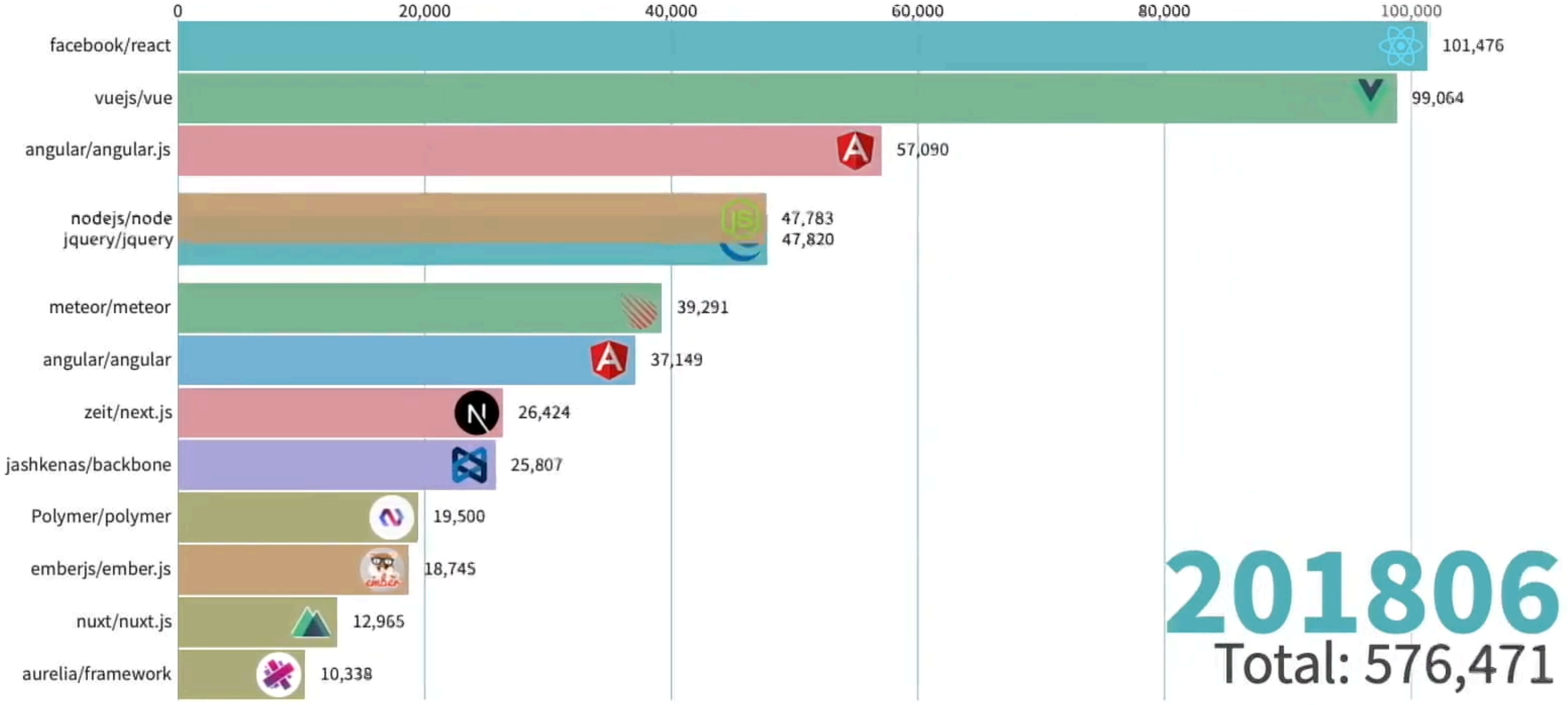
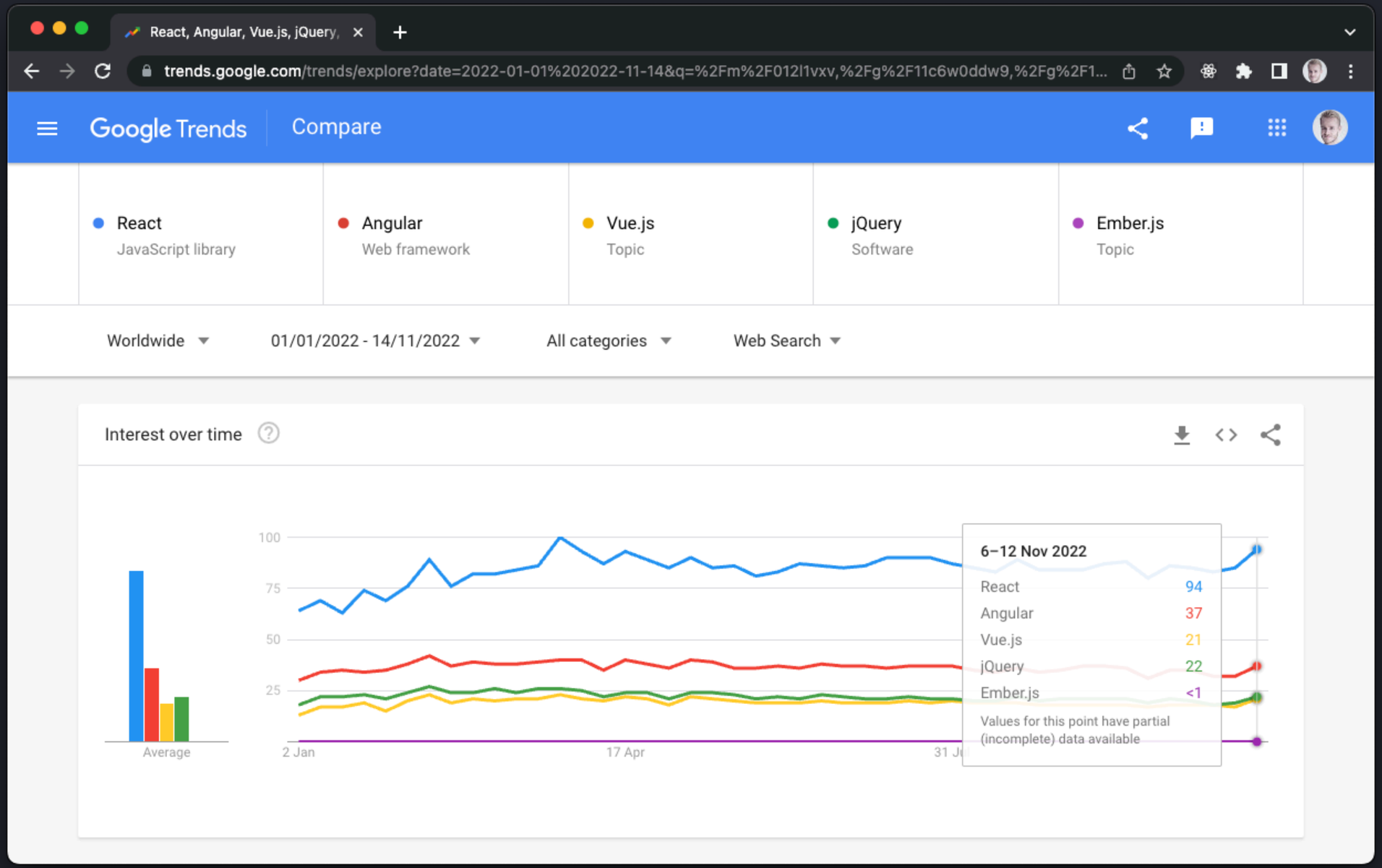
# Most popular JavaScript frameworks

2012 - 2019

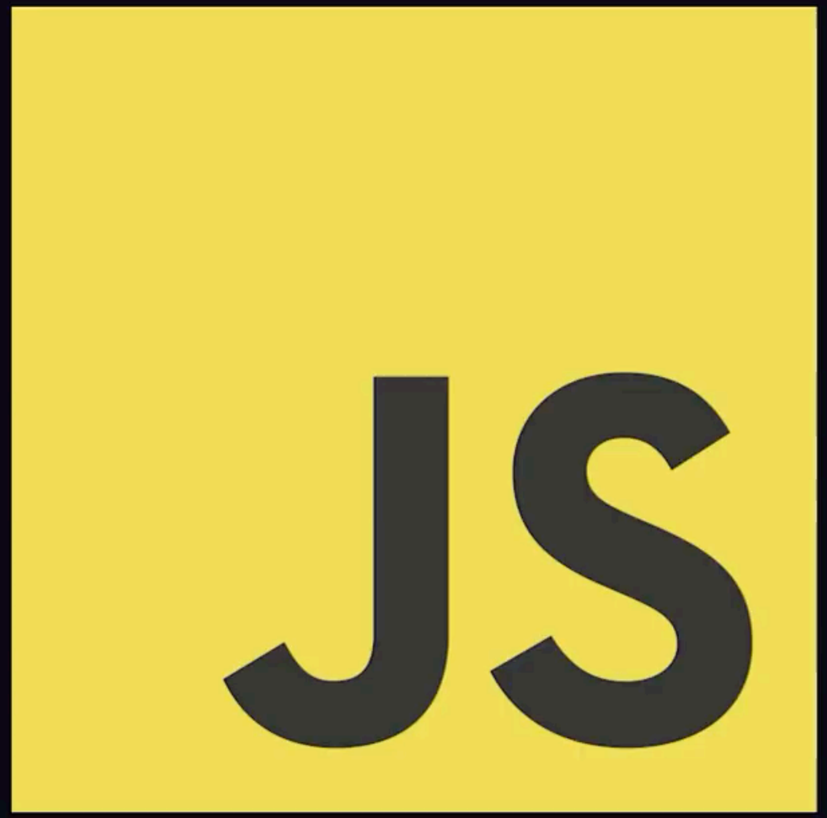



Source: GitHub Archive

CODERSRANK.IO




Google Trends




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

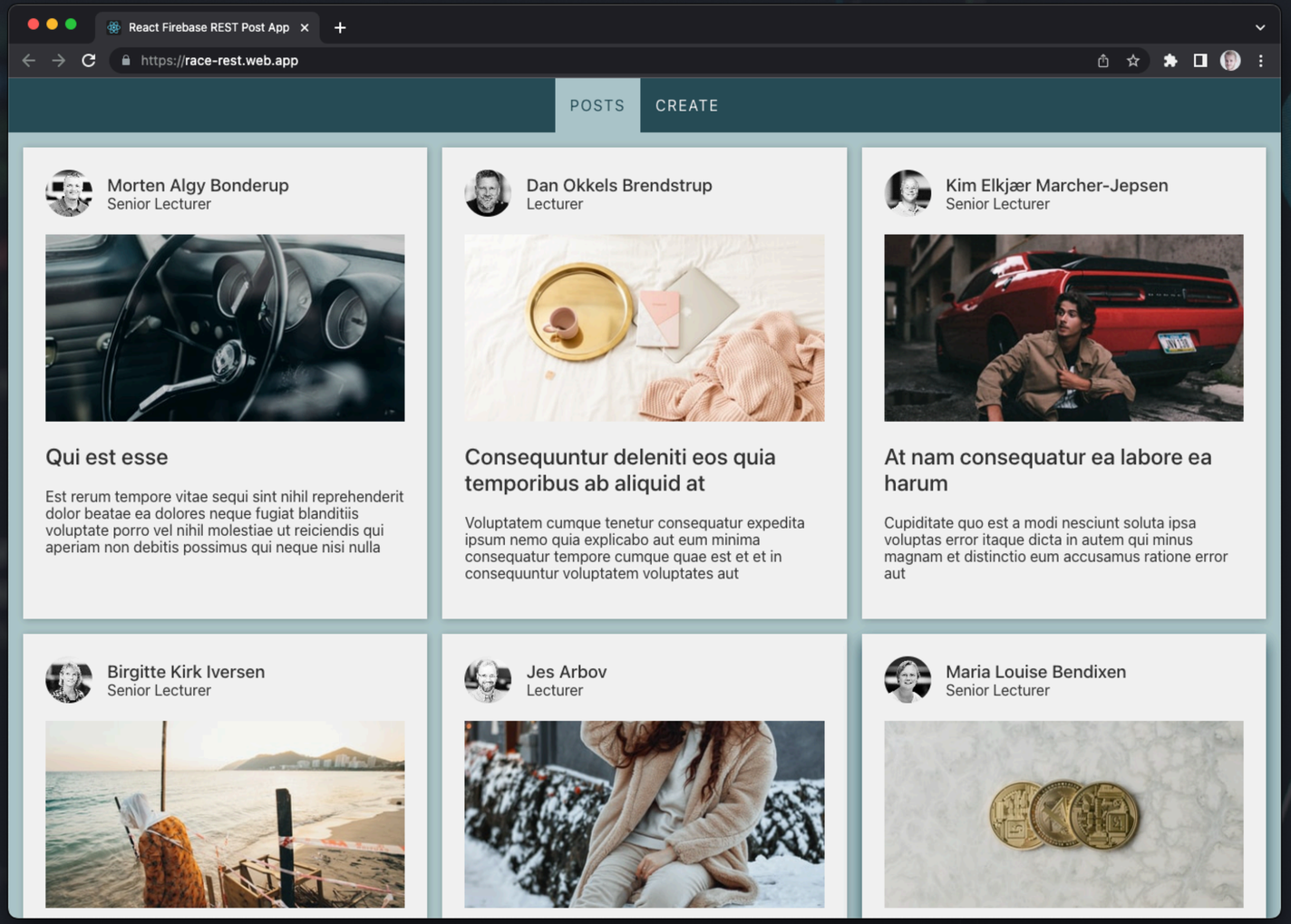
# Introduction to React

Frontend Programming

# Purpose

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

# React CRUD



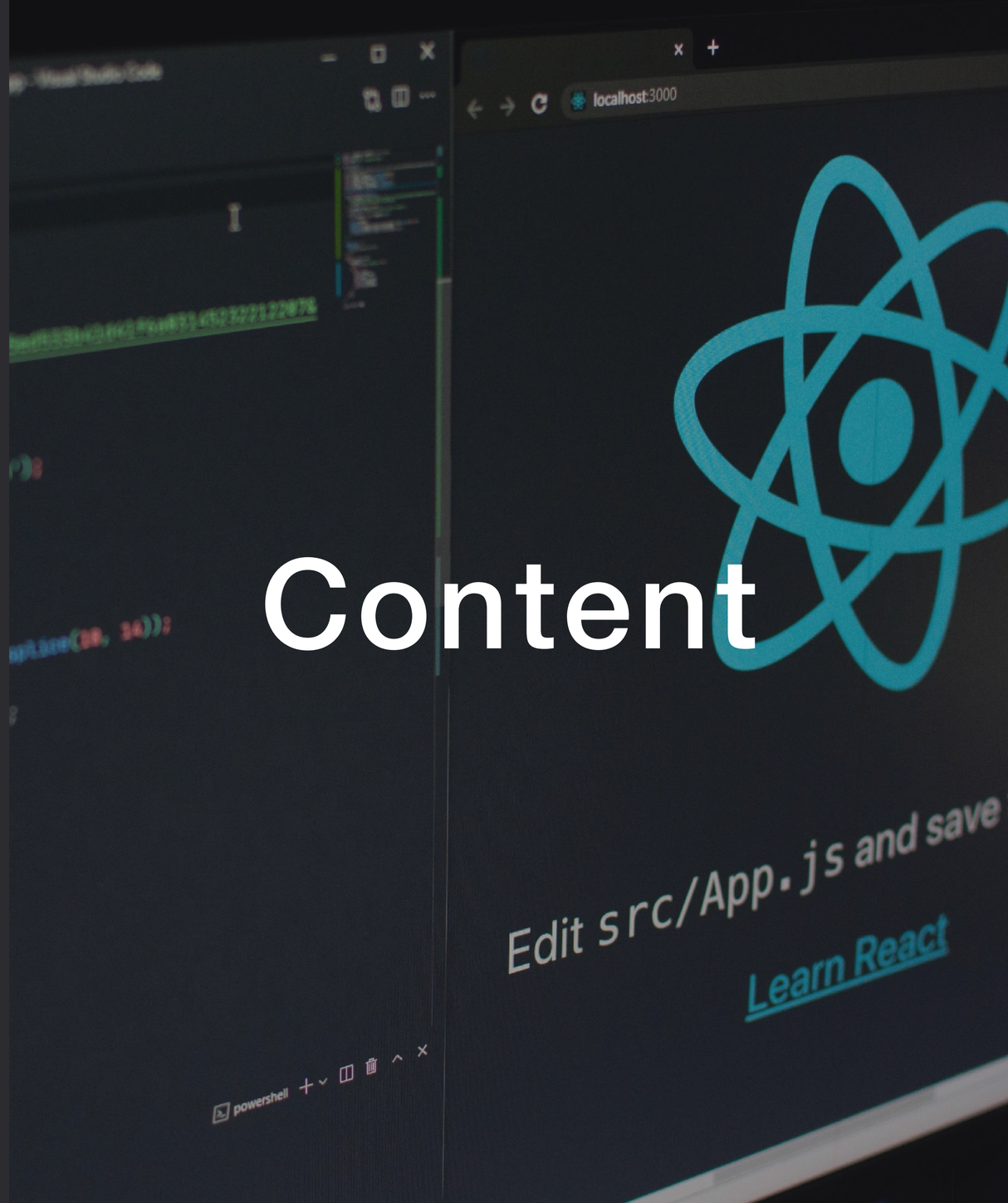

https://race-rest.web.app/

# 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

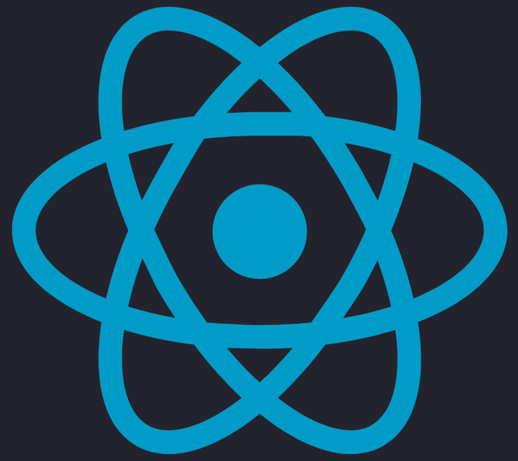
# Content

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



# Exercises

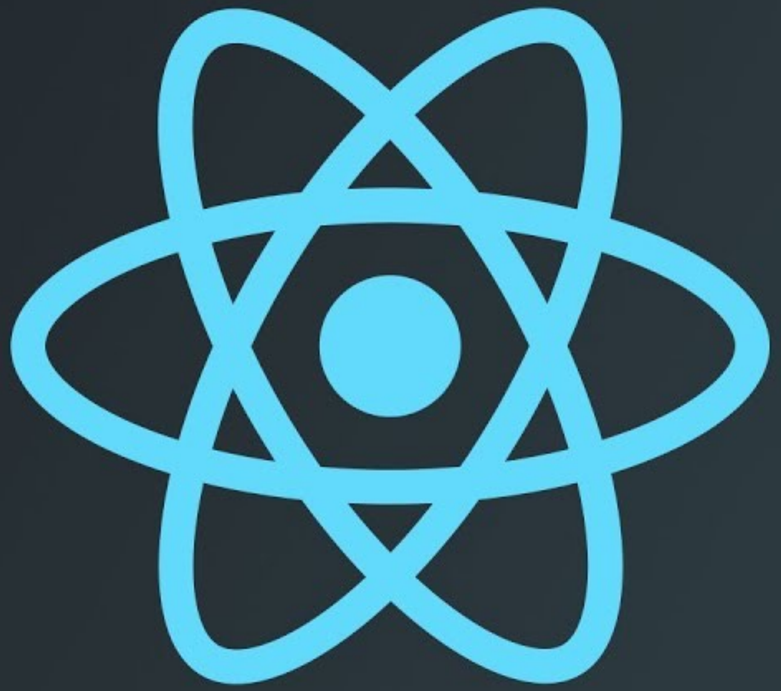
- Create React App
- Your First React App
- Component Page Layout
- Add Props: Your First React App
- Add Props: Page Layout
- Tryout useState
- React Fetch Posts #1
- React Fetch Posts #2
- Download & install Node.js & npm
- Generate create-react-app
- Canvas Users Case w/ React
- Create React SPA
-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

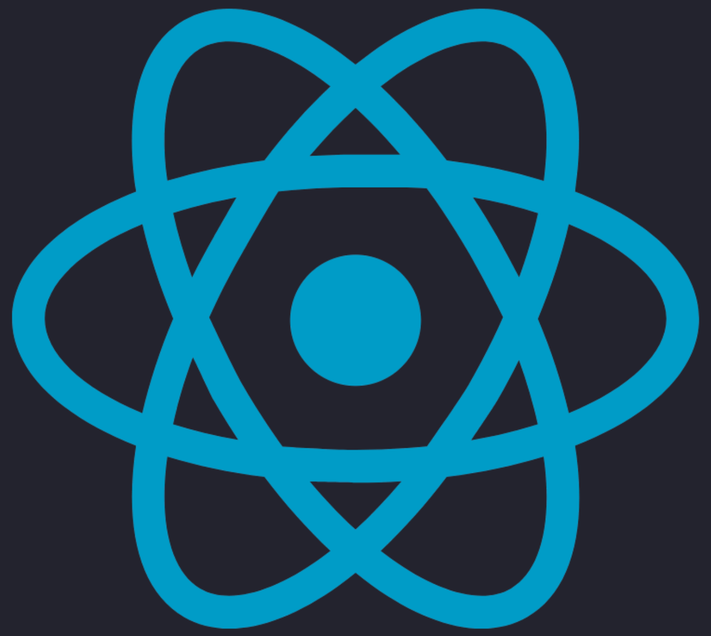


# React

A JavaScript library for building User Interfaces

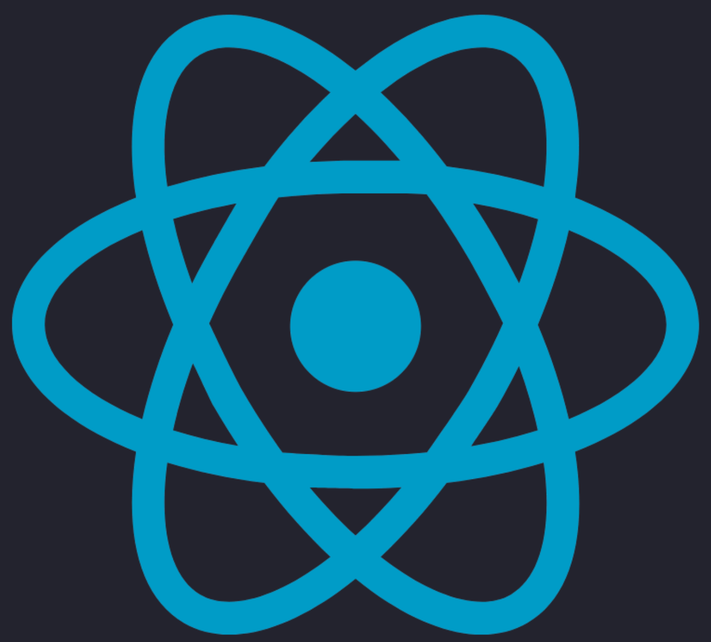
# 100 SECONDS OF





# 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

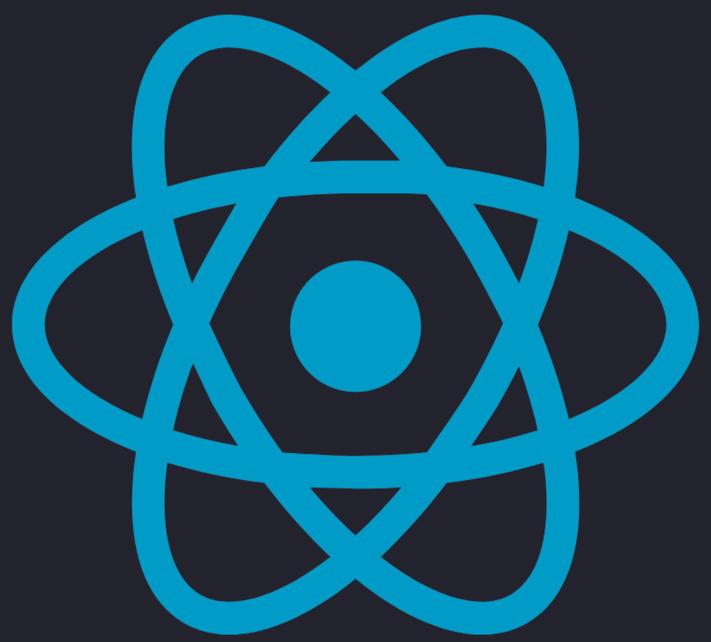
- Declarative: Describes what should be done, focusing on the desired outcome, with the system handling the implementation details (what to do).
- Imperative (the opposite): Specifies how to do something, providing step-by-step instructions, requiring manual management of implementation details (how 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

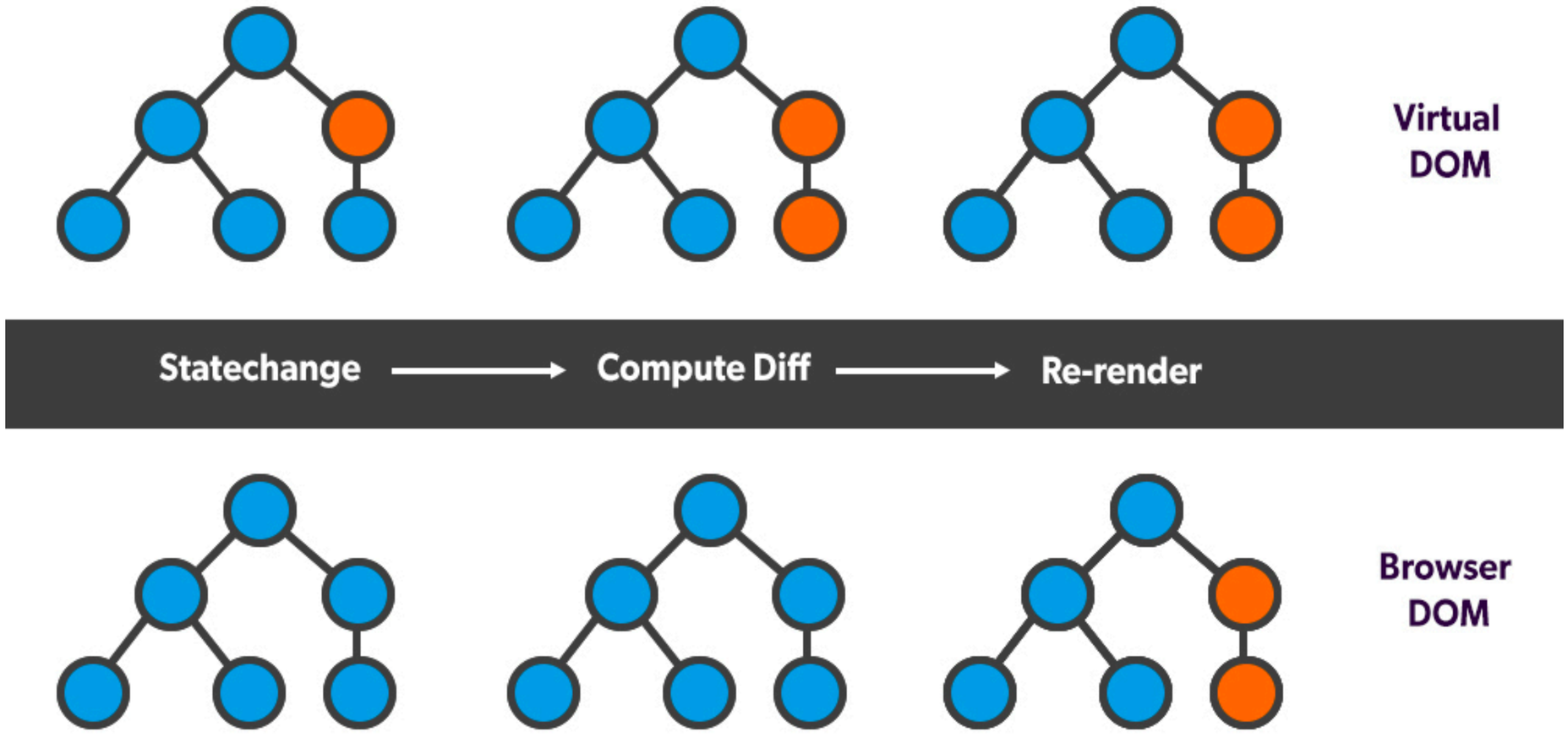
In React, UI is a **function** of **props** & **states**. The UI is built with (function) **Components**.



