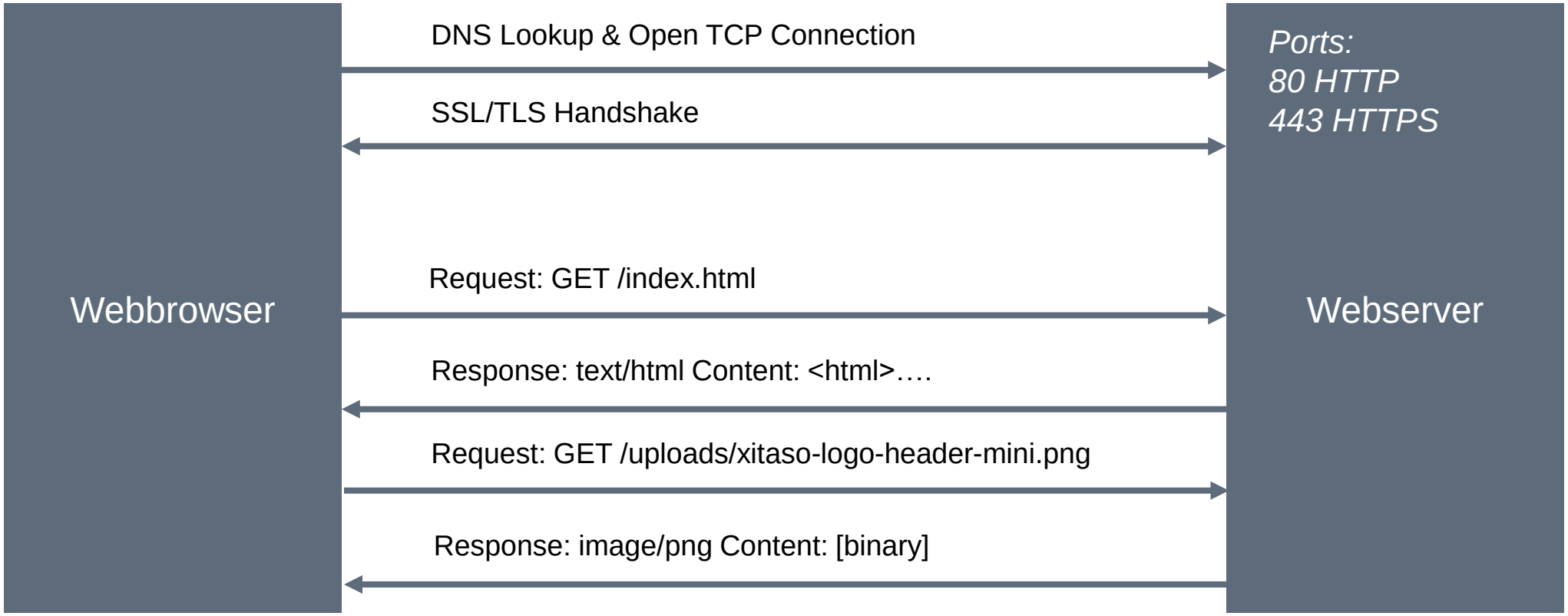


- User opens browser and navigates to a webpage
- Browser requests URL from the server
- Server gets requested data from the database
- Server uses HTML templates to generate the resulting HTML document on the fly
  - HTML document is sent back to the client

HTTP Communication





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JavaScript

im Browser

Why JavaScript?

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- Program client-side behavior of your WebPage!
