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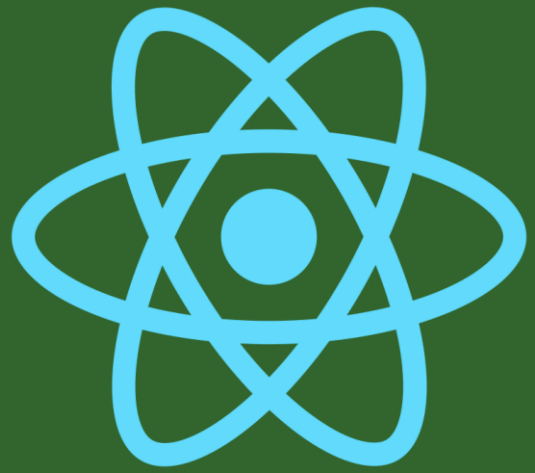


edisrupt.

Thinking in React

Understand React's Basic Concepts and Gain Hands-On Experience

Walter Wallner | relwiwa.io

Motivation

- Cooperation between Eddisrupt and FreeCodeCampLisbon
- Get you started with React, as easy and direct as possible:
  - With knowledge of HTML, CSS and basic Javascript you are ready to use React
  - Usage of create-react-app client instead of complicated configuration and setup with wepback
- Demonstrate the two main benefits of using React or another frontend framework:
  - Efficient way to create applications
  - Efficient way to organize code in a reusable manner
- Combination of understanding concepts and practicing best practices

Today‘s agenda

- Understanding (2 x 30 minutes)
  - Explanation of only a few of React‘s basic concepts
  - Best practices workflow of building React apps: „Thinking in React“
- Hands-On Practice (2 x 50 minutes)
  - You will build a Markdown Previewer, the first React challenge in FCC
  - Pair programming, a more experienced with a less experienced coder
- Reflection and Feedback (15 minutes)

Walter Wallner

- Started Web Development in the late 1990s
- Self-taught from HTML and CSS to Javascript; then PHP and Mysql and other server-side languages
- Cultural Studies and Computer Science
- Plan was to become a Developer, but became a Flight Attendant
- Got back into development via FreeCodeCamp
- relwiwa.io is my React-based portfolio, that features most FCC projects I‘ve done, live
- Looking for employment or projects as a developer in part-time ☺

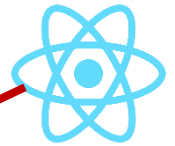
Understanding React‘s basic concepts

1. Why Single Page Applications? Traditional vs. Single Page Applications	2. How does React render HTML on the client? JSX: Javascript Syntax eXtension
3. <MarkdownPreviewer /> React Components and Javascript Modules	4. How does React update the UI and keep it in sync? state, immutability

1. Why single page applications?

```
<!doctype html>
<html>
<head class="no-js">
  <meta charset="utf-8">
  <meta name="viewport" content="width=device-width, initial-scale=1">
  <meta http-equiv="x-ua-compatible" content="ie=edge">
  <title>relwiwa's Portfolio | freeCodeCamp Certification</title>
</head>
<body>
  <div id='root'></div>
<script type="text/javascript" src="/build/index.77b404961eaed09578e5.js"></script></body>
</html>
```

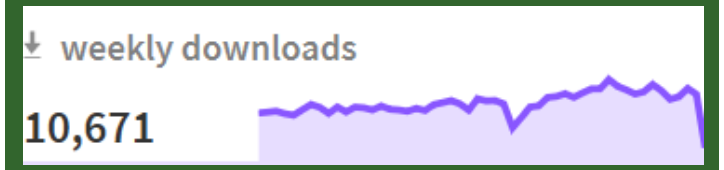
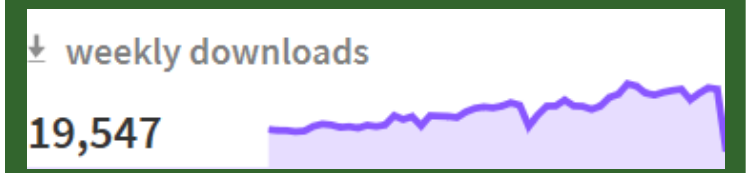
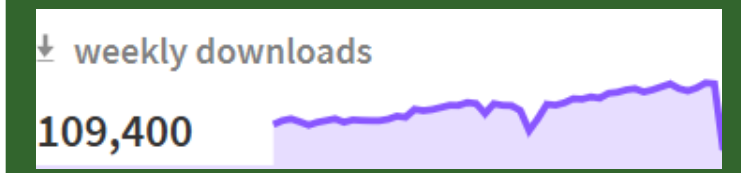
Initial HTML