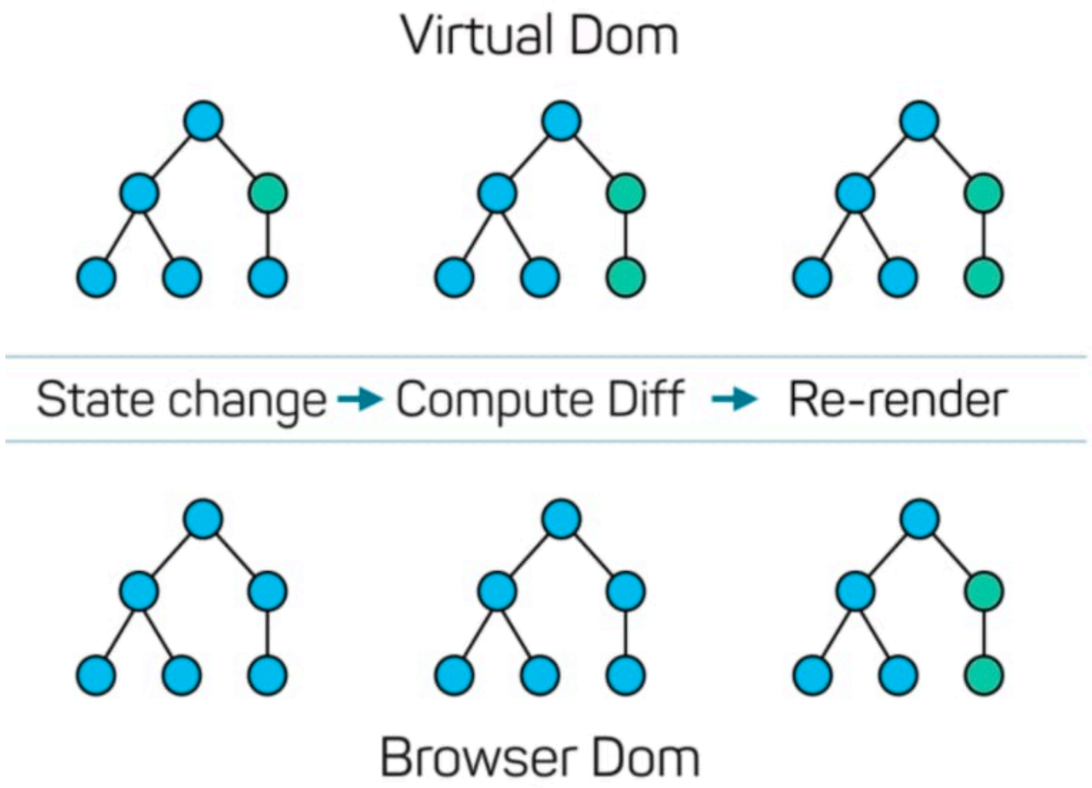
# But how?

- 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



# React Virtual DOM

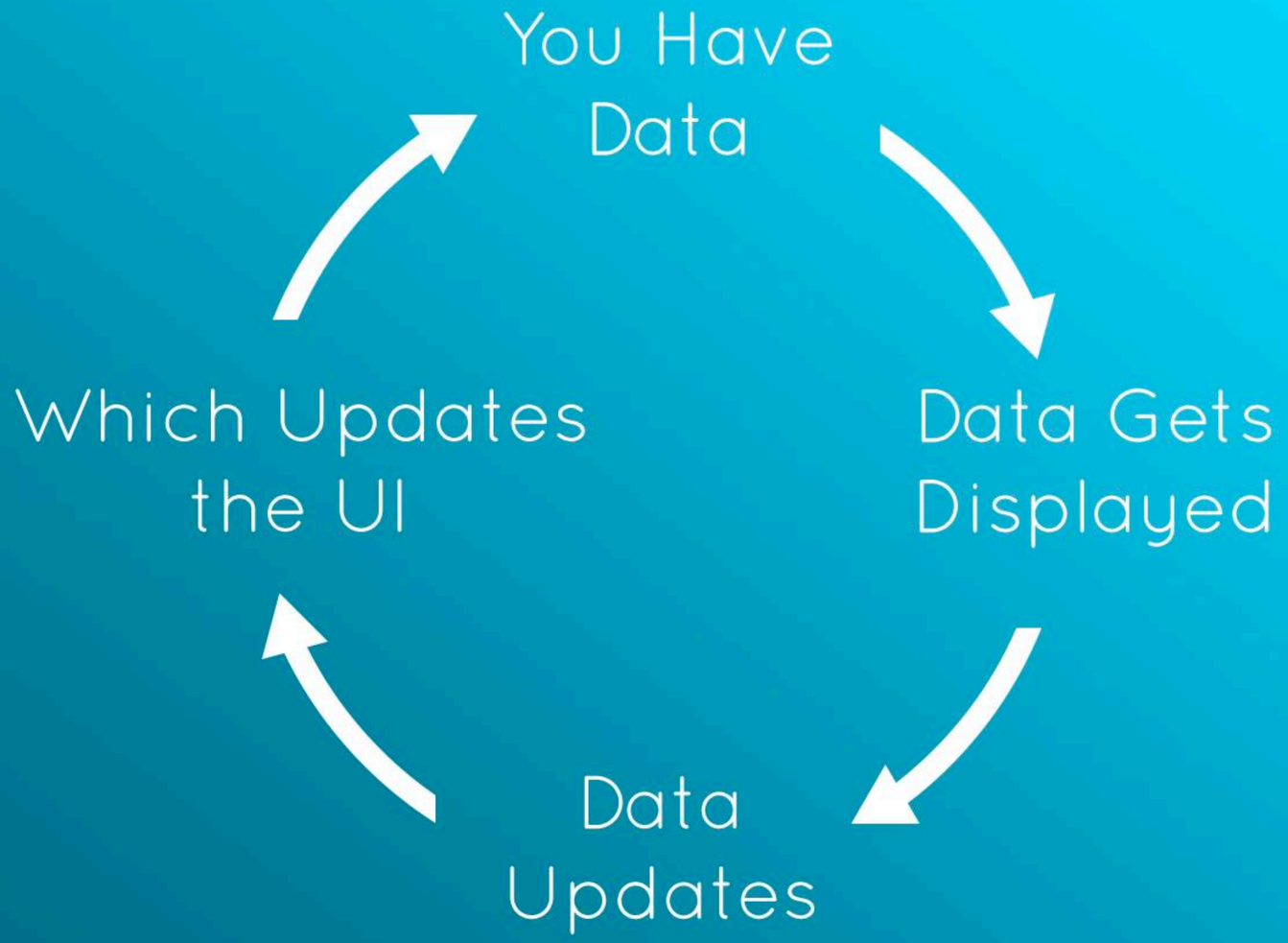



“The virtual DOM (VDOM) is a programming concept where an ideal, or “virtual”, representation of a UI is kept in memory and synced with the “real” DOM by a library such as ReactDOM.”

“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 […]”.

https://reactjs.org/docs/faq-internals.html

# The React UI Cycle




This happens AUTOMATICALLY once you define components

# HTML vs the DOM

DOM

Elements

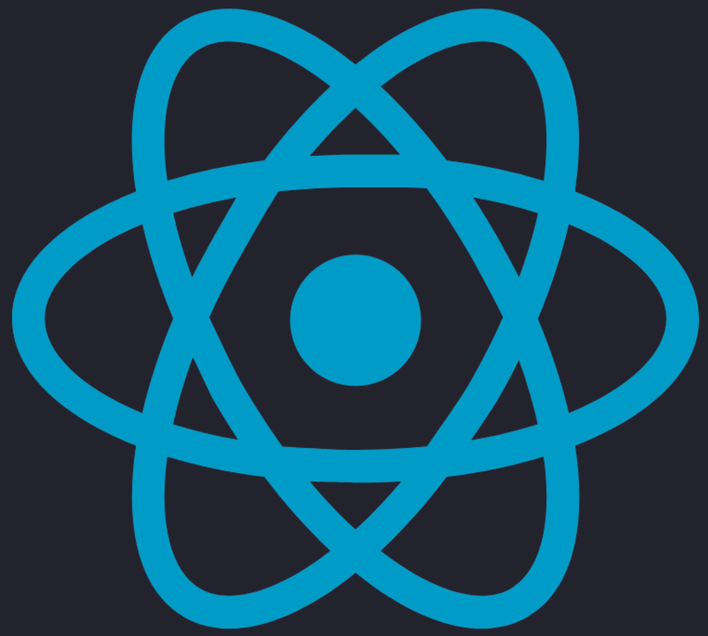
```
1  <html>
2    <head></head>
3    <body>
4      <div id="app">
5        <h1>Develop. Preview.
6  Ship. 🚀</h1>
7      </div>
8      <script type="text/
9  javascript">...</script>
10   </body>
11 </html>
```

SOURCE CODE (HTML)

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>
9
10
11
```

https://nextjs.org/learn/foundations/from-javascript-to-react/updating-ui-with-javascript



# 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.

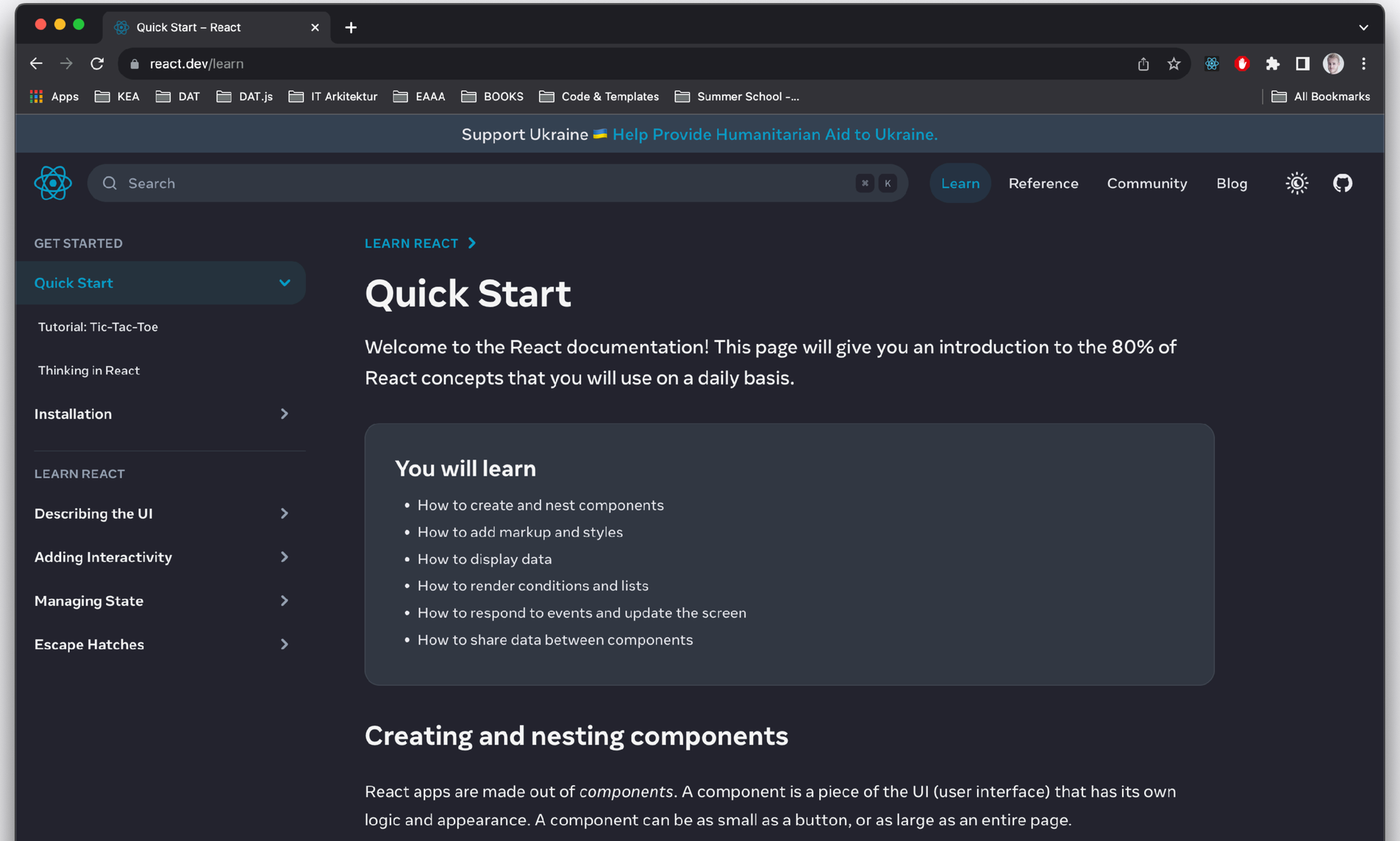
# Resources

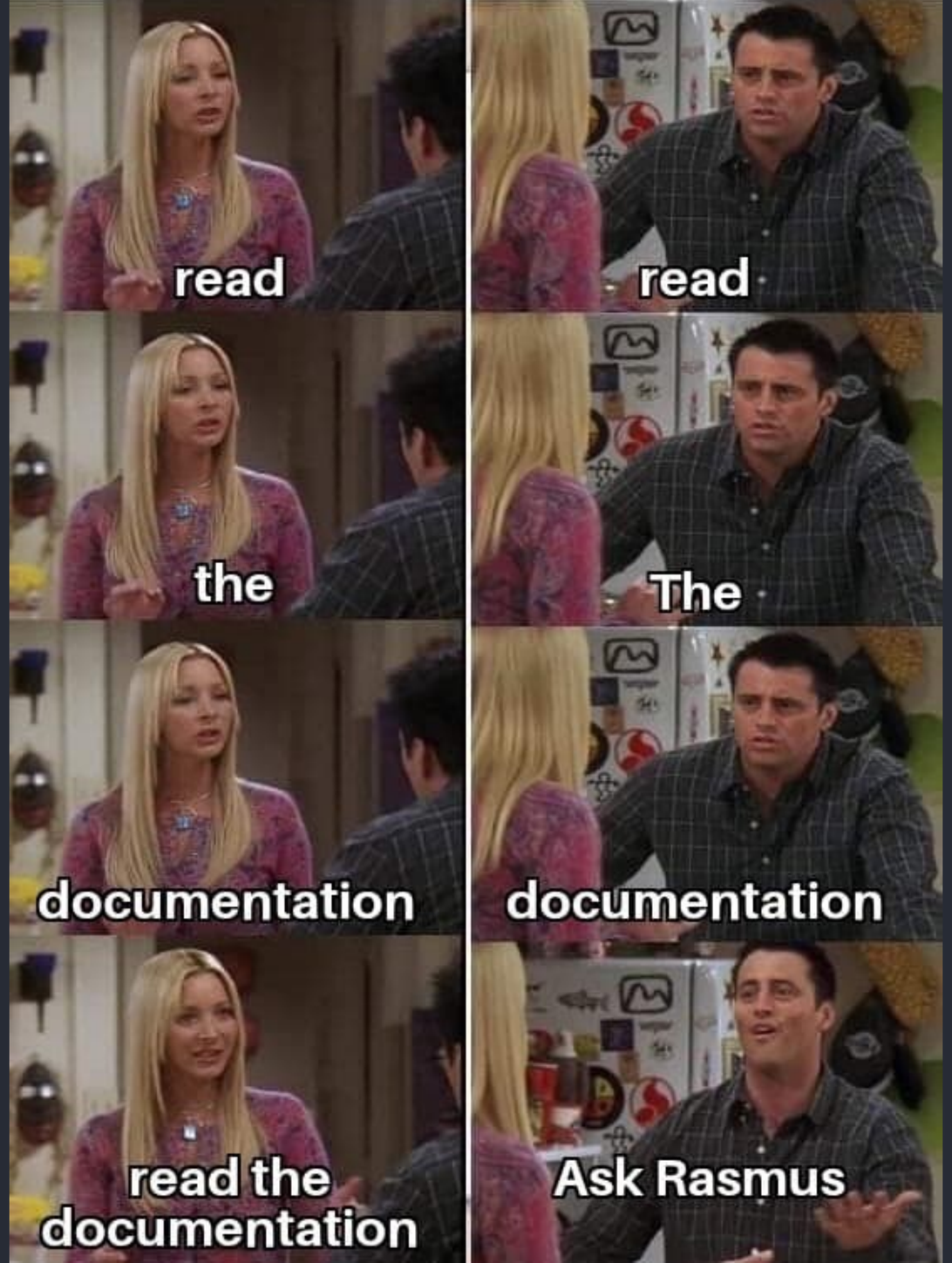
[React Resources]

[React Self-study]

[Guides & Tutorials]

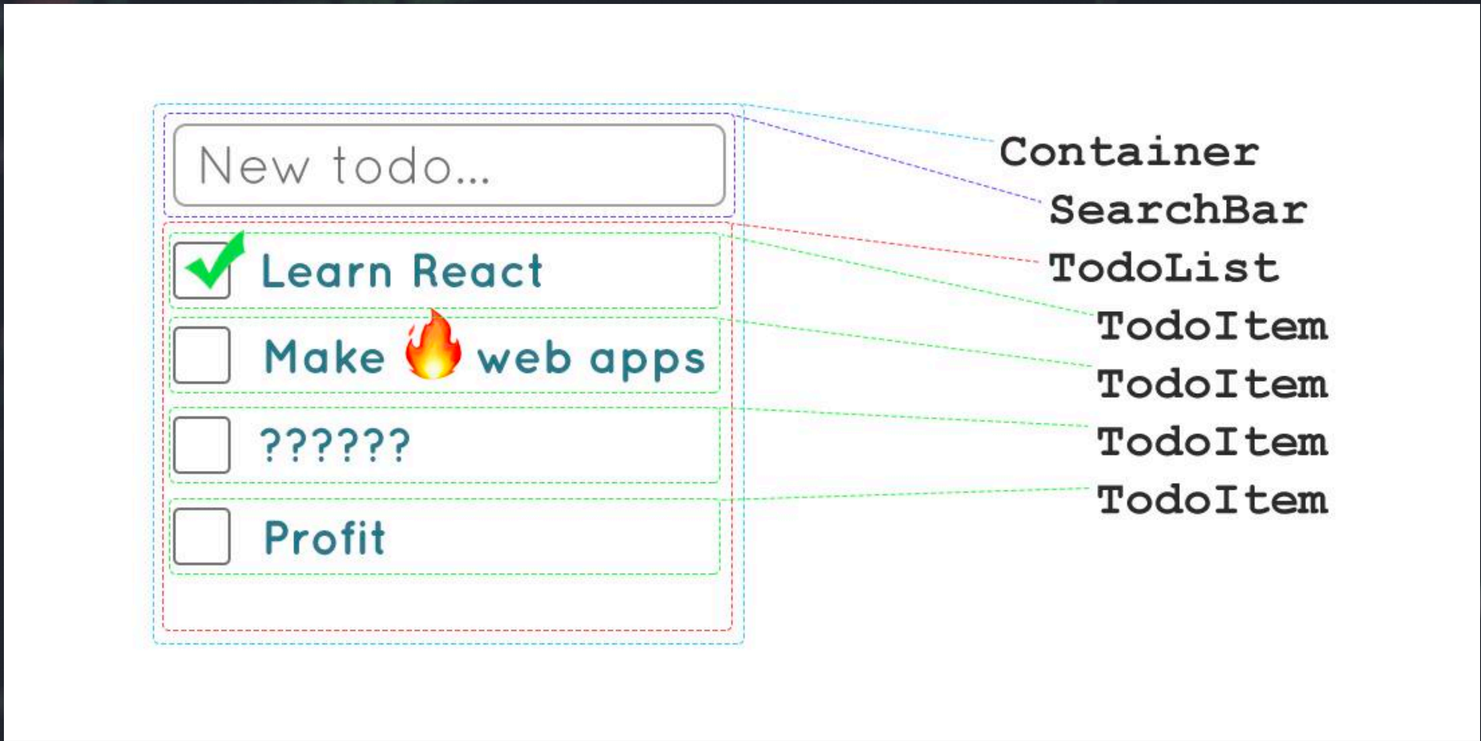
# React Docs


Quick Start – React
react.dev/learn
Apps
KEA
DAT
DAT.js
IT Arkitektur
EAAA
BOOKS
Code & Templates
Summer School -...
All Bookmarks
Support Ukraine 🇺🇦 Help Provide Humanitarian Aid to Ukraine.
Search
⌘
K
Learn
Reference
Community
Blog
GET STARTED
Quick Start
Tutorial: Tic-Tac-Toe
Thinking in React
Installation
LEARN REACT
Describing the UI
Adding Interactivity
Managing State
Escape Hatches
LEARN REACT
Quick Start
Welcome to the React documentation! This page will give you an introduction to the 80% of React concepts that you will use on a daily basis.
You will learn
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
How to share data between components
Creating and nesting components
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.


read
read
the
The
documentation
documentation
read the documentation
Ask Rasmus

# How to Think in React

Review slides & note questions



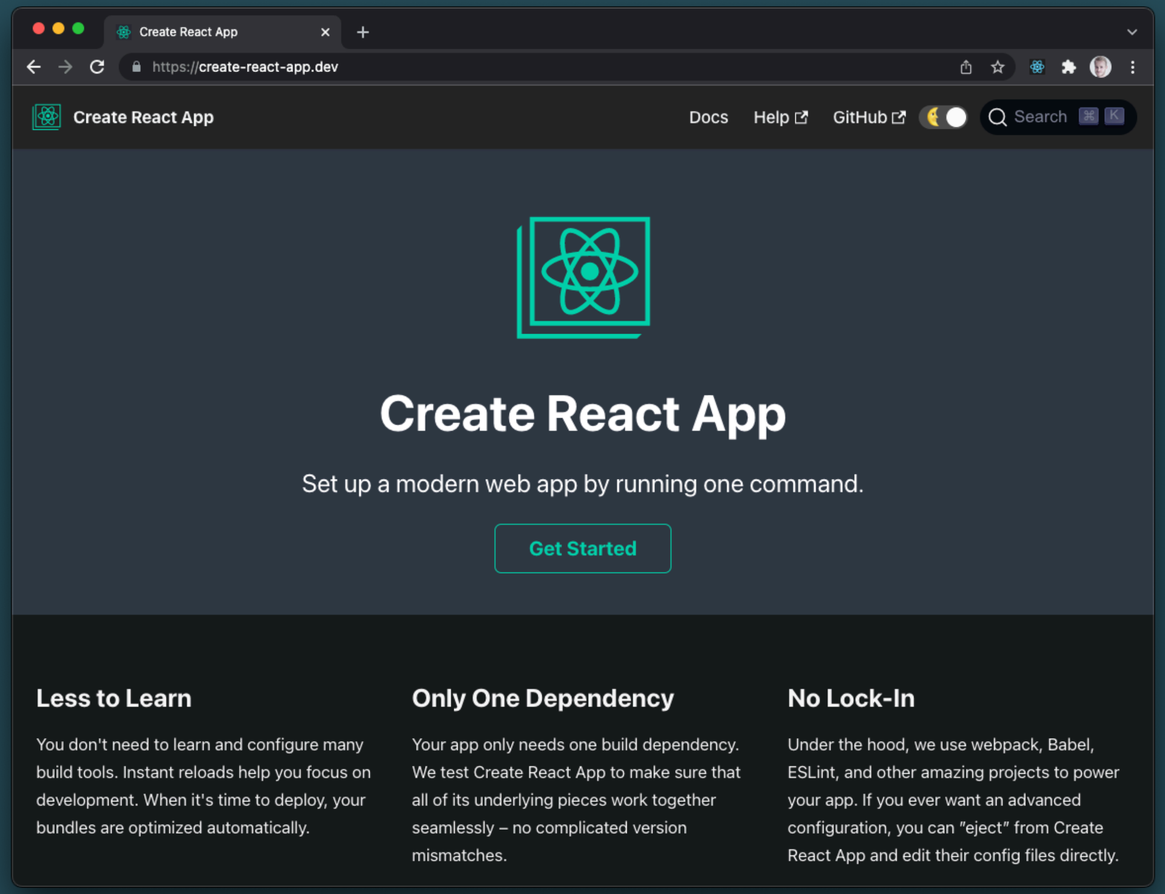
# Function Component

- 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>
    );
}
```

# create-react-app

Starter template for your react app




Generate create-react-app

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.