- Code is downloaded from the Internet and executed in the browser
- JavaScript is the only progamming language a browser understands
  - JavaScript is used to call the Browser API
  - Each browser (e.g. Chrome, Firefox, Safari) has a different implementation
- JavaScript Versions: ECMAScript ES5, ES6

DOM Manipulation using JavaScript

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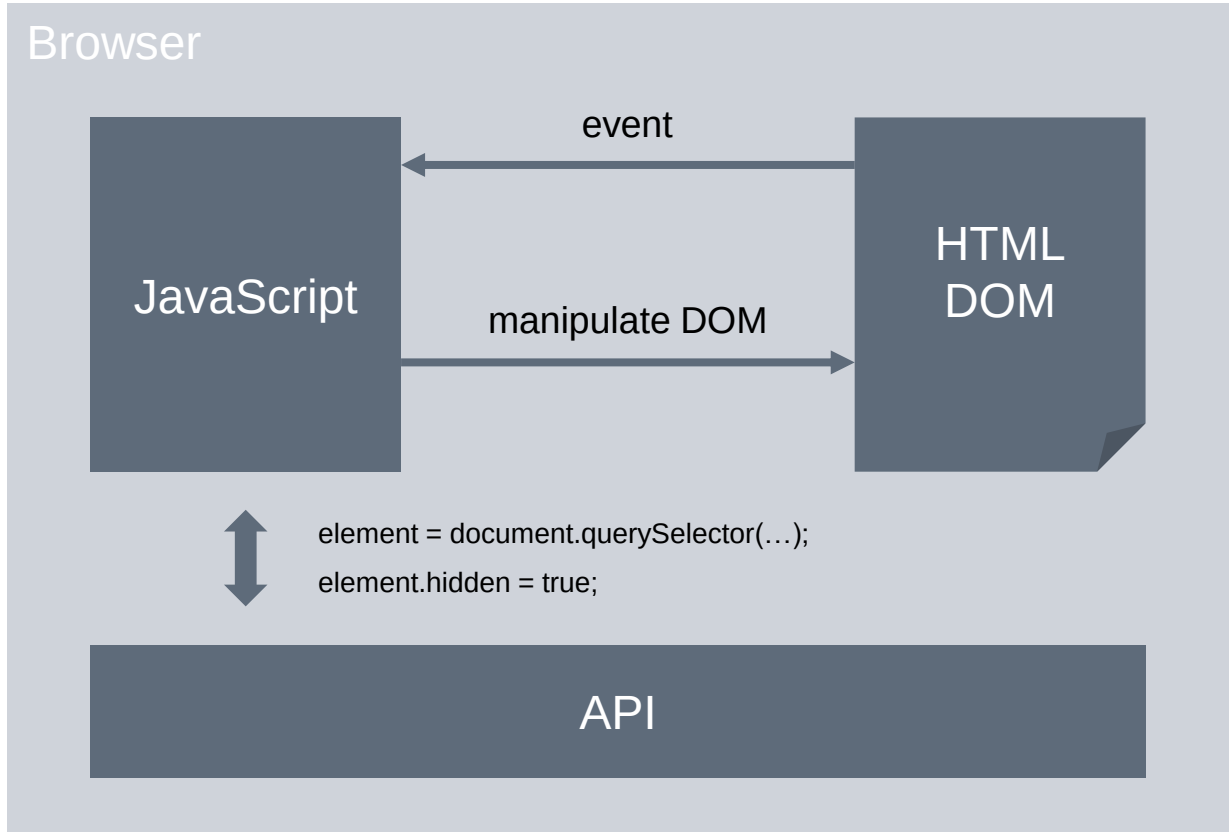

- Content of HTML page changes without page reload
- HTML can be created / generated using JavaScript commands

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```
<script>
    document.querySelector('form').addEventListener("submit", event => {
