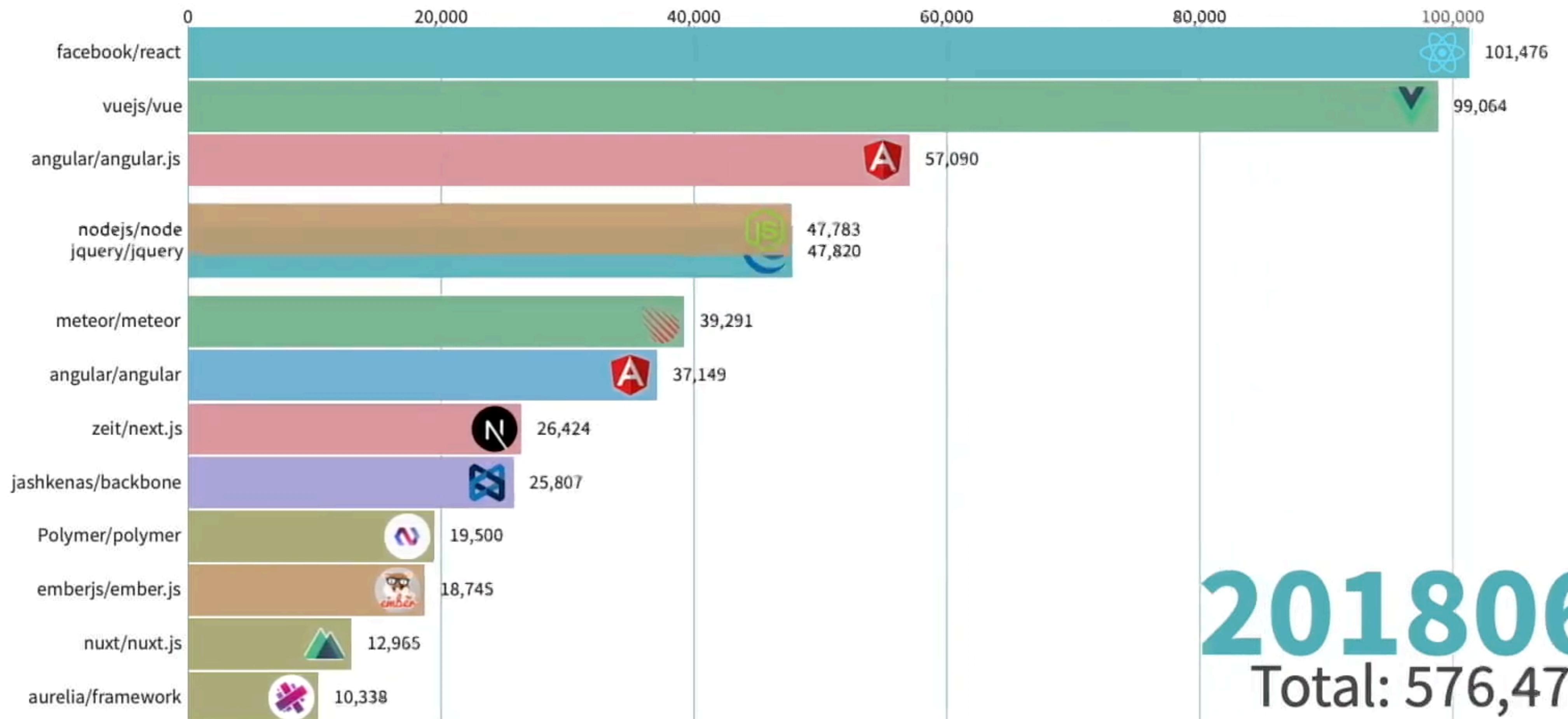
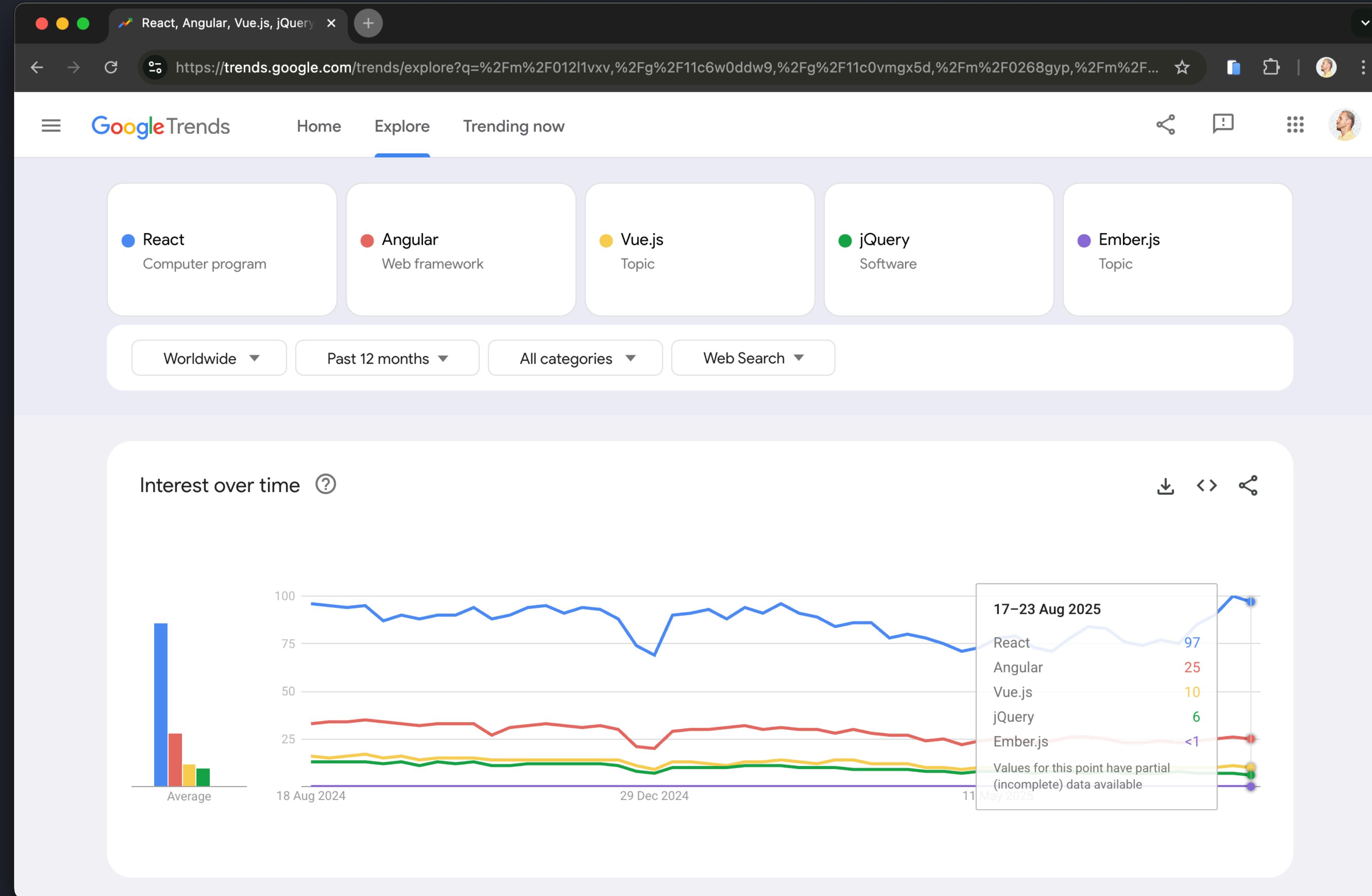


# Most popular JavaScript frameworks

2012 - 2019



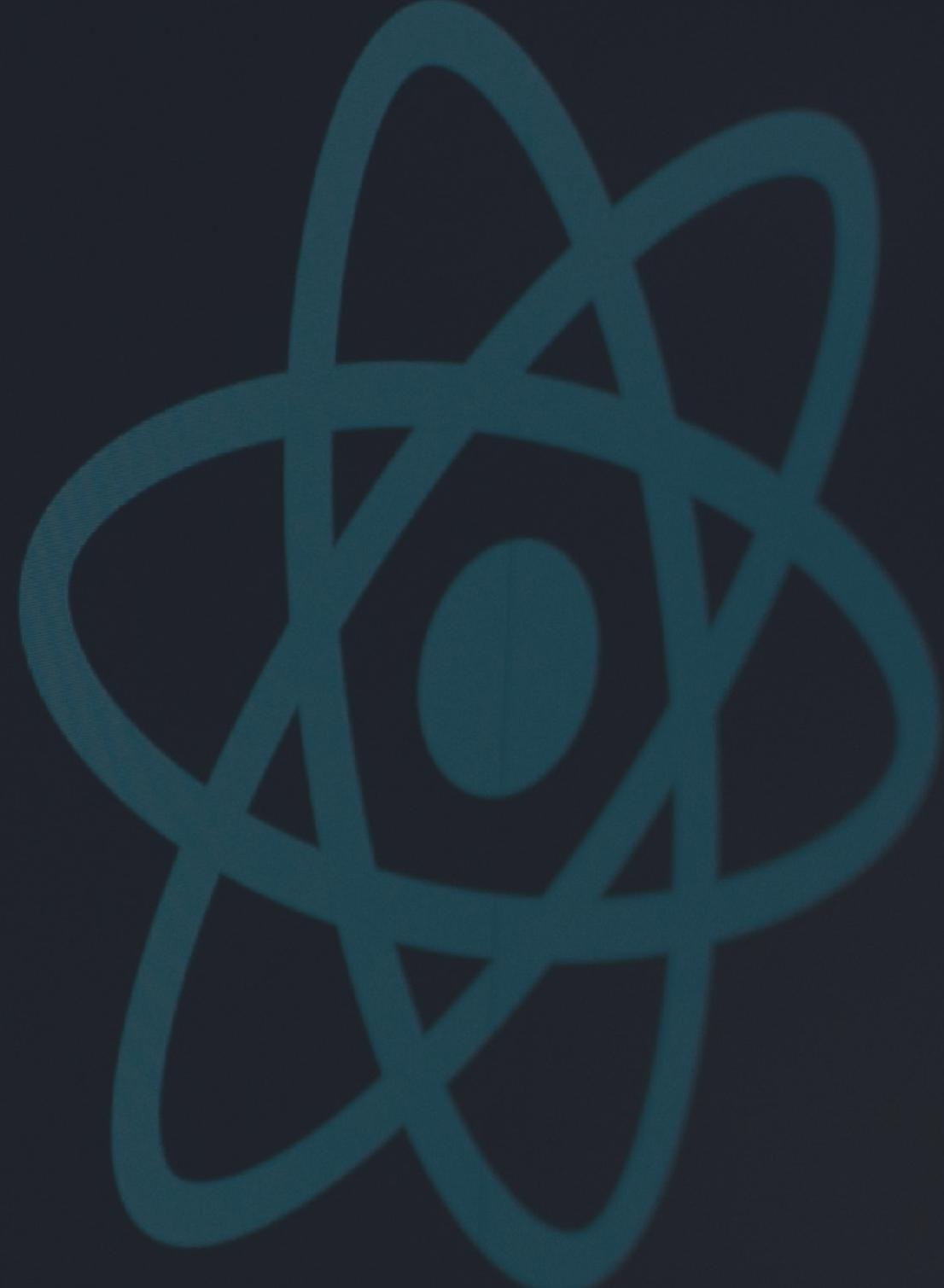
Source: GitHub Archive



Google Trends

# React

Frontend Programming



Edit `src/App.js` and save to reload  
Learn React

**JS**



<https://www.youtube.com/watch?v=cuHDQhDhvPE&t=81s>

“

The cool thing about JavaScript is  
that you can create stuff that will put  
a smile on your face, as a developer.

You can create stuff and it will  
visually look like something, and it'll  
do stuff, and it makes you feel good,  
it makes you fall in love with  
programming.

”

**Lex Fridman**  
Computer Scientist

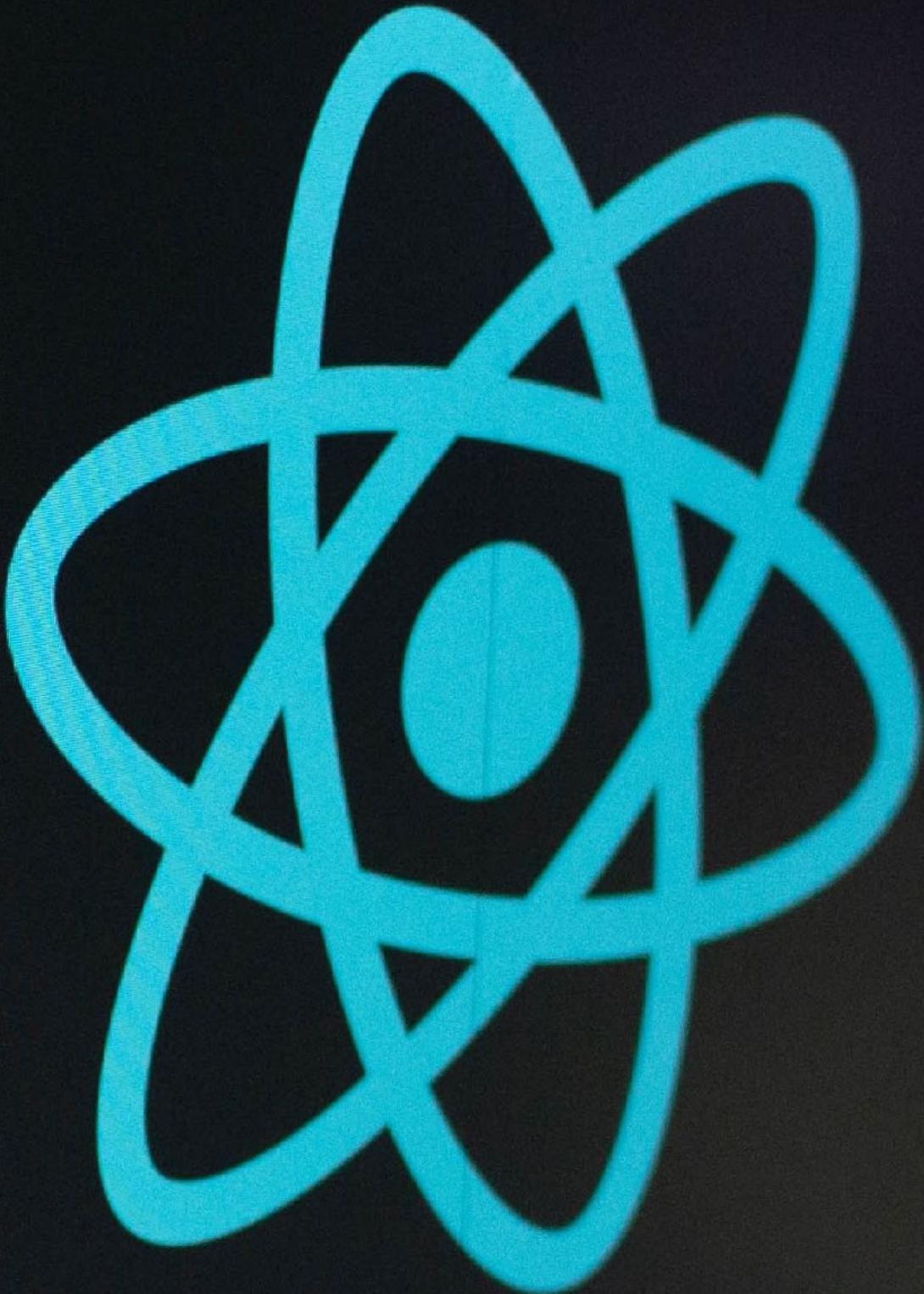
<https://www.youtube.com/watch?v=GLhyjVZp0cw&t=252s>



KEEP  
CALM  
&  
KEEP  
REACTING

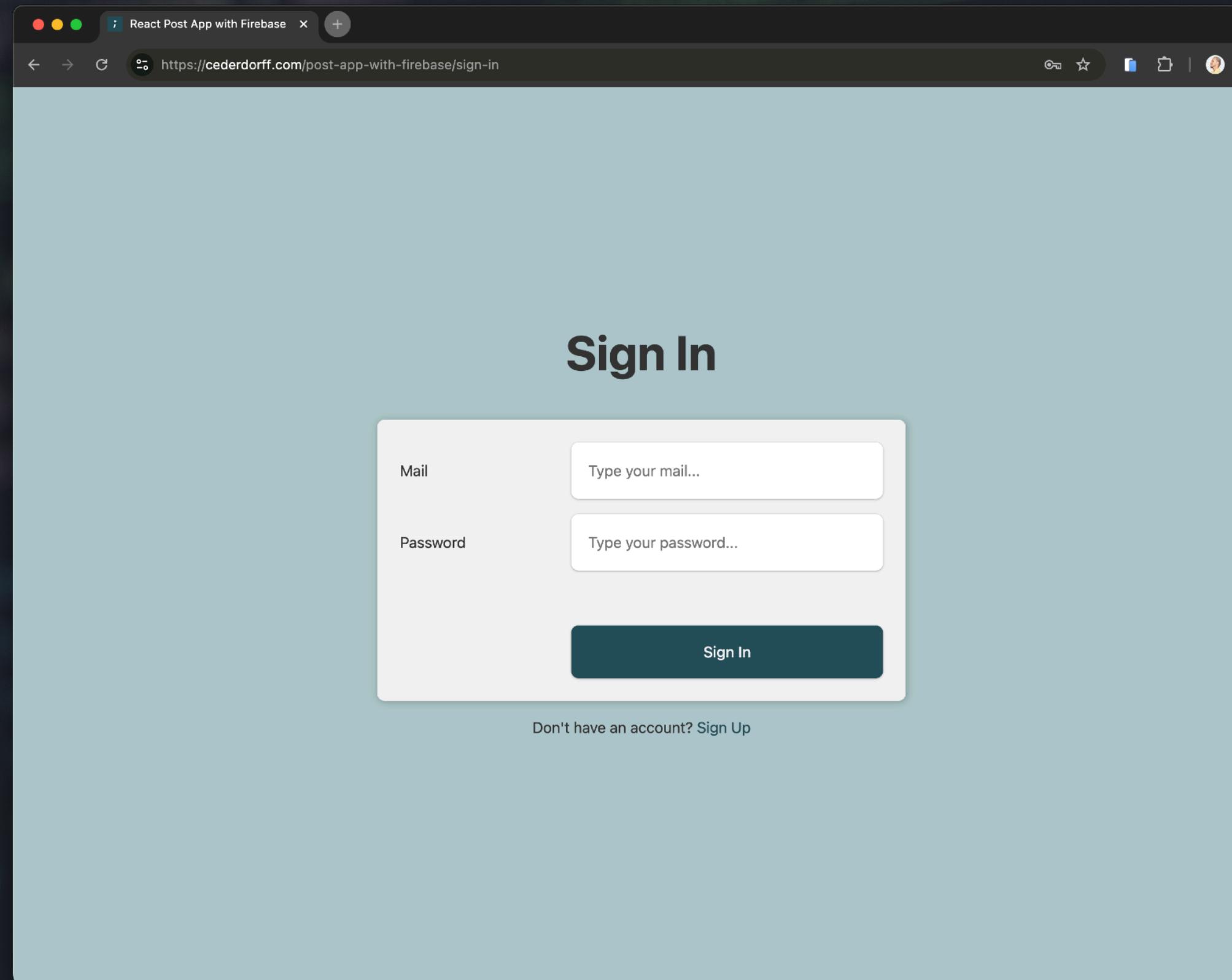
# Purpose

- Introduce you to React
- Gain an understanding of React Core Concepts.
- Hands-on with React and React CRUD SPA.



Edit src/App.js and save to reload  
Learn React

# React CRUD



The home page displays a header with three tabs: "HOME", "CREATE POST", and "PROFILE". Below the header is a search bar with a "Search" input field and a dropdown menu for "Sort by" set to "newest". The main content area shows a grid of six posts, each consisting of a user profile picture, the user's name, their title, a preview image, and a caption. The posts are arranged in two rows of three.

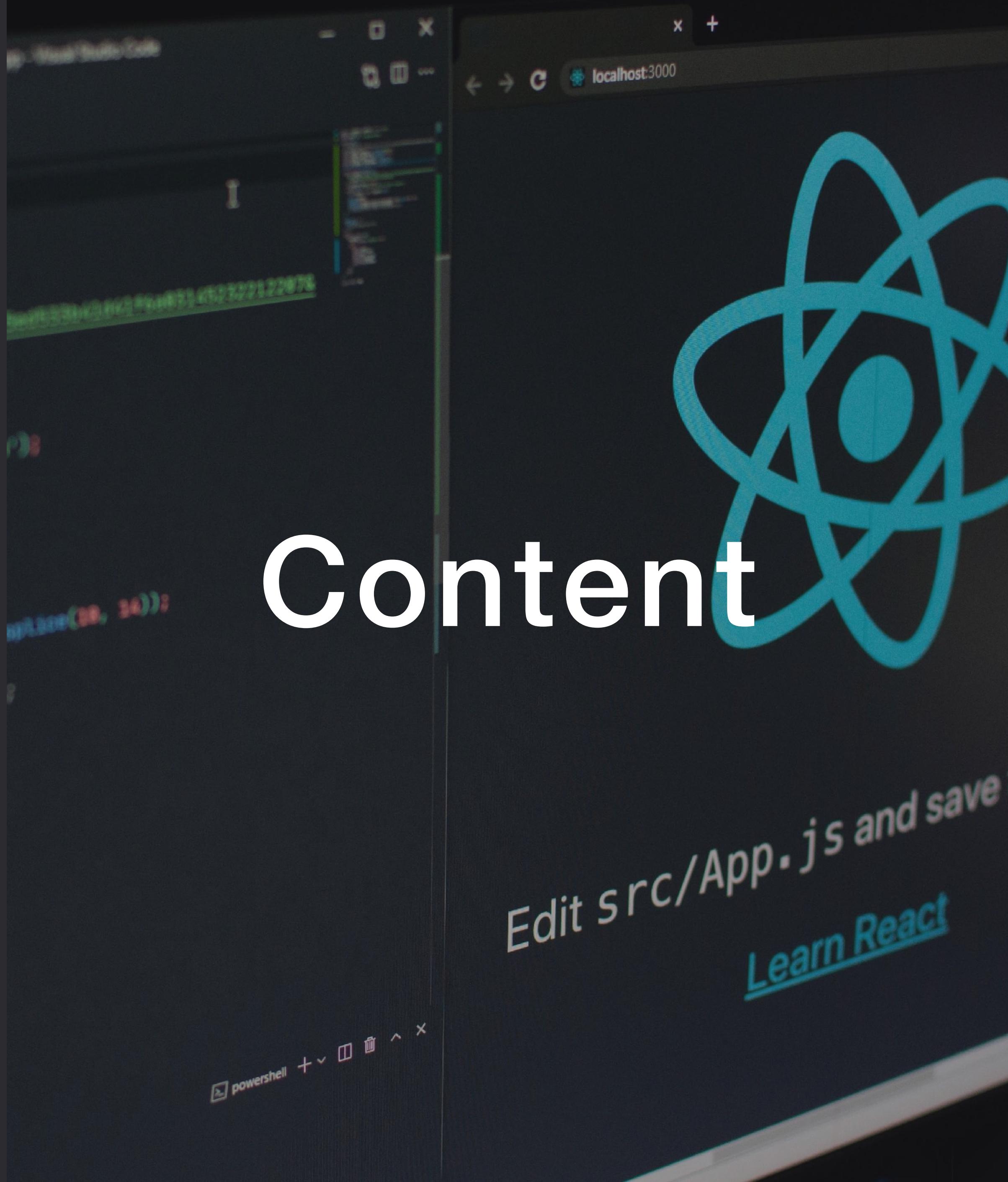
User	Caption
Line Skjødt Senior Lecturer & Internship Coordinator	Exploring the city center of Aarhus
Rasmus Cederdorff Senior Lecturer	Exploring the city streets of Aarhus
Dan Okkels Brendstrup Lecturer	A beautiful morning in Aarhus
Maria Louise Bendixen Senior Lecturer	Sunset over the lake
Maria Louise Bendixen Senior Lecturer	Path through the forest
Anne Kirketerp Head of Department	Food dish

<https://cederdorff.com/post-app-with-firebase>

# Good to know...

HTML & CSS Basics, CSS Layouts, Grids & Flexbox, Selectors  
Variables, Objects, Arrays, Loops, Functions, DOM-  
Manipulation, Template String, ES6+ Features, fetch, API,  
JSON, CRUD, Forms & Events

- What is React?
- The Core Concepts of React
  - Components
  - JSX
  - Props
  - React Hooks: useState & useEffect
- vite-react
- Web App
- Single Page Apps
- React Router
- React CRUD

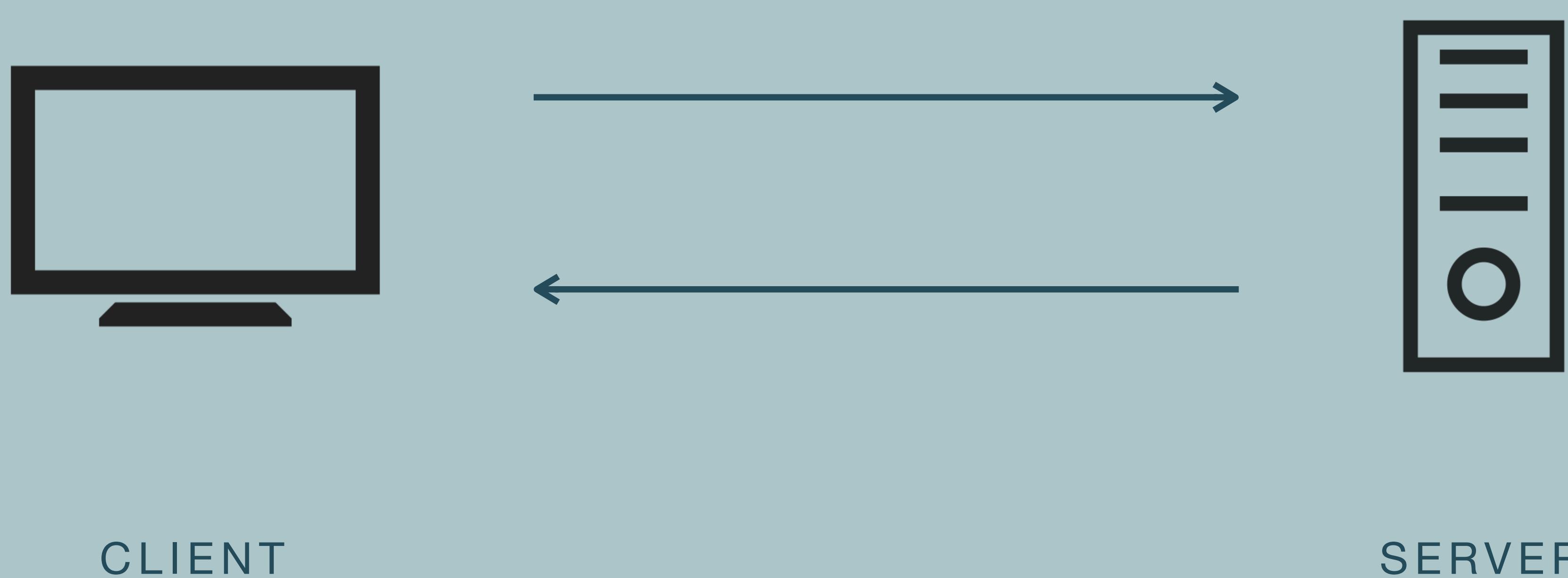


# Exercises

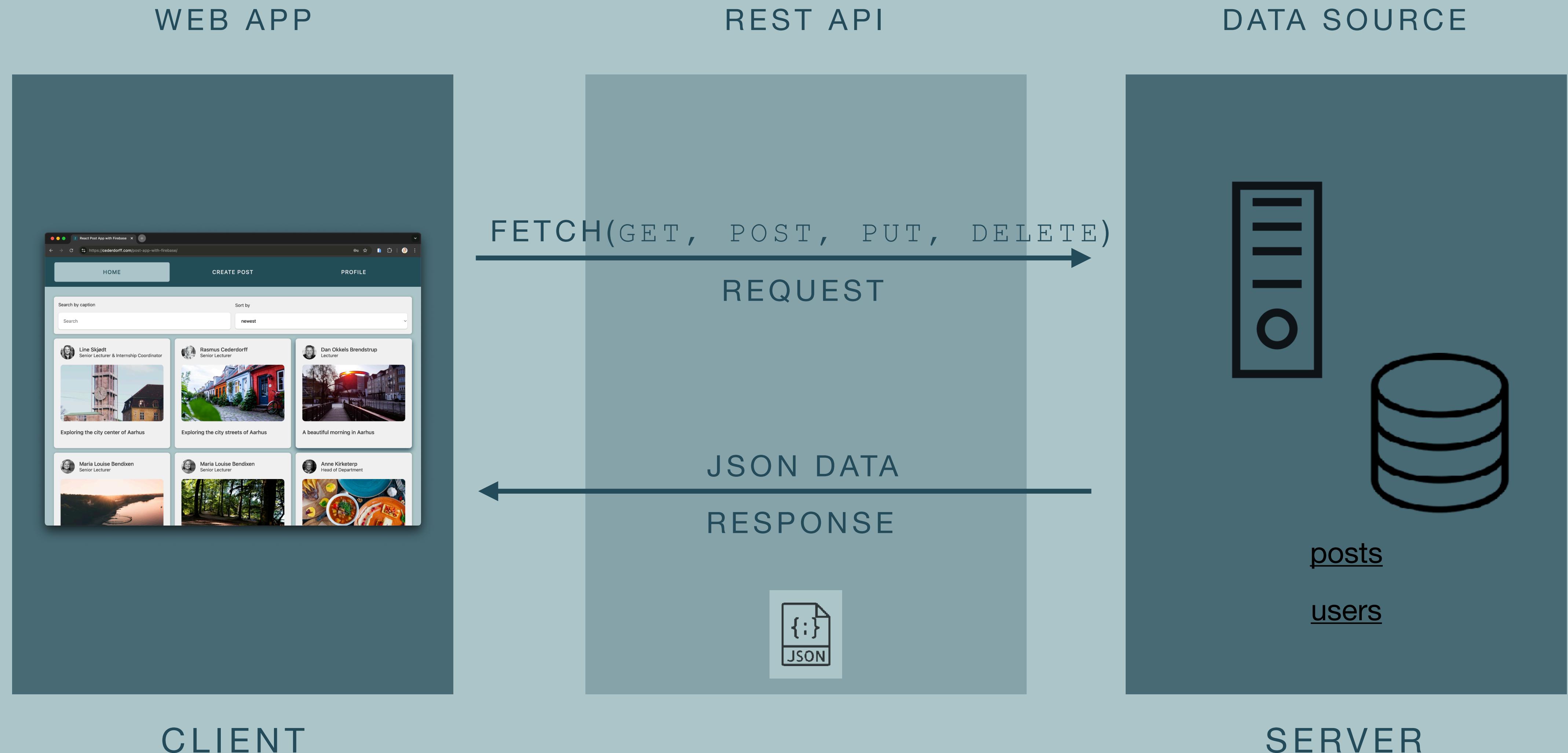
- Create React App
- [Your First React App](#)
- [Component Page Layout](#)
- [Add Props: Your First React App](#)
- [Add Props: Page Layout](#)
- [Tryout useState](#)
- [React Fetch Posts #1](#)
- [React Fetch Posts #2](#)
- [Download & install Node.js & npm](#)
- Canvas Users Case w/ React
- [Create React SPA](#)
- [React CRUD App w/ Firebase REST](#)
- [More React Practice](#)

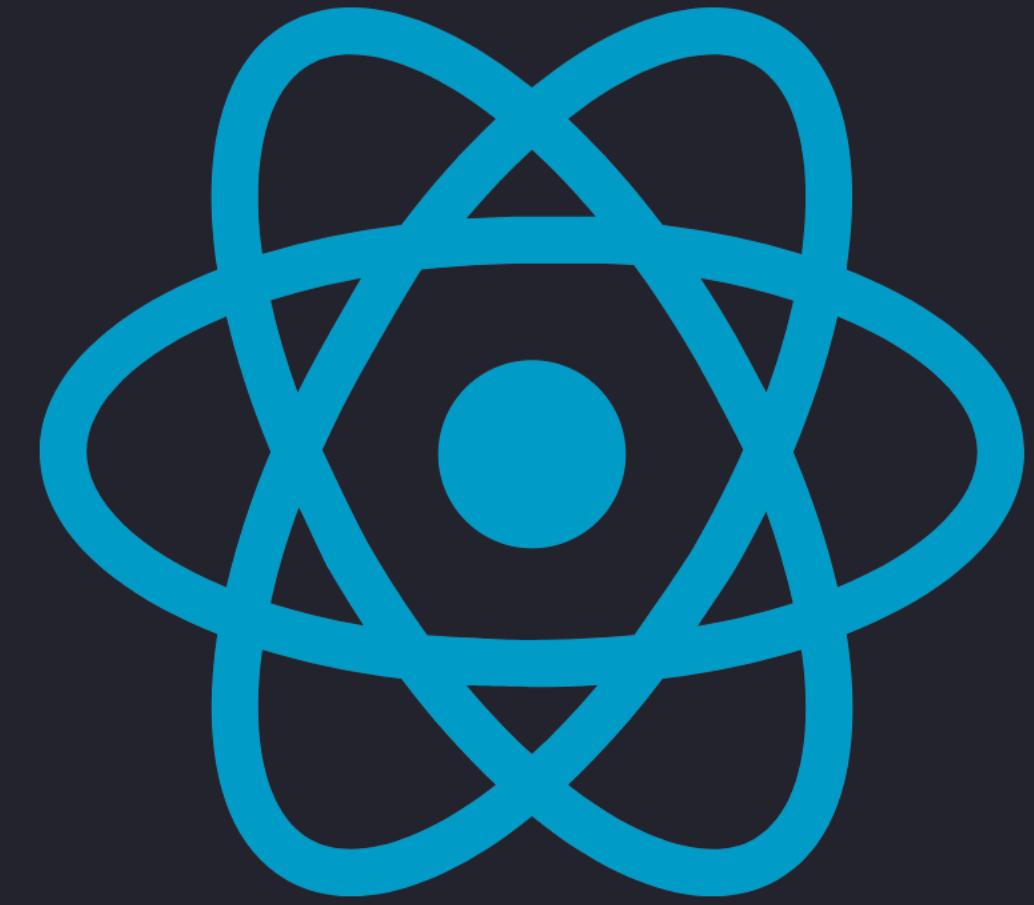
# Client-Server Model

... how to communicate with backend/ data source (server)



# Fetch, HTTP Request & Response



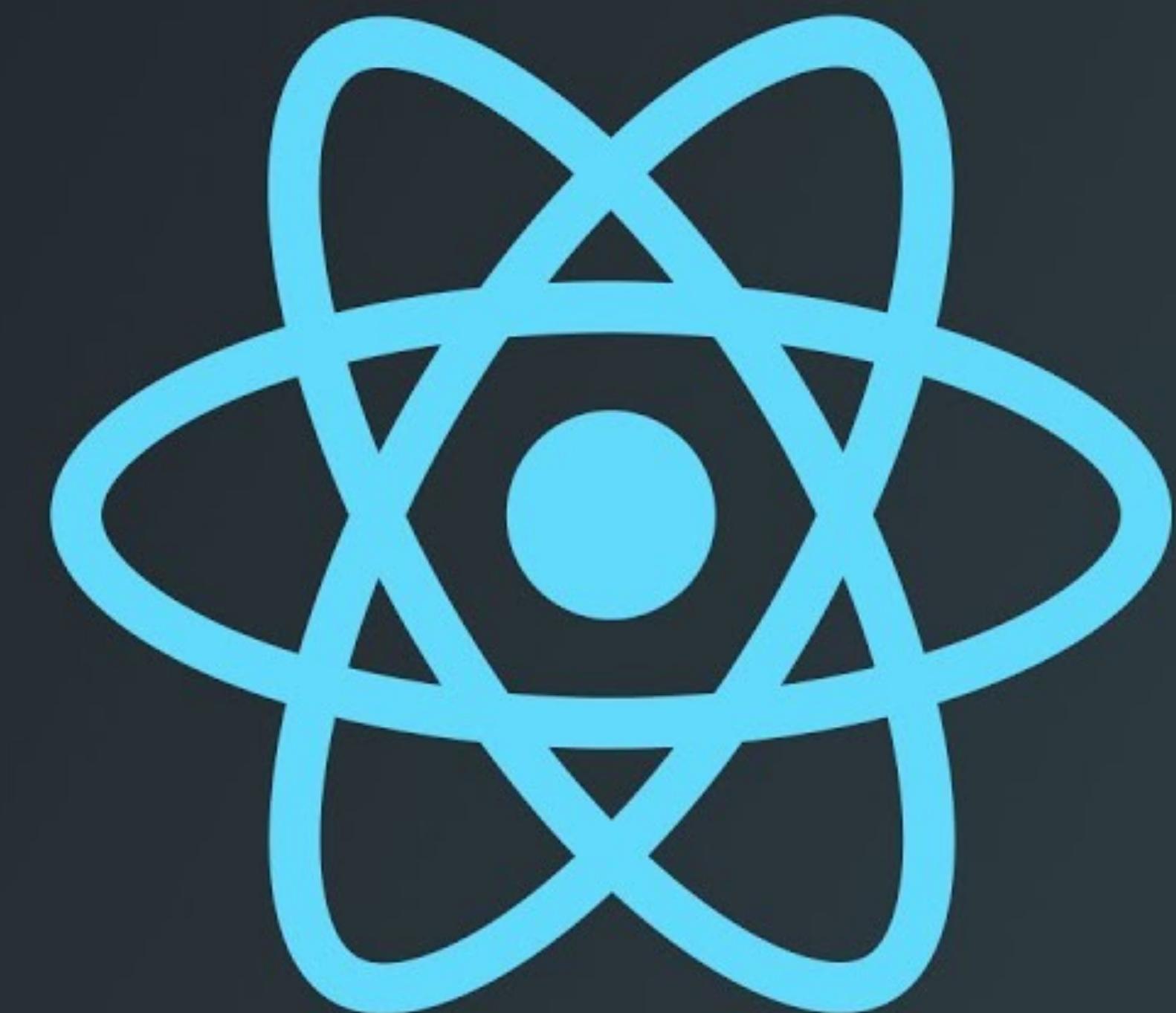


# React

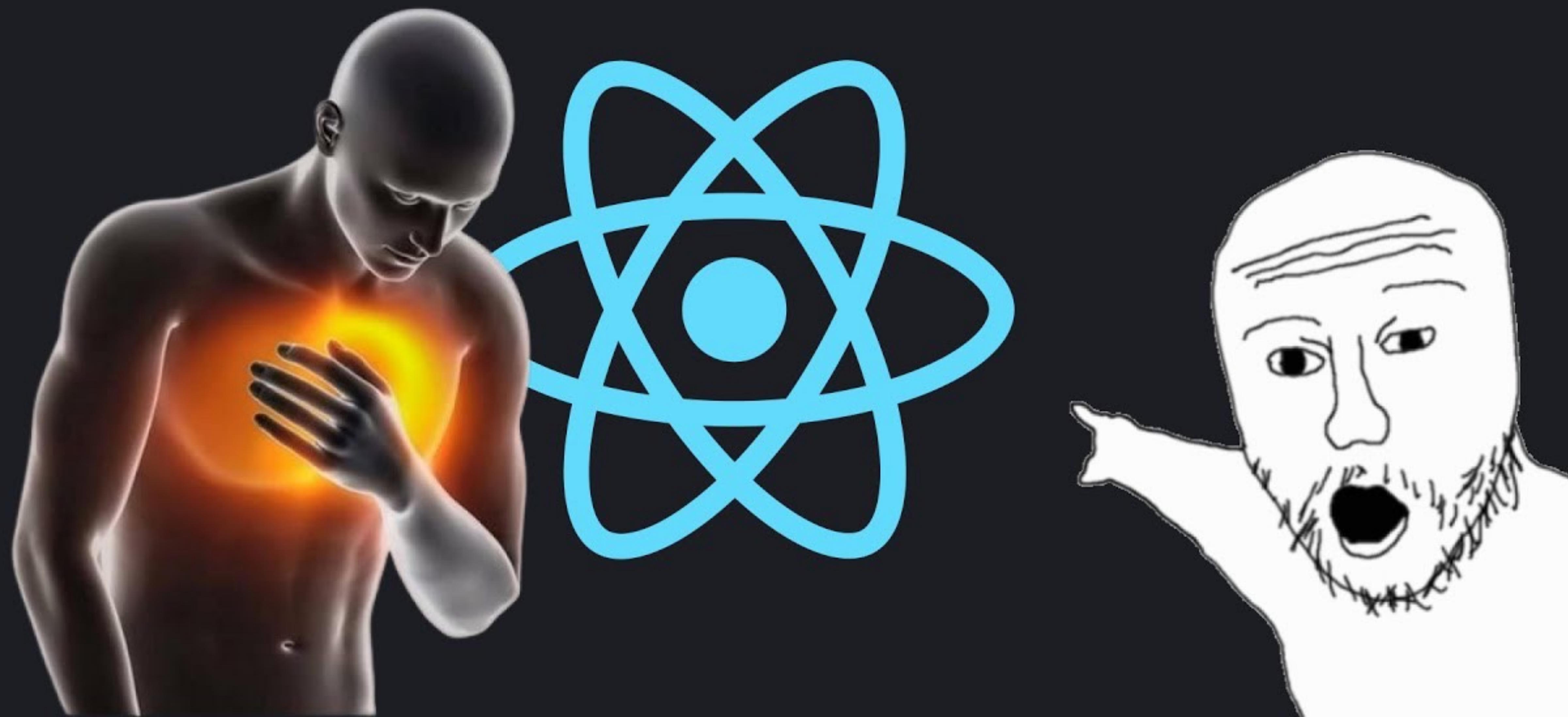
A JavaScript library for building User Interfaces