# Your First React App

# JSX

**J**ava**S**cript **X**ML

- 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>;
```

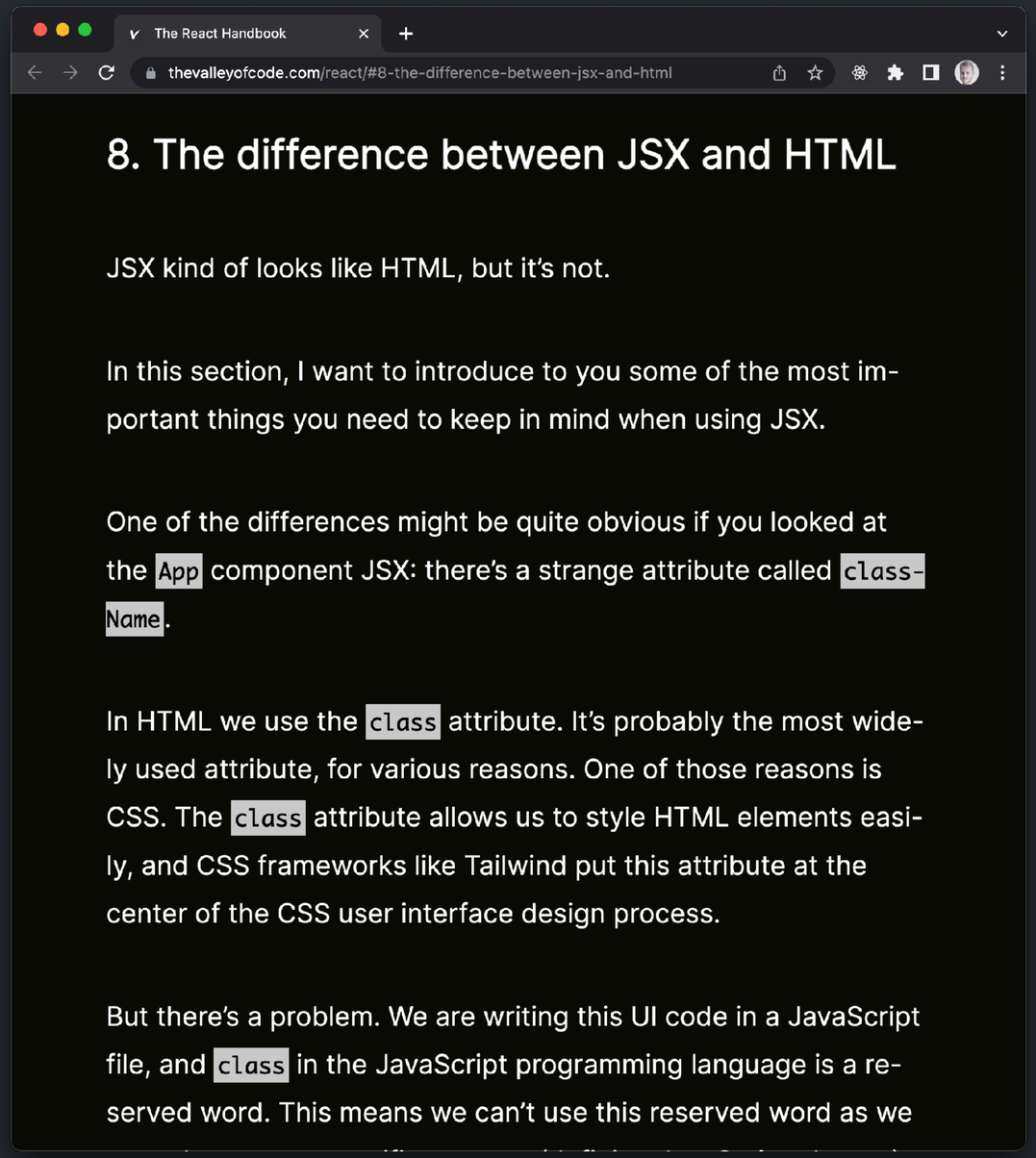
```
// Without JSX

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

# JSX

**J**ava**S**cript **X**ML

- 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>
    );
}
```




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

https://thevalleyofcode.com/react/#8-the-difference-between-jsx-and-html

# Function Component


https://twitter.com/chrisachard/status/1175022111758442497

# Function Component

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

Define the component “Greeting”

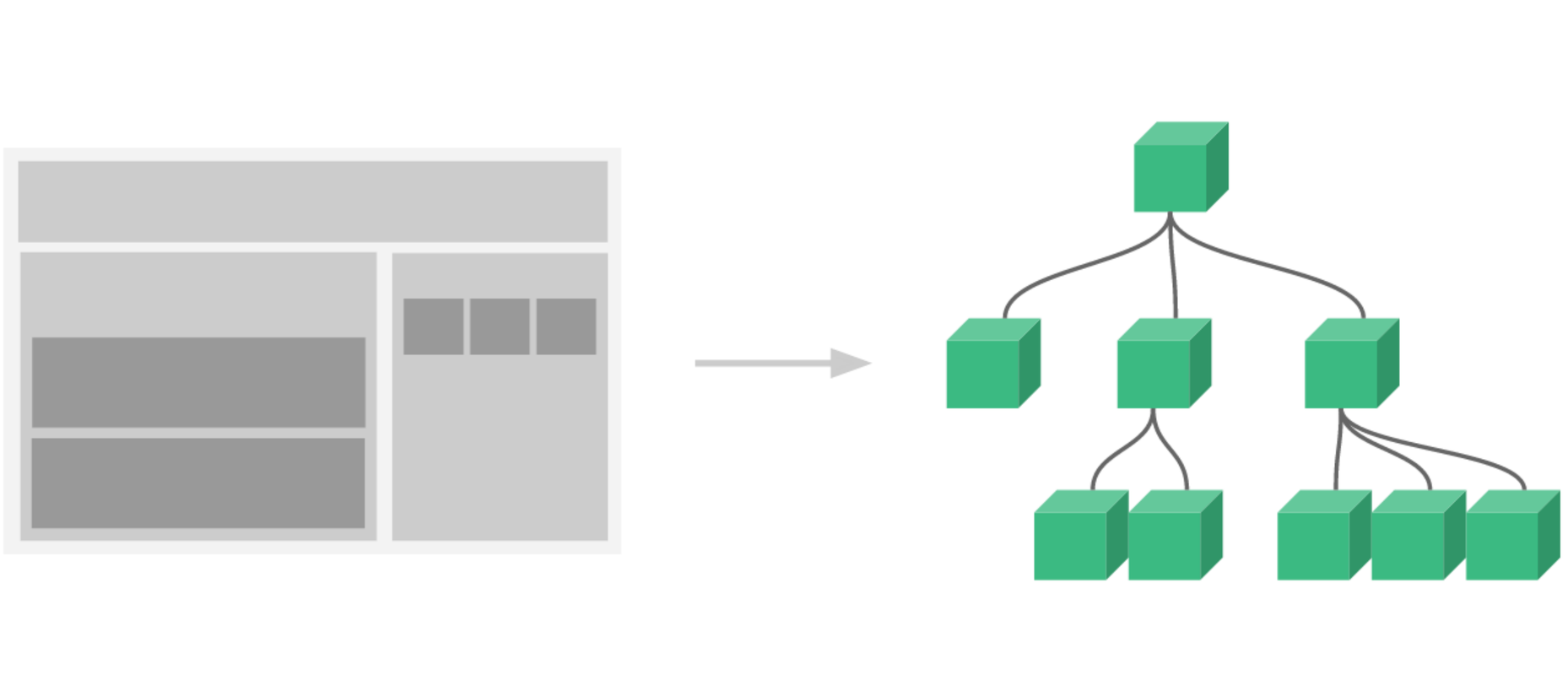
```
function App() {
  return (
    <div>
      <Greeting />
      <div>
        <Greeting />
      </div>
    </div>
  );
}
```

Use Greeting component in another component

Components without a closing tag REQUIRE a closing slash

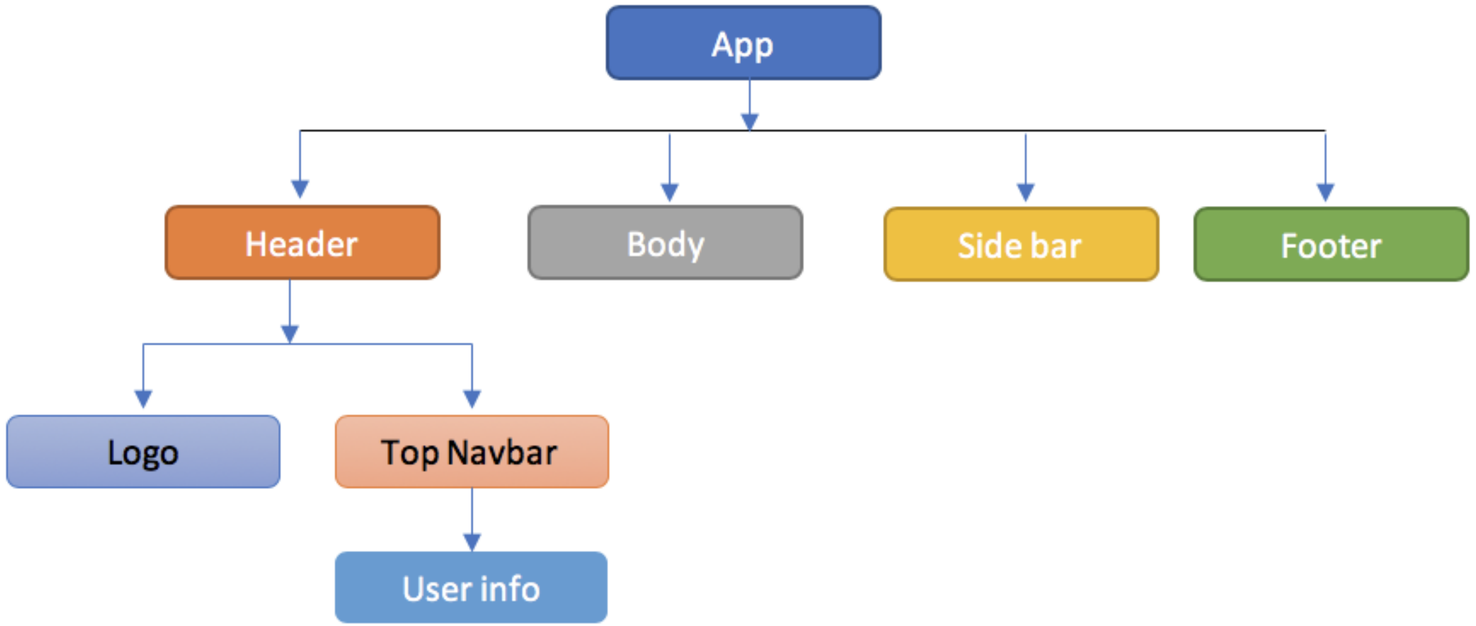
https://twitter.com/chrisachard/status/1175022111758442497

# Components, Components, Components



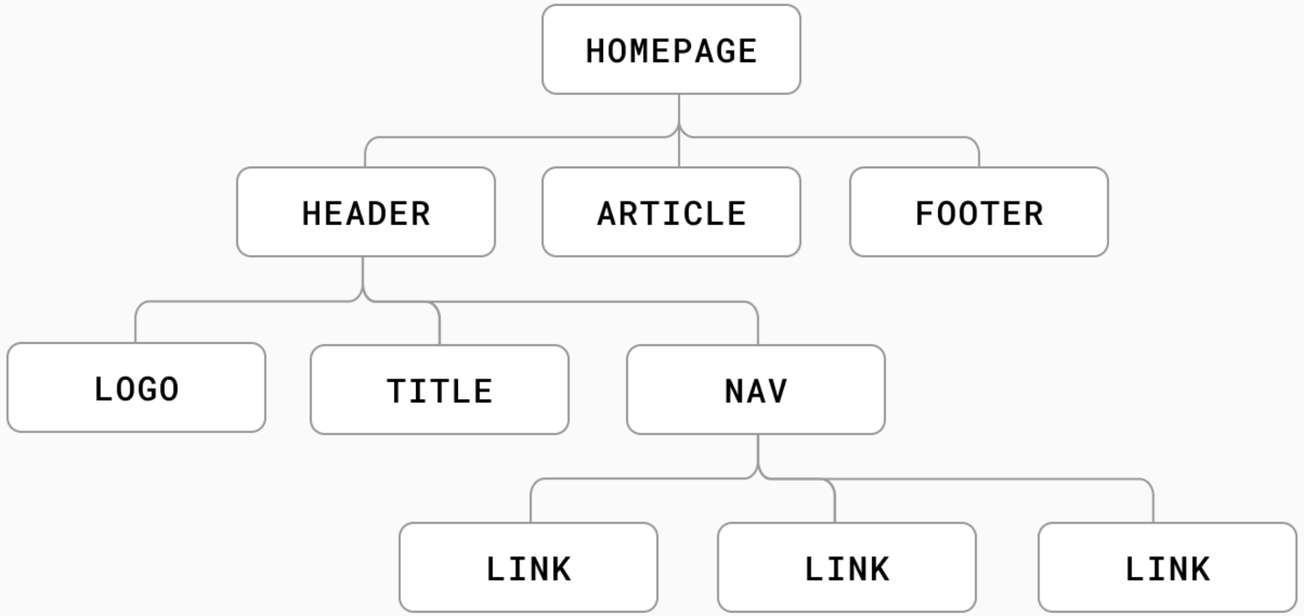
# Build Reusable Components

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

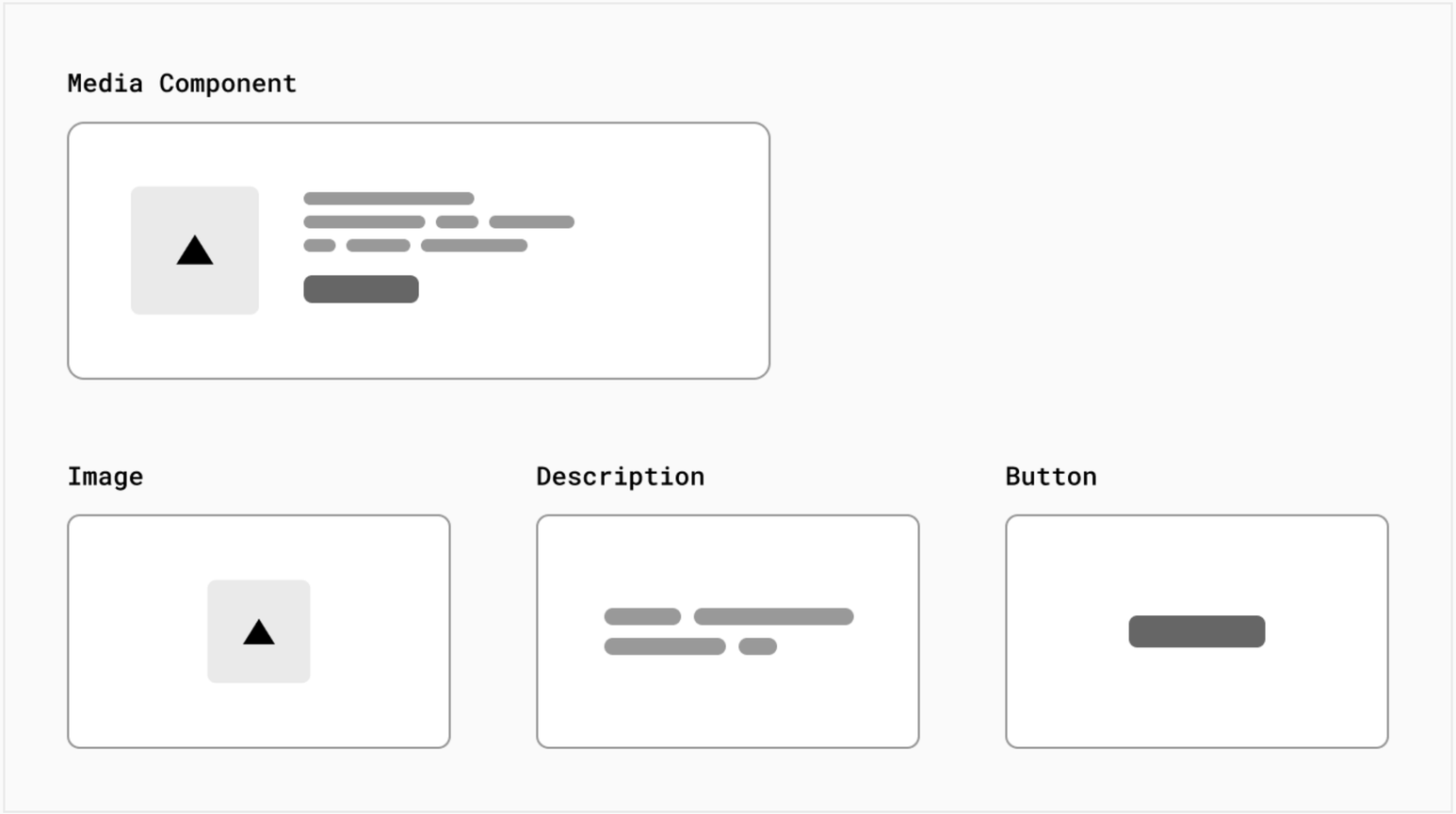


# Build Reusable Components

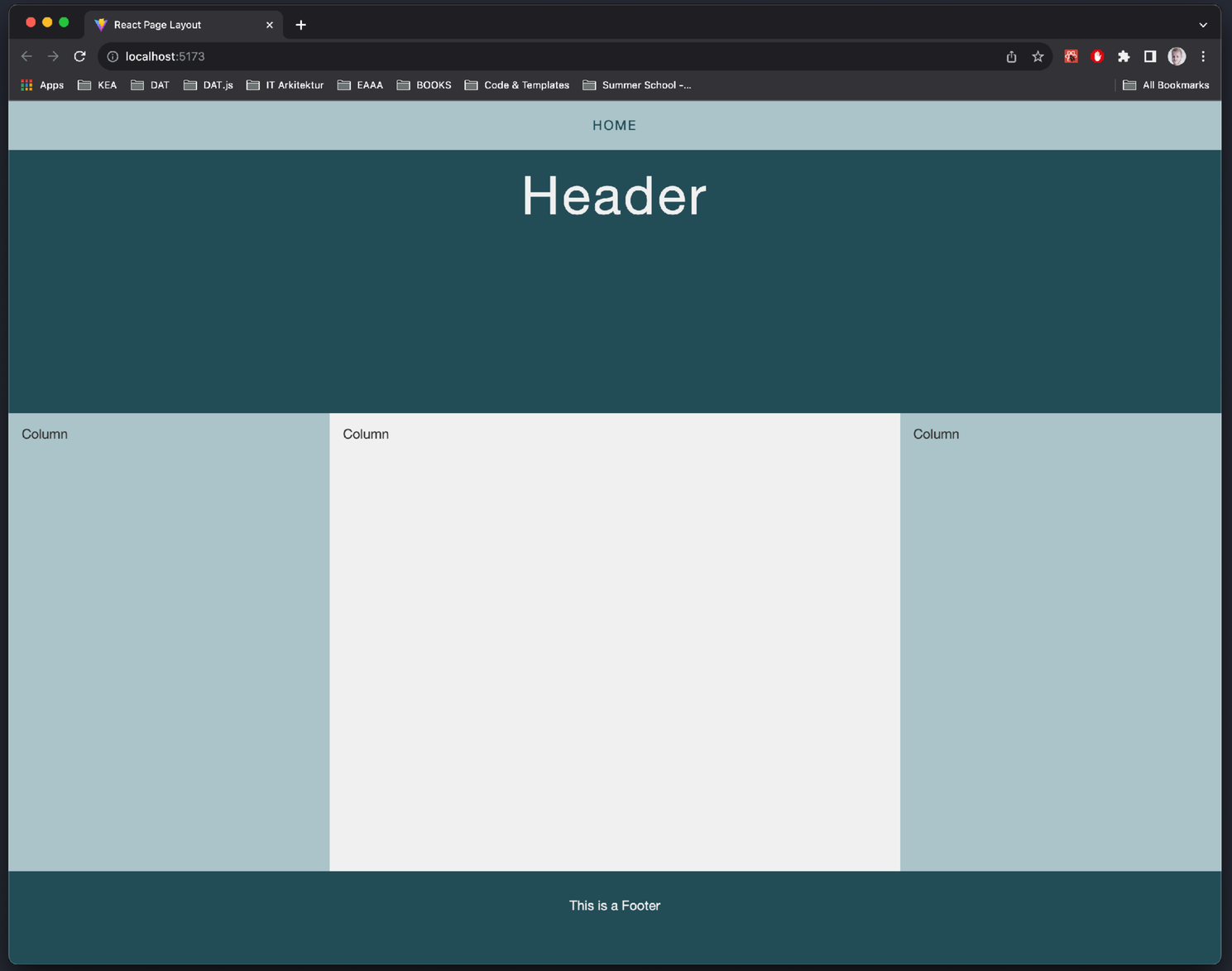
UI can be broken down to small block or modules called components



# Like “LEGO Bricks”

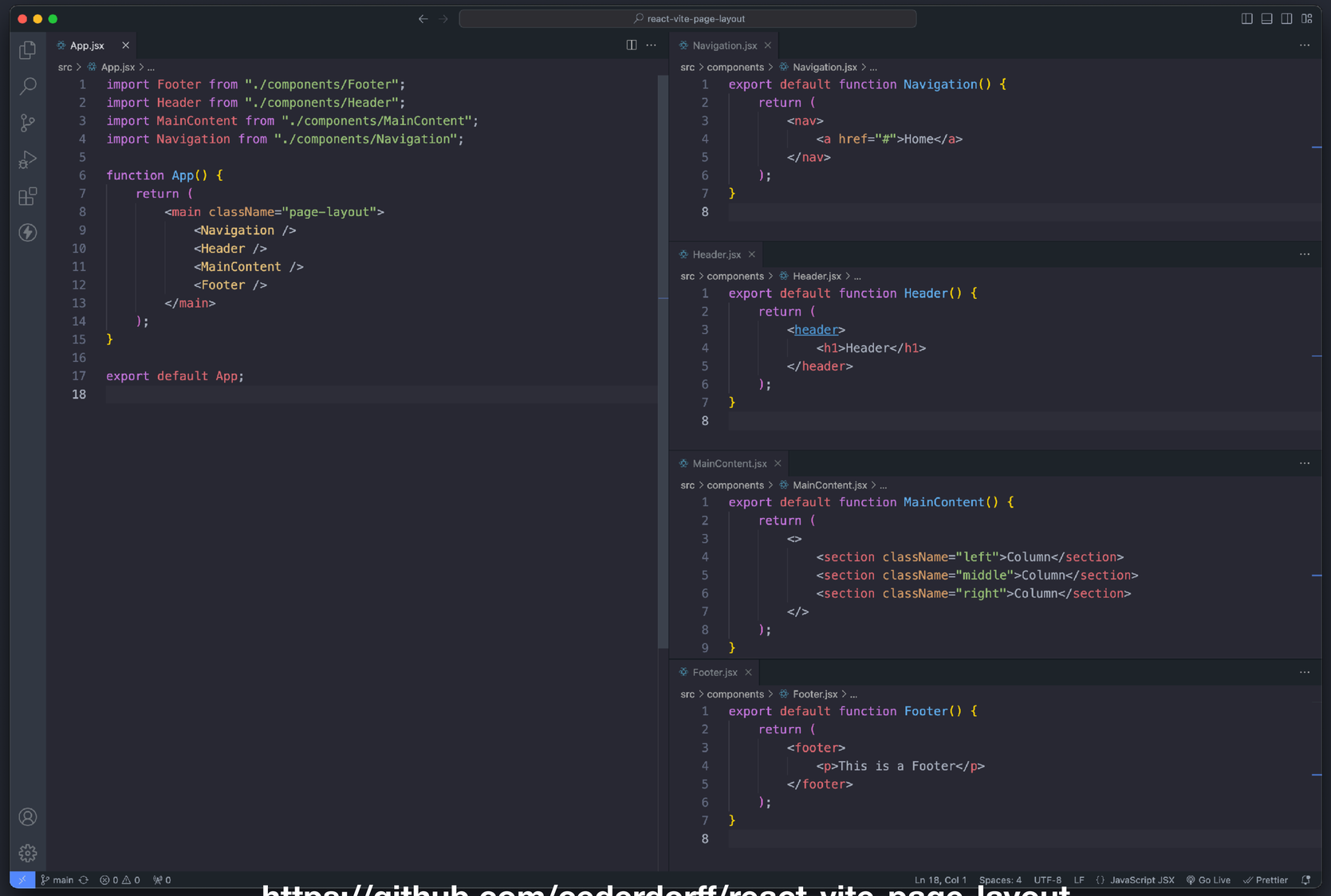



https://nextjs.org/learn/foundations/from-javascript-to-react/building-ui-with-components




```
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!




https://github.com/cederdorff/react-vite-page-layout

# 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.

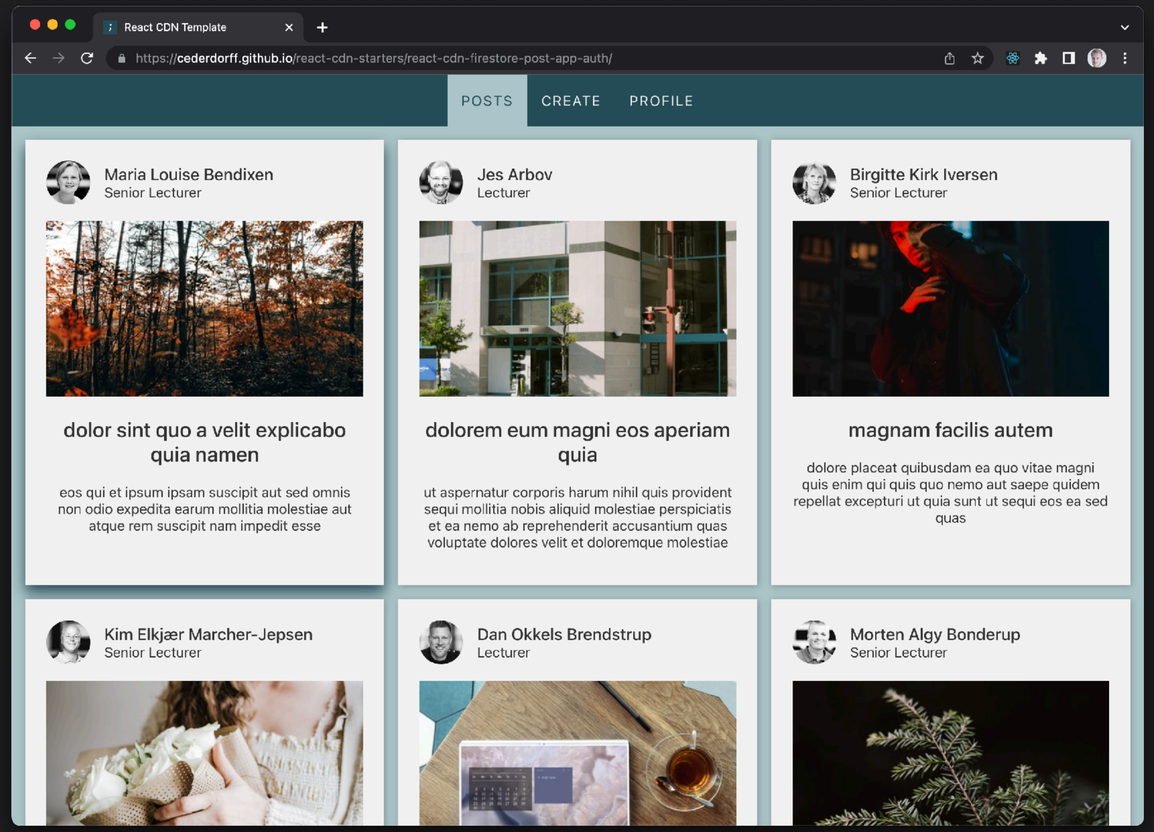
In older React code bases, you may find Class components primarily used. It is now suggested to use Function components along with Hooks, which were added in React 16.8. There is an optional section on Class components for your reference.