1. Single page applications, pros and cons

	Traditional Web Apps	Single Page Apps
HTML produced on	server, directly, or via server-side language like PHP	client, via Javascript
Requests	always full HTML page	initial large, then small
Server Workload	big	Small
Traffic	big	Small
SEO	+	- (ServerSideReact)
User Experience	Page Loads, slow	reactive, super-fast

Why React? Compare NPM downloads

Data obtained on June 4, 2018

2. JSX is how React renders HTML on the client

```
const ExampleComponent = function () {
  return (
    <div>
      <h1>Example Component</h1>
      <p>Lorem ipsum dolor amet</p>
    </div>
  );
};
```

With Javascript Syntax eXtension (JSX) you can use HTML Tags within Javascript!

Simple as that ☺

2. JSX Specifics

- JSX supports all HTML elements
- Some HTML attributes are renamed, because they are part of Javascript syntax:
  - className instead of class
  - htmlFor instead of for (label element)
- To access Javascript variables within JSX, you use curly braces:

```
const myComponent = function() {
  var someVariable = "my Text";
  return (
    <p>{someVariable}</p>
  );
}
```

- React components are also included via JSX:
  - **<MarkdownPreviewer />**

"Thinking in React" Best Practice Workflow

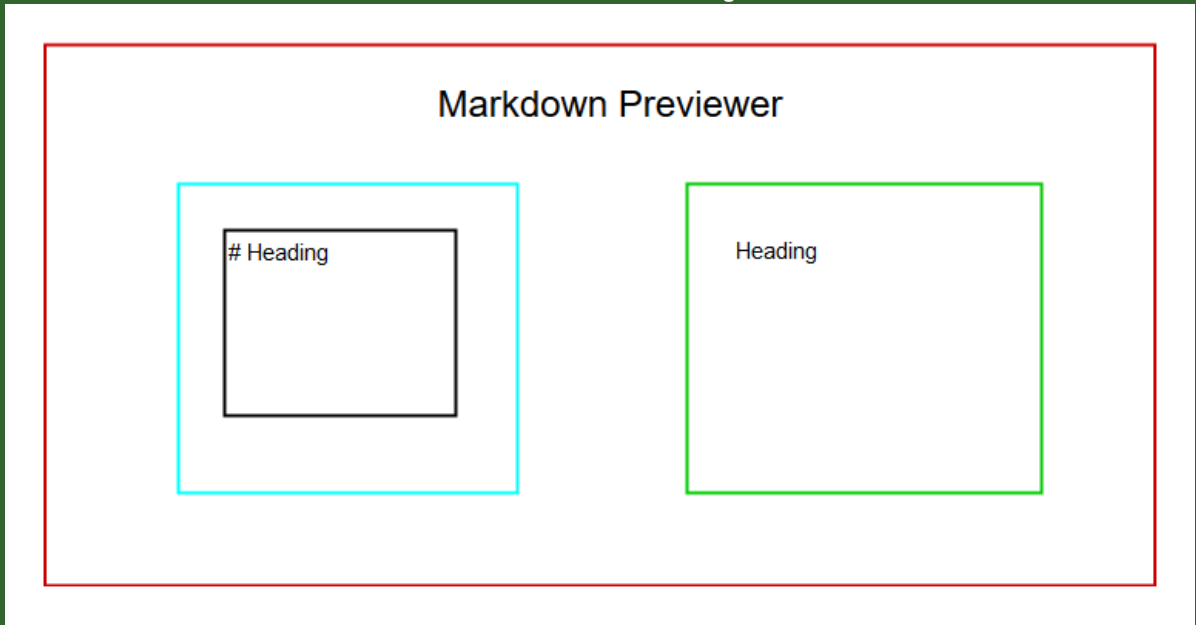
Step 1: Start with a mock and break UI into a component hierarchy
Step 2: Build a static version in React
Step 3: Identify the minimal representation of UI state
Step 4: Identify where your state should live
Step 5: Add inverse data flow

