

JavaScript Concepts

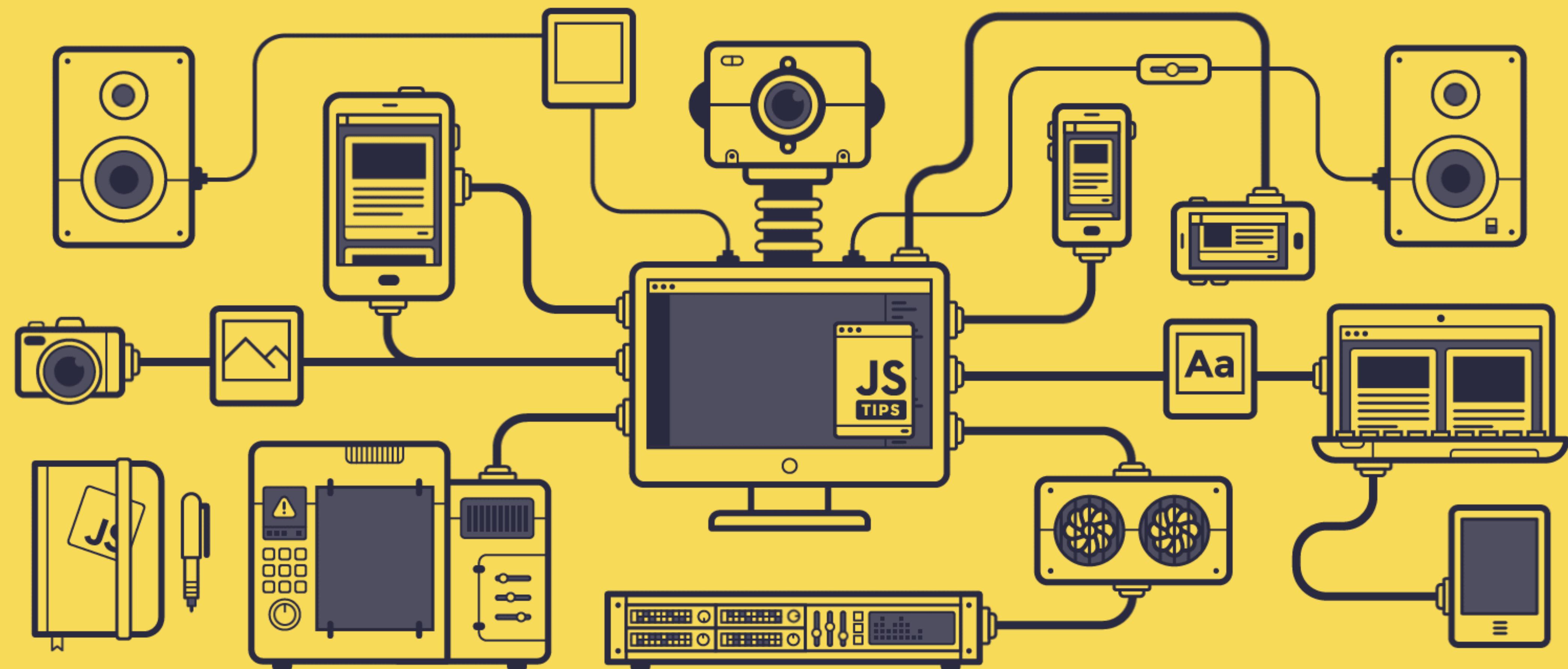
```
index.html
85 }
86
87 /**
88 * Fetches post data from my headless cms
89 */
90 function getPersons() {
91   fetch('http://headlesscms.cederdorff.com/wp-json/wp/v2/posts?_embed')
92     .then(function(response) {
93       return response.json();
94     })
95     .then(function(persons) {
96       appendPersons(persons);
97     });
98 }
99 /*
100 Appends json data to the DOM
101 */
102 function appendPersons(persons) {
103   let htmlTemplate = '';
104   for (let person of persons) {
105     console.log();
106     htmlTemplate +=
107       `

108         
109         <h4>${person.title.rendered}</h4>
110         <p>${person.acf.age} years old</p>
111         <p>Hair color: ${person.acf.hairColor}</p>
112         <p>Relation: ${person.acf.relation}</p>
113

`;
114   }
115   document.querySelector("#family-members").innerHTML += htmlTemplate;
116 }
```

Content

- What is JavaScript?
- DOM Manipulation
- Variables
- Data Types
- Objects
- Arrays
- Loops
- Conditional Statements - if/else
- Ternary operator
- The use of “signs & symbols”
- Array Methods
- Template String
- Functions
- Destructuring
- Spread Operator
- Modules, import & Export



index.html x

```
1  <!DOCTYPE html>
2  <html>
3    <head>
4      <title>Page Title</title>
5      <link rel="stylesheet" href="styles.css" />
6    </head>
7    <body>
8      <h1>This is a Heading</h1>
9      <p>This is a paragraph.</p>
10     <button onclick="tryMe()">Try me</button>
11     <script src="app.js"></script>
12   </body>
13 </html>
14
```

What is JavaScript?

.. is the world's most popular programming language.

... is the programming language of the Web.

... is easy to learn.

... can change content of a webpage (HTML content).

... can change styling of HTML.

app.js x

```
1  function tryMe() {
2    document.body.style.backgroundColor = "red";
3    document.body.style.color = "white";
4  }
5
```

<https://www.w3schools.com/js/default.asp>

index.html x

```
1  <!DOCTYPE html>
2  <html>
3    <head>
4      <title>Page Title</title>
5      <link rel="stylesheet" href="styles.css" />
6    </head>
7    <body>
8      <h1>This is a Heading</h1>
9      <p>This is a paragraph.</p>
10     <button onclick="tryMe()">Try me</button>
11     <script src="app.js"></script>
12   </body>
13 </html>
```

With JavaScript we are able to

... build dynamic web pages and web apps.

... fetch content/ data from a backend (web service, data source, etc.) through an API.

app.js x

```
1  function tryMe() {
2    document.body.style.backgroundColor = "red";
3    document.body.style.color = "white";
4  }
5
```

... do DOM-manipulation.

... build and develop anything 

DOM Manipulation

```
// declaring a variable with a value
let message = "Hi Frontenders!"

//accessing the variable and logging it to the console
console.log(message);

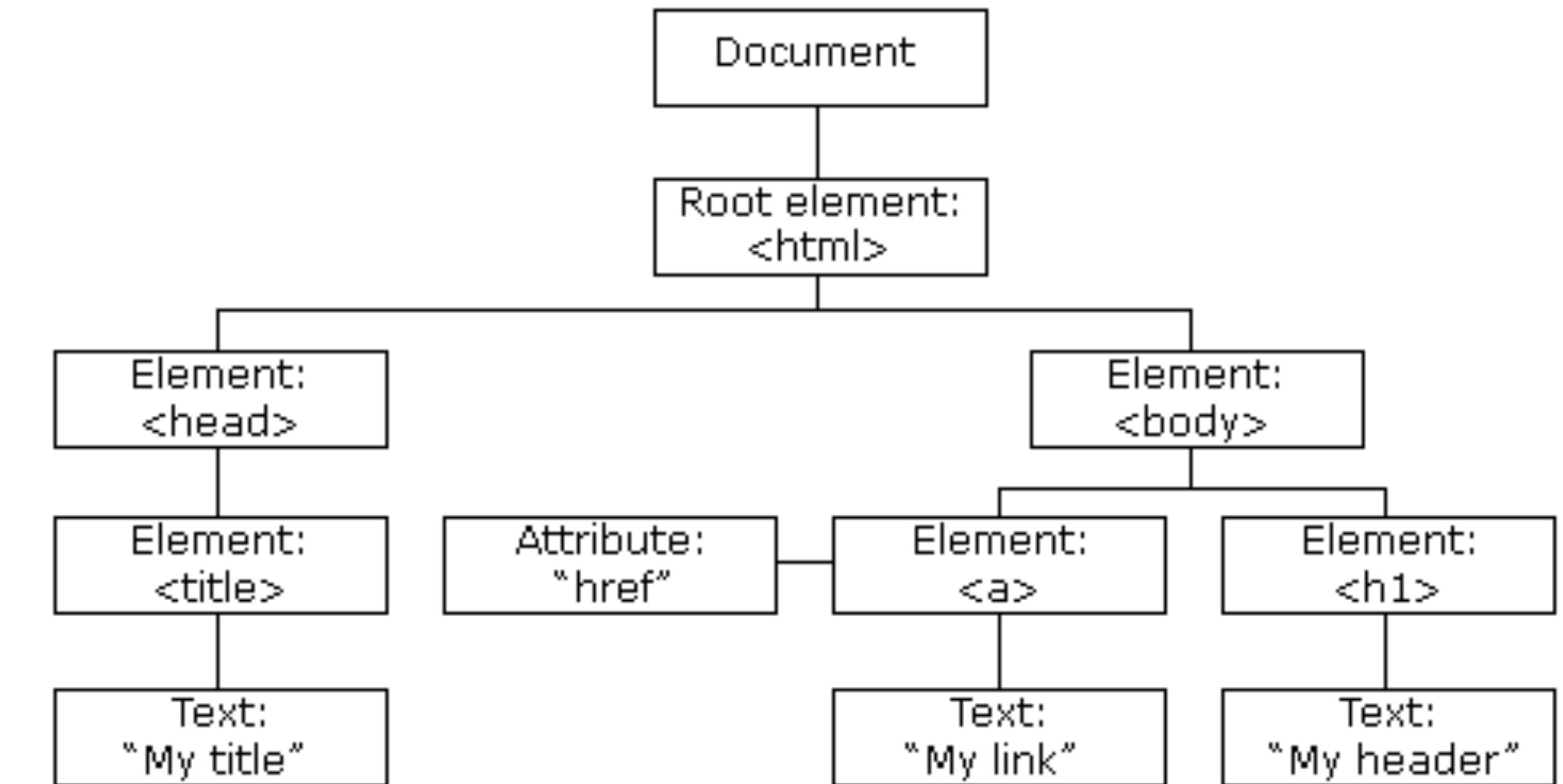
// appending the variable (the string) to the DOM element #content
document.querySelector("#content").innerHTML = message;
```

```
<body>
  <header>
    <h1>PROJECT TEMPLATE</h1>
  </header>
  <section id="content"></section>
  <!-- main is file -->
  <script src="js/main.js"></script>
</body>
```



JavaScript HTML DOM

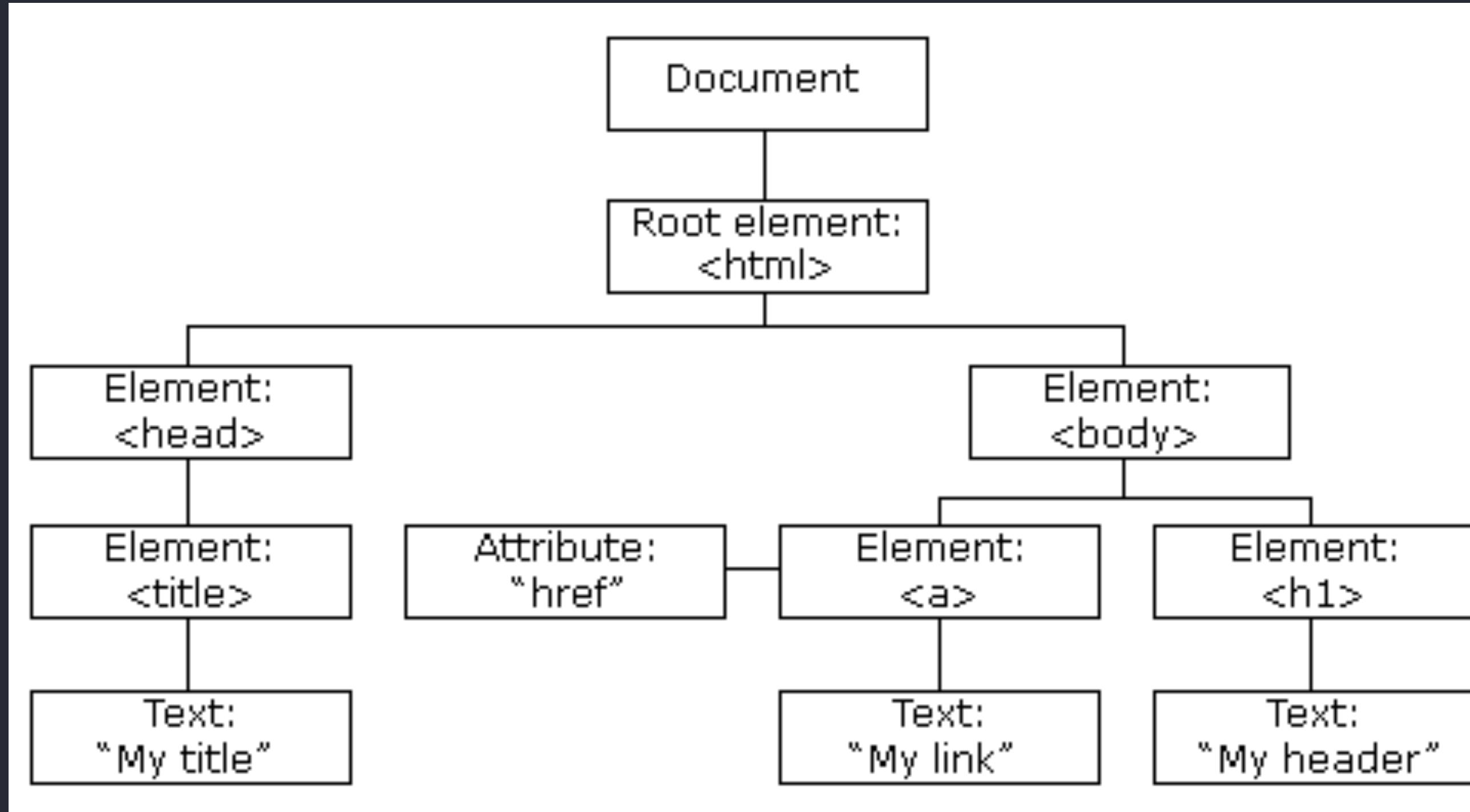
```
index.html *  
1  <!DOCTYPE html>  
2  <html>  
3  | <head>  
4  | | <title>My title</title>  
5  | </head>  
6  |  
7  <body>  
8  | | <h1>My header</h1>  
9  | | <a href="https://cederdorff.com">My link</a>  
10 | </body>  
11 |  
12 </html>
```



https://www.w3schools.com/js/js_htmldom.asp
<https://javascript.info/dom-nodes>
<https://javascript.info/dom-navigation>

The HTML DOM (Document Object Model)

A model as a tree of Objects



- Object Model for HTML:
 - HTML elements as objects
 - Properties for all HTML elements
 - Methods for all HTML elements
 - Events for all HTML elements

JavaScript HTML DOM

Document Object Model

```
index.html ×  
1  <!DOCTYPE html>  
2  <html>  
3  |   <head>  
4  |   |   <title>My title</title>  
5  |   </head>  
6  
7  <body>  
8  |   <h1>My header</h1>  
9  |   <a href="https://cederdorff.com">My link</a>  
10 |</body>  
11 </html>  
12
```

The HTML document as an object

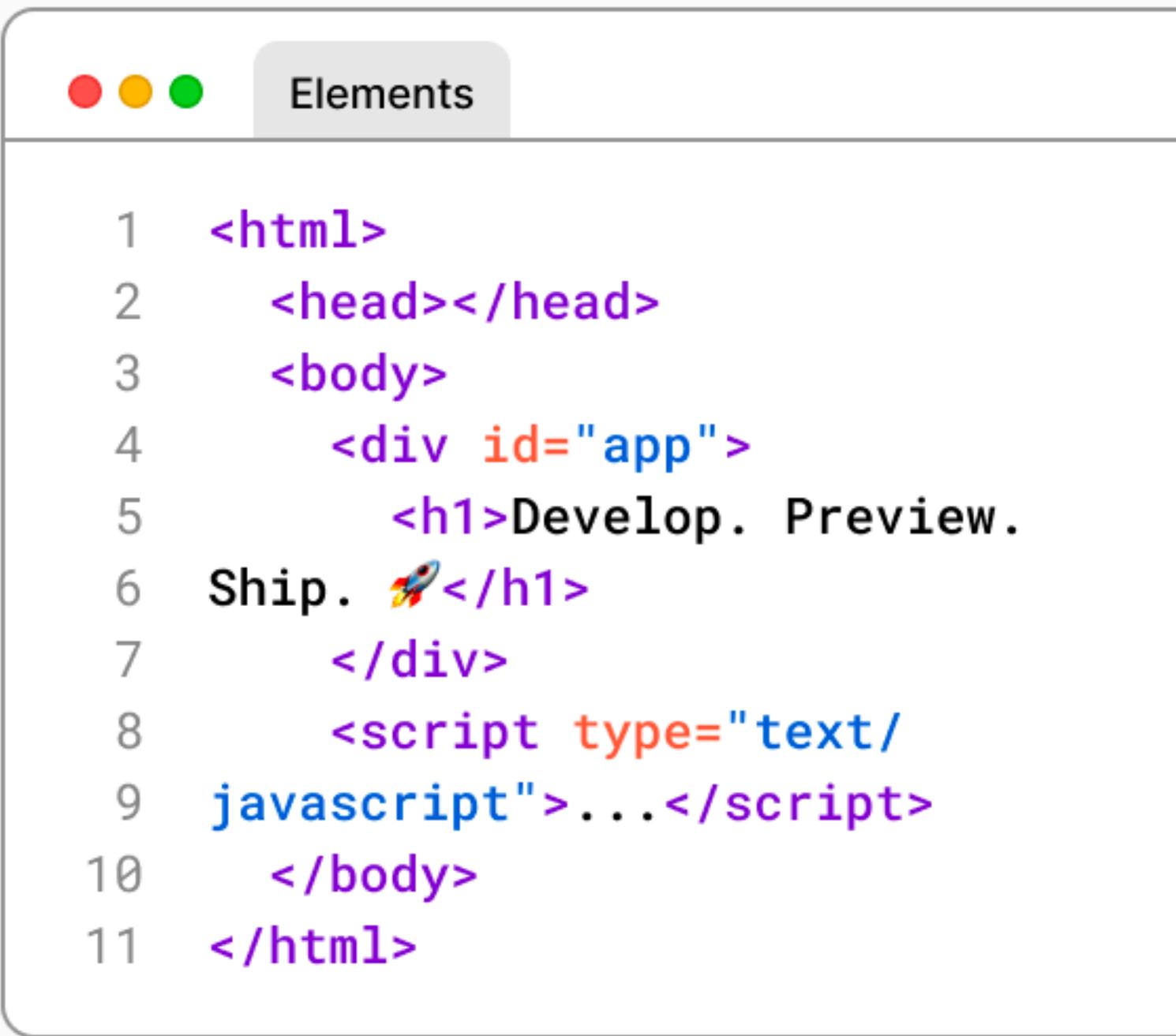
Gives us the power to create dynamic HTML and manipulate with the HTML (the DOM).