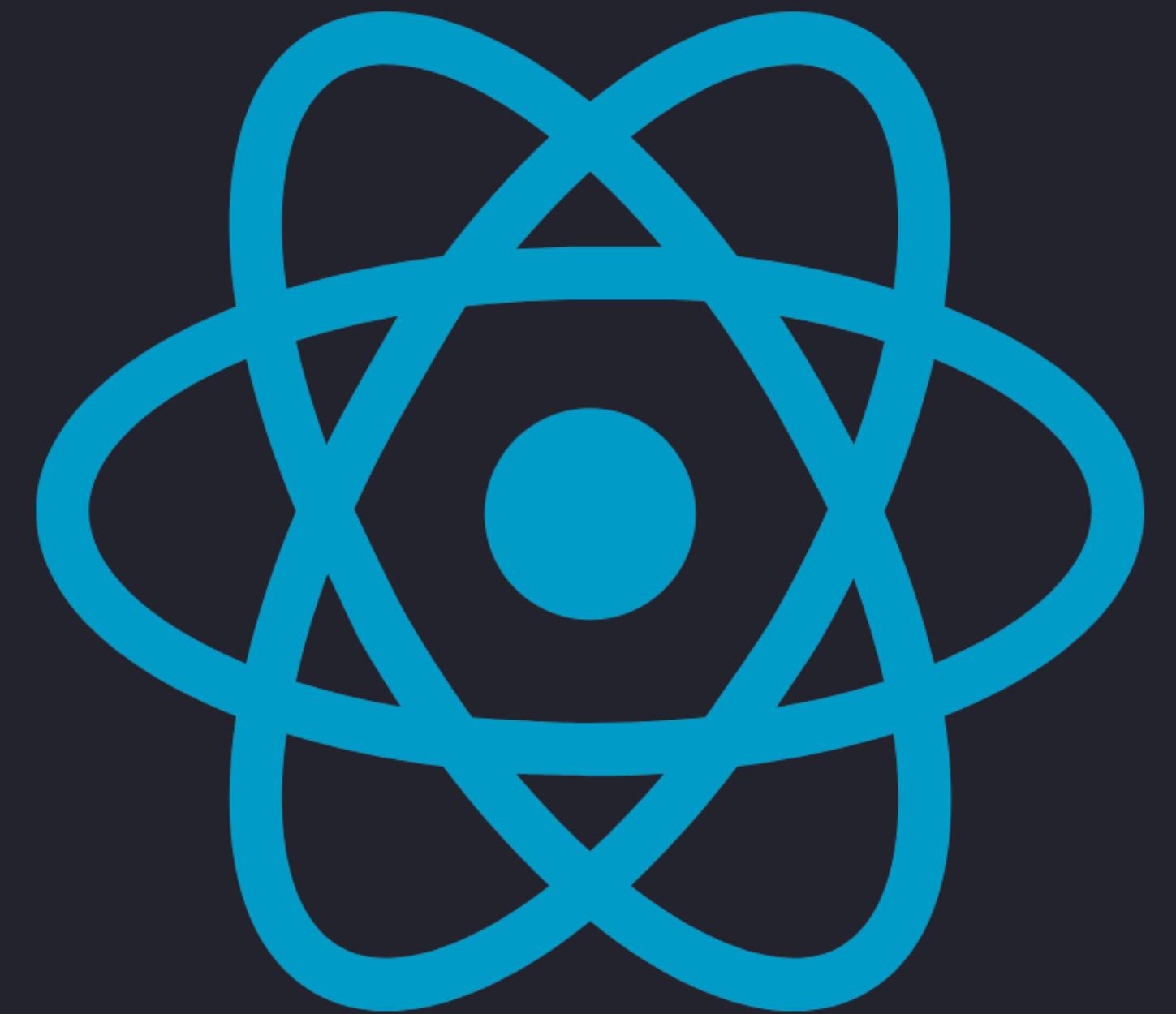
**100** *SECONDS OF*

---



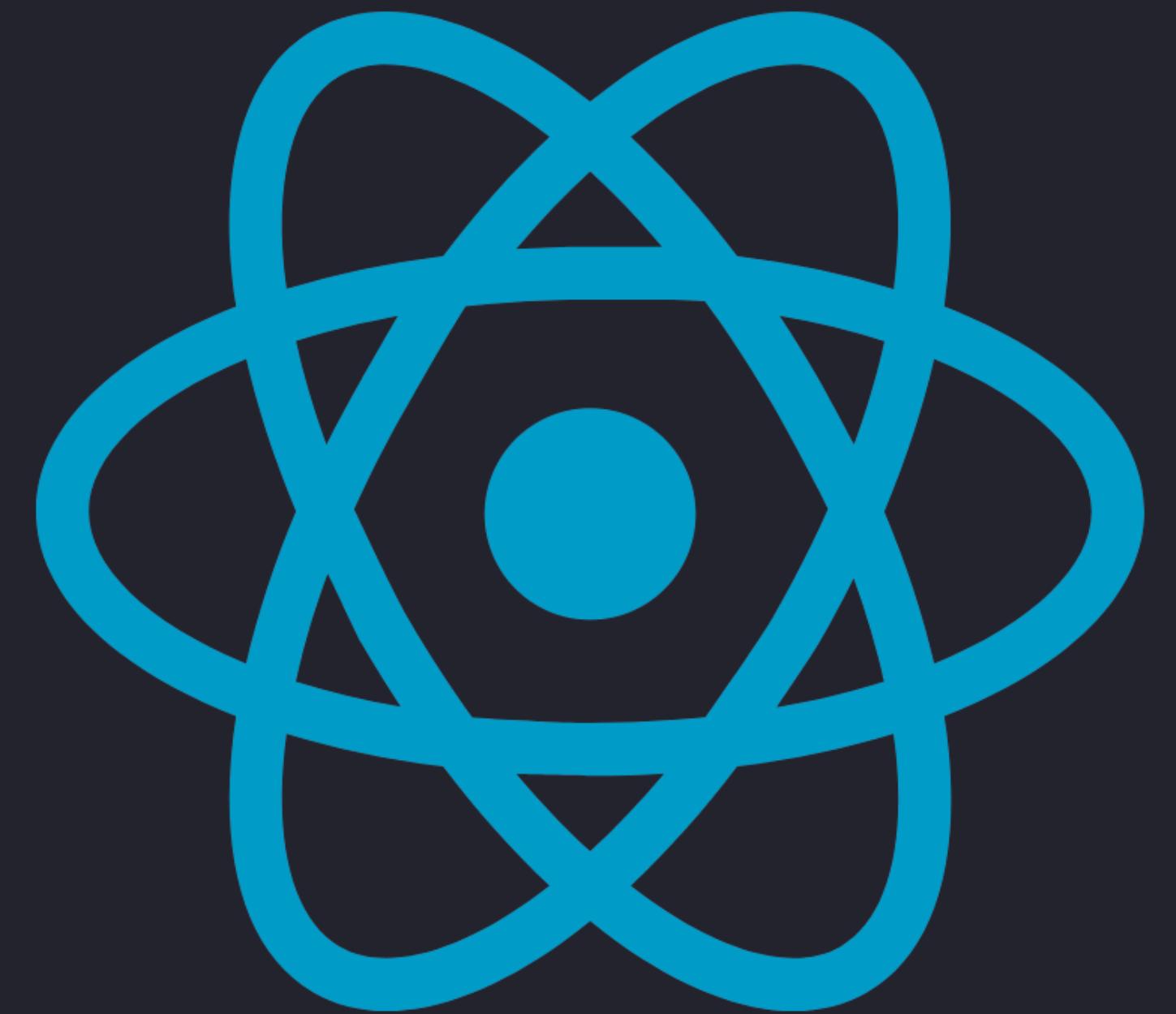
# 100 SECONDS OF





# What is React?

- A JavaScript library for building User Interfaces.
- It's a tool for creating reusable UI Components.
- State-based UI, Routing, Single Page Apps, Mobile, Server-side rendered apps, etc.

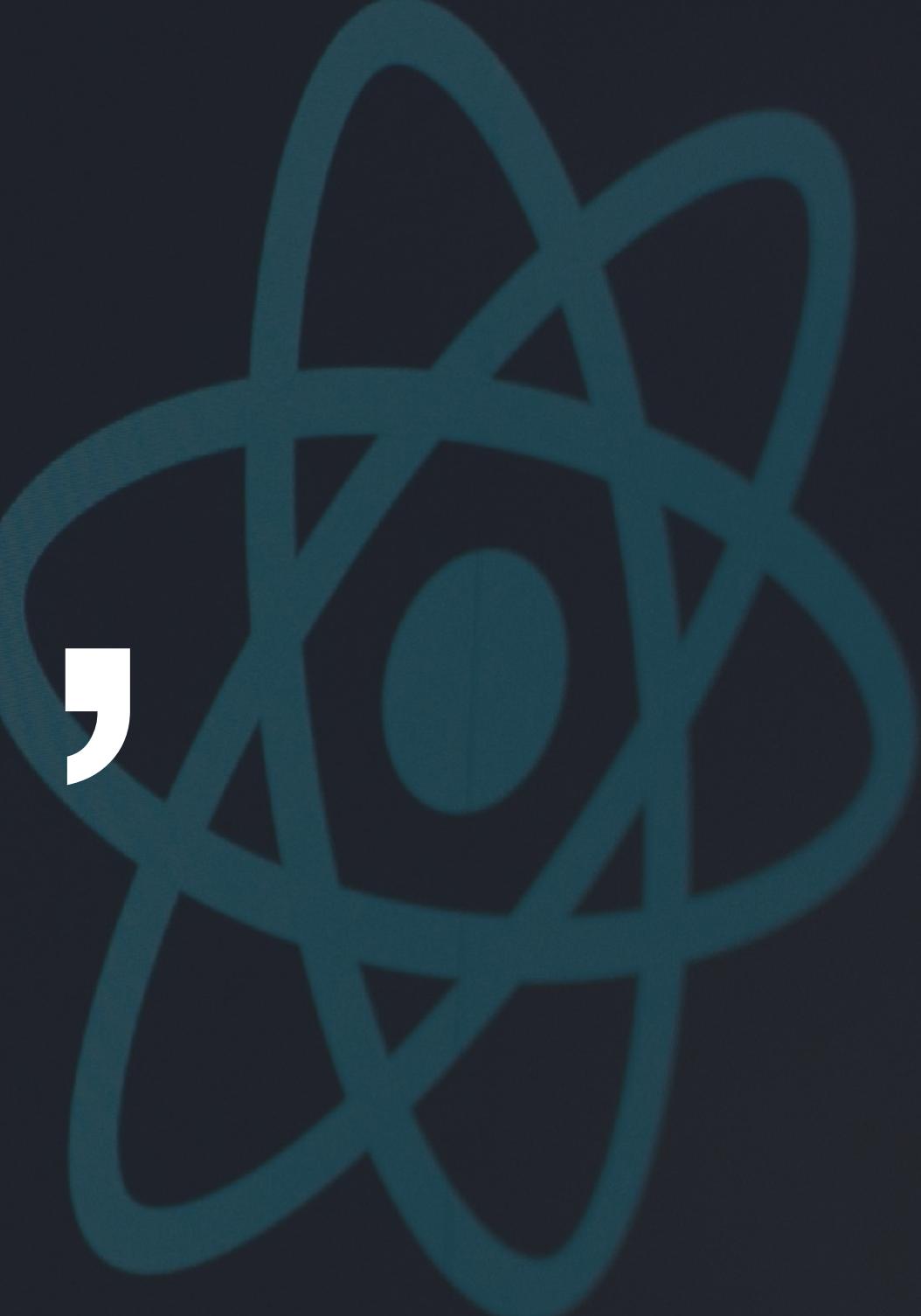


# Declarative Library

- Declarative: Describes what should be done, focusing on the desired outcome, with the system handling the implementation details (what to do).
- Imperative (the opposite): Specifies how to do something, providing step-by-step instructions, requiring manual management of implementation details (how to do it).
- React is declarative because it lets you describe what the UI should look like based on the data, instead of giving step-by-step instructions for rendering.

# Components, Props & States

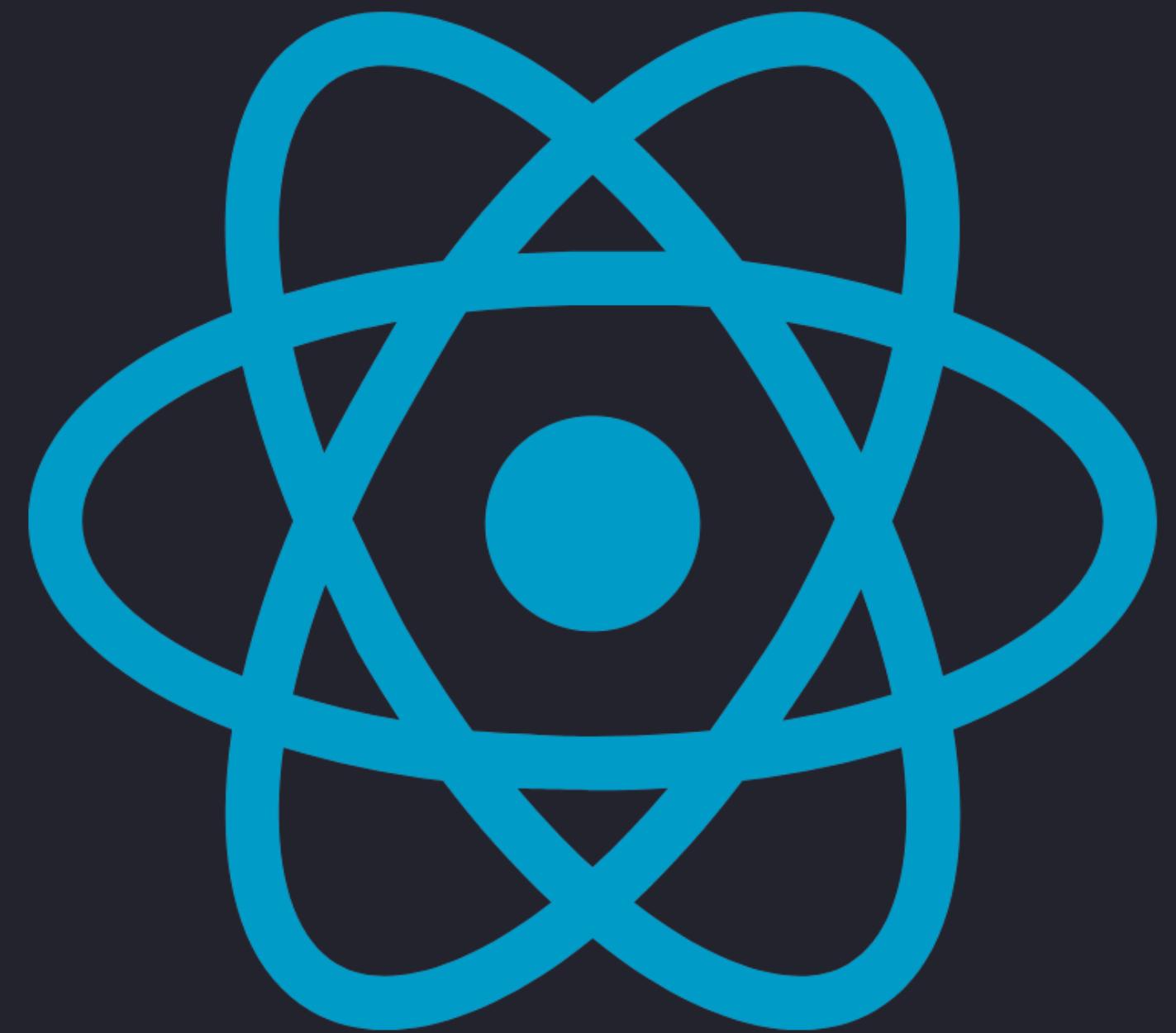
The Core Concepts of React



# Thinking in React

In React, UI is a **function** of **props & states**. The UI is built with (function) **Components**.

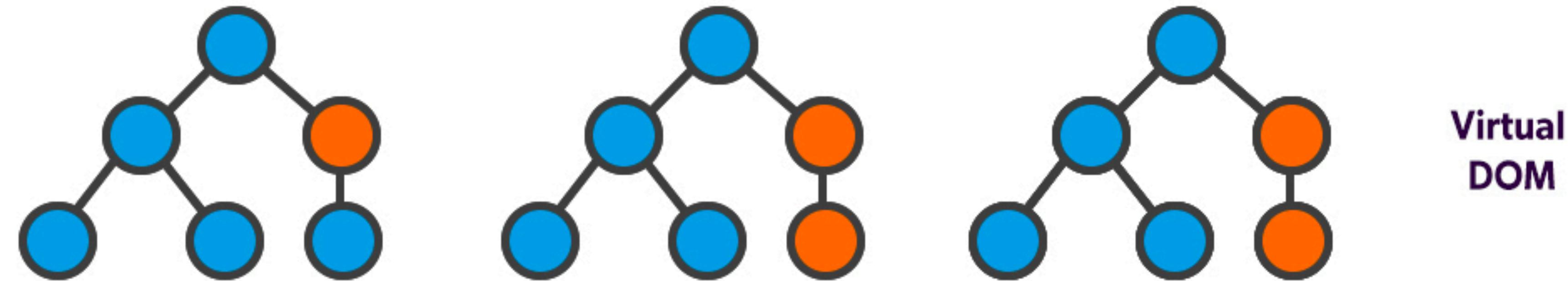
Edit src/App.js and save to reload  
Learn React



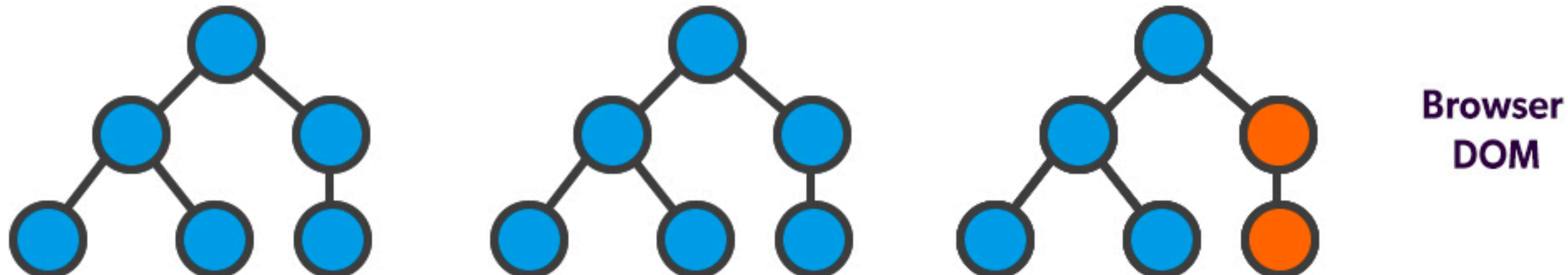
# But how?

- React creates a Virtual DOM instead of manipulating directly with the browser's DOM.
- React makes the changes in Virtual DOM and compares it to the browser DOM.
- Then React detects what's needs to be changed in the browser DOM and changes **only** what needs to be changed!

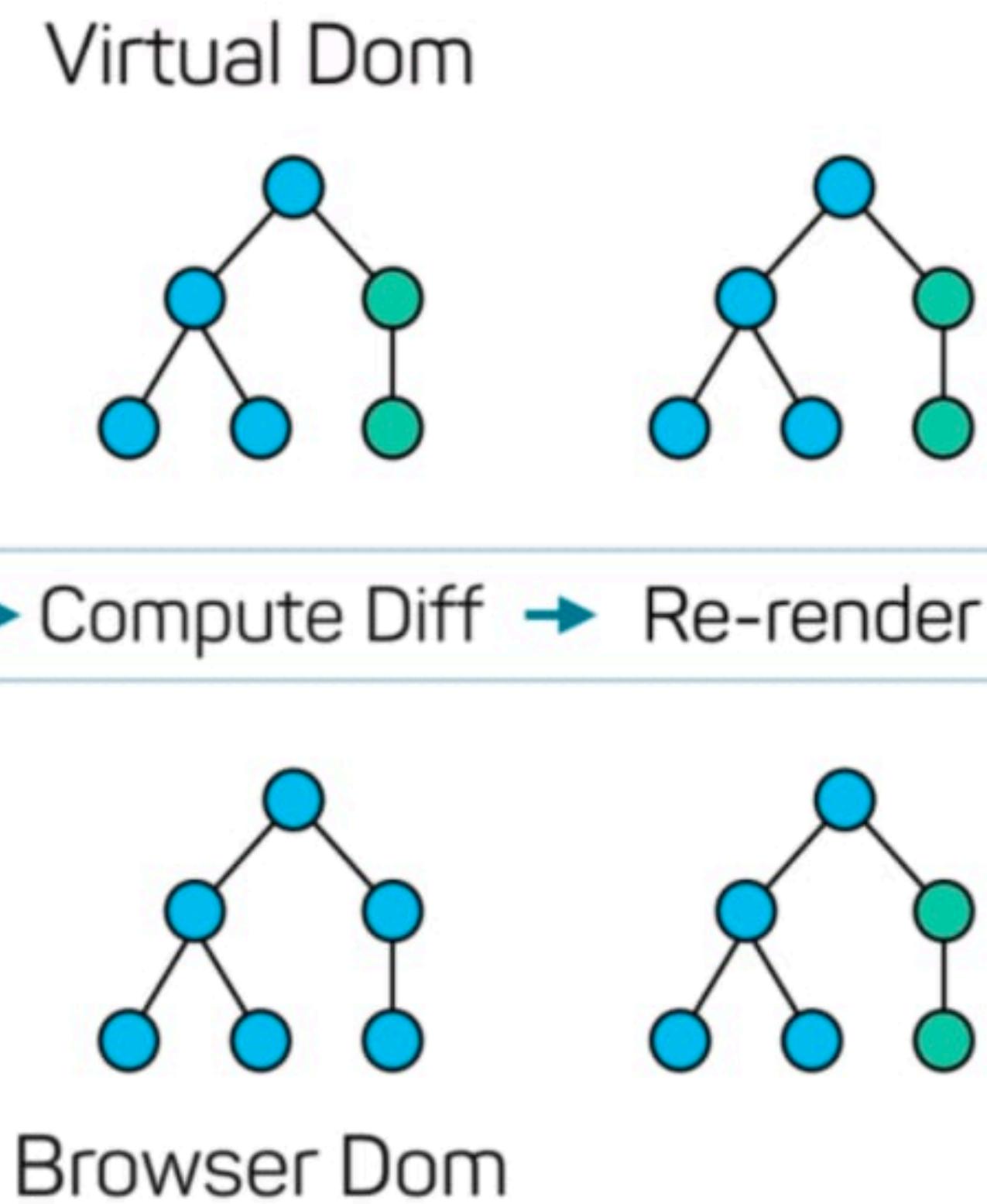
# React Virtual DOM



Statechange → Compute Diff → Re-render



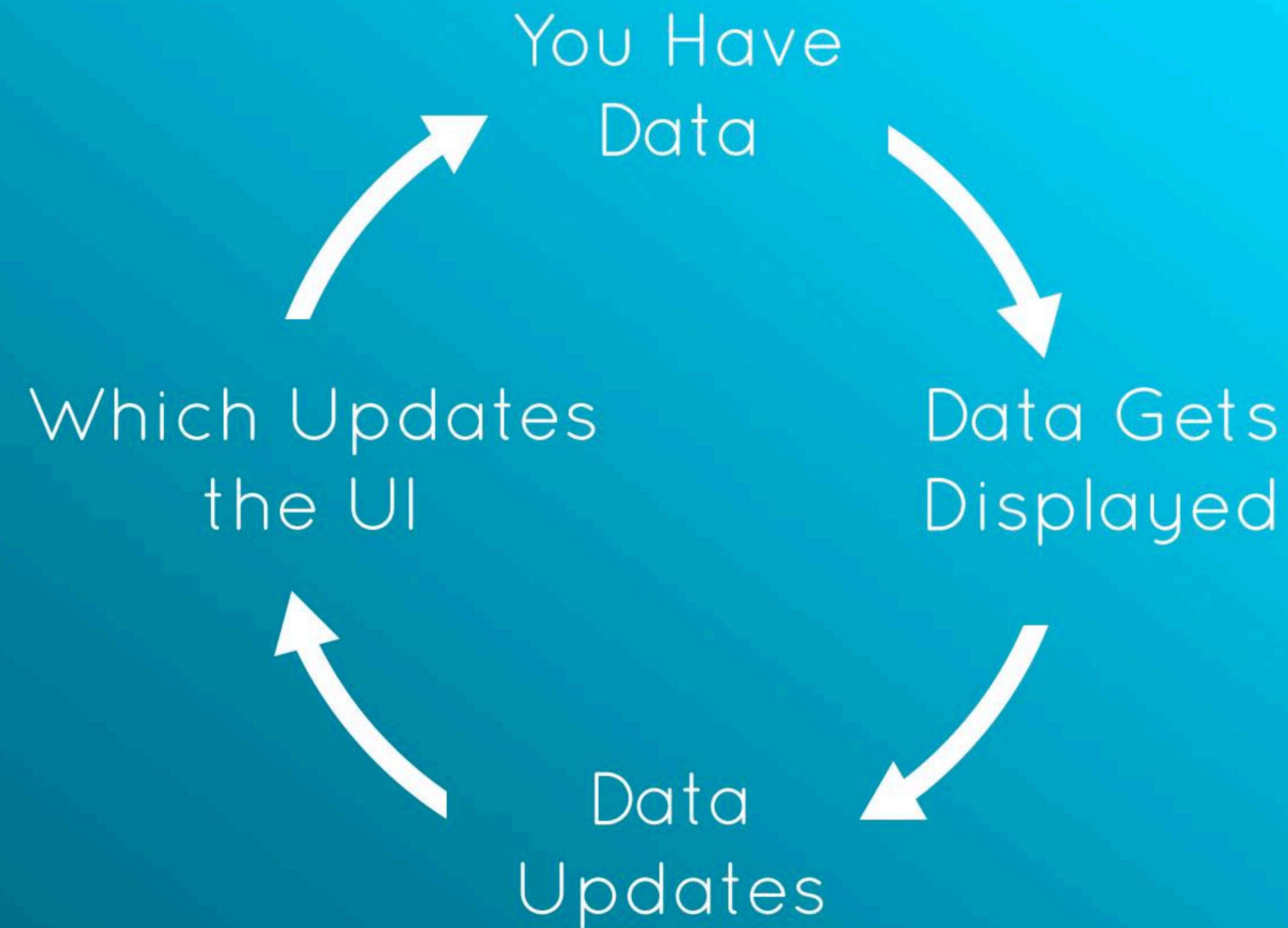
# React Virtual DOM



“The virtual DOM (VDOM) is a programming concept where an ideal, or “virtual”, representation of a UI is kept in memory and synced with the “real” DOM by a library such as ReactDOM.”

“You tell React what state you want the UI to be in, and it makes sure the DOM matches that state. This abstracts out the attribute manipulation, event handling, and manual DOM updating [...].”

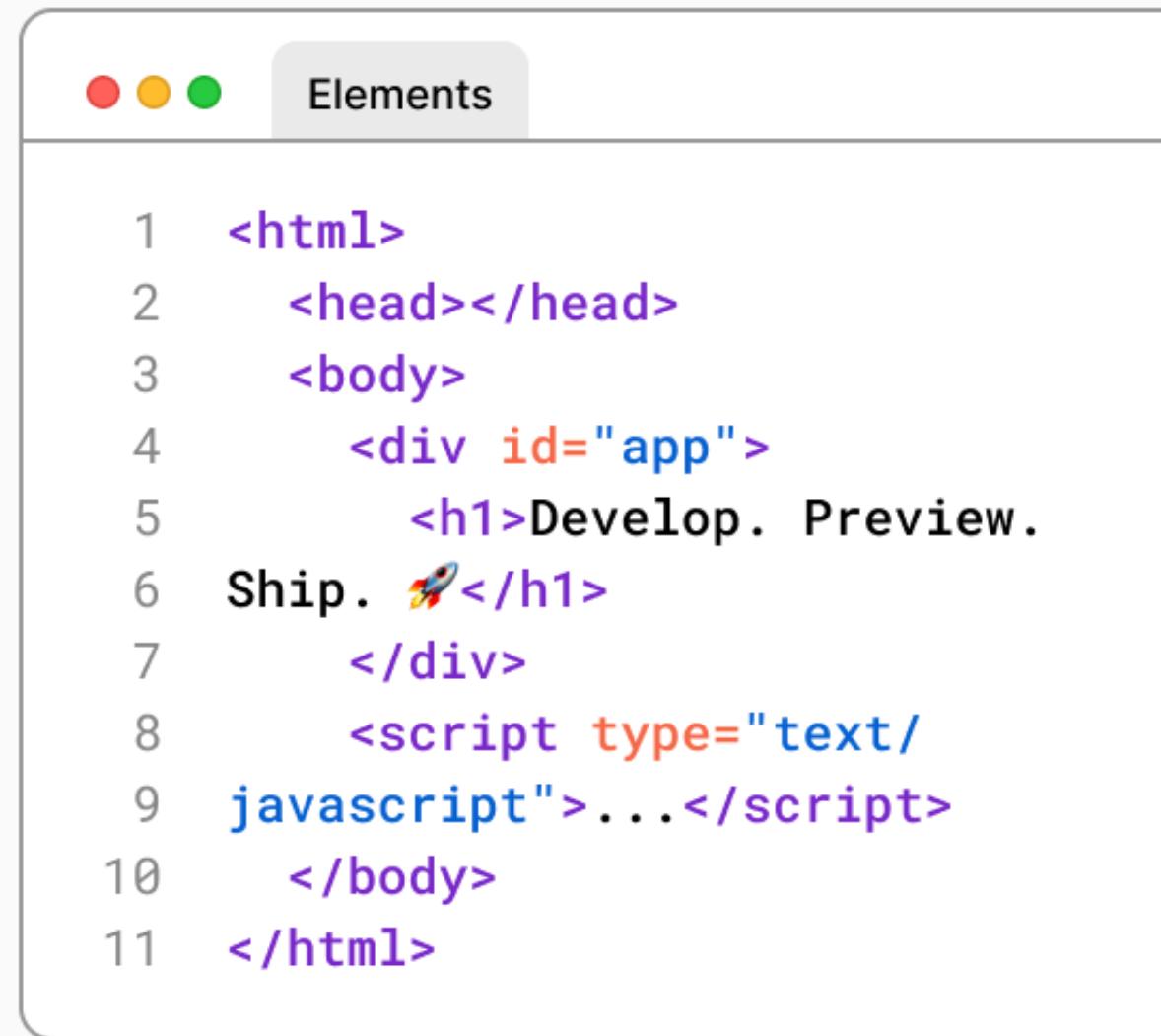
# The React UI Cycle



This happens AUTOMATICALLY  
once you define components

# HTML vs the DOM

DOM



The DOM tree visualization shows the following structure:

- <html>
- <head></head>
- <body>
- <div id="app">
- <h1>Develop. Preview.  
Ship. 🚀</h1>
- </div>
- <script type="text/javascript">...</script>
- </body>
- </html>

Line numbers 1 through 11 are shown on the left.

SOURCE CODE (HTML)

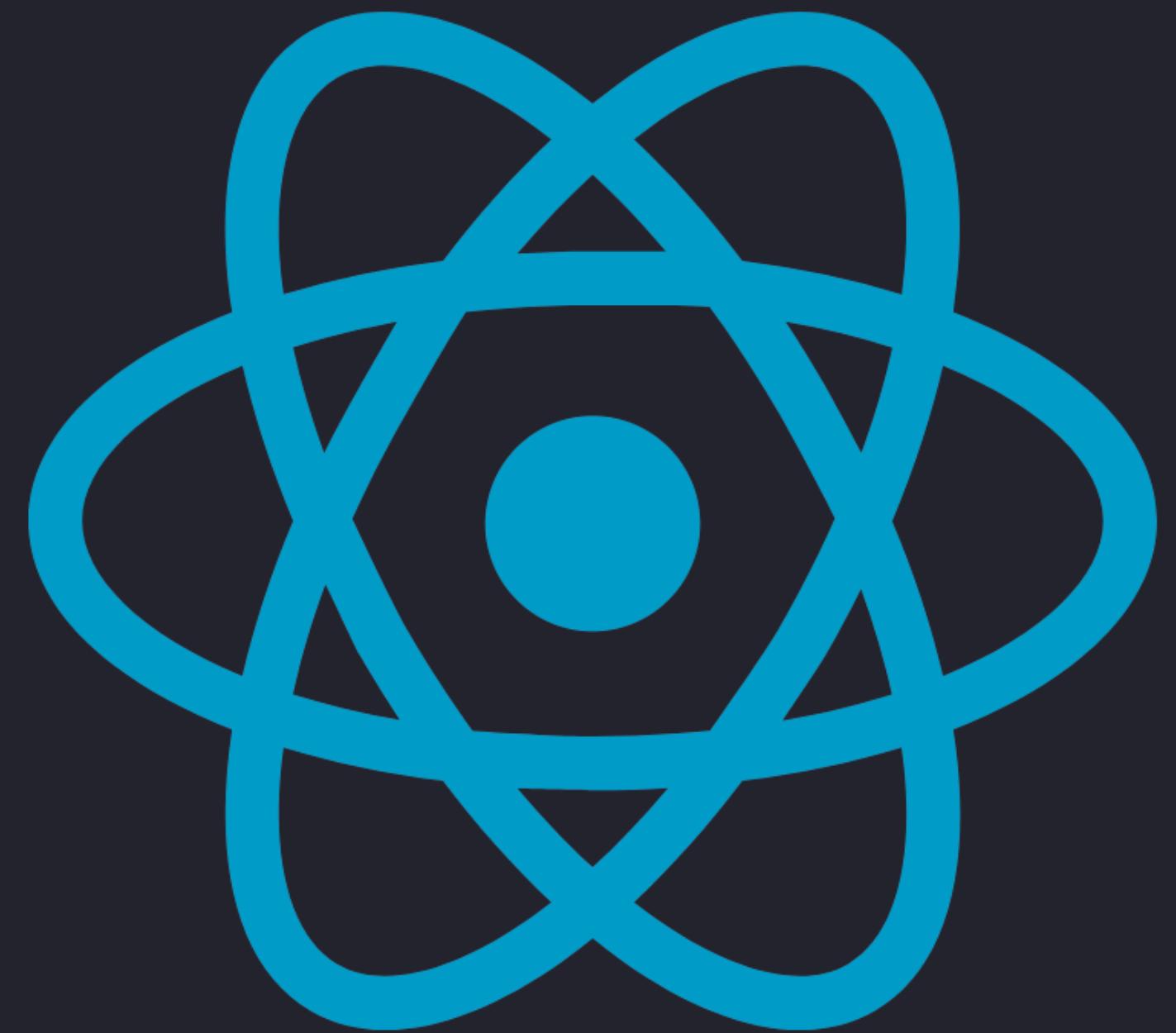


The source code editor shows the following HTML file:

```
index.html
```

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

Line numbers 1 through 11 are shown on the left.



# But why?

- It's so hard to work with the DOM
- DOM manipulation is slow.
- You must make sure the DOM is constantly updated and synchronised with the state of your data.
- React *reacts* to **changes** and updates the DOM automatically and performant without re-rendering all elements - only the changed elements.

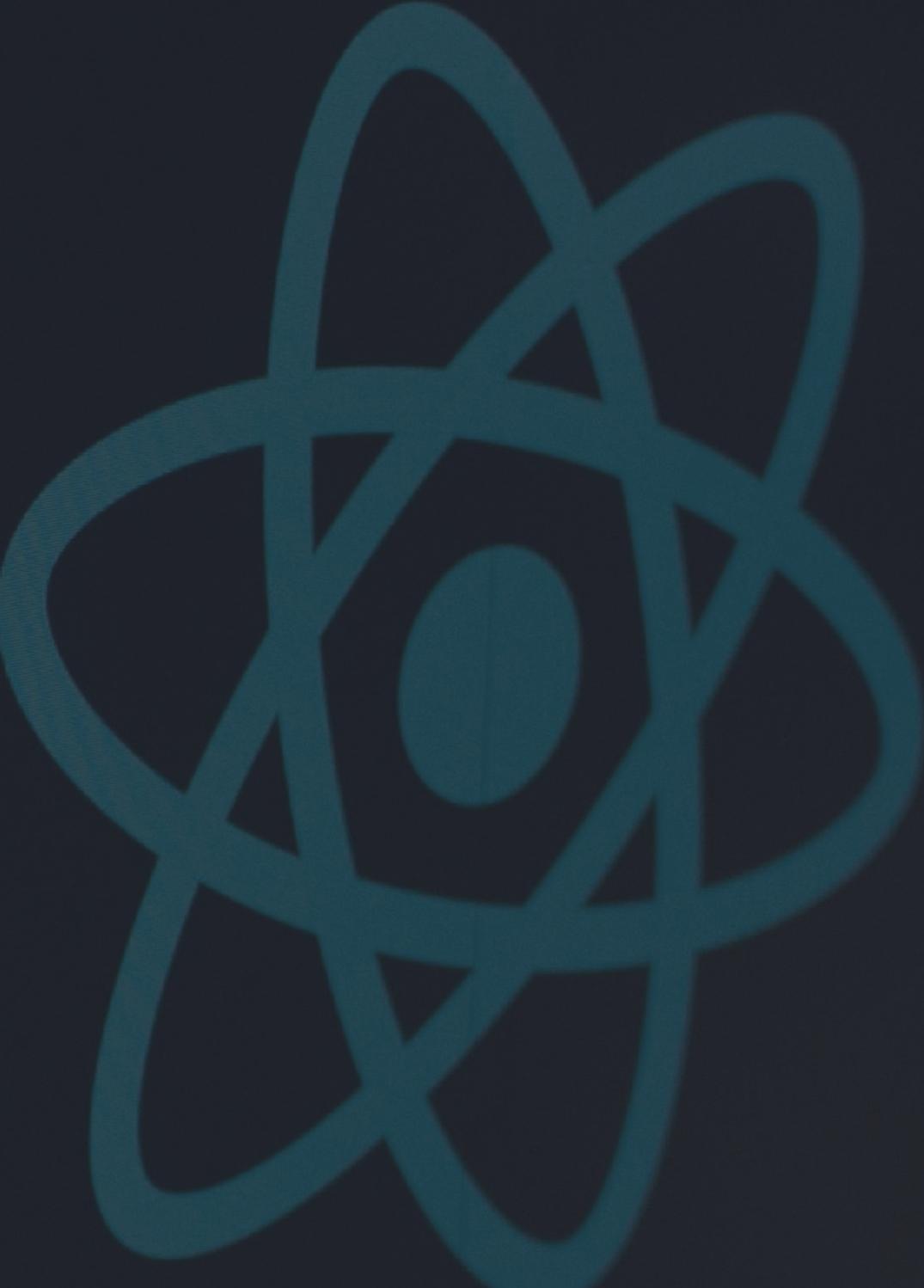
# Resources

React Resources

React Self-study

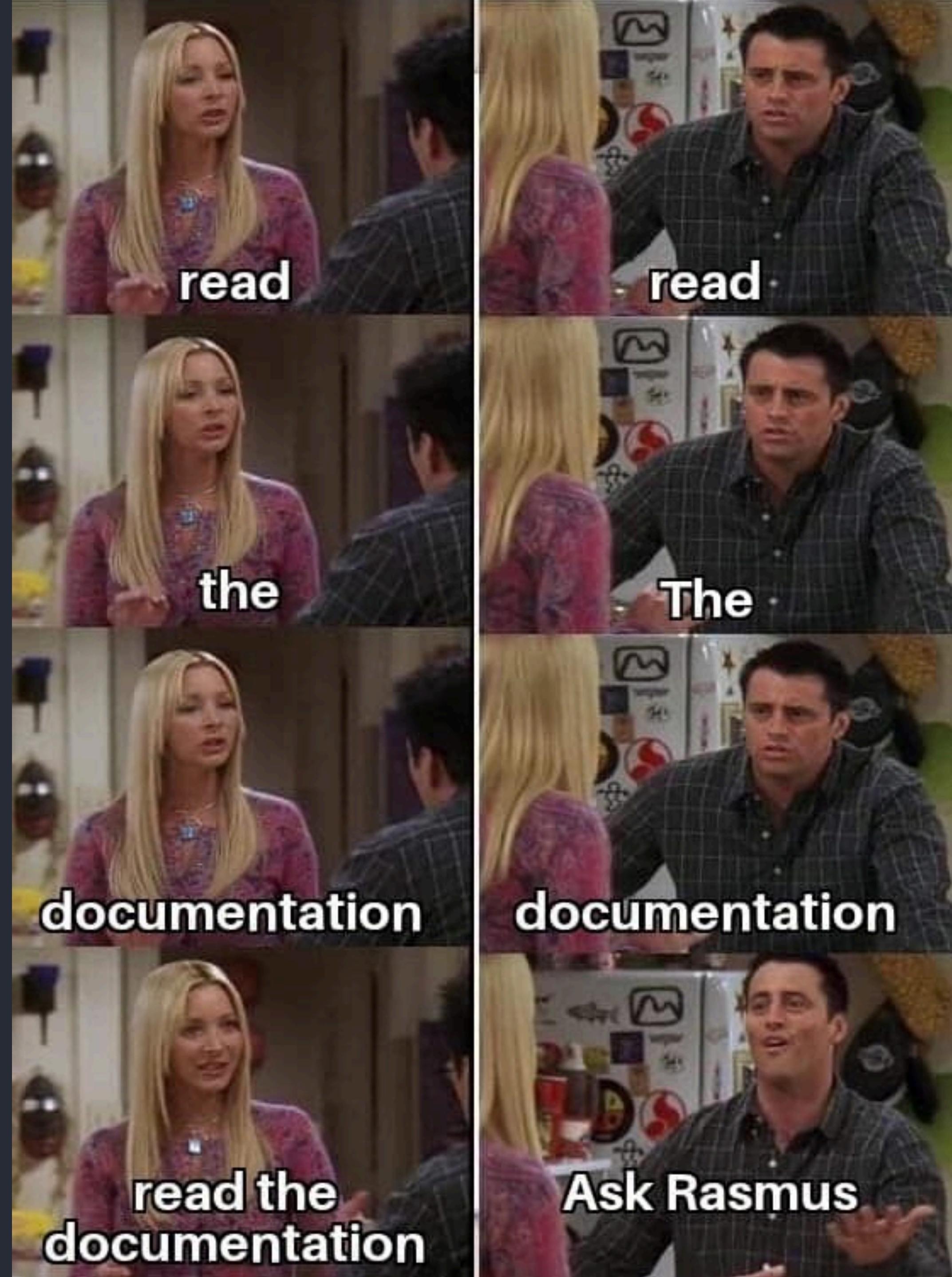
Guides & Tutorials

Edit src/App.js and save to reload  
Learn React



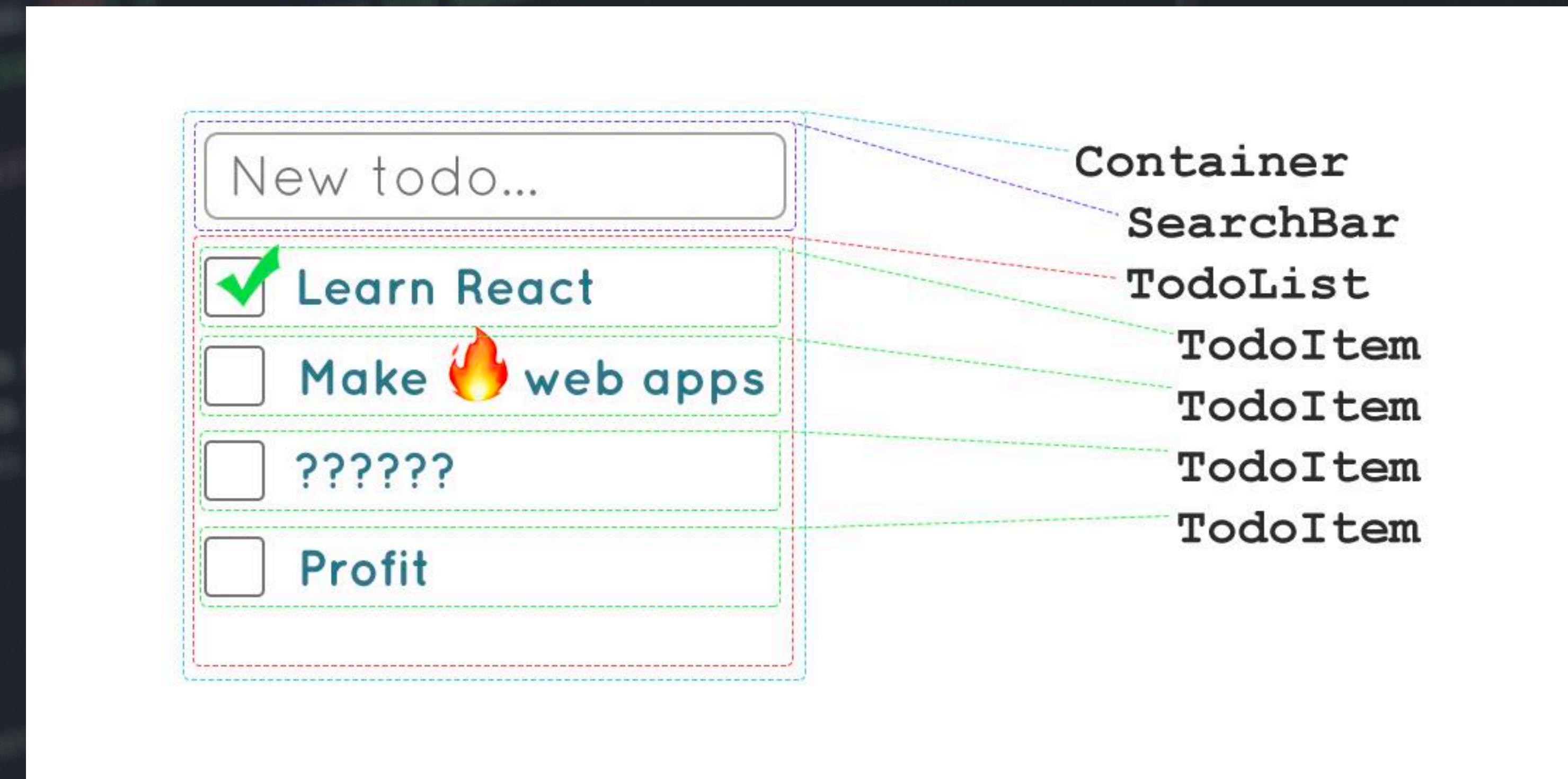
# React Docs

The screenshot shows the React Docs homepage in a dark-themed browser window. The title bar reads "Quick Start – React". The address bar shows the URL "react.dev/learn". The top navigation bar includes links for "Support Ukraine" and "Help Provide Humanitarian Aid to Ukraine". The main navigation menu on the left has sections for "GET STARTED" and "LEARN REACT". The "Quick Start" section is currently selected, indicated by a teal background. Below it are links for "Tutorial: Tic-Tac-Toe", "Thinking in React", and "Installation". The "LEARN REACT" section contains links for "Describing the UI", "Adding Interactivity", "Managing State", and "Escape Hatches". The main content area features a large heading "Quick Start" and a paragraph welcoming users to the React documentation. A callout box titled "You will learn" lists several key concepts: "How to create and nest components", "How to add markup and styles", "How to display data", "How to render conditions and lists", "How to respond to events and update the screen", and "How to share data between components". At the bottom, a section titled "Creating and nesting components" is described with the text: "React apps are made out of *components*. A component is a piece of the UI (user interface) that has its own logic and appearance. A component can be as small as a button, or as large as an entire page."



