My React.js Notes

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What is React.js and what is it for?

From https://reactjs.org/docs/getting-started.html itself, React is a JavaScript library for building user interfaces.

React will render only the components that have changed instead of having to redo the whole page when something changes.

React lets you create components with their own elements and state management, and those components can be used with other components to create new components or views.

React also gives you React Native for mobile apps.

What do you need to start writing React without installations?

You can use some React on a page you have on an existing website **without having to install anything on your computer** to create React apps. To do that you would need to give an id to whatever element you want to put a React element in (just so you can find it later).

Add this at the end of the page you have this element in, before the closing body tag:

```
<script src="https://unpkg.com/react@17/umd/react.development.js" crossorigin
></script>
<script src="https://unpkg.com/react-dom@17/umd/react-
dom.development.js" crossorigin></script>
```

Note the above links say development, for deployment you should replace "development.js" with "production.min.js"

And you will need to add also the React component you will be using:

```
<script src="myReactComponent.js"></script>
```

We will see how to create a React component later, for now, we are assuming we already have one file with one component. But how does the component know where it needs to show up? You would have to add this to that file:

```
const domContainer = document.querySelector('#whateverIdYouChoseForThisInYourPage');
ReactDOM.render(e(NameOfTheReactContainerYouWantToUse), domContainer);
```

What do you need to start writing React apps?

This is where you are going to be installing something on your computer. A toolchain is a set of programming tools used for software development. And that is what we need for this.

For learning React or creating a new single page app, this is what you need to do:

- Decide what you are going to use to write your code. In my case I love **Visual Studio Code** so I'll be using that here. If you want to install Git for windows, go to a new terminal in go to gitforwindows.org and download, choose the defaults.

- Node.js with NPM installation: Go to Nodejs.org and install it. Take the defaults. That will install npm, which is what we will be using.

To check that everything is OK, close VS Code and reopen it, go to the terminal if it's not already open. Type $npm -v to see that npm is installed and what version it is. Then similarly with $node -v for node.js.

Create React App

To create the default React App, go to your terminal in Visual Studio Code and run:

To create it:

```
npx create-react-app TheNameYouWantForYourApp
```

Move to the folder where it will be:

```
cd TheNameYouWantForYourApp
```

Start running it:

```
npm start
```

(Ctrl + c to stop it).

By default, the app will start running in the webbrowser at localhost:3000. It will usually come up on its own but it may take a few seconds.

We will talk about creating a build later. Never run npm run eject!!

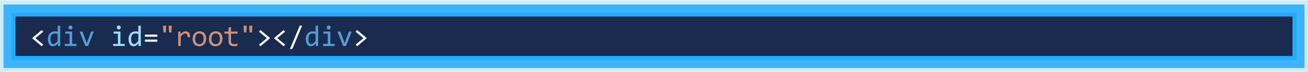
There are other tools in addition to npm but I'll be basing my notes on npm.

Note: you could also do `npm install -g create-react-app to install it` and then jus type `create-react-app TheNameYouWantForYourApp` in the folder where you want the app. The -g indicates to install it globally, so it can be accessed from any folder.

stackblitz.com and the React app basic structure

I find this site extremely helpful to try your code (simple) and see how it will work. Going to https://stackblitz.com/edit/react-ajunq2 will also give you an idea of how a React app works.

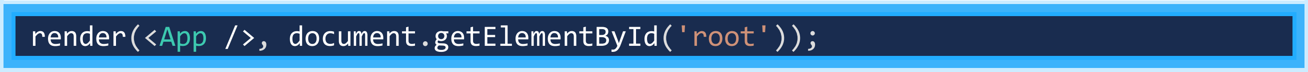
You will have an **index.html** file, which will start the whole thing. This file will have a div with an id where the React component (the main one) will be loaded. You need an id so you can access the element later.



```
<div id="root"></div>
```

That index file should be under the public folder.

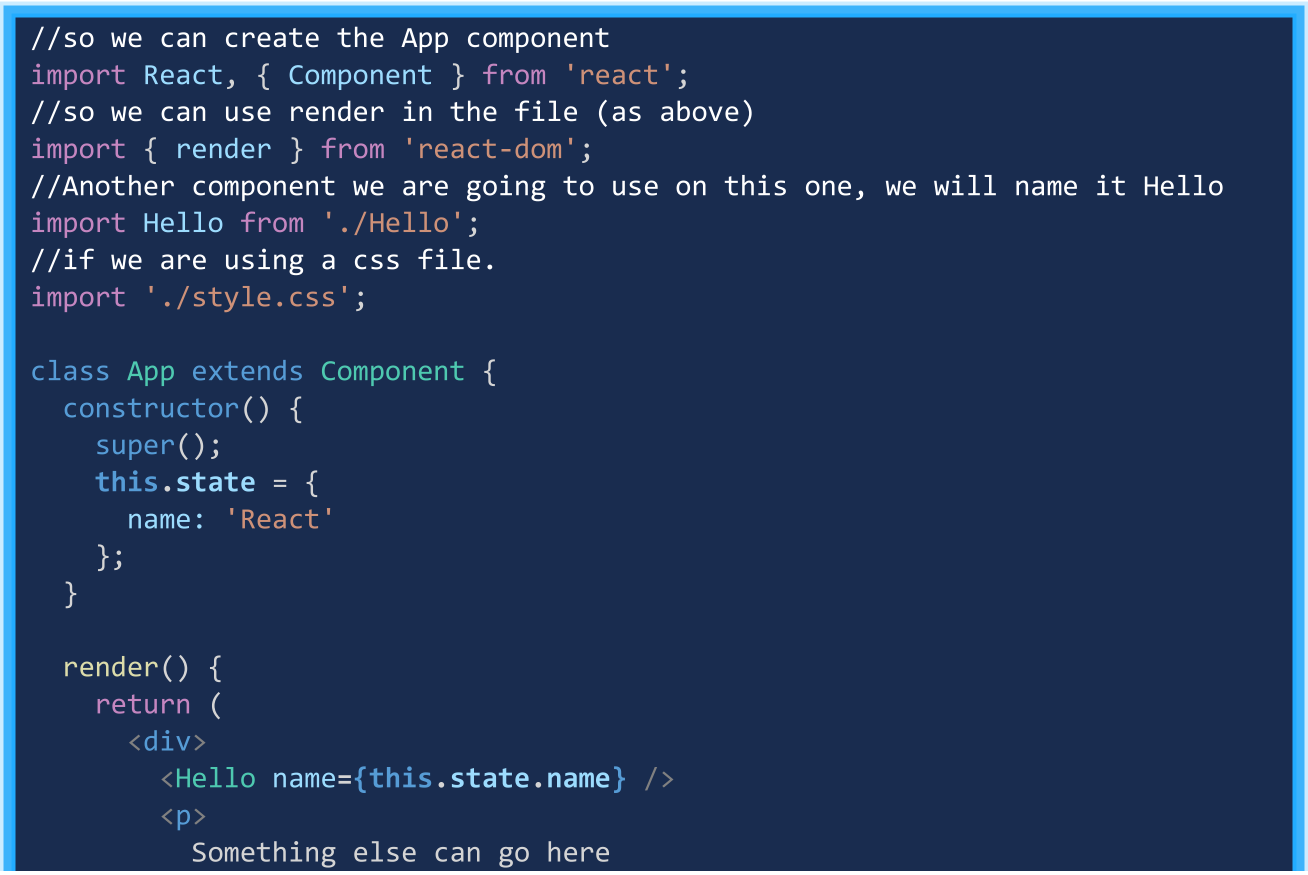
There should also be an **index.js** file. This file will have this, which is what will load the component into the element.



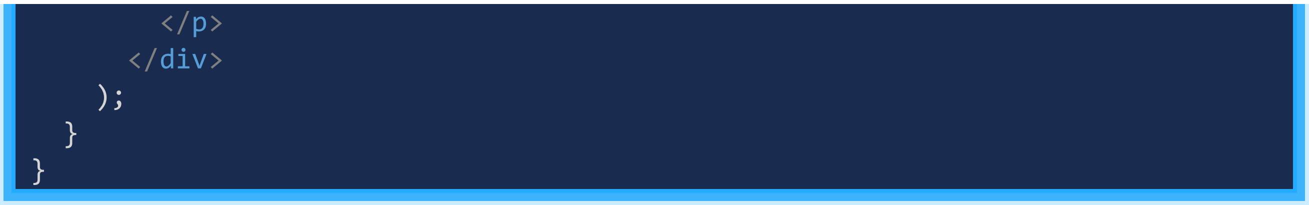
```
render(<App />, document.getElementById('root'));
```

In this case, we will be putting the **App** component into the root element. This App component could be in the same index.js file, or on another file if we import it for use in index.js.