JavaScript can:

- ... change all the HTML elements in the page*
- ... change all the HTML attributes in the page*
- ... change all the CSS styles in the page*
- ... remove existing HTML elements and attributes*
- ... add new HTML elements and attributes*
- ... react to all existing HTML events in the page*
- ... create new HTML events in the page*

https://www.w3schools.com/js/js_htmldom.asp
<https://javascript.info/dom-nodes>
<https://javascript.info/dom-navigation>

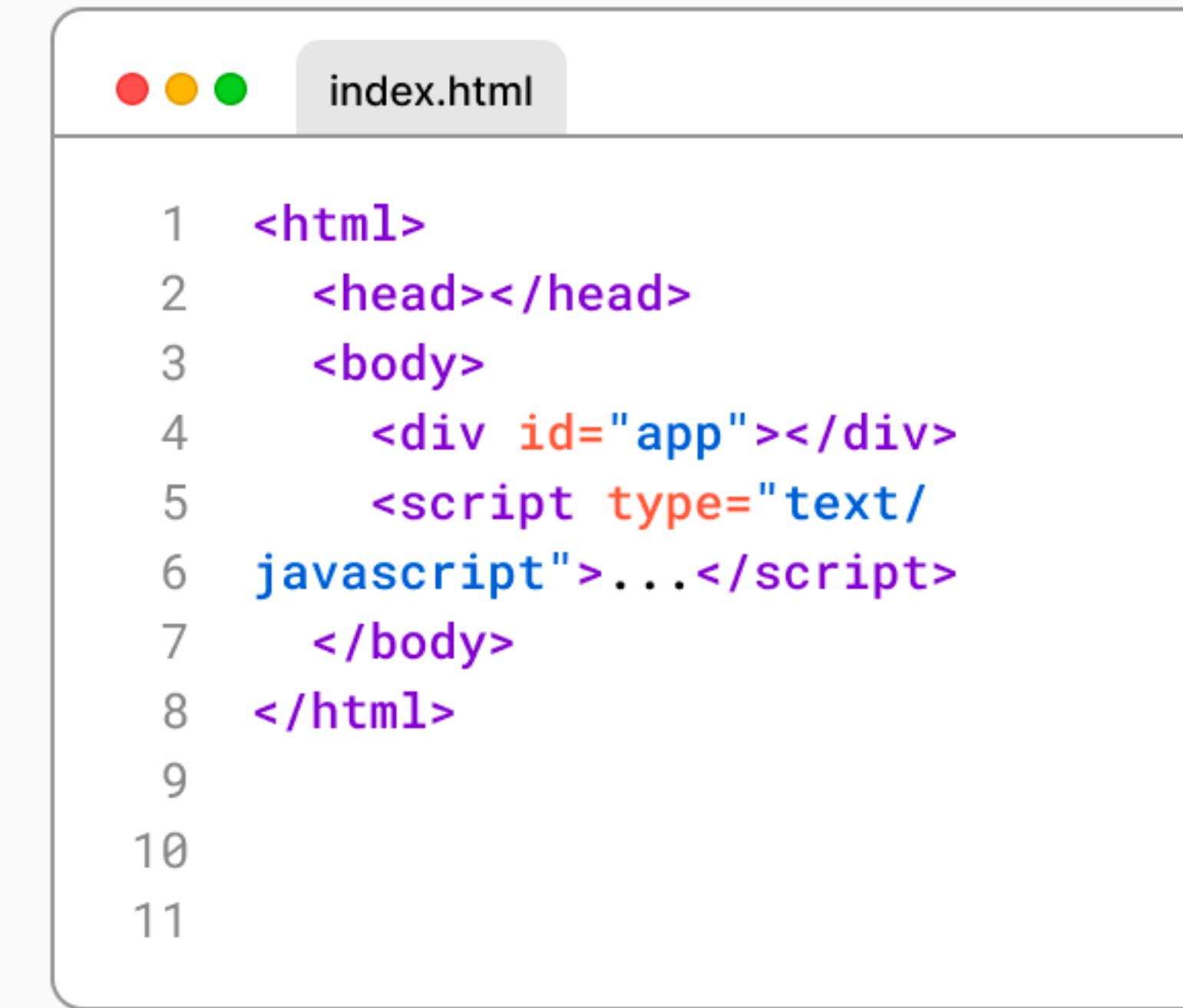
DOM



The screenshot shows the DOM tab of a browser's developer tools. At the top, there are three colored circular icons (red, yellow, green) followed by the word "Elements". Below this, the DOM structure is listed with line numbers:

```
1 <html>
2   <head></head>
3   <body>
4     <div id="app">
5       <h1>Develop. Preview.
6     Ship. 🚀</h1>
7     </div>
8     <script type="text/
9     javascript">...</script>
10    </body>
11  </html>
```

SOURCE CODE (HTML)



The screenshot shows the Source tab of a browser's developer tools. At the top, there are three colored circular icons (red, yellow, green) followed by the file name "index.html". Below this, the raw HTML code is listed with line numbers:

```
1 <html>
2   <head></head>
3   <body>
4     <div id="app"></div>
5     <script type="text/
6     javascript">...</script>
7   </body>
8 </html>
9
10
11
```

Searching the DOM: getElement* & querySelector*

```
<section id="elem">
  <article id="elem-content">Element</article>
</section>

<script>
  // get the element
  const element = document.getElementById('elem');
  // make its background red
  element.style.background = 'red';
  // get the elementContent
  const elementContent = document.querySelector('#elem-content');
  // change inner HTML
  elementContent.innerHTML = "<h2>Hi Web Developers!</h2>"
</script>
```

Searching the DOM: getElementsByTagName*

```
<section id="elem">
  <article class="elem-content">Element</article>
  <article class="elem-content">Element</article>
  <article class="elem-content">Element</article>
</section>

<script>
  // get all elements matching the selector - returns an array
  const elements = document.getElementsByTagName('elem-content');
  // loop through all elements
  for (const element of elements) {
    element.innerHTML = "<h2>Hi Web Developers!</h2>";
  }
</script>
```

Searching the DOM: querySelectorAll

```
<section id="elem">
  <article class="elem-content">Element</article>
  <article class="elem-content">Element</article>
  <article class="elem-content">Element</article>
</section>

<script>
  // get all elements matching the selector - returns an array
  const elements = document.querySelectorAll('.elem-content');
  // loop through all elements
  for (const element of elements) {
    element.innerHTML = "<h2>Hi Web Developers!</h2>";
  }
</script>
```

JS HTML DOM

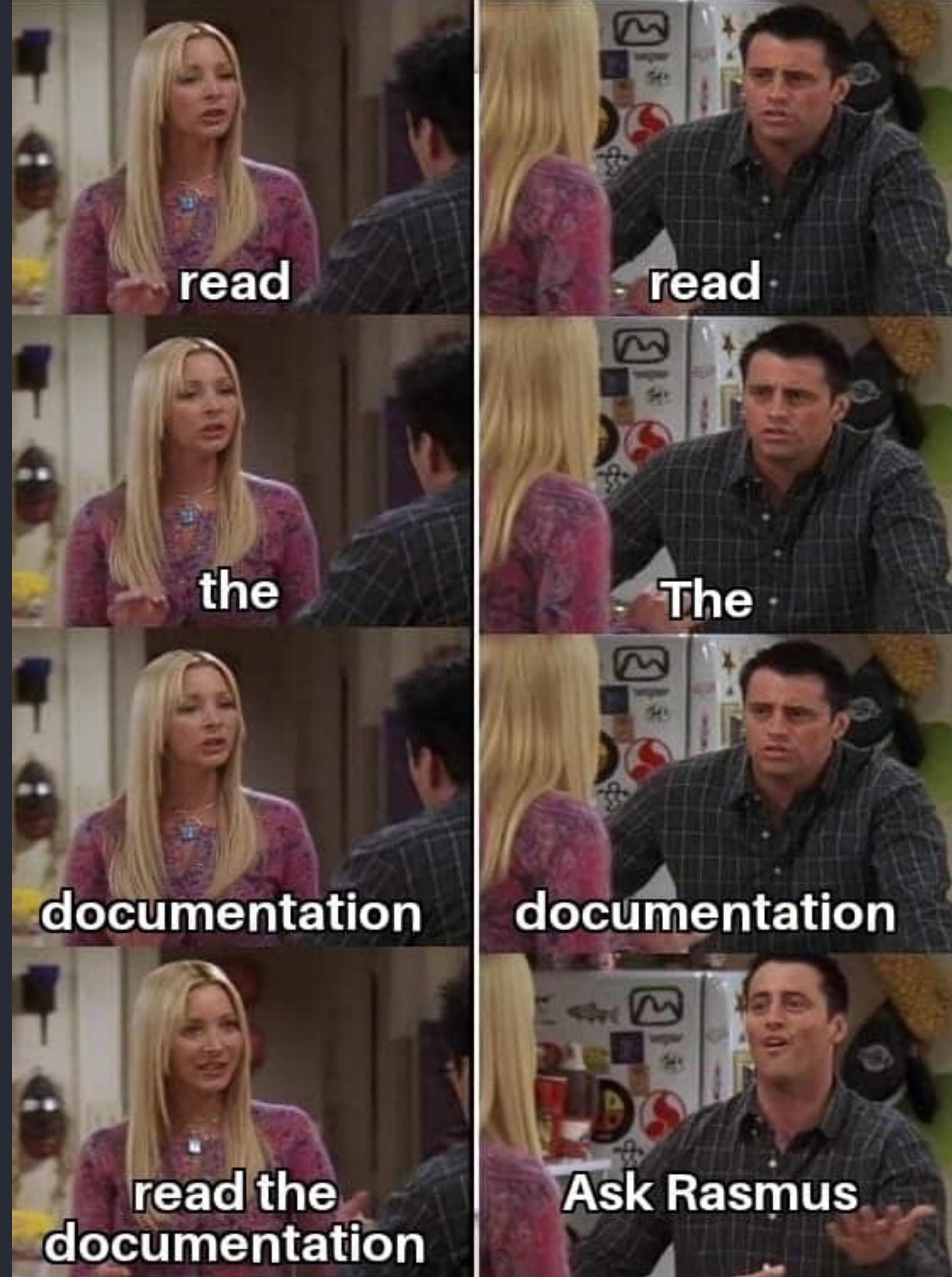
`getElements*` or `querySelector*`?

ES6 +

Modern JavaScript

Modern JavaScript

LET & CONST
TEMPLATE STRING
ARROW FUNCTIONS
FETCH
PROMISES
ASYNC & AWAIT
FOR OF LOOP
ARRAY.FIND()
ARRAY.MAP()
ARRAY.REDUCE()
ARRAY.FILTER()
ARRAY.SORT()
ARRAY.CONCAT()
DEFAULT PARAMS
DESTRUCTURING OBJECTS
DESTRUCTURING ARRAYS
OBJECT LITERAL
SPREAD OPERATOR
CLASSES
MODULES
IMPORT & EXPORT



Programming knowledge

JavaScript



Variables

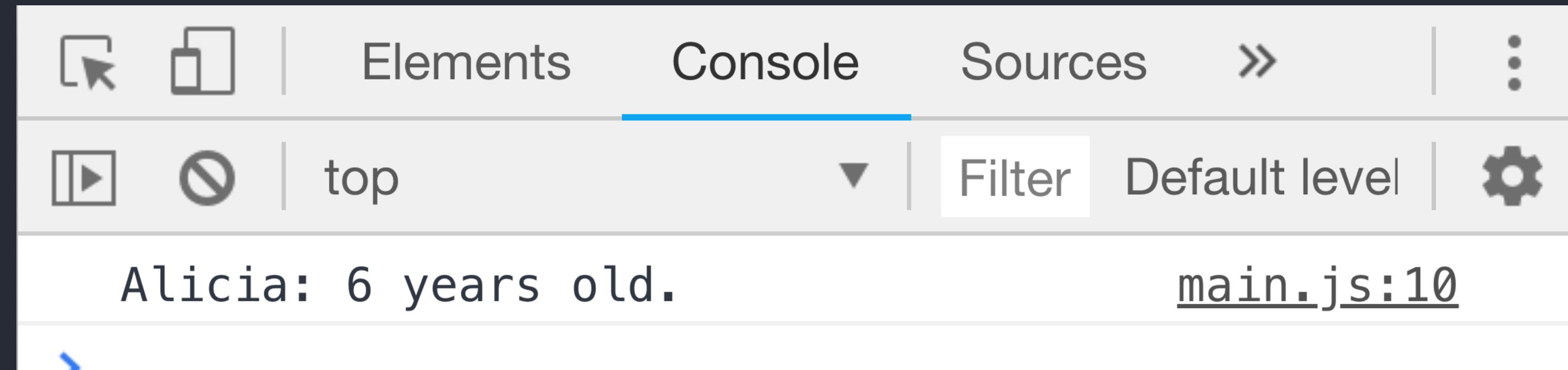
... are used to store data (values, objects, collections) in the memory

Variables

Store data in the memory

```
let name = "Alicia";
let age = 6;

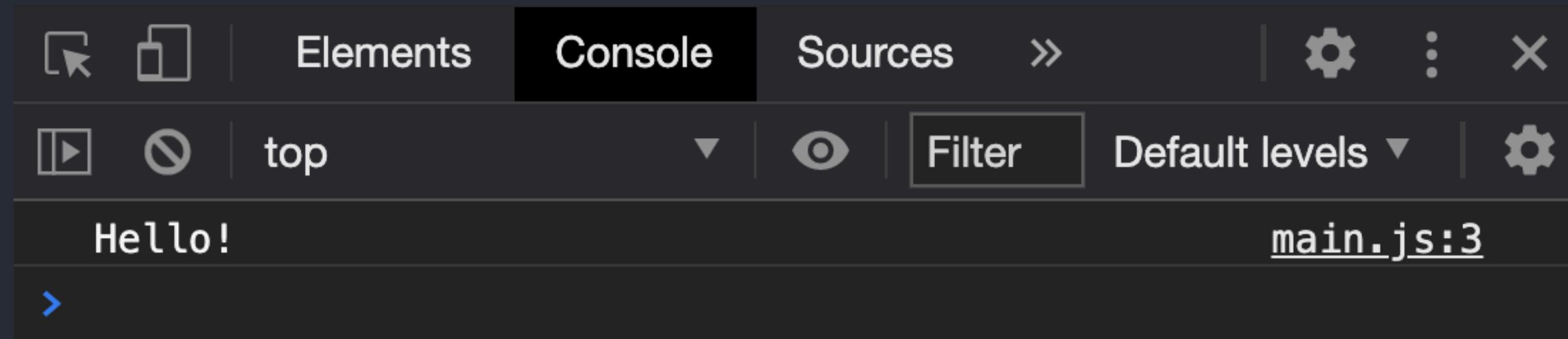
console.log(name + ": " + age + " years old.");
```



Variables

Store data in the memory

```
let message = "Hello!";  
console.log(message);
```

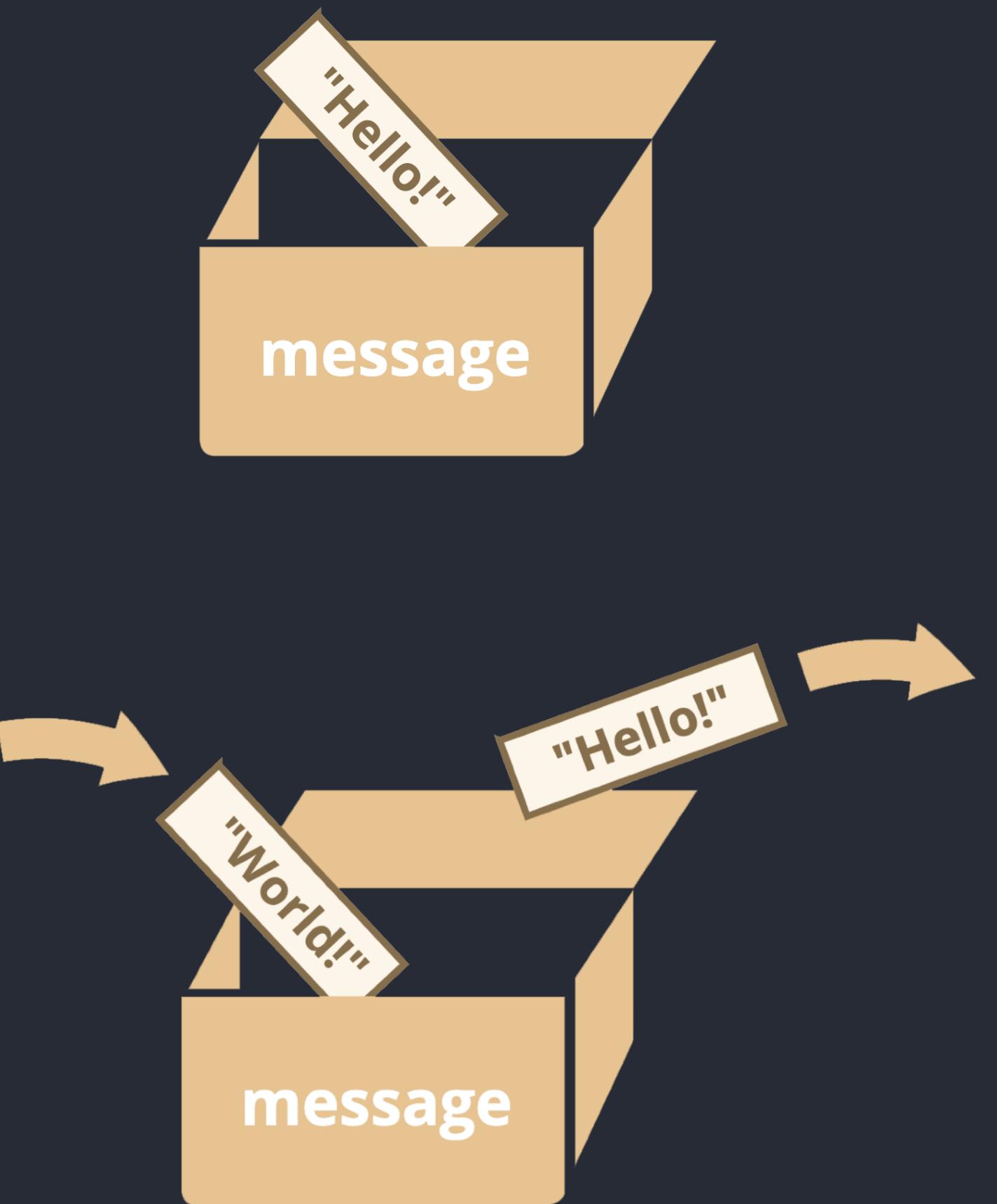
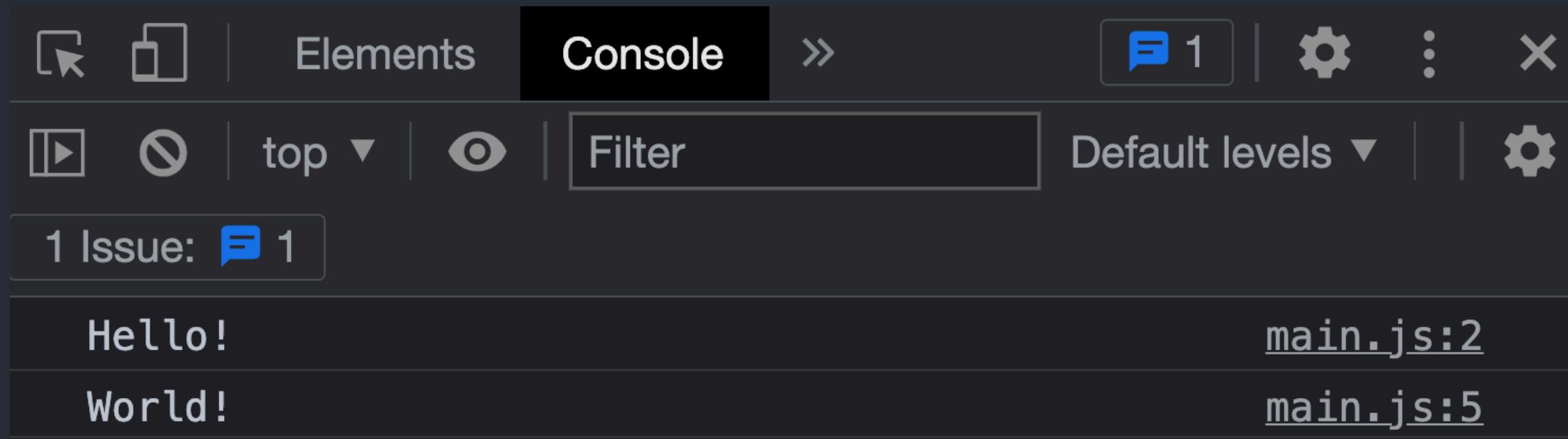


Variables

Store data in the memory

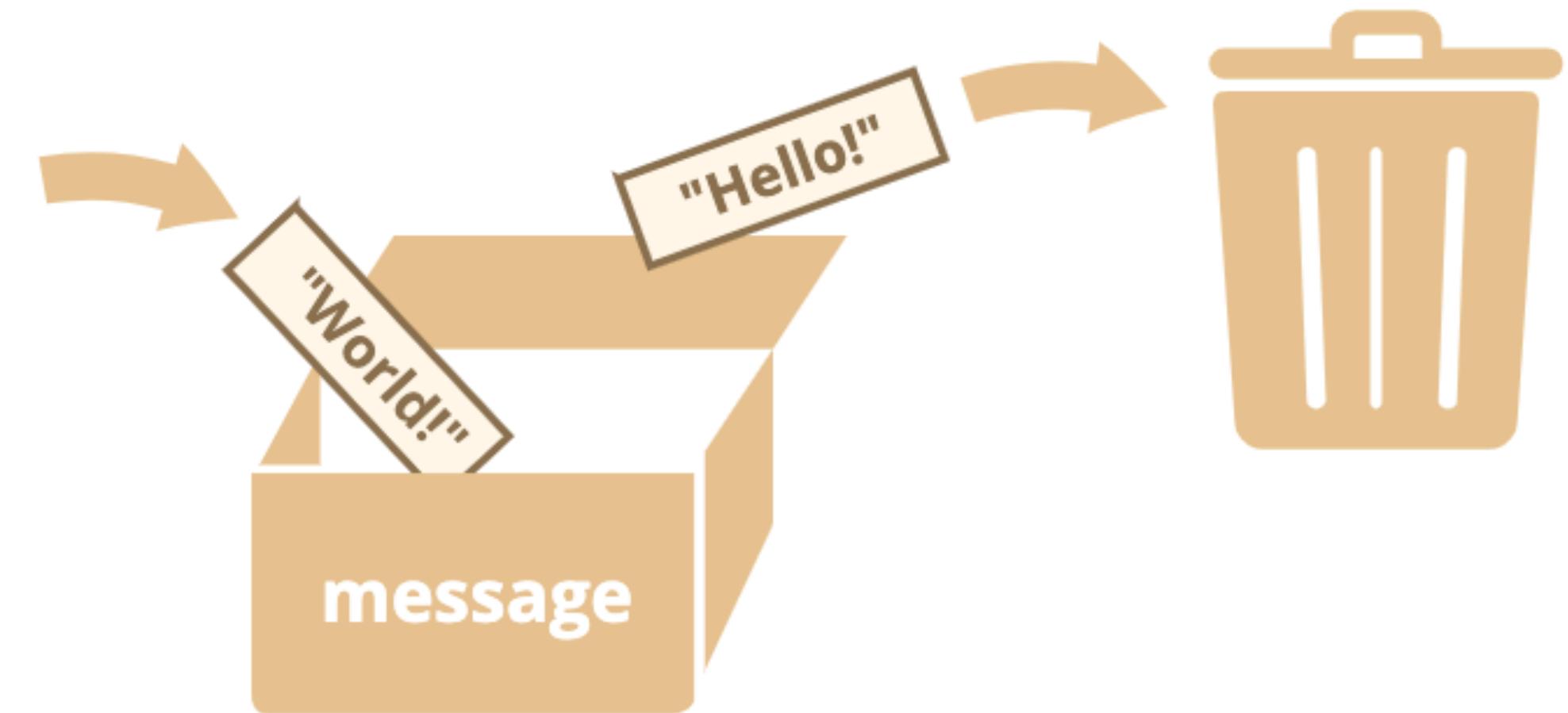
```
let message = "Hello!";
console.log(message);
```

```
message = "World!";
console.log(message);
```