## Create Your First Component

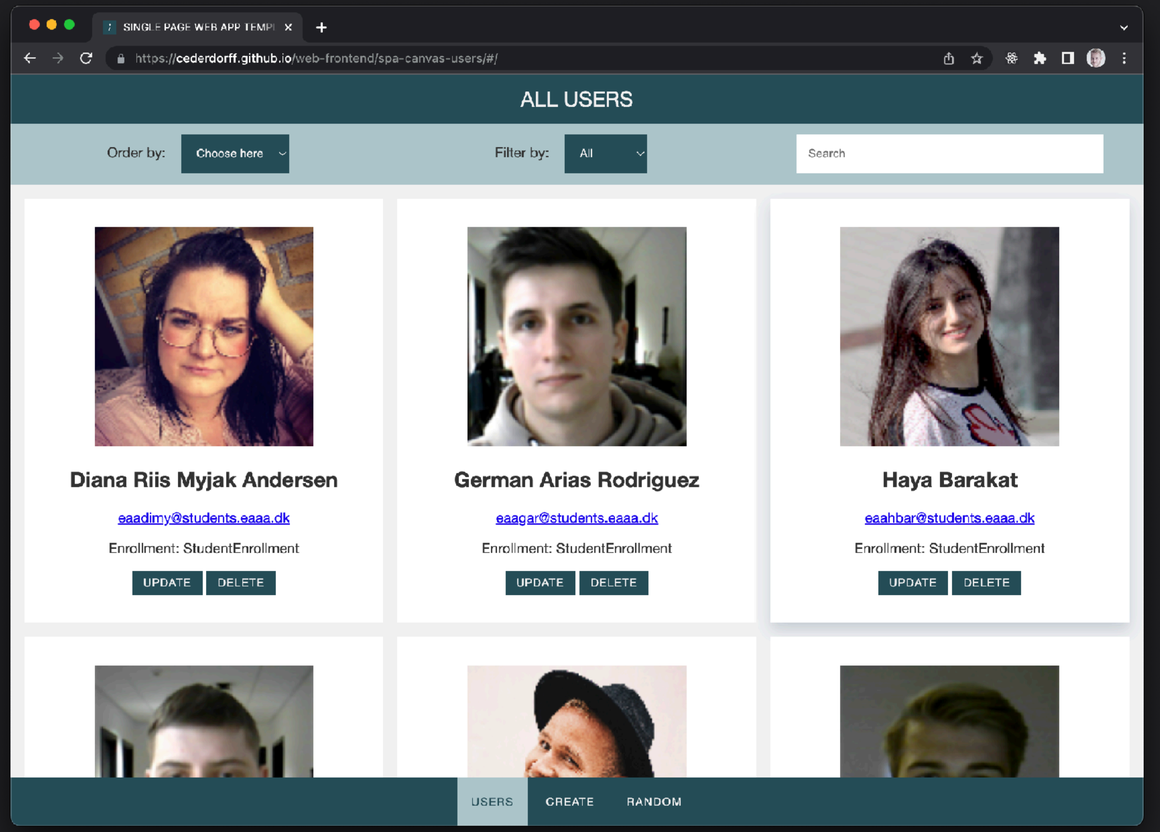
When creating a React component, the component's name *MUST* start with an upper case letter.

### Class Component

# Components?



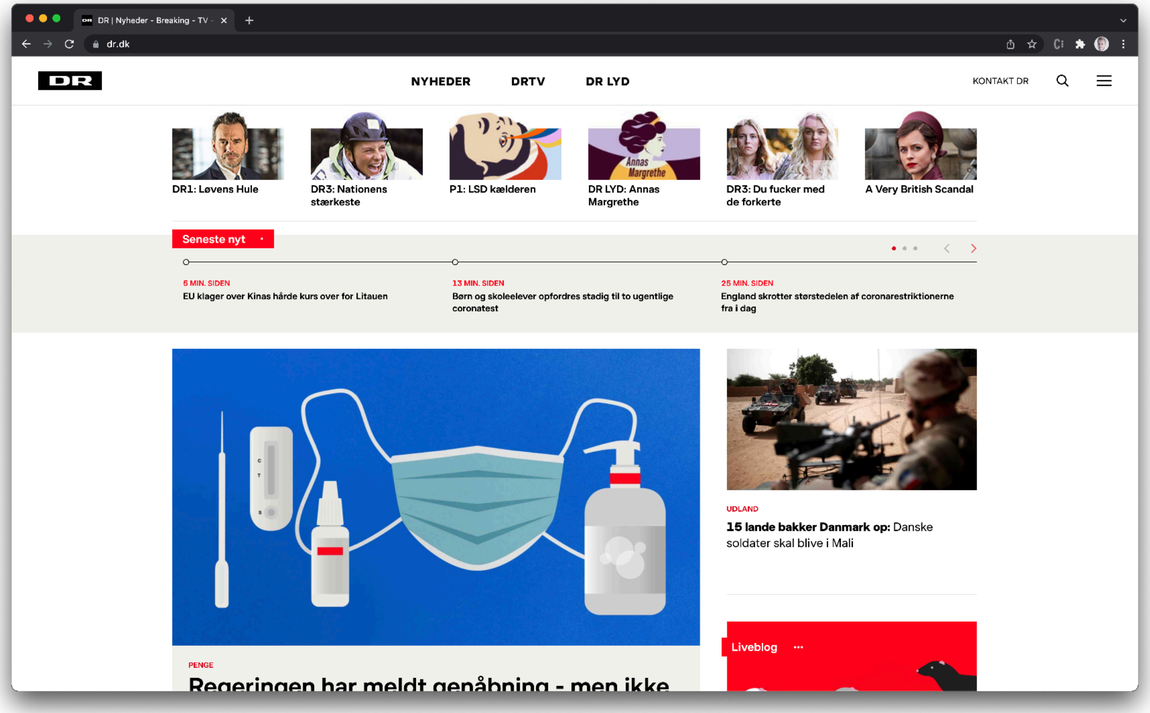

react-cdn-firestore-post-app-auth

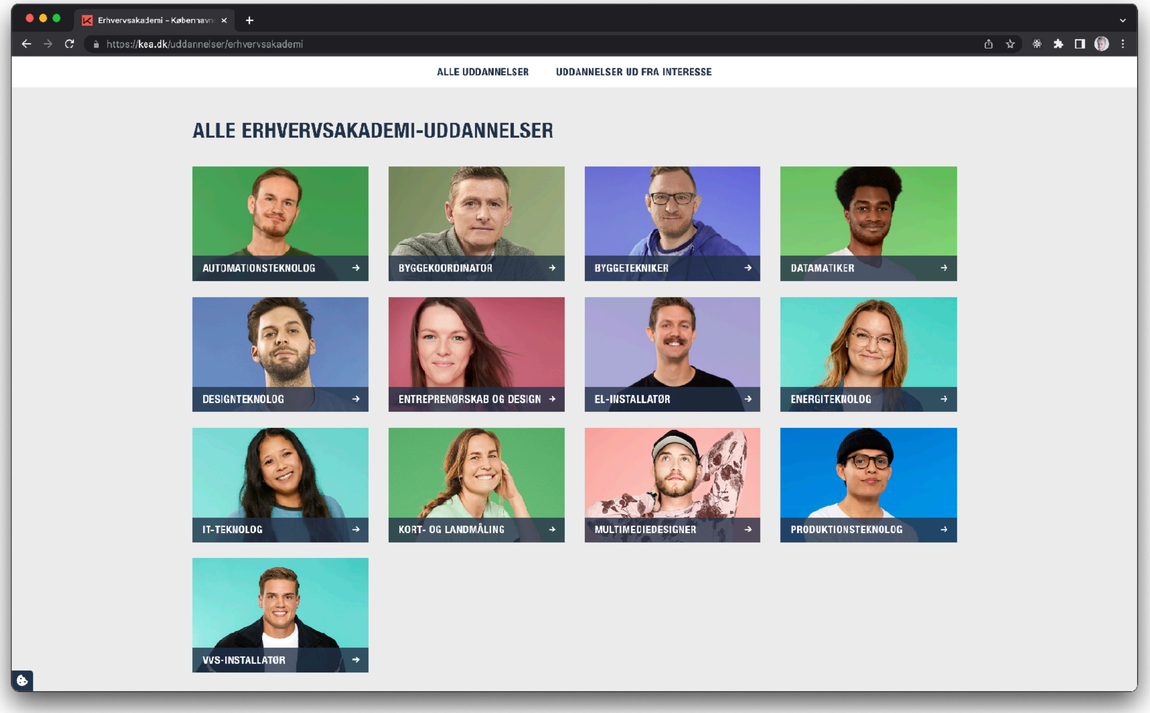



Template: `spa-canvas-users-template`

Solution: `spa-canvas-users`

# And?

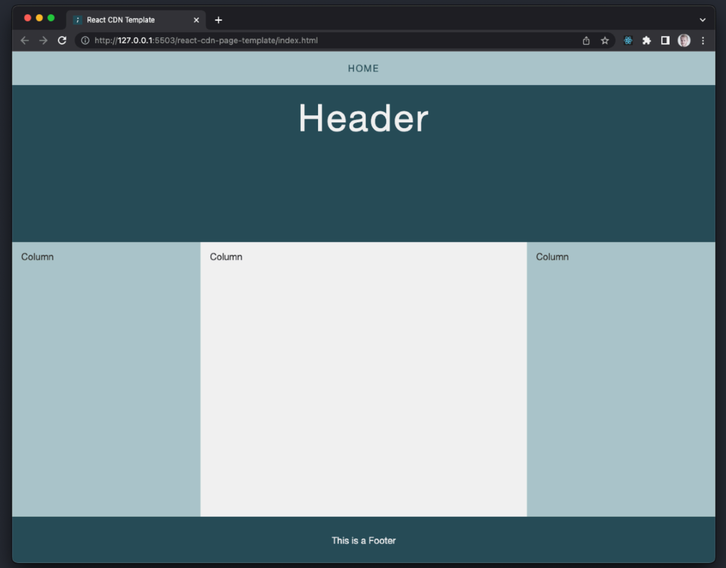



... but we thought it was all objects and array?

# 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 Component with Props

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

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

props is first argument to function components

Access props inside of curly braces to show value

Set a prop on a child component by passing an attribute

Different instances of component can have different prop values

https://twitter.com/chrisachard/status/1175022111758442497

# 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.

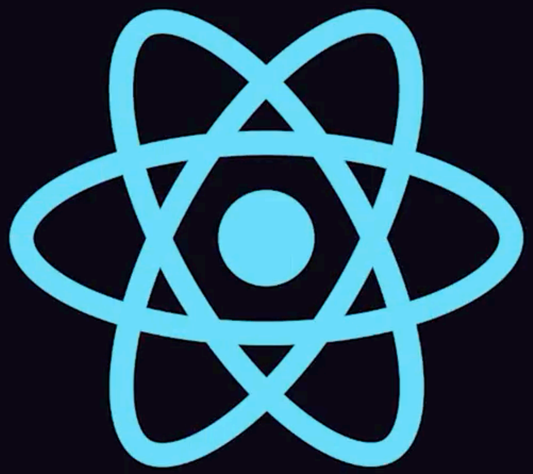
# Add Props: Page Layout

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" />;
}
```

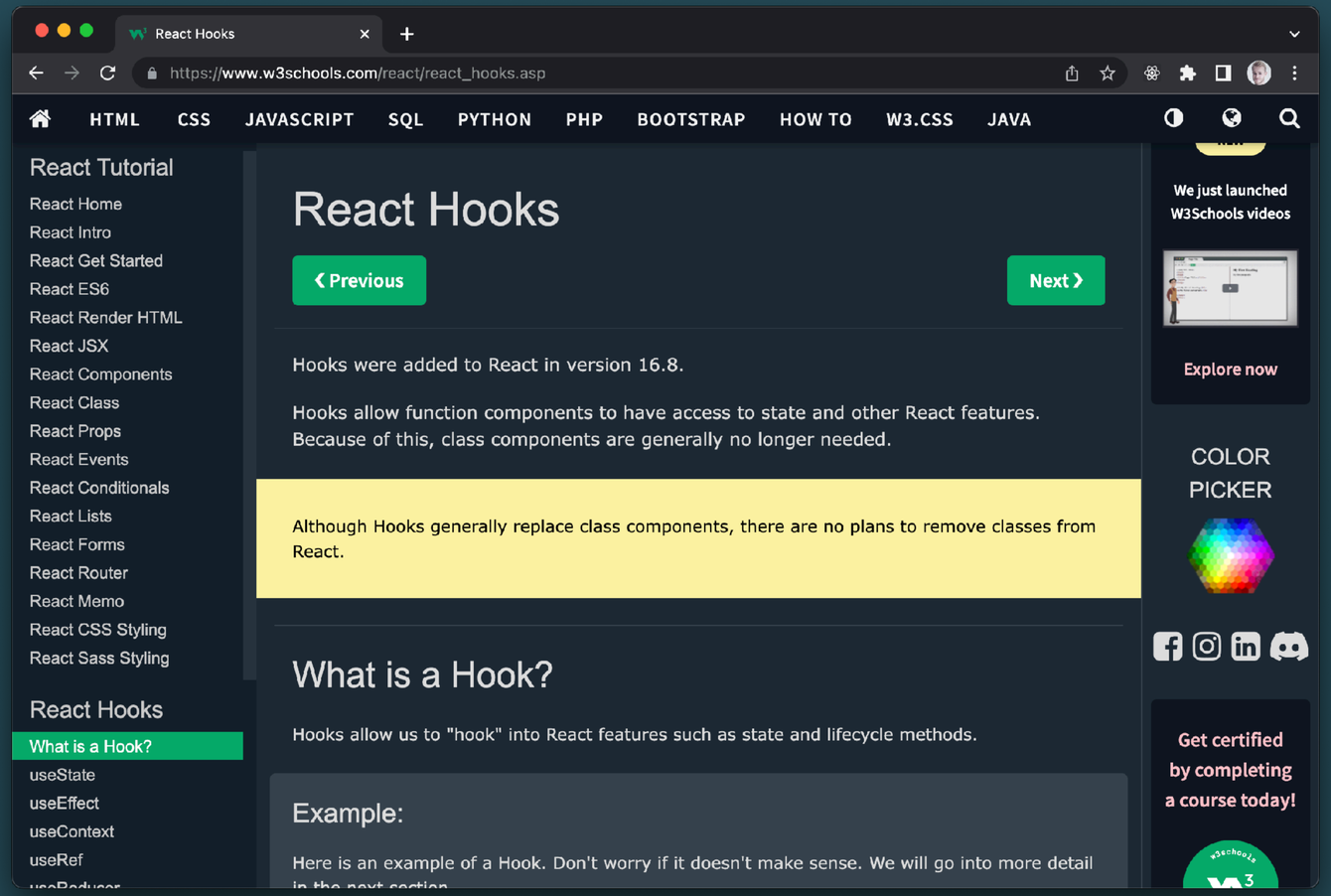
# React Hooks

useState & useEffect



https://www.youtube.com/watch?v=TNhaISOUy6Q

# React Hooks




w3schools.com/react/react_hooks.asp


https://www.youtube.com/watch?v=TNhaISOUy6Q

# 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.

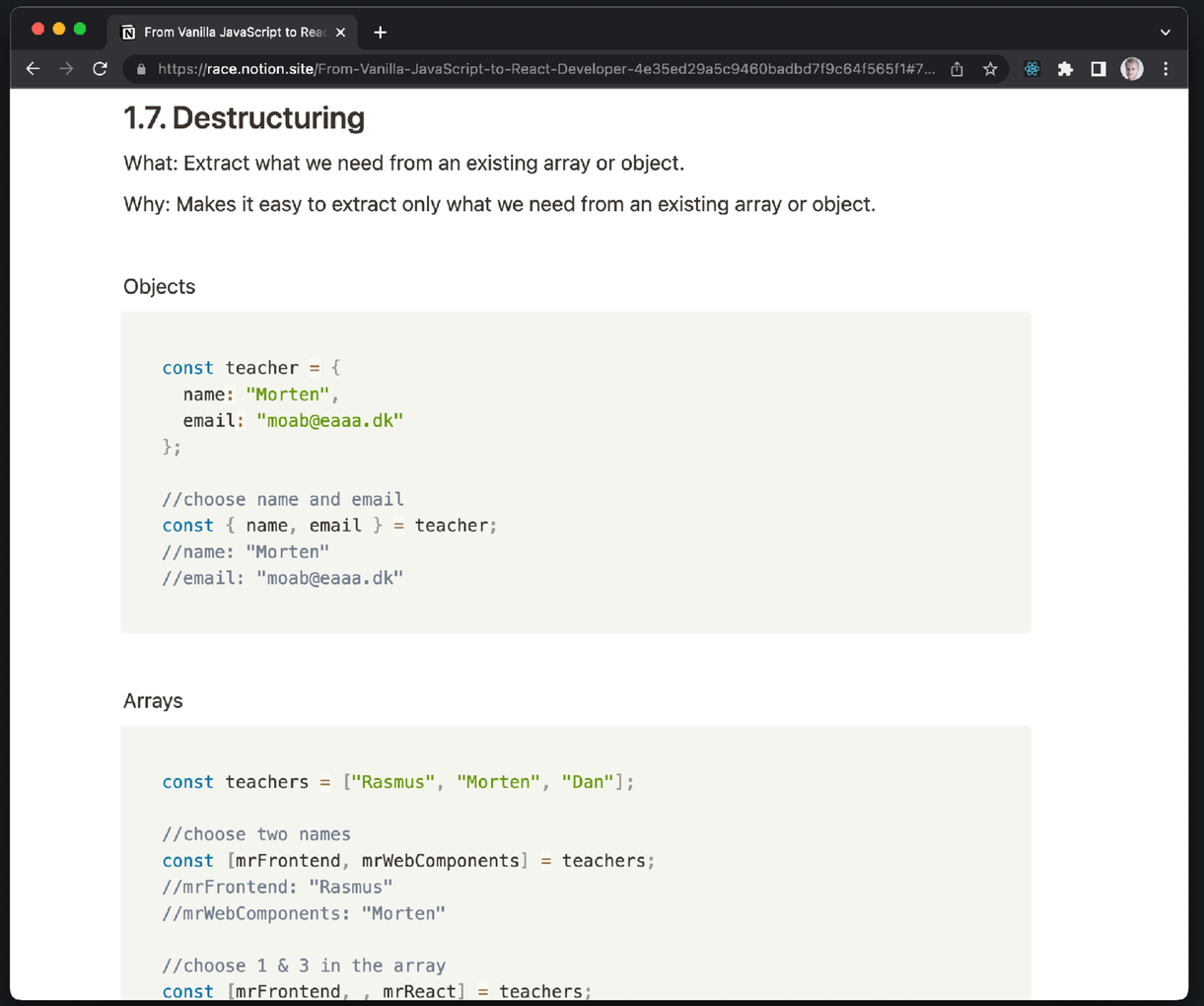
# useState(...)

... 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.


https://twitter.com/chrisachard/status/1175022111758442497

# Destructuring




Destructuring

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

React *reacts* to the changes.

```jsx
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

https://twitter.com/chrisachard/status/1175022111758442497

# 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.


```jsx
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>
  );
}
```

# 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>
  )
}
```

Wrap entire JS in curly braces

Map over data that was passed in as props

Return JSX from each iteration

Pass unique key attribute to each element

Use curly braces like normal to display data

https://twitter.com/chrisachard/status/1175022111758442497

# 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>
    );
}
```

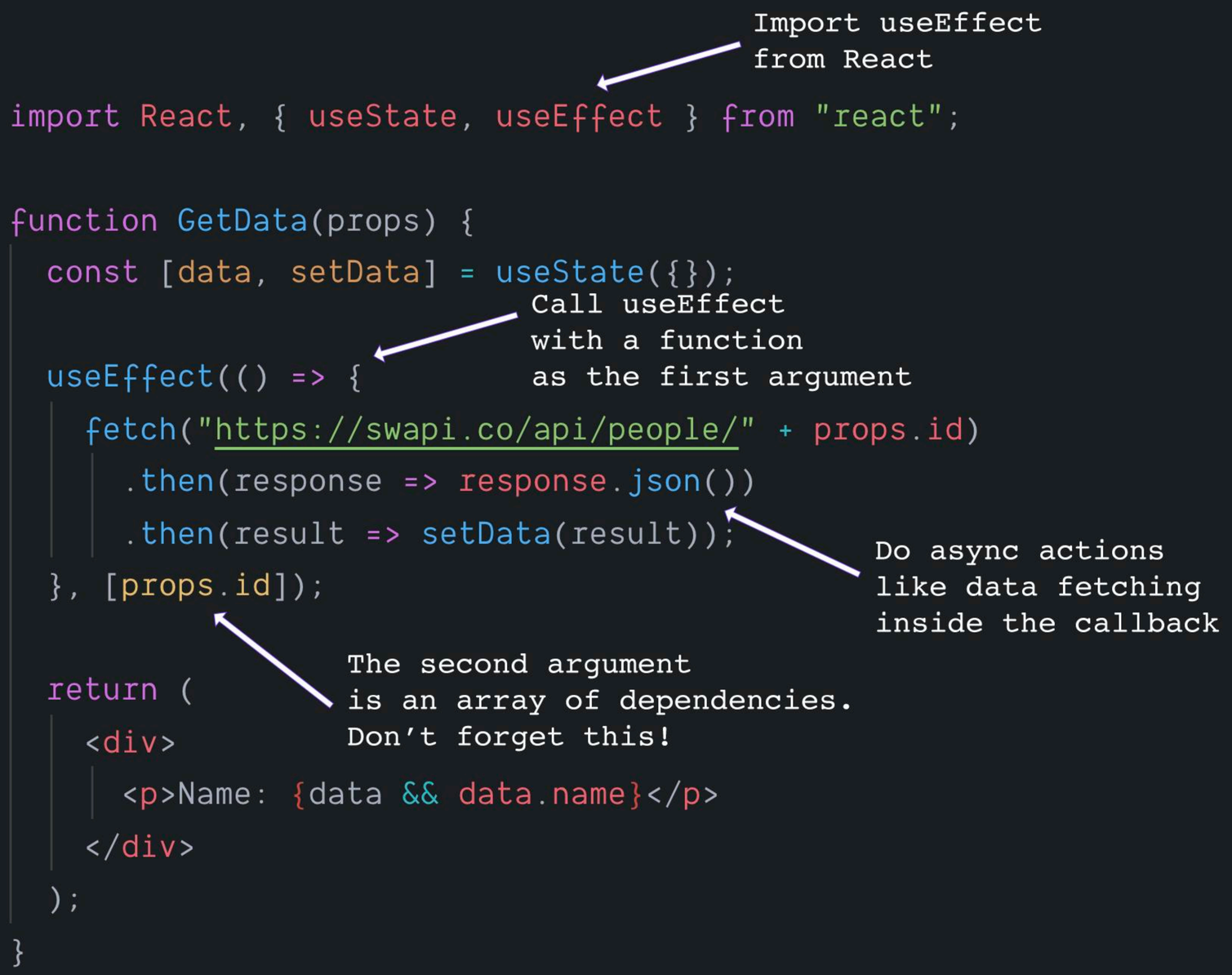
Data list

Map over the list and return jsx


https://www.youtube.com/watch?v=TNhaISOUy6Q

# useEffect(...)

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




https://twitter.com/chrisachard/status/1175022111758442497

# useEffect(...)

useEffect accepts two arguments.