The App component could have this code:



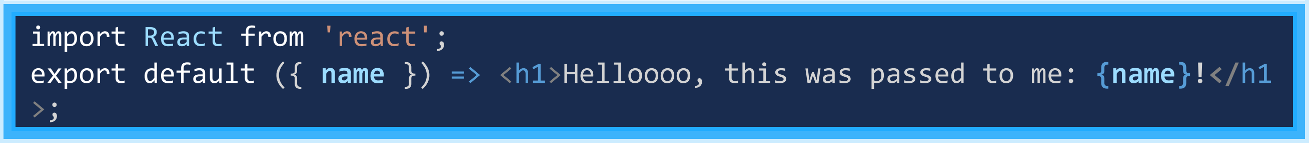
```
//so we can create the App component
import React, { Component } from 'react';
//so we can use render in the file (as above)
import { render } from 'react-dom';
//Another component we are going to use on this one, we will name it Hello
import Hello from './Hello';
//if we are using a css file.
import './style.css';

class App extends Component {
  constructor() {
    super();
    this.state = {
      name: 'React'
    };
  }

  render() {
    return (
      <div>
        <Hello name={this.state.name} />
        <p>
          Something else can go here
```



```
          </p>
        </div>
      );
    }
  }
```

Notice the render and the return. That is where we will put the React or HTML elements we want to see on the page. <Hello… is the other React component we are using, and it takes a name property, which we are setting to the state value (state.name) we set in the constructor.

In this case, the **Hello** component can be:



```
import React from 'react';
export default ({ name }) => <h1>Helloooo, this was passed to me: {name}!</h1
>;
```

The above code will make the index.html look like this when it displays in the browser:

Helloooo this was passed to me: React!

Something else can go here

A package.json file will also be created, but this will be coming later.

Creating the components

JSX

React components are created with JSX, and the files should have that extension. JSX looks like a mix of JavaScript and HTML.

In a JSX file, we can be writing JavaScript code, with what looks like HTML tags, but they are not HTML exactly, so some things will be different and if you forget, you may run into problems.

For example, class is for HTML, and the JSX equivalent would be className. Also, tabindex in HTML will become tabIndex in JSX.

To use any variables from the JS part of the file into the elements in the file, add {}, like in <h1>{title}</h1>

You can create elements by using React.createElement, but I think it’s easier to type the element itself the way you want it.

Classes or Functions?

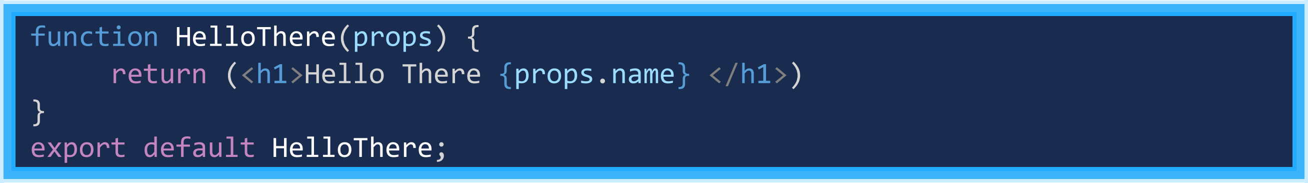
You can create components as classes or functions. Creating the component as a class will let you extend from the Component class in React and it will provide more features.

If you need a constructor (which will run once) you will need to create a class.

It is possible to use state with functions using hooks, but if you create a class (which will extend the React.Component class), you can use state for multiple variables easily. More on state later.

A function component

An example of a **function component** would be:



```
function HelloThere(props) {
     return (<h1>Hello There {props.name} </h1>)
}
export default HelloThere;
```

There are a few things to note.

This function is taking the **props** argument, and then using it with the {}. You do not have to pass it if you are not going to use it.

If you need to return more than one element, you will have to wrap those elements into a higher element or it will not work.

```
 function HelloThere(props) {
      return (<div>
                  <h1>Hello There </h1>
                  <h2>hey</h2>
               </div>);
   }
   export default HelloThere;
```

Add the export default at the end so when you need to import this component into another one React will know that HelloThere is the component that it needs to use, otherwise you will have to specify it.

Notice there is no render on the function.

The function is a regular JavaScript function and could be done with this syntax too:

```
const HelloThere = (props) => (
           <h1>Hello There you </h1>)
```

A class component

We would write a simple component class this way. This one is so simple that a function should be used instead, but this is how it would be.

```
import React, {Component} from 'react';
class HelloThere extends Component {
   constructor(props){
    super(props);
    //whatever we need to do here to set state if we are using it
  }
render() {
  return(
    <React.Fragment>
     <h1>Hello There you </h1>
    </React.Fragment>
  )
 };
}
export default HelloThere;
```

Notice that here we have a render with the return. <React/Fragment> is used as a parent div so we are returning only one element at the top level.

Importing the components

How we import a component on another file will depend on whether the file containing the component we want has a default or not.

Say we have a file that has two components, Component1, Component2.

In that file we can export both components with:

```
export { Component1, Component2 }
```

Then when we are going to use them in another file we would need to do:

```
import {Component1, Component2} from './ componentsAreInThisFile'
```

If we try to import Component1 with this, it will fail because Component1 was not exported as default.

```
import Component1 from './ componentsAreInThisFile'
```

We could export components from the file, plus the default one this way:

```
export {Component2};
export default Component1;
```

Then we could import them this way (Component1 being the default one:

```
import Component1, {Component2} from './ componentsAreInThisFile';
```

Like I mentioned earlier, https://stackblitz.com/edit/react-ajunq2?file=index.js is a great place to do some trial and errors.

Note: When importing, you could name the component whatever you want, it does not have to match the name of the component in the file you are importing.

State and Props (No Hooks)

What is State?

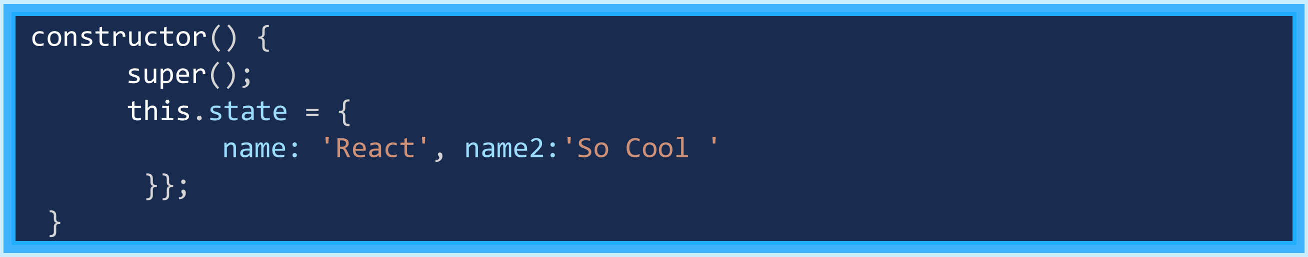
You use the state to store values that correspond to elements on your component. When the element must change you update the state and React will know to update that element (or elements) based on the change. This is how you do not have to render all the elements after something in one of them changes.

For example, if you need to display a header with Hello or Bye depending on something on your code, you can use state to store the greeting, and then you would use that on your element (<h1>{this.state.greeting}</h1>). Then when you changed the value of the greeting React would know that it needs to render the <h1> again.

When you have different components that may need the same state, instead of having each component have its own state and your code trying to keep up with communication among the different components, bring the state to the common ancestor of those components.

State – set it and update it

You will set the state in the constructor by assigning it a value, but if you want to change the value later on you must use setState and not change the value directly.



```
constructor() {
      super();
      this.state = {
            name: 'React', name2:'So Cool '
       }};
 }
```

To update the state later, you will use setState, which can take only the new values, or also a function to be called once the state is updated by React.

```
this.setState( {name2: someVariableOrValue}, this.someFunctionThatWillBeCalledWhenStateChanges);
```

The reason we can pass that second argument for React to call a function once the update has happened, is that React may not update the state value right away. We could call this.**forceUpdate**() after this.setState though to make React update at that time.