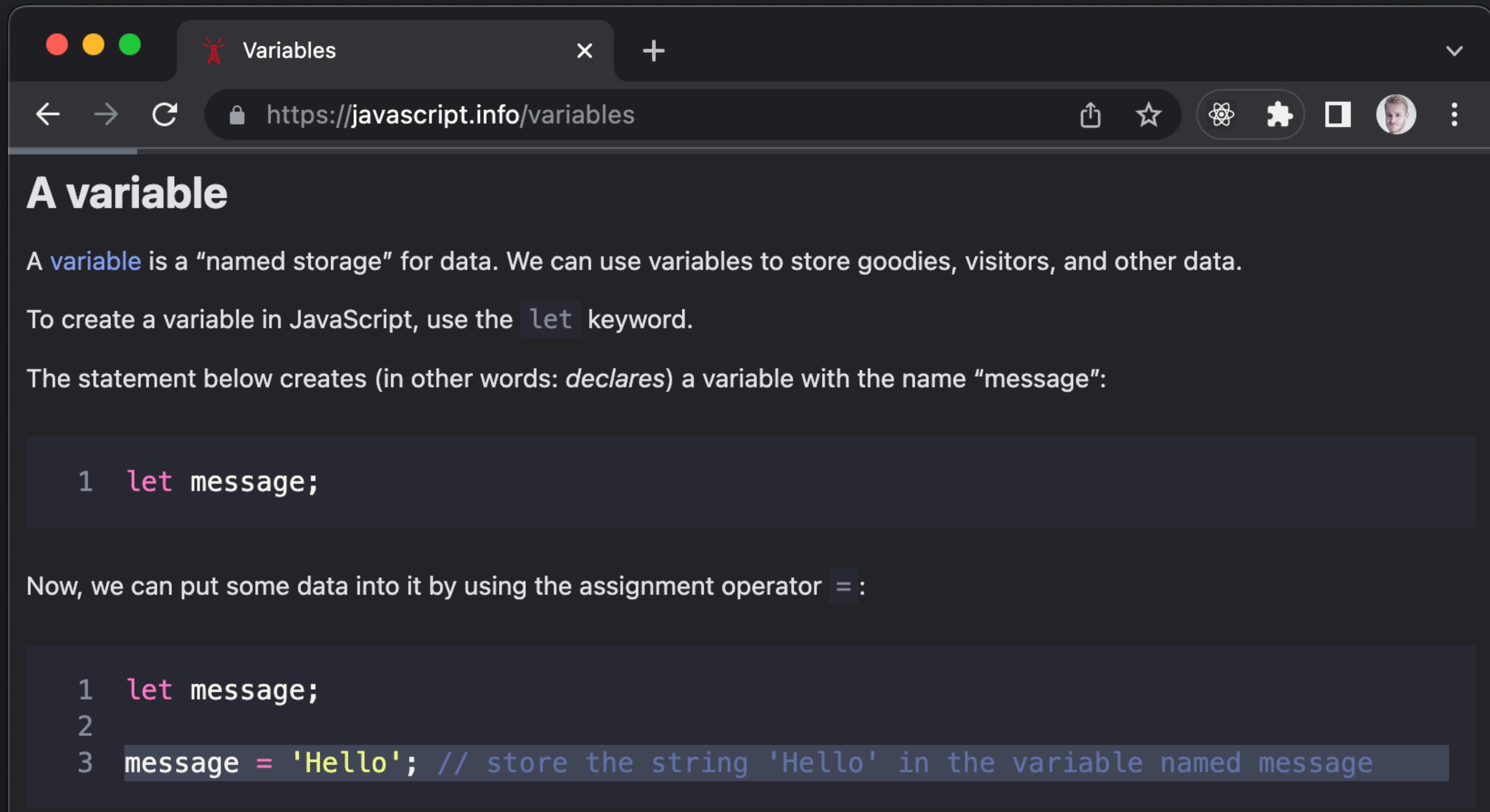
Variable

A variable is a “named storage” and stored in the memory of the browser.



We can change the value of the variables as many times as we want.

JavaScript.info/Variables



The screenshot shows a dark-themed web browser window. The title bar reads "Variables". The address bar shows the URL "https://javascript.info/variables". The main content area displays the following text:

A variable

A **variable** is a “named storage” for data. We can use variables to store goodies, visitors, and other data.

To create a variable in JavaScript, use the `let` keyword.

The statement below creates (in other words: *declares*) a variable with the name “message”:

```
1 let message;
```

Now, we can put some data into it by using the assignment operator `=`:

```
1 let message;
2
3 message = 'Hello'; // store the string 'Hello' in the variable named message
```

```
// declaring a variable with a value
let message = "Hi Frontenders!"

//accessing the variable and logging it to the console
console.log(message);

// appending the variable (the string) to the DOM element #content
document.querySelector("#content").innerHTML = message;
```

```
<body>
  <header>
    <h1>PROJECT TEMPLATE</h1>
  </header>
  <section id="content"></section>
  <!-- main is file -->
  <script src="js/main.js"></script>
</body>
```

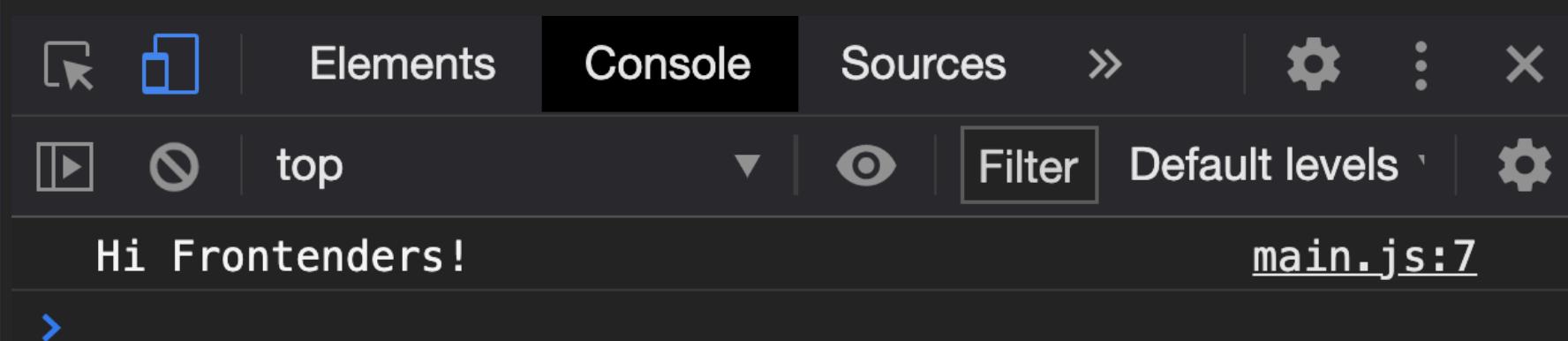


```
// declaring a variable with a value
let message = "Hi Frontenders!"

// accessing the variable and logging it to the console
console.log(message);

// changing the value of the variable
message = "Hello World";

// appending the variable (the string) to the DOM element #content
document.querySelector("#content").innerHTML = message;
```



var vs let

THE DIFFERENCE IS THE SCOPING

VAR IS FUNCTION-WIDE OR GLOBAL SCOPE

LET IS BLOCK SCOPED

VAR TOLERATES REDECLARATION

<https://javascript.info/variables>

<https://javascript.info/var>

```
// Example 1
// "var" has no block scope
if (true) {
| var test1 = true; // use "var" instead of "let"
}
console.log(test1); // true, the variable lives after if

// Example 2
if (true) {
| let test2 = true; // use "let"
}
console.log(test2); // Error: test is not defined

// Example 3
for (var i = 0; i < 10; i++) {
| // ...
}
console.log(i); // 10, "i" is visible after loop, it's a global variable
```

```
// "var" tolerates redeclarations
var user1 = "Pete";
var user1 = "John"; // this "var" does nothing (already declared)
// ...it doesn't trigger an error
console.log(user1); // John

let user2;
let user2; // SyntaxError: 'user' has already been declared
```

var-vs-let

Const

Const is an unchanging variable.

```
const myBirthday = "12-03-1990";
myBirthday = "12-03-1989";
// Uncaught TypeError: can't reassign the constant!
```

const cannot be reassigned.
If you try to, an error will be thrown.

Const can't be reassigned

```
const myBirthday = "12-03-1990";
myBirthday = "12-03-1989"; // Uncaught TypeError: can't reassign the constant!
```

```
const person = {
  name: "Kasper",
  mail: "kato@eaaa.dk",
  age: 32
};
```

```
person.age = 33; // no error
```

```
person = {
  name: "Rasmus",
  mail: "race@eaaa.dk",
  age: 31
}; // Uncaught TypeError: can't reassign the constant!
```

Use let & const
instead of var

<https://javascript.info/variables>
<https://javascript.info/var>

Name things right

Talking about variables, there's one more extremely important thing.

A variable name should have a clean, obvious meaning, describing the data that it stores.

Variable naming is one of the most important and complex skills in programming. A quick glance at variable names can reveal which code was written by a beginner versus an experienced developer.

In a real project, most of the time is spent modifying and extending an existing code base rather than writing something completely separate from scratch. When we return to some code after doing something else for a while, it's much easier to find information that is well-labeled. Or, in other words, when the variables have good names.

Please spend time thinking about the right name for a variable before declaring it. Doing so will repay you handsomely.

Some good-to-follow rules are:

- Use human-readable names like `userName` or `shoppingCart`.
- Stay away from abbreviations or short names like `a`, `b`, `c`, unless you really know what you're doing.
- Make names maximally descriptive and concise. Examples of bad names are `data` and `value`. Such names say nothing. It's only okay to use them if the context of the code makes it exceptionally obvious which data or value the variable is referencing.
- Agree on terms within your team and in your own mind. If a site visitor is called a "user" then we should name related variables `currentUser` or `newUser` instead of `currentVisitor` or `newManInTown`.

Data Types

In JavaScript there are two main data types:

- **Primitive values** like strings, numbers and booleans.
- **Objects** with properties.

```
1 let str = "Hello";
2 let str2 = 'Single quotes are ok too';
3 let phrase = `can embed another ${str}`;
```

```
1 let n = 123;
2 n = 12.345;
```

```
1 let user = new Object(); // "object constructor" syntax
2 let user = {}; // "object literal" syntax
```

In JavaScript, a value always has a certain type like a string, number, boolean, object, array, etc.

Objects

A set of named values

Objects are used to store keyed
collections of various data



Containers for named values
called properties. A property
is a “key: value” pair

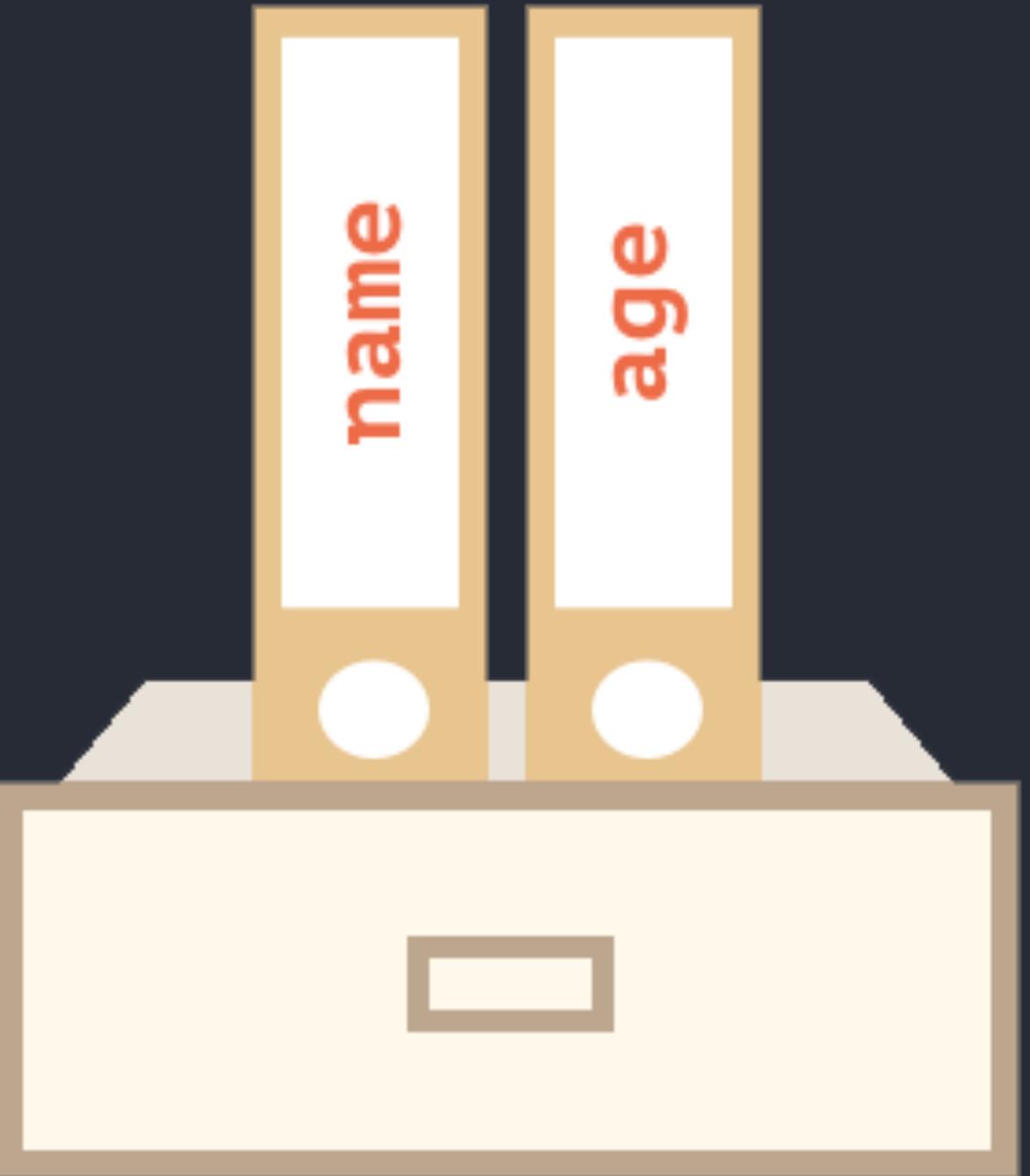
Objects

A set of named values

```
let user = {  
    name: 'Alicia',  
    age: 6  
};
```

```
console.log(user.name +  
    " is " + user.age +  
    " years old.");
```

user

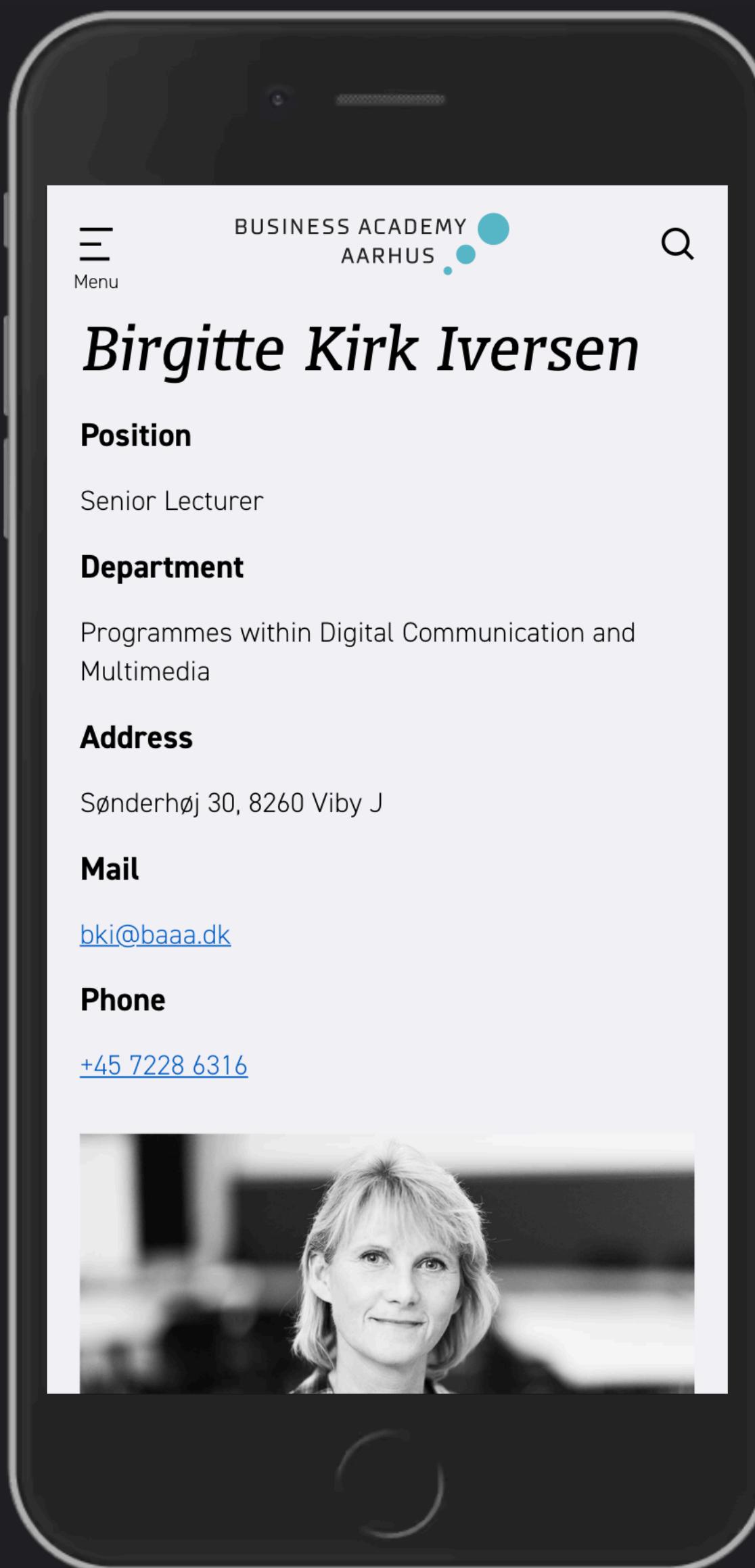


Alicia is 6 years old.

main.js:11

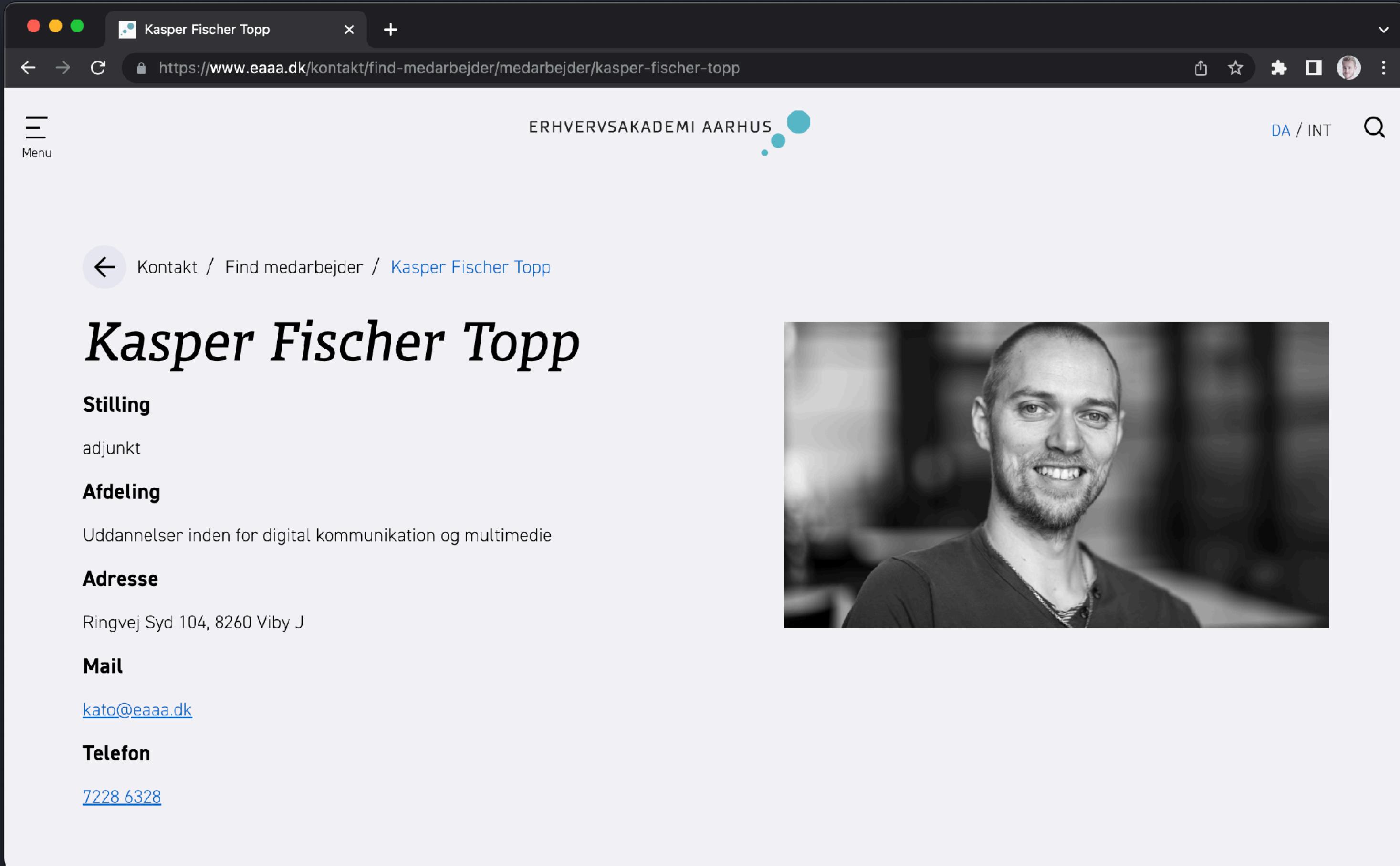
Objects

A set of named values



<https://www.baaa.dk/contact/find-employee/employee/birgitte-kirk-iversen>

Objects



A screenshot of a web browser window displaying a profile page for Kasper Fischer Topp. The browser has a dark theme with red, yellow, and green window control buttons. The title bar shows the page is titled "Kasper Fischer Topp". The address bar contains the URL <https://www.eaaa.dk/kontakt/find-medarbejder/medarbejder/kasper-fischer-topp>. The page itself is from ERHVERVSAKADEMI AARHUS, featuring a logo with three blue dots. The main content area includes a navigation menu, a search bar, and a breadcrumb trail: "Kontakt / Find medarbejder / Kasper Fischer Topp". The profile section features a large black and white portrait of a smiling man with a beard. Below the photo, the name "Kasper Fischer Topp" is displayed in a large, bold, italicized font. Underneath the name, there are sections for "Stilling" (adjunkt), "Afdeling" (Uddannelser inden for digital kommunikation og multimedie), "Adresse" (Ringvej Syd 104, 8260 Viby J), "Mail" (kato@eaaa.dk), and "Telefon" (7228 6328).