We should always include the second parameter which accepts an array of dependencies.

useEffect runs on every render and when the dependencies change.

```
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]);
```

https://www.w3schools.com/react/react_useeffect.asp

# 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`.

https://javascript.info/fetch

# Fetch & useEffect in React

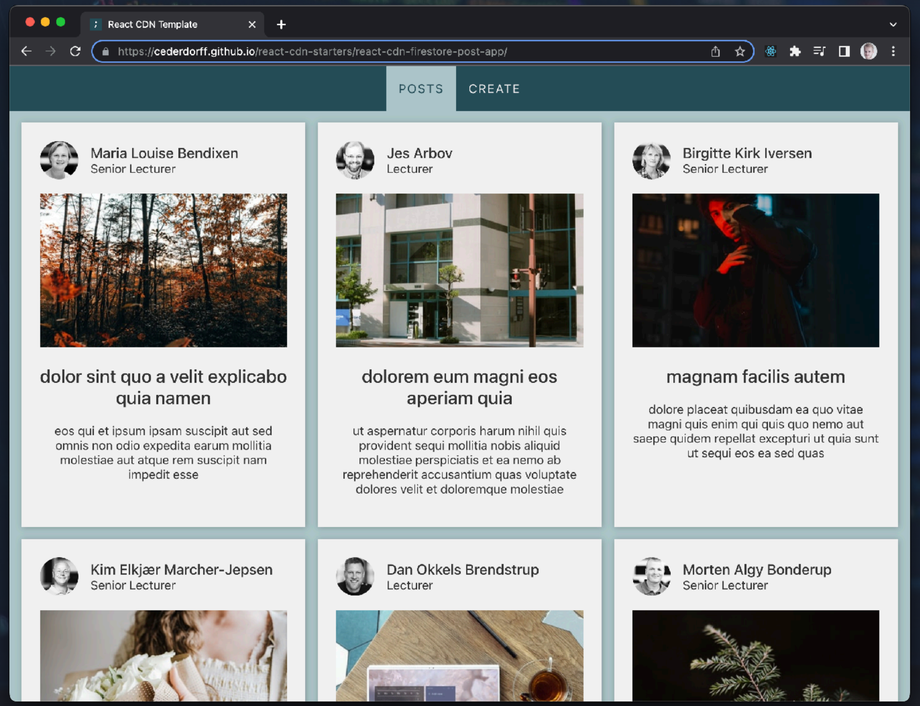
In `useEffect`, perform the sideeffect (fetch) to get data from a data source.
And save the response data in a state using `useState`.

```
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">
```

# React Fetch Posts

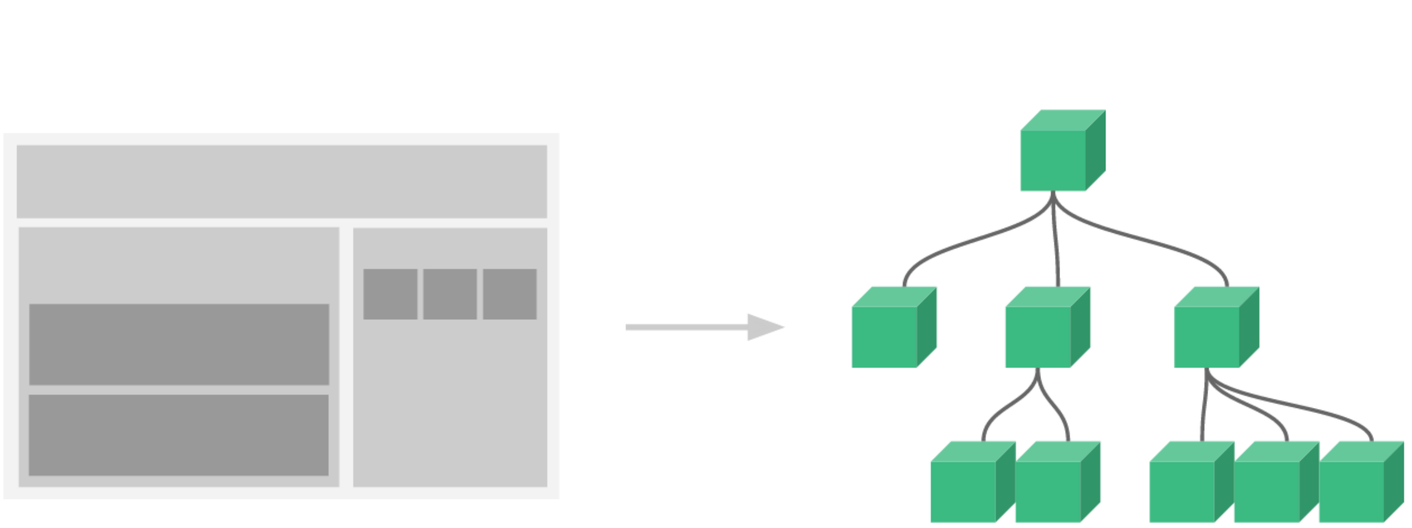
1. Use a new create project. The goal is to fetch and display a grid of posts using `useState` and `useEffect` (See screen dump to the right).
2. Create a component called `Posts` returning a `section` with an `h1` (with a title) and another section as your grid container. Render the Post component in 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.

https://raw.githubusercontent.com/cederdorff/web-frontend/main/data/posts.json



# Build Reusable Components

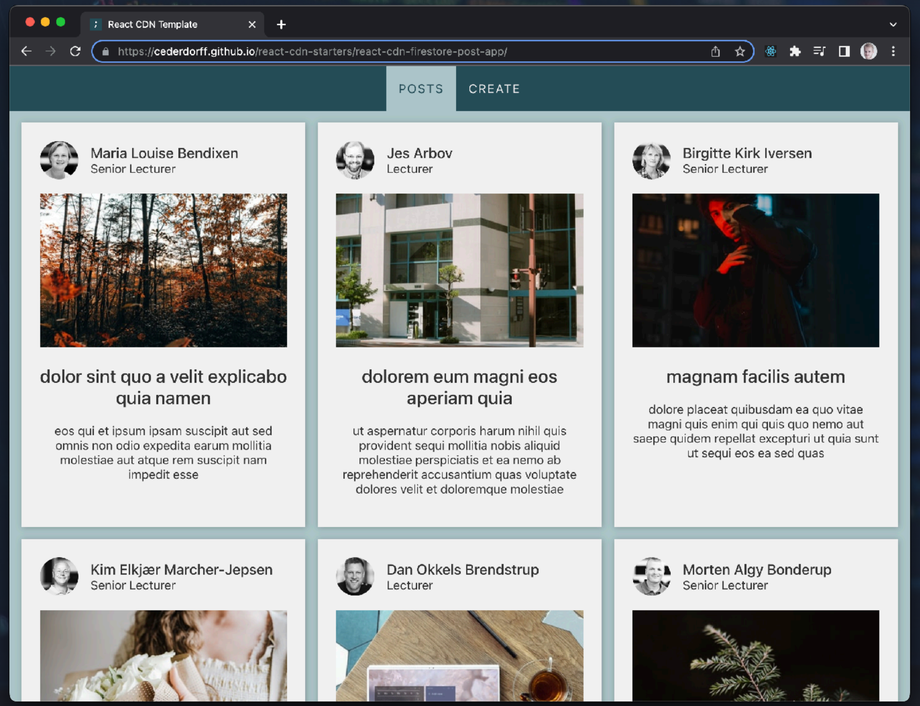
UI can be broken down to small block or modules called components. We strive for independent (and small) components.



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`).