Note: if you are doing something and it should work but you keep getting an error, check if you forgot to use “this”. (It happens to me a lot).

You can pass the state to a component inside your component (child component) inside props, but this is like passing an argument by value. You will not be able to update the state in the parent component from the child component.

What if the child component needs to update the state of the parent component?

One thing we could do is pass a function in the parent to be called by the child when something happens, and then have the parent change the state in that function.

This is easier to explain with an example.

You have a canvas.jsx component. This component imports another component called TextFieldWithButton. These are the things that TextFieldWithButton takes as props:

```
<TextFieldWithButton textForInput = "Enter you text" textForButton="To canvas !" functionToCall= {this.updateCanvas}/>
```

All the attributes above will be passed to the TextFieldWithButton component as props. The functionToCall attribute will pass {this.updateCanvas} which is a function in the parent that will update the state.

In the child component (TextFieldWithButton), the parent function will be called this way.

```
this.props.functionToCall(“someValueYouWantToPassBack”);
```

functionToCall was this.updateCanvas from the parent, so that is what will be called. The function in the parent will take an argument.

Taking in the props

In the receiving component (class or function), we can just have props or we can name each prop we want to take.

Name each one and access by name only:

```
const Hello = ( {name, name2}) => {
      return <h1>Hello {name} and {name2} !</h1>
```

Take props and access by the name preceded by props.

```
const Hello = (props) => {
      return <h1>Hello {props.name} and {props.name2} !</h1>
```

Props vs props.children

Props are passed in like we saw in the above examples. Props.children is passed automatically to components (we don't need to name them). This is also easier with an example:

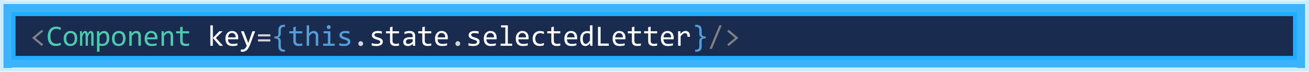
Below, the elements in bold are what will be passed as props.children (of the container Hello component).

```
render() {
       return (
         <div>
           <Hello name={this.state.name} name2={this.state.name2}>
             <h1>hello header</h1>
             <h2>hello header 2</h2>o
           </Hello>
    </div>
    )}  ;
```

Then in Hello we can access those through {props.children}

Rerender when state did not change

Sometimes you may need for something to render again even though the value being displayed from the state has not changed. In that case, add a new state property that (you may call it key) and use it in the component similar to this.



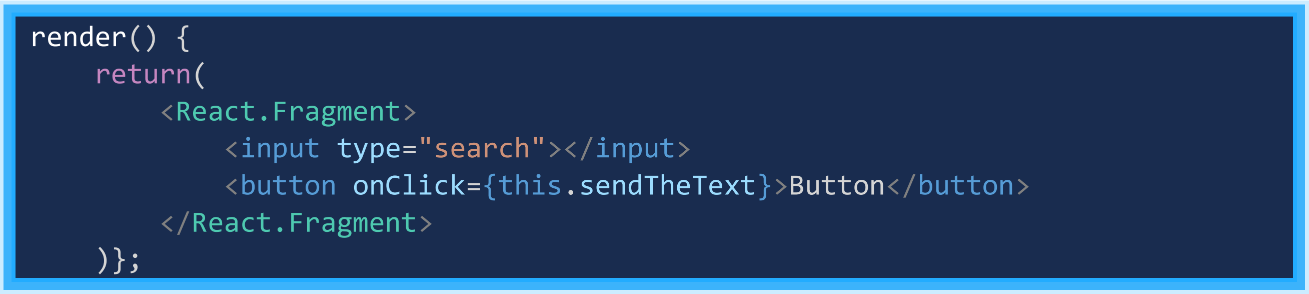
```
<Component key={this.state.selectedLetter}/>
```

Then change the key state when you want the component to re-render.

Useful methods you get with your React class component

render

All your class components will need this method. This is what will return what the element will look like.



```
render() {
    return(
        <React.Fragment>
            <input type="search"></input>
            <button onClick={this.sendTheText}>Button</button>
        </React.Fragment>
    )};
```

Constructor

Used for initializations and setting state. If you are using regular functions (as opposed to arrow functions) you can also do the bindings here.

The constructor is called before the component is mounted. Calling super(props) should be the first line in the constructor, since otherwise props will be undefined in the constructor, which could lead to problems.

Remember this is the only place where you can set state directly (without using setState())

componentDidMount()

This is called right after the component has rendered. Put code that needs to happen only after the component is available here. You should add any subscriptions here.

componentDidUpdate()

This is called after the component is updated.

componentWillUnmount()

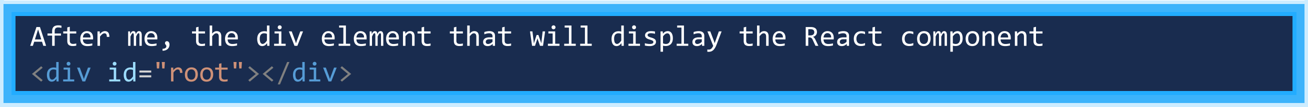
Called right before the component is unmounted and destroyed. This is where you should perform any clean up you may have to do. This includes cancelling subscriptions you may have added in componentDidMount.

Basic Examples

For each one of this create the react app with npm create-react-app

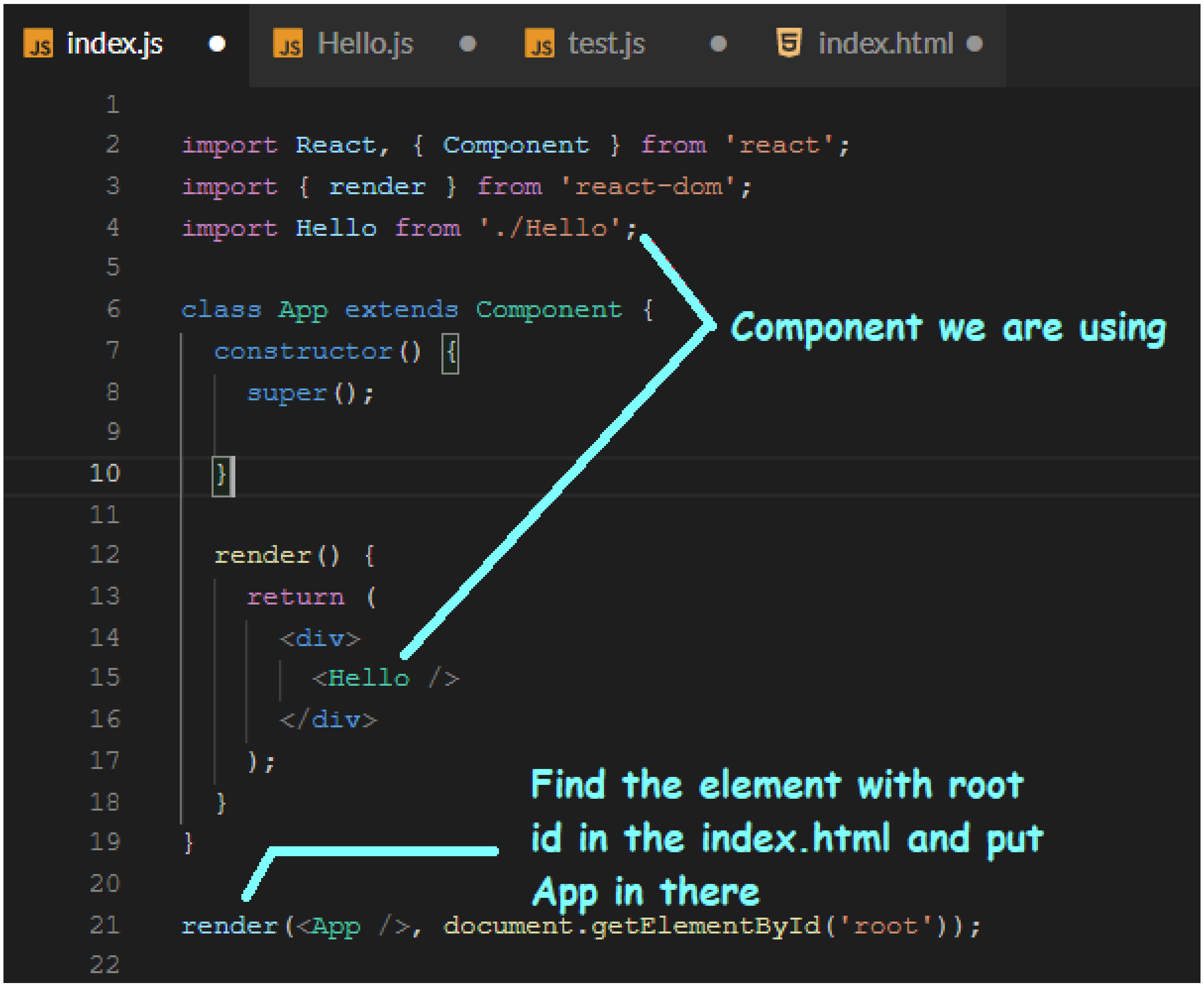
Example – Very simple app with very simple component