# How to Think in React

Review slides & note questions



# Function Component

- A Component is simply a function that returns HTML (JSX).
- Components are independent blocks of code.
- Components MUST return a single element. We can wrap in a parent element or use <></>.

```
function MyComponent() {  
  const name = "RACE";  
  
  return (  
    <section>  
      <h1>Hello, {name}</h1>  
    </section>  
  );  
}
```

# Vite

## Next Generation Frontend Tooling

Get ready for a development environment that  
can finally catch up with you.



A modern build tool for web projects

<https://vitejs.dev/>

# React + Vite

Action	Past	Present and future
Create REACT development environment	<i>npx create-react-app .</i>	<ol style="list-style-type: none"><li>1. In the terminal: <i>npm create vite@latest</i></li><li>2. Type in a project name (= folder name)</li><li>3. Select "React" from the menu (keyboard arrow down and press Enter)</li><li>4. Select "JavaScript" from the menu (keyboard arrow down and press Enter)</li><li>5. In VS Code: Open project folder</li><li>6. In the terminal: <i>npm install</i></li></ol>
Live preview in browser	<i>npm start</i>	<i>npm run dev</i>
Build version to upload to your web hotel	<i>npm run build</i>	<i>npm run build</i> <ol style="list-style-type: none"><li>1. In "dist" folder: Update &lt;title&gt; in index.html and change the favicon.</li><li>2. Upload the content of the "dist" folder to your web hotel.</li></ol>
Preview the distribution version in browser before you upload to web hotel		<i>npm run preview</i>

Comments or questions? Feel free to write to [moab@eaaa.dk](mailto:moab@eaaa.dk)

1. Create a new react project and explore App.js and the App component.
2. Create a new component called Person. Inside of the Person component, define a const name with a value. Return the name variable in an h2 wrapped in an article tag.
3. Render Person component inside of your App component.
4. Render several Person components inside of your App component.



# JSX

## JavaScript XML

- Allow us to write HTML in JavaScript.
- Makes it easier to write and add HTML in React.
- We can create our own tags.
- We MUST close all tags.

*// With JSX*

```
const myelement = <h1>I Love JSX!</h1>;
```

*// Without JSX*

```
const myelement = React.createElement("h1", {}, "I do not use JSX!");
```

# JSX

## JavaScript XML

- Allow us to write HTML in JavaScript.
- Makes it easier to write and add HTML in React.
- We can create our own tags.
- We MUST close all tags.

```
export default function HomePage() {  
  const [posts, setPosts] = useState([]);  
  
  useEffect(() => { ...  
}, []);  
  
  return (  
    <section className="page">  
      <section className="grid-container">  
        {posts.map(post => (  
          <article>  
            <img src={post.image} alt={post.title} />  
            <h2>{post.title}</h2>  
          </article>  
        ))}  
      </section>  
    </section>  
  );  
}
```

The screenshot shows a dark-themed web browser window with a tab titled "The React Handbook". The URL in the address bar is "thevalleyofcode.com/react/#8-the-difference-between-jsx-and-html". The main content area displays a section titled "8. The difference between JSX and HTML".

JSX kind of looks like HTML, but it's not.

In this section, I want to introduce to you some of the most important things you need to keep in mind when using JSX.

One of the differences might be quite obvious if you looked at the `App` component JSX: there's a strange attribute called `className`.

In HTML we use the `class` attribute. It's probably the most widely used attribute, for various reasons. One of those reasons is CSS. The `class` attribute allows us to style HTML elements easily, and CSS frameworks like Tailwind put this attribute at the center of the CSS user interface design process.

But there's a problem. We are writing this UI code in a JavaScript file, and `class` in the JavaScript programming language is a reserved word. This means we can't use this reserved word as we

```
<main className="page">
  <section className="grid-container">
    ...
  </section>
</main>
```

# Function Component

```
Regular function      Starts with a capital letter
                    ↗
function MyComponent() {
  const name = "React"
  return (
    <div>
      <h1>Hello, {name}</h1>
    </div>
  )
}
```

Return JSX

Anything inside curly braces will execute as JavaScript

Use any HTML tag to build component

The diagram illustrates the structure of a React function component. It starts with a regular function named 'MyComponent'. The function begins with a capital letter 'M', which is annotated with a callout 'Starts with a capital letter'. The function body returns a JSX expression, annotated with a callout 'Return JSX'. Inside the JSX, there is a div element containing an h1 tag with a dynamic placeholder '{name}', annotated with a callout 'Anything inside curly braces will execute as JavaScript'. The h1 tag is also annotated with a callout 'Use any HTML tag to build component' pointing to the entire tag structure. The code uses color coding: purple for the function keyword and opening/closing brackets, blue for the component name, orange for the variable 'name', green for the string 'React', and red for the HTML tags and the brace in the placeholder.

# Function Component

```
function Greeting() {  
  return (  
    <div>  
      | <h1>Hello, React!</h1>  
      | "Greeting"  
    </div>  
  );  
}
```

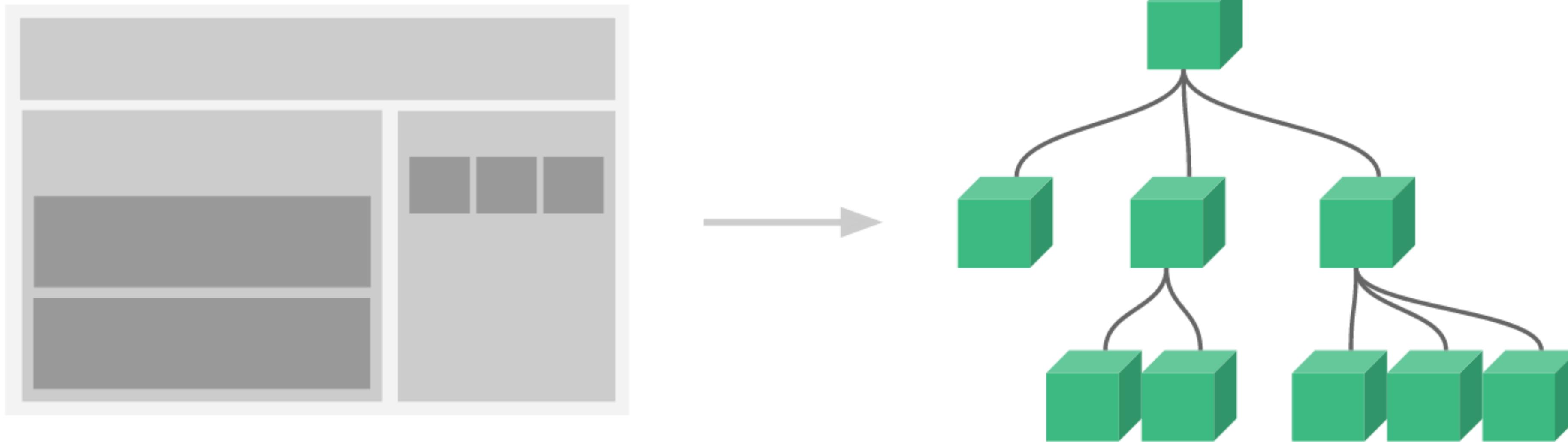
Define the component

```
function App() {  
  return (  
    <div>  
      | <Greeting />  
      | <div>  
      |   | <Greeting />  
      |   | </div>  
      | </div>  
  );  
}
```

Use Greeting component  
in another component

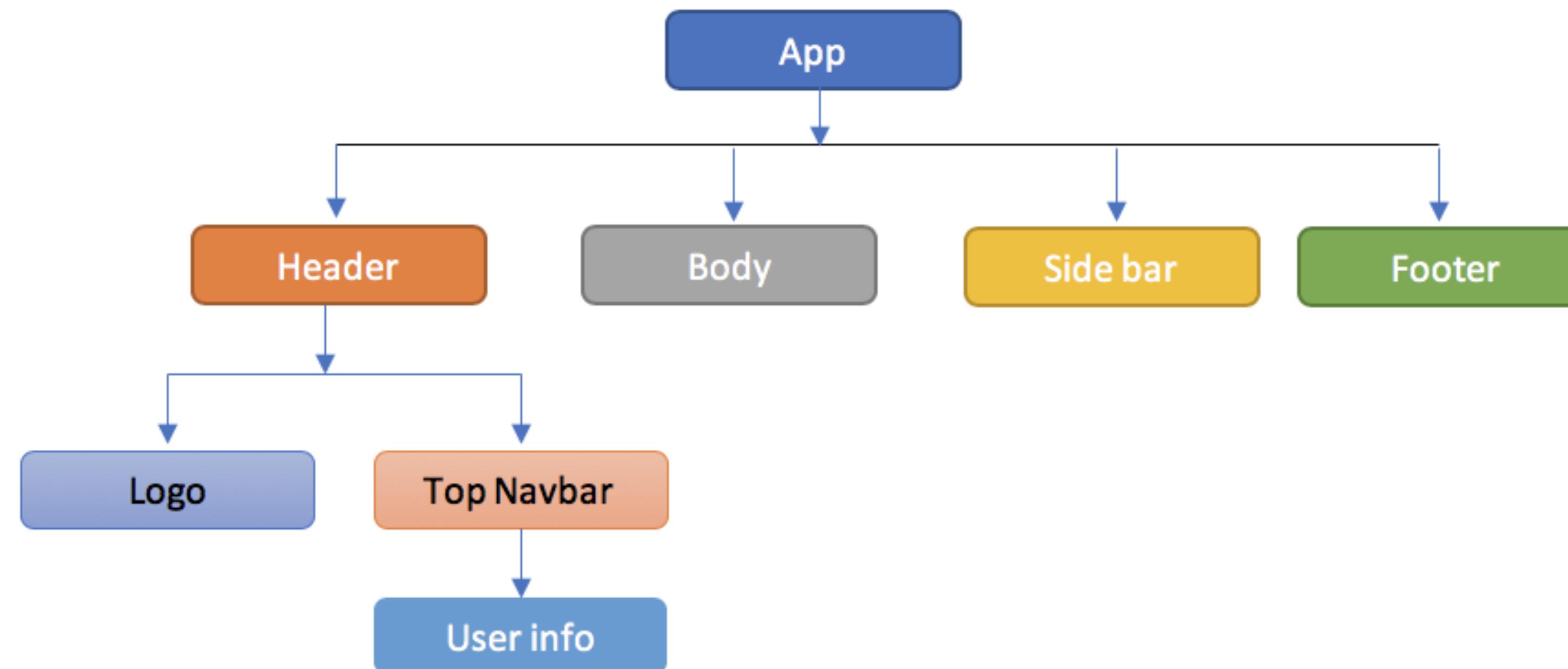
Components without  
a closing tag  
REQUIRE a closing  
slash

# Components, Components, Components



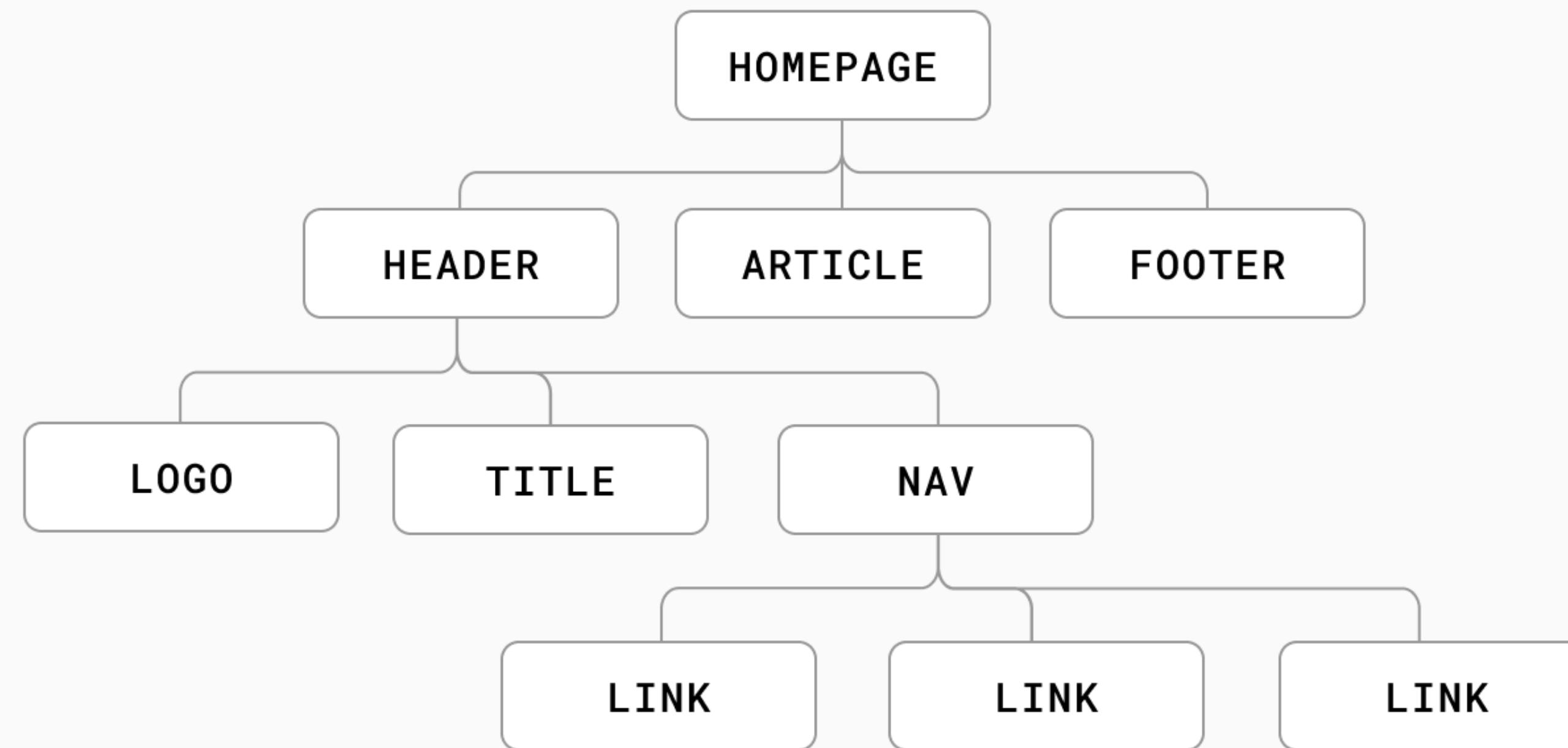
# Build Reusable Components

UI can be broken down to small block or modules called components

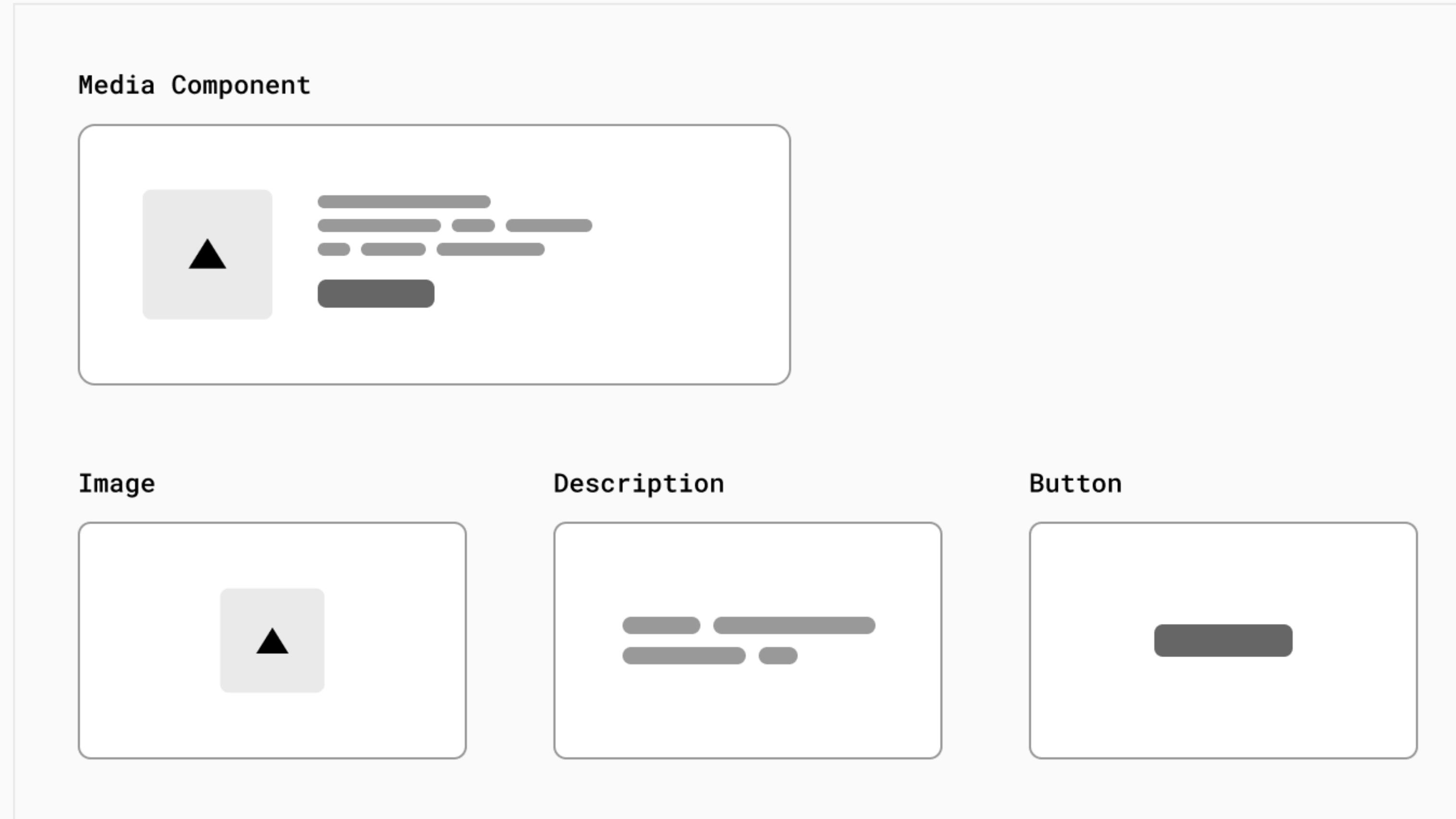


# Build Reusable Components

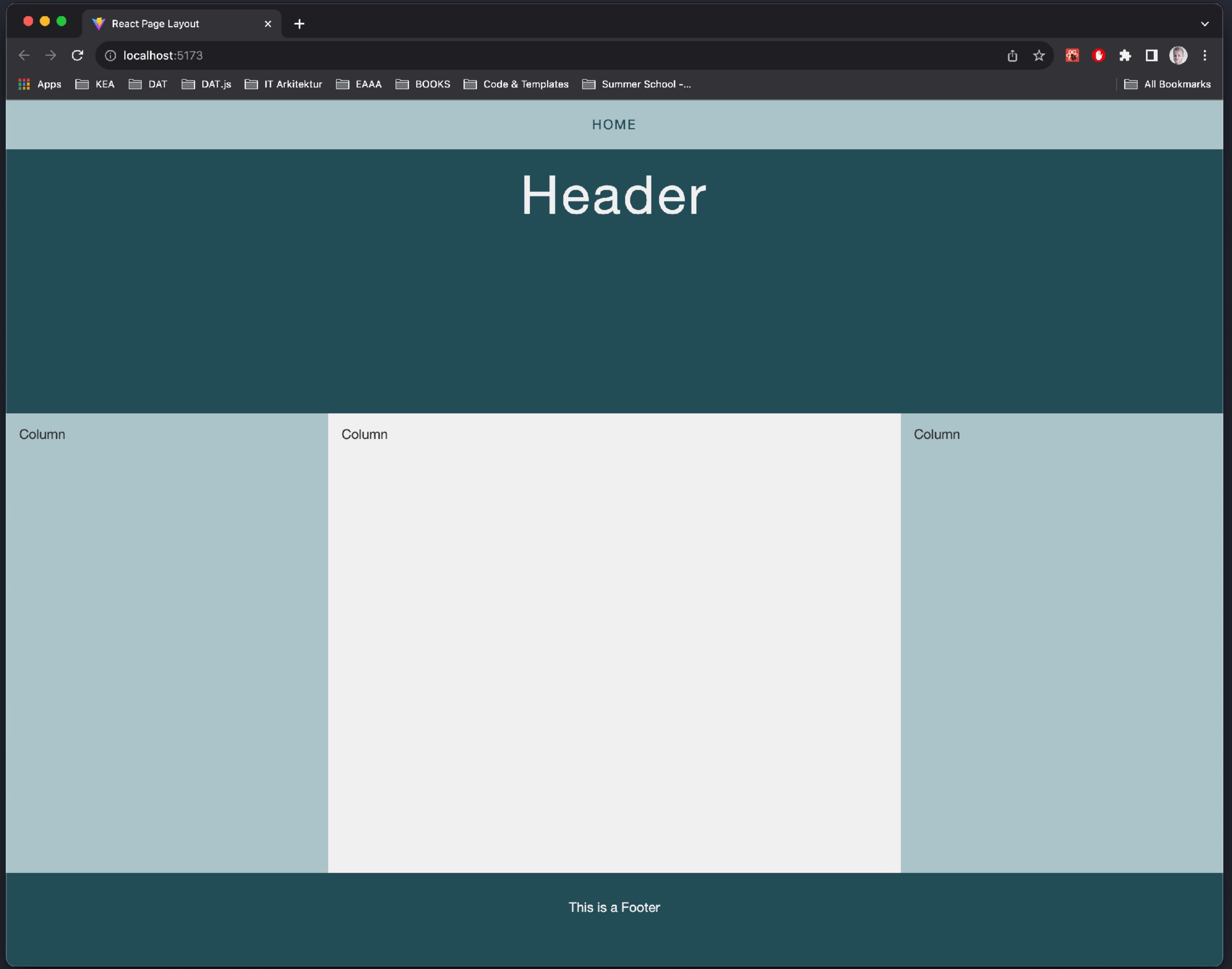
UI can be broken down to small block or modules called components



# Like “LEGO Bricks”



<https://nextjs.org/learn-foundations/from-javascript-to-react/building-ui-with-components>



```
function Navigation() {
  return (
    <nav>
      <a href="#">Home</a>
    </nav>
  );
}

function Header() {
  return (
    <header>
      <h1>React Page Template</h1>
    </header>
  );
}

function PageContent() {
  return (
    <section>
      <h2>Here goes some page content</h2>
    </section>
  );
}

function Footer() {
  return (
    <footer>
      <p>This is my Footer</p>
    </footer>
  );
}
```

# It's all Components!

The screenshot shows a dark-themed code editor with five tabs open, each containing JSX code for a different component:

- App.jsx**:

```
src > App.jsx <...>
1 import Footer from "./components/Footer";
2 import Header from "./components/Header";
3 import MainContent from "./components/MainContent";
4 import Navigation from "./components/Navigation";
5
6 function App() {
7   return (
8     <main className="page-layout">
9       <Navigation />
10      <Header />
11      <MainContent />
12      <Footer />
13    </main>
14  );
15}
16
17 export default App;
18
```
- Navigation.jsx**:

```
src > components > Navigation.jsx <...>
1 export default function Navigation() {
2   return (
3     <nav>
4       <a href="#">Home</a>
5     </nav>
6   );
7 }
8
```
- Header.jsx**:

```
src > components > Header.jsx <...>
1 export default function Header() {
2   return (
3     <header>
4       <h1>Header</h1>
5     </header>
6   );
7 }
8
```
- MainContent.jsx**:

```
src > components > MainContent.jsx <...>
1 export default function MainContent() {
2   return (
3     <>
4       <section className="left">Column</section>
5       <section className="middle">Column</section>
6       <section className="right">Column</section>
7     </>
8   );
9 }
```
- Footer.jsx**:

```
src > components > Footer.jsx <...>
1 export default function Footer() {
2   return (
3     <footer>
4       <p>This is a Footer</p>
5     </footer>
6   );
7 }
8
```

The status bar at the bottom indicates the code is 18 lines long, 4 spaces wide, and uses LF line endings. It also shows tabs for JavaScript JSX, Go Live, and Prettier.

React Components

https://www.w3schools.com/react/react\_components.asp

Tutorials ▾ References ▾ Exercises ▾ Videos

Pro NEW Get Certified Website Login

HTML CSS JAVASCRIPT SQL PYTHON PHP BOOTSTRAP HOW TO W3.CSS JAVA JQUERY C C++ C# R React

React Tutorial

- React Home
- React Intro
- React Get Started
- React ES6
- React Render HTML
- React JSX
- React Components**
- React Class
- React Props
- React Events
- React Conditionals
- React Lists
- React Forms
- React Router
- React Memo
- React CSS Styling
- React Sass Styling

React Hooks

- What is a Hook?
- useState
- useEffect
- useContext
- useRef
- useReducer
- useCallback
- useMemo
- Custom Hooks

React Exercises

# React Components

◀ Previous Next ▶

Components are like functions that return HTML elements.

## React Components

Components are independent and reusable bits of code. They serve the same purpose as JavaScript functions, but work in isolation and return HTML.

Components come in two types, Class components and Function components, in this tutorial we will concentrate on Function components.

In older React code bases, you may find Class components primarily used. It is now suggested to use Function components along with Hooks, which were added in React 16.8. There is an optional section on Class components for your reference.

## Create Your First Component

When creating a React component, the component's name *MUST* start with an upper case letter.

### Class Component

We just launched  
W3Schools videos

Explore now

COLOR PICKER

f i n d

Get certified  
by completing  
a React.js  
course today!

# Components?

A screenshot of a web browser displaying a React application. The page has a dark header with tabs for 'POSTS', 'CREATE', and 'PROFILE'. Below the header is a grid of six cards, each representing a post. Each card contains a user profile picture, the user's name, their title, a preview image, and a short snippet of text.

Post	User Name	Title	Image Preview	Text Snippet
1	Maria Louise Bendixen	Senior Lecturer		dolor sint quo a velit explicabo quia namen
2	Jes Arbov	Lecturer		dolorem eum magni eos aperiam quia
3	Birgitte Kirk Iversen	Senior Lecturer		magnam facilis autem  dolore placeat quibusdam ea quo vitae magni quis enim qui quis quo nemo aut saepe quidem repellat excepturi ut quia sunt ut sequi eos ea sed quas
4	Kim Elkjær Marcher-Jepsen	Senior Lecturer		ut aspernatur corporis harum nihil quis provident sequi molestiae nobis aliquid molestiae perspiciatis et ea nemo ab reprehenderit accusantium quas voluptate dolores velit et doloremque molestiae
5	Dan Okkels Brendstrup	Lecturer		
6	Morten Algy Bonderup	Senior Lecturer		

react-cdn-firebase-post-app-auth

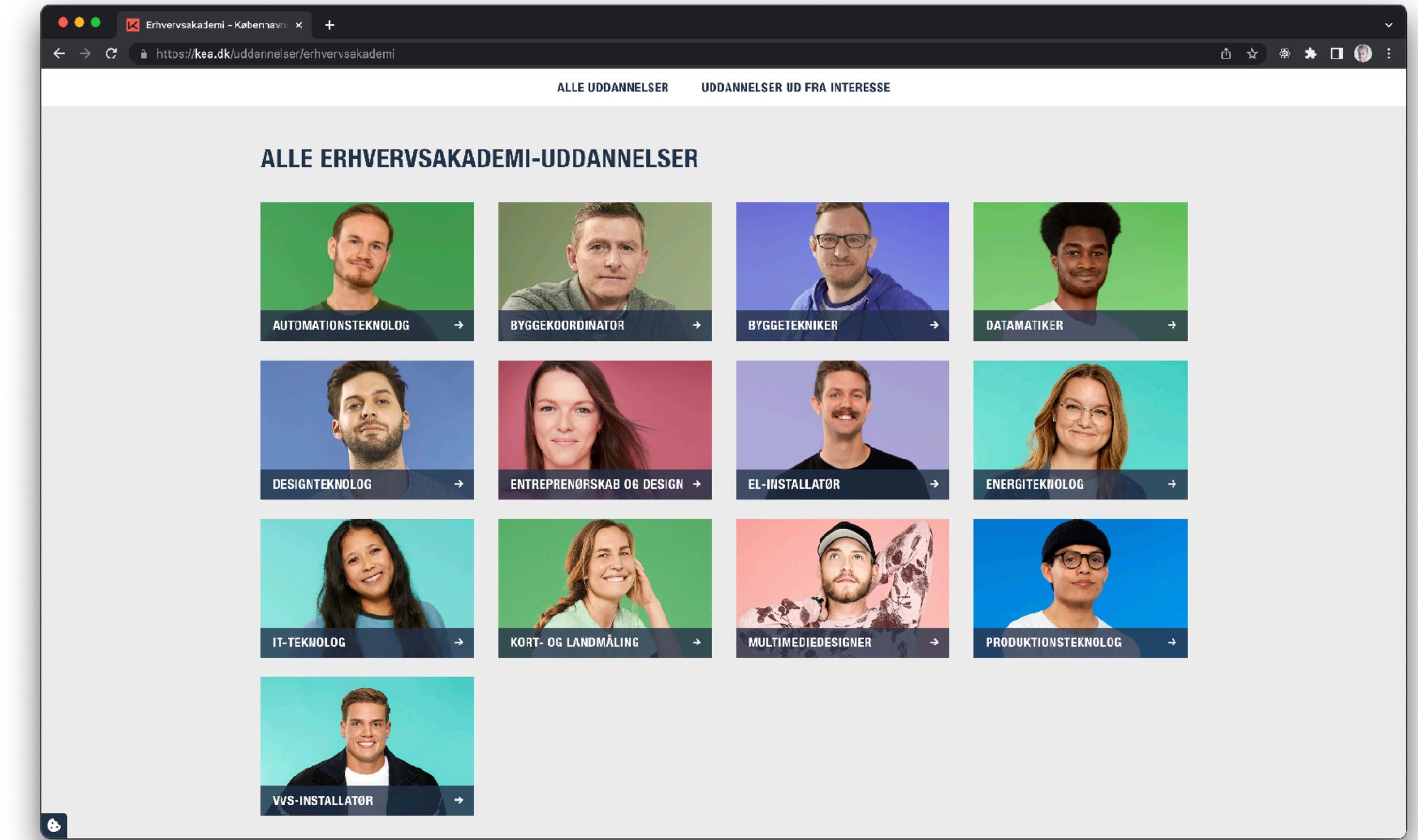
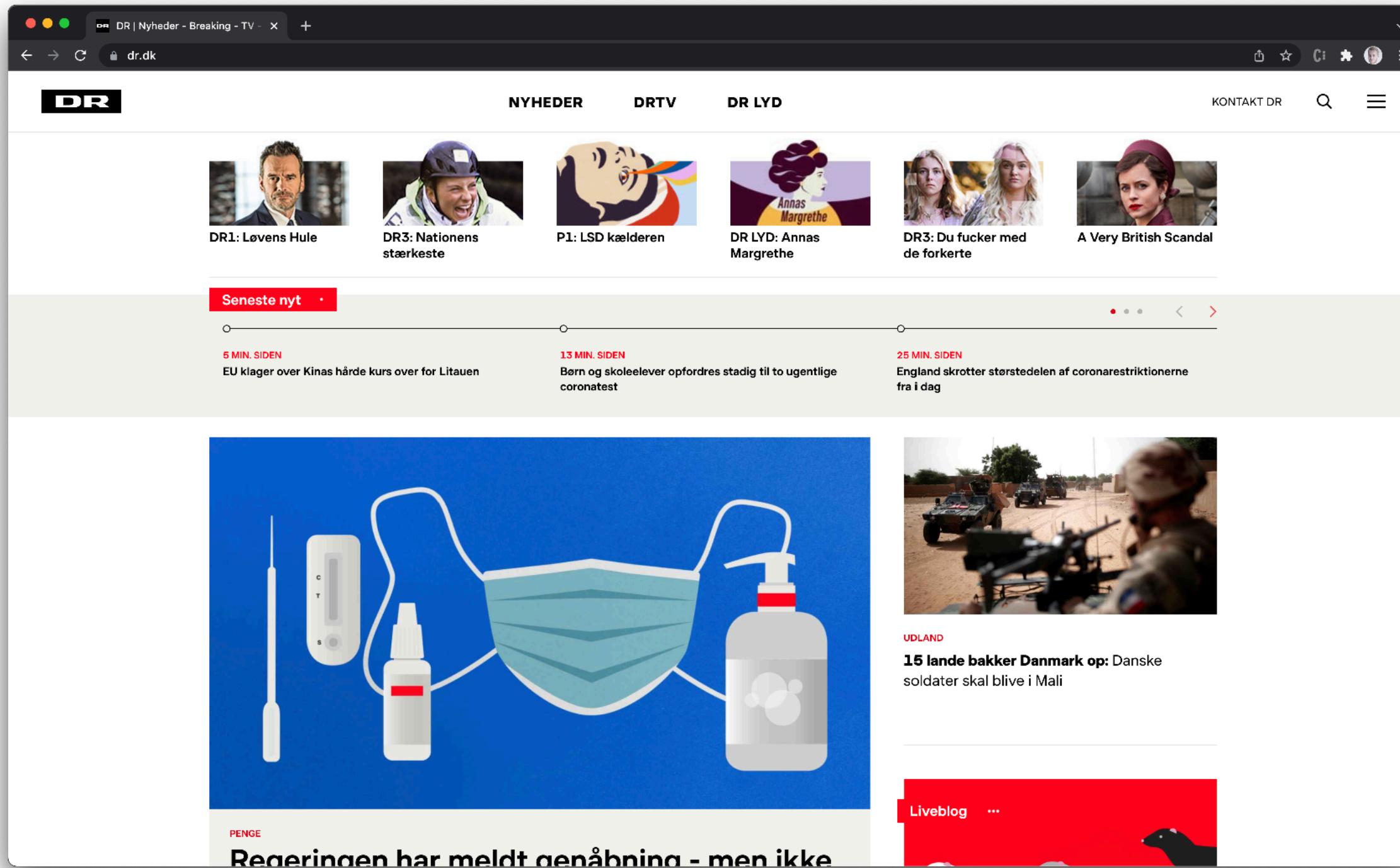
A screenshot of a web browser displaying a Single Page Web App (SPA). The page has a dark header with tabs for 'ALL USERS', 'CREATE', and 'RANDOM'. Below the header is a grid of user profiles. Each profile card includes a user picture, the user's name, their email address, their enrollment status, and 'UPDATE' and 'DELETE' buttons.