# React Fetch Posts

https://raw.githubusercontent.com/cederdorff/web-frontend/main/data/posts.json



# 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>
  );
}
```

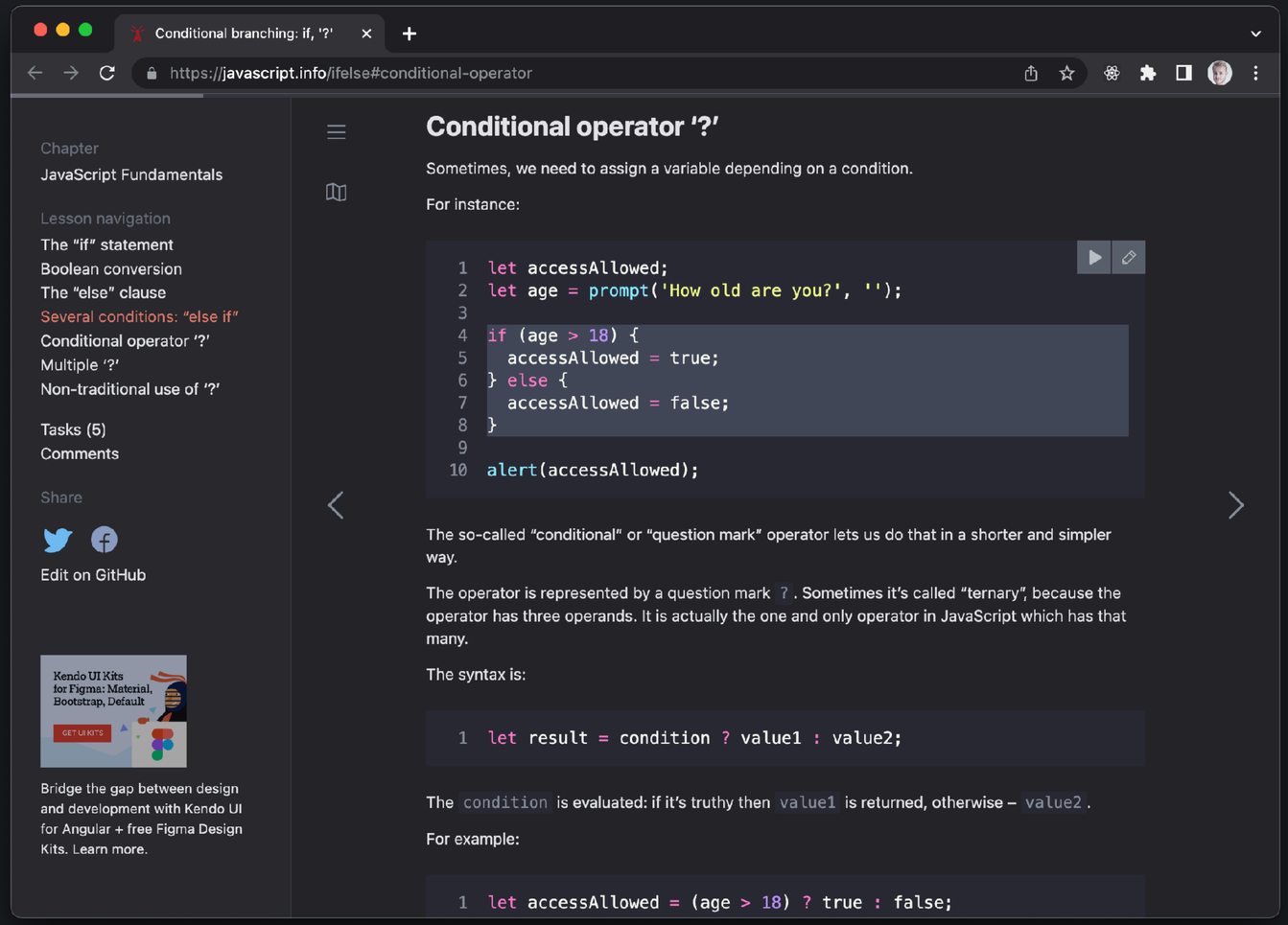
Double curly braces because you're defining a JS object inside of JSX

Camel case attributes

Values like colors must be in strings

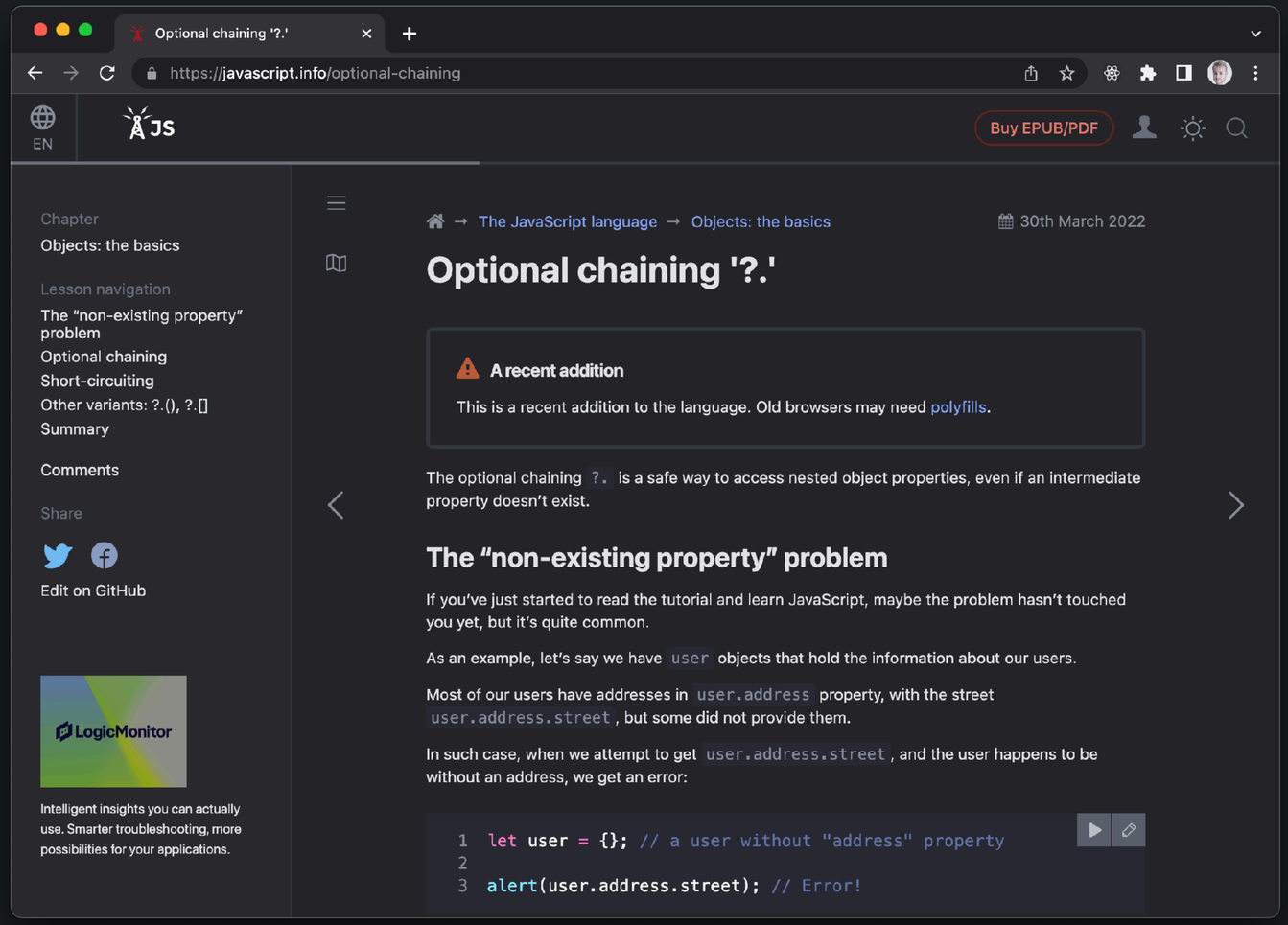
https://twitter.com/chrisachard/status/1175022111758442497

# Shorter and simpler way to do `if/else`



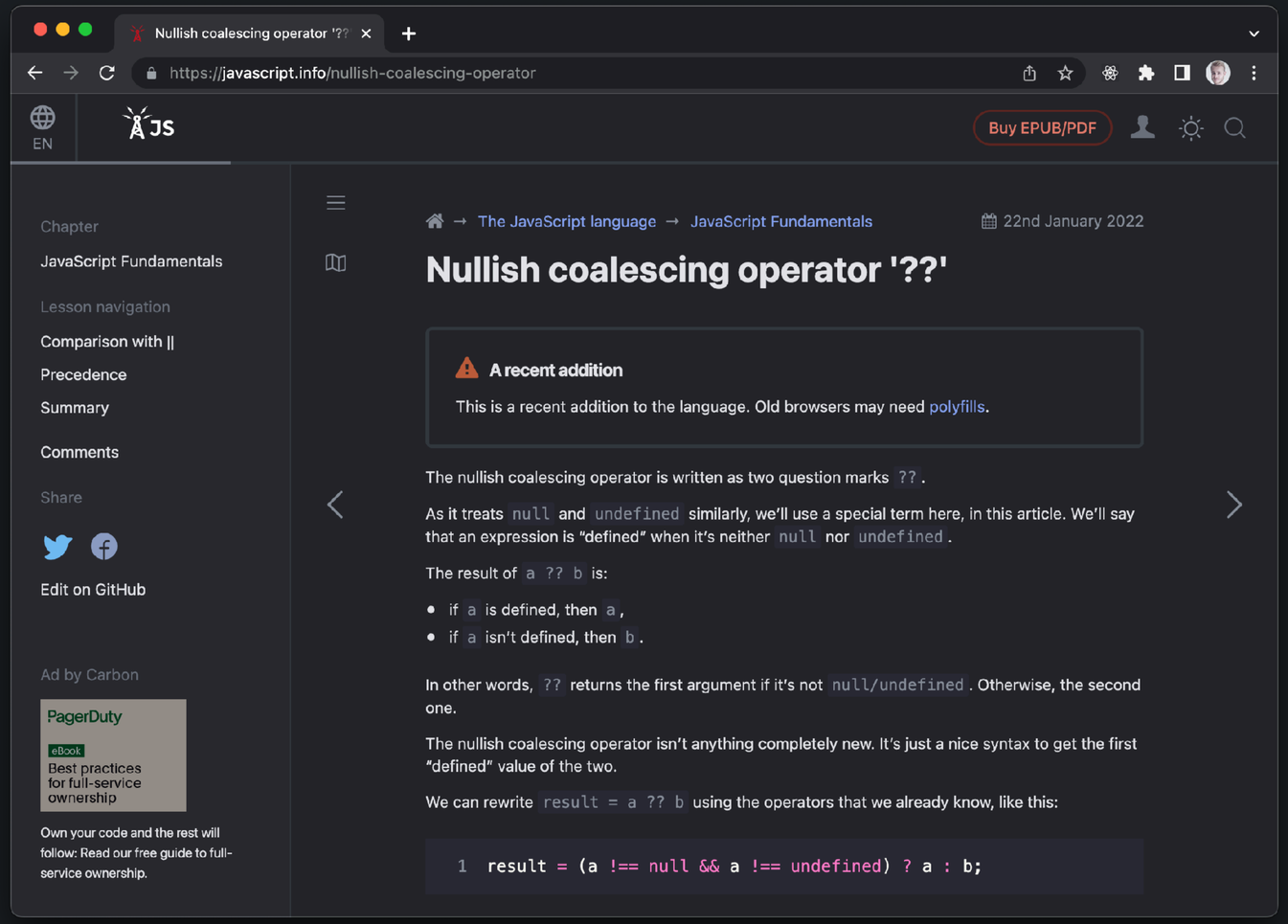

https://javascript.info/ifelse#conditional-operator
Ternary Operator

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




https://javascript.info/optional-chaining

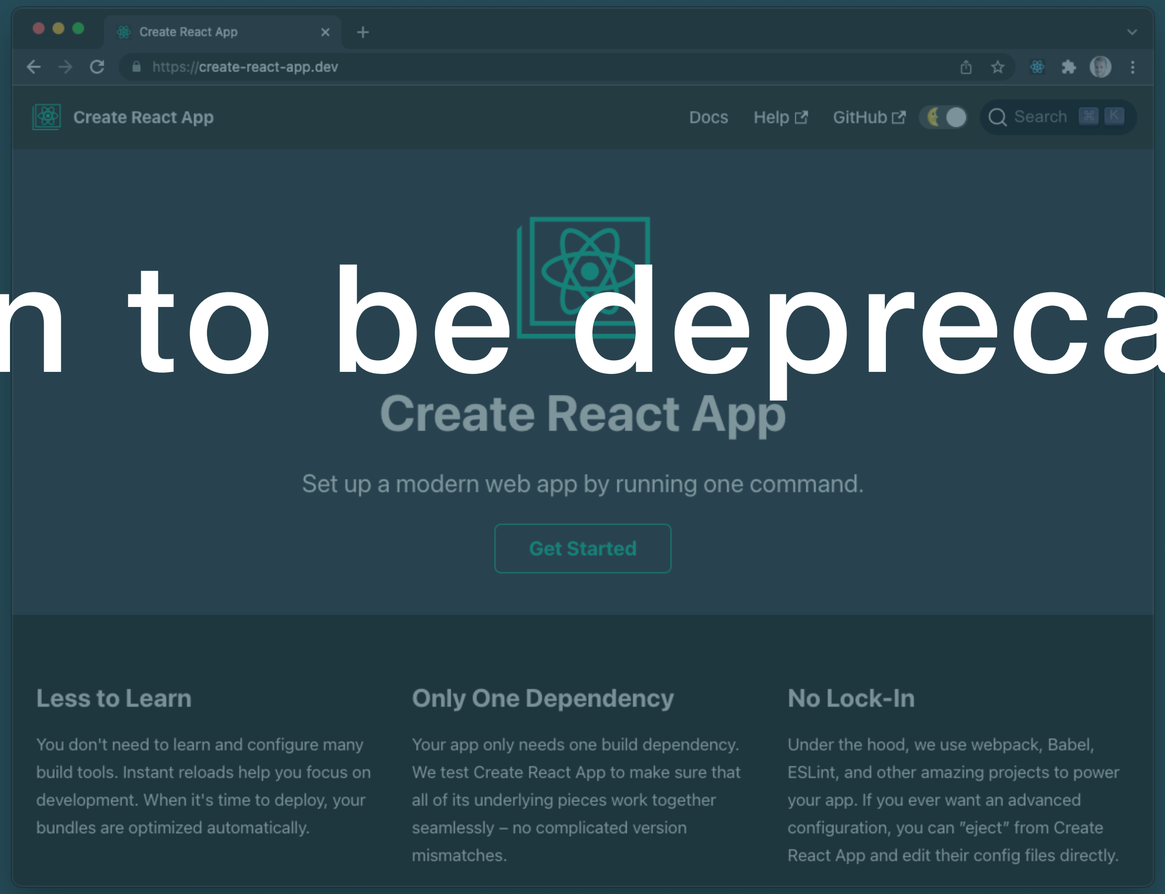
# ?? returns the first argument if it's not null/undefined




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

# create-react-app

Starter template for your react app




## Soon to be deprecated!

Generate create-react-app

# 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 | *npx create-react-app .* | 1. In the terminal: *npm create vite@latest*<br>2. Type in a project name (= folder name)<br>3. Select ”React” from the menu (keyboard arrow down and press Enter)<br>4. Select ”JavaScript” from the menu (keyboard arrow down and press Enter)<br>5. In VS Code: Open project folder<br>6. In the terminal: *npm install* |
| Live preview in browser | *npm start* | *npm run dev* |
| Build version to upload to your web hotel | *npm run build* | *npm run build*<br><br>1. In ”dist” folder: Update <title> in index.html and change the favicon.<br>2. Upload the content of the “dist” folder to your web hotel. |
| Preview the distribution version in browser before you upload to web hotel | | *npm run preview* |

Comments or questions? Feel free to write to moab@eaaa.dk

# Getting started

Download & install Node.js & NPM: 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

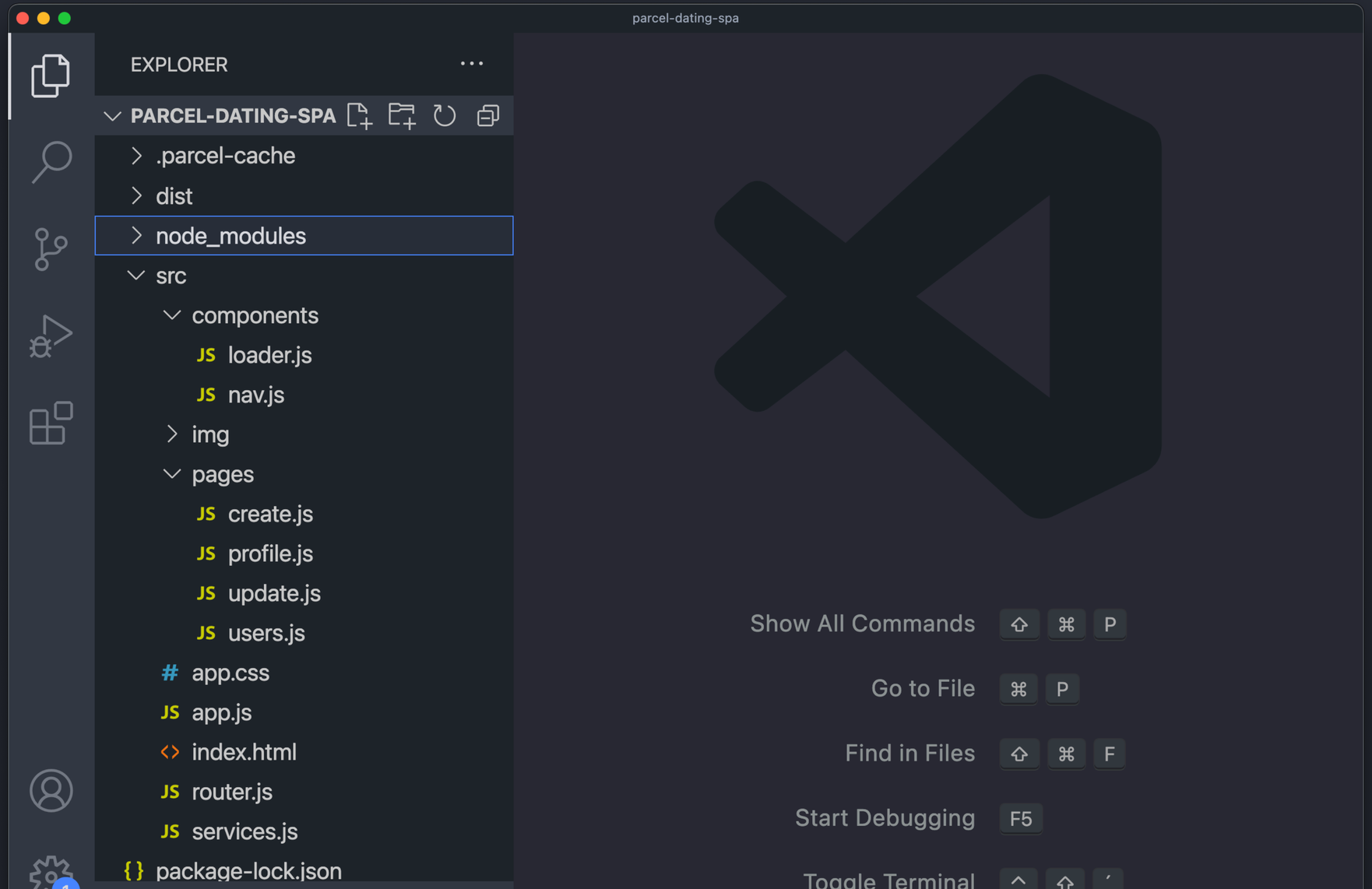
Executes JavaScript outside of the browser

# 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

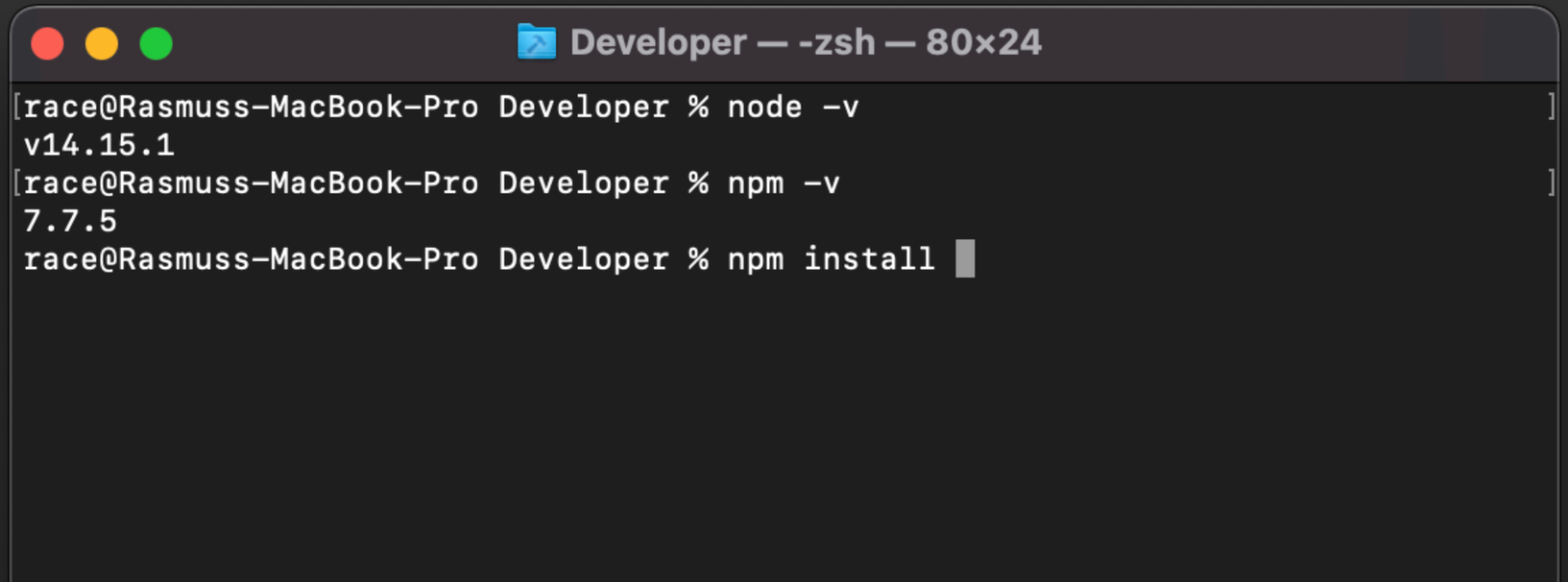
1. Website to discover packages
2. Command line interface (cli)
3. A registry - database with JS software / node modules

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

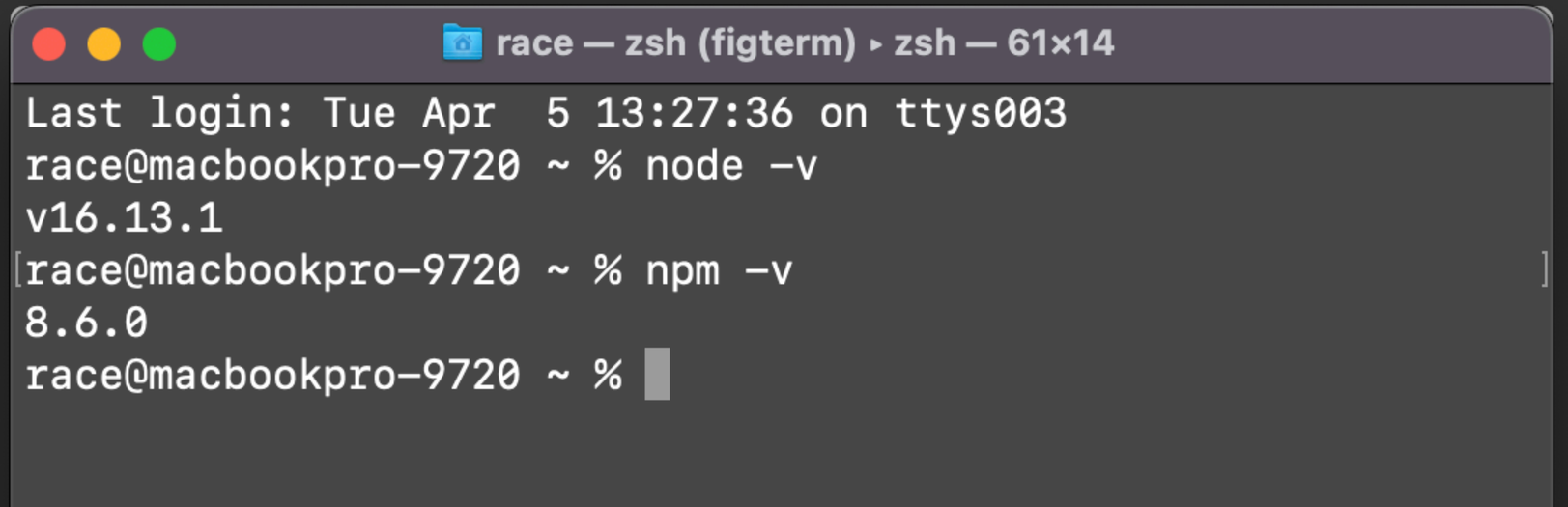
# Command Line Interface

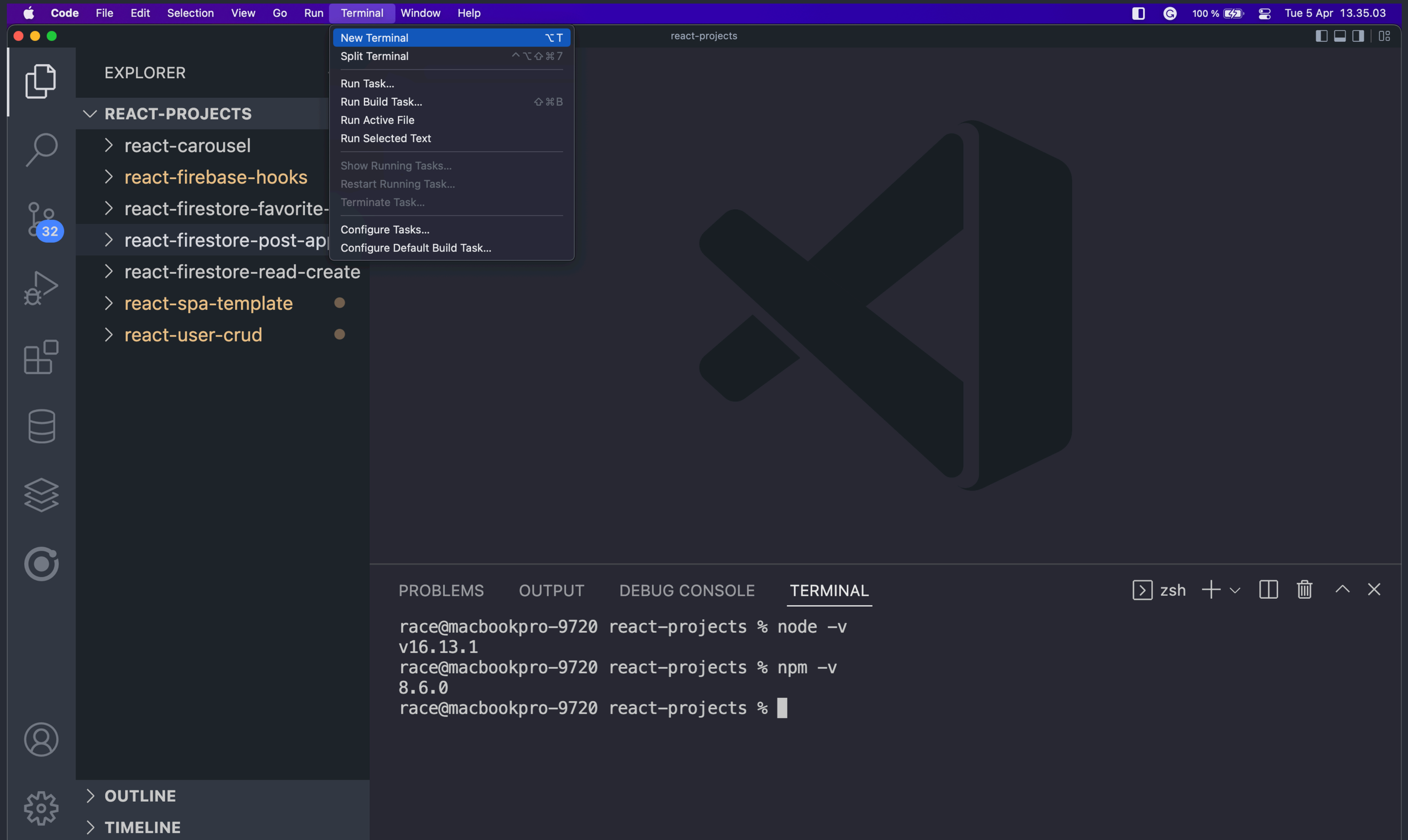
... a program that allows users to type text commands to execute functions.

npm uses CLI to install software & packages.



1. Download & install Node.js & npm: nodejs.org/en/
2. Check your version of npm & Node.js




Code File Edit Selection View Go Run Terminal Window Help
100 % Tue 5 Apr 13.35.03
New Terminal ⌥T
Split Terminal ^⌥⇧⌘7
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
EXPLORER
REACT-PROJECTS
react-carousel
react-firebase-hooks
react-firestore-favorite-
react-firestore-post-ap
react-firestore-read-create
react-spa-template
react-user-crud
OUTLINE
TIMELINE
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
zsh
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 %

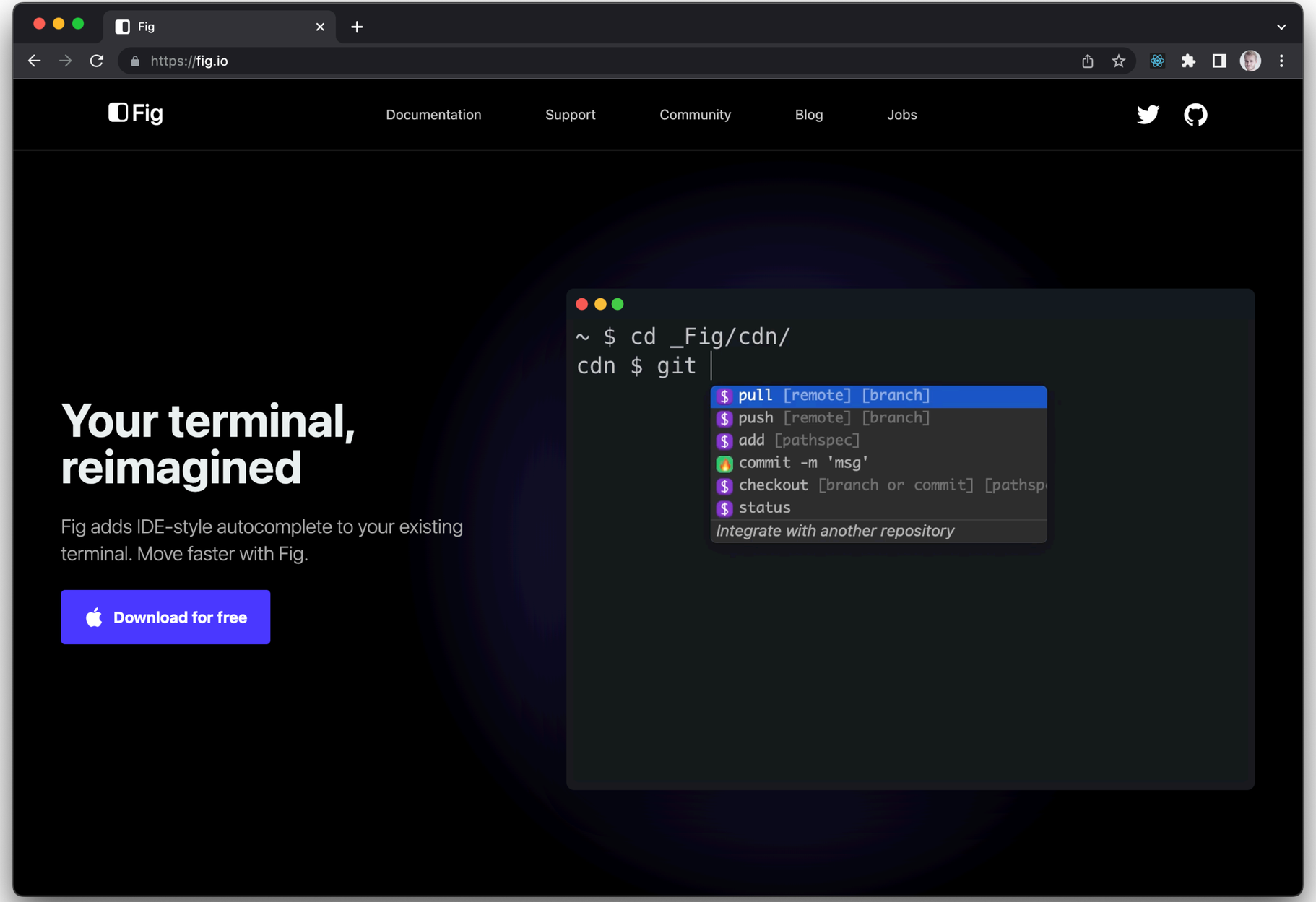
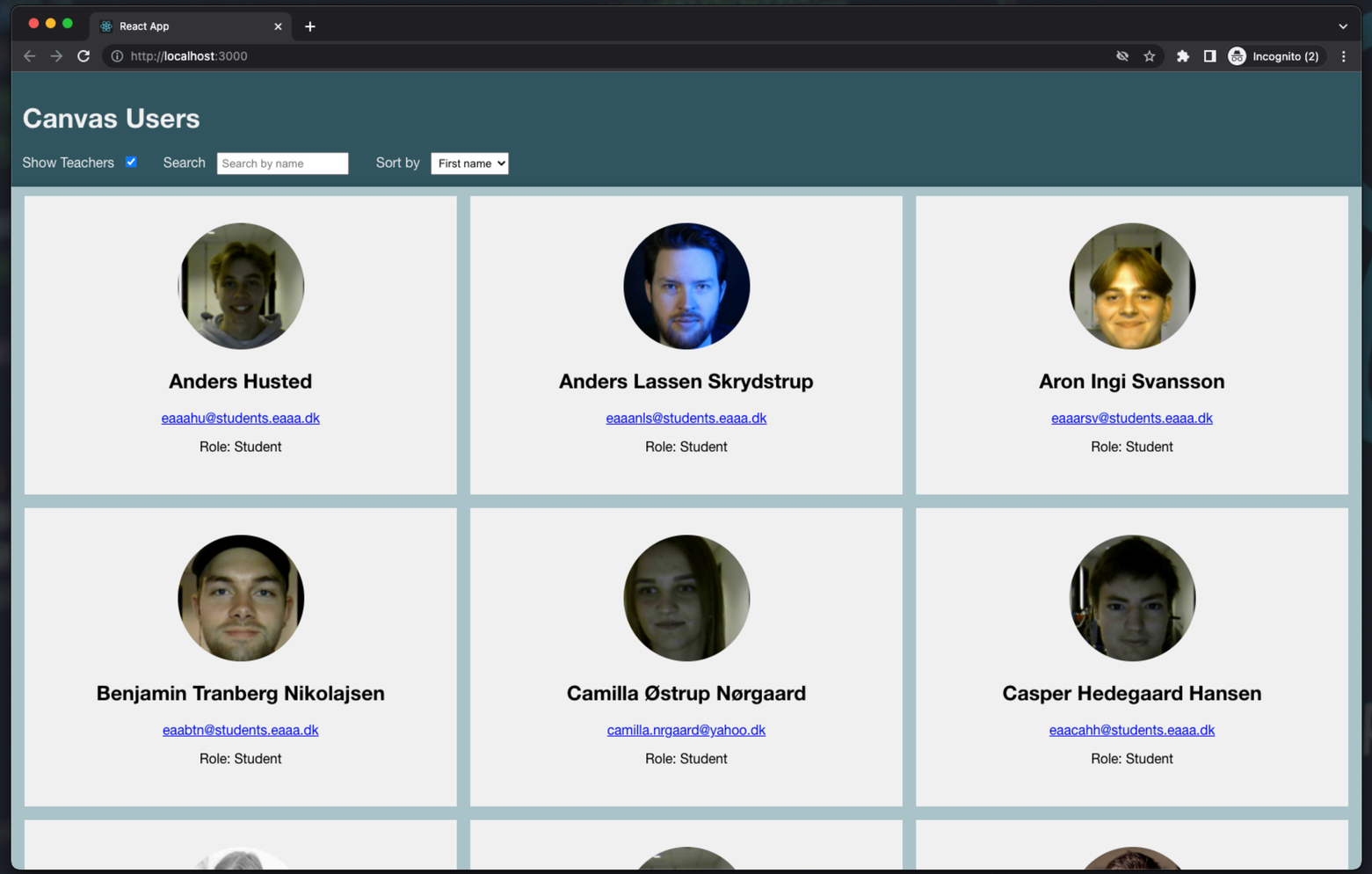


Fig
https://fig.io
Fig
Documentation
Support
Community
Blog
Jobs
Your terminal, reimagined
Fig adds IDE-style autocomplete to your existing terminal. Move faster with Fig.
Download for free
~ $ cd _Fig/cdn/
cdn $ git
pull [remote] [branch]
push [remote] [branch]
add [pathspec]
commit -m 'msg'
checkout [branch or commit] [pathsp
status
Integrate with another repository

https://fig.io/

# Canvas Users Case w/ React




https://race.notion.site/Canvas-Users-Case-w-React-191f2533ac8248f4874c077796497d86

# 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

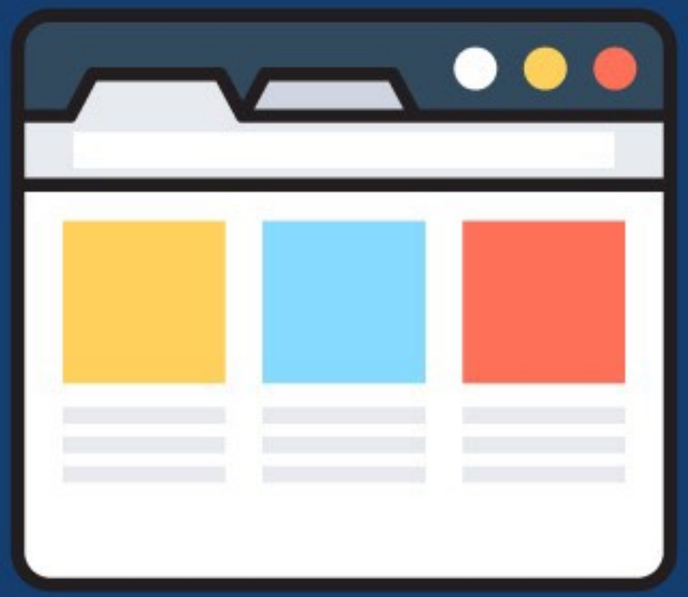
# SPA (Single-page application)

[...] 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.

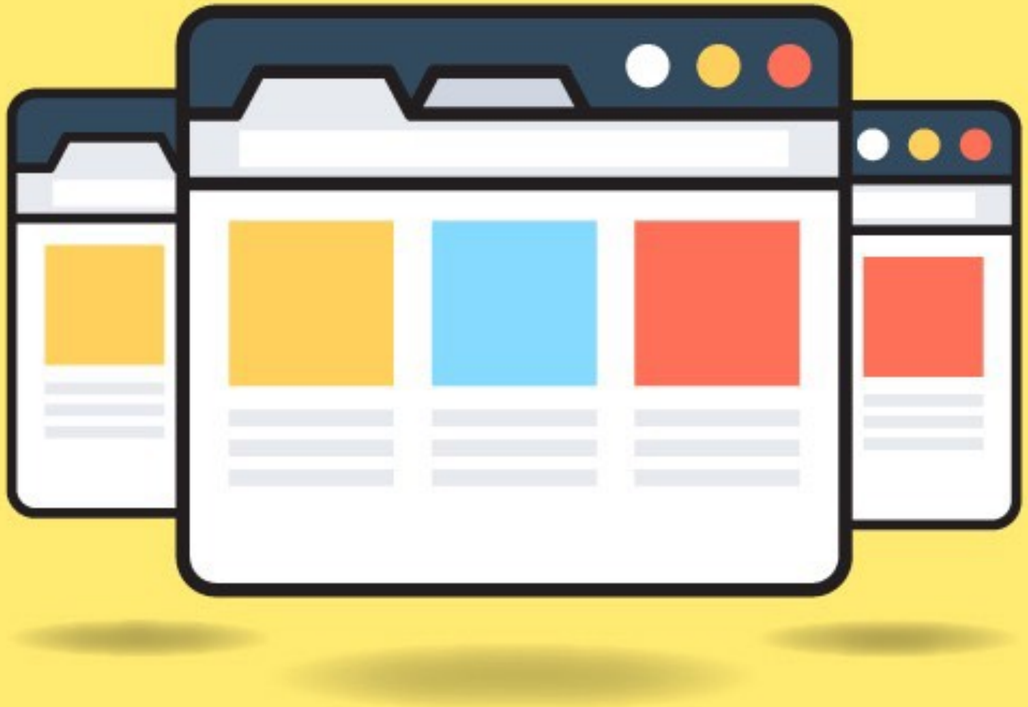
This therefore allows users to use websites without loading whole new pages from the server, which can result in performance gains and a more dynamic experience, with some tradeoff disadvantages such as SEO, more effort required to maintain state, implement navigation, and do meaningful performance monitoring.