<https://www.eaaa.dk/kontakt/find-medarbejder/medarbejder/kasper-fischer-topp>

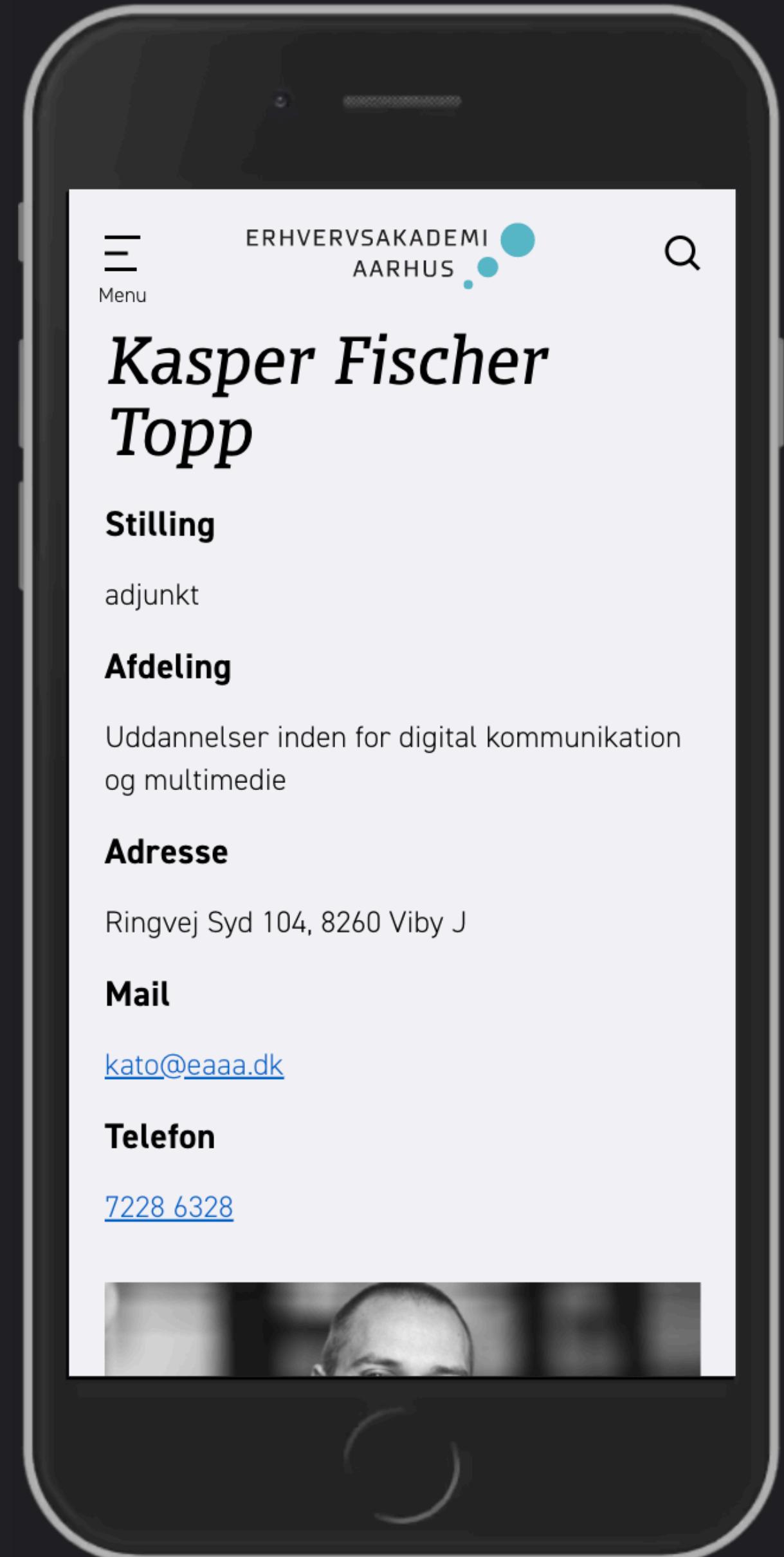
Objects

A set of named values

property

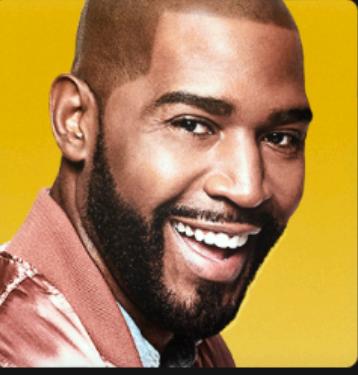
value

```
const mrBackend = {  
  name: "Kasper Fischer Topp",  
  mail: "kato@eaaa.dk",  
  phone: "72286328",  
  position: "Lecturer",  
  favTechnologies: ["PHP", "SQL"]  
};
```



NETFLIX

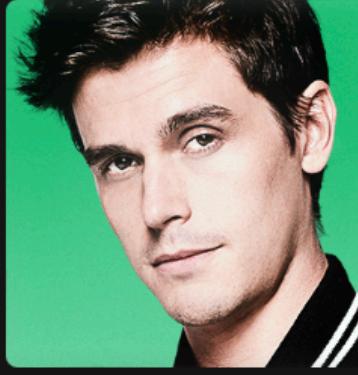
Hvem ser?



Personen der
rent faktisk
betaler for
profilen



Nasser 1



Nasser 2



Nasser 3



Nasser 4 Khader

Administrer profiler

● ○ ● | □ | < > ⌂ +

netflix.com

NETFLIX Start Serier Film Nyt og populært Min liste

N SERIE

TOO HOT TO HANDLE

TOP 10 Nr. 4 i Danmark i dag

På paradisets kyst mødes de lækkere singler og mingler. Men der er et tvist. For at vinde den attraktive pengepræmie, må de give afkald på at have sex.

Afspil Mere info

13+

Kun på Netflix

TOO HOT TO HANDLE NYE EPISODER

EMILY IN PARIS

QUEER EYE more than a makeover

The Woman in the House Across the Street From the Girl in the Window

BRIDGERTON NYE EPISODER

Se videre med profilen Nasser 1

the office

TIGER KING

Don't Look UP

JEFFREY EPSTEIN: FILTHY RICH

THE MIND explained

Frost II (2019) - IMDb

imdb.com/title/tt4520988/

IMDb Menu All Search IMDb

Frost II

Original title: Frozen II
2019 · 7 · 1h 43m

IMDb RATING YOUR RATING POPULARITY

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Cast & crew · User reviews · Trivia · IMDbPro 🔍 All topics | [Share](#)

+ Play trailer 0:16

55 VIDEOS

99+ PHOTOS

Animation Adventure Comedy

+ Add to Watchlist

Anna, Elsa, Kristoff, Olaf and Sven leave Arendelle to travel to an ancient, autumn-bound forest of an enchanted land. They set out to find the origin of Elsa's powers in order to save their kingdom.

1.4K User reviews 289 Critic reviews 64 Metascore

Directors Chris Buck · Jennifer Lee

Writers

```
let movie = {  
  title: "Frozen 2",  
  description: "Elsa the Snow Queen has a",  
  trailer: "https://www.youtube.com/embed",  
  length: "1h 43m",  
  year: "2019"  
}
```

Define yourself as an object

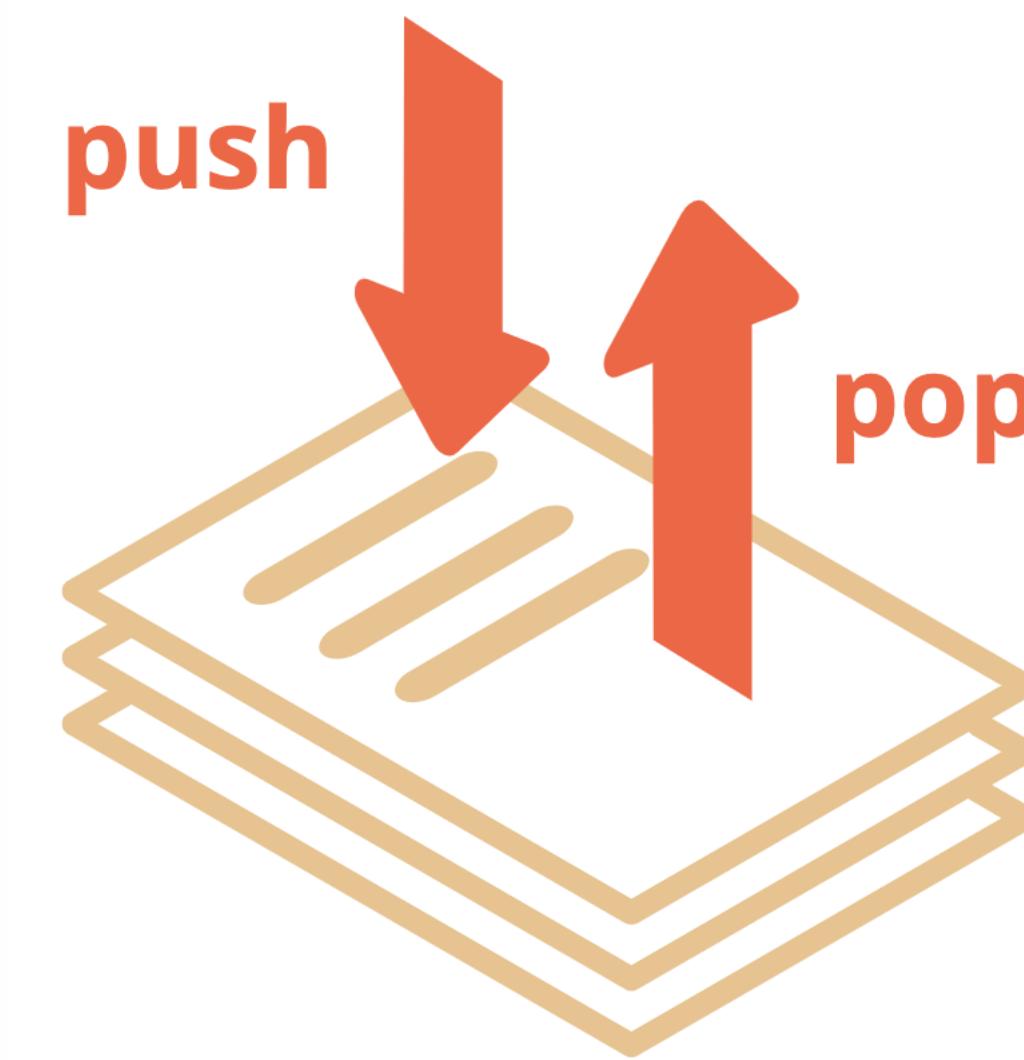
with the following properties

name, age, mail, phone, city, address

Arrays

Collections

Ordered collection of values or
objects



An array is a way to hold more than one value at a time we have a 1st, a 2nd, a 3rd, a 4th element and so on.

```
let todaysLecturers = [
  {
    name: "Kasper Fischer Topp",
    mail: "kato@eaaa.dk",
    phone: "72286328",
    position: "Lecturer",
    favTechnologies: ["PHP", "SQL"],
    nickname: "Mr. Backend"
  },
  {
    name: "Rasmus Cederdorff",
    mail: "race@eaaa.dk",
    phone: "72286318",
    position: "Lecturer",
    favTechnologies: ["JavaScript"],
    nickname: "Mr. Frontend"
  }
];
```

First element

Second element

Arrays

Rasmus Cederdorff	
Position: Lecturer	<i>Michael Hvidtfeldt</i>
Department/ Multimedia De Digital Conce	
Address: Ringvej Syd 10	Position: Lecturer <i>Birgitte Kirk Iversen</i>
Mail: race@baaa.dk	Department/ Multimedia Di
Phone: 7228 6318	Address: Senior Lecturer Ringvej Syd 10
	Department/programme: Multimedia Design
Mail: mhv@baaa.dk	Address: Sønderhøj 30, 8260 Viby J
Phone: 7228 6328	Mail: bki@baaa.dk
	Phone: 7228 6316



```
main.js:21
▼ (3) [...], [...], [...] ⓘ
▶ 0: {name: "Birgitte Kirk Iversen", mail: "bki@baaa..."}
▶ 1: {name: "Michael Hvidtfeldt", mail: "mhv@baaa.dk..."}
▶ 2: {name: "Rasmus Cederdorff", mail: "race@baaa.dk..."}
  length: 3
▶ __proto__: Array(0)
main.js:22
▶ {name: "Michael Hvidtfeldt", mail: "mhv@baaa.dk"} ⓘ
main.js:23
```

```
let teachers = [
  name: "Birgitte Kirk Iversen",
  mail: "bki@baaa.dk"
},
{
  name: "Michael Hvidtfeldt",
  mail: "mhv@baaa.dk"
},
{
  name: "Rasmus Cederdorff",
  mail: "race@baaa.dk"
}
];
```

```
console.log(teachers);
console.log(teachers[1]);
console.log(teachers.length);
```

Teachers

http://127.0.0.1:5501/array-teachers/index.html

Console

main.js:46

```
▶ (4) [{} , {} , {} , {} ] ⓘ
  ▶ 0:
    address: "Sønderhøj 30, 8260 Viby J"
    department: "Multimedia Design"
    img: "https://www.eaaa.dk/media/u4gorzs"
    initials: "bki"
    mail: "bki@baaa.dk"
    name: "Birgitte Kirk Iversen"
    phone: "72286316"
    position: "Senior Lecturer"
    ► [[Prototype]]: Object
  ▶ 1: {name: 'Maria Louise Bendixen', initials: 'mlbe'}
  ▶ 2: {name: 'Kim Elkjær Marcher-Jepsen', initials: 'kje'}
  ▶ 3: {name: 'Rasmus Cederdorff', initials: 'race'}
  length: 4
  ► [[Prototype]]: Array(0)
```



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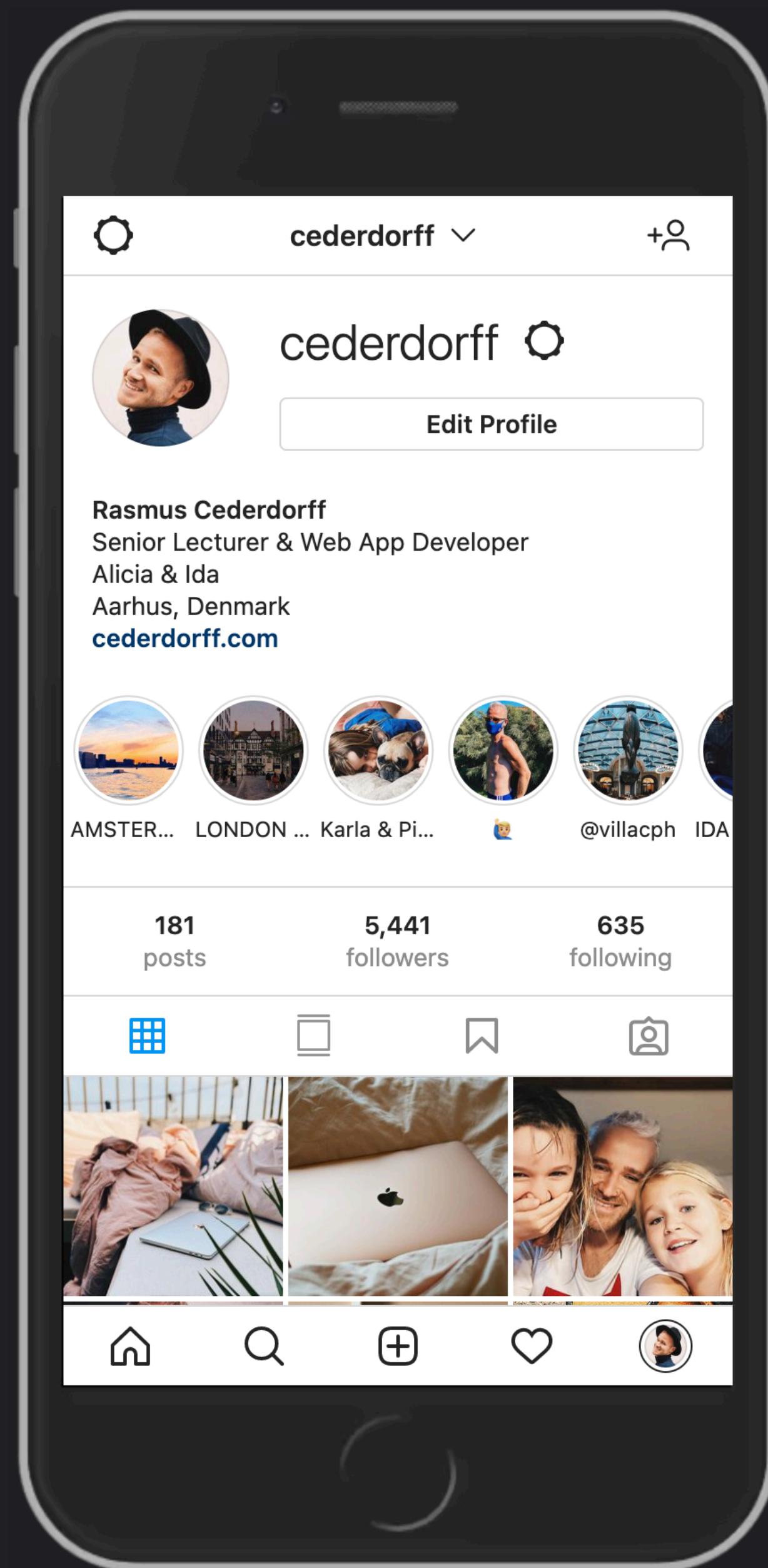
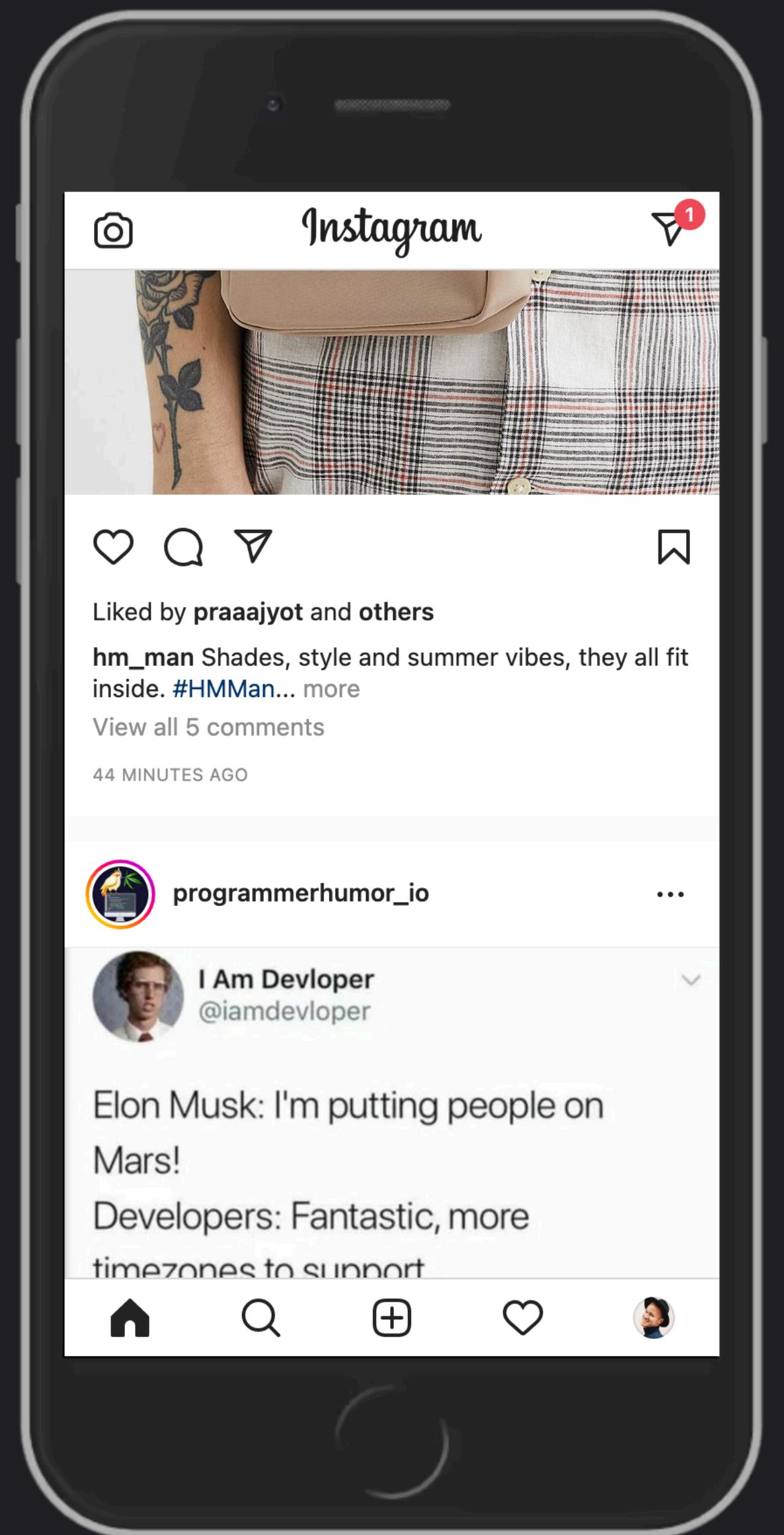
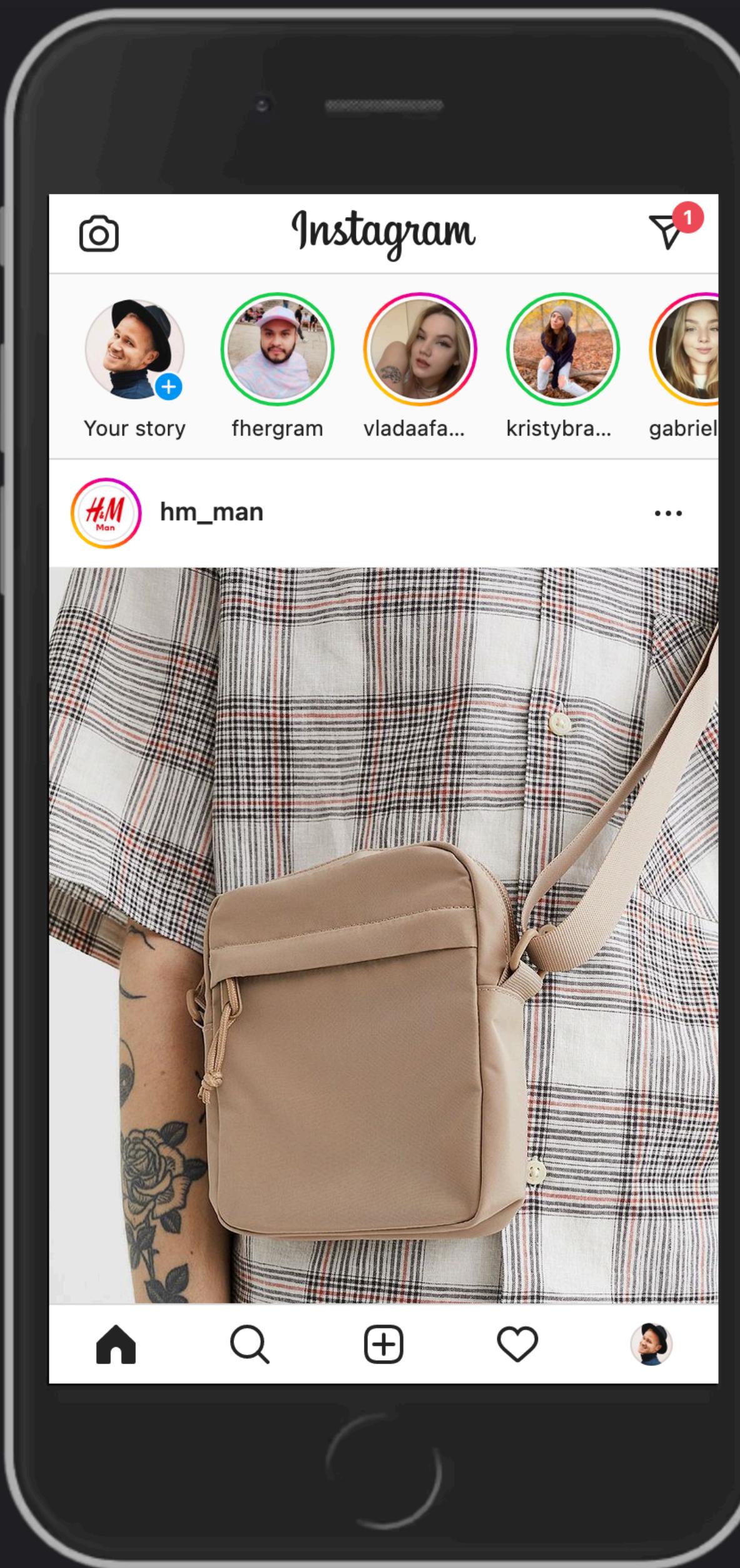
Kim Elkjær Marcher-Jepsen

