Most popular JavaScript frameworks

2012 - 2019

Source: GitHub Archive

CODERSRANK.IO

Google Trends

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

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

I’m Rasmus Cederdorff (RACE)

Senior Lecturer

Freelance Web App Developer

Programming, UI & UX

JavaScript & Web Development

“I speak JavaScript”

Websites, Webshops, Web Apps

& Mobile Apps

Rasmus Cederdorff

Computer Science EAAA	2011
Web Development (PBA) EAAA	2013
Master of Science in IT SDU	2015
App Developer Visiolink ApS	2013
Freelance Web App Developer Cederdorff	2014
Lecturer EAAA	2018
Senior Lecturer EAAA	2021
Senior Lecturer KEA	2022

Backend → Frontend

I’m Rasmus Cederdorff

Aarhus —> Copenhagen

Alicia & Ida

From Holstebro

I’m into sports

Love (🍎) gadgets, to take pictures & interior design projects

What’s with my arm?

Frontend (client)

https://github.com/cederdorff/rest-user-crud-frontend

Backend (Server)

https://github.com/cederdorff/rest-user-crud-backend

Client-Server Model

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

Fetch, HTTP Request & Response

WEB APP

REST API

DATA SOURCE

FETCH(GET, POST, PUT, DELETE)

REQUEST

JSON DATA

RESPONSE

JSON

posts

users

CLIENT

SERVER

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.

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 and 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 then updates the DOM automatically and performant without re-rendering all elements - only the needed elements.

Resources

React Resources

React Self-study

Guides & Tutorials

React Beta Docs

read
the
documentation
read the documentation
read
The
documentation
Ask Rasmus

How to Think in React

Review slides & note questions

Function Component

A Component is simply just 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

Java**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!");
```

The React Handbook

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

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 `class-Name`.

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>
```

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

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

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

Function Component

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

Define the component "Greeting"

Use Greeting component in another component

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

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

It’s all 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>
    );
}
```

```
function App() {
    return (
        <>
            <Navigation />
            <Header />
            <PageContent />
            <Footer />
        </>
    );
}

ReactDOM.render(<App />, document.getElementById("root"));
```

react-cdn-page-template

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

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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)

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

ReactDOM.render(<App />, document.getElementById("root"));
```

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>
  );
}

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.

```
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`

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

React Hooks

w3schools.com/react/react_hooks.asp

useState( )

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.

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 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>
  );
}
```

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

Destructuring

From Vanilla JavaScript to Rea

https://race.notion.site/From-Vanilla-JavaScript-to-React-Developer-4e35ed29a5c9460badbd7f9c64f565f1#7...

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

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.

```
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

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

useEffect()

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.

```
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

Do async actions like data fetching inside the callback

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

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

```
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

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

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`).

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`

Conditional branching: if, '?'

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

Chapter
JavaScript Fundamentals

Lesson navigation
The "if" statement
Boolean conversion
The "else" clause
Several conditions: "else if"
Conditional operator '?'
Multiple '?'
Non-traditional use of '?'

Tasks (5)
Comments

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Conditional operator '?'

Sometimes, we need to assign a variable depending on a condition.

For instance:

```
let accessAllowed;
let age = prompt('How old are you?', '');

if (age > 18) {
  accessAllowed = true;
} else {
  accessAllowed = false;
}

alert(accessAllowed);
```

The so-called "conditional" or "question mark" operator lets us do that in a shorter and simpler way.

The operator is represented by a question mark `?`. Sometimes it's called "ternary", because the operator has three operands. It is actually the one and only operator in JavaScript which has that many.

The syntax is:

```
let result = condition ? value1 : value2;
```

The `condition` is evaluated: if it's truthy then `value1` is returned, otherwise – `value2`.

For example:

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

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

Nullish coalescing operator '??

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

EN JS Buy EPUB/PDF

Chapter
JavaScript Fundamentals

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Comparison with ||
Precedence
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Own your code and the rest will follow: Read our free guide to full-service ownership.

The JavaScript language → JavaScript Fundamentals 22nd January 2022

Nullish coalescing operator '??'

A recent addition

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

The nullish coalescing operator is written as two question marks `??`.

As it treats `null` and `undefined` similarly, we'll use a special term here, in this article. We'll say that an expression is "defined" when it's neither `null` nor `undefined`.

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:

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

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

create-react-app

Starter template for your react app

Generate create-react-app

Getting started

Download & install Node.js & npm: nodejs.org/en/

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

react-projects

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...

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

No page refresh on request

MPA

Whole page refresh on request

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/

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182 posts 5,390 followers 673 following

Rasmus Cederdorff
Senior Lecturer @keacph
Web App Developer
Alicia & Ida
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cederdorff.com

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POSTS SAVED TAGGED

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

Elements Console Sources Network Performance

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

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

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

FETCH(...)

REQUEST

JSON DATA

RESPONSE

JSON

DATA SOURCE

Firebase
Realtime Database

posts

users

Two data sources

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