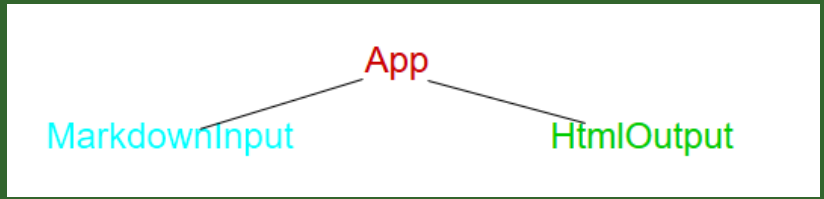
When following these steps, you will build clean, reusable React components and applications

The two most important chapters in React documentation:

- Thinking in React
- Lifting state up

1. Create a mock and component hierarchy





- Data in React always flows from top to bottom
- React is about composition of reusable components

2. Build a static version

- Create all the components based on the component hierarchy
- There is no interactivity yet
- It is only about the relationship between the components

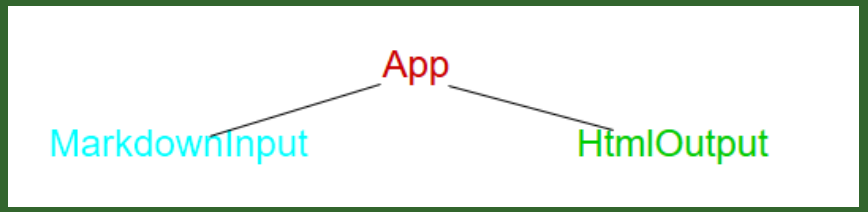
First part of hands on practice

- Form pairs (less experienced with more experienced)
- Install tools
- Start with step 1 + 2 of the tutorial

- Tutorial is at:
  - https://github.com/freeCodeCampLisbon/eventos => Tutorial
  - https://bit.ly/2KJ3Z3m

3. React components and Javascript modules

- React is based on components
- React creates a hierarchy of components, similar to the DOM
- Every component is a Javascript module
- Every component is in a separate file



Pros:

+ no trouble with global scope
+ good code organization, hard to spaghetti code
+ reusability of components, DRY

Cons:

- Javascript modules are not natively supported in browser, so complex configuration is necessary

3. global scope trouble

fileOne.js:

```
var incredible = "blue";
```

fileTwo.js:

```
var incredible = "red";
```

```
<script src="fileOne.js"></script>
<script src="fileTwo.js"></script>
```

Both files have a variable incredible, they are both on the global scope. fileTwo's variable will overwrite fileOne's variable

3. global scope trouble

fileOne.js:

```
var incredible = "blue";
export default incredible;
```

fileTwo.js:

```
var incredible = "red";
export default incredible;
```

app.js:

```
import incredible from './fileOne.js';
import incredible as incredible2 from './fileTwo.js';
```

With importing and exporting from modules, we can overcome the trouble of using global scope

3. React components

```
import React from 'react';

const ExampleComponent = function () {
  return (
    <div>
      <h1>Example Component</h1>
      <p>Lorem ipsum dolor amet</p>
    </div>
  );
};

export default ExampleComponent;
```

```
import React from 'react';

import ExampleComponent from './ExampleComponent';

const App = function () {
  return (
    <div>
      <ExampleComponent />
    </div>
  );
};

export default App;
```

4. How does React update the UI?

- There are functional and class-based components in React
- Functional components are "dumb": They only display the UI
- Class-based components are "smart", because they have state
- state represents all the data you need to represent your UI and manage your components
- You should try to have as little components with state as possible
- You should always try to lift state up as much as possible in the component hierarchy