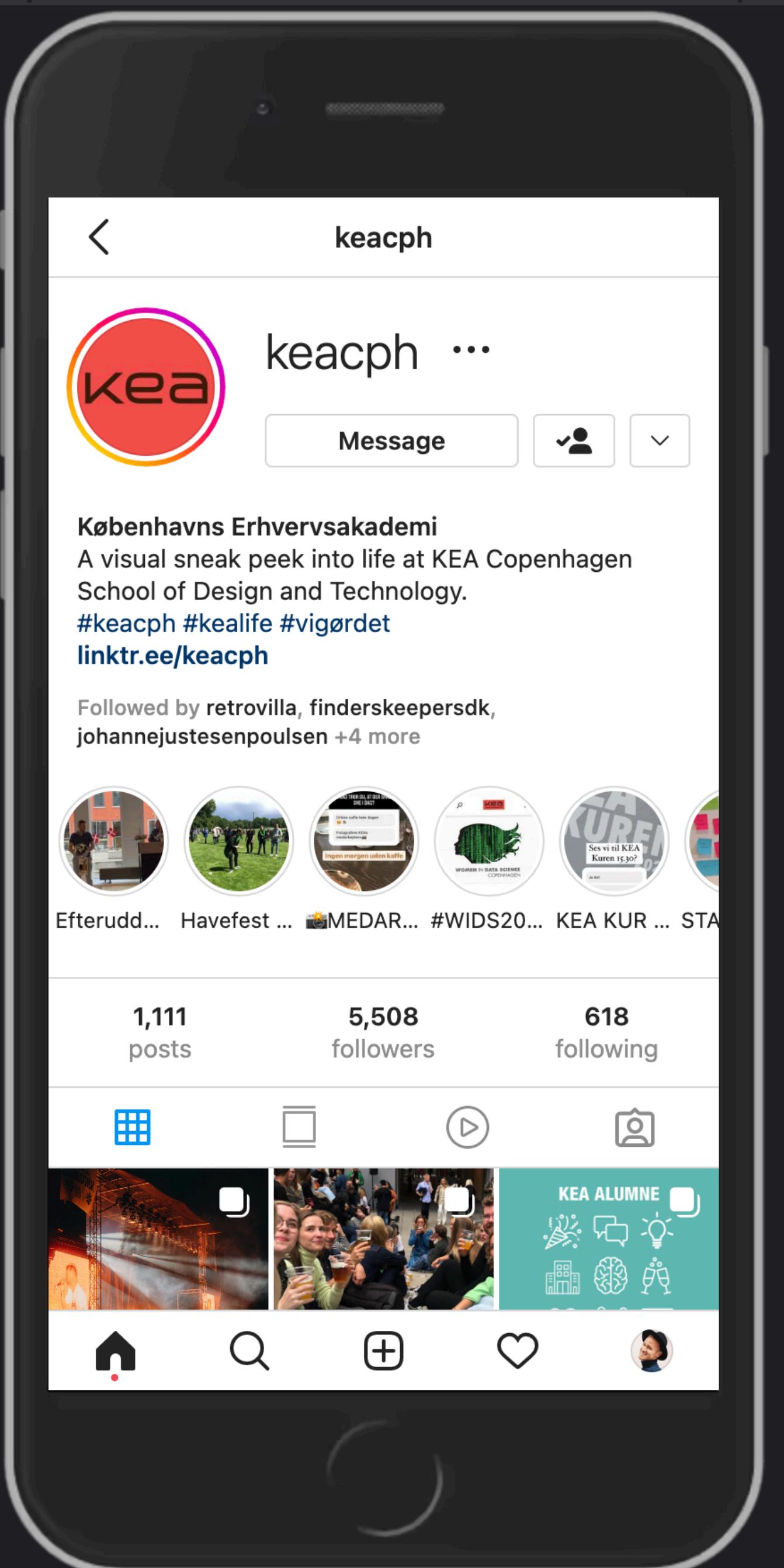
Lecturer
kje@baaa.dk



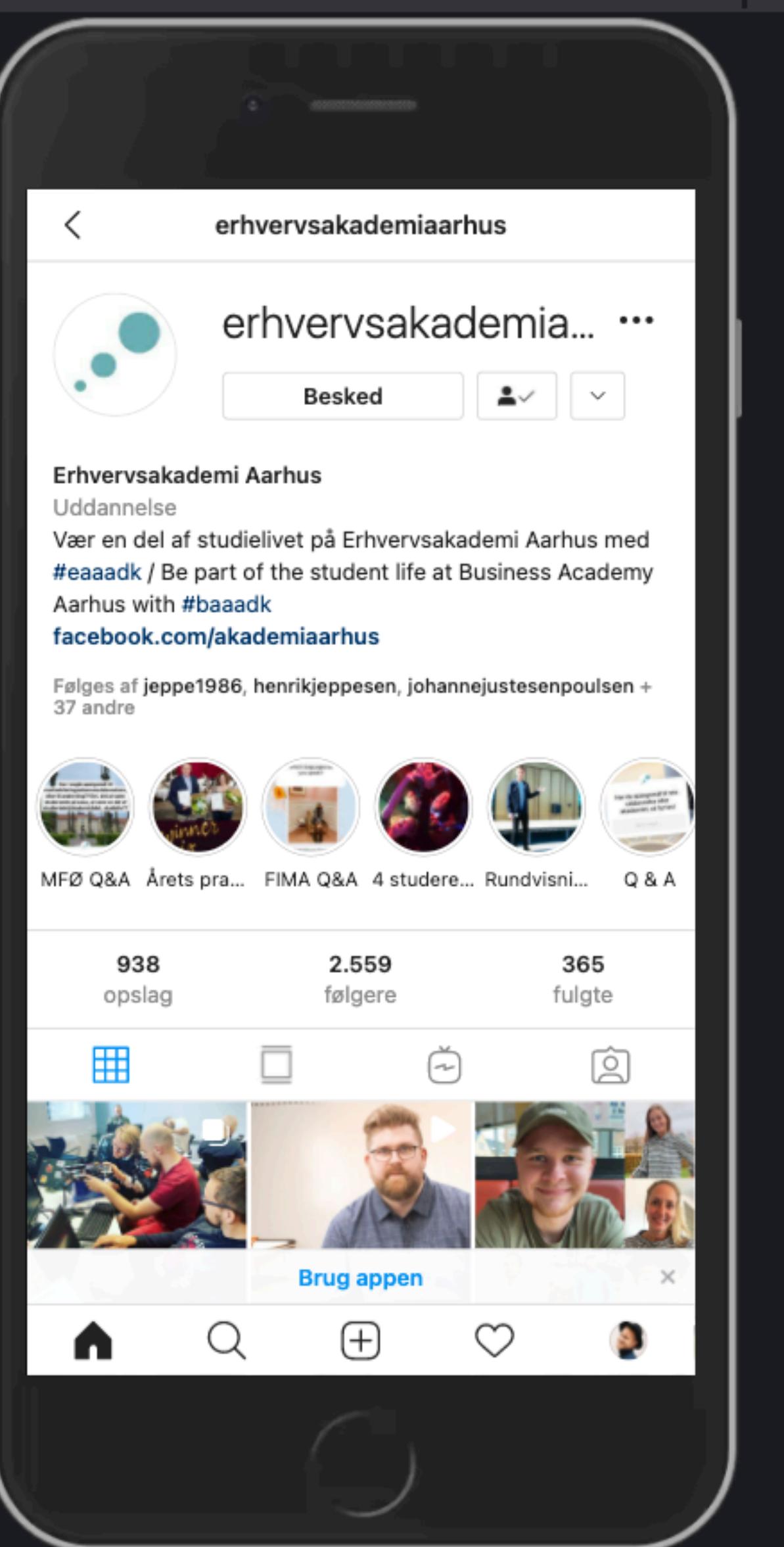
Rasmus Cederdorff

Lecturer
race@baaa.dk





Name	Headers	Payload	Preview	Response	Initiator	Timing	Cookies
□ ?modules=PolarisBD...							
□ ?content_type=PROF...							
□ ?username=keacph							
□ reels_tray/							
□ timeline/							
□ ig_sso_users/							
□ logging_client_events							
□ bz?__d=dis							
□ falco							
□ bz?__a=1&__ccg=G...							
□ batch_fetch_web/							
□ get_encrypted_crede...							
□ highlights_tray/							
□ ?target_user_id=140...							
□ badge/							
□ story/							
□ bulk-route-definitions/							
□ bulk-route-definitions/							
□ ?query_hash=69cba4...							
□ bz?__a=1&__ccg=G...							
□ bz?__a=1&__ccg=G...							
□ bulk-route-definitions/							
□ bz?__a=1&__ccg=G...							
□ logging_client_events							
□ bz?__d=dis							



Course roster: WU-E22a - 1. se

<https://eaaa.instructure.com/courses/15482/users>

WU-E22a > People

60 Student view

Home Announcements Modules Assignments Discussions People BigBlueButton Grades Pages Files Syllabus Outcomes Rubrics Quizzes Collaborations Settings

Everyone Groups + Group set

Search people All roles + People

Name	Login ID	SIS ID	Section	Role	Last Activity	Total Activity
Clara Juul Birk	eaaclbi@students.eaaa.dk	WU-E22a - 1.	Student semester	Student	24 Aug at 13:16	01:04:21
Martin Rieper Boesen	eaamrbo@students.eaaa.dk	WU-E22a - 1.	Student semester	Student	24 Aug at 7:54	01:07:06
Dan Okkels Brendstrup	dob@eaaa.dk	WU-E22a - 1.	Teacher semester	Teacher	3 Aug at 8:55	
Rasmus Cederdorff	race@eaaa.dk	WU-E22a - 1.	Teacher semester	Teacher	25 Aug at 9:28	01:19:23
Jeffrey David Serio	jds@eaaa.dk	WU-E22a - 1.	Teacher semester	Teacher	17 Aug at 16:39	
Charlotte Meng Emanuel Dyrholm	eaacmed@students.eaaa.dk	WU-E22a - 1.	Student semester	Student	23 Aug at 16:59	22:24

property value

```
[{"id": "23974", "name": "Clara Juul Birk", "created_at": "2020-08-10T10:45:00+02:00", "email": "eaaclbi@students.eaaa.dk", "sis_user_id": null, "short_name": "Clara Juul Birk", "sortable_name": "Birk, Clara Juul", "integration_id": null, "login_id": "eaaclbi@students.eaaa.dk", "unread_count": 0, "group_categories": []}, {"id": "36267", "name": "Martin Rieper Boesen", "created_at": "2020-08-10T10:45:00+02:00", "email": "eaamrbo@students.eaaa.dk", "sis_user_id": null, "short_name": "Martin Rieper Boesen", "sortable_name": "Boesen, Martin Rieper", "integration_id": null, "login_id": "eaamrbo@students.eaaa.dk", "unread_count": 1, "group_categories": []}, {"id": "29923", "name": "Dan Okkels Brendstrup", "created_at": "2021-07-30T00:46:05+02:00", "email": "dob@eaaa.dk", "sis_user_id": null, "short_name": "Dan Okkels Brendstrup (adjunkt – dob@eaaa.dk)", "sortable_name": "Brendstrup, Dan Okkels", "integration_id": null, "login_id": "dob@eaaa.dk", "unread_count": 0, "group_categories": []}, {"id": "14427", "name": "Rasmus Cederdorff", "created_at": "2020-08-10T10:45:00+02:00", "email": "race@eaaa.dk", "sis_user_id": null, "short_name": "Rasmus Cederdorff", "sortable_name": "Cederdorff, Rasmus", "integration_id": null, "login_id": "race@eaaa.dk", "unread_count": 0, "group_categories": []}, {"id": "41", "name": "Jeffrey David Serio", "created_at": "2020-08-10T10:45:00+02:00", "email": "jds@eaaa.dk", "sis_user_id": null, "short_name": "Jeffrey David Serio", "sortable_name": "Serio, Jeffrey David", "integration_id": null, "login_id": "jds@eaaa.dk", "unread_count": 0, "group_categories": []}, {"id": "24043", "name": "Charlotte Meng Emanuel Dyrholm", "created_at": "2020-08-10T10:45:00+02:00", "email": "eaacmed@students.eaaa.dk", "sis_user_id": null, "short_name": "Charlotte Meng Emanuel Dyrholm", "sortable_name": "Dyrholm, Charlotte Meng Emanuel", "integration_id": null, "login_id": "eaacmed@students.eaaa.dk", "unread_count": 0, "group_categories": []}, {"id": "23978", "name": "Jeppe Frik", "created_at": "2020-08-07T10:45:00+02:00", "email": null, "sis_user_id": null, "short_name": "Jeppe Frik", "sortable_name": "Frik, Jeppe", "integration_id": null, "login_id": null, "unread_count": 0, "group_categories": []}, {"id": "23963", "name": "Daniel Tjerrild Gamborg", "created_at": "2020-08-07T10:45:00+02:00", "email": null, "sis_user_id": null, "short_name": "Daniel Tjerrild Gamborg", "sortable_name": "Gamborg, Daniel Tjerrild", "integration_id": null, "login_id": null, "unread_count": 0, "group_categories": []}, {"id": "23992", "name": "Casper Hedegaard Hansen", "created_at": "2020-08-07T10:45:00+02:00", "email": null, "sis_user_id": null, "short_name": "Casper Hedegaard Hansen", "sortable_name": "Hansen, Casper Hedegaard", "integration_id": null, "login_id": null, "unread_count": 0, "group_categories": []}, {"id": "36266", "name": "Morten Gedsted Hansen", "created_at": "2020-08-07T10:45:00+02:00", "email": null, "sis_user_id": null, "short_name": "Morten Gedsted Hansen", "sortable_name": "Hansen, Morten Gedsted", "integration_id": null, "login_id": null, "unread_count": 0, "group_categories": []}, {"id": "23980", "name": "Anders Husted", "created_at": "2020-08-07T10:45:00+02:00", "email": null, "sis_user_id": null, "short_name": "Anders Husted", "sortable_name": "Husted, Anders", "integration_id": null, "login_id": null, "unread_count": 0, "group_categories": []}, {"id": "23531", "name": "Søren Bo Jørgensen", "created_at": "2020-08-07T10:45:00+02:00", "email": null, "sis_user_id": null, "short_name": "Søren Bo Jørgensen", "sortable_name": "Jørgensen, Søren Bo", "integration_id": null, "login_id": null, "unread_count": 0, "group_categories": []}]
```

6 / 157 requests

Objects? Arrays?

The screenshot shows the homepage of DR Nyheder. At the top, there are navigation links for NYHEDER, DRTV, and DR LYD. Below the navigation, there are six thumbnail cards for TV shows: DR1: Løvens Hule, DR3: Nationens stærkeste, P1: LSD kælderen, DR LYD: Annas Margrethe, DR3: Du fucker med de forkerte, and A Very British Scandal. Under these, a section titled "Seneste nyt" (Latest news) displays three news items: "EU klager over Kinas hårde kurs over for Litauen" (5 MIN. SIDEN), "Børn og skoleelever opfordres stadig til to ugentlige coronatest" (13 MIN. SIDEN), and "England skrætter størstedelen af coronarestriktionerne fra i dag" (25 MIN. SIDEN). The main content area features a large image of medical supplies (a mask, a thermometer, a syringe, and a bottle of hand sanitizer) against a blue background, with the text "15 lande bakker Danmark op: Danske soldater skal blive i Mali" overlaid. At the bottom, a red banner reads "Regeringen har meldt genåbning - men ikke".

The screenshot shows the "ALLE ERHVERVSAKADEMI-UDDANNELSER" (All Business Academy Programs) page. The page has two main navigation links: "ALLE UDDANNELSER" and "UDDANNELSER UD FRA INTERESSE". Below the title, there is a grid of 12 program profiles, each featuring a student's portrait and the program name. Each profile includes a small arrow icon indicating more details. The programs listed are: AUTOMATIONSTEKNOLOG, BYGGEKOORDINATOR, BYGGETEKNIKER, DATAMATIKER, DESIGNTEKNOLOG, ENTREPRENØRSKAB OG DESIGN, EL-INSTALLATOR, ENERGITEKNOLOG, IT-TEKNOLOG, KORT- OG LANDMÅLING, MULTIMEDIEDESIGNER, and VVS-INSTALLATOR.

Objects with properties in arrays

The screenshot shows a web browser window for the Business Academy Aarhus website (baaa.dk/programmes/). The page displays various study programs:

- Programmes at Business Academy Aarhus**
 - Study start in August**
 - Multimedia Design**: AP degree - 2 years. For those who would like to work with digital communication and interactive design. The programme is the first part of a Bachelor's programme.
 - Digital Concept Development**: Bachelor's top-up degree - 1½ years. Get additional qualifications to develop concepts for digital platforms - at both the strategic and the practical level.
 - Study start in January**
 - IT Technology**: AP degree (Final intake with study start in January 2022). Would you like to work with computers, server and network technology? The programme is the first part of a Bachelor's programme.
 - Chemical and Biotechnical Technology and Food Technology**: Bachelor's top-up degree (Final intake with study start in January 2022). Be successful in both national and international laboratory environments, and get updated on the
 - Web Development**: Bachelor's top-up degree (Final intake with study start in January 2022). Focus on the development of web technologies within several application fields and distribution platforms.
 - Programmes that no longer accept new applicants**
 - Chemical and Biotechnical Science**: AP degree (We no longer accept new applicants for this programme).
 - Marketing Management**: AP degree (We no longer accept new applicants for this programme).