```
{
  "1mNVXMNbZWjKsiaTFsDw": {
    "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-1642049888276-9c9f0a1a8758?
    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"
  },
  "5tl4jHHSRaKEB0UW9nQd": {
    "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=MnwyOTA4MTB8MHwxfGFsbHwxNXx8fHx8fDJ8fDE2NDIwNzUwMzQ&ixlib=rb-
    1.2.1&q=80&w=400",
    "title": "consequuntur deleniti eos quia temporibus ab aliquid at",
    "uid": "HlvRHr58C05guOLl64k5"
  },
  "6RtyNxxTYIBDRODr3dwv": {
    "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=MnwyOTA4MTB8MHwxfGFsbHwyN3x8fHx8fDJ8fDE2NDIwNzUwNzQ&ixlib=rb-
    1.2.1&q=80&w=400",
    "title": "at nam consequatur ea labore ea harum",
    "uid": "LWPSKpRvx7Htyjlb8JqV"
  },
  "8H0oH1WlDNfqyZAehXel": {
    "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": "SaW39AGOfU8DMUUG0FhJ"
  },
  "9yHtqIcc25e4kzMInds6": {
    "body": "ex quod dolorem ea eum iure qui provident amet\nquia qui facere excepturi et
    repudiandae\nasperiores molestias provident\nminus incidunt vero fugit rerum sint sunt excepturi provident",
    "image": "https://images.unsplash.com/photo-1642053427171-45b13e6730db?
    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"
  },
  "B3xo03oPgyOfpr3i3x9D": {
    "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=MnwyOTA4MTB8MXwxfGFsbHwyMXx8fHx8fDJ8fDE2NDIwNzUwNzQ&ixlib=rb-
```


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

https://race-rest-default-rtdb.firebaseio.com/users.json


```
{
  "AlOr0n80qPLrqA0vJl48": {
    "image": "https://www.eaaa.dk/media/oayjq02h/martin-n%C3%B8hr.jpg?
    anchor=center&mode=crop&width=800&height=450&rnd=1327929216588000000&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=1327929216698000000&format=webp",
    "mail": "moab@eaaa.dk",
    "name": "Morten Algy Bonderup",
    "phone": "72286339",
    "title": "Senior Lecturer"
  },
  "HlvRHr58C05guOLl64k5": {
    "image": "https://www.eaaa.dk/media/bdojel41/dan-okkels-brendstrup.jpg?
    anchor=center&mode=crop&width=800&height=450&rnd=1327929215596300000&format=webp",
    "mail": "dob@eaaa.dk",
    "name": "Dan Okkels Brendstrup",
    "phone": "72286327",
    "title": "Lecturer"
  },
  "LWPSKpRvx7Htyjlb8JqV": {
    "image": "https://www.baaa.dk/media/3zihz211/kim-elkjaer-marcher-jepsen.jpg?
    anchor=center&mode=crop&width=800&height=450&rnd=1327929216208300000&format=webp",
    "mail": "kije@eaaa.dk",
    "name": "Kim Elkjær Marcher-Jepsen",
    "phone": "7228 6325",
    "title": "Senior Lecturer"
  },
  "SaW39AGOfU8DMUUG0FhJ": {
    "image": "https://www.baaa.dk/media/u4gorzsd/birgitte-kirk-iversen2.jpg?
    anchor=center&mode=crop&width=800&height=450&rnd=1327929215416300000&format=webp",
    "mail": "bki@eaaa.dk",
    "name": "Birgitte Kirk Iversen",
    "phone": "72286316",
    "title": "Senior Lecturer"
  },
  "WKjy6B8IfDJxIsBbyxEe": {
    "image": "https://www.eaaa.dk/media/opybpteb/jes-arbov.jpg?
    anchor=center&mode=crop&width=800&height=450&rnd=1327929216047000000&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=1327929216503300000&format=webp",
```


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.

```
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 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.

```
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

```
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

```
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

```
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.

```
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