Index.html:



```
After me, the div element that will display the React component
<div id="root"></div>
```

Index.js:



```

import React, { Component } from 'react';
import { render } from 'react-dom';
import Hello from './Hello';

class App extends Component {
  constructor() {
    super();

  }

  render() {
    return (
      <div>
        <Hello />
      </div>
    );
  }
}

render(<App />, document.getElementById('root'));

```

Component we are using

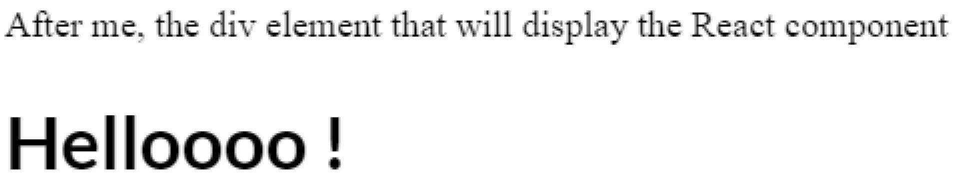
Find the element with root id in the index.html and put App in there

```
import React, { Component } from 'react';
import { render } from 'react-dom';
import Hello from './Hello';

class App extends Component {
  constructor() {
    super();

  }

  render() {
    return (
      <div>
        <Hello />
      </div>
    );
  }
}

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

Hello.js

```
import React from 'react';
export default () => <h1>Helloooo !</h1>;
```

On the browser:



After me, the div element that will display the React component

Helloooo !

Example – The component takes one argument

Index.html:

```
After me, the div element that will display the React component
<div id="root"></div>
```

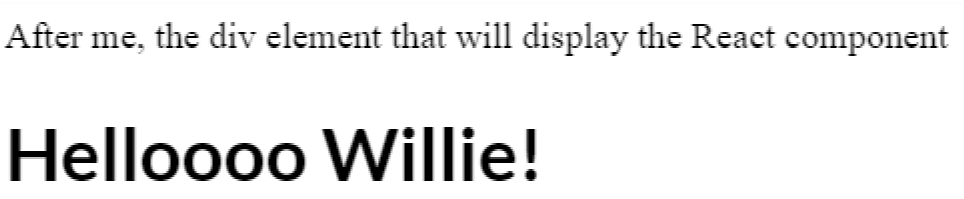
Index.js:

```
import React, { Component } from 'react';
import { render } from 'react-dom';
import Hello from './Hello';

class App extends Component {
  constructor() {
    super();

  }
  render() {
    return (
      <div>
        <Hello name="Willie" />
      </div>
    );
  }
}
render(<App />, document.getElementById('root'));
```

hello.js:

```
import React from 'react';
export default ( {name}) => <h1>Helloooo {name}!</h1>;
```

Browser:



After me, the div element that will display the React component

Helloooo Willie!

Example – The component takes arguments from props

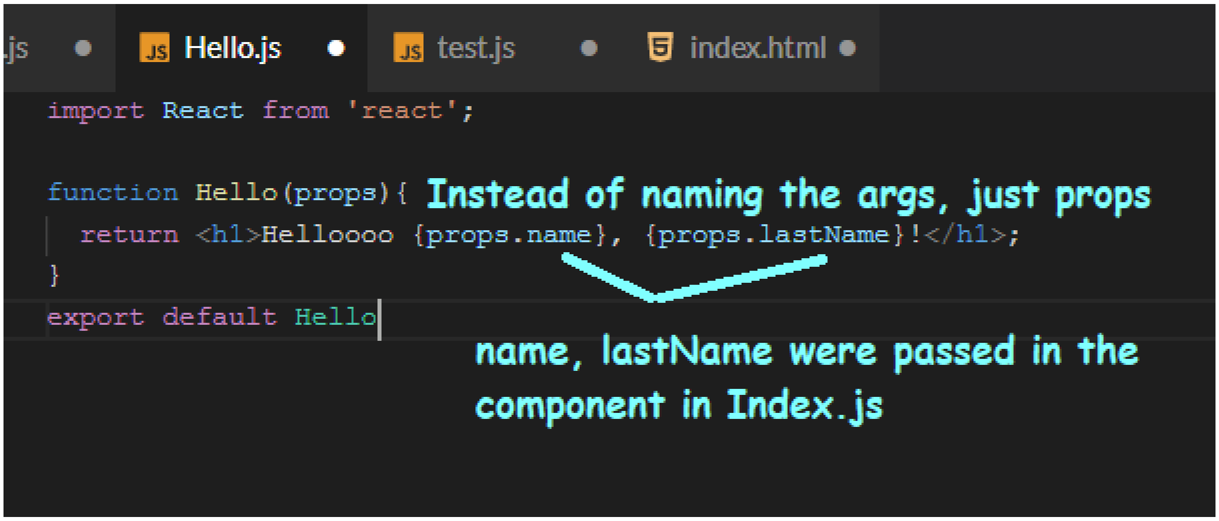
Index.html:

```
After me, the div element that will display the React component
<div id="root"></div>
```

Index.js:

```
import React, { Component } from 'react';
import { render } from 'react-dom';
import Hello from './Hello';

class App extends Component {
  constructor() {
    super();

  }

  render() {
    return (
      <div>
        <Hello name="Willie" lastName="Wilson" />
      </div>
    );
  }
}

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

Hello.js



```
import React from 'react';

function Hello(props){
  return <h1>Helloooo {props.name}, {props.lastName}!</h1>;
}
export default Hello
```

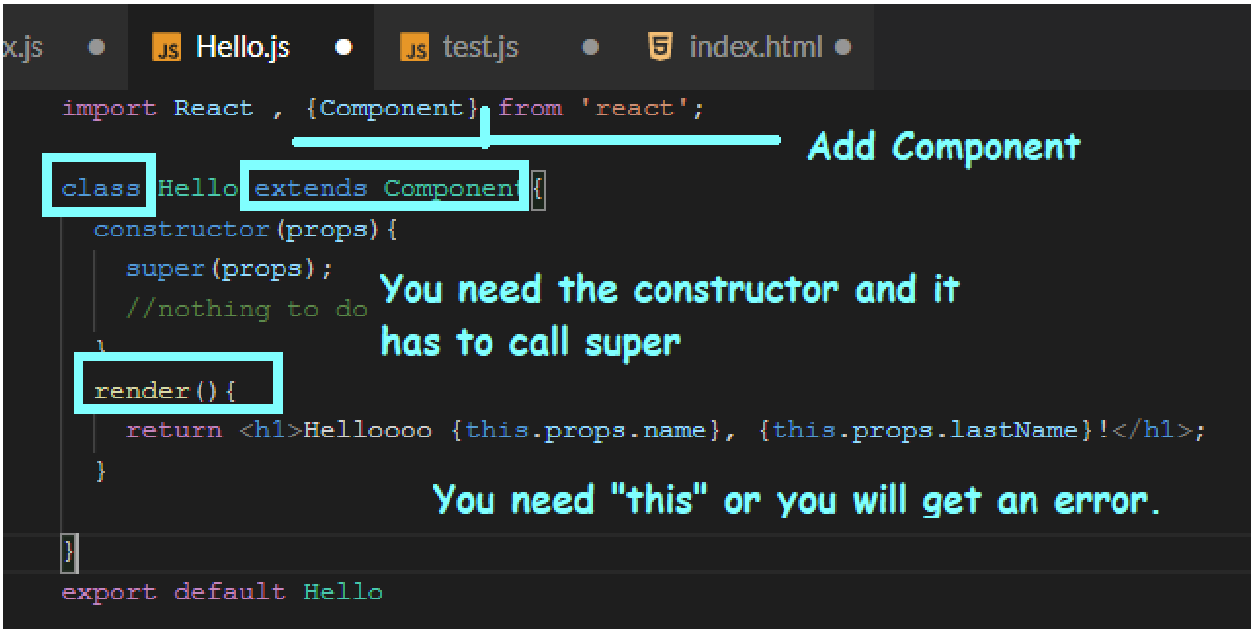
Instead of naming the args, just props

name, lastName were passed in the component in Index.js

```
import React from 'react';

function Hello(props){
  return <h1>Helloooo {props.name}, {props.lastName}!</h1>;
}
export default Hello
```