        const name = document.querySelector('input[name="UserName"]').value;
        if (name === ''){
            event.preventDefault();
            const errorDiv = document.createElement('div');
            errorDiv.innerText = 'No User Name';
            errorDiv.className = 'alert alert-warning';
            document.querySelector('.btn-primary').parentElement.append(errorDiv);
            // window.alert('User name is required');
        }
    });
</script>
```

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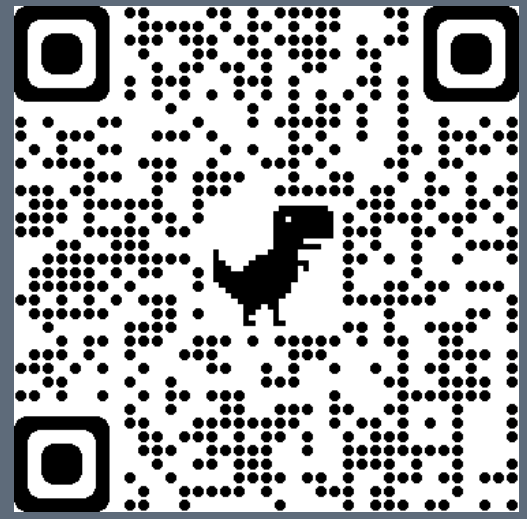

https://xitaso-intro-webdev.azurewebsites.net/

HTML5 API in JavaScript