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

MULTI PAGE APPLICATION

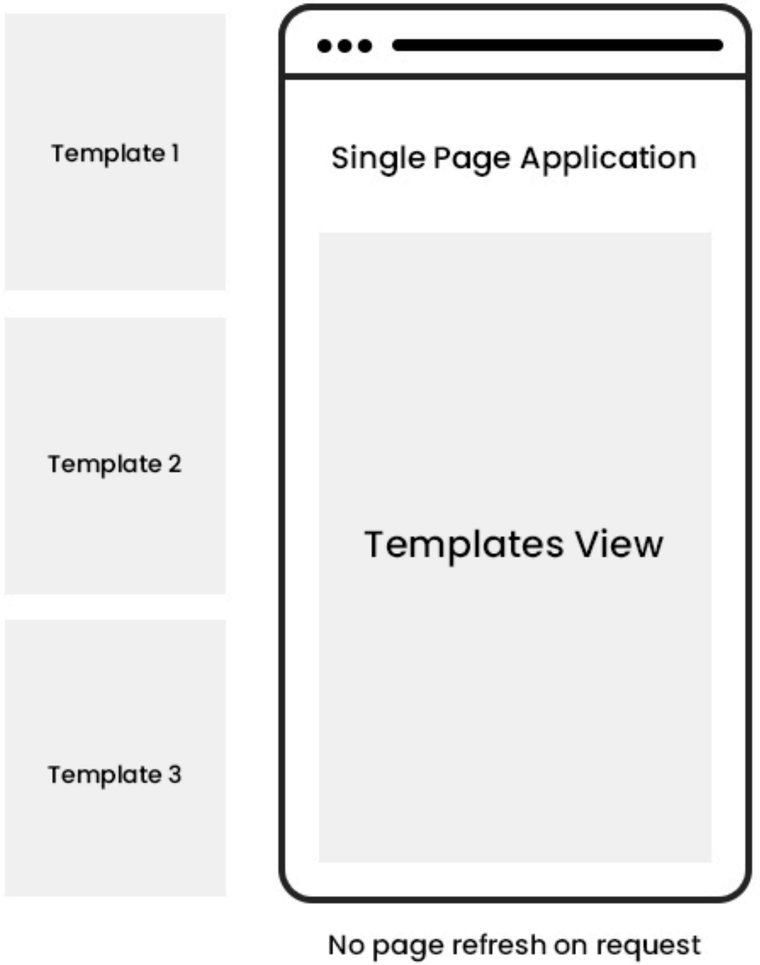


VS

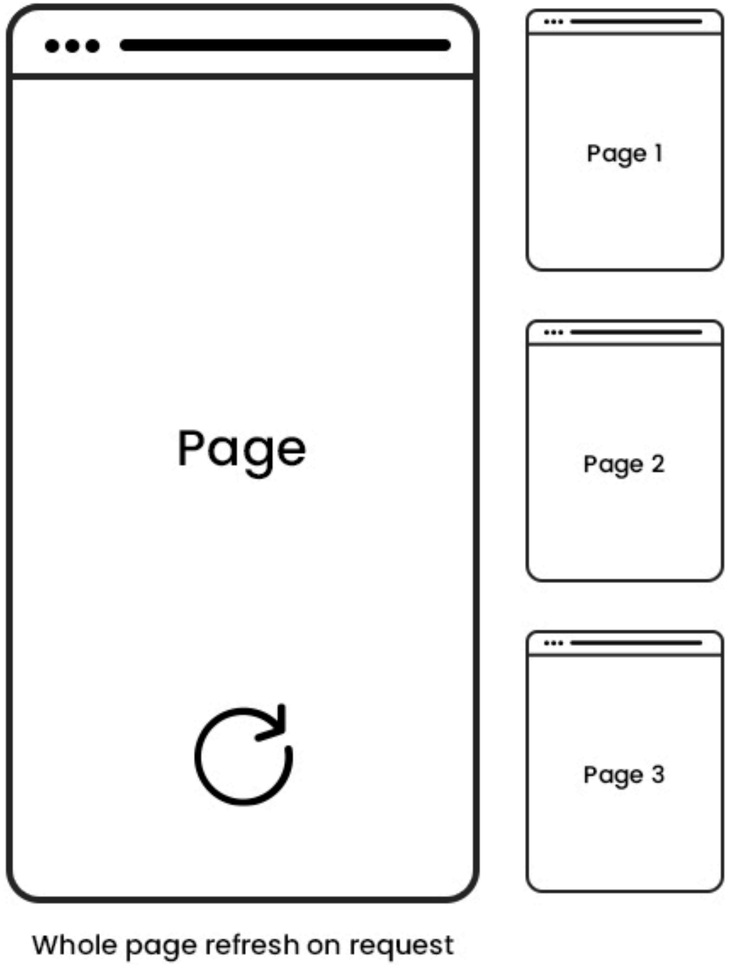


SINGLE PAGE APPLICATION

# SPA

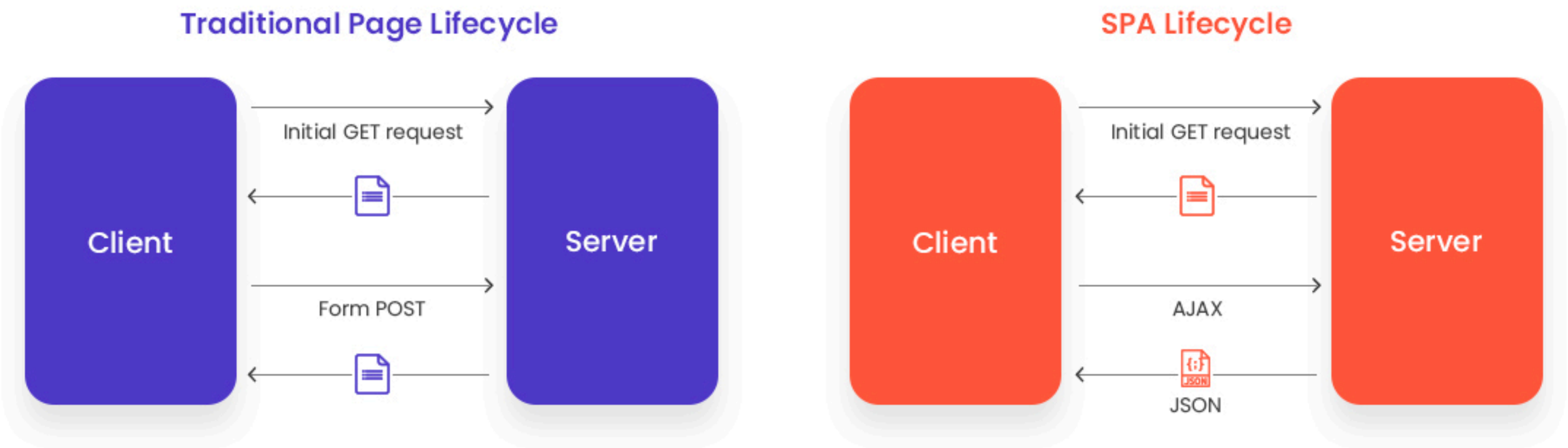



# MPA




excellentwebworld.com/what-is-a-single-page-application

# MPA VS SPA




excellentwebworld.com/what-is-a-single-page-application

# The Architecture

## Initial request

Traditional

Single Page Application

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

# The Architecture

Request a new page

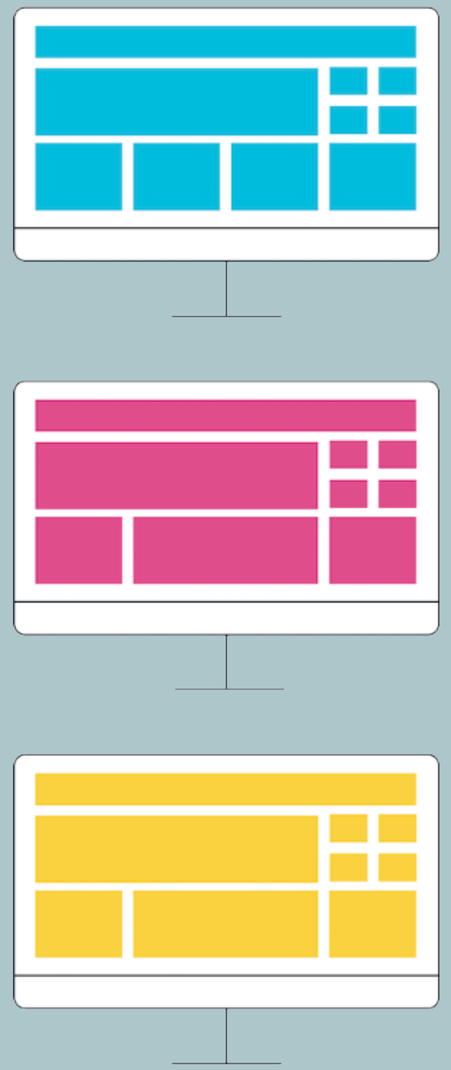
Traditional

Single Page Application

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

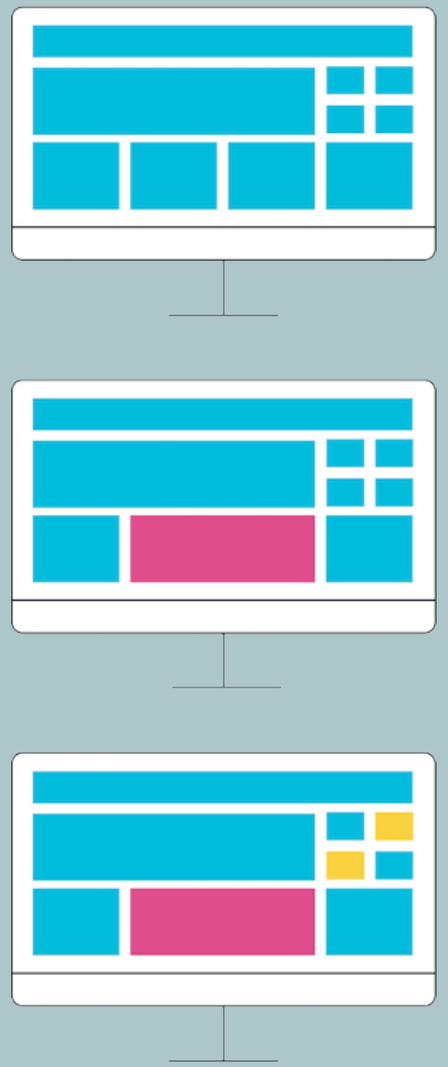
# MPA

- 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.

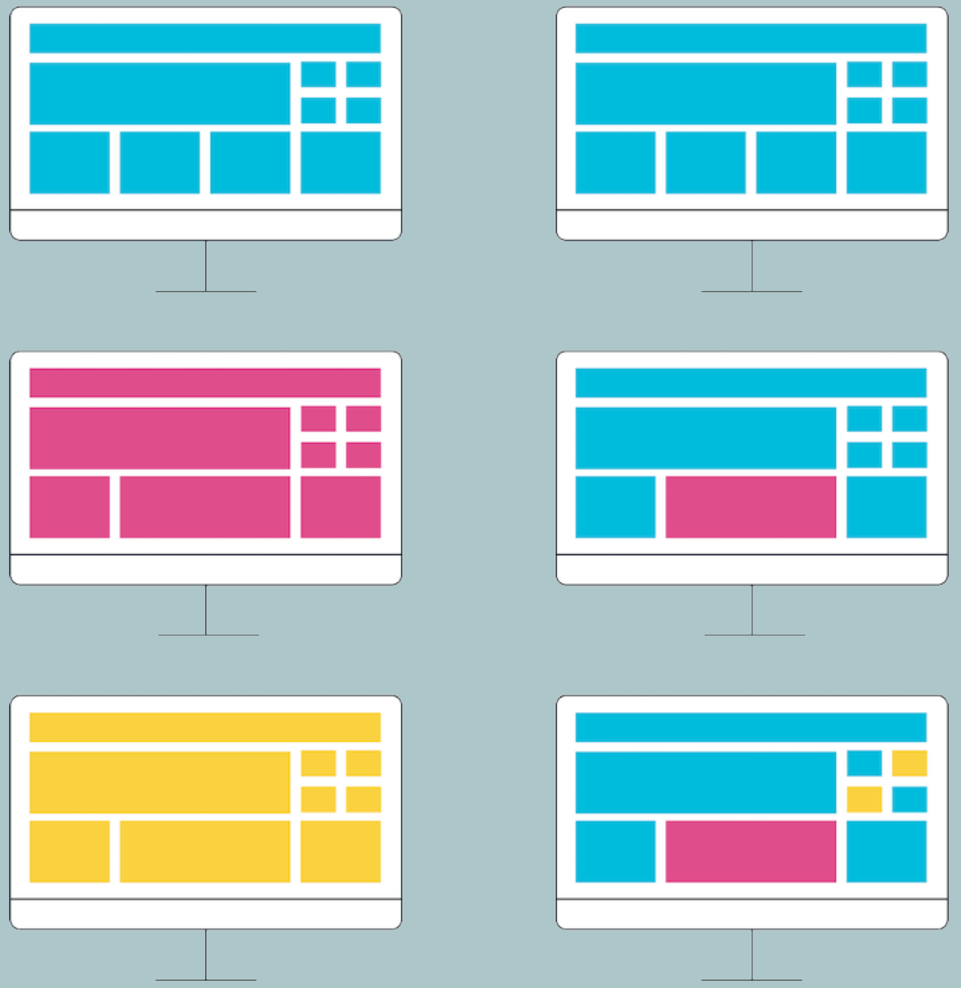


# SPA

- 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.

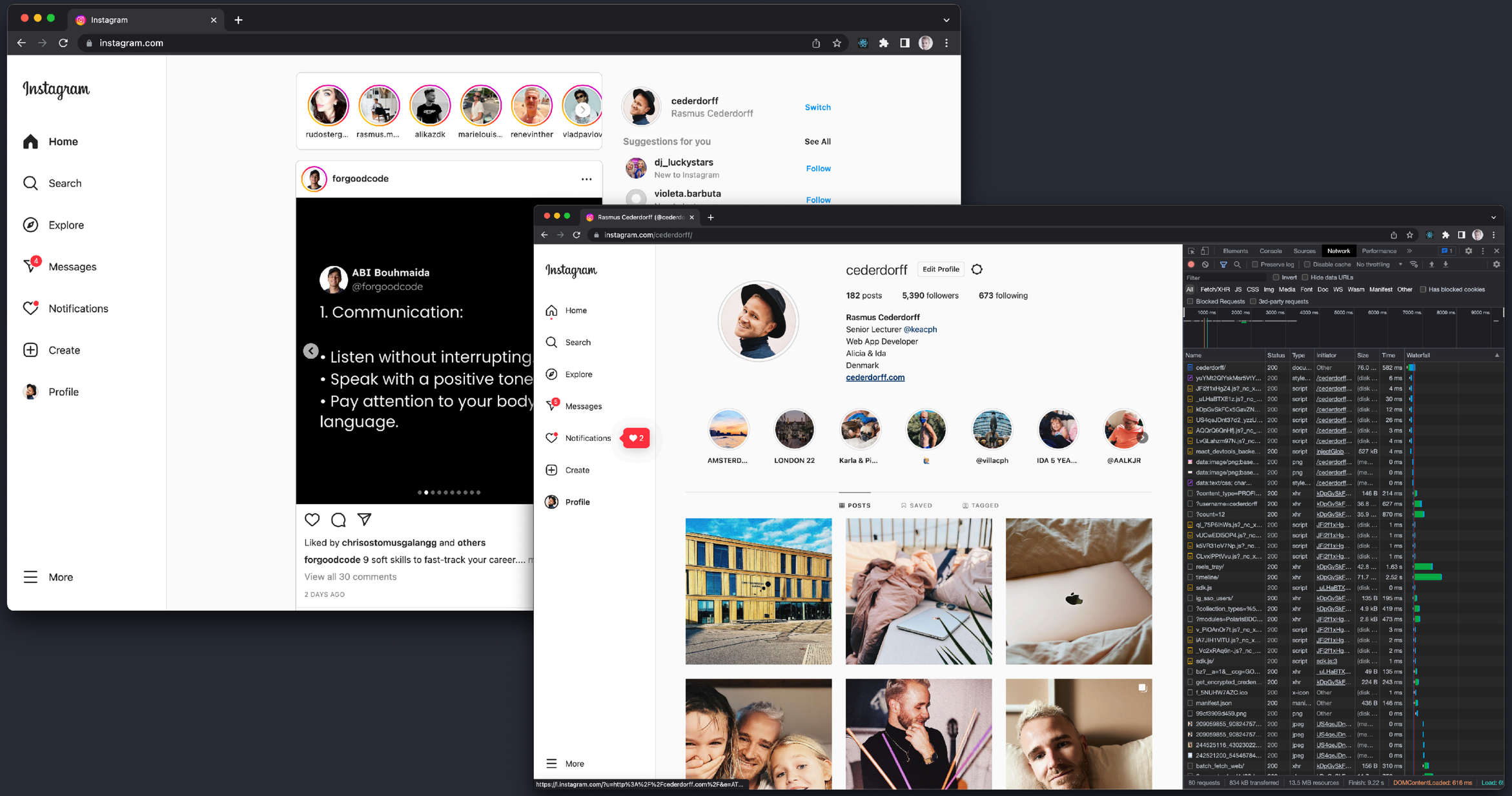


# MPA VS SPA



# SPA’s




Instagram
instagram.com
Home
Search
Explore
Messages
Notifications
Create
Profile
More
rudosterg...
rasmus.m...
alikazdk
marielouis...
renevinther
vladpavlov
cederdorff
Rasmus Cederdorff
Switch
Suggestions for you
See All
dj_luckystars
New to Instagram
Follow
violeta.barbuta
Follow
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 (@cederdo
instagram.com/cederdorff/
cederdorff
Edit Profile
182 posts
5,390 followers
673 following
Rasmus Cederdorff
Senior Lecturer @keacph
Web App Developer
Alicia & Ida
Denmark
cederdorff.com
AMSTERD...
LONDON 22
Karla & Pi...
@villacph
IDA 5 YEA...
@AALKJR
POSTS
SAVED
TAGGED
Elements
Console
Sources
Network
Performance
Preserve log
Disable cache
No throttling
Filter
Invert
Hide data URLs
All
Fetch/XHR
JS
CSS
Img
Media
Font
Doc
WS
Wasm
Manifest
Other
Has blocked cookies
Blocked Requests
3rd-party requests
Name
Status
Type
Initiator
Size
Time
Waterfall
80 requests
834 kB transferred
13.5 MB resources
Finish: 9.22 s
DOMContentLoaded: 616 ms

# 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.

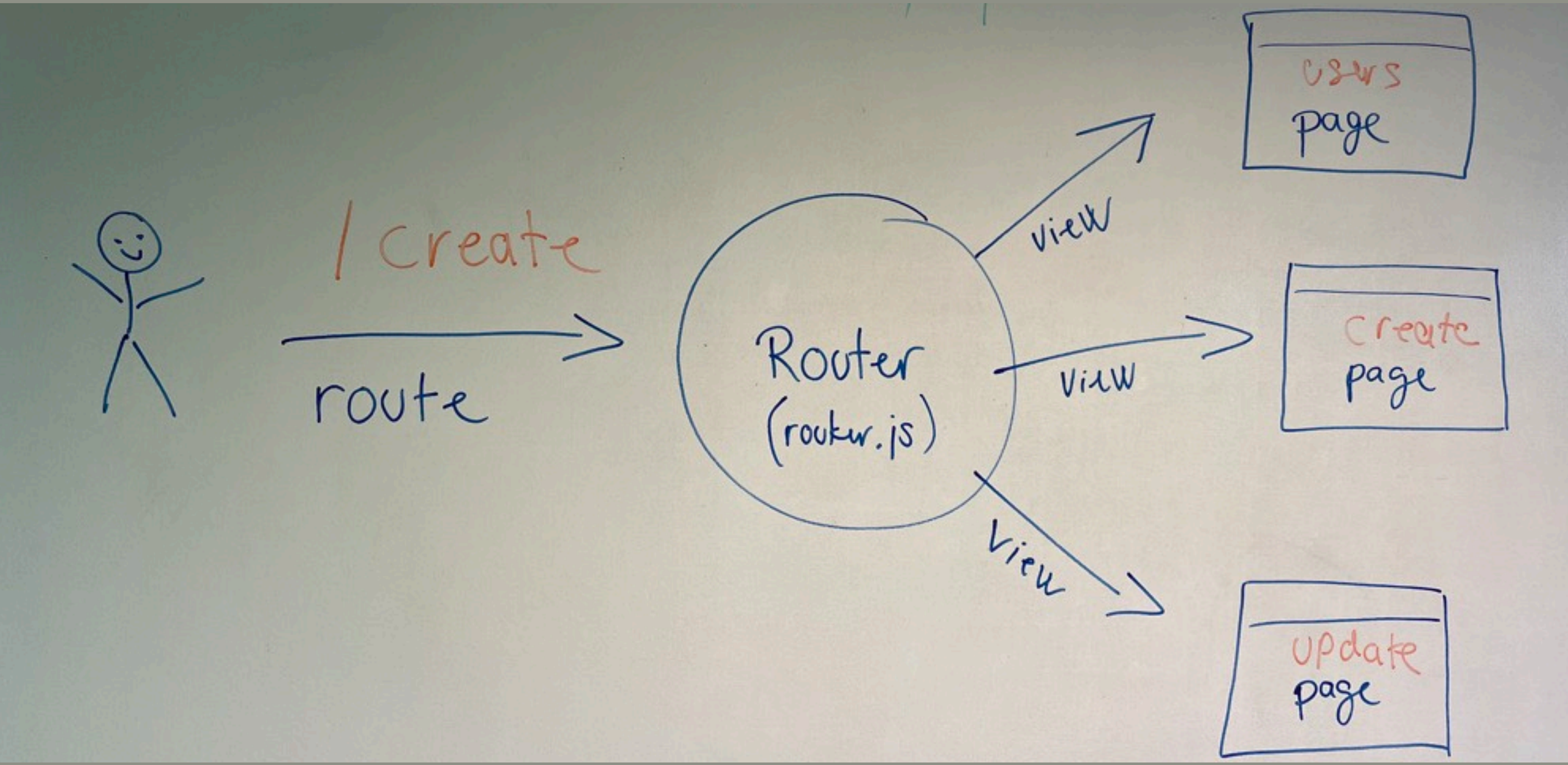
https://medium.com/@fro_g/routing-in-javascript-d552ff4d2921

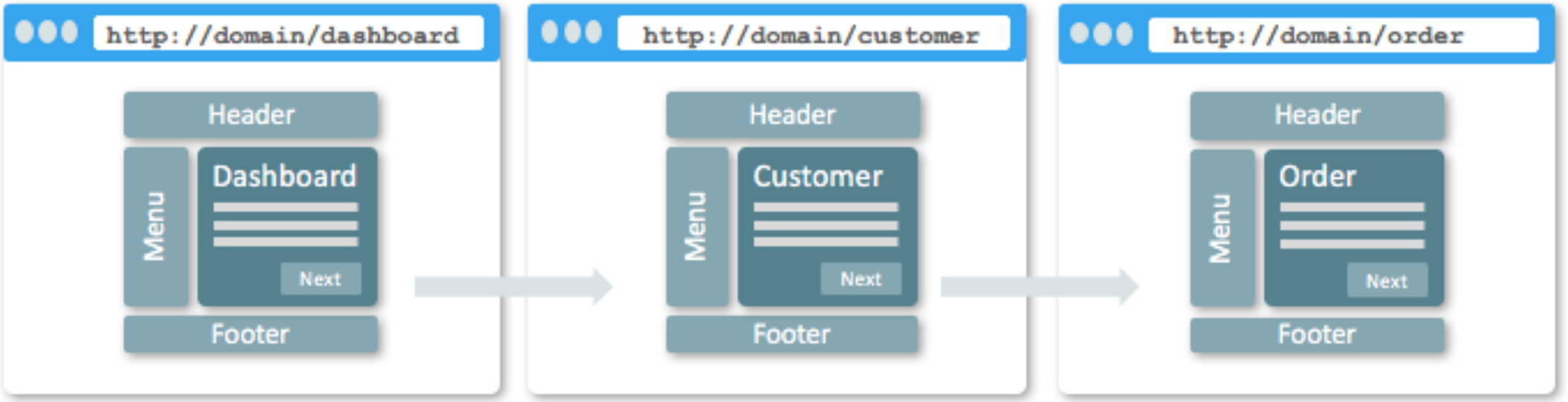
# SPA & Router

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

The router makes it looks 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


/create
route
Router
(router.js)
view
view
view
users
page
create
page
update
page

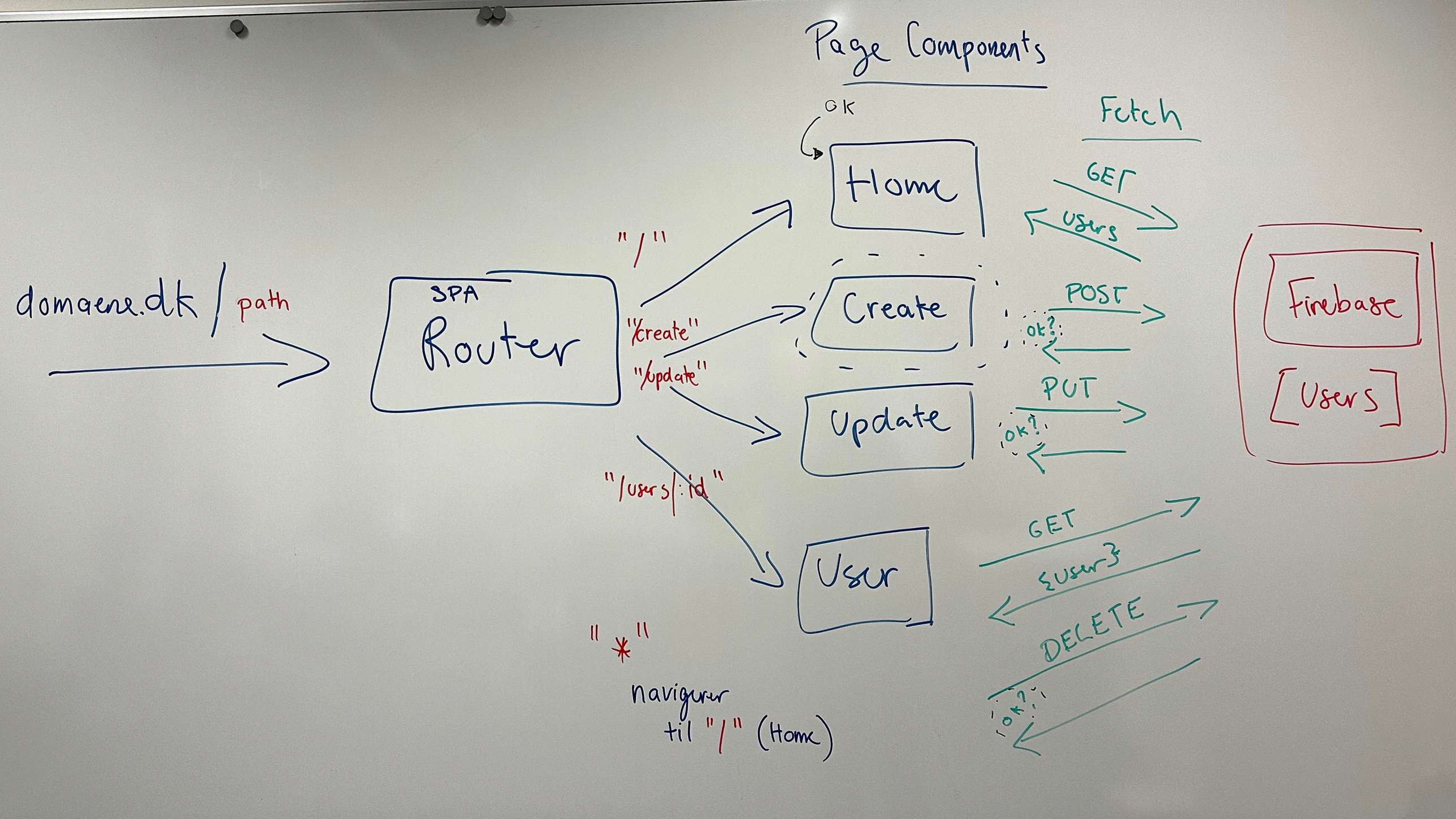


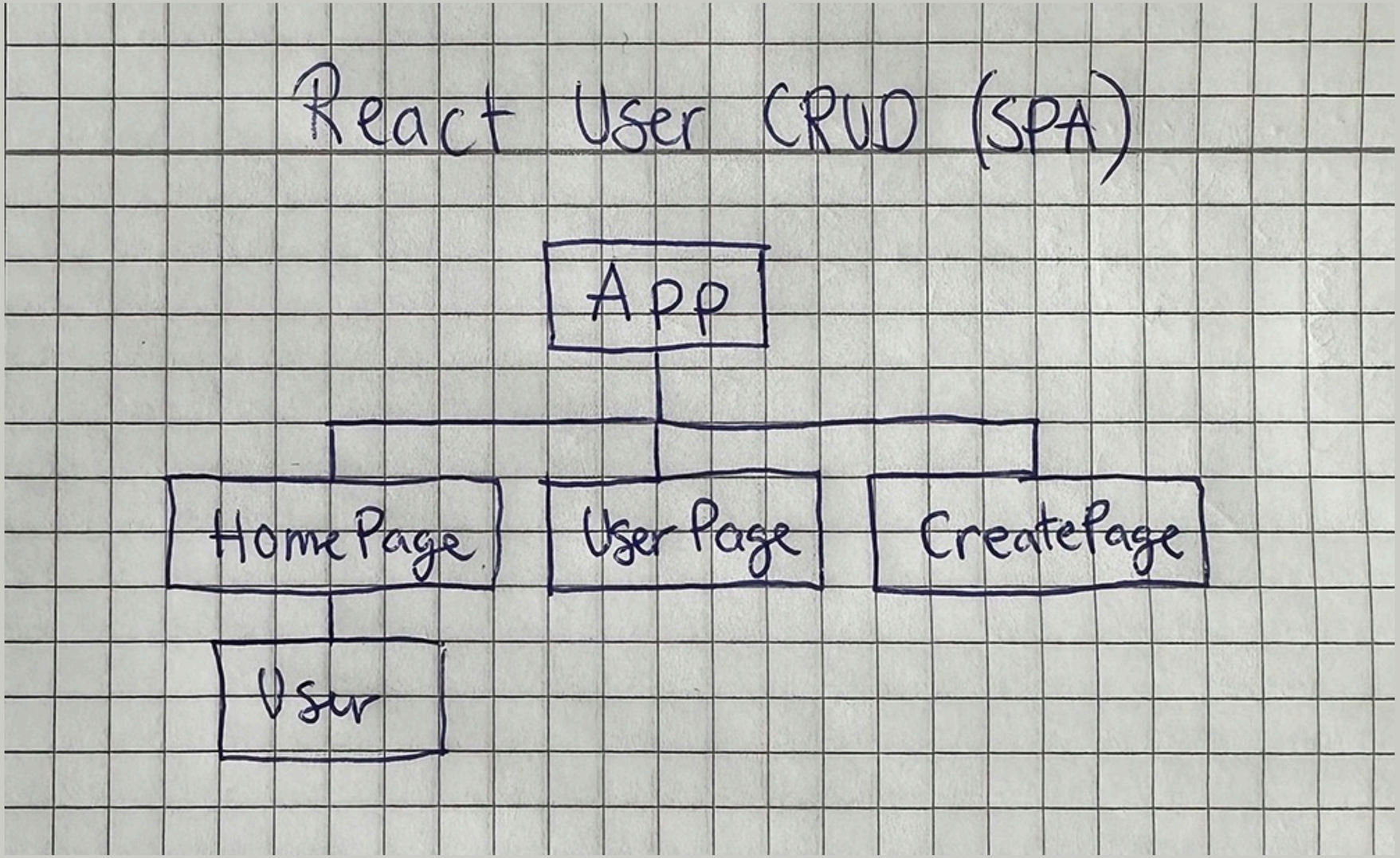

https://dzone.com/articles/single-page-applications-in-oracle-jet

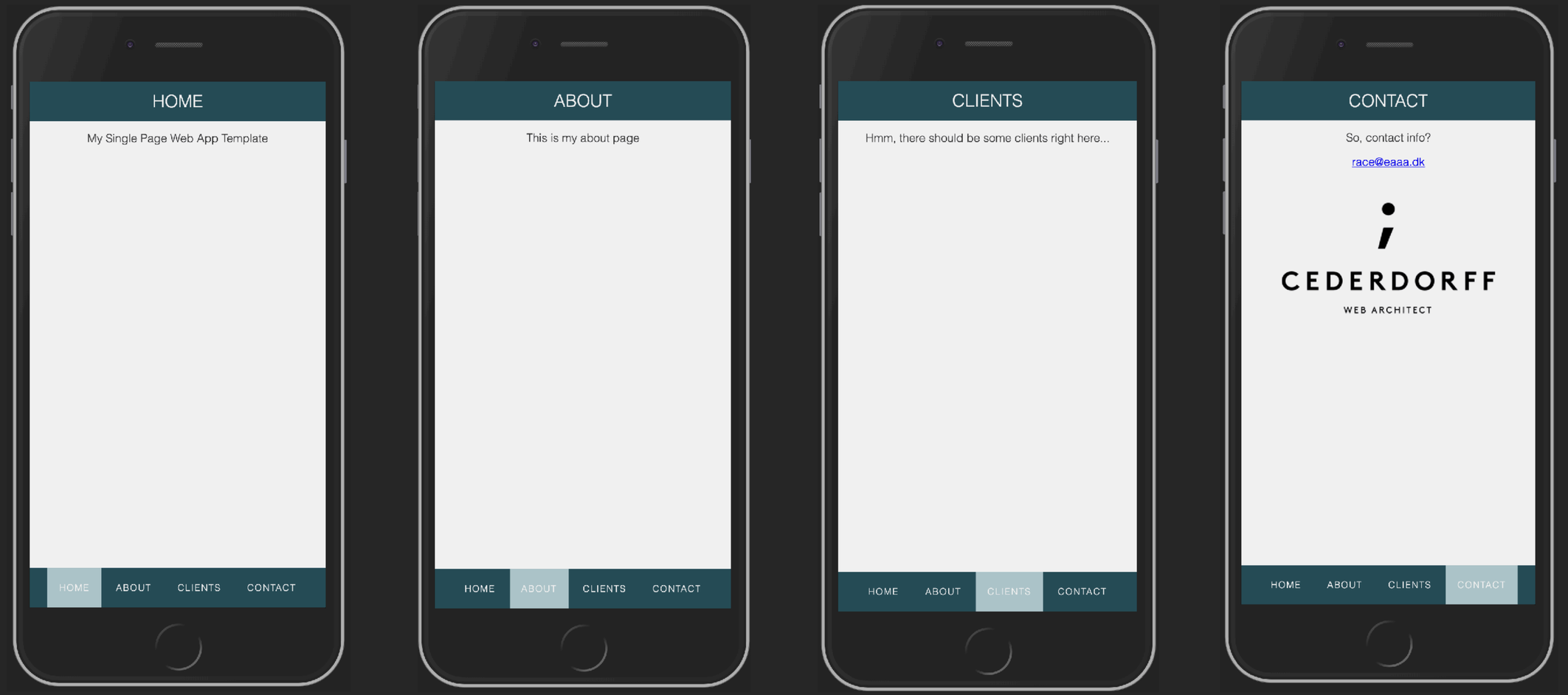
# React Router

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

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

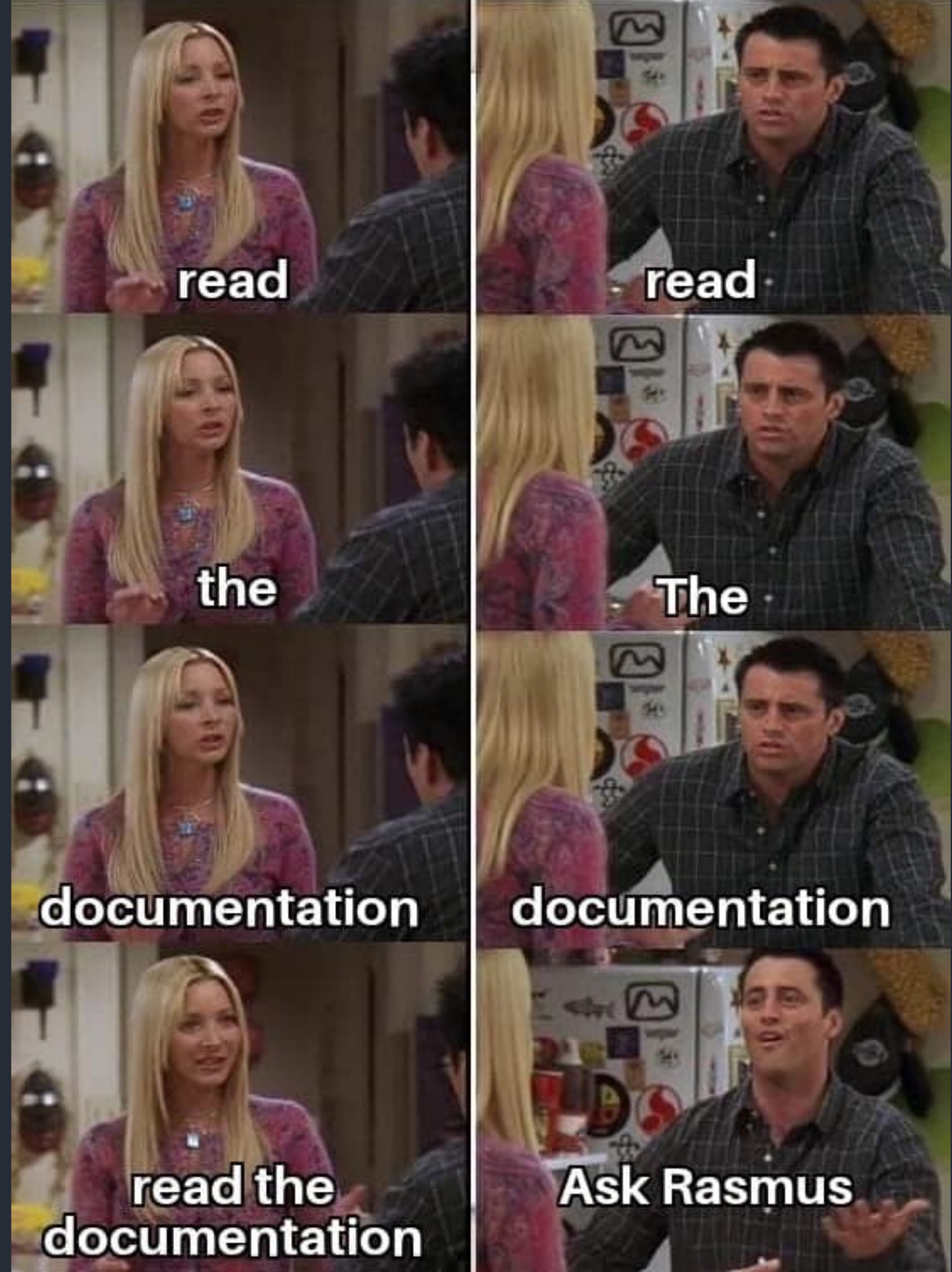

Page Components
Fetch
domaene.dk / path
SPA
Router
"/"
"/create"
"/update"
"/users/:id"
"*"
navigurer til "/" (Home)
Home
Create
Update
Usur
ok
GET
users
POST
ok?
PUT
ok?
GET
{user}
DELETE
ok?
Firebase
[Users]


React User CRUD (SPA)
App
HomePage
UserPage
CreatePage
User


HOME
My Single Page Web App Template
HOME ABOUT CLIENTS CONTACT
ABOUT
This is my about page
HOME ABOUT CLIENTS CONTACT
CLIENTS
Hmm, there should be some clients right here...
HOME ABOUT CLIENTS CONTACT
CONTACT
So, contact info?
race@eaaa.dk
CEDERDORFF
WEB ARCHITECT
HOME ABOUT CLIENTS CONTACT

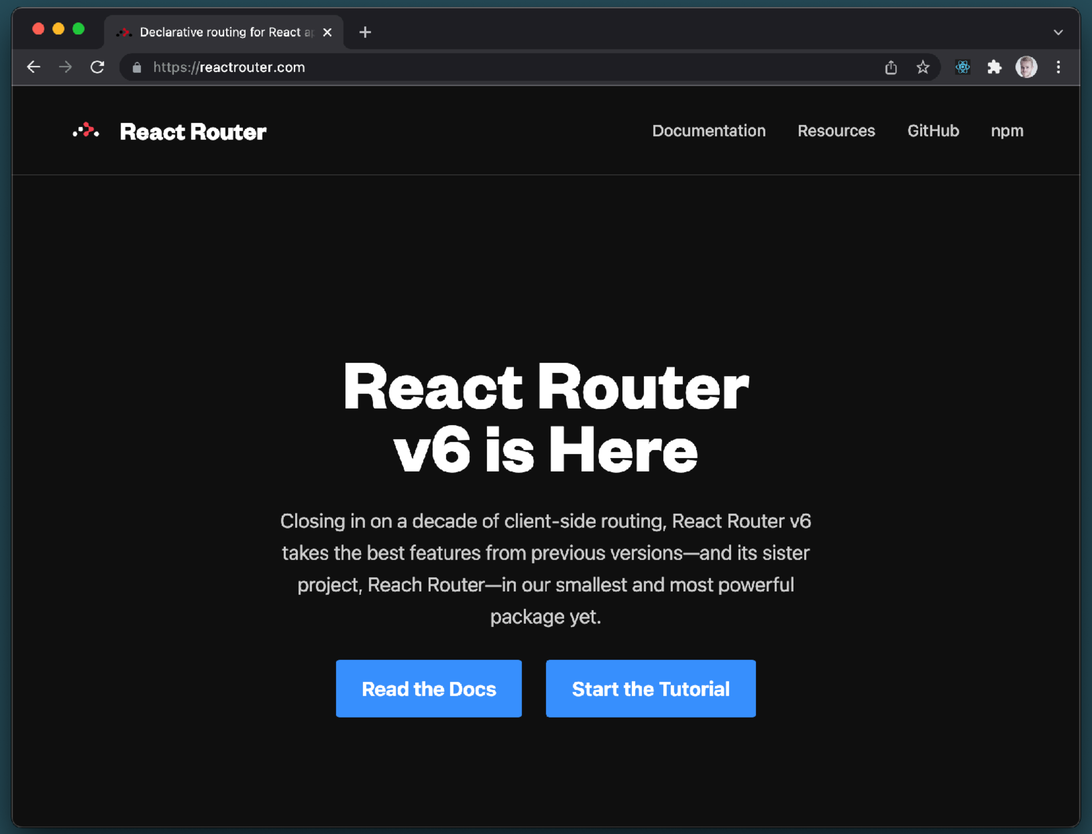
# But RACE, how do you know all that stuff?

- React Resources
- React Self-study
- Guides & Tutorials
- From Vanilla JavaScript to React Developer



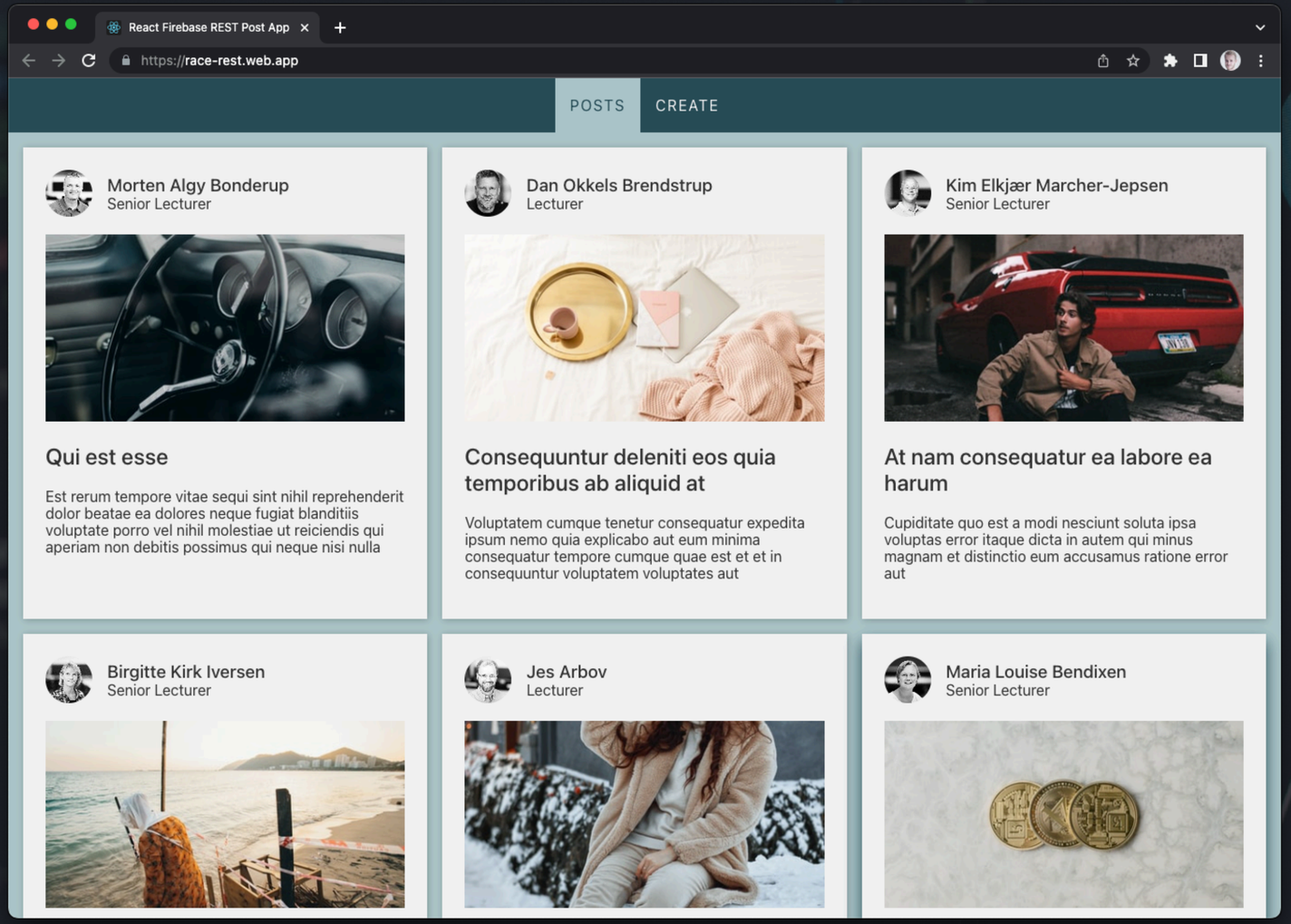
# Create React SPA

## With React Router




Create React SPA

# React CRUD



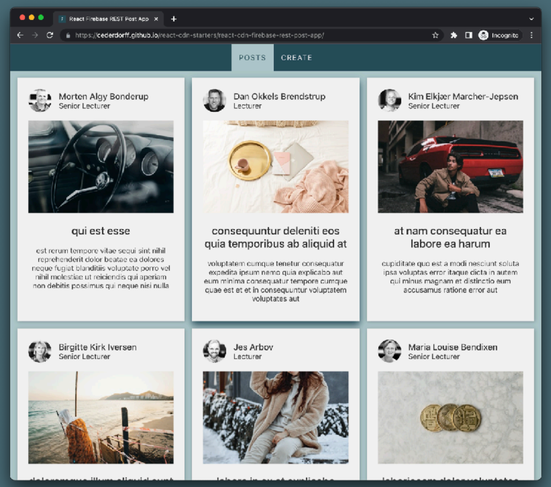

https://race-rest.web.app/

# Web Development

WEB APP

FIREBASE REST API

DATA SOURCE




FETCH(...)

REQUEST

JSON DATA

RESPONSE

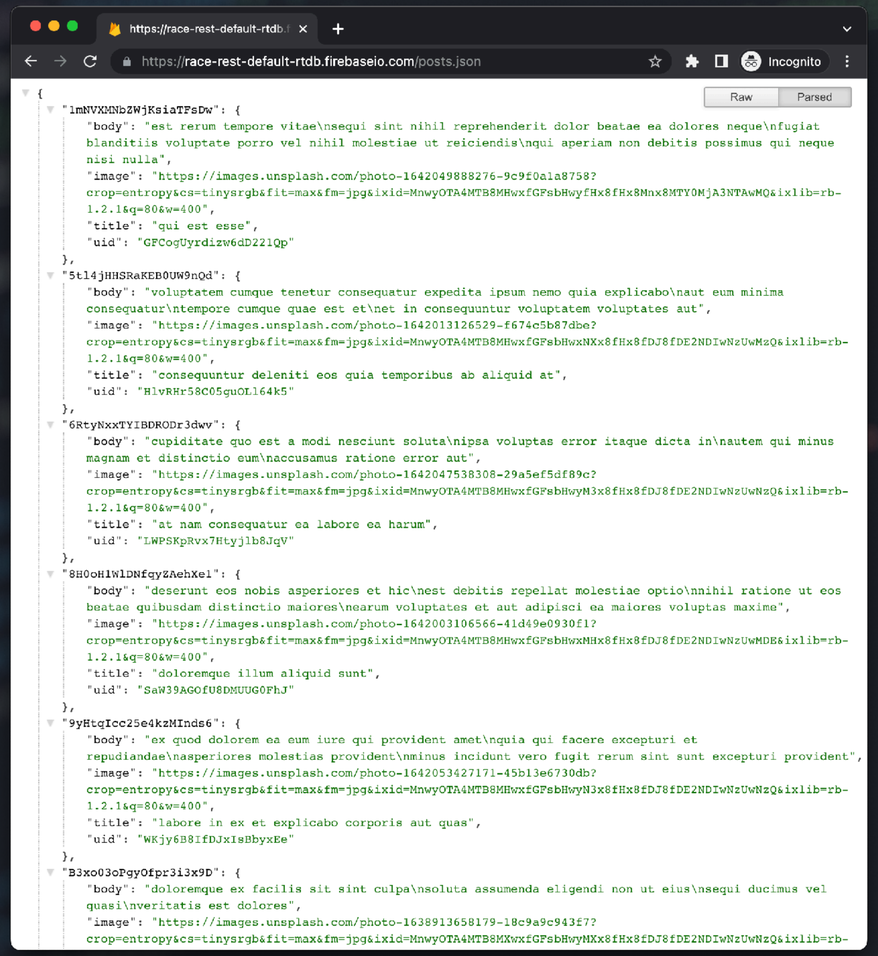
JSON

Firebase
Realtime Database

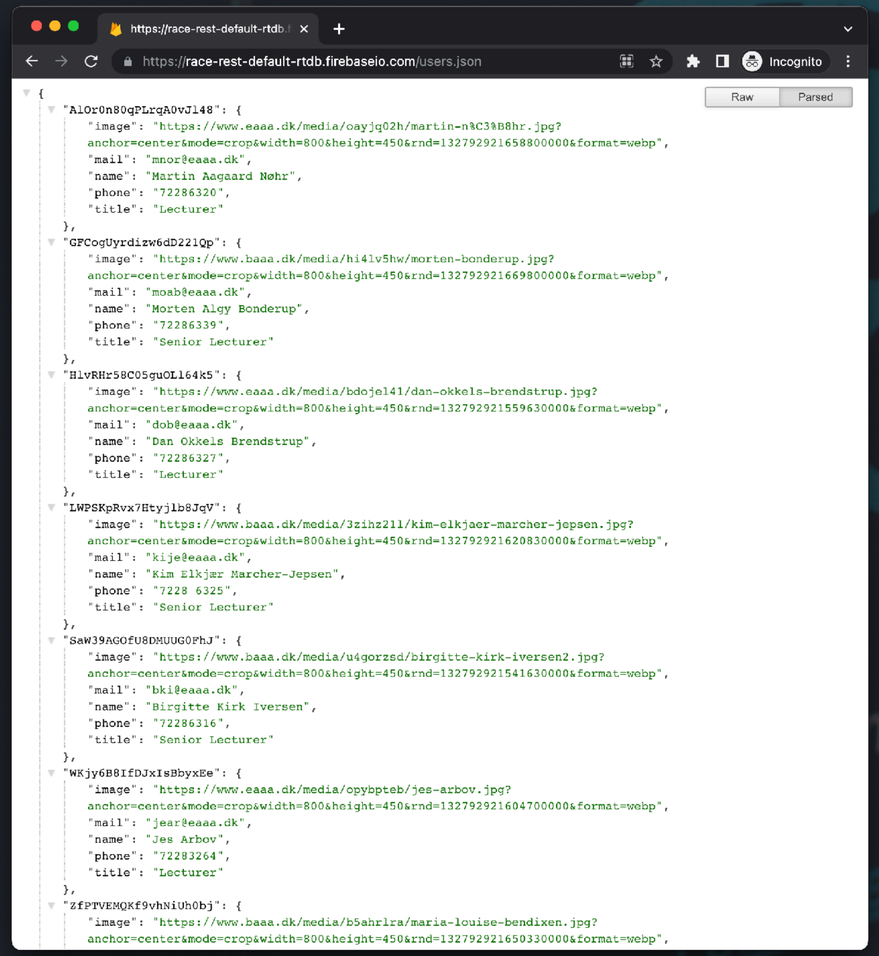
posts

users

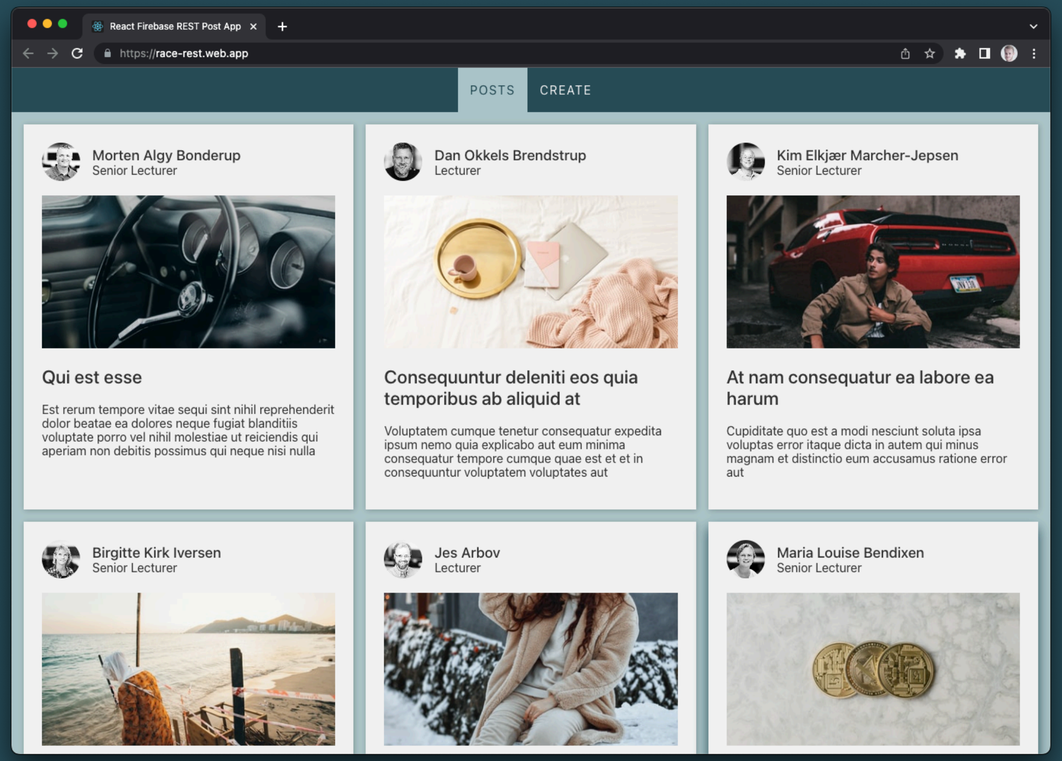
# Two data sources




race-rest-default-rtdb.firebaseio.com/posts.json




race-rest-default-rtdb.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.