Example – Same as above, but with class component

The only file that changes is the Hello component.



```
import React , {Component} from 'react';

class Hello extends Component{
  constructor(props){
    super(props);
    //nothing to do
  }
  render(){
    return <h1>Helloooo {this.props.name}, {this.props.lastName}!</h1>;
  }

}
export default Hello
```

Add Component

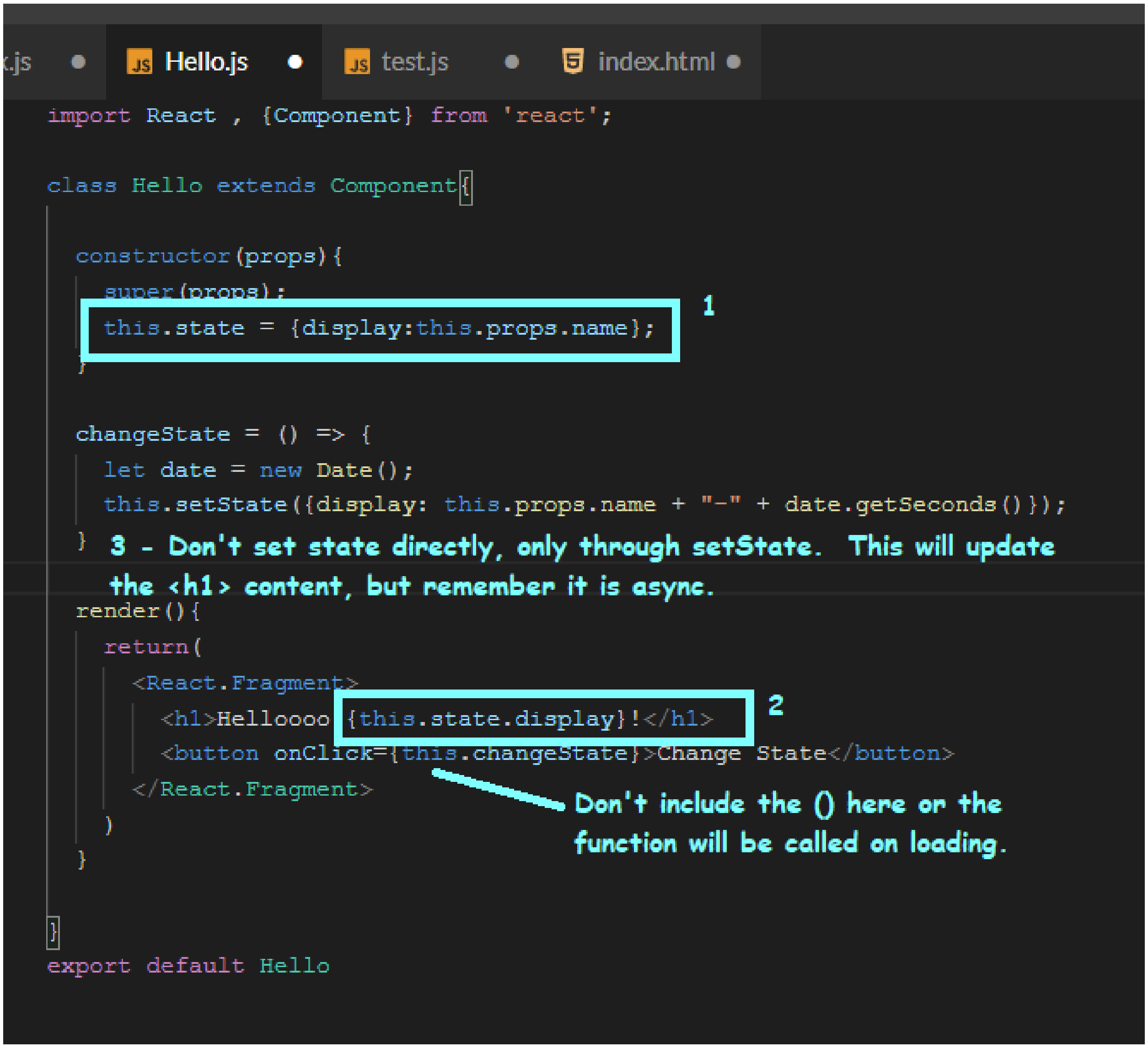
You need the constructor and it has to call super

You need "this" or you will get an error.

```
import React , {Component} from 'react';
class Hello extends Component{
  constructor(props){
    super(props);
    //nothing to do
  }
  render(){
    return <h1>Helloooo {this.props.name}, {this.props.lastName}!</h1>;
  }
}
export default Hello
```

Example – Using state

The example similar to the above ones, but the Hello component has changed.



```
import React , {Component} from 'react';

class Hello extends Component{

  constructor(props){
    super(props);
    this.state = {display:this.props.name};
  }

  changeState = () => {
    let date = new Date();
    this.setState({display: this.props.name + "-" + date.getSeconds()});
  }

  render(){
    return(
      <React.Fragment>
        <h1>Helloooo {this.state.display}!</h1>
        <button onClick={this.changeState}>Change State</button>
      </React.Fragment>
    )
  }

}
export default Hello
```

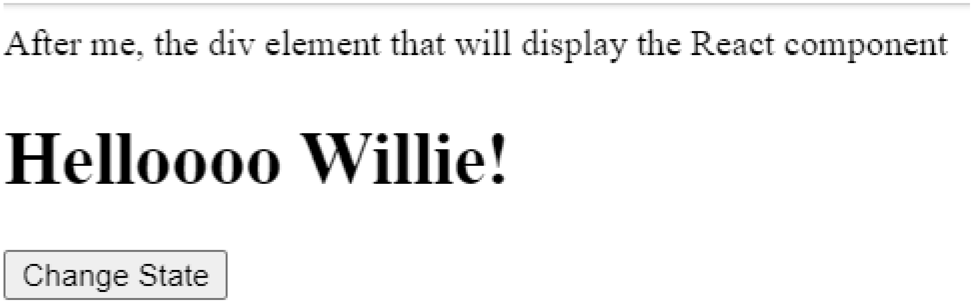
1

2

3 - Don't set state directly, only through setState. This will update the <h1> content, but remember it is async.

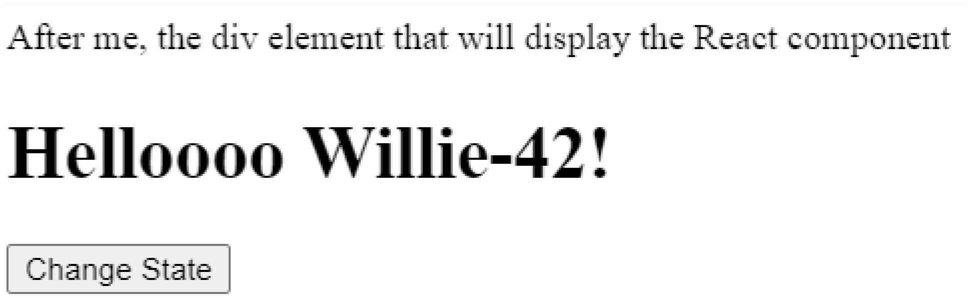
Don't include the () here or the function will be called on loading.