User	Email	Enrollment	Actions
Diana Riis Myjak Andersen	<a href="#">eaadimy@students.eaaa.dk</a>	StudentEnrollment	<a href="#">UPDATE</a> <a href="#">DELETE</a>
German Arias Rodriguez	<a href="#">eaagar@students.eaaa.dk</a>	StudentEnrollment	<a href="#">UPDATE</a> <a href="#">DELETE</a>
Haya Barakat	<a href="#">eaahbar@students.eaaa.dk</a>	StudentEnrollment	<a href="#">UPDATE</a> <a href="#">DELETE</a>

Template: spa-canvas-users-template

Solution: spa-canvas-users

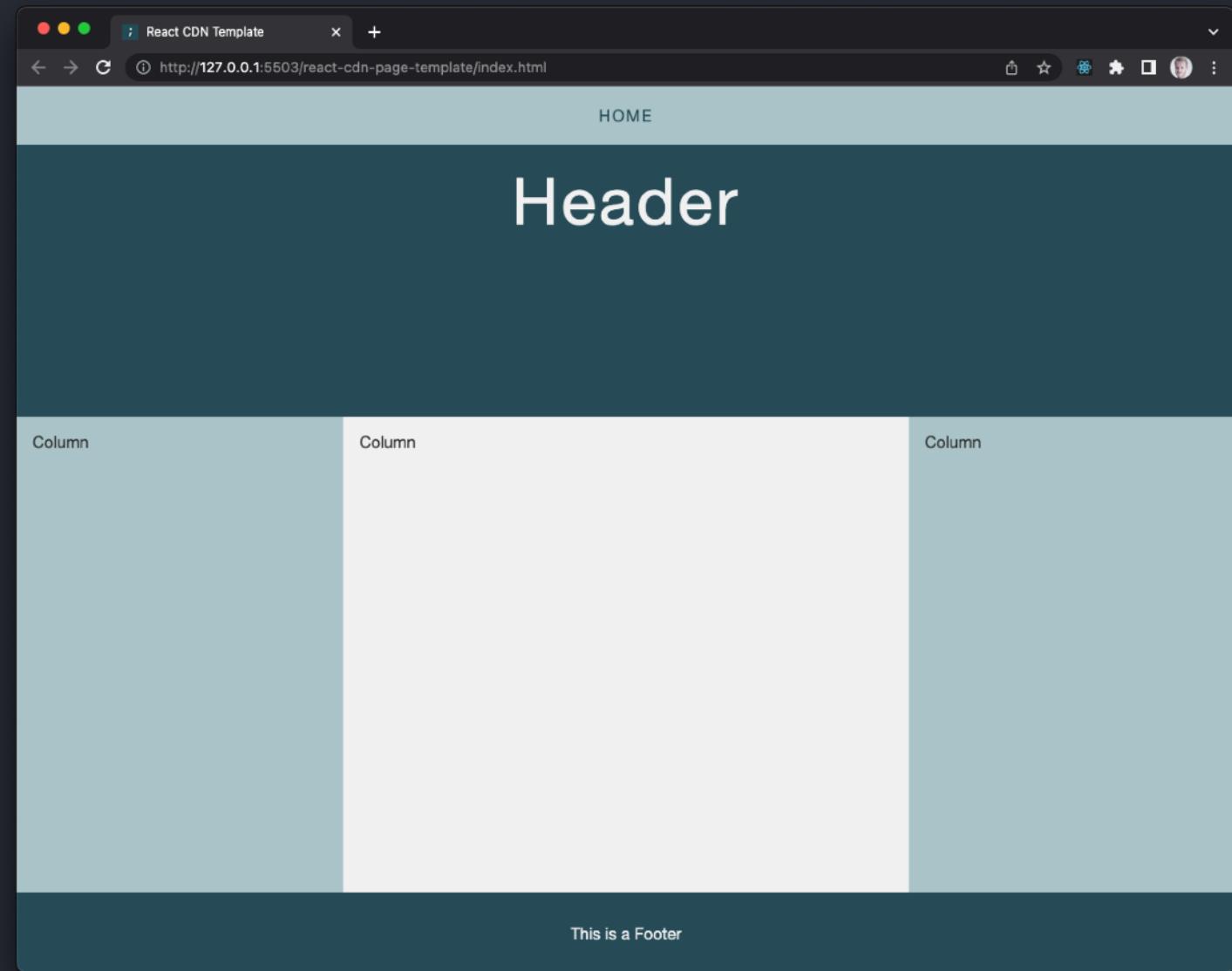
# And?



... but we thought it was all objects and array?

# Component Page Layout

1. Create a new react project
2. Implement a page layout and create the following components: Navigation, Header, MainContent & Footer
3. Add some placeholder content in every component like headlines and/or text.  
MainContent should consist of 3 columns (use the CSS classes left, middle & right).
4. Make sure to render all components in the App component.
5. Style your page layout using a grid and/or flexbox. Get inspired by [react-cdn-page \(code\)](#)

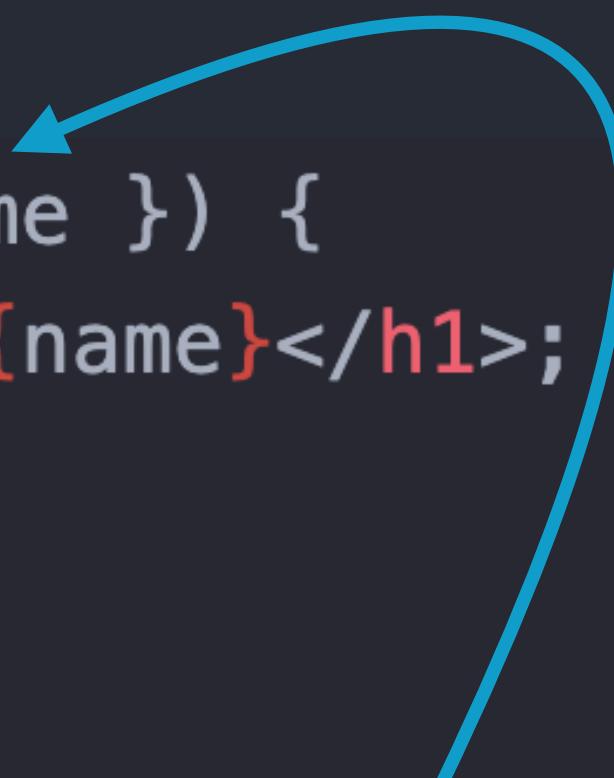


```
export default function App() {
  return (
    <main className="page-layout">
      <Navigation />
      <Header />
      <MainContent />
      <Footer />
    </main>
  );
}
```

# Props

... arguments passed into a React Component. Props are passed to components via HTML attributes.

```
function Greeting({ name }) {  
  return <h1>Hello, {name}</h1>;  
}  
  
function App() {  
  return <Greeting name="world" />;  
}
```



# Function Component with Props

```
function Greeting(props) {  
  return (  
    <div>  
      | <h1>Hello, {props.name}!</h1>  
    </div>  
  );  
}
```

props is first argument to function components

Access props inside of curly braces to show value

```
function App() {  
  return (  
    <div>  
      | <Greeting name="React" />  
      <div>  
        | <Greeting name="Chris" />  
      </div>  
    </div>  
  );  
}
```

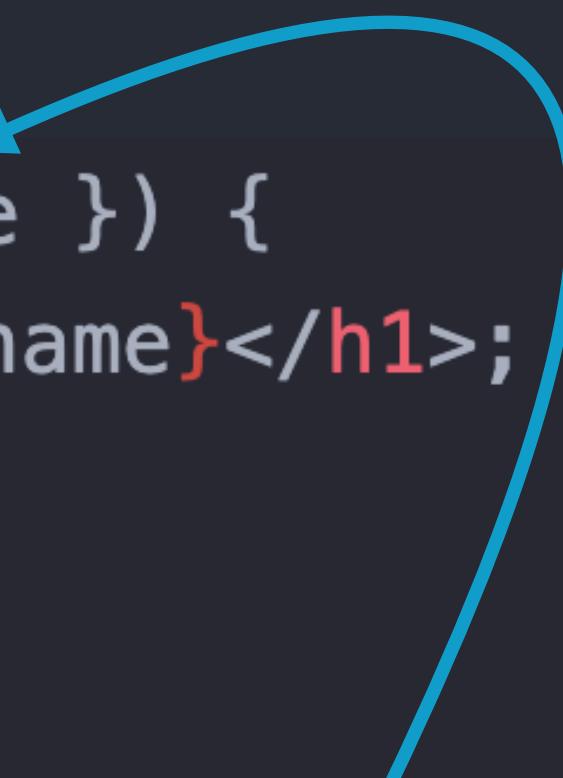
Set a prop on a child component by passing an attribute

Different instances of component can have different prop values

# Add Props: Your First React App

1. Use your implementation of Your First React App.
2. Delete the `const name` variable Person component.
3. Add a prop to your Person component called `name`. The `name` prop is an argument pass to the function (component)t.
4. Make sure the `name` prop is rendered in the JSX of your Person component.
5. Locate your Person components in your App component and add a `name` attribute. Pass in a name to every Person component.
6. Test your solution and try to change the `name` attribute value.
7. Consider why props are useful in addition to creating dynamic web apps and reusable code.
8. Implement other props like mail, phone, etc., and make sure the props are rendered inside of your Person component.

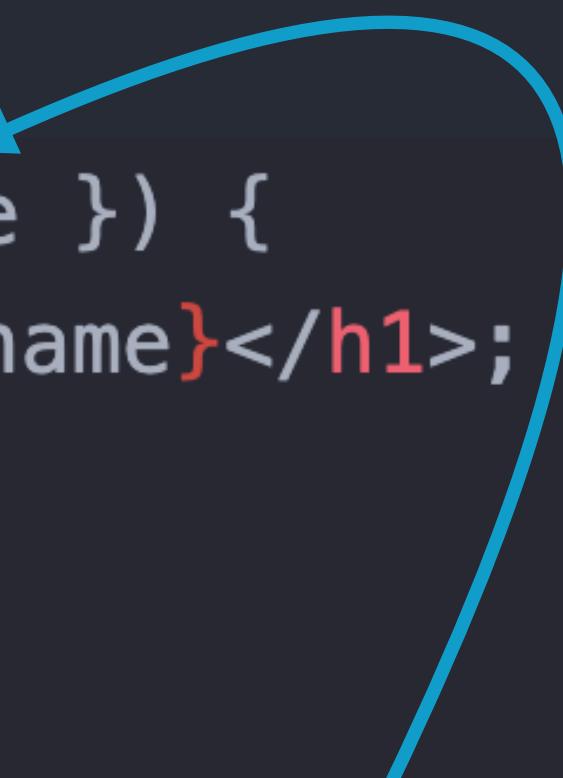
```
function Greeting({ name }) {  
  return <h1>Hello, {name}</h1>;  
}  
  
function App() {  
  return <Greeting name="world" />;  
}
```



# Add Props: Page Layout

1. Use your implemented Page Layout.
2. Add a prop to your Header component called title. Make sure the component (function) takes in an argument. The title prop must be rendered in the JSX inside the h1.
3. Locate the Header component in App and add the attribute title and pass in a title (“My Title”, “Your Name” etc.).
4. Test your solution and try to change the title attribute value.
5. Implement and try out props for some of the other components in your Page Layout.

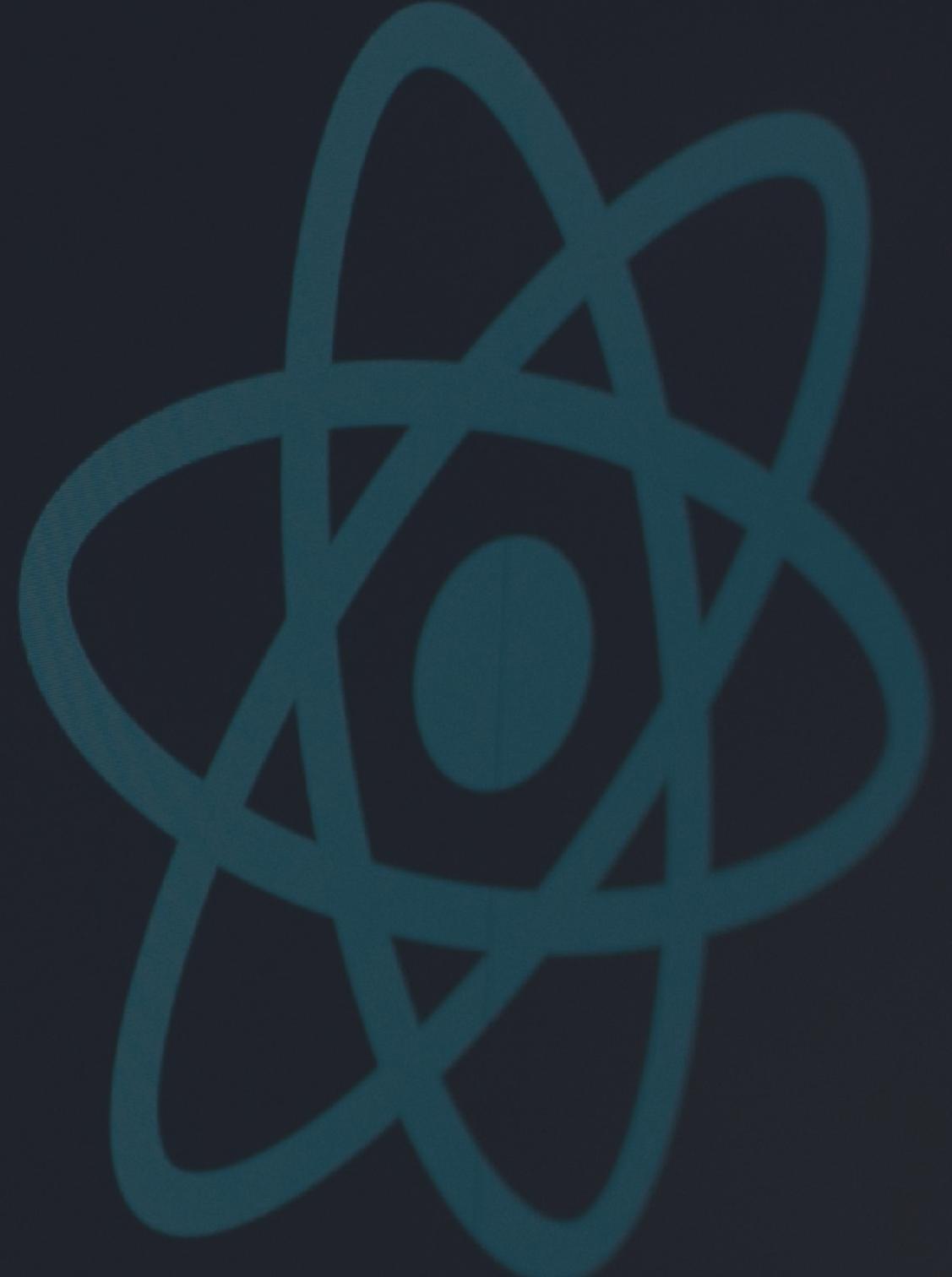
```
function Greeting({ name }) {  
  return <h1>Hello, {name}</h1>;  
}  
  
function App() {  
  return <Greeting name="world" />;  
}
```

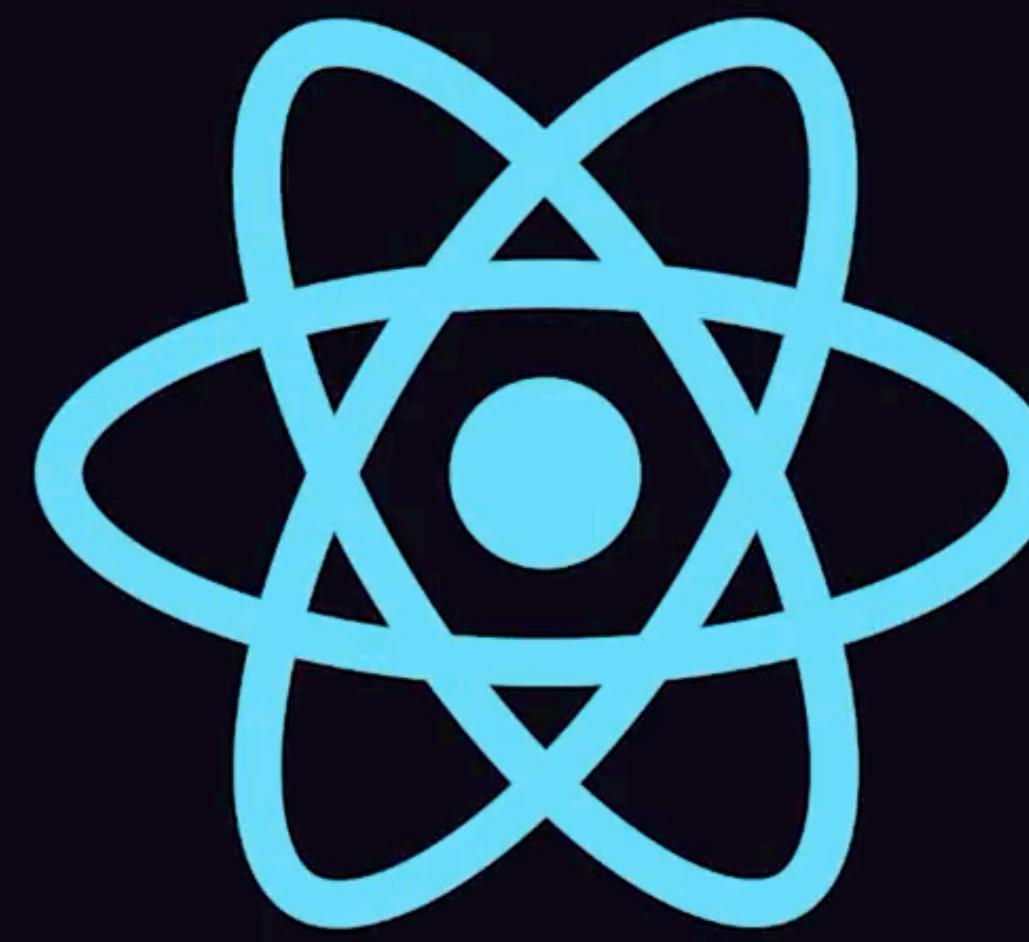


# React Hooks

useState & useEffect

Edit src/App.js and save to reload  
Learn React





<https://www.youtube.com/watch?v=TNhalSOUy6Q>

# React Hooks

The screenshot shows a web browser window with the title "React Hooks" at the top. The URL in the address bar is [https://www.w3schools.com/react/react\\_hooks.asp](https://www.w3schools.com/react/react_hooks.asp). The page content is titled "React Hooks". It includes a sidebar with "React Tutorial" links such as React Home, React Intro, React Get Started, React ES6, React Render HTML, React JSX, React Components, React Class, React Props, React Events, React Conditionals, React Lists, React Forms, React Router, React Memo, React CSS Styling, and React Sass Styling. A specific link "What is a Hook?" is highlighted with a green background. The main content area starts with a note about Hooks being added in version 16.8, followed by a paragraph explaining that Hooks allow function components to access state and other features, making class components unnecessary. A yellow callout box states: "Although Hooks generally replace class components, there are no plans to remove classes from React." Below this, a section titled "What is a Hook?" defines Hooks as allowing us to "hook" into React features like state and lifecycle methods. An "Example:" section provides a brief code snippet. On the right side of the page, there are promotional banners for W3Schools videos, a color picker, and social media sharing options (Facebook, Instagram, LinkedIn, etc.). A footer banner encourages users to get certified by completing a course.

[w3schools.com/react/react\\_hooks.asp](https://www.w3schools.com/react/react_hooks.asp)

# useState()

<https://www.youtube.com/watch?v=TNhalSOUy6Q>

# useState

... a hook that allows us to track states in a function component.

The purpose is to handle reactive data. When data in a state change, React reacts and re-renders the UI.

# useState(...)

... a hook that allows us to track states in a function component.

The purpose is to handle reactive data. When data in a state change, React reacts and re-renders the UI.

```
import React, { useState } from "react";  
  
function Greeting(props) {  
  const [count, setCount] = useState(0)  
  const updateCount = () => {  
    setCount(count + 1)  
  }  
  
  return (  
    <div>  
      <h1>Hello, {props.name}!</h1>  
      <p>You've clicked {count} times</p>  
      <button onClick={updateCount}>  
        Click me  
      </button>  
    </div>  
  );  
}
```

Import useState from React

Call useState and pass in a default value

useState returns the current value and an update function

Display state in curly braces

# Destructuring

The screenshot shows a web browser window with a dark theme, displaying a Notion page titled "From Vanilla JavaScript to React". The page content is organized into sections:

- 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"

//choose 1 & 3 in the array
const [mrFrontend, , mrReact] = teachers;
```

Destructuring

When States & Props  
change, your component  
is automatically updated!

React *reacts* to the  
changes.

```
import React, { useState } from "react";

function Greeting(props) {
  const [count, setCount] = useState(0)

  const updateCount = () => {
    setCount(count + 1)
  }

  return (
    <div>
      <h1>Hello, {props.name}!</h1>
      <p>You've clicked {count} times</p>
      <button onClick={updateCount}>
        Click me
      </button>
    </div>
  );
}


```

Call the update function  
with a new value to set the state.  
NEVER set the value directly

count will update  
AUTOMATICALLY!

Use curly braces  
to set attribute  
to JS value

Set onClick attribute of  
a button to a custom function

# Tryout useState

1. Use a previous React project or create a new.
2. Create a component called Counter.
3. The Counter component should have a similar structure as the component to the right, with a count state, updateCount function, displaying the count state and a button calling updateCount on click.
4. Render the Counter component in your App component or another component.
5. Test and think of the pros of using React and states compared to Vanilla JS.
6. Try to render the Counter component in another component.

```
import React, { useState } from "react";  
  
function Greeting(props) {  
  const [count, setCount] = useState(0)  
  const updateCount = () => {  
    setCount(count + 1)  
  }  
  
  return (  
    <div>  
      <h1>Hello, {props.name}!</h1>  
      <p>You've clicked {count} times</p>  
      <button onClick={updateCount}>  
        Click me  
      </button>  
    </div>  
  );  
}
```

Import useState from React

Call useState and pass in a default value

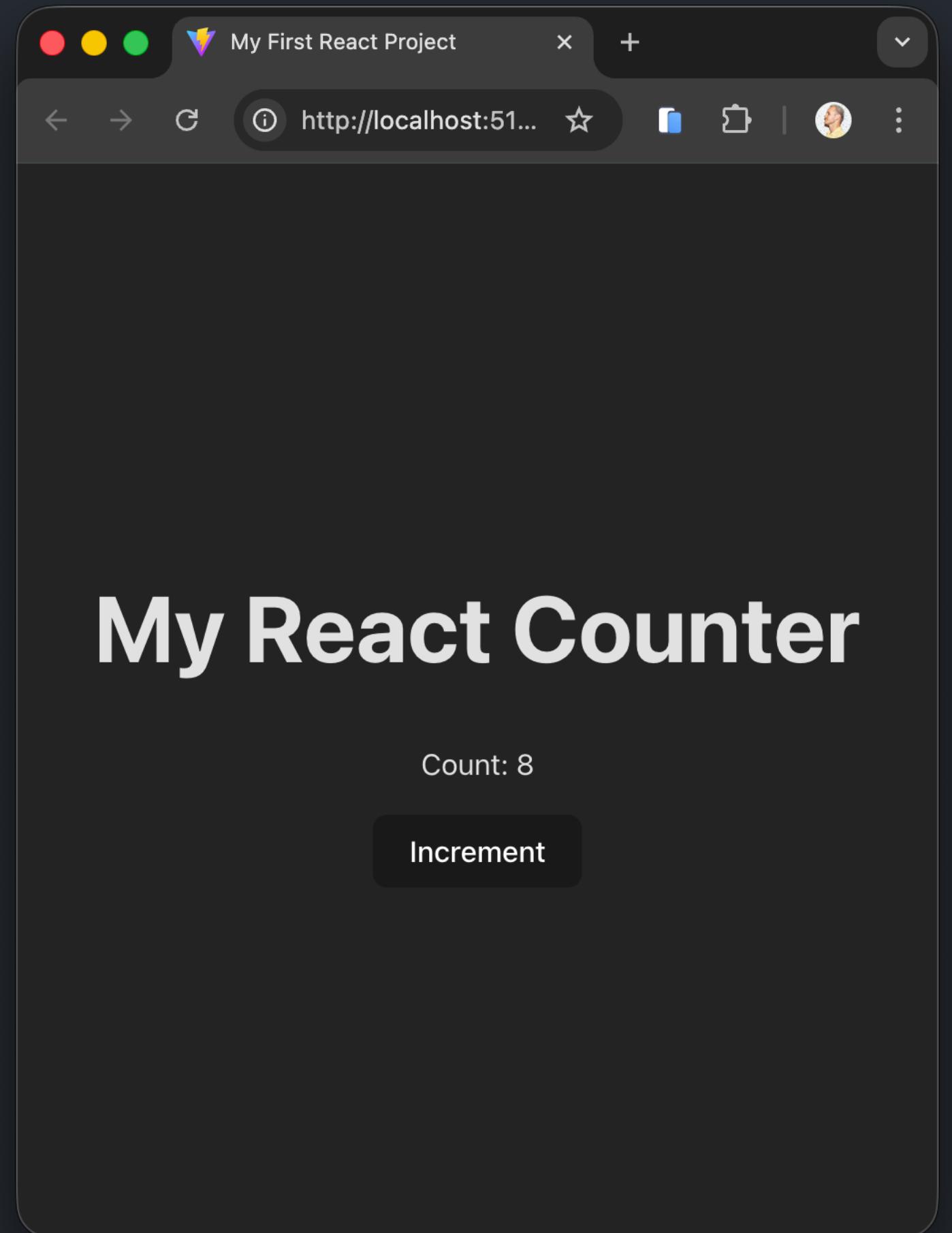
useState returns the current value and an update function

Display state in curly braces

```
import { useState } from "react";
import "./App.css";

export default function App() {
  const [count, setCount] = useState(0);

  return (
    <>
      <h1>My React Counter</h1>
      <p>Count: {count}</p>
      <button onClick={() => setCount(count + 1)}>Increment</button>
    </>
  );
}
```



```
<!doctype html>
<html lang="en">
  <head>
    <meta charset="UTF-8" />
    <meta name="viewport" content="width=device-width, initial-scale=1.0" />
    <title>Counter</title>
  </head>
  <body>
    <h1>My JavaScript Counter</h1>
    <p>Count: <span id="count">0</span></p>
    <button id="incrementBtn">Increment</button>

    <script>
      let count = 0;

      const countElement = document.querySelector("#count");
      const incrementBtn = document.querySelector("#incrementBtn");

      incrementBtn.addEventListener("click", function () {
        count = count + 1;
        countElement.textContent = count;
      });
    </script>
  </body>
</html>
```



# JavaScript

```
<!doctype html>
<html lang="en">
  <head>
    <meta charset="UTF-8" />
    <meta name="viewport" content="width=device-width, initial-scale=1.0" />
    <title>Counter</title>
  </head>
  <body>
    <h1>My JavaScript Counter</h1>
    <p>Count: <span id="count">0</span></p>
    <button id="incrementBtn">Increment</button>

    <script>
      let count = 0;

      const countElement = document.querySelector("#count");
      const incrementBtn = document.querySelector("#incrementBtn");

      incrementBtn.addEventListener("click", function () {
        count = count + 1;
        countElement.textContent = count;
      });
    </script>
  </body>
</html>
```

# React

```
import { useState } from "react";
import "./App.css";

export default function App() {
  const [count, setCount] = useState(0);

  return (
    <>
      <h1>My React Counter</h1>
      <p>Count: {count}</p>
      <button onClick={() => setCount(count + 1)}>Increment</button>
    </>
  );
}
```

# List, loop and map

```
const DATA = [
  { id: 4, title: 'A New Hope' },
  { id: 5, title: 'The Empire Strikes Back' },
  { id: 6, title: 'Return of the Jedi' }
]
```

```
const App = () => <MyList items={DATA} />
```

```
function MyList(props) {
  return (
    <div>
      {
        props.items.map(item => {
          return <p key={item.id}>{item.title}</p>
        })
      }
    </div>
  )
}
```

Annotations for the MyList component code:

- Wrap entire JS in curly braces
- Map over data that was passed in as props
- Pass unique key attribute to each element
- Use curly braces like normal to display data
- Return JSX from each iteration

# List, loop and map

```
const contacts = [
  {
    id: 1,
    name: "Birgitte Hansen",
    mail: "b@hansen.com"
  },
  {
    id: 2,
    name: "Jens Petersen",
    mail: "jens@petersen.com"
  },
  {
    id: 3,
    name: "Hanne Hansen",
    mail: "hanne@hansen.com"
  }
];

export default function ContactList() {
  return (
    <section className="contact-list">
      {contacts.map(contact => (
        <article className="card" key={contact.id}>
          <h2>{contact.name}</h2>
          <a href={`mailto:${contact.mail}`}>{contact.mail}</a>
        </article>
      )));
    </section>
  );
}
```

Data list

Map over the list  
and return jsx

# useEffect()

<https://www.youtube.com/watch?v=TNhalSOUy6Q>

# useEffect(...)

... a hook that allows us to do side effects in a component, like fetching data, directly updating the DOM, and timers.

```
import React, { useState, useEffect } from "react";
```

```
function GetData(props) {
  const [data, setData] = useState({});

  useEffect(() => {
    fetch("https://swapi.co/api/people/" + props.id)
      .then(response => response.json())
      .then(result => setData(result));
  }, [props.id]);

  return (
    <div>
      <p>Name: {data && data.name}</p>
    </div>
  );
}
```

Import useEffect from React

Call useEffect with a function as the first argument

The second argument is an array of dependencies. Don't forget this!

Do async actions like data fetching inside the callback

# useEffect()

useEffect () lets a component run code after it renders.

useEffect () is a React hook used to run side effects after a component has rendered.

Side effects let us control what happens after a component renders.

Examples of side effects:

- Showing pop-ups
- Fetching external data
- Setting timers
- Directly updating the DOM

```
import { useEffect } from "react";  
  
useEffect(function() {  
  // Your side effect code...  
}, [dependency]);
```

# useEffect()

useEffect(first, second) accepts two arguments

## How it works

- 1st argument: a function containing the side effect
- 2nd argument (optional): a dependency array that controls when the effect runs
- useEffect runs on every render and when the dependencies change.

```
import { useEffect } from "react";  
  
useEffect(function() {  
  // Your side effect code...  
}, [dependency]);
```

# useEffect()

useEffect(first, second) accepts two arguments

## Dependency array behavior

- With dependencies: runs when one of the values changes
- Empty array ([]): runs once after first render
- No array: runs after every render

```
useEffect(() => {
  //Runs on every render
});

useEffect(() => {
  //Runs only on the first render
}, []);

useEffect(() => {
  //Runs on the first render
  //And any time any dependency value changes
}, [prop, state]);
```

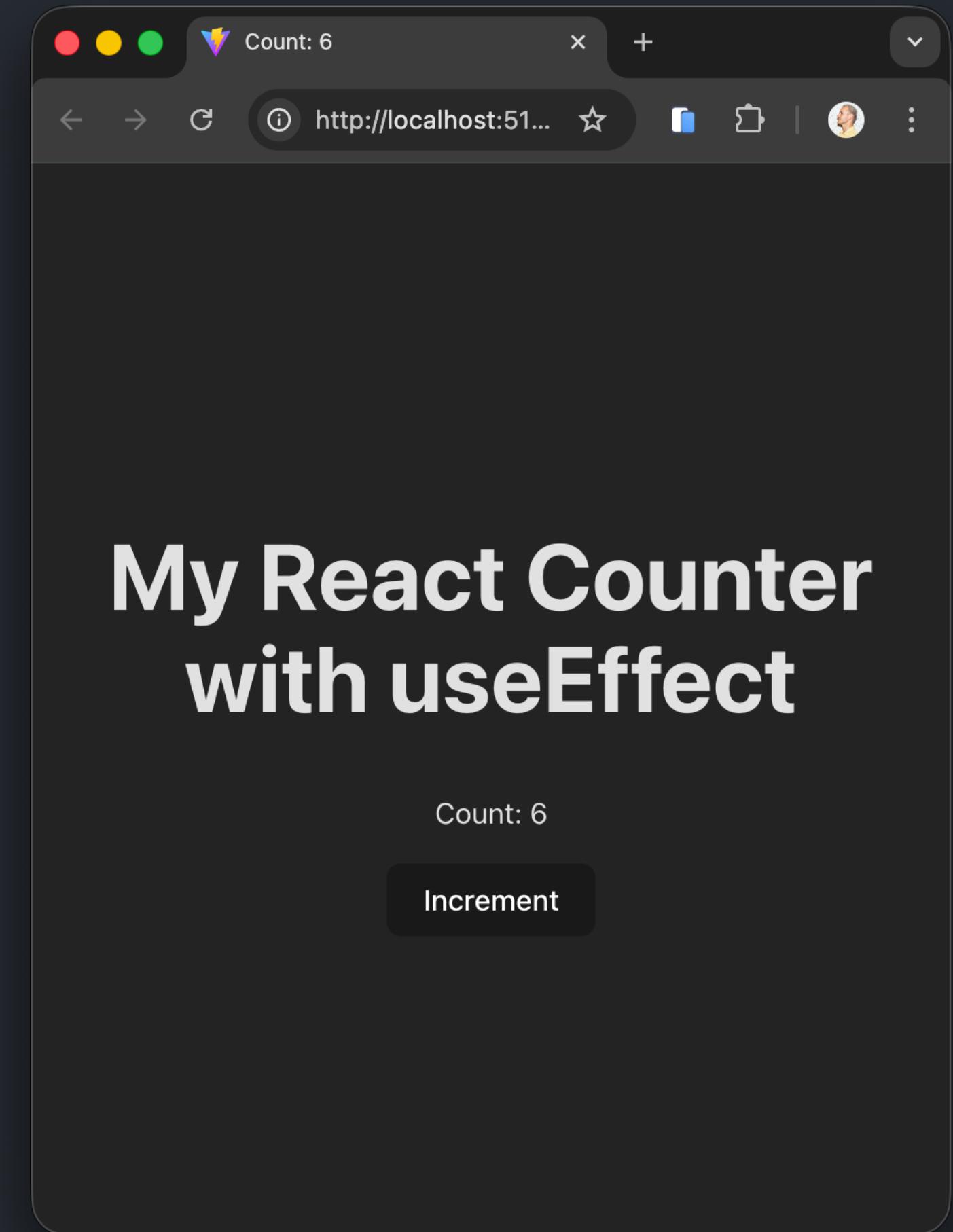
# useEffect to update title of the page

```
import { useEffect, useState } from "react";
import "./App.css";

export default function App() {
  const [count, setCount] = useState(0);

  useEffect(() => {
    document.title = `Count: ${count}`;
  }, [count]);

  return (
    <>
      <h1>My React Counter with useEffect</h1>
      <p>Count: {count}</p>
      <button onClick={() => setCount(count + 1)}>Increment</button>
    </>
  );
}
```



# useEffect with conditionals

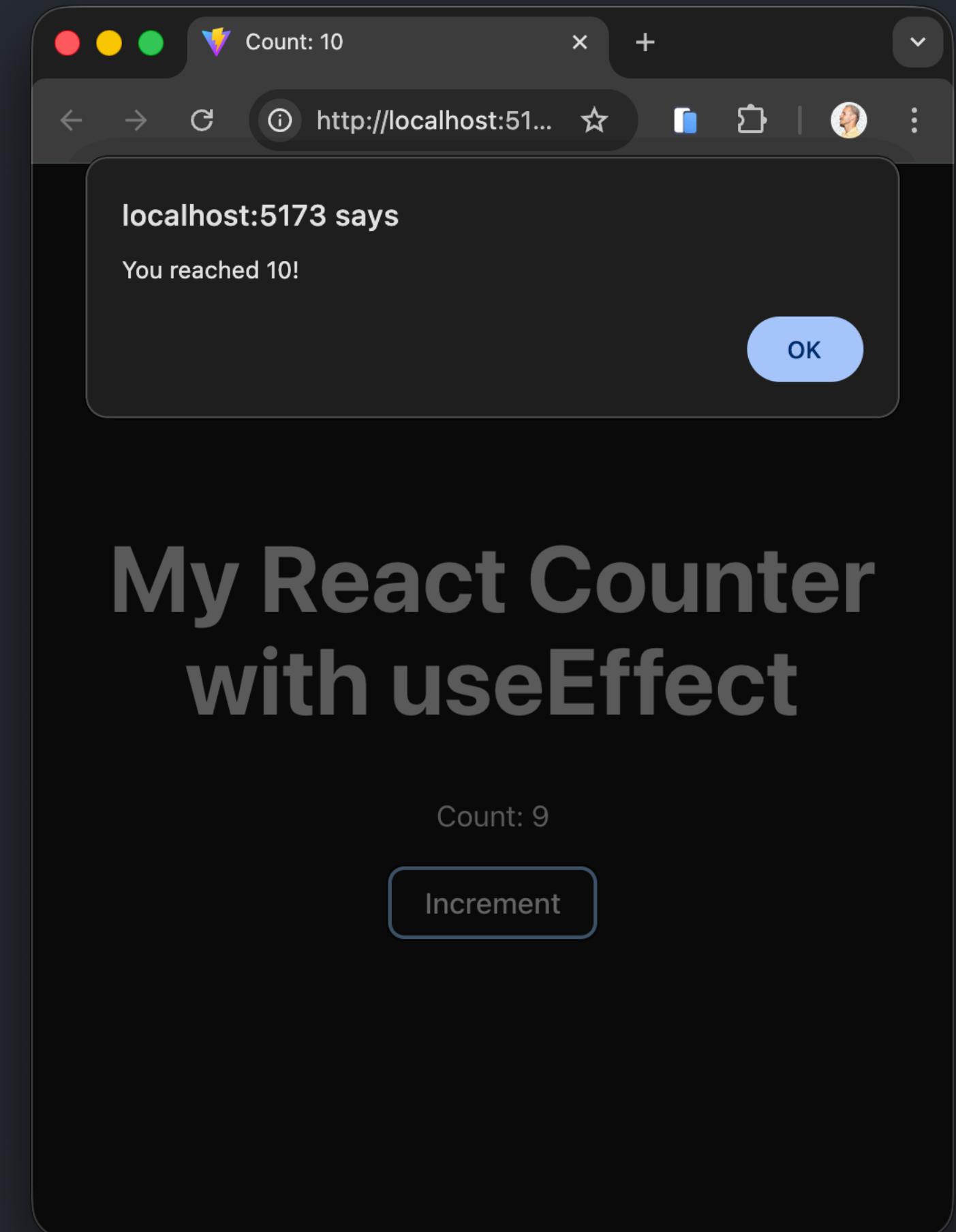
```
import { useEffect, useState } from "react";
import "./App.css";

export default function App() {
  const [count, setCount] = useState(0);

  useEffect(() => {
    document.title = `Count: ${count}`;
  }, [count]);

  useEffect(() => {
    if (count === 10) {
      alert("You reached 10!");
    }
  }, [count]);

  return (
    <>
      <h1>My React Counter with useEffect</h1>
      <p>Count: {count}</p>
      <button onClick={() => setCount(count + 1)}>Increment</button>
    </>
  );
}
```



# useEffect to Fetch data

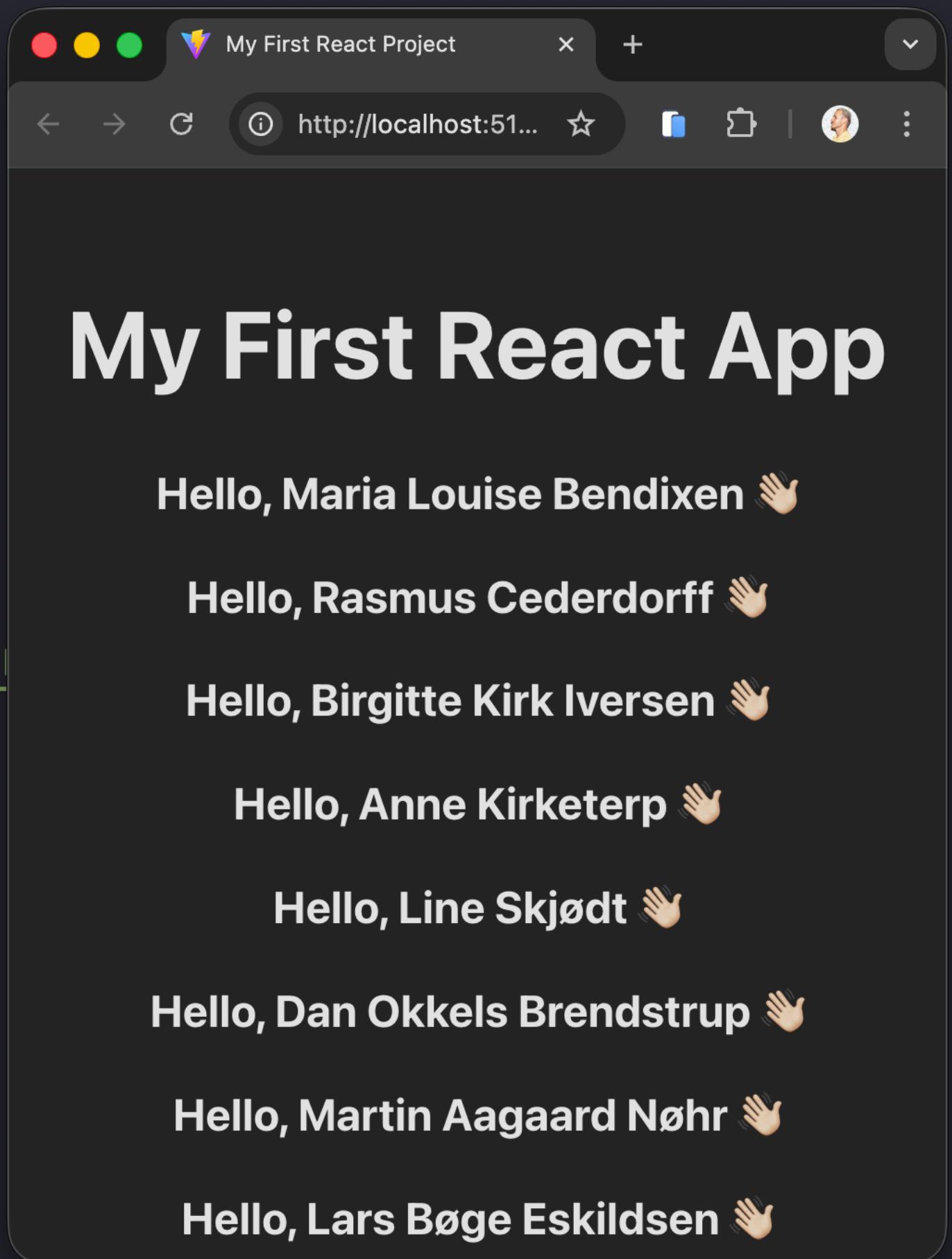
```
import { useEffect, useState } from "react";
import "./App.css";
import User from "./components/User";

function App() {
  const [users, setUsers] = useState([]);

  useEffect(() => {
    async function fetchUsers() {
      const response = await fetch("https://raw.githubusercontent.com/cederdorff/react-useEffect-to-fetch-data/master/src/users.json");
      const data = await response.json();
      setUsers(data);
    }
    fetchUsers();
  }, []);

  return (
    <>
      <h1>My First React App</h1>
      {users.map(user => (
        <User name={user.name} />
      ))}
    </>
  );
}

export default App;
```



# Fetch

... get & post data from and to a data source  
... can perform network requests to a server

```
1 let promise = fetch(url, [options])
```

- `url` – the URL to access.
- `options` – optional parameters: method, headers etc.

Without `options`, this is a simple GET request, downloading the contents of the `url`.

# Fetch & useEffect in React

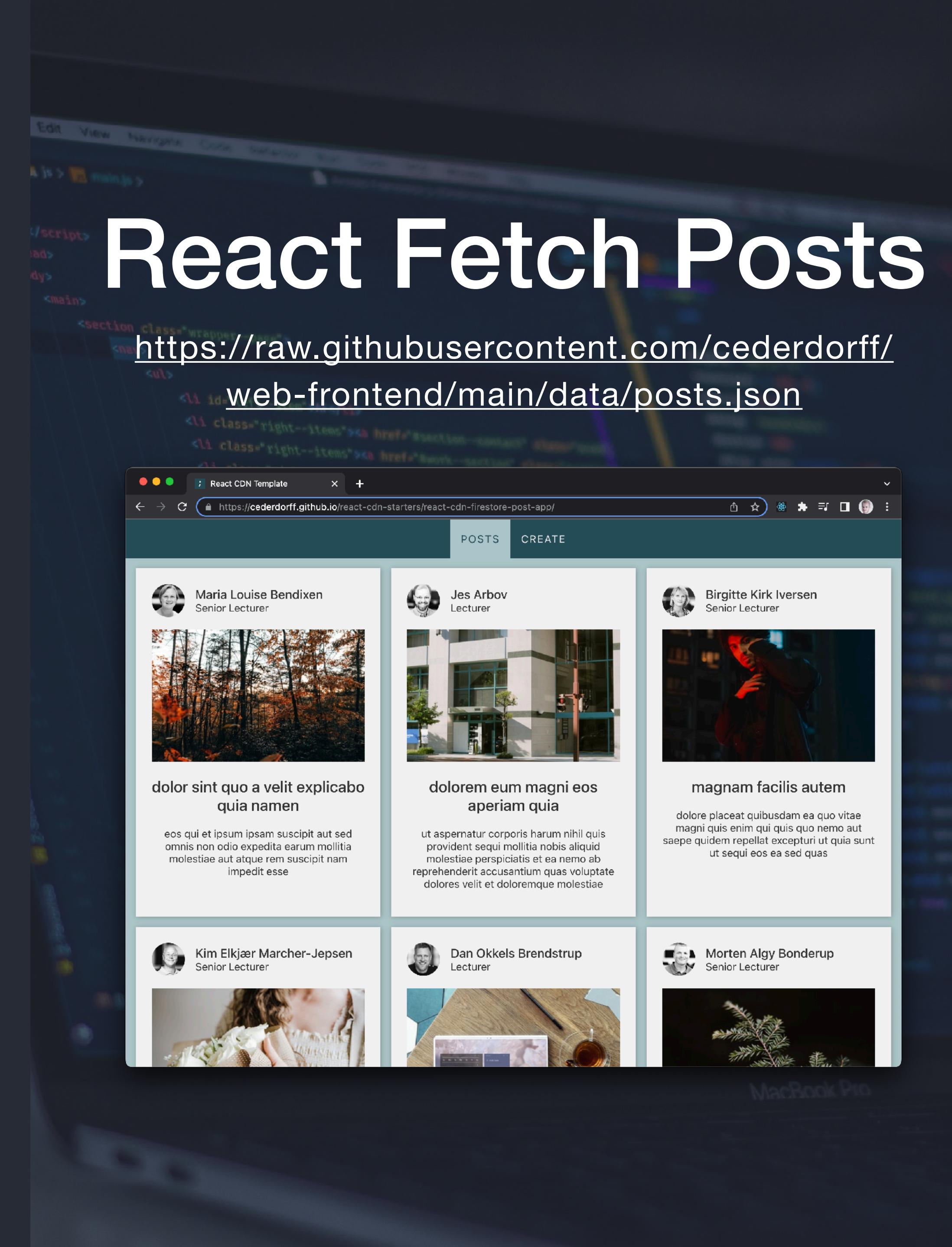
In useEffect, perform the sideeffect (fetch) to get data from a data source.  
And save the response data in a state using useState.