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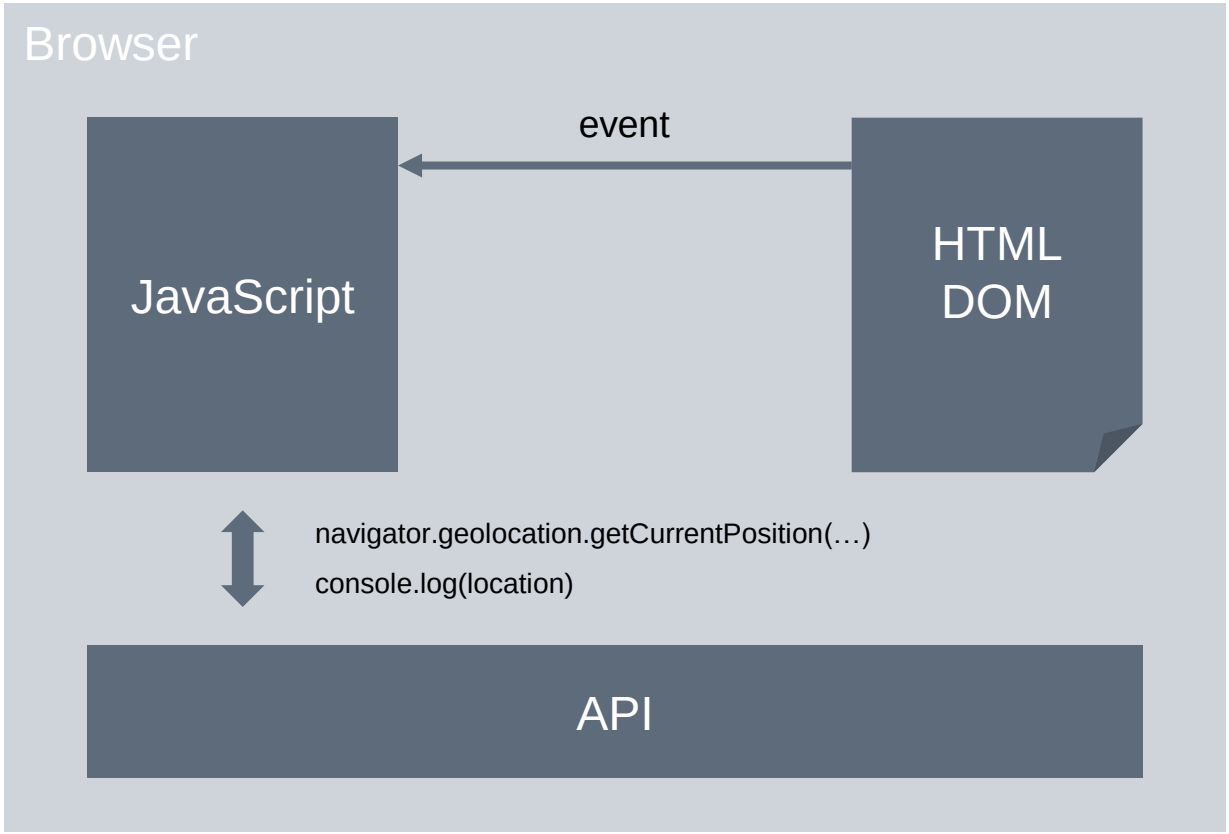

- Possibility to access Device APIs
- User is asked for permission

https://caniuse.com/geolocation

https://developer.mozilla.org/de/docs/Web/API

AJAX / XHR / Fetch API

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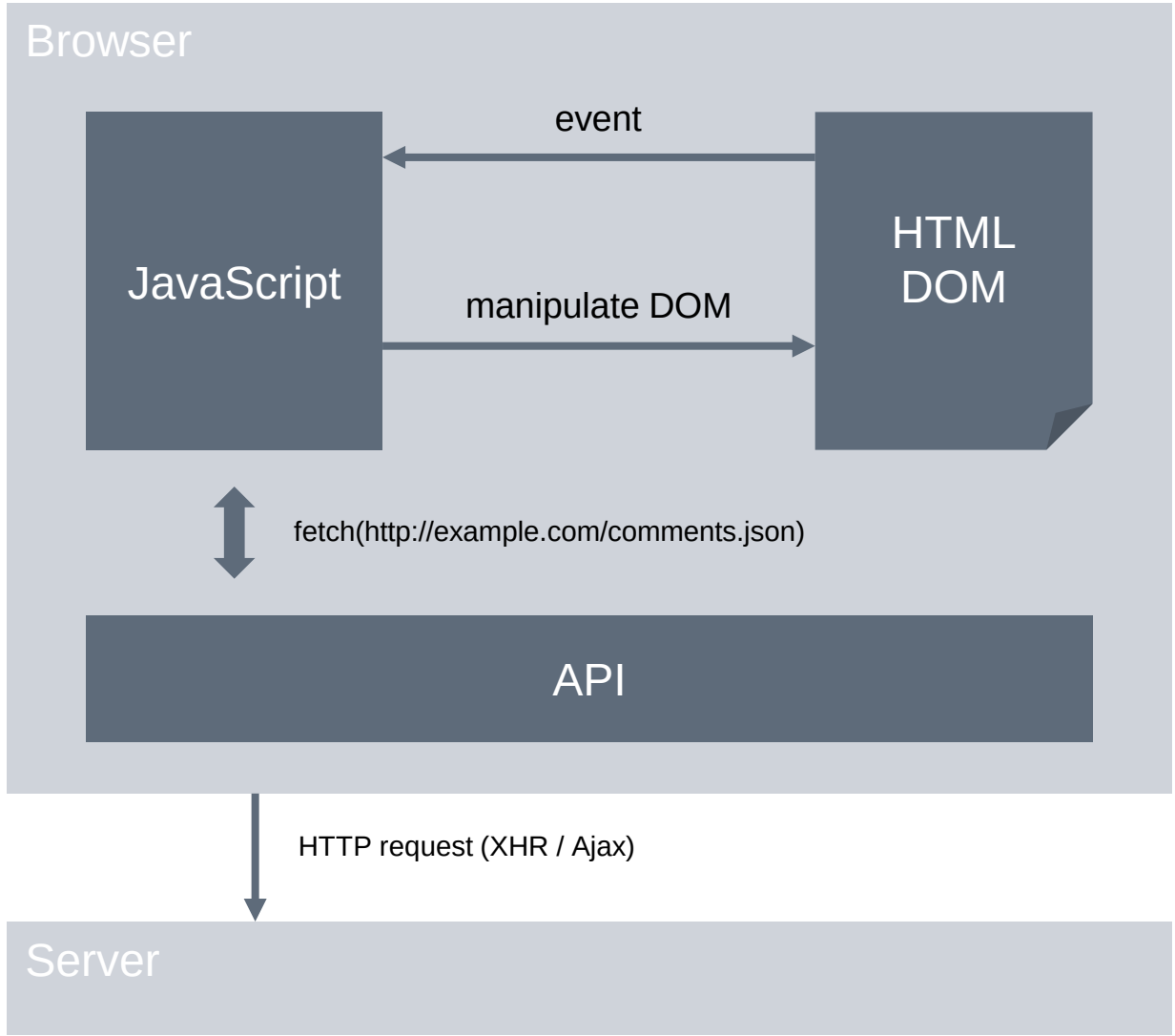

- Webpage can load additional data from a server and update the DOM after the page was loaded
- Page can be „refreshed“ without a page reload

Single Page Applications (SPA)

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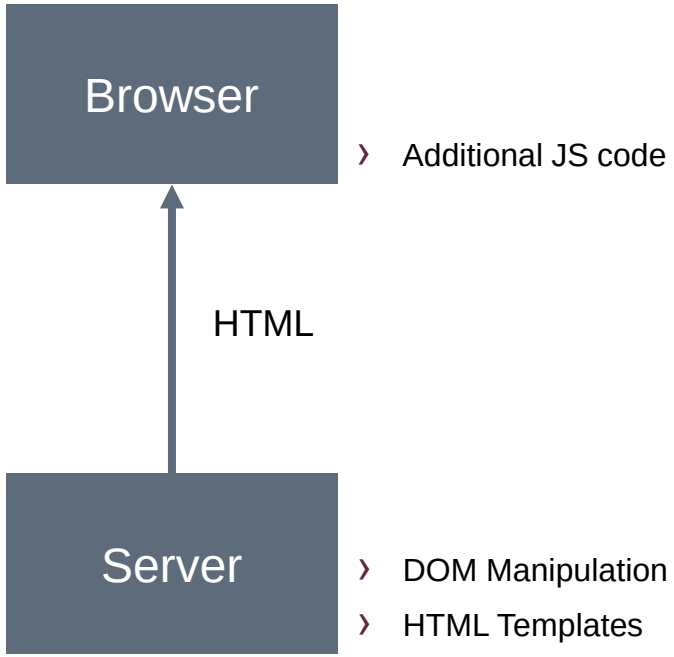
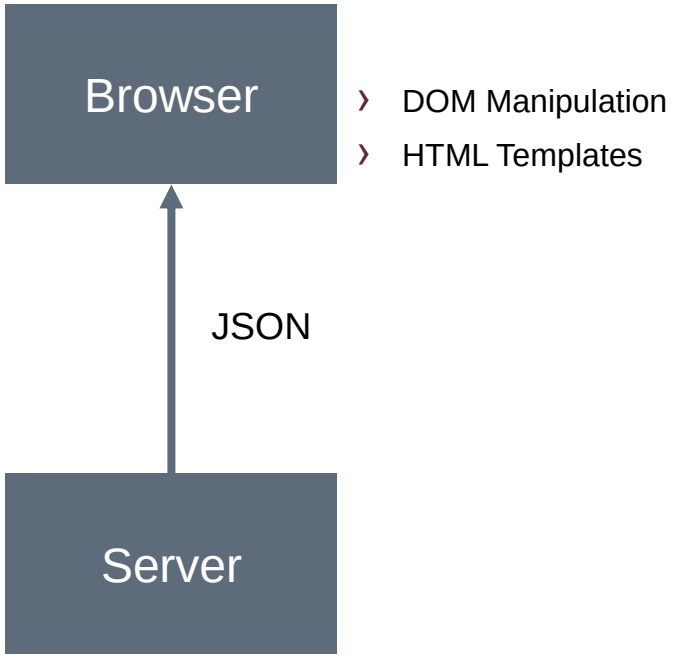