When you first run this, you see the following:


After me, the div element that will display the React component

Helloooo Willie!

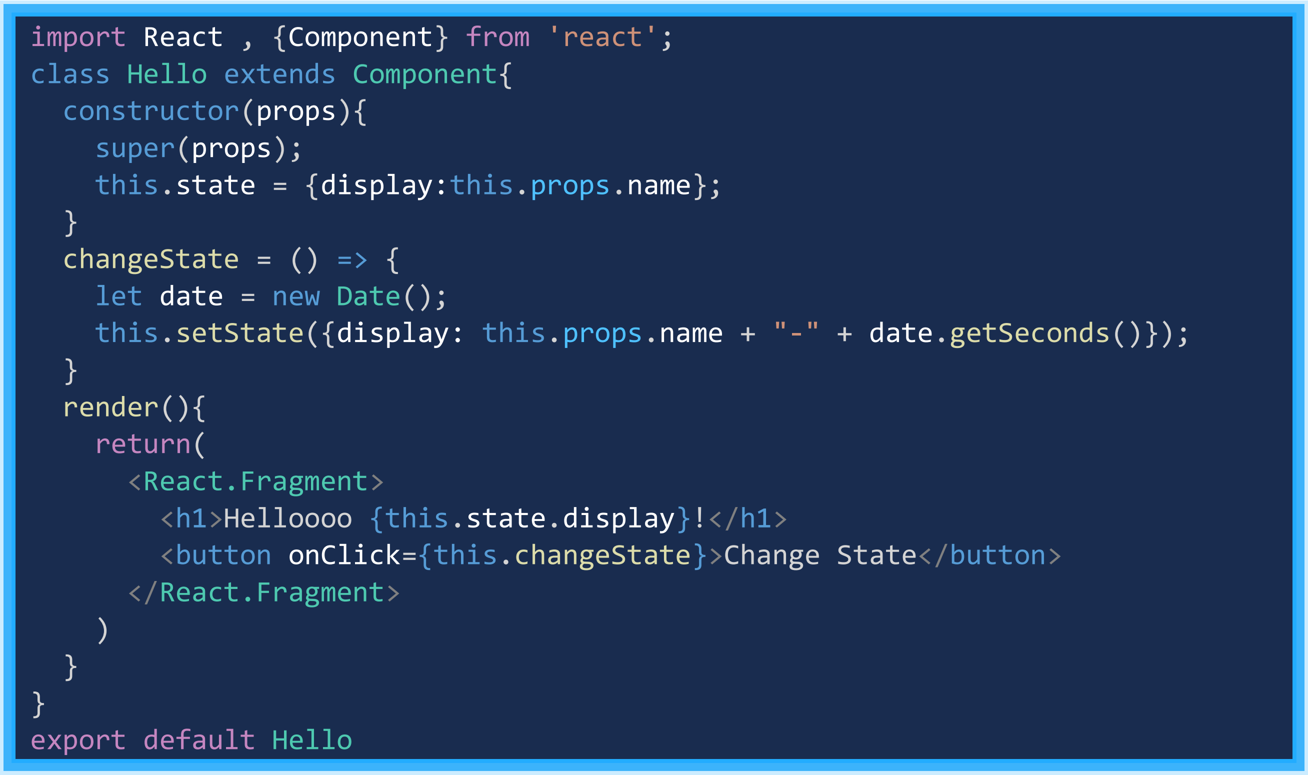
Click the button and you will get:



After me, the div element that will display the React component

Helloooo Willie-42!

Etc.



```
import React , {Component} from 'react';
class Hello extends Component{
  constructor(props){
    super(props);
    this.state = {display:this.props.name};
  }
  changeState = () => {
    let date = new Date();
    this.setState({display: this.props.name + "-" + date.getSeconds()});
  }
  render(){
    return(
      <React.Fragment>
        <h1>Helloooo {this.state.display}!</h1>
        <button onClick={this.changeState}>Change State</button>
      </React.Fragment>
    )
  }
}
export default Hello
```

Events in React.

Events are similar to how they are done in regular HTML.

Setting onClick to the handler

With regular HTML you would do this: onclick="activateLasers()", but with React you will do this: onClick={this.activateLasers}

Notice that you do not include the (). You can do it (not for functions that will update state though), but the function will be called when the component loads so you need to keep that in mind.

Prevent default behavior

With HTML you can just use “return false” to prevent the default behavior of an element.

With React, you need to call preventDefault yourself.

```
<a href="http://goingNowhere" onClick={this.linkDoNothing}>link to nowhere</a>
  linkDoNothing = (e) => {
    e.preventDefault();
  }
```

When you click the above link in the browser nothing will happen.

Remember that if you do not use arrow functions in the file (class fields syntax) you will have to bind the functions on the constructor. Otherwise, you will get undefined errors. You can also use the arrow functions in the callback to avoid having to bind (OK in most cases but may affect performance):

```
onClick={() => this.handleClick()}
```

passing arguments

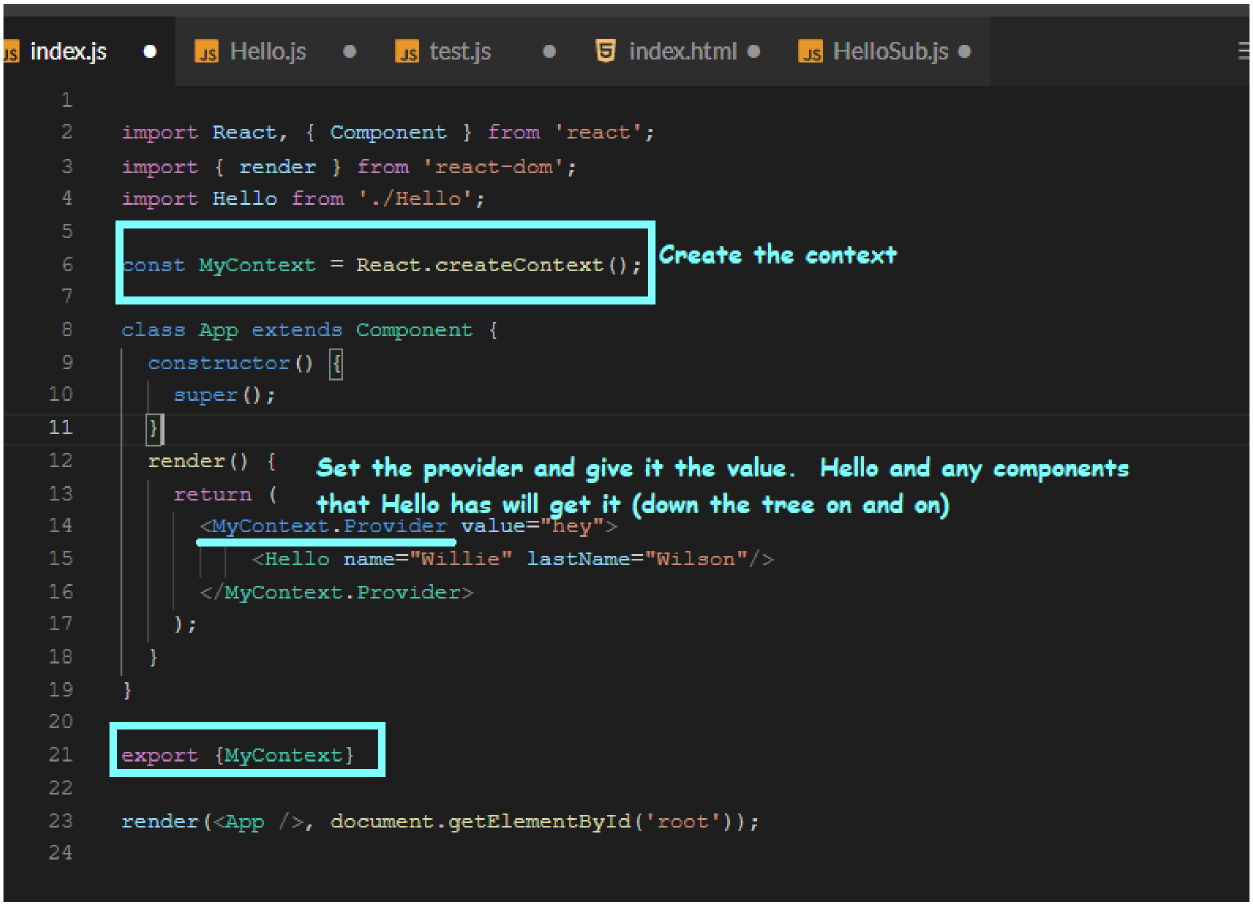
If you need to pass arguments to the handler function, use this form so you do not end up calling it on load:

```
onChange = { () => this.checkedLetter("M")}
```

Advanced Concepts

Context

Props are used to pass data around between components, but some things are going to be used but a lot of components in the app (like a configuration value) and passing them all over the place with props can get to be a lot. Context is another way to approach that situation.