```
function PostsPage() {
  const [posts, setPosts] = useState([]);

  useEffect(() => {
    async function getPosts() {
      const url = "https://raw.githubusercontent.com/cederdorff/web-frontend/main/data/posts.json";
      const response = await fetch(url);
      const data = await response.json();
      setPosts(data);
    }
    getPosts();
  }, []);

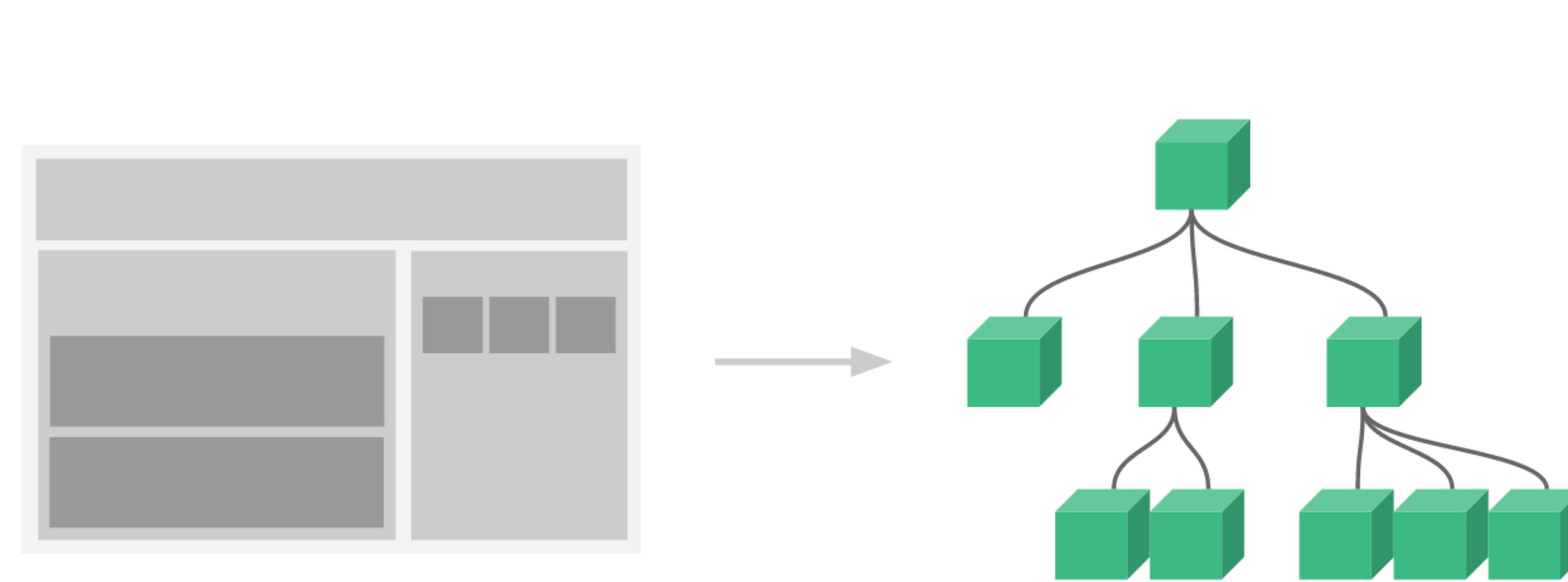
  return (
    <section className="page">
```

1. Use a new create project. The goal is to fetch and display a grid of posts using `useState` and `useEffect` (See screen dump to the right).
2. Create a component called `Posts` returning a section with an `h1` (with a title) and another section as your grid container. Render the `Post` component in the `App` and test it in the browser.
3. In `Posts` component, implement a state called `posts`. The state must be initialised with an empty array in `useState`.
4. Use `useEffect` to fetch post data from the URL to the right. Save the fetched posts in the state. Use `console.log(...)` to test your fetch call.
5. In the grid container, map through the `posts` state and create an `article` for every post (similar to the JS Fetch Posts exercise). Display the properties `image`, `title` and `body` in matching HTML tags inside of the `article` tag. Also add a `key` attribute on the `article` tag using the `post.id` value.

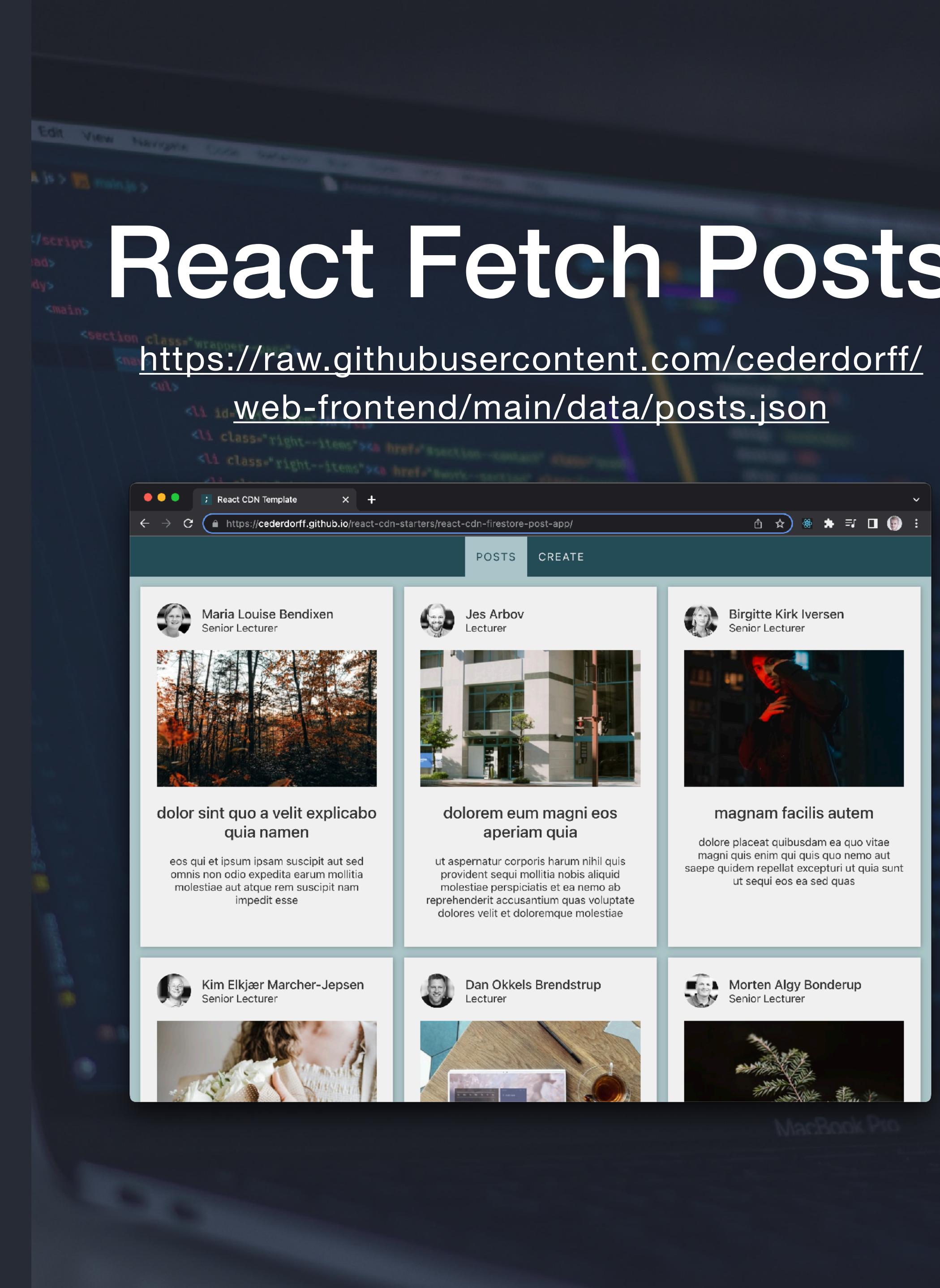


# Build Reusable Components

UI can be broken down to small block or modules called components. We strive for independent (and small) components.



6. Split your Posts component into more components. Start by creating a new component called PostCard.
7. Extract the post article logic from the Posts component to the PostCard component (only the article not the .map part).
8. Make sure PostCard takes in a prop called post. Use the prop to render the post in PostCard.
9. Inside of your .map in your Posts component render a PostCard and pass in post as a prop. A PostCard component will be rendered for every post. Remember to add a key attribute on the PostCard. (and remove it from the article).



# useContext()

<https://www.youtube.com/watch?v=TNhalSOUy6Q&t=356s>

# useContext(...)

... a way to manage state globally.

It allows us to share data across components without prop drilling.

```
// App.jsx
export const UserContext = createContext();

const user = { name: "RACE" };

export default function App() {
  return (
    <UserContext.Provider value={user}>
      <main>
        <Routes>
          <Route path="/" element={<Home />} />
          <Route path="/profile" element={<Profile />} />
        </Routes>
      </main>
    </UserContext.Provider>
  );
}
```

```
// Home.jsx
import { useContext } from "react";
import { UserContext } from "../App";

export default function Home() {
  const user = useContext(UserContext);

  return (
    <>
      <h1>Home</h1>
      <h2>{user.name}</h2>
    </>
  );
}
```

```
// Profile.jsx
import { useContext } from "react";
import { UserContext } from "../App";

export default function Profile() {
  const user = useContext(UserContext);

  return (
    <>
      <h1>Profile</h1>
      <h2>{user.name}</h2>
    </>
  );
}
```

[https://www.w3schools.com/react/react\\_usecontext.asp](https://www.w3schools.com/react/react_usecontext.asp)

# Style your component

## Regular Stylesheet

```
import "./styles.css";

function NormalCSS() {
  return <p className="big-text">
    BIG!
  </p>;
}
```

Use `className` instead  
of `class`, because  
`class` is a restricted  
word in javascript

## Inline Styles

```
function InlineStyle() {
  return (
    <p
      style={{

        fontSize: 20,
        color: "#0000ff"
      }}
    >
      Blue Text
    </p>
  );
}
```

Double curly braces  
because you're defining  
a JS object inside of JSX

Camel case  
attributes

Values like colors  
must be in strings

# Shorter and simpler way to do if/else

The screenshot shows a web browser window with the title "Conditional branching: if, ?" and the URL <https://javascript.info/ifelse#conditional-operator>. The page content is about the conditional operator (ternary operator). It includes a sidebar with navigation links for chapters like "JavaScript Fundamentals" and "Lesson navigation". The main content area has a heading "Conditional operator '?'". It explains that sometimes we need to assign a variable depending on a condition, and provides an example code snippet:

```
1 let accessAllowed;
2 let age = prompt('How old are you?', '');
3
4 if (age > 18) {
5   accessAllowed = true;
6 } else {
7   accessAllowed = false;
8 }
9
10 alert(accessAllowed);
```

It then states that the so-called "conditional" or "question mark" operator lets us do that in a shorter and simpler way. It describes the syntax: `let result = condition ? value1 : value2;`. It explains that the `condition` is evaluated: if it's truthy then `value1` is returned, otherwise – `value2`. An example is shown:

```
1 let accessAllowed = (age > 18) ? true : false;
```

At the bottom of the page, there is an advertisement for "Kendo UI Kits for Figma: Material, Bootstrap, Default" with a "GET UI KITS" button.

<https://javascript.info/ifelse#conditional-operator>  
Ternary Operator

# ? . is a safe way to access nested object properties

The screenshot shows a dark-themed web browser window displaying the [JavaScript.info](https://javascript.info/optional-chaining) website. The page title is "Optional chaining '?.'". The URL in the address bar is <https://javascript.info/optional-chaining>. The page content is about optional chaining, specifically addressing the "non-existing property" problem. It includes a note that it's a recent addition and may need polyfills. A code example shows attempting to access a non-existent property without causing an error.

Chapter  
Objects: the basics

Lesson navigation  
The "non-existing property" problem  
Optional chaining  
Short-circuiting  
Other variants: `?()`, `?[]`  
Summary

Comments

Share

[Edit on GitHub](#)

LogicMonitor

Intelligent insights you can actually use. Smarter troubleshooting, more possibilities for your applications.

A recent addition

This is a recent addition to the language. Old browsers may need polyfills.

The optional chaining `?.` is a safe way to access nested object properties, even if an intermediate property doesn't exist.

## The "non-existing property" problem

If you've just started to read the tutorial and learn JavaScript, maybe the problem hasn't touched you yet, but it's quite common.

As an example, let's say we have `user` objects that hold the information about our users.

Most of our users have addresses in `user.address` property, with the street `user.address.street`, but some did not provide them.

In such case, when we attempt to get `user.address.street`, and the user happens to be without an address, we get an error:

```
1 let user = {}; // a user without "address" property
2
3 alert(user.address.street); // Error!
```

<https://javascript.info/optional-chaining>

# ?? returns the first argument if it's not null/undefined

The screenshot shows a dark-themed web browser window displaying the [Nullish coalescing operator ??](https://javascript.info/nullish-coalescing-operator) article from the [JavaScript.info](https://javascript.info) website.

The page title is "Nullish coalescing operator '??'" and the subtitle indicates it is a "Recent addition". A note states: "This is a recent addition to the language. Old browsers may need polyfills."

The main content explains that the nullish coalescing operator is written as two question marks `??`. It treats `null` and `undefined` similarly. The result of `a ?? b` is:

- if `a` is defined, then `a`,
- if `a` isn't defined, then `b`.

In other words, `??` returns the first argument if it's not `null/undefined`. Otherwise, the second one.

The nullish coalescing operator isn't anything completely new. It's just a nice syntax to get the first "defined" value of the two.

We can rewrite `result = a ?? b` using the operators that we already know, like this:

```
1 result = (a !== null && a !== undefined) ? a : b;
```

The left sidebar contains a navigation menu with links to "Chapter", "JavaScript Fundamentals", "Lesson navigation", "Comparison with ||", "Precedence", "Summary", "Comments", "Share" (with Twitter and Facebook icons), and "Edit on GitHub". There is also an advertisement for "Ad by Carbon" featuring "PagerDuty" and an "eBook" titled "Best practices for full-service ownership".

<https://javascript.info/nullish-coalescing-operator>

# Vite

## Next Generation Frontend Tooling

Get ready for a development environment that  
can finally catch up with you.



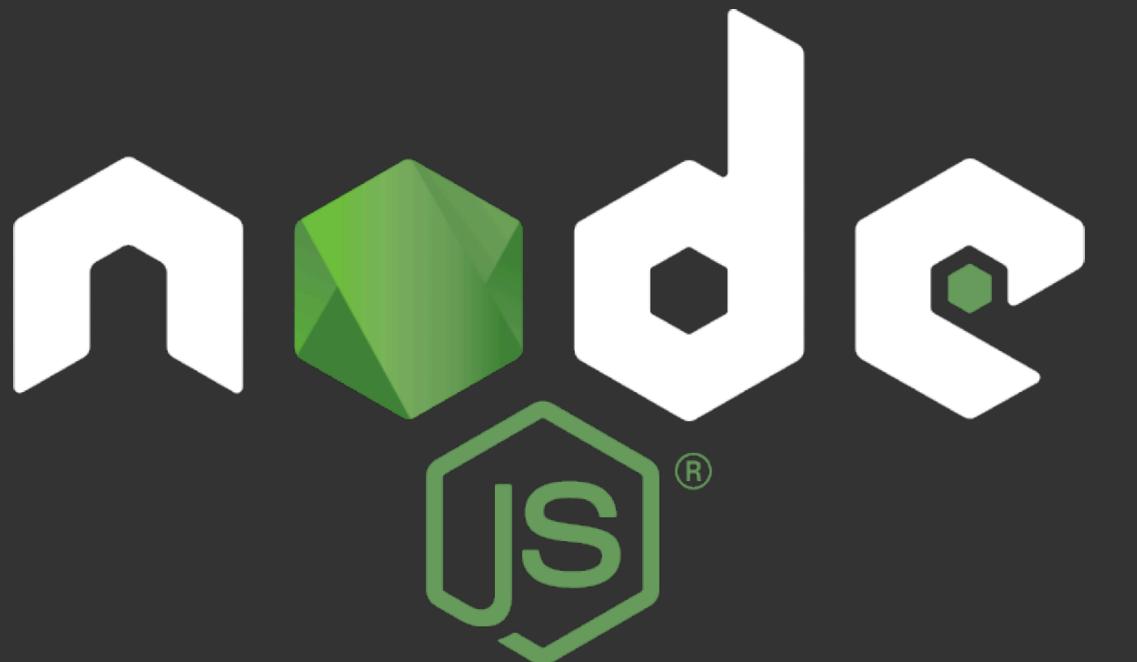
A modern build tool for web projects

<https://vitejs.dev/>

# React + Vite

Action	Past	Present and future
Create REACT development environment	<i>npx create-react-app .</i>	<ol style="list-style-type: none"><li>1. In the terminal: <i>npm create vite@latest</i></li><li>2. Type in a project name (= folder name)</li><li>3. Select "React" from the menu (keyboard arrow down and press Enter)</li><li>4. Select "JavaScript" from the menu (keyboard arrow down and press Enter)</li><li>5. In VS Code: Open project folder</li><li>6. In the terminal: <i>npm install</i></li></ol>
Live preview in browser	<i>npm start</i>	<i>npm run dev</i>
Build version to upload to your web hotel	<i>npm run build</i>	<i>npm run build</i> <ol style="list-style-type: none"><li>1. In "dist" folder: Update &lt;title&gt; in index.html and change the favicon.</li><li>2. Upload the content of the "dist" folder to your web hotel.</li></ol>
Preview the distribution version in browser before you upload to web hotel		<i>npm run preview</i>

Comments or questions? Feel free to write to [moab@eaaa.dk](mailto:moab@eaaa.dk)

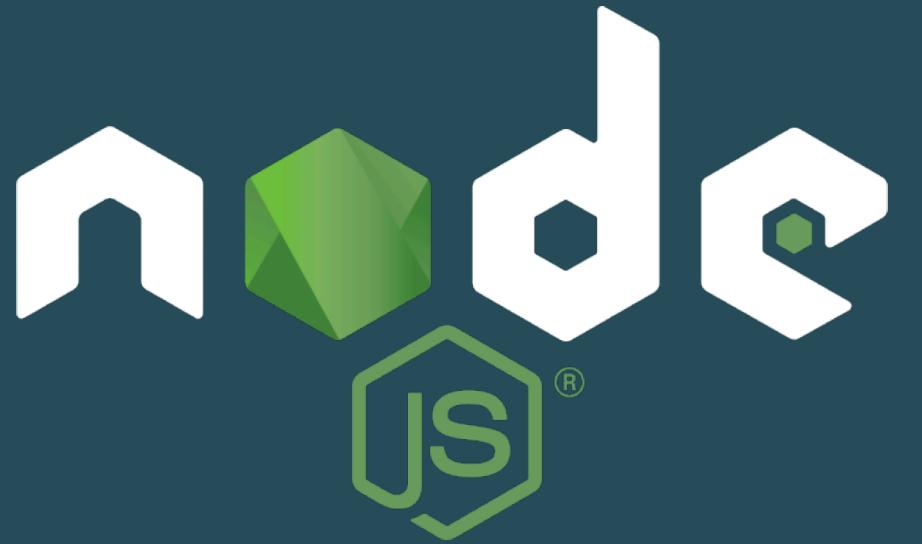


# Getting started

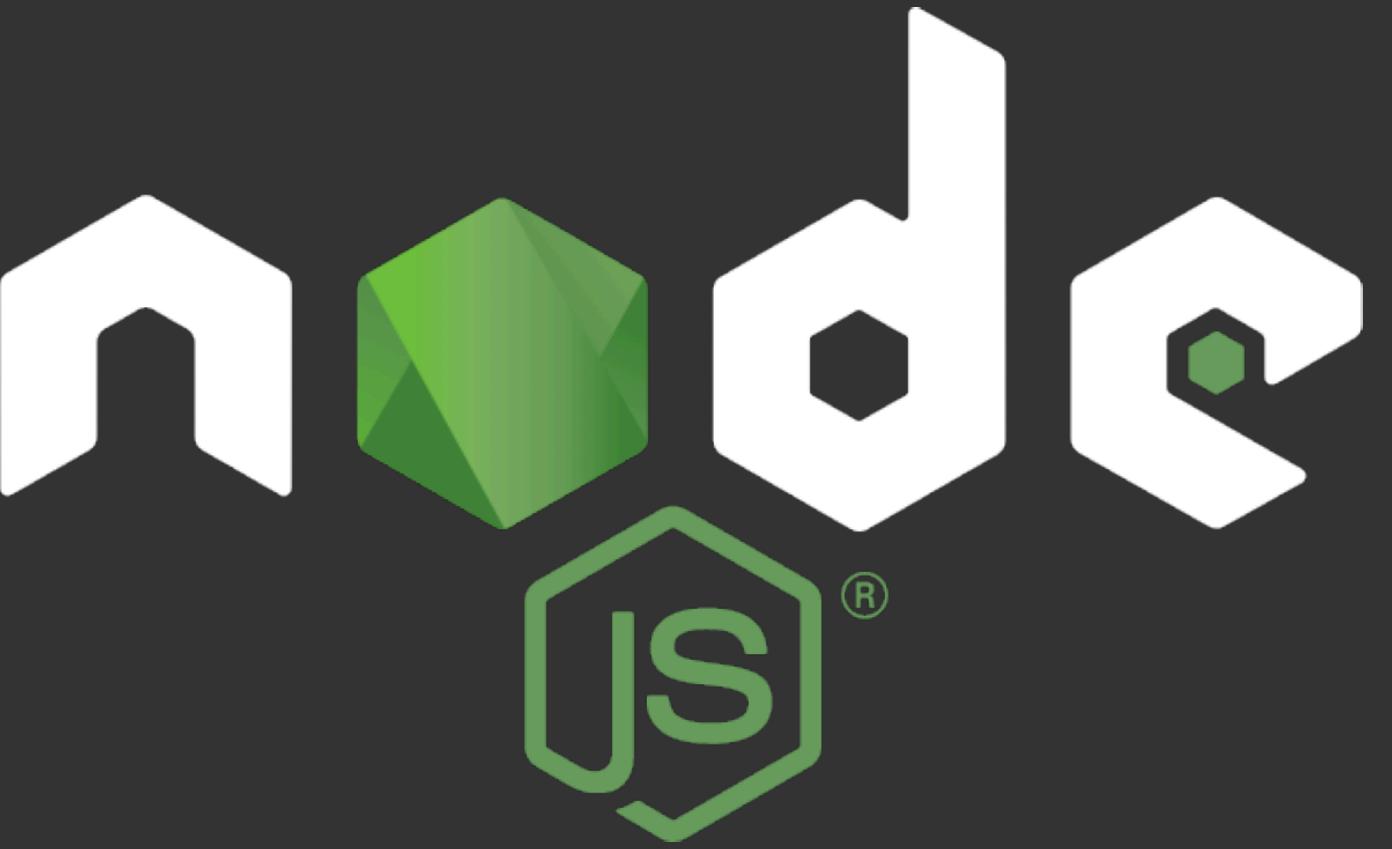
Download & install Node.js & NPM: [nodejs.org/en/](https://nodejs.org/en/)

Follow VS Code, Node.js & npm to make sure you have installed  
Node and NPM

Builds tools,  
Package Managers,  
Compilers, Transpilers,  
Module Bundlers &  
Command-line Interface (CLI)



It is simply just tools!



JavaScript runtime environment  
Executes JavaScript outside of the browser

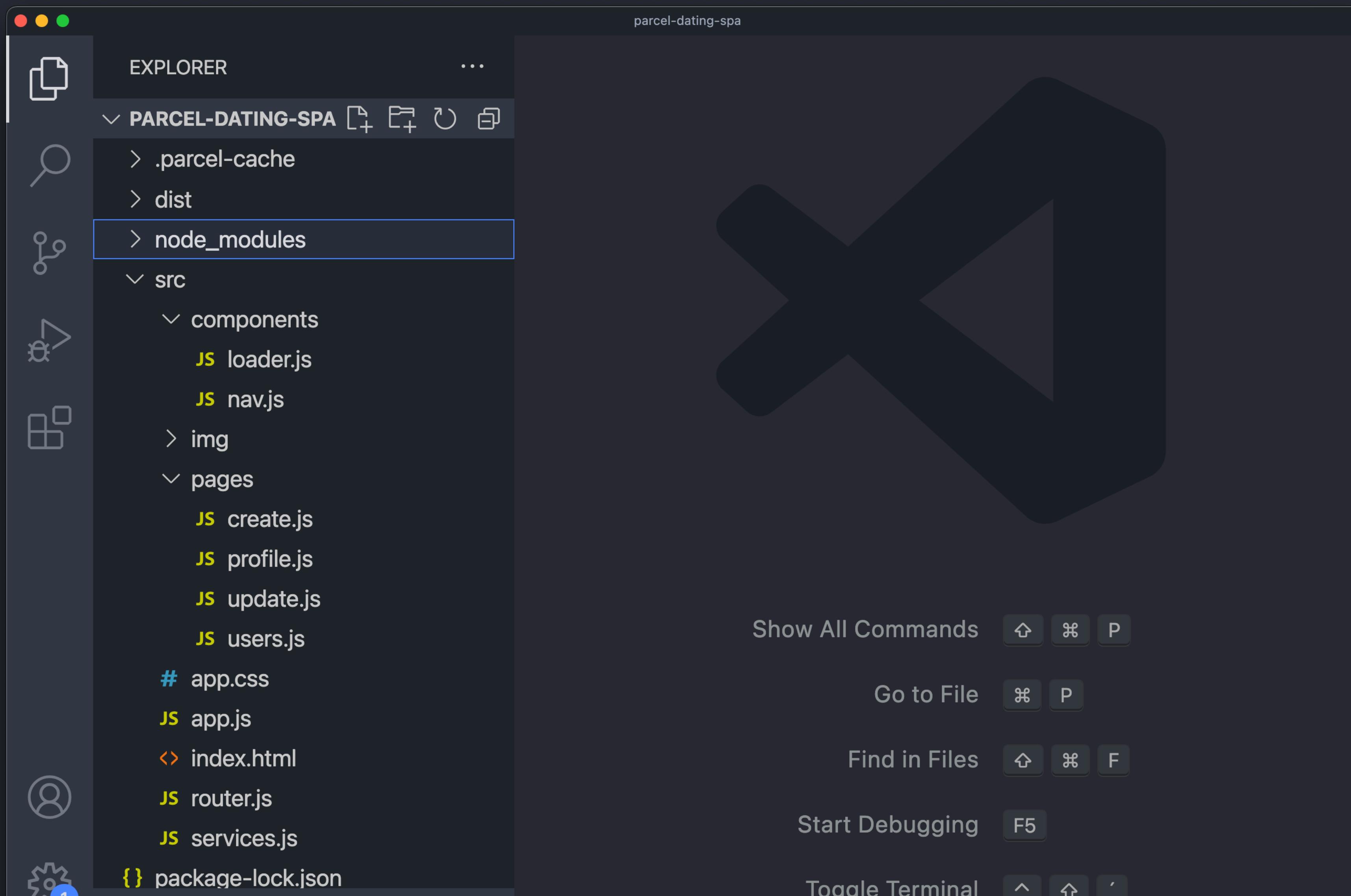
Npm is a package manager for node.js  
packages - or modules



Node.js packages contains all the files you need for  
a module.

Modules are JavaScript libraries you can include in  
your project.

# node\_modules



# npm consists of

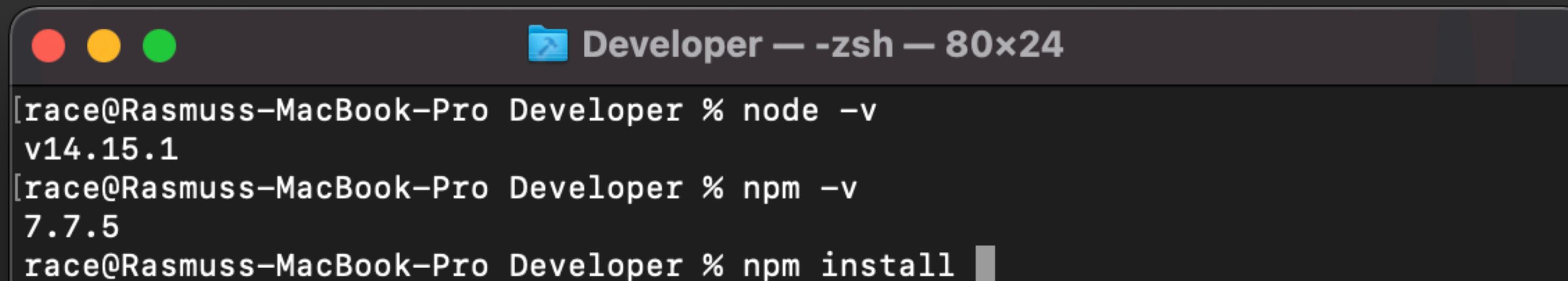
1. Website to discover packages
2. Command line interface (cli)
3. A registry - database with JS software / node modules

<https://docs.npmjs.com/about-npm/>

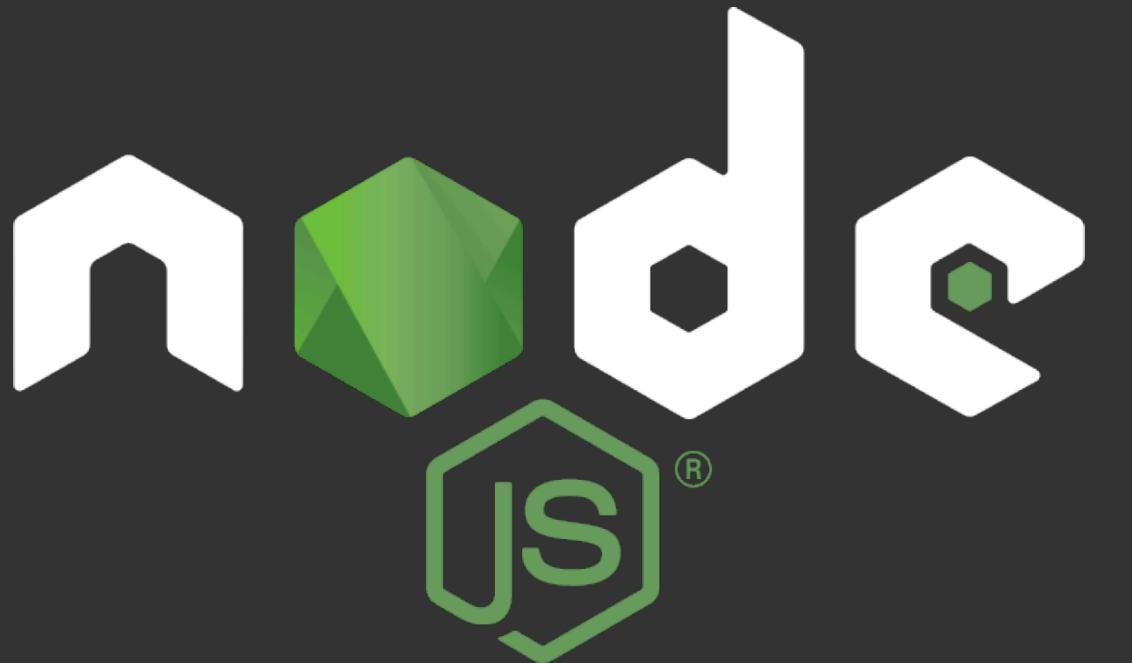
# Command Line Interface

... a program that allows users to type text commands to execute functions.

npm uses CLI to install software & packages.



```
[race@Rasmuss-MacBook-Pro Developer % node -v
v14.15.1
[race@Rasmuss-MacBook-Pro Developer % npm -v
7.7.5
race@Rasmuss-MacBook-Pro Developer % npm install ]
```



1. Download & install Node.js & npm: [nodejs.org/en/](https://nodejs.org/en/)
2. Check your version of npm & Node.js

```
race@macbookpro-9720 ~ % node -v
v16.13.1
race@macbookpro-9720 ~ % npm -v
8.6.0
race@macbookpro-9720 ~ %
```

**EXPLORER**

REACT-PROJECTS

- > react-carousel
- > react-firebase-hooks
- > react-firebase-favorite-
- > react-firebase-post-ap
- > react-firebase-read-create
- > react-spa-template
- > react-user-crud

New Terminal ⌘T

Split Terminal ⌘⇧T

Run Task...

Run Build Task... ⌘B

Run Active File

Run Selected Text

Show Running Tasks...

Restart Running Task...

Terminate Task...

Configure Tasks...

Configure Default Build Task...

react-projects

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