Server side



SPA



Where is the HTML calculated?

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Single Page Application (SPA)	Combination	Server Side Rendering
e.g. - Angular - React - Vue.JS - Blazor	e.g. - PHP + JQuery - ASP.NET MVC + React	e.g. - PHP - ASP.NET MVC

For modern web applications you always need some JavaScript in the browser.

Blazor Server

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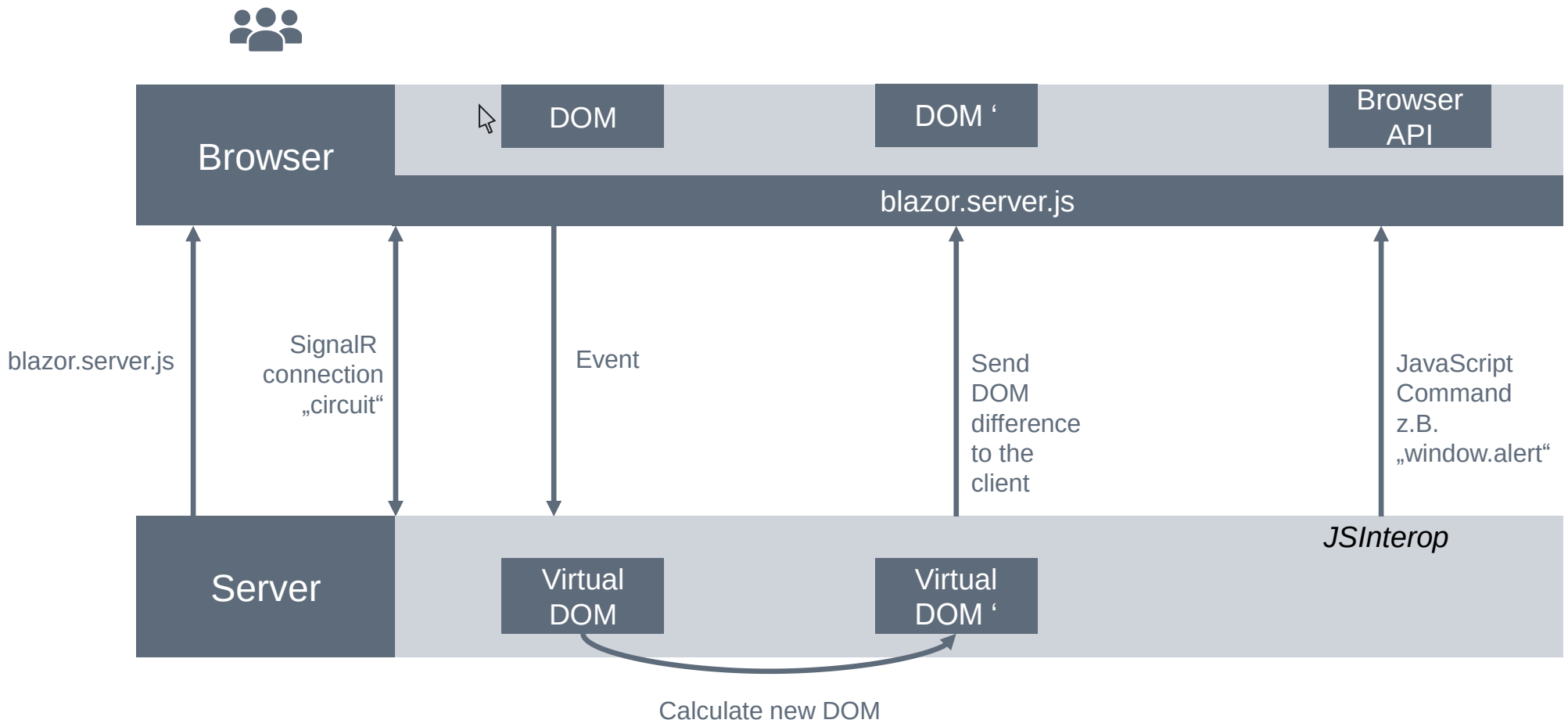

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Stacks

Example Tech-Stacks

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	SSR	SPA	SPA	SPA
Frontend Framework	ASP.NET MVC (C#)	Angular (TypeScript)	React (JavaScript)	Blazor (C#)