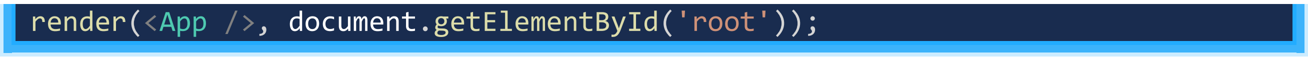


```
import React, { Component } from 'react';
import { render } from 'react-dom';
import Hello from './Hello';

const MyContext = React.createContext();

class App extends Component {
  constructor() {
    super();
  }
  render() {
    return (
      <MyContext.Provider value="hey">
        <Hello name="Willie" lastName="Wilson"/>
      </MyContext.Provider>
    );
  }
}

export {MyContext}

render(<App />, document.getElementById('root'));

```

Create the context

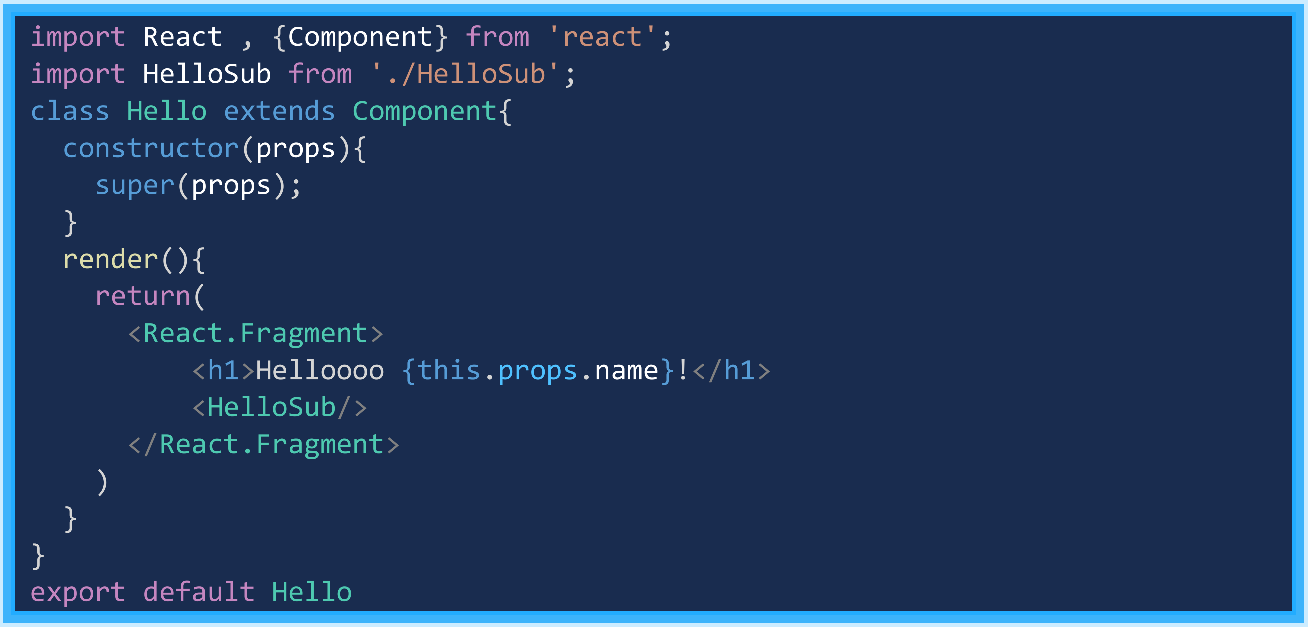
Set the provider and give it the value. Hello and any components that Hello has will get it (down the tree on and on)

```
import React, { Component } from 'react';
import { render } from 'react-dom';
import Hello from './Hello';

const MyContext = React.createContext();
class App extends Component {
  constructor() {
    super();
  }
  render() {
    return (
      <MyContext.Provider value="hey">
          <Hello name="Willie" lastName="Wilson"/>
      </MyContext.Provider>
    );
  }
}
export {MyContext}
```



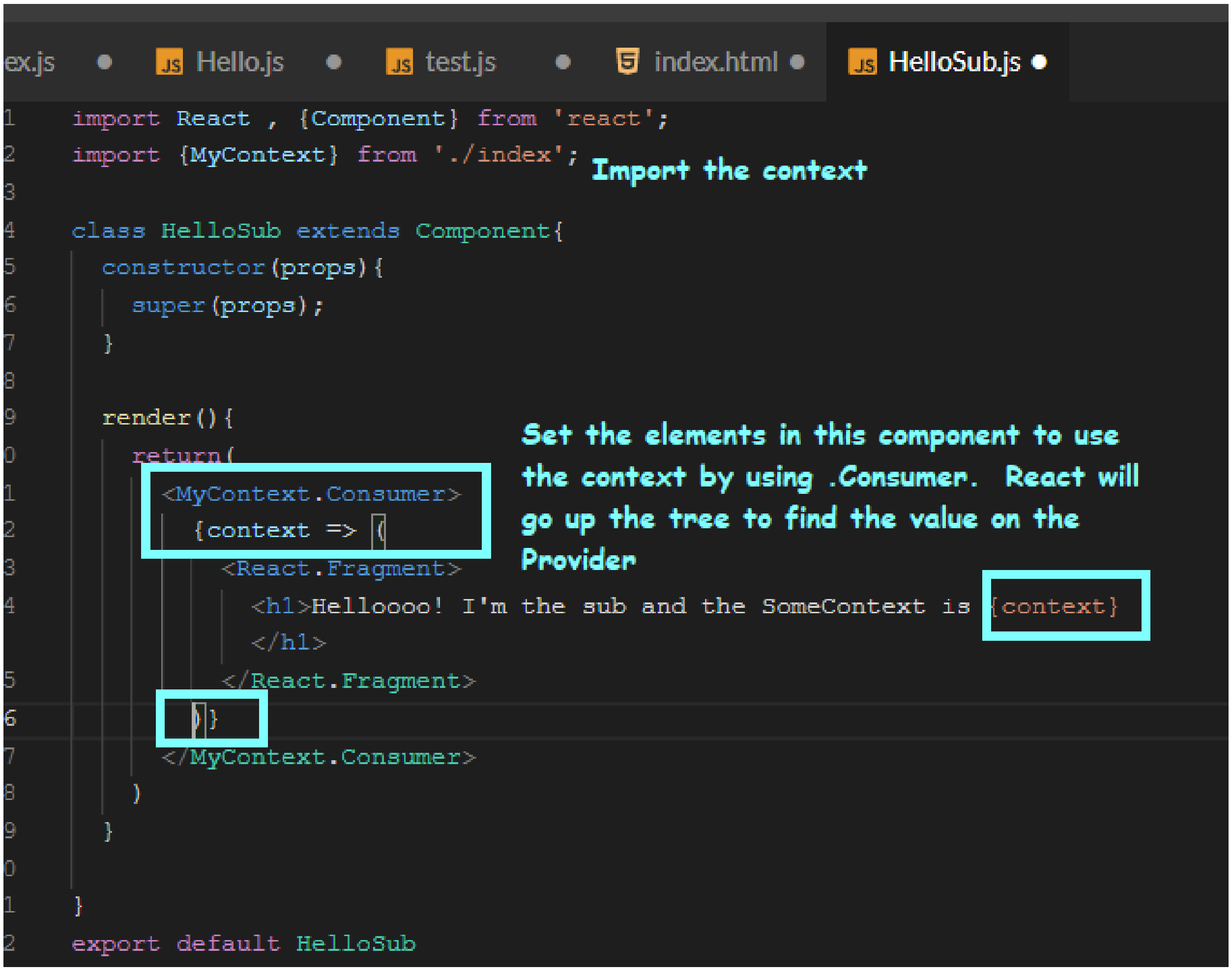
```
render(<App />, document.getElementById('root'));
```

Hello.js has not changed and it’s still using props:



```
import React , {Component} from 'react';
import HelloSub from './HelloSub';
class Hello extends Component{
  constructor(props){
    super(props);
  }
  render(){
    return(
      <React.Fragment>
          <h1>Helloooo {this.props.name}!</h1>
          <HelloSub/>
      </React.Fragment>
    )
  }
}
export default Hello
```

HelloSub makes use of the context.