```
race@macbookpro-9720 react-projects % node -v
v16.13.1
race@macbookpro-9720 react-projects % npm -v
8.6.0
race@macbookpro-9720 react-projects %
```

zsh + × □ └ ^ ×

# Web App

.. is any program executed in the browser

# Web App

.. is any program that performs a specific function  
by using a web browser as its client

# Web App

Do you know any web apps?

**HTML**



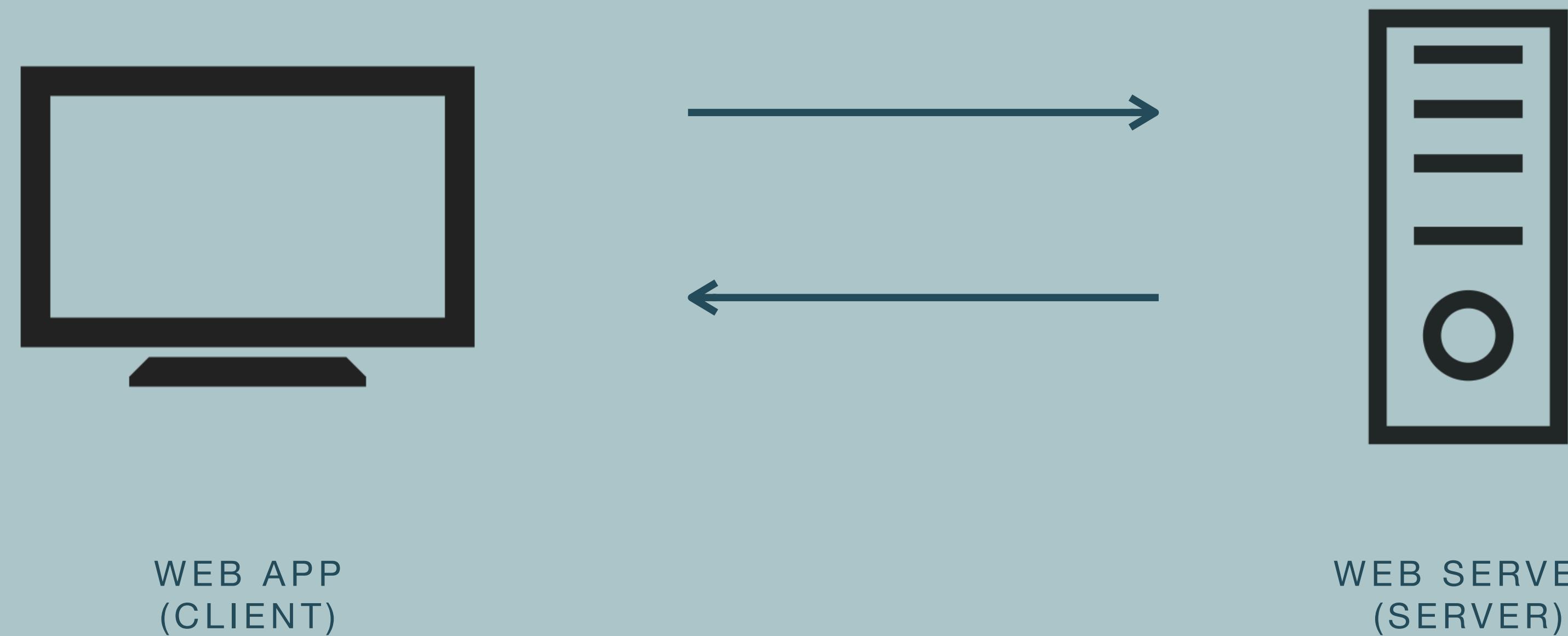
**JS**



**CSS**



# Web App



# Website

The user wants to get something!

# Web App

The user wants to do something!

# Web App

Web as Action

# Web App

Accessible anywhere, at any time!

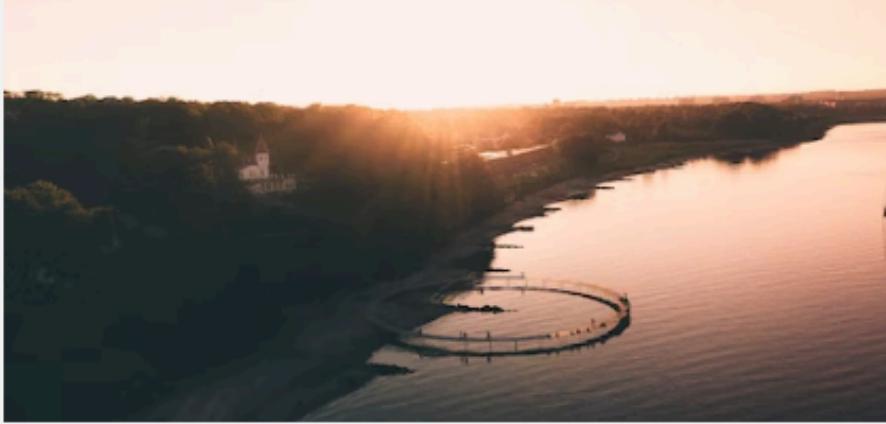
React SPA Starter

localhost:5173

HOME

# Posts

 **Maria Louise Bendixen**  
Senior Lecturer



Beautiful sunset at the beach

Invalid Date

 **Rasmus Cederdorff**  
Senior Lecturer



Newest

06/10/2023

 **Line Skjødt**  
Senior Lecturer & Internship Coordinator



Exploring the city center of Aarhus

24/06/2023

 **Rasmus Cederdorff**  
Senior Lecturer



Exploring the city streets of Aarhus

24/06/2023

 **Dan Okkels Brendstrup**  
Lecturer



A beautiful morning in Aarhus

24/06/2023

 **Maria Louise Bendixen**  
Senior Lecturer



Serenity of the forest

19/06/2023

React SPA Starter

localhost:5173

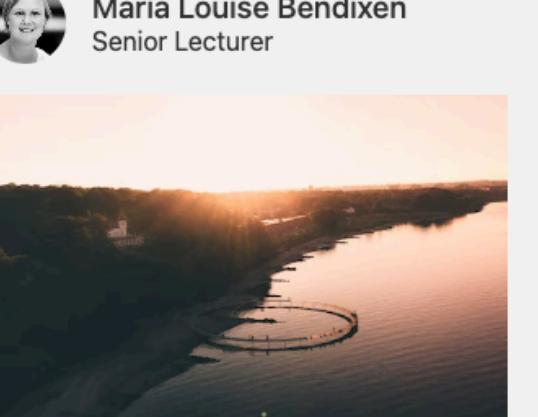
Apps KEA DAT DAT.js IT Arkitektur EAAA BOOKS Code & Templates Summer School -...

## HOME CREATE

# Posts

Sort by Newest Search by caption

Maria Louise Bendixen Senior Lecturer



Beautiful sunset at the beach

Invalid Date

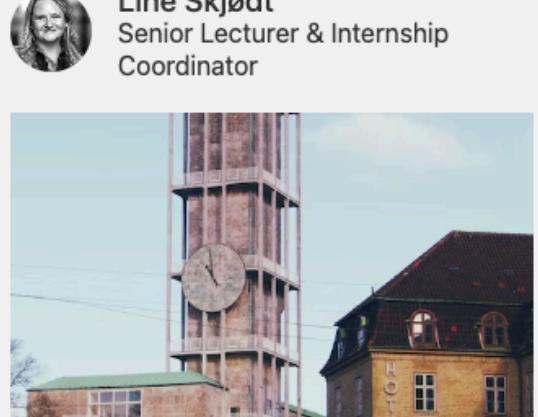
Rasmus Cederdorff Senior Lecturer



Newest

06/10/2023

Line Skjødt Senior Lecturer & Internship Coordinator



Exploring the city center of Aarhus

24/06/2023

Rasmus Cederdorff Senior Lecturer



Exploring the city streets of Aarhus

24/06/2023

Dan Okkels Brendstrup Lecturer



A beautiful morning in Aarhus

24/06/2023

Maria Louise Bendixen Senior Lecturer



Serenity of the forest

19/06/2023

React SPA Starter

localhost:5173/create

Apps KEA DAT DAT.js IT Arkitektur EAAA BOOKS Code & Templates Summer School -...

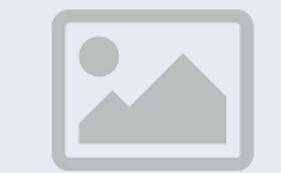
## HOME CREATE

# Create New Post

Body

Type a caption

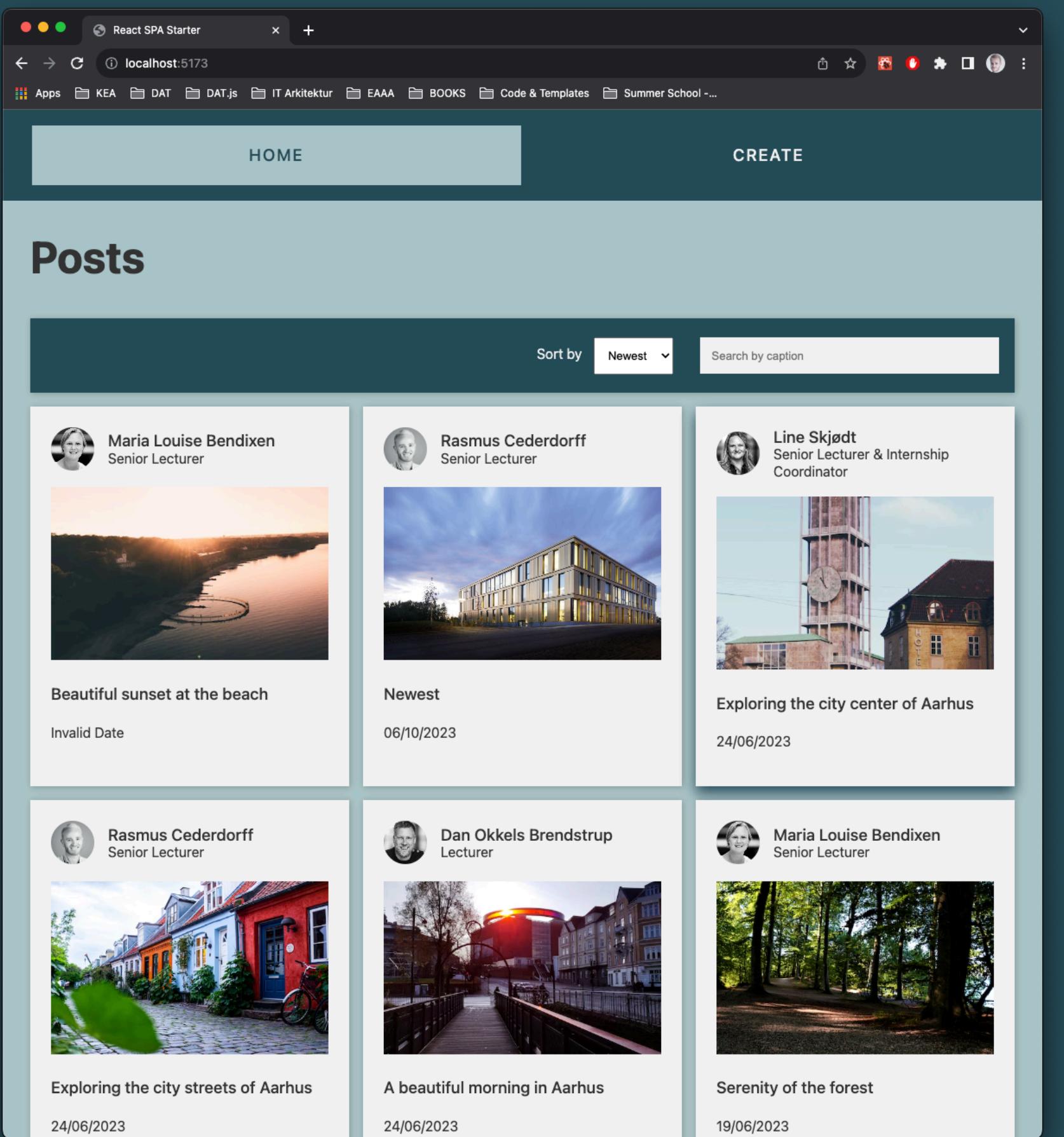
Image



SAVE

# Web App

- Any program or app executed in the browser.
- Any program that performs a specific function by using a web browser as its client
- The user wants to complete a task - to do something.
- Accessible anywhere, at any time.
- Not just about mobile devices.



# Web App

- Actions and functions
- Stored on a web server
- Using the browser as it's client:  
Launched and executed by the browser
- Accessible anywhere, anytime - on any  
device through the browser
- JavaScript, HTML & CSS
- Single Page Application
- Fetches data from data sources.



# Types of (Web) Apps

WEB BASED

BROWSER BASED

API BASED

SOFTWARE AS A SERVICE

NATIVE WEB APP/ HYBRID APPS

PROGRESSIVE WEB APP

# Single Page Apps

“A single-page application is an application that loads a single HTML page and all the necessary assets (such as JavaScript and CSS) required for the application to run. Any interactions with the page or subsequent pages do not require a round trip to the server which means the page is not reloaded.”

<https://reactjs.org/docs/glossary.html#single-page-application>

# “ SPA (Single-page application)

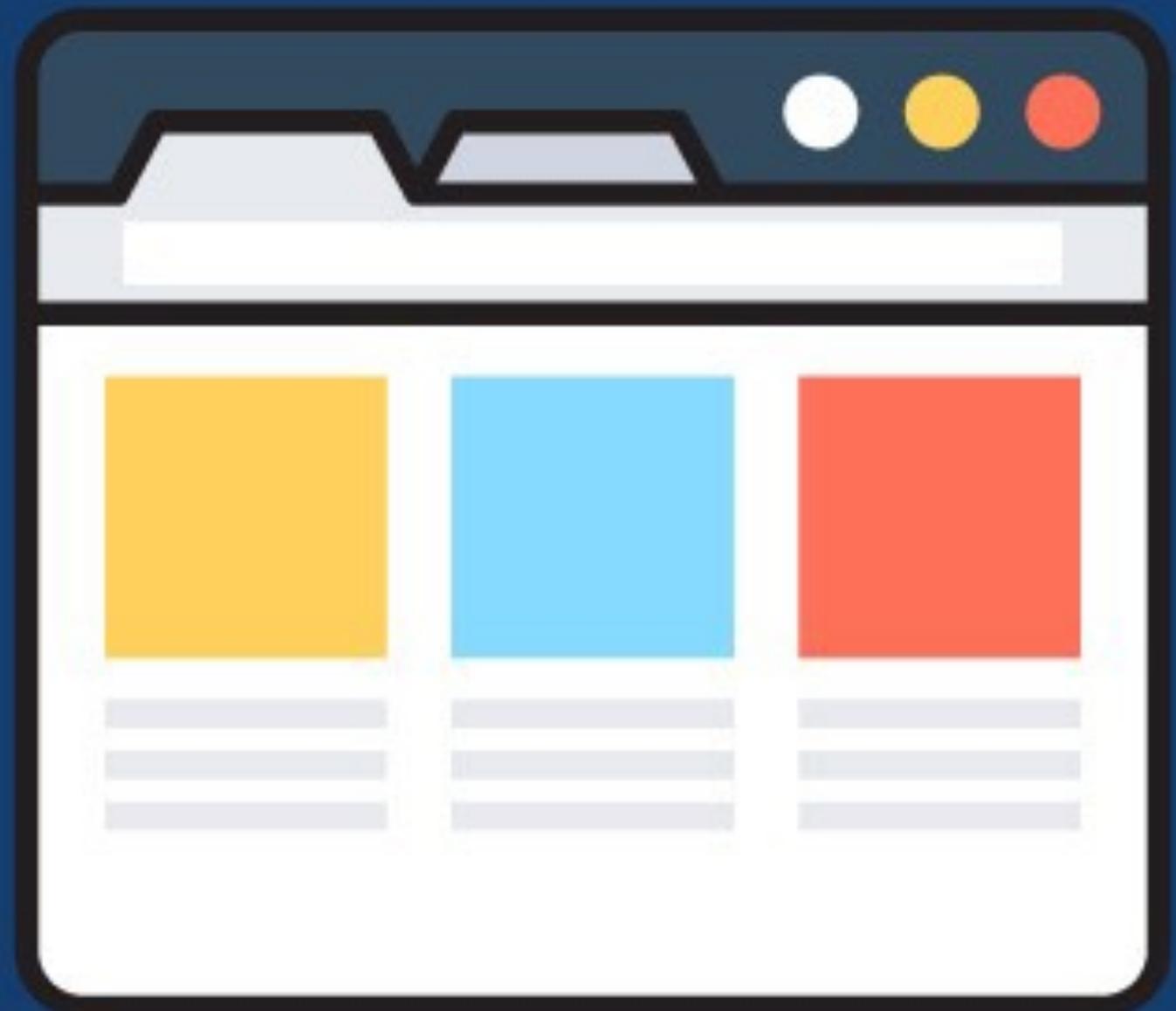
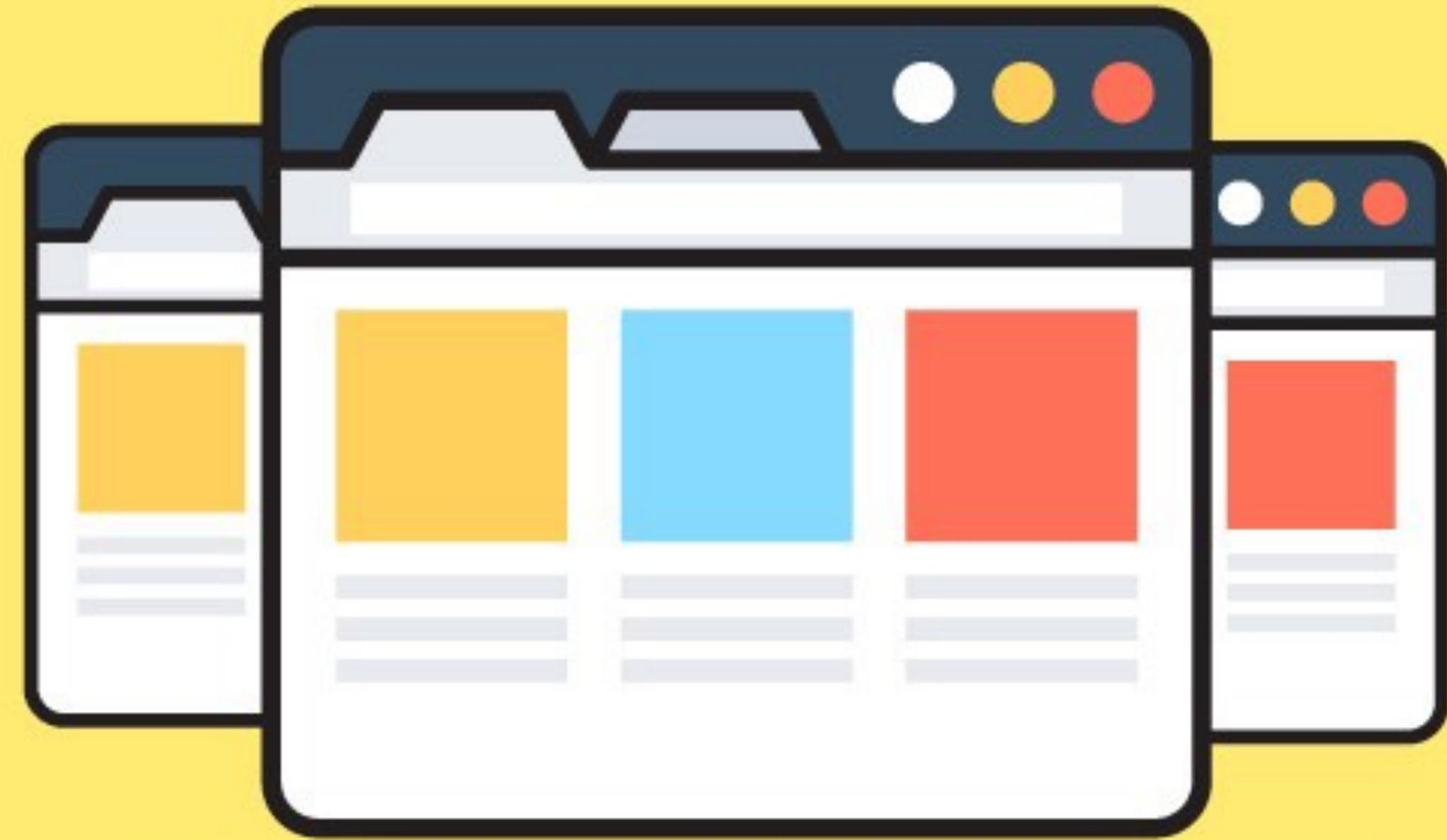
[...] is a web app implementation that loads only a single web document, and then updates the body content of that single document via JavaScript APIs such as XMLHttpRequest and Fetch when different content is to be shown.

This therefore allows users to use websites without loading whole new pages from the server, which can result in performance gains and a more dynamic experience, with some tradeoff disadvantages such as SEO, more effort required to maintain state, implement navigation, and do meaningful performance monitoring.

”

<https://developer.mozilla.org/en-US/docs/Glossary/SPA>

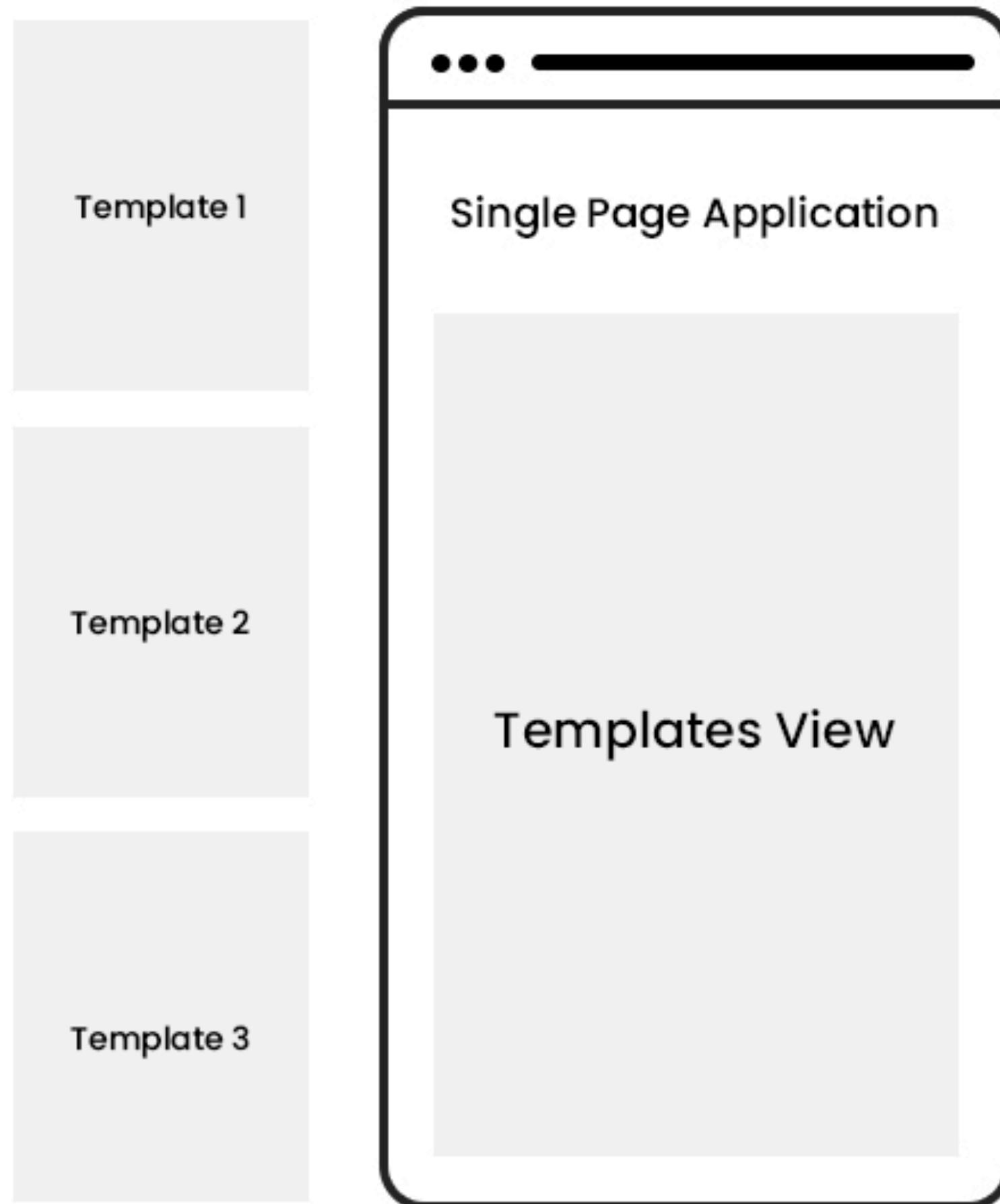
## MULTI PAGE APPLICATION



SINGLE PAGE APPLICATION

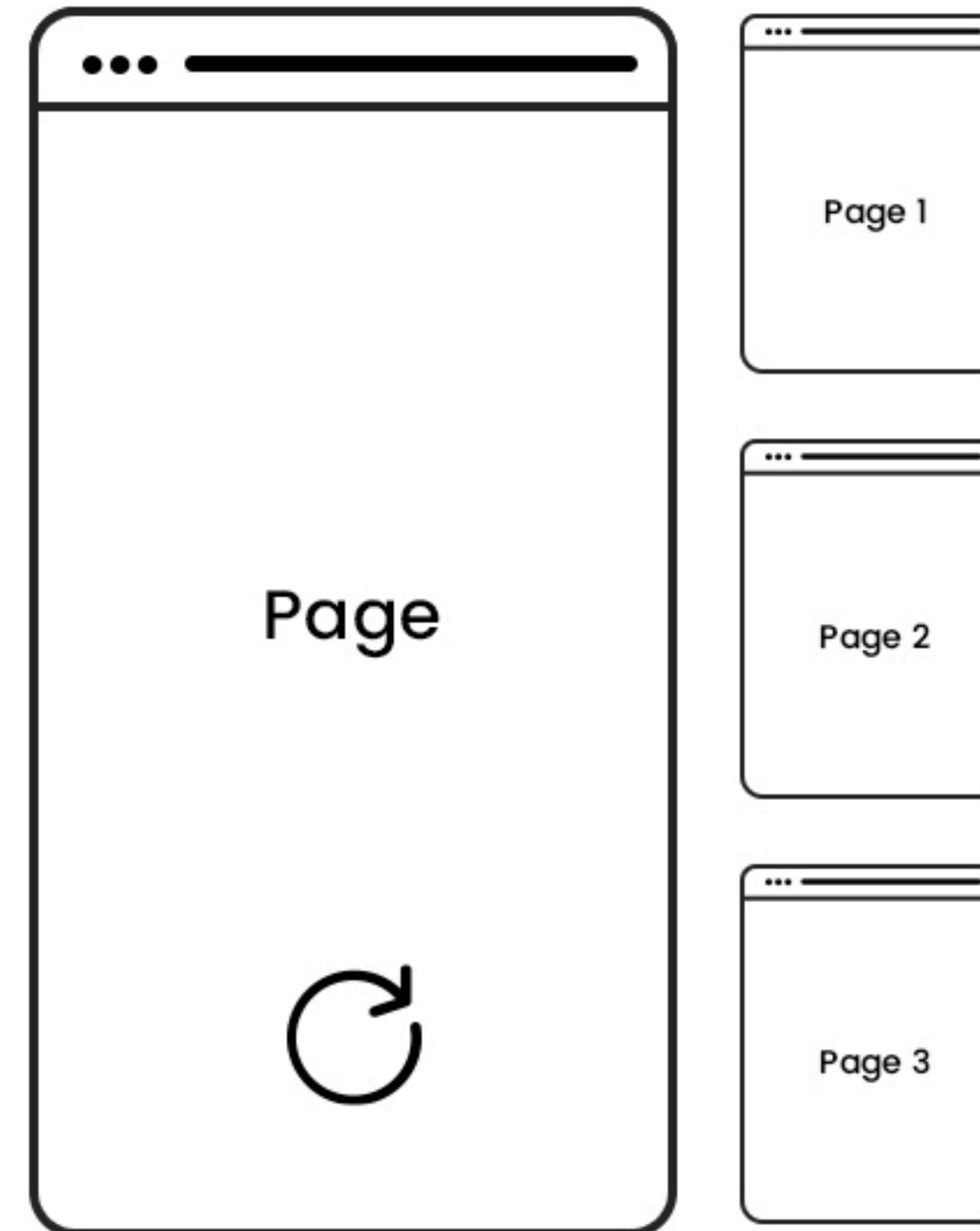
VS

# SPA



No page refresh on request

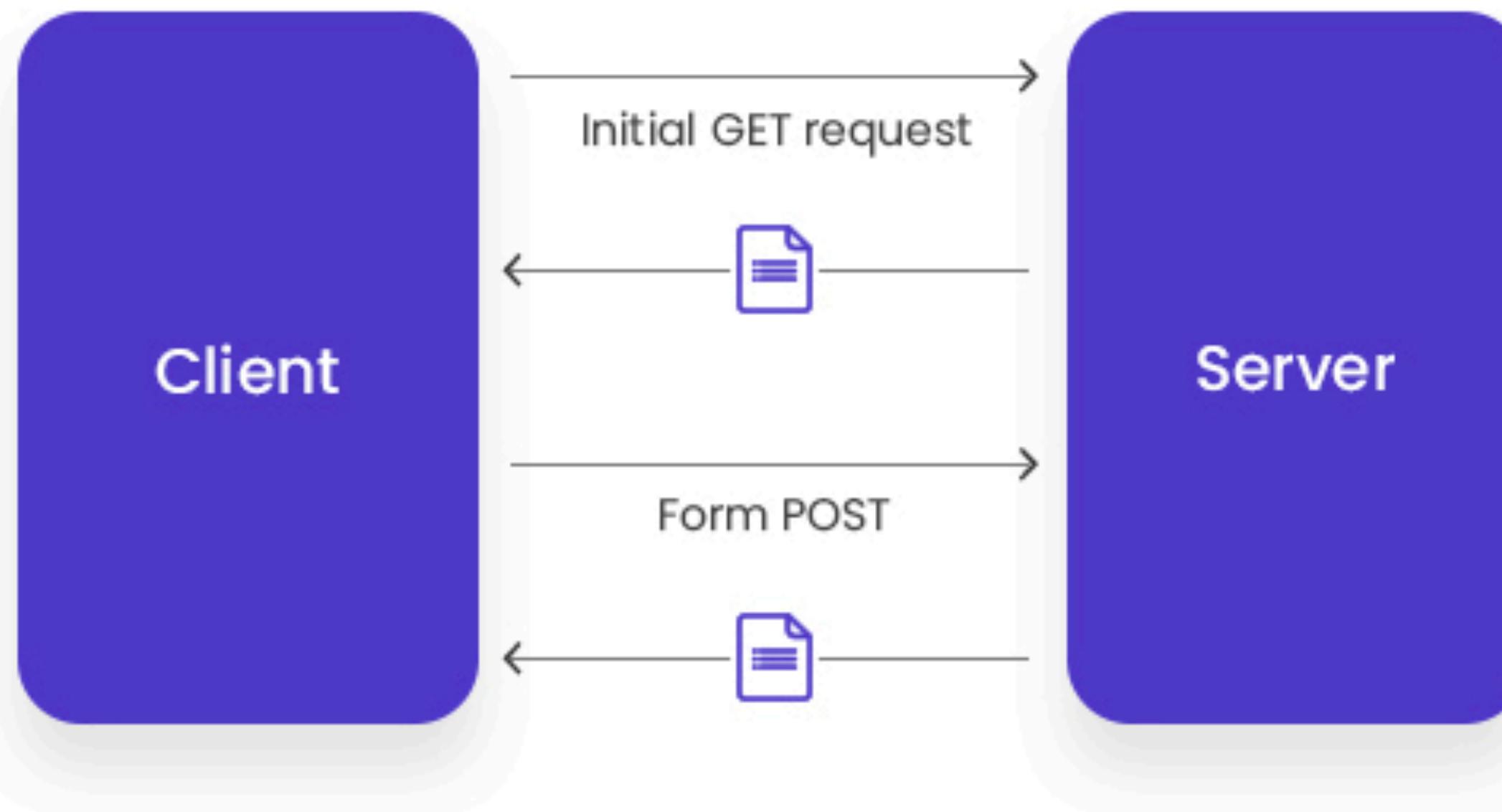
# MPA



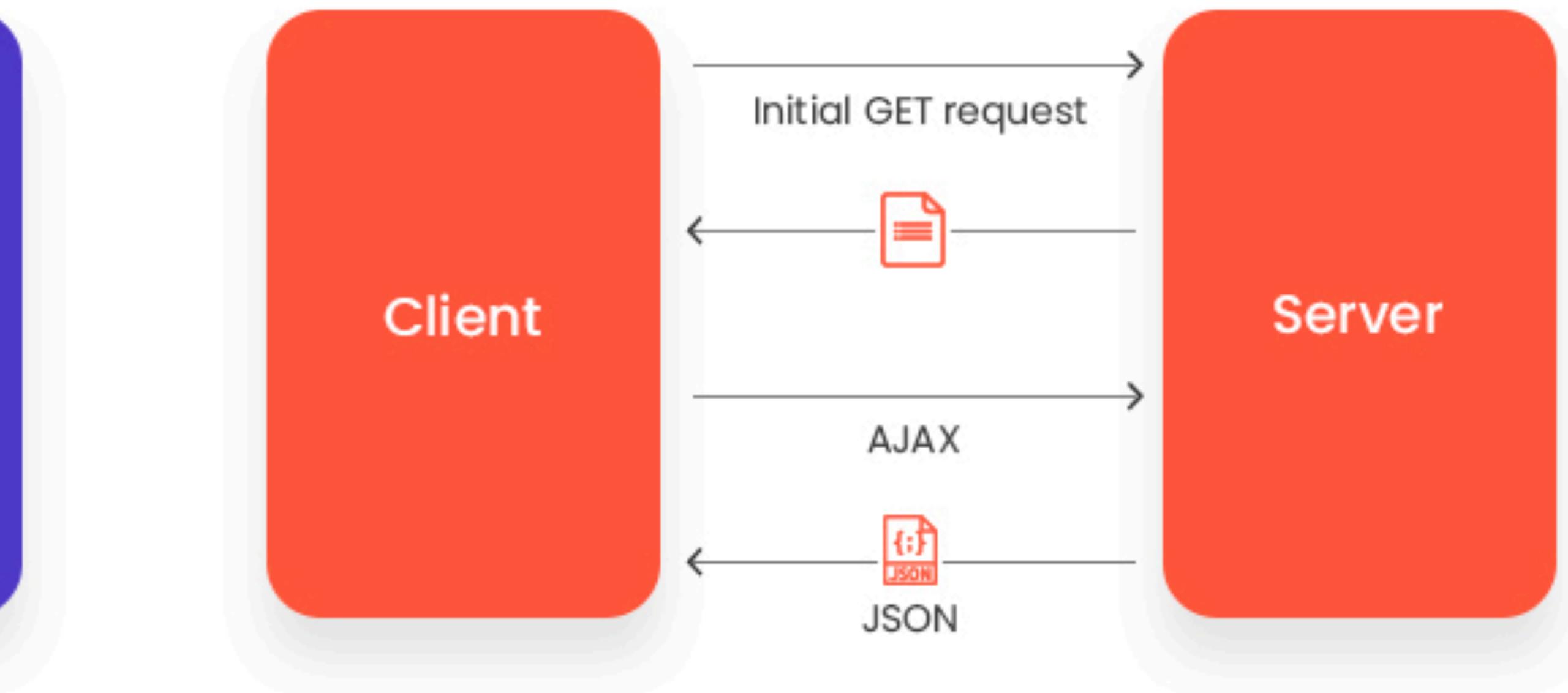
Whole page refresh on request

# MPA VS SPA

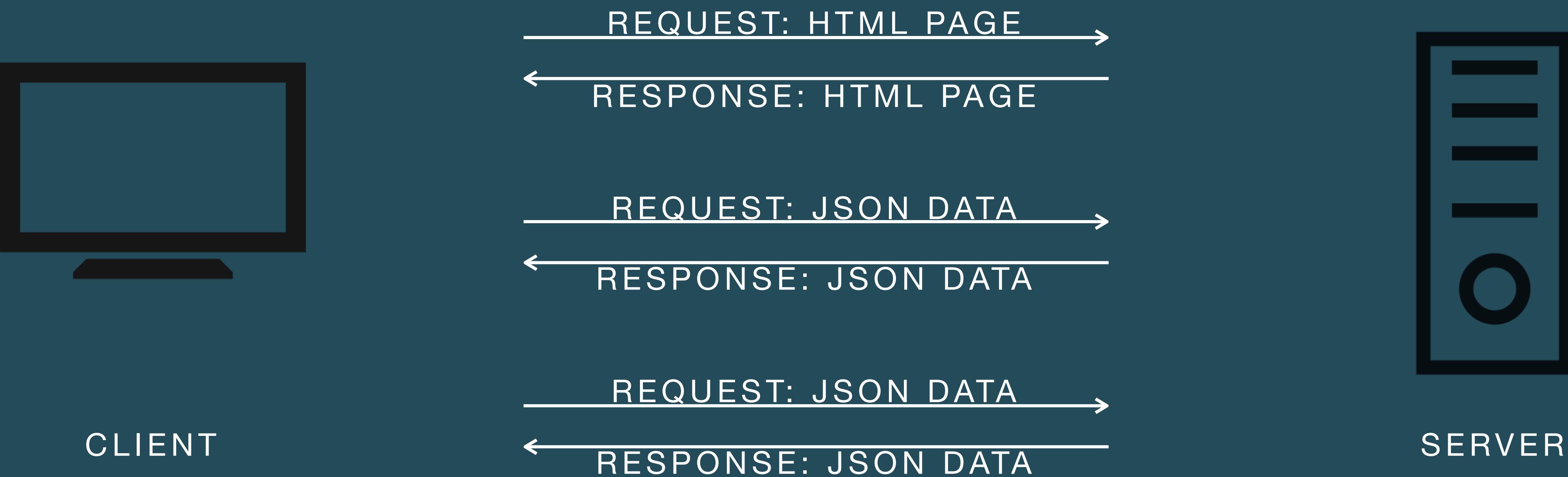
Traditional Page Lifecycle



SPA Lifecycle



# SPA - CLIENT SERVER



# The Architecture

Initial request

Traditional

Single Page  
Application

# The Architecture

Request a new page

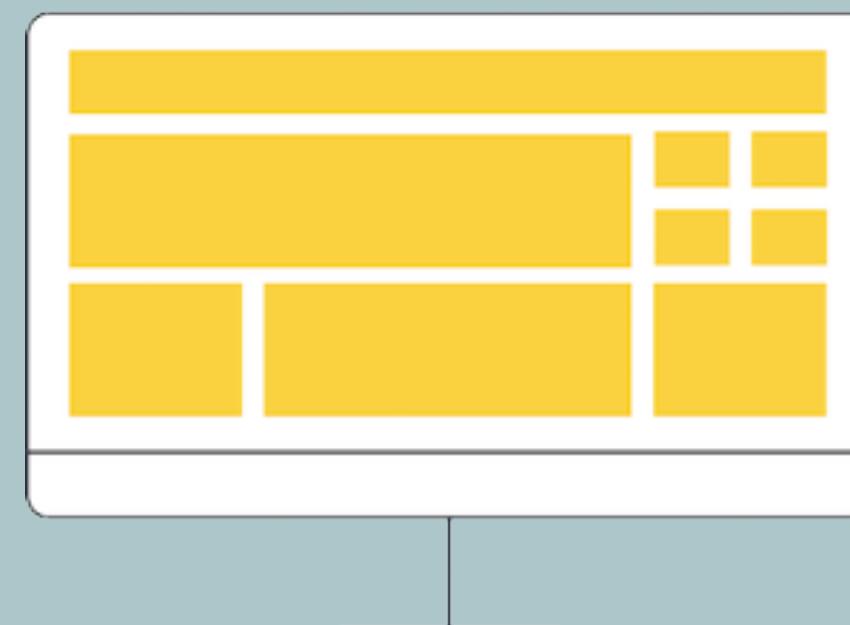
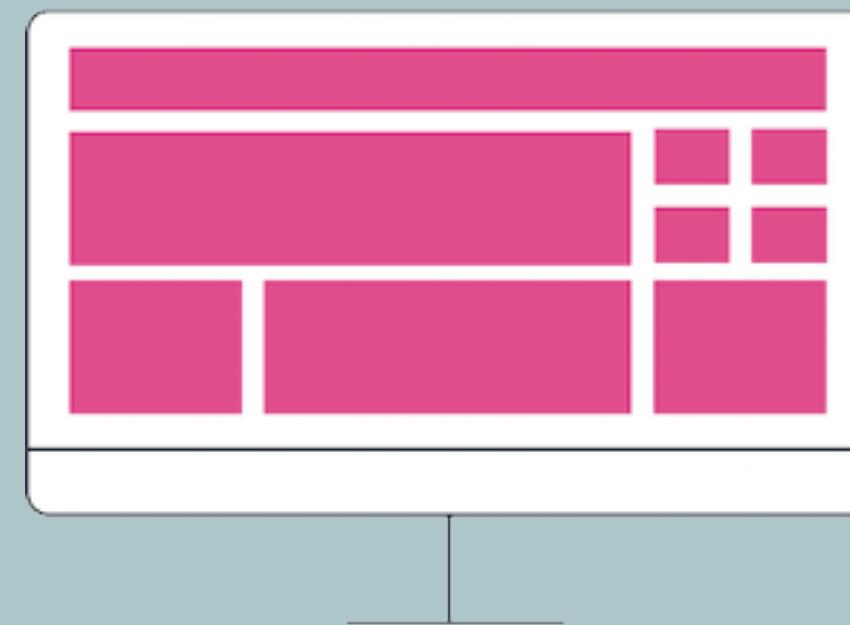
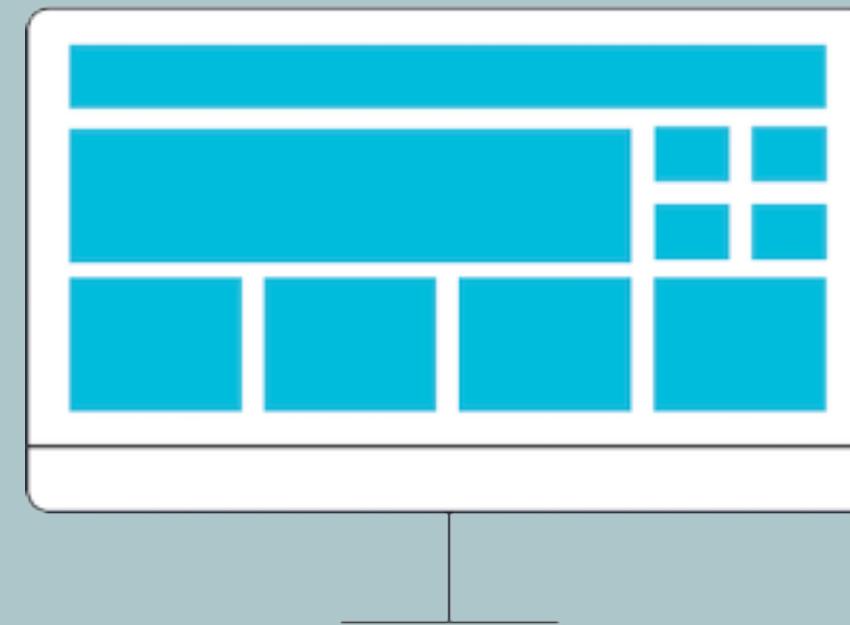
Traditional

Single Page  
Application

<https://www.bloomreach.com/en/blog/2018/what-is-a-single-page-application>

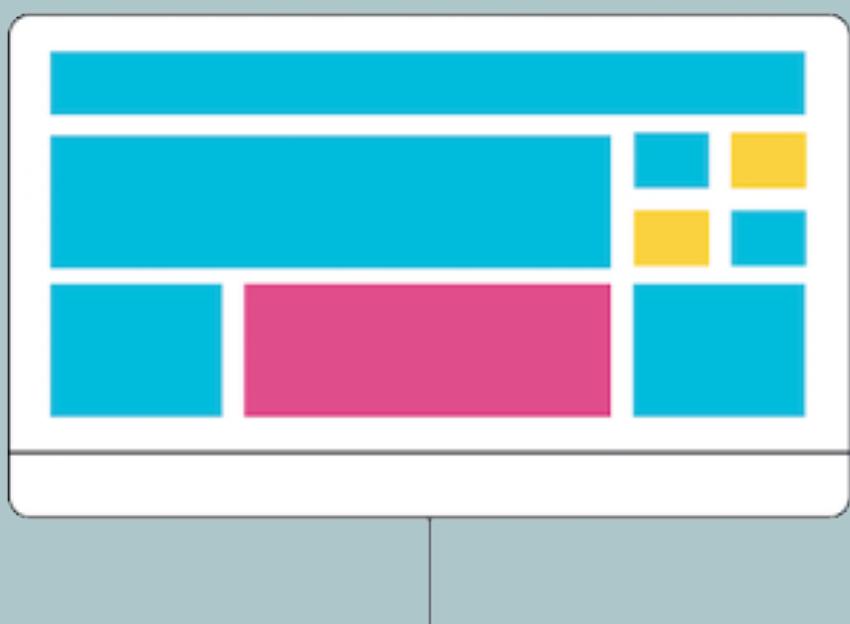
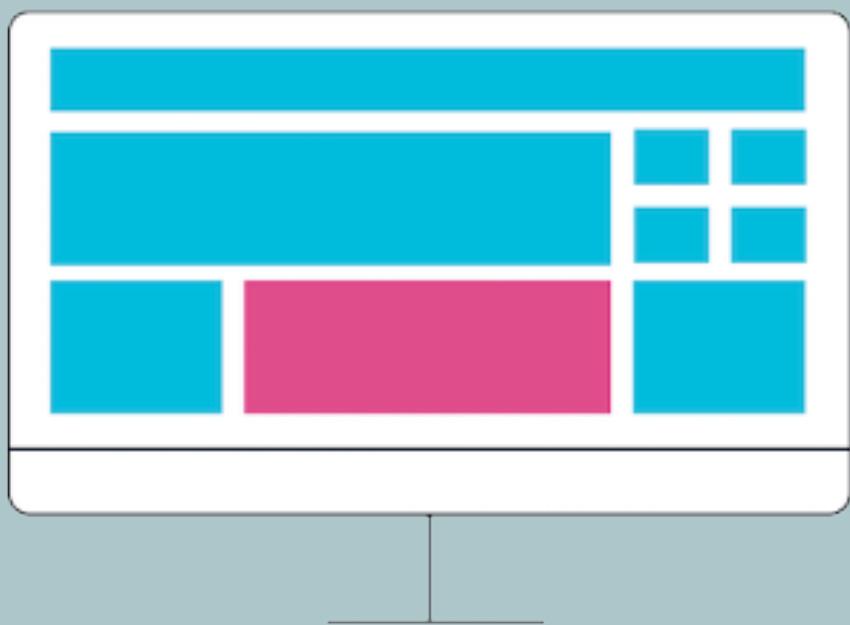
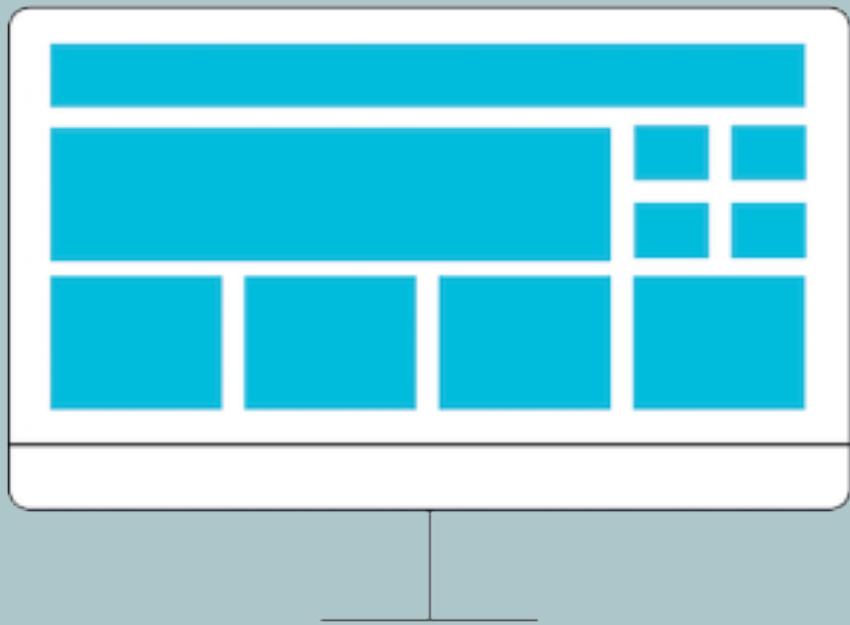
# MPA

- Every request for new information gives you a new version of the whole page.
- We have to load it all over again every time we want to change data and get new data.
- The browser has to render the page again.

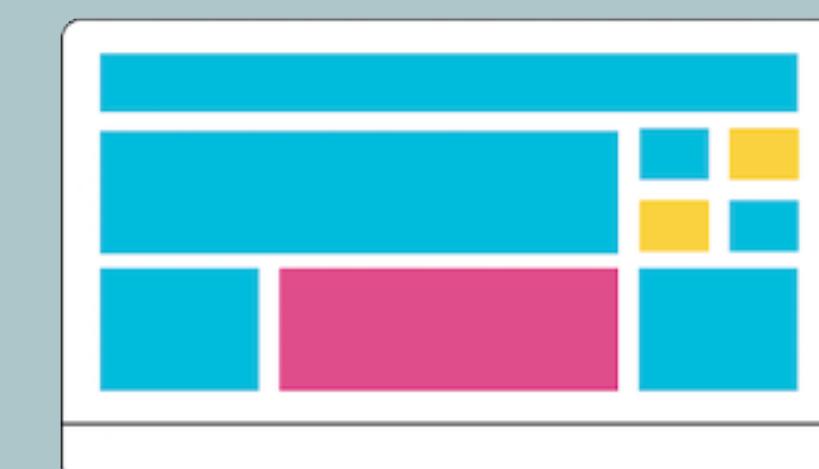
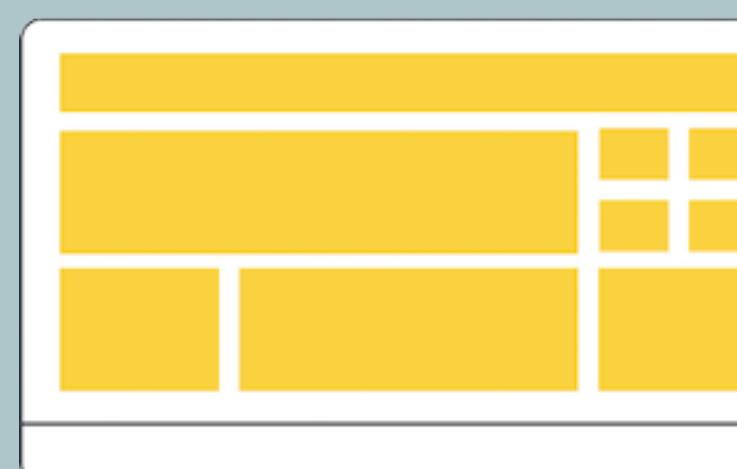
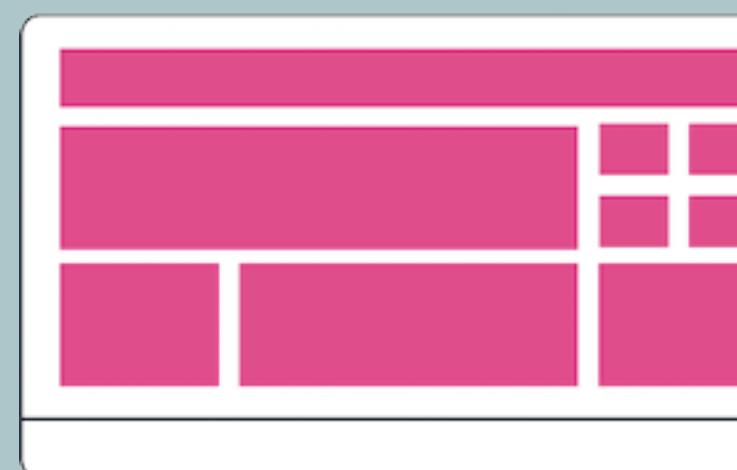
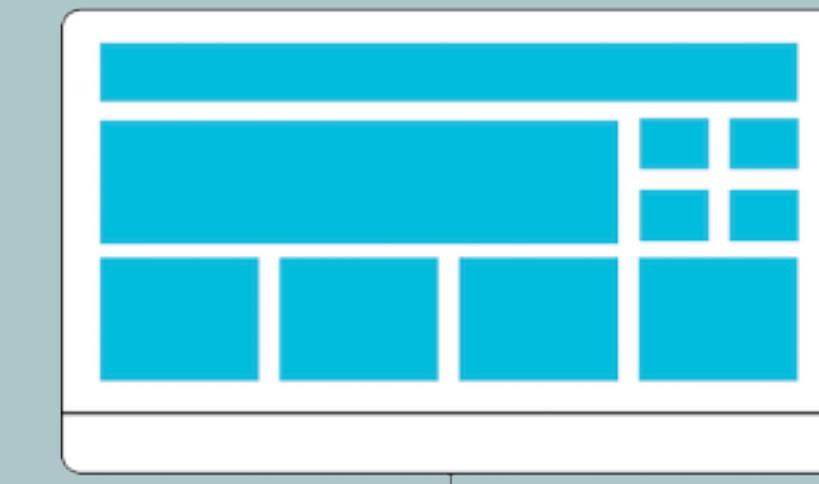
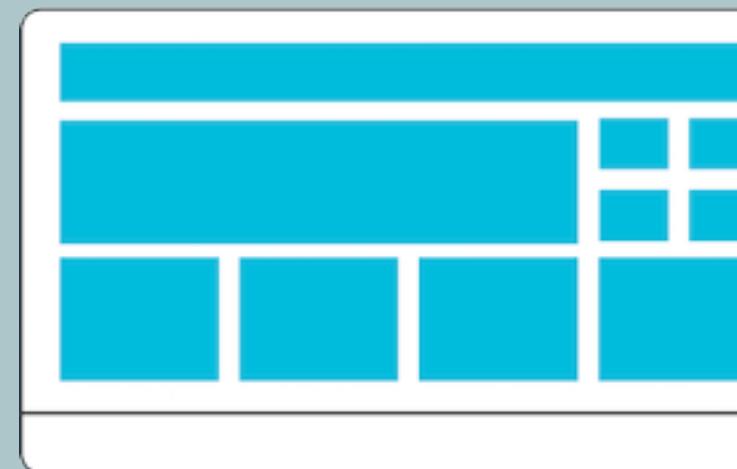


# SPA

- We only request and load the data we want.
- No page reload/ refresh.
- Client-side & JavaScript.
- Less server work is required.
- Advanced UI & Animations on page change.
- Better performance.



# MPA VS SPA



# SPA's



Instagram

- Home
- Search
- Explore
- Messages (4)
- Notifications
- Create
- Profile
- More

**forgoodcode**

ABI Bouhmaida @forgoodcode

### 1. Communication:

- Listen without interrupting
- Speak with a positive tone
- Pay attention to your body language.

Liked by chrisostomusgalangg and others

forgoodcode 9 soft skills to fast-track your career....

View all 30 comments

2 DAYS AGO

Rasmus Cederdorff (@cederdorff)

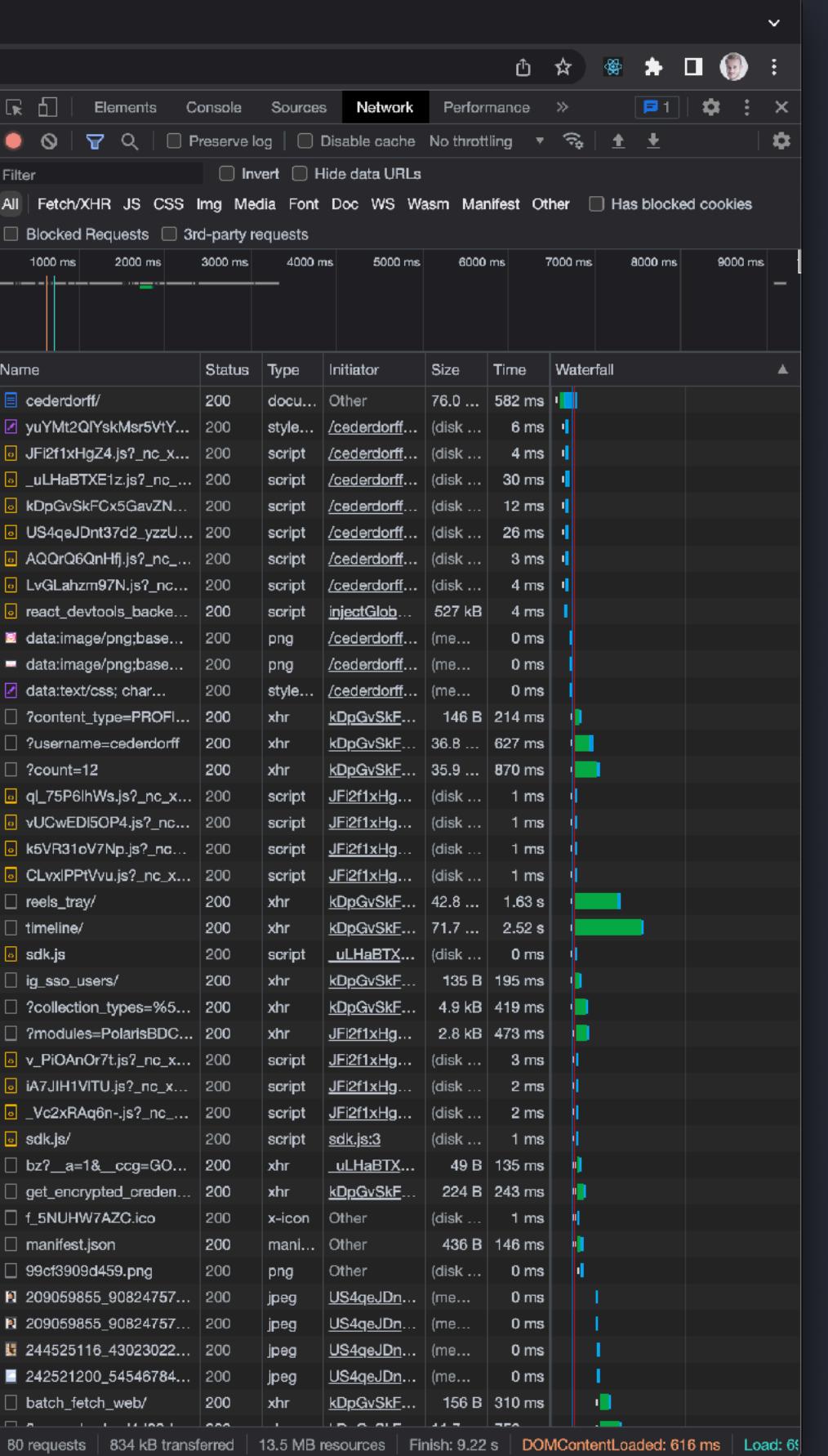
182 posts 5,390 followers 673 following

**Rasmus Cederdorff**  
Senior Lecturer @keacph  
Web App Developer  
Alicia & Ida  
Denmark  
[cederdorff.com](http://cederdorff.com)

AMSTERD... LONDON 22 Karla & Pi... @villacph IDA 5 YEA... @AAJKJR

**POSTS** **SAVED** **TAGGED**

<https://i.instagram.com/?u=http%3A%2F%2Fcederdorff.com%2F&e=AT...>



A close-up photograph of a person's hands interacting with a black Wi-Fi router. One hand is holding a blue Ethernet cable and is in the process of plugging it into one of the four yellow LAN ports on the front panel of the router. The router has three external black antennas. The background is blurred.

# What's a Router?

# What's a Router?

*“It is the piece of software in charge to organize the states of the application, switching between different views.”*

It's a key component in Single Page Applications.

# SPA & Router

In a SPA the router is in charge of displaying the right view by watching changes on the URL.

The router makes it look like the web app has multiple pages and HTML files. But it's just changing the view of what is displayed inside the single `index.html` file. The page transition and change of content are done dynamically by JavaScript.

[https://medium.com/@fro\\_g/routing-in-javascript-d552ff4d2921](https://medium.com/@fro_g/routing-in-javascript-d552ff4d2921)



/create  
route

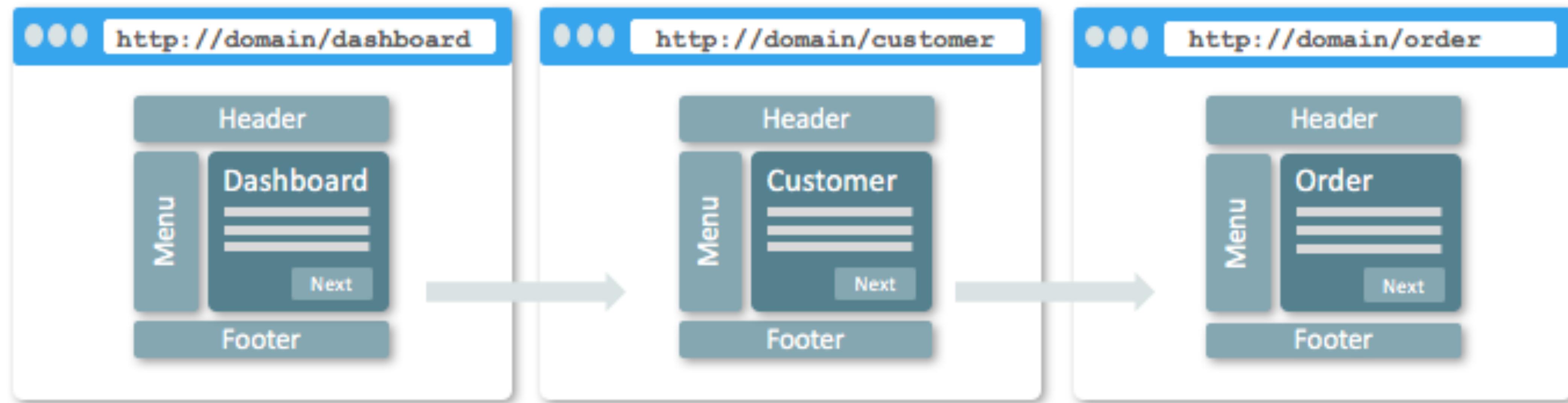
Router  
(router.js)



View 1  
Update page

View 2  
Create page

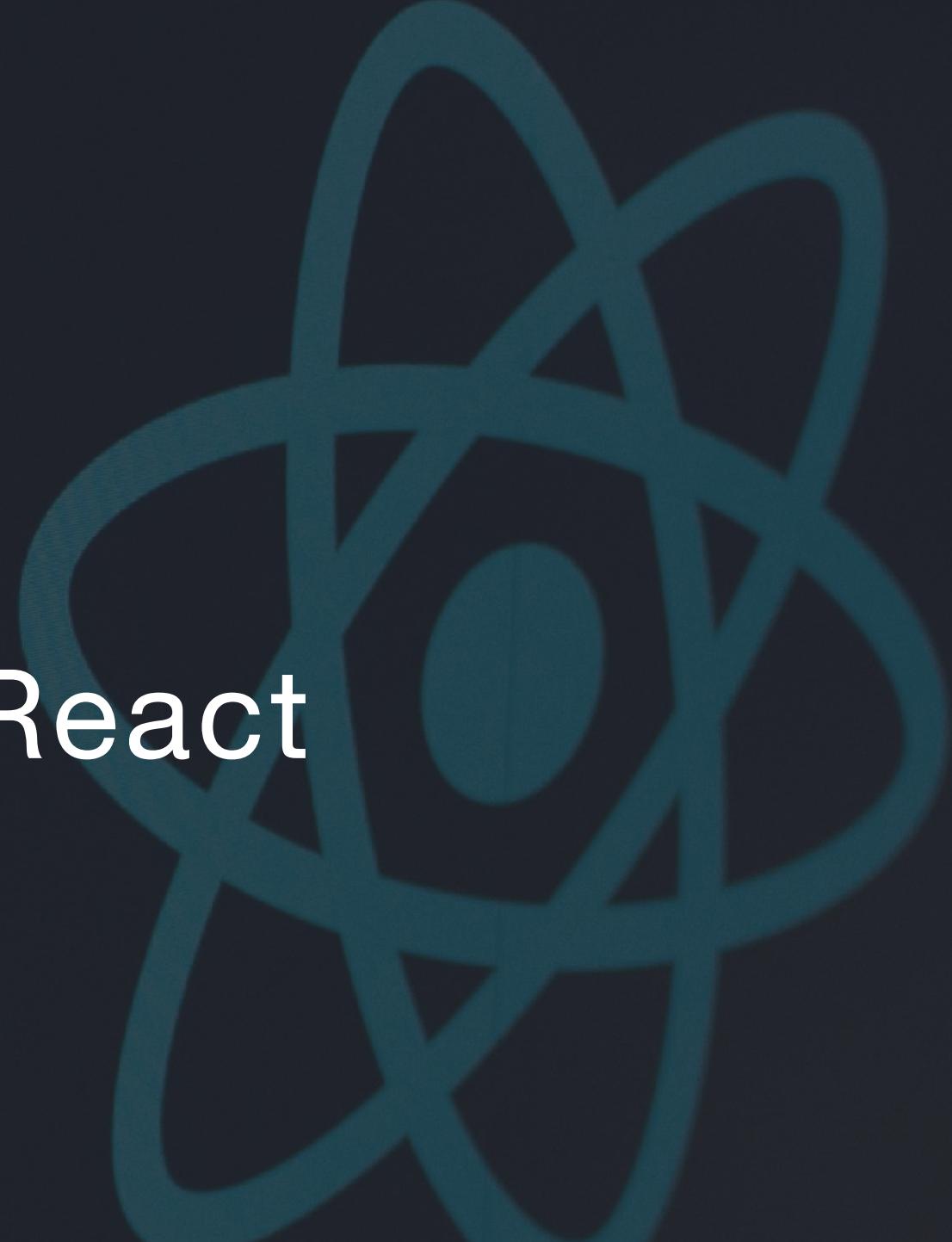
View 3  
Users page



<https://dzone.com/articles/single-page-applications-in-oracle-jet>

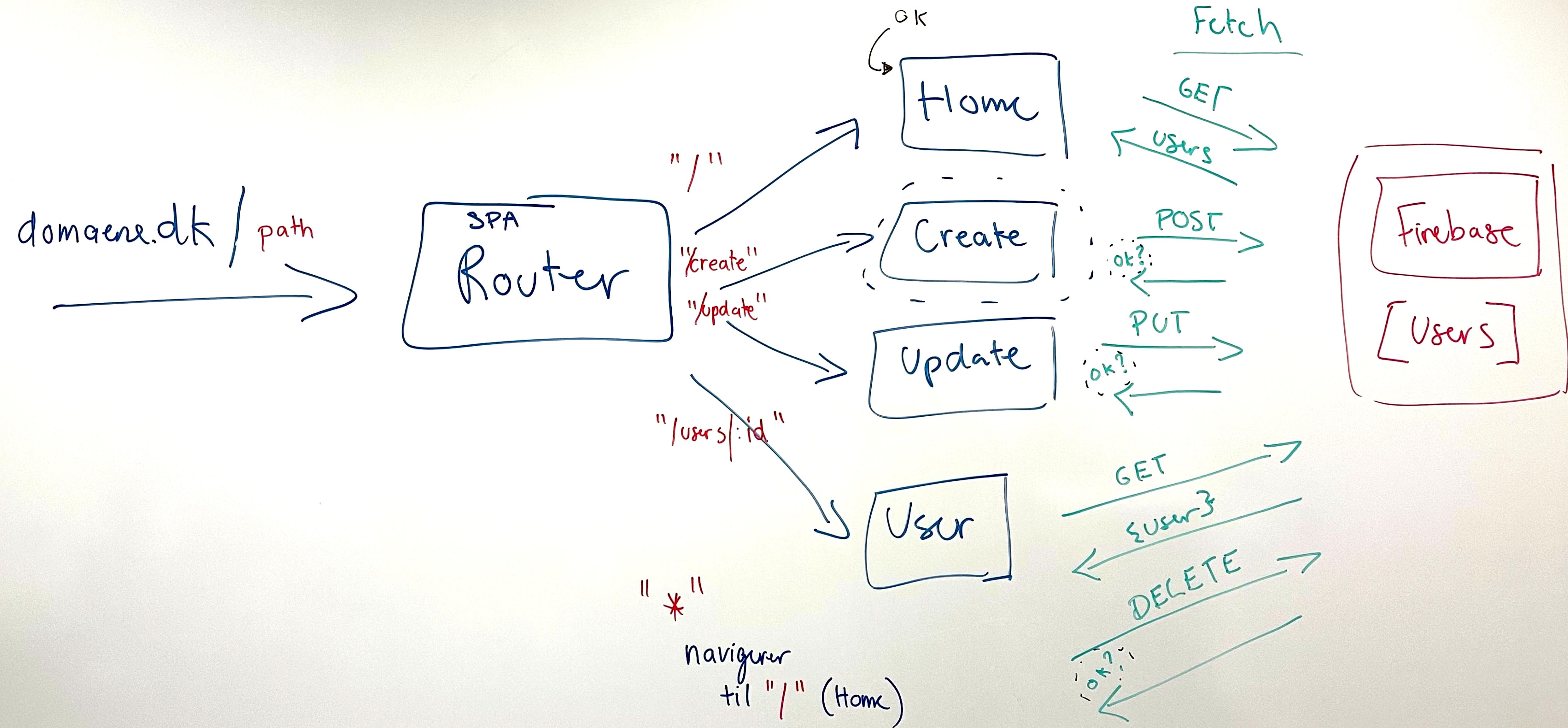
# React Router

... a client & server-side routing library for React

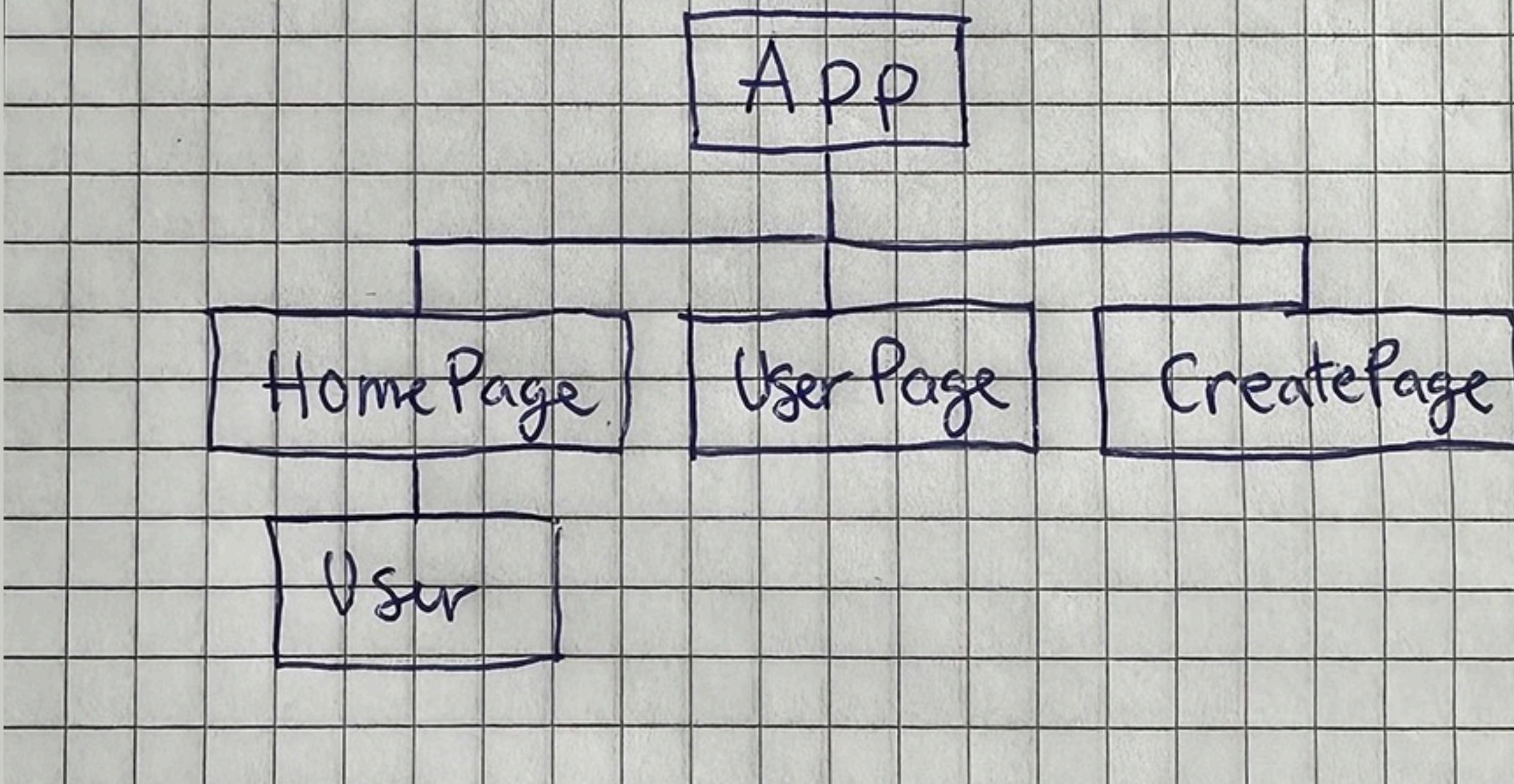


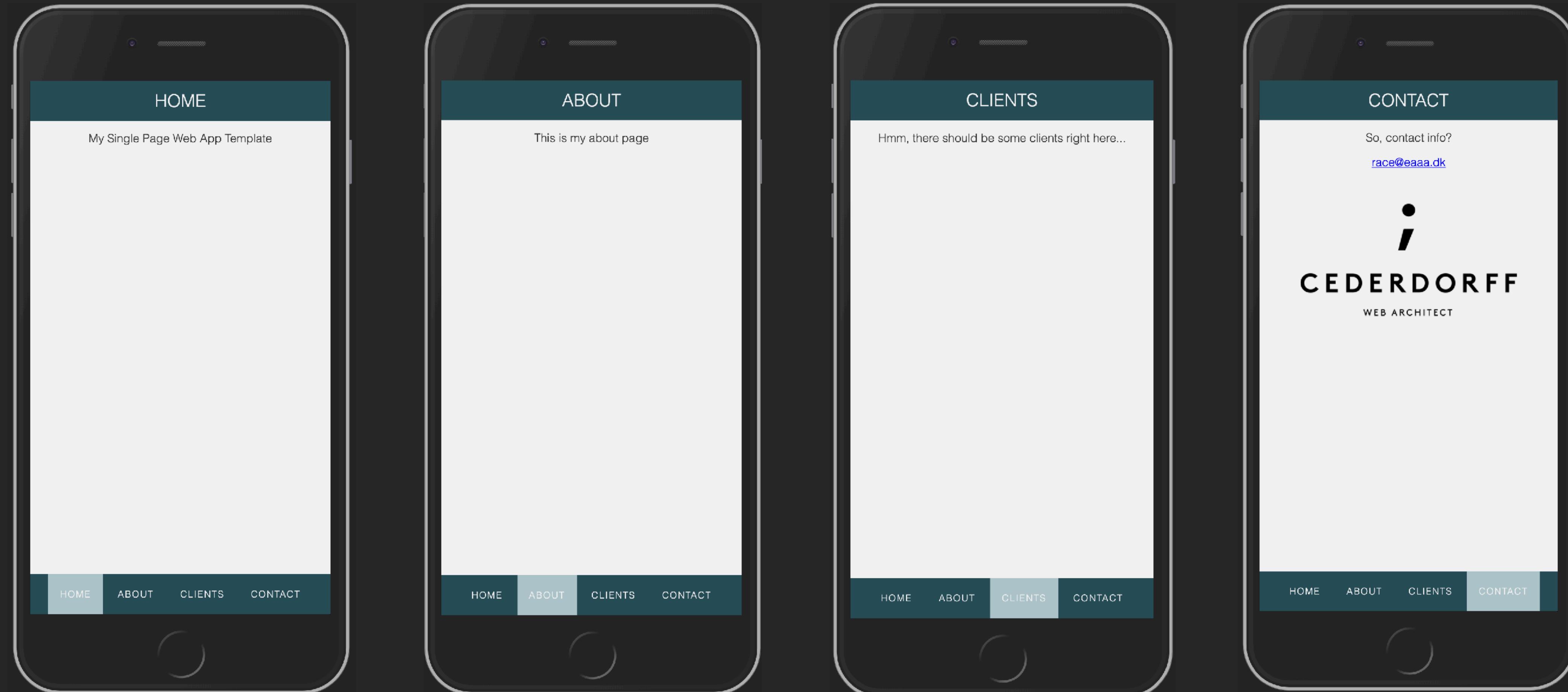
```
<Routes>
  <Route path="/" element={<HomePage />} />
  <Route path="/about" element={<AboutPage />} />
  <Route path="/contact" element={<ContactPage />} />
  <Route path="*" element={<Navigate to="/" />} />
</Routes>
```

## Page Components



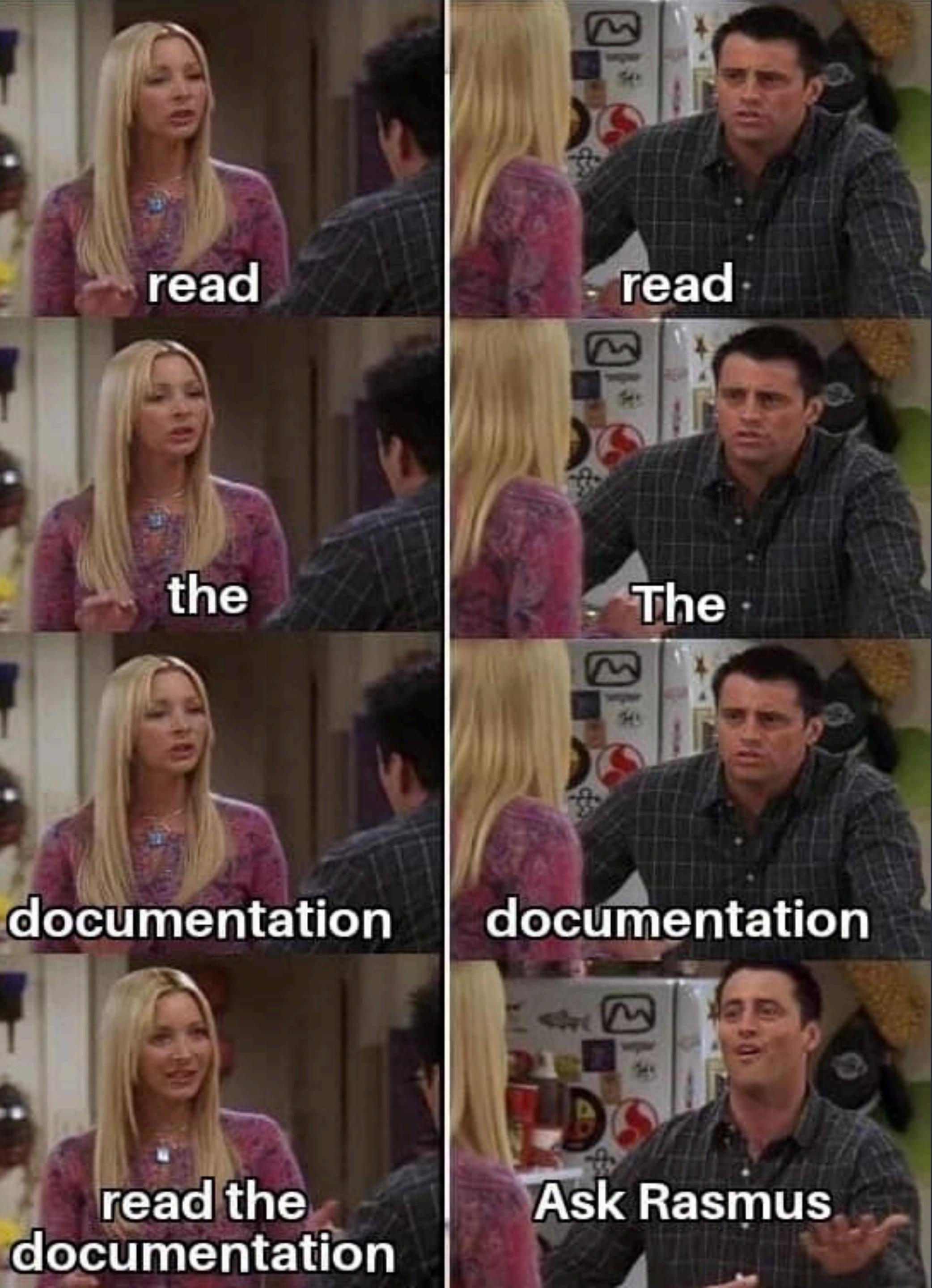
# React User CRUD (SPA)





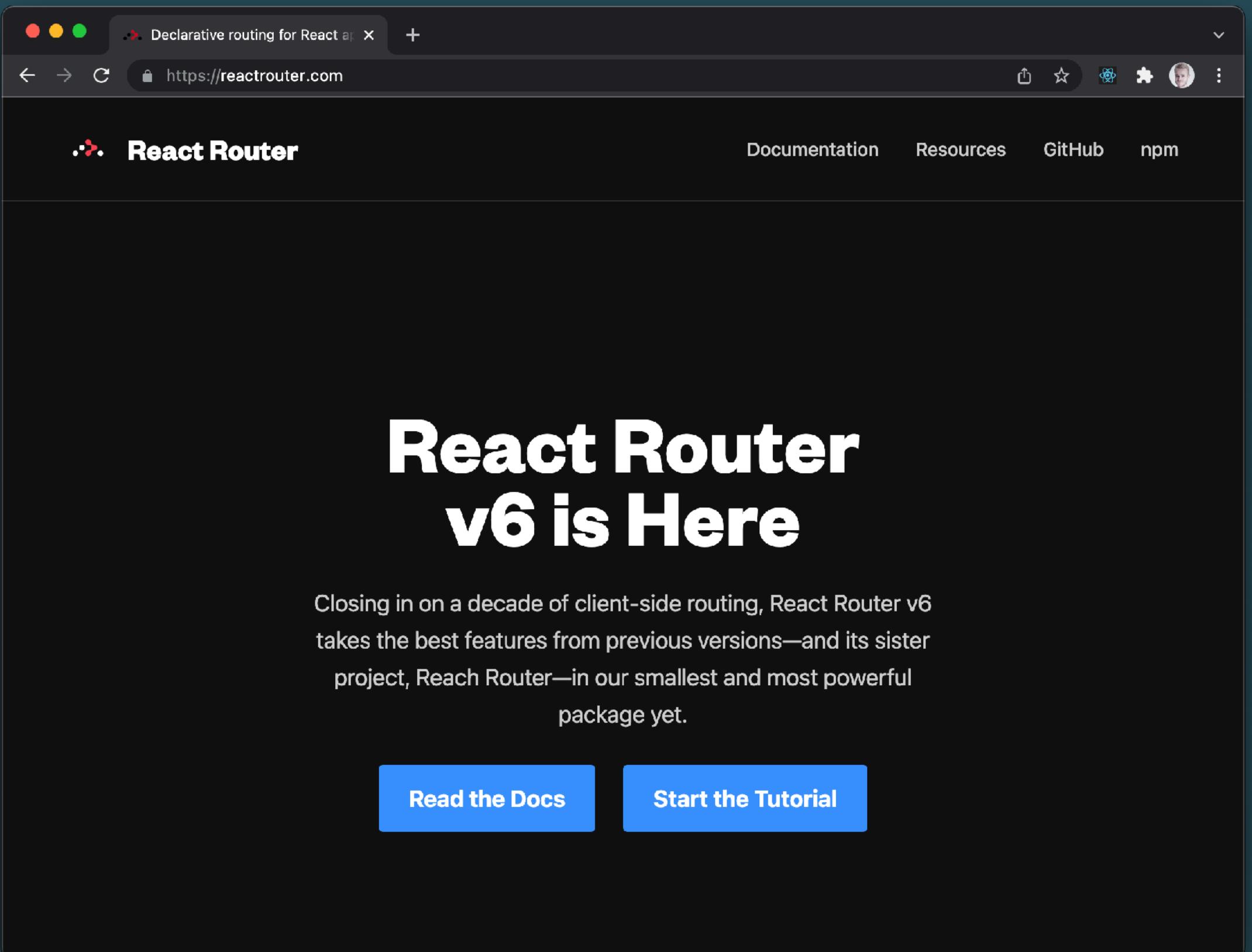
# But RACE, how do you know all that stuff?

- [React Resources](#)
- [React Self-study](#)
- [Guides & Tutorials](#)
- [From Vanilla JavaScript to React Developer](#)



# Create React SPA

With React Router



Create React SPA

# React CRUD

React Firebase REST Post App https://race-rest.web.app

POSTS CREATE

 Morten Algy Bonderup  
Senior Lecturer



**Qui est esse**

Est rerum tempore vitae sequi sint nihil reprehenderit dolor beatae ea dolores neque fugiat blanditiis voluptate porro vel nihil molestiae ut reiciendis qui aperiam non debitis possimus qui neque nisi nulla

 Dan Okkels Brendstrup  
Lecturer



**Consequuntur deleniti eos quia temporibus ab aliquid at**

Voluptatem cumque tenetur consequatur expedita ipsum nemo quia explicabo aut eum minima consequatur tempore cumque quae est et et in consequuntur voluptatem voluptates aut

 Kim Elkjær Marcher-Jepsen  
Senior Lecturer



**At nam consequatur ea labore ea harum**

Cupiditate quo est a modi nesciunt soluta ipsa voluptas error itaque dicta in autem qui minus magnam et distinctio eum accusamus ratione error aut

 Birgitte Kirk Iversen  
Senior Lecturer



**Jes Arbov**  
Lecturer

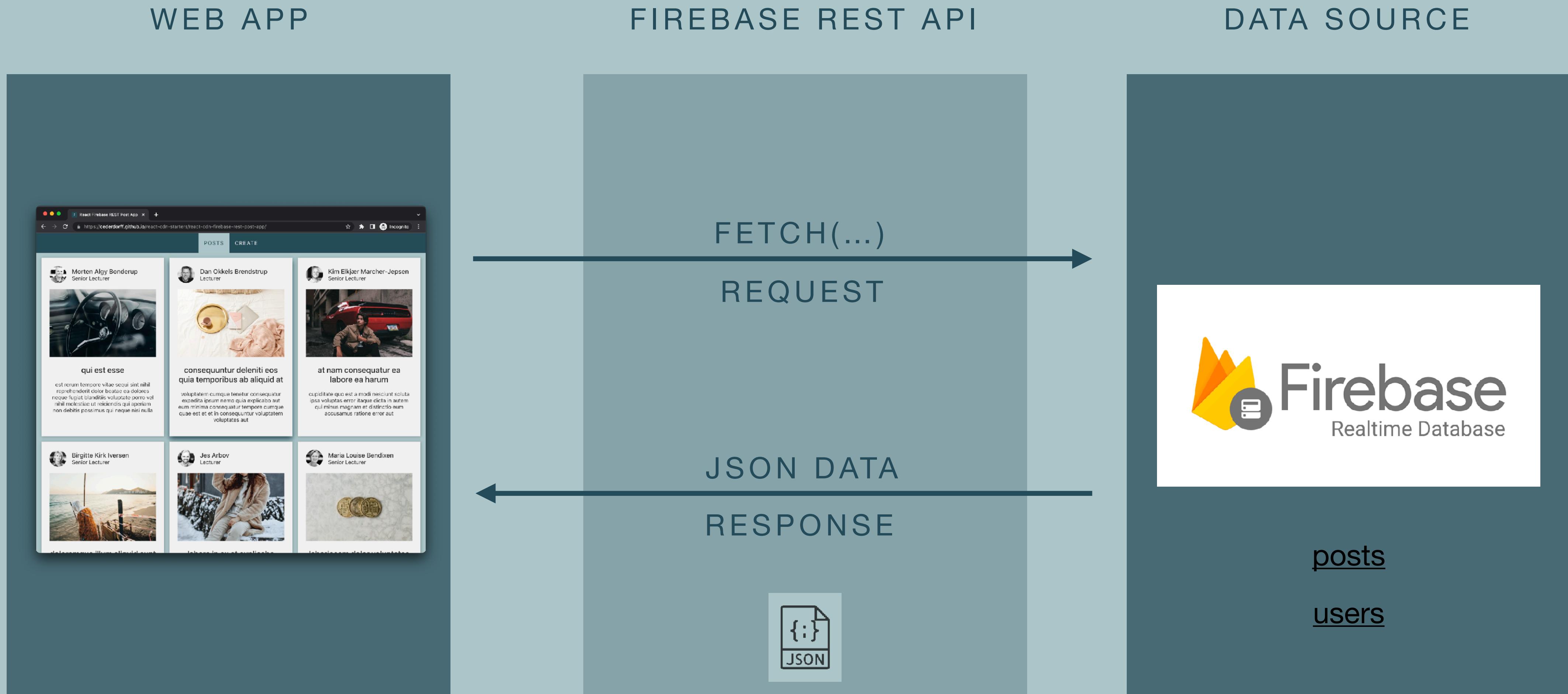


 Maria Louise Bendixen  
Senior Lecturer

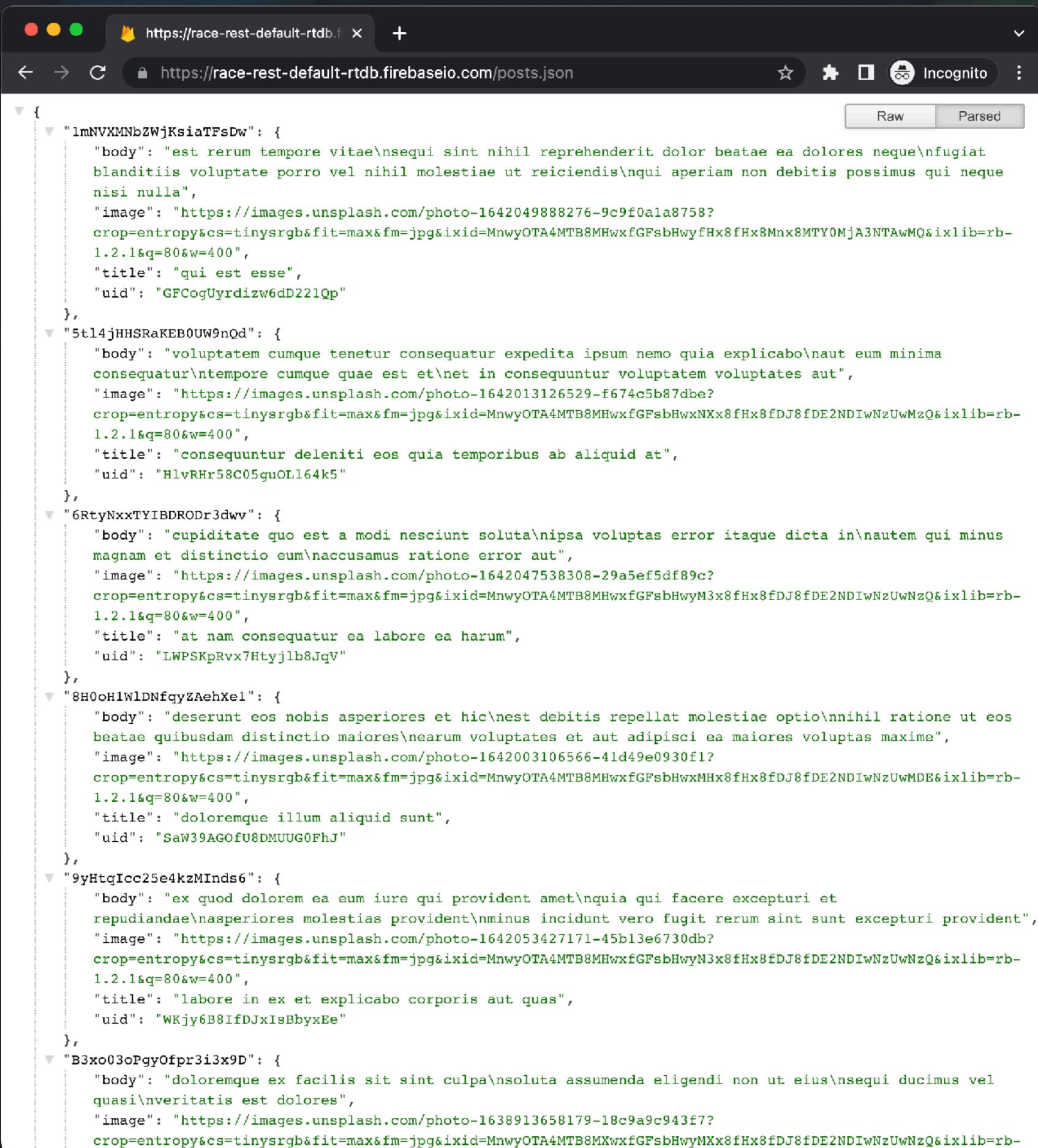


<https://race-rest.web.app/>

# Web Development

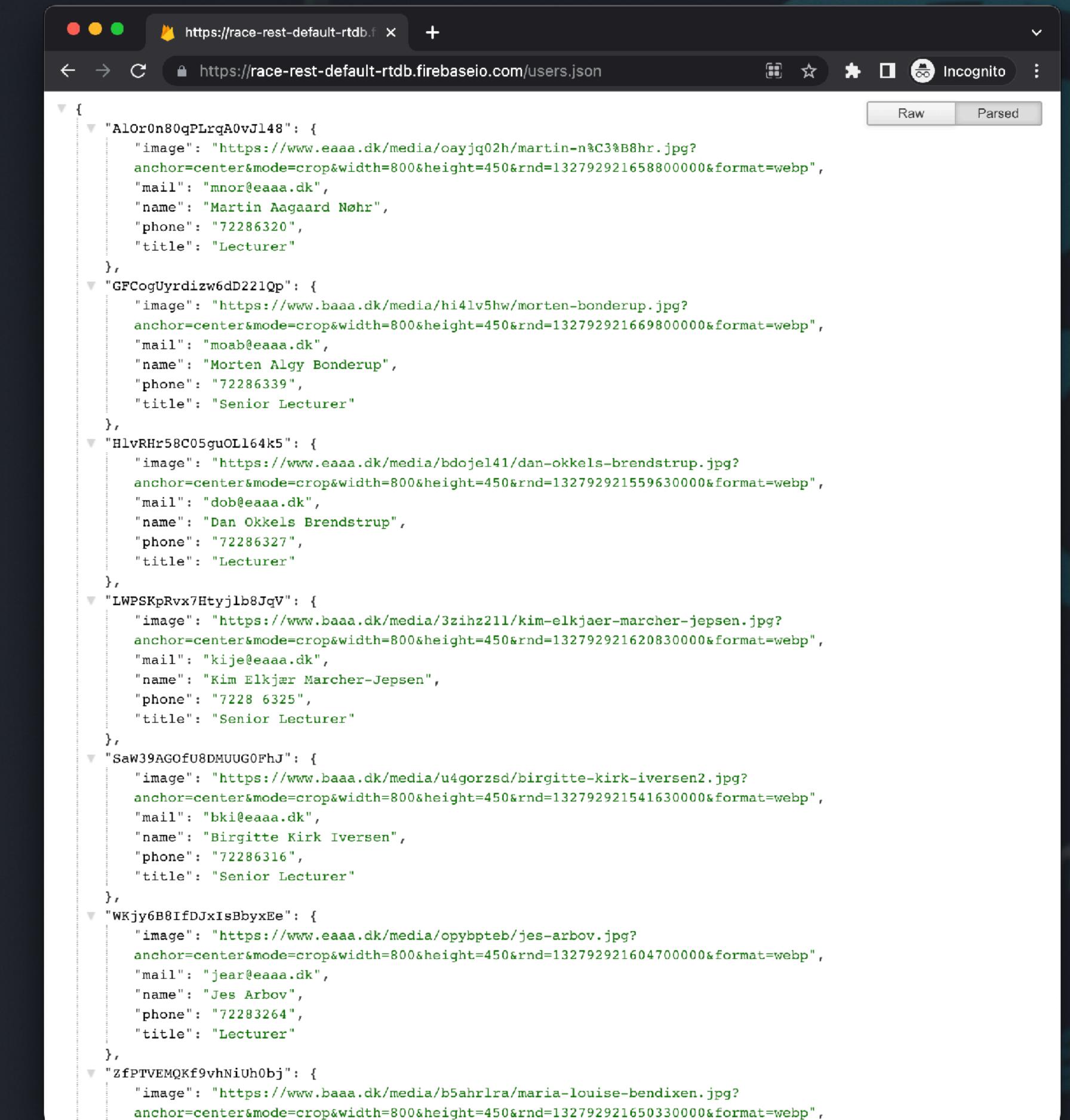


# Two data sources



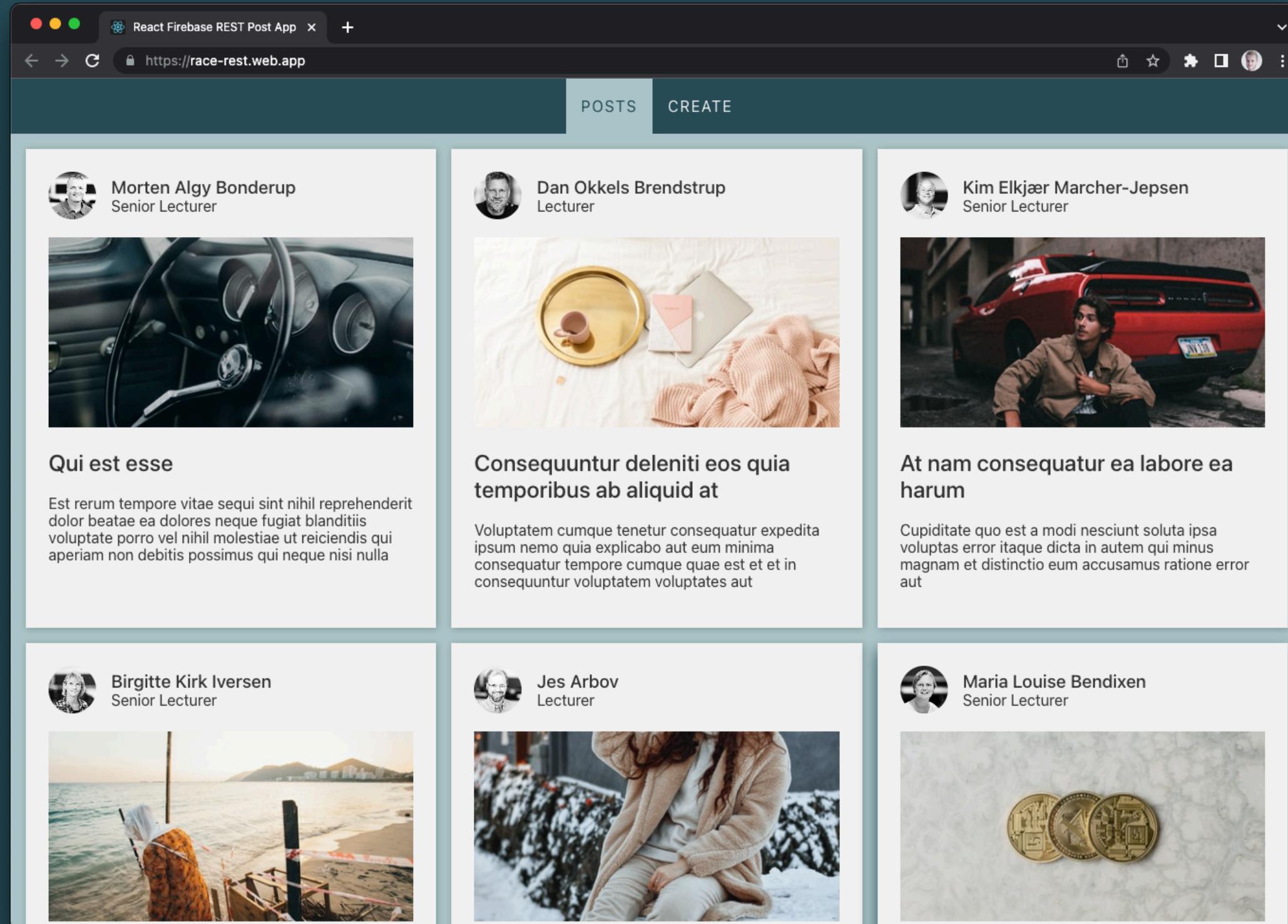
```
Raw Parsed
{
  "1mNVXMMNbZWjKsiaTFsDw": {
    "body": "est rerum tempore vitae\\nsequi sint nihil reprehenderit dolor beatae ea dolores neque\\nfugiat blanditiis voluptate porro vel nihil molestiae ut reiciendis\\nqui aperiam non debitis possimus qui neque nisi nulla",
    "image": "https://images.unsplash.com/photo-1642049888276-9c9f0ala8758?crop=entropy&cs=tinysrgb&fit=max&fm=jpg&ixid=MnwyOTA4MTB8MHwxfgFsbHwyfHx8fHx8Mnx8MTY0MjA3NTAwMQ&ixlib=rb-1.2.1&q=80&w=400",
    "title": "qui est esse",
    "uid": "GFCogUyrdizw6dD221Qp"
  },
  "5t14jHHSRAKEB0UW9npd": {
    "body": "voluptatem cumque tenetur consequatur expedita ipsum nemo quia explicabo\\naut eum minima consequatur\\ntempore cumque quae est et\\net in consequuntur voluptatem voluptates aut",
    "image": "https://images.unsplash.com/photo-1642013126529-f674c5b87dbe?crop=entropy&cs=tinysrgb&fit=max&fm=jpg&ixid=MnwyOTA4MTB8MHwxfgFsbHwxNx8fHx8fDJ8fDE2NDIwNzUwMzQ&ixlib=rb-1.2.1&q=80&w=400",
    "title": "consequuntur deleniti eos quia temporibus ab aliquid at",
    "uid": "HlvRHR58C05guOLl64k5"
  },
  "6RtyNxxTYIBDRDr3dwv": {
    "body": "cupiditate quo est a modi nesciunt soluta\\nipsa voluptas error itaque dicta in\\nautem qui minus magnam et distinctio eum\\naccusamus ratione error aut",
    "image": "https://images.unsplash.com/photo-1642047538308-29a5ef5df89c?crop=entropy&cs=tinysrgb&fit=max&fm=jpg&ixid=MnwyOTA4MTB8MHwxfgFsbHwyM3x8fHx8fDJ8fDE2NDIwNzUwNzQ&ixlib=rb-1.2.1&q=80&w=400",
    "title": "at nam consequatur ea labore ea harum",
    "uid": "LWPSKpRvx7Htyjl8JqV"
  },
  "8H0oH1wLDNfgyZAhXel": {
    "body": "deserunt eos nobis asperiores et hic\\nest debitis repellat molestiae optio\\nnihil ratione ut eos beatae quibusdam distinctio maiores\\nearum voluptates et aut adipisci ea maiores voluptas maxime",
    "image": "https://images.unsplash.com/photo-1642003106566-41d49e0930f1?crop=entropy&cs=tinysrgb&fit=max&fm=jpg&ixid=MnwyOTA4MTB8MHwxfgFsbHwxMHx8fHx8fDJ8fDE2NDIwNzUwMDE&ixlib=rb-1.2.1&q=80&w=400",
    "title": "doloremque illum aliquid sunt",
    "uid": "SaW39AGOfU8DMUUG0PhJ"
  },
  "9yHtqIcc25e4kzMInds6": {
    "body": "ex quod dolorum ea eum iure qui provident amet\\nquia qui facere excepturi et repudiandae\\nasperiores molestias provident\\nminus incidente vero fugit rerum sint sunt excepturi provident",
    "image": "https://images.unsplash.com/photo-1642053427171-45b1e6730db?crop=entropy&cs=tinysrgb&fit=max&fm=jpg&ixid=MnwyOTA4MTB8MHwxfgFsbHwyN3x8fHx8fDJ8fDE2NDIwNzUwNzQ&ixlib=rb-1.2.1&q=80&w=400",
    "title": "labore in ex et explicabo corporis aut quas",
    "uid": "WKjy6B8IfDJxIsBbyxEe"
  },
  "B3x003oPgyOfpr3i3x9D": {
    "body": "doloremque ex facilis sit sint culpa\\nsoluta assumenda eligendi non ut eius\\nsequi ducimus vel quasi\\nveritatis est dolores",
    "image": "https://images.unsplash.com/photo-1638913658179-18c9a9c943f7?crop=entropy&cs=tinysrgb&fit=max&fm=jpg&ixid=MnwyOTA4MTB8MXxfGFsbHwyMxx8fHx8fDJ8fDE2NDIwNzUwNzQ&ixlib=rb-1.2.1&q=80&w=400"
  }
}
```

[race-rest-default.firebaseio.com/posts.json](https://race-rest-default.firebaseio.com/posts.json)