A "Chat now" button is located in the bottom right corner.

It's all objects &
arrays!

Data Types & Data Structures

Objects & Arrays

Computer science student



Senior developer, 10+ years experience



<https://www.instagram.com/p/BxWAgatgSmn/>

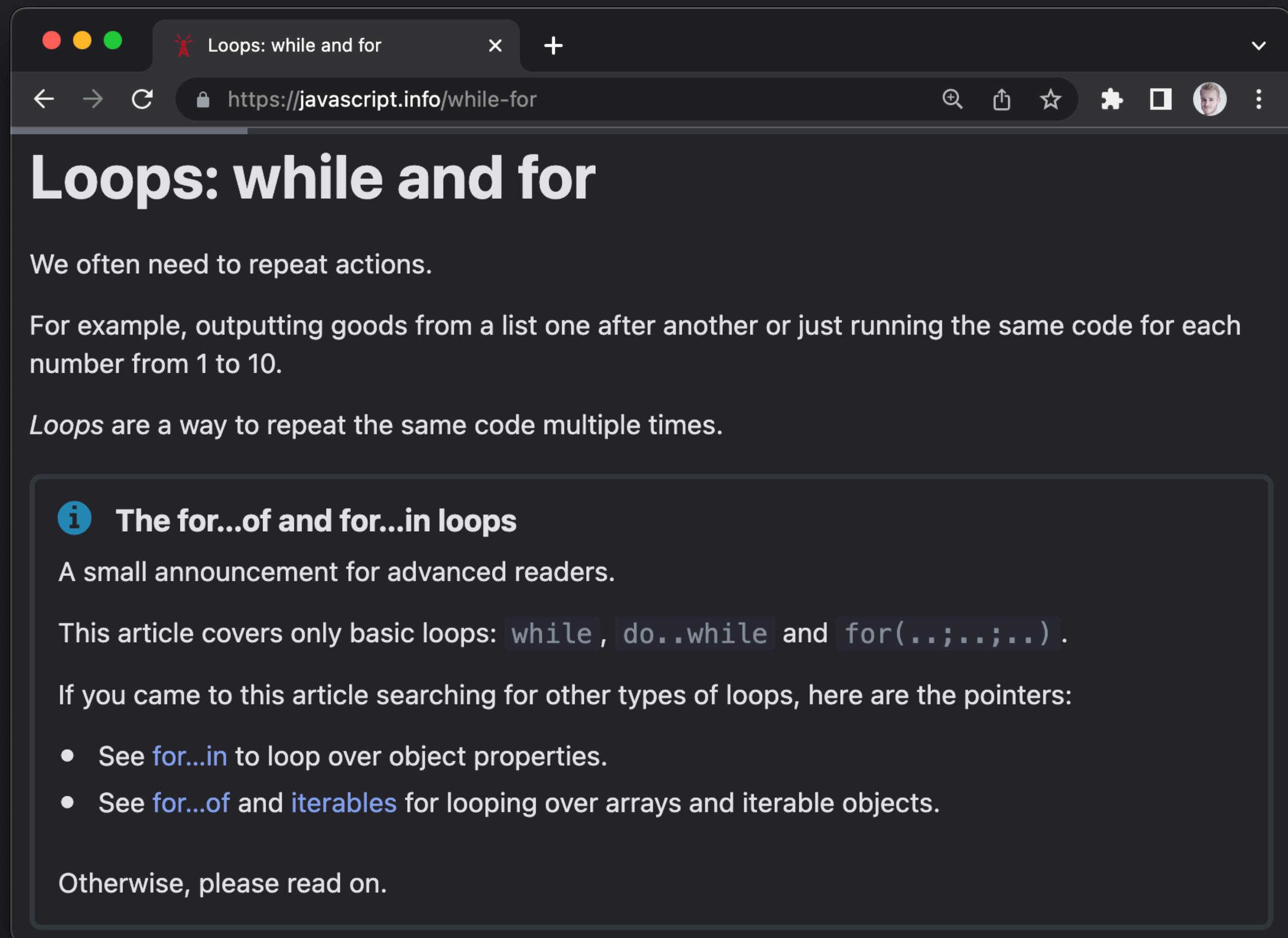
Arrays

Loops

```
for (let teacher of teachers) {  
  console.log(teacher);  
}
```

```
▶ {name: "Birgitte Kirk Iversen", mail: "bki@baaa.dk"}  main.js:20  
▶ {name: "Michael Hvidtfeldt", mail: "mhv@baaa.dk"}  main.js:20  
▶ {name: "Rasmus Cederdorff", mail: "race@baaa.dk"}  main.js:20
```

Loops



The screenshot shows a dark-themed web browser window. The title bar reads "Loops: while and for". The address bar shows the URL "https://javascript.info/while-for". The main content area has a large heading "Loops: while and for". Below it, a paragraph states "We often need to repeat actions. For example, outputting goods from a list one after another or just running the same code for each number from 1 to 10. Loops are a way to repeat the same code multiple times." A callout box with a blue border and rounded corners contains the following text: "i The for...of and for...in loops A small announcement for advanced readers. This article covers only basic loops: `while`, `do..while` and `for(..;..;..)`. If you came to this article searching for other types of loops, here are the pointers: • See `for...in` to loop over object properties. • See `for...of` and `iterables` for looping over arrays and iterable objects. Otherwise, please read on." The browser interface includes standard controls like back, forward, and search.

Loops: while and for

We often need to repeat actions. For example, outputting goods from a list one after another or just running the same code for each number from 1 to 10. Loops are a way to repeat the same code multiple times.

i The for...of and for...in loops

A small announcement for advanced readers.

This article covers only basic loops: `while`, `do..while` and `for(..;..;..)`.

If you came to this article searching for other types of loops, here are the pointers:

- See `for...in` to loop over object properties.
- See `for...of` and `iterables` for looping over arrays and iterable objects.

Otherwise, please read on.

For of loop

iterate over arrays or other iterable objects

<https://scrimba.com/learn/introductiontojavascript/for-loops-cMMM8U9>

<https://scrimba.com/learn/introductiontojavascript/challenge-for-loops-cPkpJrcv>

Loops

```
for (const familyMember of familyMembers) {  
    console.log(familyMember);  
}
```

```
for (let index = 0; index < familyMembers.length; index++) {  
    const familyMember = familyMembers[index];  
    console.log(familyMember);  
}
```

https://www.w3schools.com/js/js_loop_for.asp
<https://javascript.info/array#loops>
<https://javascript.info/while-for>

JavaScript.info/array#loops

One of the oldest ways to cycle array items is the `for` loop over indexes:

```
1 let arr = ["Apple", "Orange", "Pear"];
2
3 for (let i = 0; i < arr.length; i++) {
4   alert( arr[i] );
5 }
```



But for arrays there is another form of loop, `for..of`:

```
1 let fruits = ["Apple", "Orange", "Plum"];
2
3 // iterates over array elements
4 for (let fruit of fruits) {
5   alert( fruit );
6 }
```



ARRAYS

LOOPS

```
for (let teacher of teachers) {  
  console.log(teacher.mail);  
}
```

bki@baaa.dk

main.js:20

mhv@baaa.dk

main.js:20

race@baaa.dk

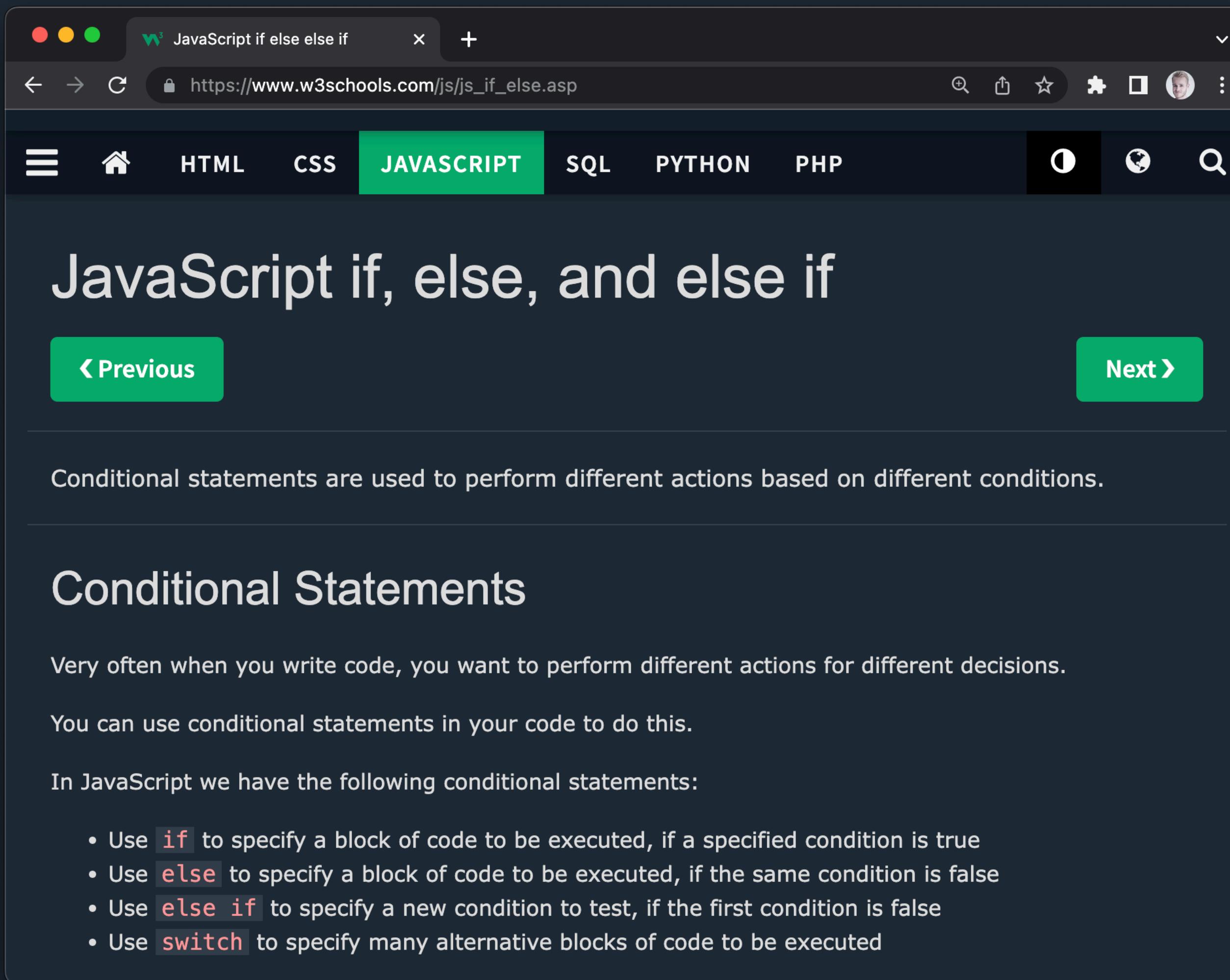
main.js:20

LOOPS

... LOOP THROUGH AN ARRAY AND ADD A CONDITION

```
for (let teacher of teachers) {  
  if (teacher.name === "Rasmus Cederdorff") {  
    console.log(teacher);  
  }  
}
```

Conditional Statements



The screenshot shows a web browser window with the title bar "JavaScript if else else if" and the URL "https://www.w3schools.com/js/js_if_else.asp". The page content is titled "JavaScript if, else, and else if". It includes navigation buttons for "Previous" and "Next", and a section about conditional statements. The text states: "Conditional statements are used to perform different actions based on different conditions." Below this, a heading "Conditional Statements" is followed by text explaining that conditional statements allow performing different actions for different decisions, and listing the four types of conditional statements in JavaScript: if, else, else if, and switch.

Conditional statements are used to perform different actions based on different conditions.

Conditional Statements

Very often when you write code, you want to perform different actions for different decisions.

You can use conditional statements in your code to do this.

In JavaScript we have the following conditional statements:

- Use `if` to specify a block of code to be executed, if a specified condition is true
- Use `else` to specify a block of code to be executed, if the same condition is false
- Use `else if` to specify a new condition to test, if the first condition is false
- Use `switch` to specify many alternative blocks of code to be executed

https://www.w3schools.com/js/js_if_else.asp

Ternary Operator

1.5. Ternary Operator

What: Simplifies the conditional operator `if` / `else`.

Why: It takes (too) long to write conditionals with `if` / `else`. Ternary Operator is often used in JSX expressions as an efficient implementation of conditional rendering.

Syntax: `condition ? <expression if true> : <expression if false>`

JS: `const result = condition ? value1 : value2;`

```
// condition ? <expression if true> : <expression if false>

const age = 43;

const status = age > 18 ? "adult" : "child";

//same as
let status;
if (age > 18) {
  status = "adult";
} else {
  status = "child";
}
```

The use of

;
:
()
[]
{ }
\$
"
'
. .
==
====
< >
?

`==` VS `== =`

`== =` IS MORE STRICT

`== =` compares both types and values
`==` compares values

```
"32" == 32 is true
"32" == = 32 is false
```

Array Methods to know

.push (...)

.map (...)

.filter (...)

.find (...)

.sort (...)

Computer science student



Senior developer, 10+ years experience



Array methods

<https://javascript.info/array-methods#filter>

- Chapter
- Data types
- Lesson navigation
- Add/remove items
- Iterate: forEach
- Searching in array**
- Transform an array
- Array.isArray
- Most methods support "thisArg"
- Summary
- Tasks (13)
- Comments
- Share
- [Edit on GitHub](#)
- Ads



filter

The `find` method looks for a single (first) element that makes the function return `true`. If there may be many, we can use `arr.filter(fn)`.

The syntax is similar to `find`, but `filter` returns an array of all matching elements:

```
1 let results = arr.filter(function(item, index, array) {  
2   // if true item is pushed to results and the iteration continues  
3   // returns empty array if nothing found  
4});
```

For instance:

```
1 let users = [  
2   {id: 1, name: "John"},  
3   {id: 2, name: "Pete"},  
4   {id: 3, name: "Mary"}  
5];  
6  
7 // returns array of the first two users  
8 let someUsers = users.filter(item => item.id < 3);  
9  
10 alert(someUsers.length); // 2
```

Transform an array

Let's move on to methods that transform and reorder an array.

map

The `arr.map` method is one of the most useful and often used. It calls the function for each element of the array and returns the array of results.

■ ■ ■ ■	.map(■ → ●)	→	● ● ● ●
■ ■ ● ■	.filter(■)	→	■ ■ ■
● ● ■ ■	.find(■)	→	■
● ● ● ■	.findIndexof(■)	→	3
■ ■ ■ ■	.fill(1, ●)	→	■ ● ● ●
● ■ ■ ●	.some(■)	→	true
■ ■ ■ ●	.every(■)	→	false

<https://javascript.info/array-methods>

<https://medium.com/@mandeepkaur1/a-list-of-javascript-array-methods-145d09dd19a0>

Array.map(...)

...iterate over an array and modify each element.

Array.map(...) calls a callback function for each element in the array.

```
const persons = [
  { firstname: "Birgitte", lastname: "Iversen" },
  { firstname: "Lykke", lastname: "Dahlen" },
  { firstname: "Rasmus", lastname: "Cederdorff" }
];

const mapped = persons.map(person => {
  return {
    name: `${person.firstname} ${person.lastname}`
  };
});

console.log(mapped);
```

▼ (3) [{...}, {...}, {...}] *i*

- 0: {name: 'Birgitte Iversen'}
- 1: {name: 'Lykke Dahlen'}
- 2: {name: 'Rasmus Cederdorff'}

length: 3

From Vanilla JS to React Developer

1.4.1. Array.map(...)

What: `.map()` allow us to run a function for each item in an array and transform the items. At the end a new array will be returned.

Why: When “thinking in React” one of the most useful is the `.map()` array method. It makes it easy to transform an array of objects into HTML. And in general, to transform and manipulate with objects in an array.

```
const numbers = [2, 4, 6, 8];

const newNumbers = numbers.map(number => number * 2);

//same as
const newNumbers = numbers.map(function(number) {
  return number * 2;
});
```

```
const teachers = ["Rasmus", "Morten", "Dan"];

const result = teachers.map(teacher => <p>{teacher}</p>)
```

```
const persons = [
{
  firstName: "Birgitte",
  lastName: "Iversen"
}]
```

100 seconds of

JS

ARRAY MAP



Array.map(...)

- Project template: array-map
- Use .map to map over the persons array and concatenate firstName and lastName to a new property called name.
- console.log() the result
- Add a property called birthYear for each person object. Use map to map over the array and add the property birthYear dynamically based on birthDate (hint: use String.split(...) or .slice(...)).

```
const persons = [  
  {  
    firstName: "Jane",  
    lastName: "Doe",  
    birthDate: "1992-03-04"  
  },  
  {  
    firstName: "Jens",  
    lastName: "Jensen",  
    birthDate: "1992-07-04"  
  },  
  {  
    firstName: "Birgitte",  
    lastName: "Iversen",  
    birthDate: "1990-10-04"  
  },  
  {  
    firstName: "Lykke",  
    lastName: "Dahlen",  
    birthDate: "1987-06-04"  
  },  
  {  
    firstName: "Kasper",  
    lastName: "Topp",  
    birthDate: "1989-03-07"  
  }];  
  
const result = persons.map(person => {  
  console.log(person);  
  // manipulate and return value  
});
```

Arrays

.filter()

```
let users = [  
  { age: 35, name: "John" },  
  { age: 40, name: "Pete" },  
  { age: 44, name: "Mary" }  
];
```

// returns array of with users older than 39

```
let someUsers = users.filter(item => item.age > 39);
```

```
console.log(someUsers);
```

▼ Array(2) ⓘ
▶ 0: {age: 40, name: "Pete"}
▶ 1: {age: 44, name: "Mary"}
length: 2

`template string`

“Template literals are literals delimited with backtick (`) characters, allowing for multi-line strings, for string interpolation with embedded expressions, and for special constructs called tagged templates.”

```
let name = "Alicia";
let age = 6;
```

```
console.log(name + " is " + age + " years old.");
```

```
console.log(` ${name} is ${age} years old. `);
```

Alicia is 6 years old.

[main.js:10](#)

Alicia is 6 years old.

[main.js:12](#)

`template string`

Backtick String / Template Literals

- Extended functionality
- Simplifies concatenating strings
- Embed values and expression into a string with \${ ... }
- Simplifies the syntax and the reading
- Let us create more readable HTML templates

```
let name = "Alicia";
console.log(`Hello, ${name}`);
```

Hello, Alicia

main.js:8

`template string`

```
let name = "Alicia";
let age = 6;

console.log(name + " is " + age + " years old.");

console.log(` ${name} is ${age} years old.`);
```

Alicia is 6 years old.

[main.js:10](#)

Alicia is 6 years old.