```jsx
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.

```jsx
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.

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

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

```jsx
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 = “fTs84KRoYw5pRZEWCq2Z”`
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: "fTs84KRoYw5pRZEWCq2Z" // 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

```jsx
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 objebt 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 hav
        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

```jsx
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 = "fTs84KRoYw5pRZEWCq2Z"; // 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("/");
    }

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

# Update

UpdatePage Component

```jsx
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-rtdb.firebaseio.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

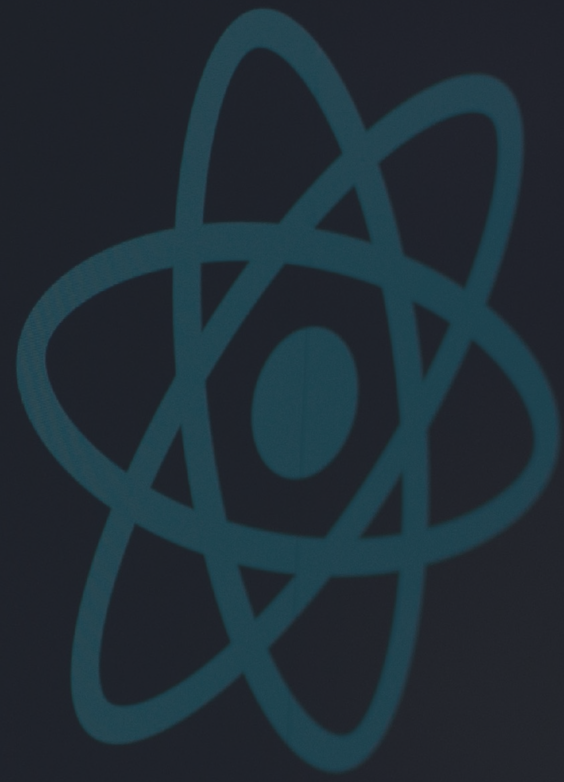
Using `DELETE` to an object by a given id.
Add deletePost logic in UpdatePage component.

```jsx
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-rtdb.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


- GitHub Repo (code)
- Running solution
- Data Sources:
  - posts
  - users

# 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