4. How to use state

- state is a regular Javascript object with key-value pairs
- It is defined in the constructor of a class-based component:

```
class exampleComponent extends React.Component {
  constructor(props) {
    super(props);
    this.state = {
      numbers: []
    };
  }
}
```

- Whenever you want to update one or more state values, you have to use the **this.setState() method**:

```
this.setState({ numbers: [100, 12, 34, 45] });
```

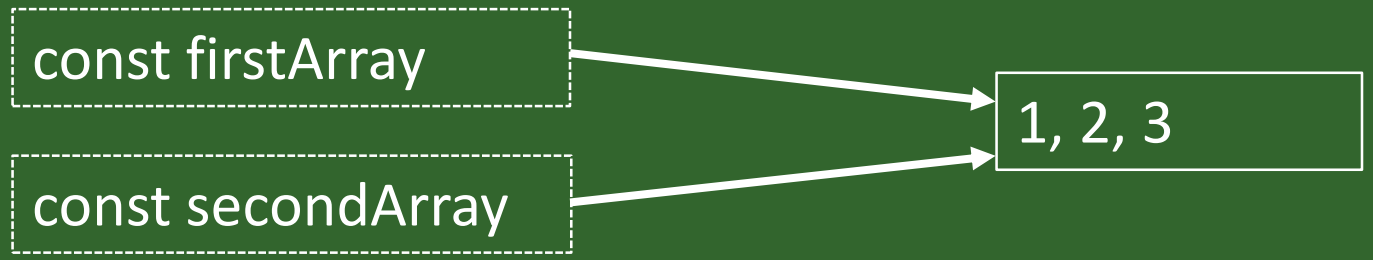
- React will then realize the values that have changed, and start updating all the components affected by the changes
- React uses a virtual DOM to manage components, and only updates the real DOM upon changes

4. Never mutate state

- Whenever you want to update values in state, you use this.setState()
- You have to be careful when updating arrays and objects inside state
- In order to find out about the changes, React does not check every entry inside of arrays or objects
- Instead, it only checks, whether the reference of the array or object has changed
- Only if the reference has changed, it looks for the changes inside of the array or object
- Only then React updates the affected components, very efficient

4. Array references

- **const firstArray = [1, 2, 3];**
  const secondArray = firstArray;
  secondArray[0] = 5;
  console.log(secondArray[0], firstArray[0]);
- When assigning arrays to variables, only references to the existing array are assigned, no new array is created!

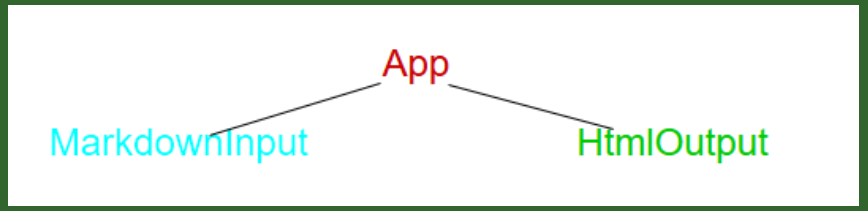


4. How to update arrays without mutations

- When you want to update an array inside of state, you always have to create a new array
- Never use array-methods that change the array without creating a new one (pop, push, shift, unshift)
- You can create a new array by using the concat method:
  const secondArray = [].concat(firstArray);
- Or you can use the ES6-Spread Operator:
  const secondArray = […firstArray];
- There is also a Spread-Operator for objects

Next steps in React workflow

- Step 3: Identify minimal state
  - **this.state = { markup: '' };**
- Step 4: Locate where to put state
  - You always try to lift state up as much as possible
- Step 5: Add inverse data flow
  - This is how child components interact with their parents
  - This is how child components can update state
  - This is how to handle user interaction



Second part of hands on practice

- Form pairs (less experienced with more experienced), take turns
- Install tools
- Continue with steps 1 + 2 and go on with steps 3 – 5

- Tutorial is at:
  - https://github.com/freeCodeCampLisbon/eventos => Tutorial
  - https://bit.ly/2KJ3Z3m