```
Raw Parsed
{
  "AlOr0n80qPLrqA0vJ148": {
    "image": "https://www.eaaa.dk/media/oayjq02h/martin-n%C3%B8hr.jpg?anchor=center&mode=crop&width=800&height=450&rnd=132792921658800000&format=webp",
    "mail": "mnor@eaaa.dk",
    "name": "Martin Aagaard Nøhr",
    "phone": "72286320",
    "title": "Lecturer"
  },
  "GFCogUyrdizw6dD221Qp": {
    "image": "https://www.baaa.dk/media/hi4lv5hw/morten-bonderup.jpg?anchor=center&mode=crop&width=800&height=450&rnd=132792921669800000&format=webp",
    "mail": "moab@eaaa.dk",
    "name": "Morten Algy Bonderup",
    "phone": "72286339",
    "title": "Senior Lecturer"
  },
  "HlvRHR58C05guOLl64k5": {
    "image": "https://www.eaaa.dk/media/bdoje141/dan-okkels-brendstrup.jpg?anchor=center&mode=crop&width=800&height=450&rnd=132792921559630000&format=webp",
    "mail": "dob@eaaa.dk",
    "name": "Dan Okkels Brendstrup",
    "phone": "72286327",
    "title": "Lecturer"
  },
  "LWPSKpRvx7Htyjl8JqV": {
    "image": "https://www.baaa.dk/media/3zihz211/kim-elkjær-marcher-jepsen.jpg?anchor=center&mode=crop&width=800&height=450&rnd=132792921620830000&format=webp",
    "mail": "kije@eaaa.dk",
    "name": "Kim Elkjær Marcher-Jepsen",
    "phone": "7228 6325",
    "title": "Senior Lecturer"
  },
  "SaW39AGOfU8DMUUG0PhJ": {
    "image": "https://www.baaa.dk/media/u4gorzsdbirgitte-kirk-iversen2.jpg?anchor=center&mode=crop&width=800&height=450&rnd=132792921541630000&format=webp",
    "mail": "bki@eaaa.dk",
    "name": "Birgitte Kirk Iversen",
    "phone": "72286316",
    "title": "Senior Lecturer"
  },
  "WKjy6B8IfDJxIsBbyxEe": {
    "image": "https://www.eaaa.dk/media/opybpceb/jes-arbov.jpg?anchor=center&mode=crop&width=800&height=450&rnd=132792921604700000&format=webp",
    "mail": "jear@eaaa.dk",
    "name": "Jes Arbov",
    "phone": "72283264",
    "title": "Lecturer"
  },
  "zfPTVEMQKf9vhNiUh0bj": {
    "image": "https://www.baaa.dk/media/b5ahrlra/maria-louise-bendixen.jpg?anchor=center&mode=crop&width=800&height=450&rnd=132792921650330000&format=webp",
    "mail": "mlb@eaaa.dk"
  }
}
```

[race-rest-default.firebaseio.com/users.json](https://race-rest-default.firebaseio.com/users.json)



# React CRUD App w/ Firebase REST

<https://race.notion.site/React-CRUD-App-w-Firebase-eea97554f9b94f6688fcacc5d2d51f62>

# Read

GET is the default request method for fetch.