UI Components / Styling	Bootstrap	Angular Material	React Bootstrap	Bootstrap
Communication		HTTP / REST	HTTP / gRPC	Websocket / SignalR
Web Framework		ASP.NET Core (C#)	express.js (JavaScript)	Blazor (C#)
Web Server	Kestrel	IIS	Node	Kestrel
Database	CouchDB	MSSQL	MongoDB	MongoDB

Outlook: WebAssembly

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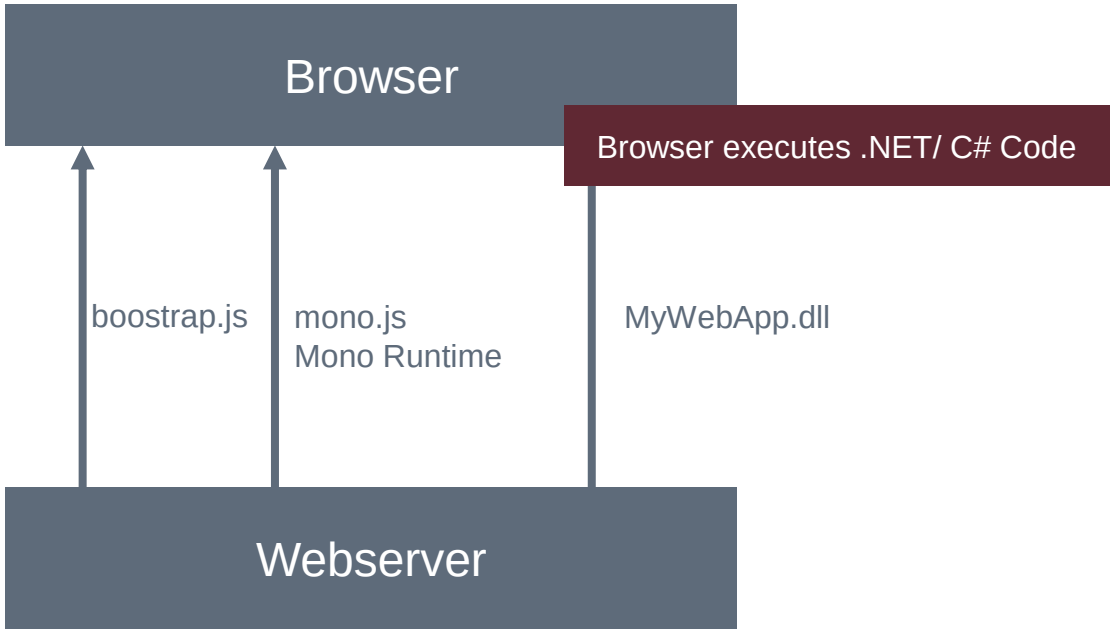
- Browsers only understand JavaScript?
  - No!
- WebAssembly (WASM)
  - Browsers can execute C, C++, C#, Rust etc.
  - e.g. Blazor Webassembly



Viel Erfolg beim SoPro

Source Code: https://github.com/XITASO/introduction-to-web-development