[main.js:12](#)

`template string`

REGULAR STRING EXPRESSION

```
function appendTeachers(teachers) {  
  for (let teacher of teachers) {  
    console.log(teacher);  
    document.querySelector("#grid-teachers").innerHTML +=  
      "<article>" +  
      "<img src='" + teacher.img + "'>" +  
      "<h3>" + teacher.name + "</h3>" +  
      teacher.position + "<br>" +  
      "<a href='mailto:" + teacher.mail + "'>" + teacher.mail + "</a>" +  
      "</article>";  
  }  
}
```

TEACHERS



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Michael Hvidtfeldt

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`template string`

... EMBED VARIABLES AND EXPRESSIONS IN A STRING

```
function appendTeachers(teachers) {  
  for (let teacher of teachers) {  
    console.log(teacher);  
    document.querySelector("#grid-teachers").innerHTML +=  
      "<article>" +  
      "<img src=''" + teacher.img + "'>" +  
      "<h3>" + teacher.name + "</h3>" +  
      teacher.position + "<br>" +  
      "<a href='mailto:" + teacher.mail + "'>" + teacher.mail + "</a>" +  
      "</article>";  
  }  
}
```



```
function appendTeachers(teachers) {  
  for (let teacher of teachers) {  
    console.log(teacher);  
    document.querySelector("#grid-teachers").innerHTML += `  
      <article>  
        <img src='${teacher.img}'>  
        <h3>${teacher.name}</h3>  
        ${teacher.position}<br>  
        <a href='mailto:${teacher.mail}'>${teacher.mail}</a>  
      </article>`;  
  }  
}
```

`VS Code ES6 String HTML`

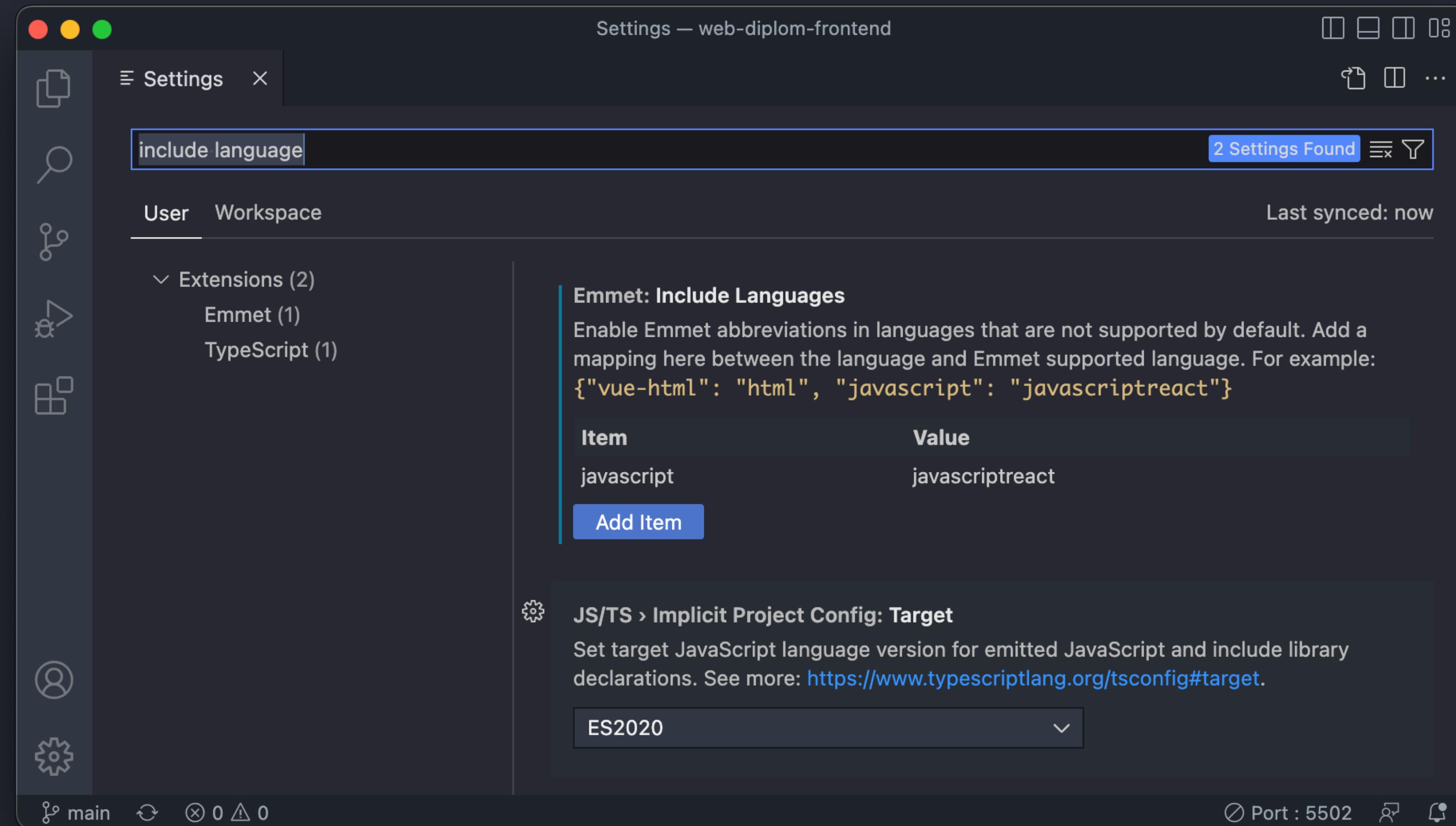
<https://marketplace.visualstudio.com/items?itemName=hjb2012.vscode-es6-string-html>

```
function appendTeachers(teachers) {
  for (let teacher of teachers) {
    console.log(teacher);
    document.querySelector("#grid-teachers").innerHTML += `
      <article>
        <img src='${teacher.img}'>
        <h3>${teacher.name}</h3>
        ${teacher.position}<br>
        <a href='mailto:${teacher.mail}'>${teacher.mail}</a>
      </article>`;
  }
}
```



```
function appendTeachers(teachers) {
  for (let teacher of teachers) {
    console.log(teacher);
    document.querySelector("#grid-teachers").innerHTML += /*html*/
      <article>
        <img src='${teacher.img}'>
        <h3>${teacher.name}</h3>
        ${teacher.position}<br>
        <a href='mailto:${teacher.mail}'>${teacher.mail}</a>
      </article>;
  }
}
```

Add language support in template string



Functions

A block of code to perform a specific task.

A way to make reusable code by storing tasks we can use again and again.

Best practice: write reusable code

```
function log(message) {  
  console.log(message);  
}  
  
log("Hi Frontenders!");
```

<https://javascript.info/function-basics>

Functions

Function declaration

```
console.log("Hi Frontenders!");
console.log("Good job!");
console.log("I'm testing something!");
console.log("Hola");
```

```
function log(message) {
  console.log(message);
}

log("Hi Frontenders!");
log("Good job!");
log("I'm testing something!");
log("Hola");
```

The screenshot shows a web browser window with the title bar "JavaScript Functions". The address bar contains the URL "https://www.w3schools.com/js/js_functions.asp". The navigation bar includes links for Home, HTML, CSS, JAVASCRIPT (which is highlighted in green), SQL, PYTHON, PHP, and BOOTSTRAP. There are also icons for search, refresh, and user profile.

JavaScript Function Syntax

A JavaScript function is defined with the `function` keyword, followed by a **name**, followed by parentheses `()`.

Function names can contain letters, digits, underscores, and dollar signs (same rules as variables).

The parentheses may include parameter names separated by commas:
`(parameter1, parameter2, ...)`

The code to be executed, by the function, is placed inside curly brackets: `{}`

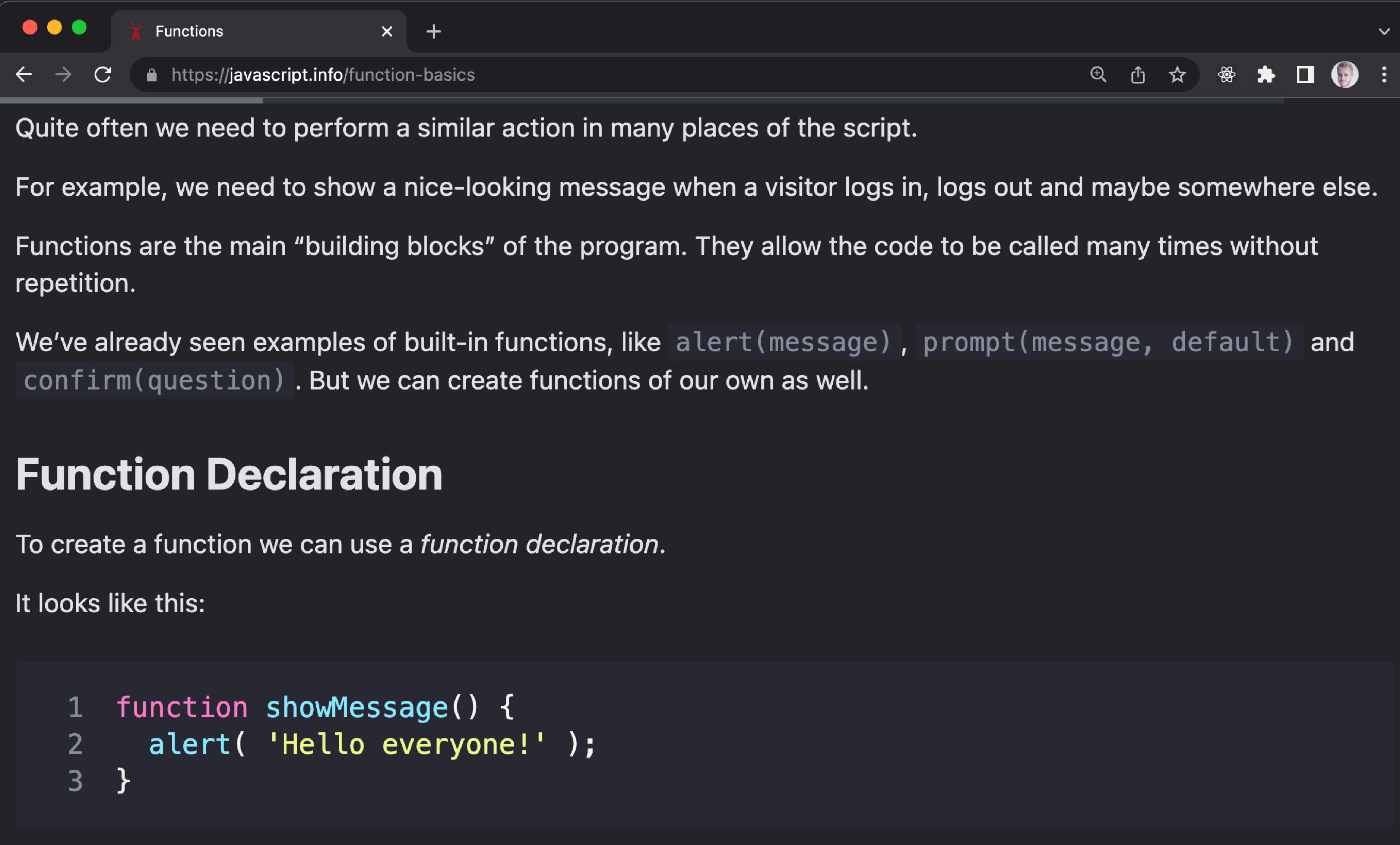
```
function name(parameter1, parameter2, parameter3) {  
    // code to be executed  
}
```

Function **parameters** are listed inside the parentheses `()` in the function definition.

Function **arguments** are the **values** received by the function when it is invoked.

Inside the function, the arguments (the parameters) behave as local variables.

JavaScript.info/Function-Basics



The screenshot shows a dark-themed web browser window with the title bar "Functions". The address bar displays the URL "https://javascript.info/function-basics". The main content area contains text explaining the purpose and benefits of functions, followed by a code example.

Quite often we need to perform a similar action in many places of the script.
For example, we need to show a nice-looking message when a visitor logs in, logs out and maybe somewhere else.
Functions are the main “building blocks” of the program. They allow the code to be called many times without repetition.
We've already seen examples of built-in functions, like `alert(message)`, `prompt(message, default)` and `confirm(question)`. But we can create functions of our own as well.

Function Declaration

To create a function we can use a *function declaration*.

It looks like this:

```
1 function showMessage() {  
2     alert( 'Hello everyone!' );  
3 }
```

Functions

Function declaration

```
function append(htmlTemplate, idOfElement) {  
    console.log(htmlTemplate);  
    document.getElementById(idOfElement).innerHTML += htmlTemplate;  
    alert("Yaaaaah, you did it!");  
}  
  
append("<h2>Hi Frontenders!</h2>", "content");
```

The name of the function

Parameters

Body of the function
(code block)

How to call the function

The diagram illustrates the structure of a JavaScript function declaration. It shows a code block with two main parts: the function definition and its invocation. The function definition starts with 'function' followed by the name 'append'. It takes two parameters: 'htmlTemplate' and 'idOfElement'. The body of the function contains three statements: logging the template to the console, setting the innerHTML of the specified element, and displaying an alert. Below the function definition, an arrow points to the word 'append' with the label 'How to call the function'. To the left of the function name, an arrow points down with the label 'The name of the function'. Above the parameter list, two arrows point down to the parameter names with the label 'Parameters'. To the right of the closing brace of the function definition, a large bracket encompasses the entire body of the function, with the label 'Body of the function (code block)' positioned below it.

Functions

Arrays & Loops

The name of the function



Parameters



```
function appendTeachers(teachers) {  
  for (let teacher of teachers) {  
    console.log(teacher);  
    document.querySelector("#grid-teachers").innerHTML +=  
      "<article>" +  
      "<img src=''" + teacher.img + "'>" +  
      "<h3>" + teacher.name + "</h3>" +  
      teacher.position + "<br>" +  
      "<a href='mailto:" + teacher.mail + "'>" + teacher.mail + "</a>" +  
      "</article>";  
  }  
}  
  
appendTeachers(teachers);
```

How to call the function

Body of the function
(code block)

TEACHERS



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Functions

3 different types

```
function logPersons(persons) {  
  for (var i = 0; i < persons.length; i++) {  
    console.log(persons[i]);  
  }  
}
```

FUNCTION DECLARATION

```
const logPersons = function(persons) {  
  for (var i = 0; i < persons.length; i++) {  
    console.log(persons[i]);  
  }  
}
```

FUNCTION EXPRESSION

```
const logPersons = (persons) => {  
  for (var i = 0; i < persons.length; i++) {  
    console.log(persons[i]);  
  }  
}
```

ARROW FUNCTION

JavaScript.info/function-basics#parameters

We can pass arbitrary data to functions using parameters.

In the example below, the function has two parameters: `from` and `text`.

```
1 function showMessage(from, text) { // parameters: from, text
2   alert(from + ': ' + text);
3 }
4
5 showMessage('Ann', 'Hello!'); // Ann: Hello! (*)
6 showMessage('Ann', "What's up?"); // Ann: What's up? (**)
```

Global Variables

VARIABLES OUTSIDE A FUNCTION (AND SCOPES)
ARE GLOBAL VARIABLES

Local variables

A variable declared inside a function is only visible inside that function.

For example:

```
1 function showMessage() {  
2     let message = "Hello, I'm JavaScript!"; // local variable  
3  
4     alert( message );  
5 }  
6  
7 showMessage(); // Hello, I'm JavaScript!  
8  
9 alert( message ); // <-- Error! The variable is local to the function
```

Outer variables

A function can access an outer variable as well, for example:

```
1 let userName = 'John';  
2  
3 function showMessage() {  
4     let message = 'Hello, ' + userName;  
5     alert(message);  
6 }  
7  
8 showMessage(); // Hello, John
```

The function has full access to the outer variable. It can modify it as well.

```
let userName = 'John';

function showMessage() {
    userName = "Bob"; // (1) changed the outer variable

    let message = 'Hello, ' + userName;
    alert(message);
}

alert( userName ); // John before the function call

showMessage();

alert( userName ); // Bob, the value was modified by the function
```

Global variables

Variables declared outside of any function, such as the outer `userName` in the code above, are called *global*.

Global variables are visible from any function (unless shadowed by locals).

It's a good practice to minimize the use of global variables. Modern code has few or no globals. Most variables reside in their functions. Sometimes though, they can be useful to store project-level data.

Global
Variable

```
let _movies = [];

// fetch all movies from WP
async function getMovies() {
  let response = await fetch("https://movie-api.cederdorff.com/wp-json/wp/v2/posts");
  let data = await response.json();
  console.log(data);
  _movies = data;
  appendMovies(data);
  showLoader(false);
}

getMovies();
```

ARRAY
movies

```
// append movies to the DOM
function appendMovies(movies) {
  let htmlTemplate = "";
  for (let movie of movies) {
    htmlTemplate += `
      <article>
        <h2>${movie.title.rendered} (${movie.acf.year})</h2>
        
        <p>${movie.acf.description}</p>
        <iframe src="${movie.acf.trailer}"></iframe>
      </article>
    `;
  }
  document.querySelector('#movies-container').innerHTML = htmlTemplate;
}
```

Inline variable

Store the current object
from the array

function
argument

variable inside
the function

```
let _movies = [];

// fetch all movies from WP
async function getMovies() {
  let response = await fetch("https://movie-api.cederdorff.com/wp-json/wp/v2/posts");
  let data = await response.json();
  console.log(data);
  _movies = data;
  appendMovies(data);
  showLoader(false);
}

getMovies();
```

function argument

variable inside the function

Inline variable

Store the current object from the array

```
// append movies to the DOM
function appendMovies(movies) {
  let htmlTemplate = "";
  for (let movie of movies) {
    htmlTemplate += `
      <article>
        <h2>${movie.title.rendered} (${movie.acf.year})</h2>
        
        <p>${movie.acf.plot}</p>
      </article>
    `;
  }
  document.querySelector("#content").innerHTML = htmlTemplate;
}
```

```
// ===== Product functionality ===== //
/*
global variables: _products, _selectedProductId
*/
let _products = [];
let _selectedProductId;

/*
Fetches json data from the file products.json
*/
async function fetchData() {
    const response = await fetch('json/products.json');
    const data = await response.json();
    _products = data;
    console.log(_products);
    appendProducts(_products);
    showLoader(false);
}

fetchData();

function appendProducts(products) {
    let htmlTemplate = "";
    for (let product of products) {
        htmlTemplate += /*html*/
            <article class="${product.status}">
                <article onclick="showDetailView(${product.id})">
```

JavaScript.info/function-basics#local-variables

Local variables

A variable declared inside a function is only visible inside that function.

For example:

```
1 function showMessage() {  
2   let message = "Hello, I'm JavaScript!"; // local variable  
3  
4   alert( message );  
5 }  
6  
7 showMessage(); // Hello, I'm JavaScript!  
8  
9 alert( message ); // <-- Error! The variable is local to the function
```

Scopes:

- Local Variable
- Global Variable

Outer variables

A function can access an outer variable as well, for example:

```
1 let userName = 'John';  
2  
3 function showMessage() {  
4   let message = 'Hello, ' + userName;  
5   alert(message);  
6 }  
7  
8 showMessage(); // Hello, John
```

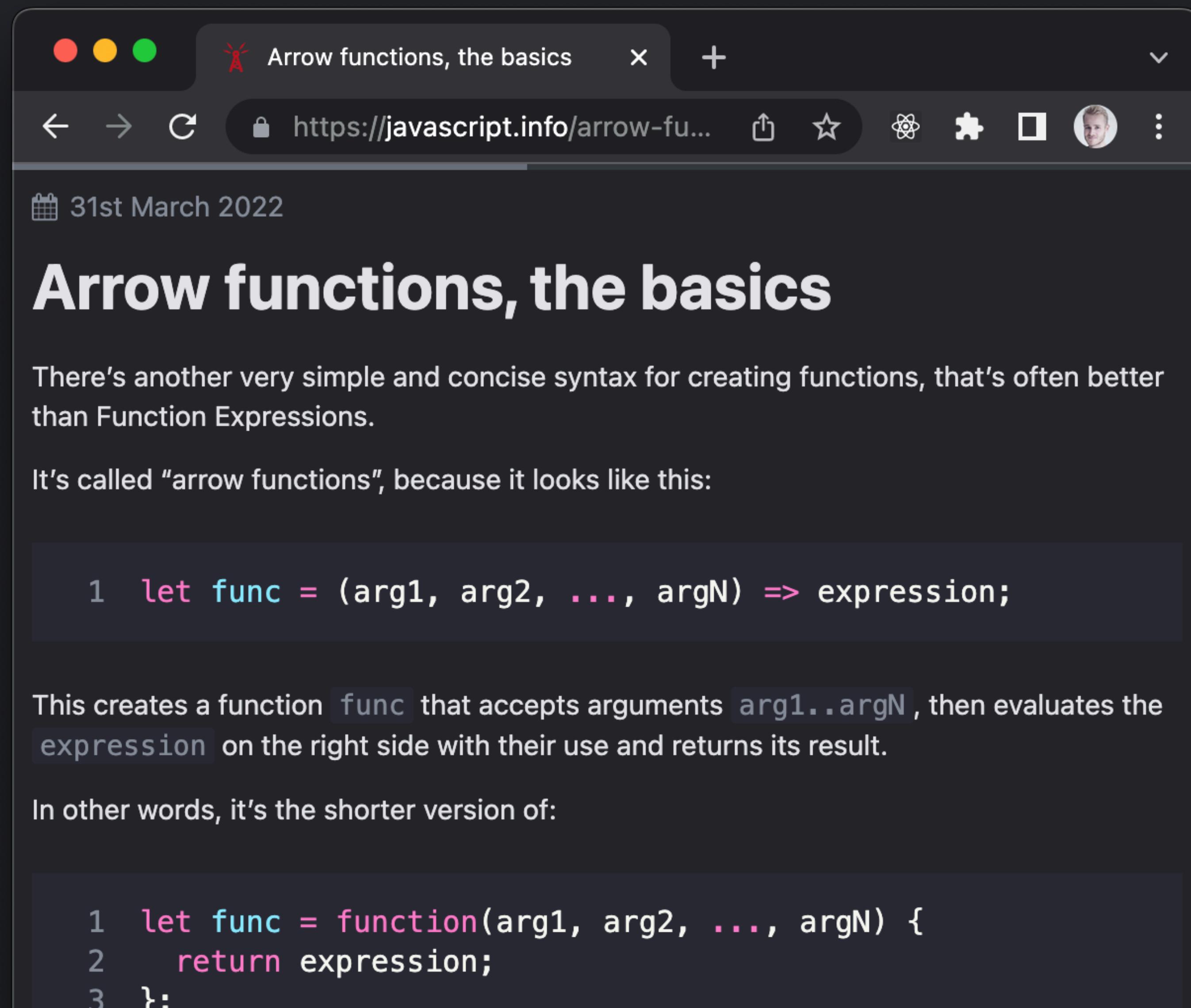
Function called by another function

Use the name of
the function to
call / execute

```
let users = [...  
];  
  
function appendUsers(users) {  
  let htmlTemplate = "";  
  for (const user of users) {  
    console.log(user);  
    htmlTemplate += /*html*/`  
      <article>  
          
        <h2>${user.name}</h2>  
        <a href="mailto:${user.email}">${user.email}</a>  
        <p>Role: ${user.enrollment_type}</p>  
      </article>  
    `;  
  }  
  document.querySelector("#users").innerHTML = htmlTemplate;  
}  
  
function initApp() {  
  appendUsers(users);  
}  
  
initApp();
```

users refers to our declared variable, users, (global variable)

Javascript.info/Arrow-Functions-Basics



The screenshot shows a dark-themed web browser window. The title bar says "Arrow functions, the basics". The address bar shows the URL "https://javascript.info/arrow-fu...". Below the address bar, there's a date "31st March 2022". The main content area has a large heading "Arrow functions, the basics". Below the heading, a text block says: "There's another very simple and concise syntax for creating functions, that's often better than Function Expressions. It's called "arrow functions", because it looks like this:". A code block shows the syntax: "1 let func = (arg1, arg2, ..., argN) => expression;". Below this, a text block explains: "This creates a function `func` that accepts arguments `arg1..argN`, then evaluates the `expression` on the right side with their use and returns its result. In other words, it's the shorter version of:". Another code block shows the equivalent function expression: "1 let func = function(arg1, arg2, ..., argN) { 2 return expression; 3 };".

```
function orderByBrand() {  
  _products.sort((product1, product2) => {  
    return product1.brand.localeCompare(product2.brand);  
  });  
  appendProducts(_products);  
}
```

```
function orderByModel() {  
  _products.sort((product1, product2) => {  
    return product1.model.localeCompare(product2.model);  
  });  
  appendProducts(_products);  
}
```

```
function orderByPrice() {  
  _products.sort((product1, product2) => {  
    return product1.price - product2.price;  
  });  
  appendProducts(_products);  
}
```

.SORT & ARROW FUNCTIONS
INSIDE FUNCTIONS DECLARATIONS

```
function search(value) {  
    value = value.toLowerCase();  
    let filteredTeachers = [];  
    for (let teacher of teachers) {  
        let name = teacher.name.toLowerCase();  
        if (name.includes(value)) {  
            filteredTeachers.push(teacher);  
        }  
    }  
    appendTeachers(filteredTeachers);  
}
```

FOR OF LOOP

.FILTER & ARROW FUNCTION

```
function search(value) {  
    let searchValue = value.toLowerCase();  
    let filteredTeachers = _teachers.filter(teacher => teacher.title.rendered.toLowerCase().includes(searchValue));  
    appendTeachers(filteredTeachers);  
}
```

Destructuring

1.7. Destructuring

What: Extract what we need from an existing array or object.