```
import { useState, useEffect } from "react";
import PostCard from "../components/PostCard";

export default function HomePage() {
  const [posts, setPosts] = useState([]);

  useEffect(() => {
    async function getPosts() {
      const url = "https://race-rest-default-rtdb.firebaseio.com/posts.json";
      const response = await fetch(url);
      const data = await response.json();
      const postsArray = Object.keys(data).map(key => ({ id: key, ...data[key] }));
      setPosts(postsArray);
    }
    getPosts();
  }, []);

  return (
    <section className="page">
      <section className="grid-container">
        {posts.map(post => (
          <PostCard post={post} key={post.id} />
        ))}
      </section>
    </section>
  );
}
```

# PostCard

Use the prop post to implement the structure of the PostCard component. Skip handleClick for now.

```
import { useNavigate } from "react-router-dom";

export default function PostCard({ post }) {
  const navigate = useNavigate();

  /**
   * handleClick is called when user clicks on the Article (PostCard)
   */
  function handleClick() {
    navigate(`posts/${post.id}`);
  }

  return (
    <article onClick={handleClick}>
      <img src={post.image} alt={post.title} />
      <h2>{post.title}</h2>
      <p>{post.body}</p>
    </article>
  );
}
```

# PostCard

Add user details on every PostCard. Add it in PostCard or create a separate component to handle the logic. I created a separate UserAvatar component.

```
import { useNavigate } from "react-router-dom";
import UserAvatar from "./UserAvatar";

export default function PostCard({ post }) {
  const navigate = useNavigate();

  /**
   * handleClick is called when user clicks on the Article (PostCard)
   */
  function handleClick() {
    navigate(`posts/${post.id}`);
  }

  return (
    <article onClick={handleClick}>
      <UserAvatar uid={post.uid} />
      <img src={post.image} alt={post.title} />
      <h2>{post.title}</h2>
      <p>{post.body}</p>
    </article>
  );
}
```

# UserAvatar

Based on the prop uid, user detail is fetched from Firebase and saved in a state. Note that the user state is initialised with a default object with placeholders.

```
import { useState, useEffect } from "react";
import placeholder from "../assets/img/user-placeholder.jpg";

export default function UserAvatar({ uid }) {
  const [user, setUser] = useState({
    image: placeholder,
    name: "User's Name",
    title: "User's Title"
  });
  const url = `https://race-rest-default-firebaseio.com/users/${uid}.json`;

  useEffect(() => {
    async function getUser() {
      const response = await fetch(url);
      const data = await response.json();
      console.log(data);
      setUser(data);
    }
    getUser();
  }, [url]);

  return (
    <div className="avatar">
      <img src={user.image} alt={user.id} />
      <span>
        <h3>{user.name}</h3>
        <p>{user.title}</p>
      </span>
    </div>
  );
}
```

# Create

Implement a form with a field for title, body (description) and image. Also add an image preview. Add states for every field including and error message state.

```
export default function CreatePage() {
  const [title, setTitle] = useState("");
  const [body, setBody] = useState("");
  const [image, setImage] = useState("");
  const [errorMessage, setErrorMessage] = useState("");

  return (
    <form onSubmit={handleSubmit}>
      <label>
        Title
        <input type="text" value={title} placeholder="Type a title" onChange={e => setTitle(e.target.value)} />
      </label>
      <label>
        Body
        <input type="text" value={body} placeholder="Type a body text" onChange={e => setBody(e.target.value)} />
      </label>
      <label>
        Image
        <input type="file" className="file-input" accept="image/*" onChange={handleImageChange} />
        <img className="image-preview" src={image} alt="Choose" onError={event => (event.target.src = imgPlaceholder)} />
      </label>
      <p className="text-error">{errorMessage}</p>
      <button type="submit">Save</button>
    </form>
  );
}
```

# Create

## Implement handleImageChange

```
/**  
 * handleImageChange is called every time the user chooses an image in the fire system.  
 * The event is fired by the input file field in the form  
 */  
function handleImageChange(event) {  
    const file = event.target.files[0];  
    if (file.size < 500000) {  
        // image file size must be below 0,5MB  
        const reader = new FileReader();  
        reader.onload = event => {  
            setImage(event.target.result);  
        };  
        reader.readAsDataURL(file);  
        setErrorMessage(""); // reset errorMessage state  
    } else {  
        // if not below 0.5MB display an error message using the errorMessage state  
        setErrorMessage("The image file is too big!");  
    }  
}
```

# Create

onSubmit call handleSubmit. The function creates a new post object based on the states. Also add a hardcoded uid = "fTs84KR0Yw5pRZEWCq2Z"  
Use fetch and post to post the new post object to the data source.

```
async function handleSubmit() {
  const newPost = {
    title: title,
    body: body,
    image: image,
    uid: "fTs84KR0Yw5pRZEWCq2Z" // default user id added
};

const url = "https://race-rest-default-rtdb.firebaseio.com/posts.json";
const response = await fetch(url, {
  method: "POST",
  body: JSON.stringify(newPost)
});
const data = await response.json();
console.log(data);
navigate("/");
}
```

# Update

Using PUT to an  
existing post object  
by given id.

You have two options:

- Implement an update form similar to the create form.
- Or implement a PostForm component you can reuse for CreatePage and UpdatePage.

# Update

## PostForm

### Component #1

```
import { useEffect, useState } from "react";
import imgPlaceholder from "../assets/img/img-placeholder.jpg";

export default function PostForm({ savePost, post }) {
  const [title, setTitle] = useState("");
  const [body, setBody] = useState("");
  const [image, setImage] = useState("");
  const [errorMessage, setErrorMessage] = useState("");

  useEffect(() => {
    if (post) {
      // if post, set the states with values from the post object.
      // The post object is a prop, passed from UpdatePage
      setTitle(post.title);
      setBody(post.body);
      setImage(post.image);
    }
  }, [post]); // useEffect is called every time post changes.

  /**
   * handleImageChange is called every time the user chooses an image in the fire system.
   * The event is fired by the input file field in the form
   */
  function handleImageChange(event) {
    const file = event.target.files[0];
    if (file.size < 500000) {
      // image file size must be below 0,5MB
      const reader = new FileReader();
      reader.onload = event => {
        setImage(event.target.result);
      };
      reader.readAsDataURL(file);
      setErrorMessage(""); // reset errorMessage state
    } else {
      // if not below 0.5MB display an error message using the errorMessage state
      setErrorMessage("The image file is too big!");
    }
  }
}
```

# Update

## PostForm

### Component #2

```
function handleSubmit(event) {
  event.preventDefault();
  const formData = {
    // create a new object to hold the value from states / input fields
    title: title,
    image: image,
    body: body
  };

  const validForm = formData.title && formData.body && formData.image; // will return false if one of the properties doesn't have a value
  if (validForm) {
    // if all fields/ properties are filled, then call savePost
    savePost(formData);
  } else {
    // if not, set errorMessage state.
    setErrorMessage("Please, fill in all fields.");
  }
}

return (
  <form onSubmit={handleSubmit}>
    <label>
      Title
      <input type="text" value={title} placeholder="Type a title" onChange={e => setTitle(e.target.value)} />
    </label>
    <label>
      Body
      <input type="text" value={body} placeholder="Type a body text" onChange={e => setBody(e.target.value)} />
    </label>
    <label>
      Image
      <input type="file" className="file-input" accept="image/*" onChange={handleImageChange} />
        <img className="image-preview" src={image} alt="Choose" onError={event => (event.target.src = imgPlaceholder)} />
    </label>
    <p className="text-error">{errorMessage}</p>
    <button type="submit">Save</button>
  </form>
);
}
```

# Update

## CreatePage Component

```
import { useNavigate } from "react-router-dom";
import PostForm from "../components/PostForm";

export default function CreatePage({ showLoader }) {
  const navigate = useNavigate();

  async function createPost(newPost) {
    newPost.uid = "fTs84KR0Yw5pRZEWCq2Z"; // default user id added

    const url = "https://race-rest-default-firebase.firebaseio.com/posts.json";
    const response = await fetch(url, {
      method: "POST",
      body: JSON.stringify(newPost)
    });
    const data = await response.json();
    console.log(data);
    navigate("/");
  }

  return (
    <section className="page">
      <h1>Create New Post</h1>
      <PostForm savePost={createPost} />
    </section>
  );
}
```

# Update

## UpdatePage Component

```
import { useEffect, useState } from "react";
import { useNavigate, useParams } from "react-router-dom";
import PostForm from "../components/PostForm";

export default function UpdatePage() {
  const [post, setPost] = useState({});
  const params = useParams();
  const navigate = useNavigate();
  const url = `https://race-rest-default-firebase.com/posts/${params.postId}.json`;

  useEffect(() => {
    async function getPost() {
      const response = await fetch(url);
      const data = await response.json();
      setPost(data);
    }

    getPost();
  }, [url]);

  async function savePost(postToUpdate) {
    const response = await fetch(url, {
      method: "PUT",
      body: JSON.stringify(postToUpdate)
    });
    const data = await response.json();
    console.log(data);
    navigate("/");
  }

  return (
    <section className="page">
      <h1>Update Post</h1>
      <PostForm post={post} savePost={savePost} />
    </section>
  );
}
```

# Delete

Using DELETE to an object  
by a given id.  
Add deletePost logic in  
UpdatePage component.

```
import { useEffect, useState } from "react";
import { useNavigate, useParams } from "react-router-dom";
import PostForm from "../components/PostForm";

export default function UpdatePage() {
  const [post, setPost] = useState({});
  const params = useParams();
  const navigate = useNavigate();
  const url = `https://race-rest-default-firebase.firebaseio.com/posts/${params.postId}.json`;

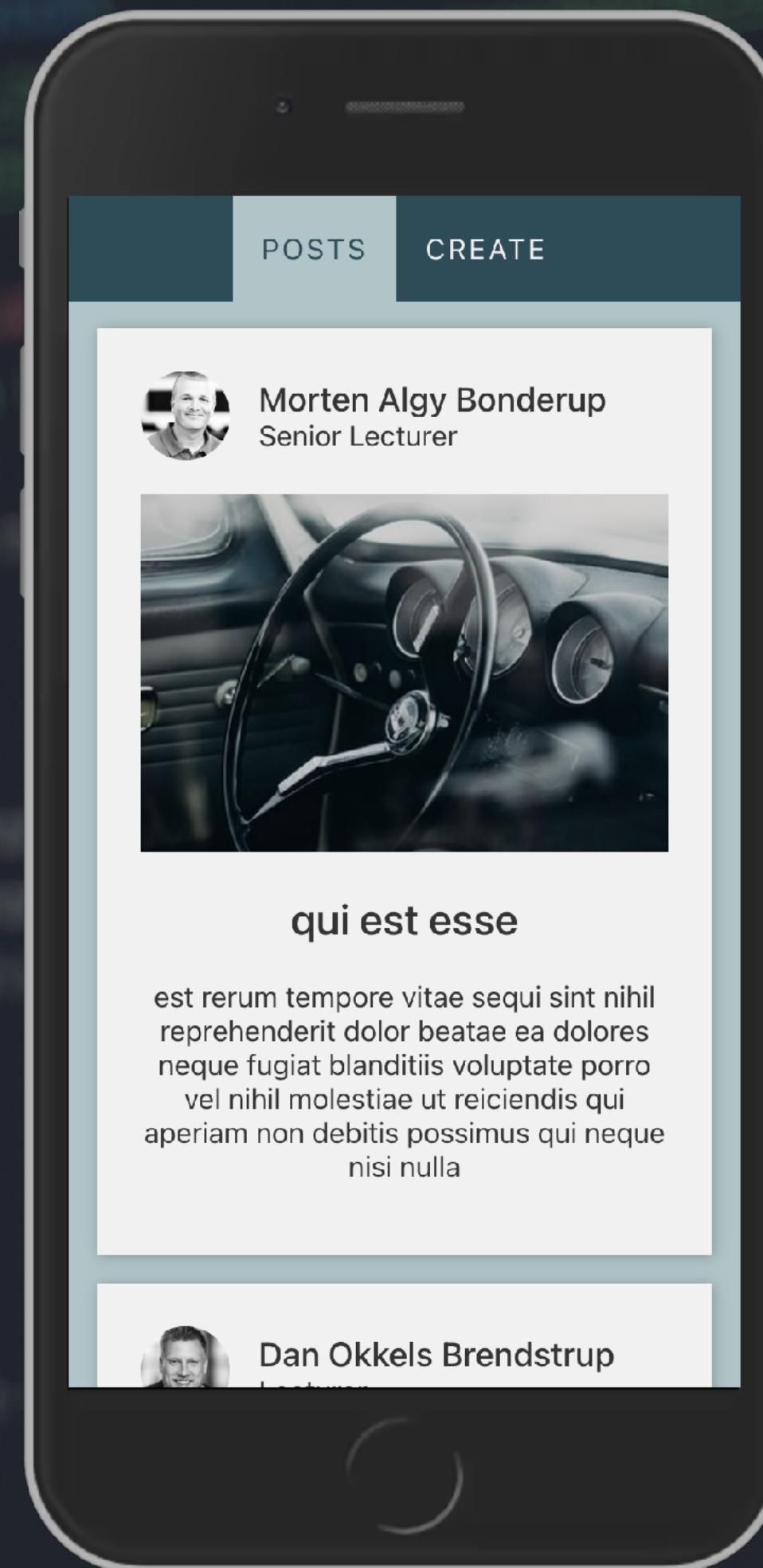
  useEffect(() => {
    // ...
  }, [url]);

  async function savePost(postToUpdate) {
    // ...
  }

  async function deletePost() {
    const confirmDelete = window.confirm(`Do you want to delete post, ${post.title}?`);
    if (confirmDelete) {
      const response = await fetch(url, {
        method: "DELETE"
      });
      const data = await response.json();
      console.log(data);
      navigate("/");
    }
  }

  return (
    <section className="page">
      <h1>Update Post</h1>
      <PostForm post={post} savePost={savePost} />
      <button className="btn-delete" onClick={deletePost}>
        Delete Post
      </button>
    </section>
  );
}
```

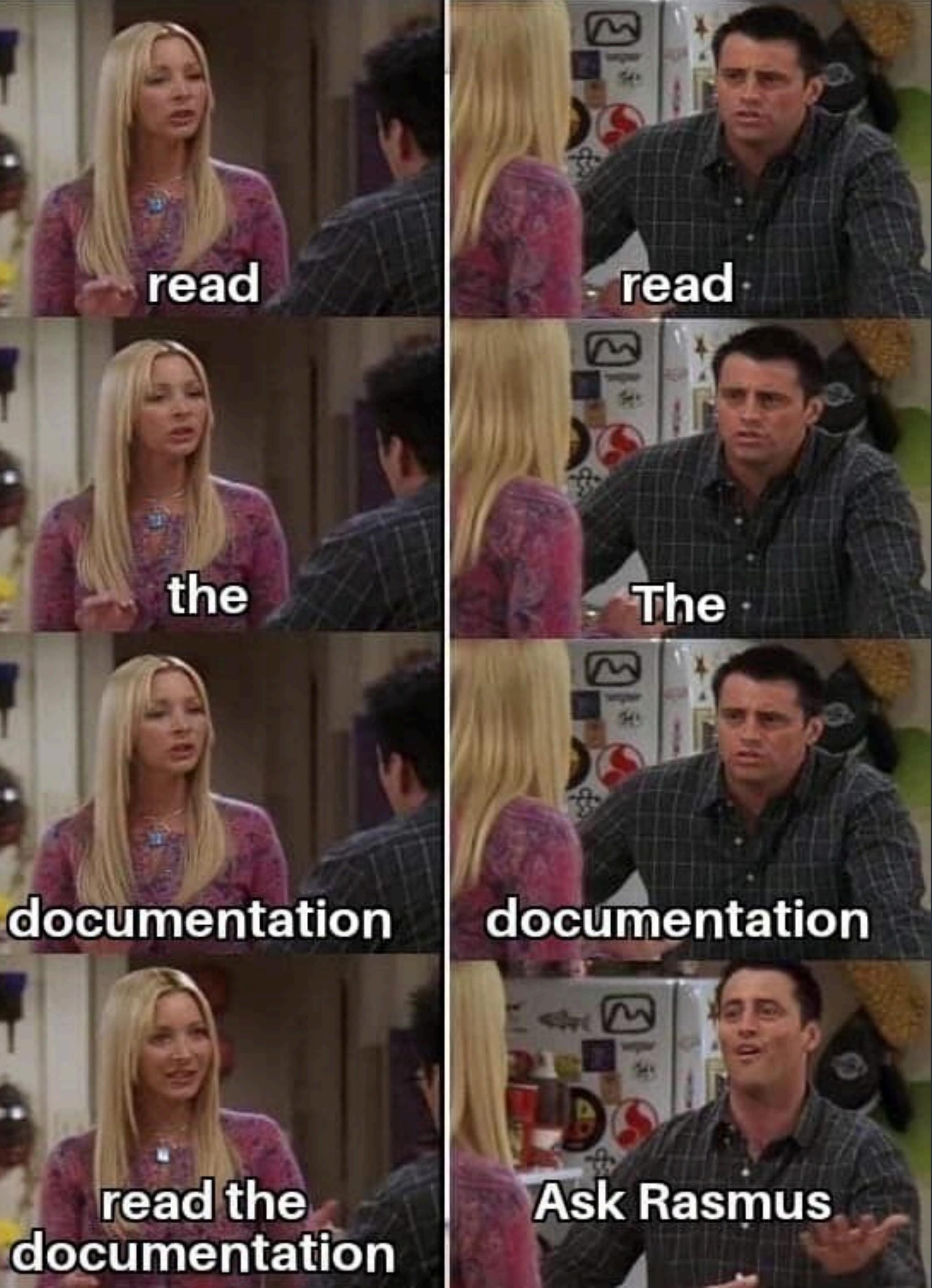
# Solution Proposal



- <https://github.com/cederdorff/react-vite-crud-app>  
(main **branch**, `post-form-component` **branch**  
and `search-and-filter` **branch**)
- [https://github.com/cederdorff/react-vite-crud-app-  
cloud-storage](https://github.com/cederdorff/react-vite-crud-app-cloud-storage)
- Running solution
- Data Sources:
  - posts
  - users

# But RACE, how do you know all that stuff?

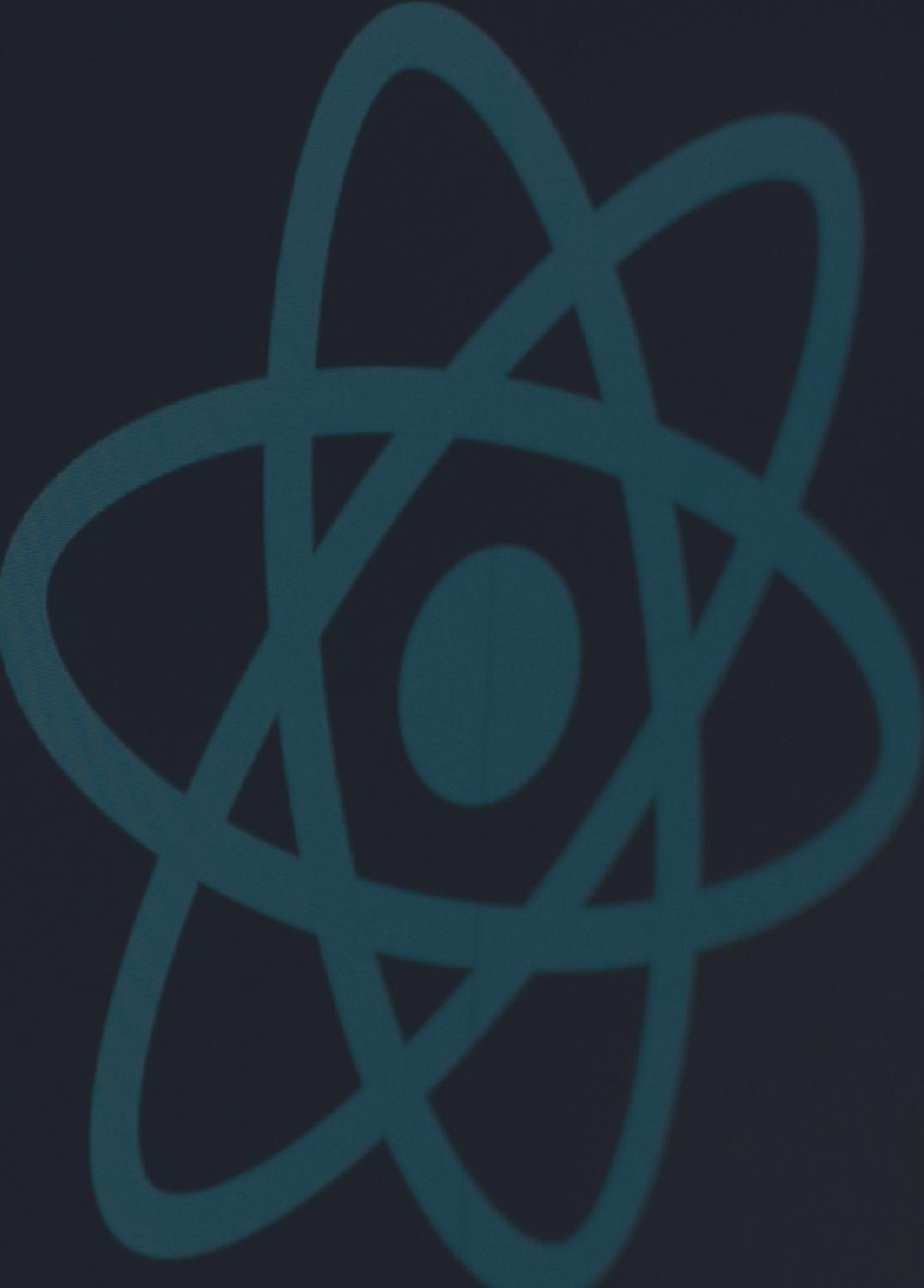
- [React Resources](#)
- [React Self-study](#)
- [Guides & Tutorials](#)
- [From Vanilla JavaScript to React Developer](#)



# React Practice

Practice your React knowledge with `create-react-app` and [react-router](#):

1. Build a Portfolio site template with pages (components) like Home, Projects, About and Contact.
2. Do a remake of Canvas Users SPA with React.  
Inspiration on GitHub: `react-starters` and `react-cdn-starters`
3. Checkout [React Self-study](#) and [Guides & Tutorials](#)



# Code Every Day

Edit [src/App.js](#) and save to reload  
[Learn React](#)