Why: Makes it easy to extract only what we need from an existing array or object.

Objects

```
const teacher = {
  name: "Morten",
  email: "moab@eaaa.dk"
};

//choose name and email
const { name, email } = teacher;
//name: "Morten"
//email: "moab@eaaa.dk"
```

Arrays

```
const teachers = ["Rasmus", "Morten", "Dan"];

//choose two names
const [mrFrontend, mrWebComponents] = teachers;
//mrFrontend: "Rasmus"
//mrWebComponents: "Morten"
```

Spread Operator

1.6. Spread Operator

What: Allow us to expand and copy existing objects and arrays into another object or array.

Why: Efficient expansion and a simplified syntax to concatenate strings, objects and arrays.

Spread an array:

```
const numbersOne = [1, 2, 3];
const numbersTwo = [4, 5, 6];
const numbersCombined = [...numbersOne, ...numbersTwo];
```

```
const array1 = [1,2,3];
const array2 = [...array1, 4, 5]; // [1,2,3,4,5]
```

Copy arrays without reference using the spread operator:

```
const ar1 = [1,2,3];
const copy = [...ar1]; // [1,2,3]
```

Split strings:

Modules, Import & Export

1.8. Modules, import & export

What: A module is just a script file. One is script or one file is one module. We use the keywords `export` and `import` to tell what we would like to export from one script and import in another script.

Why: Gives structure and easier to maintain a codebase. As our app grows, we want to split our code in multiple files instead of one long script file. Also, it makes it easier to work with components.

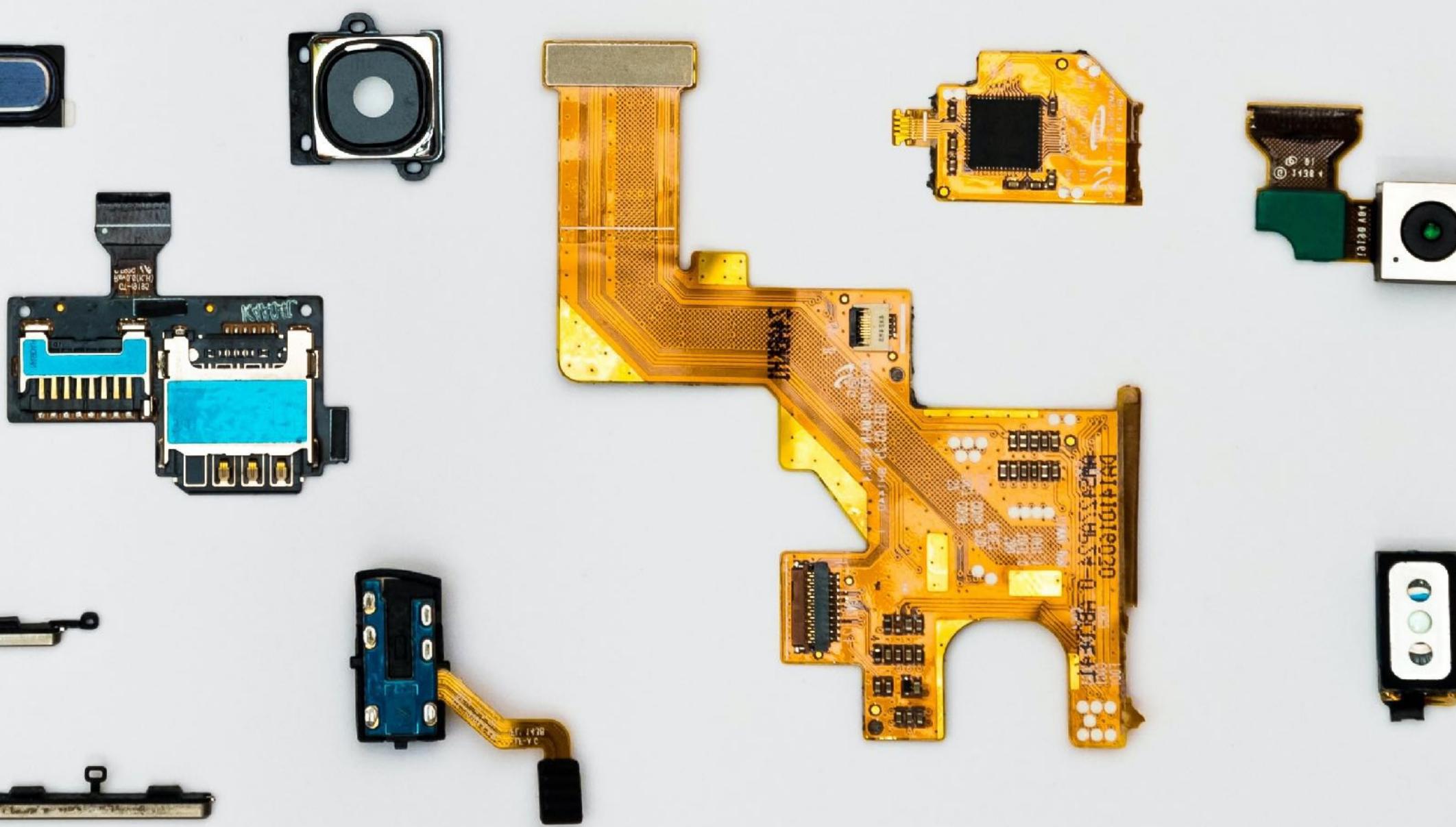
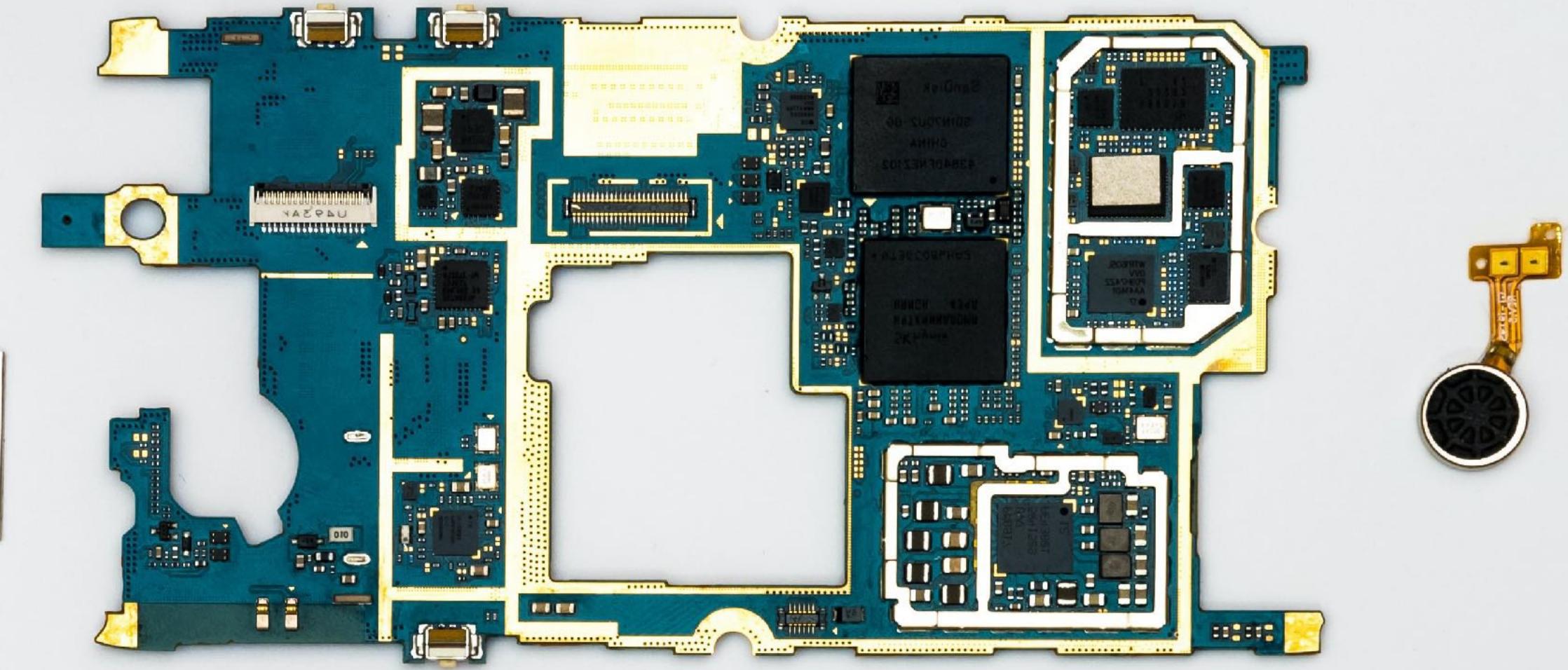
Export and import a const:

```
// 📄 user.js
```

```
export const user = {  
  name: "Jane"  
  age: 29  
};
```

```
// 📄 app.js
```

```
import { user } from "user.js";  
  
console.log(user);
```



Modules

A module is just a file
(or a script).

One script is one
module.

```
// └─ sayHi.js
export function sayHi(user) {
  alert(`Hello, ${user}!`);
}
```

A MODULE (SCRIPT)

```
// └─ main.js
import {sayHi} from './sayHi.js';
alert(sayHi); // function...
sayHi('John'); // Hello, John!
```

ANOTHER MODULE

(SCRIPT)

MODULES

As our application grows bigger, we want to split it into multiple files, so called “modules”. A module may contain a class or a library of functions for a specific purpose.

MODULES

Modules can load each other and use special directives
export and import to interchange functionality, call
functions of one module from another one ...

EXPORT => IMPORT

export keyword labels variables and functions that should be accessible from outside the current module.

import allows to import functionality from other modules.

```
// └─ sayHi.js
export function sayHi(user) {
  alert(`Hello, ${user}!`);
}
```

A MODULE (SCRIPT)

```
// └─ main.js
import {sayHi} from './sayHi.js';
alert(sayHi); // function...
sayHi('John'); // Hello, John!
```

ANOTHER MODULE

(SCRIPT)

```
// 📁 user.js
class User { // just add "default"
  constructor(name) {
    this.name = name;
  }
}
export default User;
```

```
// 📁 main.js
import User from './user.js'; // not {User}, just User
new User('John');
```

```
// 📁 user.js
export default class User { // just add "default"
  constructor(name) {
    this.name = name;
  }
}
```

```
// 📁 main.js
import User from './user.js'; // not {User}, just User
new User('John');
```

```
JS main.js ... JS user.js ...
1 import User from "./user.js";
2
3 const users = [
4   new User("Birgitte", "bki@mail.dk", "1966-01-14", "https://www.eaaa"),
5   new User("Martin", "mnor@mail.dk", "1989-05-02", "https://media-expo"),
6   new User("Rasmus", "race@mail.dk", "1990-09-15", "https://www.eaaa")
7 ];
8
9 console.log(users);
10
11 for (const user of users) {
12   document.querySelector("#content").innerHTML += user.getHtmlTemplate();
13 }
```

```
JS user.js ...
1 export default class User {
2   constructor(name, mail, birthDate, img) {
3     this.name = name;
4     this.mail = mail;
5     this.birthDate = birthDate;
6     this.img = img;
7   }
8
9   log() {
10    console.log(`Name: ${this.name}, Mail: ${this.mail}, Birth date: ${this.birthDate}, Image Url: ${this.img}`);
11  }
12
13   getAge() {
14     const birthDate = new Date(this.birthDate);
15     const today = new Date();
16     const diff = new Date(today - birthDate);
17     return diff.getFullYear() - 1970;
18   }
19
20   getHtmlTemplate() {
21     const template = /*html*/
22       `<article>
23         
24         <h2>${this.name}</h2>
25         <a href="mailto:${this.mail}">${this.mail}</a>
26         <p>Birth date: ${this.birthDate}</p>
27         <p>Age: ${this.getAge()} years old</p>
28       </article>
29     `;
30   }
31 }
32
33 
```

TELL THE BROWSER IT'S A MODULE

```
<script src="js/main.js" type="module"></script>
```

Exercises



OBJECT TEACHERS EXERCISE

The screenshot shows a web browser window with the title "TEACHERS". The address bar indicates the URL is 127.0.0.1:5500/object-teachers/index.html. The browser is set to an iPhone 6/7/8 view with a width of 375 and a height of 667, at 98% zoom, and is connected to an online network.

The main content area displays a mobile application interface. At the top, it says "TEACHERS". Below that is a portrait of a woman with blonde hair, identified as Birgitte Kirk Iversen, a Senior Lecturer, with an email link: bki@baaa.dk. Below her profile is another partial portrait of a man.

The browser's developer tools are open on the right side. The "Console" tab is active, showing the following log entries:

- ▶ Object main.js:52
- ▶ Object main.js:53
- ▶ Object main.js:54
- ▶ Object main.js:55
- Live reload enabled. index.html:49

OBJECT TEACHERS

Create a grid view with your new teachers.

1. Make a copy of the project-template folder and save it in your own dev library. Rename the project to object-techers-grid.
2. Create two variables, teacher1 & teacher2, containing a teacher object with properties (name, position, department, address, mail & phone):
 - 2.1. BKI: <https://www.baaa.dk/contact/find-employee/employee/birgitte-kirk-iversen>
 - 2.2. RACE: <https://www.baaa.dk/contact/find-employee/employee/rasmus-cederdorff>
3. Append the data from the teacher objects to the DOM (display them in the HTML page).
4. Add at least two new objects. The objects must consist of data about teachers:
 - 4.1. PETJ: <https://www.baaa.dk/contact/find-employee/employee/per-thykjaer-jensen>
 - 4.2. JDS: <https://www.baaa.dk/contact/find-employee/employee/jeffrey-david-serio>
5. Append the data from the teacher objects to the DOM (display them in the HTML page).
6. Make sure to display all the properties: position, department, address, mail & phone
7. Add styling and display the teachers nicely in a grid.
8. Add an image property to every teacher object and display it in the DOM.

ARRAY TEACHERS

- Make a copy of your local project object-teachers and rename to array-teachers
- Modify the structure of your script (your JavaScript), in order to use an array and a loop to display your teachers:
 - Define an array and add the object to the array.
 - Test and debug the array using `console.log`
 - Use a `for` of loop to loop through the array and display the teachers (append to the DOM).
 - Add another teacher object and test.

FAMILY MEMBERS

- Use the project-template. Copy the project into your own dev folder and rename family-members.
- If needed, get inspired by the project template called array-family-members-template
- Declare a new array called familyMembers.
- Use push (...) to add at least four person objects (family members) to the array.
- The person object must consist of the properties name, age & relation. Add more properties if you like.
- Make use of .length & pop () and tryout other array methods.
- Loop through familyMembers and append the data to the DOM (your HTML page).
- Loop through familyMembers and log persons older than 32 years (add a condition).

FAMILY MEMBERS

- Extra:
 - Implement search functionality.
 - Implement a form and a function to add new family members to the array.
 - Make sure you display the new added family member.

FAMILY MEMBERS 2

- Make use of your new knowledge about backtick strings, arrays and functions.
- Customise the previously exercise about family members.
- Get inspired by the project template called `array-family-members-template`
- Create a function called `appendFamilyMembers()` looping through `familyMembers` and appending the properties from each object to the DOM (your HTML page). Make use of the backtick string to create your HTML template. Remember to call your function.
- Create another function that loops through `familyMembers` and log persons older than 32 years (add a condition). Remember to call your function.
- Extra: Create a button to handle the above filter function and append the new filtered `familyMembers` to the DOM.

ARRAY TEACHERS 2

- Make use of your new knowledge about backtick strings, arrays and functions.
- Customise the exercise about teachers by using:
 - an array to define and hold the teacher objects
 - a function to loop through the array of teachers and append the teachers to the DOM (your HTML page).
 - the backtick string to create your HTML template defining the HTML of the teacher.
- Create another function that loops through the teachers array and logs all teachers with the position === "Senior Lecturer"
- Extra: Create buttons to handle *show* and *hide* Lectures and Senior Lecturers (filter by teacher.position).

EXERCISE

TEACHER AND/OR FAMILY MEMBER

- Make it possible to add a new teacher or family member (a new object).
- Get inspired by the code examples in the slides.
- Add a form with input fields and a save button.
- Implement a function called `createTeacher()` or `createFamilyMember()`.
- Make use of `push()` inside the function to add a new object to the array.
- Add an `eventListener` (`onclick event`) to the save button - must call `createTeacher()` or `createFamilyMember()`.
- Make sure the create function appends the new object data to the DOM (your HTML file).

EXERCISE

TEACHER AND/OR FAMILY MEMBER

- Improvements:
 - Add search functionality: Add an input field to your `index.html` and implement a search function in your script.
 - Add edit functionality
 - Add delete functionality
- JSON & Fetch (+++):
 - Create a JSON file consisting of an array of `teachers` or `familyMembers`.
 - Make use of `fetch (...)` to fetch the data from the JSON file and append it to the DOM.
- JSON: https://www.w3schools.com/js/js_json_intro.asp
- FETCH: <https://javascript.info/fetch> or <https://scrimba.com/scrim/cVye2ztW>

JSON & FETCH FAMILY MEMBERS

- With the exercise about family members on your mind:
- Explore the `fetch-family-members-template` and use it as your code base.
- Define your own family members as json in `json/persons.json`
- Add at least 3 JSON objects with at least 5 properties (`name`, `age`, `hairColor`, `relation`, `img`)
- Make use of `fetch()` to get the data from the JSON file in to your JavaScript.
- Append the data from the JSON file to your HTML file by using JavaScript.
- Add more properties like `birthDate`, `height`, `email`, etc. and make sure to display them in your HTML page.
- Extra: Use `async` & `await` to implement `fetch()`

SINGLE PAGE WEB APP TEMP | Products | +

127.0.0.1:5501/spa-products-fetch-json-enhanced/index.html

PRODUCTS

Order by: Choose here ▾

Show out of stock

Search



MacBook Pro 13"

Apple

Price: 11799 kr.

Status: outOfStock

[EDIT](#) [DELETE](#)



MacBook Pro 15"

Apple

Price: 21499 kr.

Status: inStock

[EDIT](#) [DELETE](#)



Zenbook 14"

ASUS

Price: 8099 kr.

Status: outOfStock

[EDIT](#) [DELETE](#)



Unknown Product

Apple

Price: 11799 kr.

Status: outOfStock

[EDIT](#) [DELETE](#)



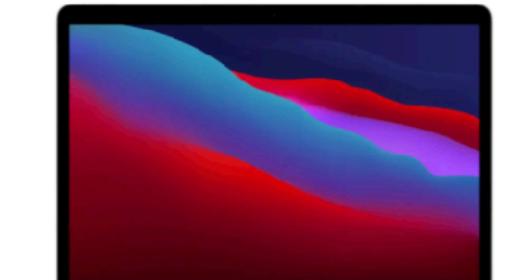
Zenbook 14"

ASUS

Price: 8099 kr.

Status: outOfStock

[EDIT](#) [DELETE](#)



Unknown Product

Apple

Price: 11799 kr.

Status: outOfStock

[EDIT](#) [DELETE](#)

PRODUCTS ADD PRODUCT

PRODUCT WEB APP

- Make a copy of the project template *spa-products-template* and paste it into your own code library.
- Declare an array with at least three product objects with the following properties: model, brand, price & img
- Implement a function that appends the products to the DOM
- Implement a form and a function to create new products
- Implement search functionality

PRODUCT WEB APP (EXTRA)

- Project template: spa-products-template
- Use your knowledge about JavaScript and SPA to build a web app.
- Declare a new array with at least 4 products. The product objects must have the following properties: model, brand, price, img and status
- Two of your products must have the status `outOfStock` and two `inStock`.
- The img should just be an URL to an image like: https://store.storeimages.cdn-apple.com/4668/as-images.apple.com/is_mbp13touch-space-select-201807?wid=904&hei=840&fmt=jpeg&qlt=80&op_usm=0.5,0.5&.v=1529520060550
- Display all products by appending the products to the PRODUCTS page.
- Another tab/page with a form to add new products.
- Customise and style your app.
- Add functionality to filter and/or sort by the status. You could add an input checkbox to show and hide `outofStock` products.
- Add functionality to handle edit and delete.

JSON & FETCH PRODUCTS

- With the exercises about family members and products on your mind:
- Copy and use the `spa-products-fetch-json-template` as your code base.
- Define products as json in `json/products.json`
- Add at least 4 JSON objects with the following properties: `model`, `brand`, `price`, `status` and `img`
- Make sure the products have a property called `status`. Two of your products must have the `status` “`outOfStock`” and two “`inStock`”.
- Use `fetch()` to get the data from the JSON file and append the products to your HTML page.
- Implement the add functionality.
- Implement the search functionality.
- Extra / advanced:
 - Add functionality to filter and/or sort by the `status`. You could add an input checkbox to show only products “`inStock`”. Make use of your knowledge about functions, loops, `filter`, etc.
 - Add functionality to handle edit and delete.
 - Customise and style your web app.



Code
Every
Day