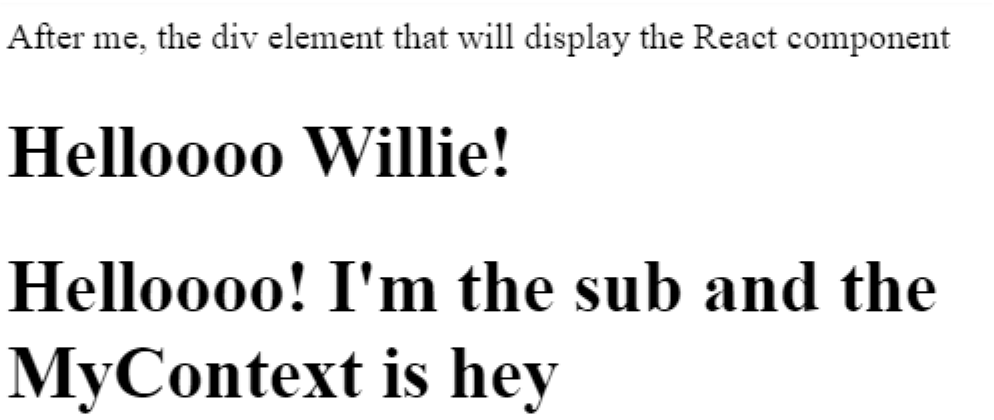
```
import React , {Component} from 'react';
import {MyContext} from './index';

class HelloSub extends Component{
  constructor(props){
    super(props);
  }

  render(){
    return(
      <MyContext.Consumer>
        {context => (
          <React.Fragment>
            <h1>Helloooo! I'm the sub and the SomeContext is {context}
            </h1>
          </React.Fragment>
        )}
      </MyContext.Consumer>
    )
  }

}
export default HelloSub
```

Import the context

Set the elements in this component to use the context by using .Consumer. React will go up the tree to find the value on the Provider

```
import React , {Component} from 'react';
import {MyContext} from './index';

class HelloSub extends Component{
  constructor(props){
    super(props);
  }
  render(){
    return(
      <MyContext.Consumer>
        {context => (
          <React.Fragment>
            <h1>Helloooo! I'm the sub and the SomeContext is {context}</h1>

          </React.Fragment>
        )}
      </MyContext.Consumer>
    )
  }
}
export default HelloSub
```

In the browser we see:



After me, the div element that will display the React component

Helloooo Willie!

Helloooo! I'm the sub and the MyContext is hey

“Hey” is what we set as the value in index.js when we did

```
<MyContext.Provider value="hey">
```

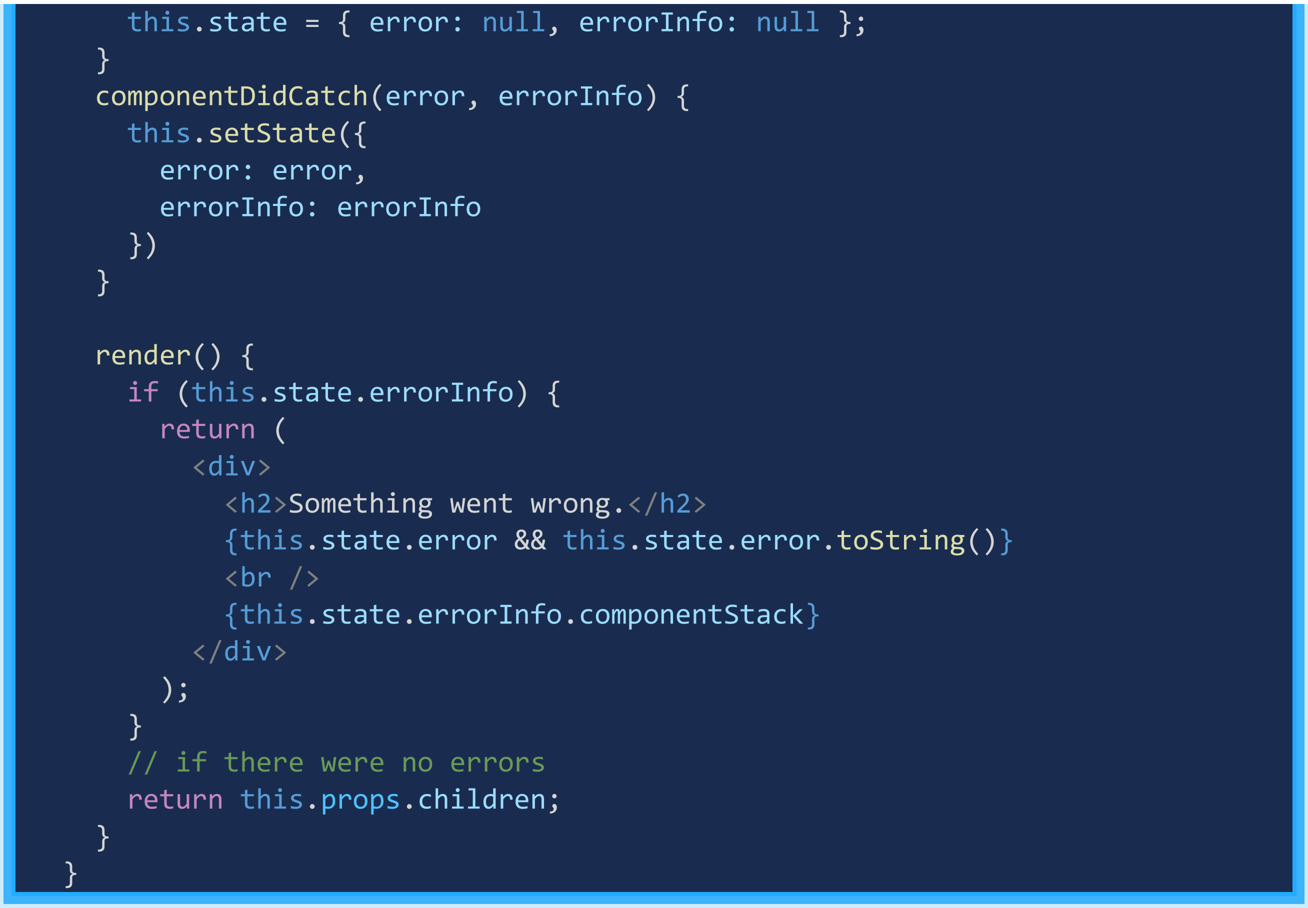
Error Boundaries

Error boundaries are React components that catch JavaScript errors anywhere in their child component tree, log those errors, and display a fallback UI instead of the component tree that crashed. They catch errors during rendering, but they do not catch all kinds of errors (server side, event handlers, async code).

You create an Error Boundary by creating a class that has methods **static getDerivedStateFromError**() and/or **componentDidCatch**().

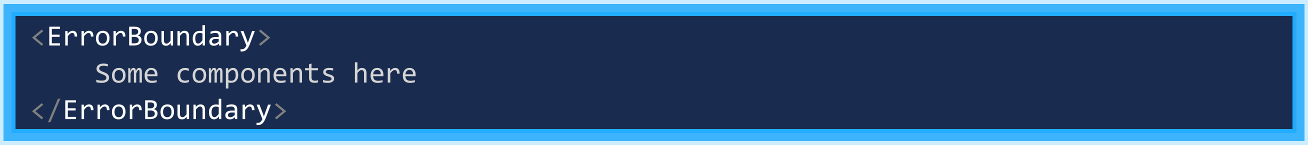
Create the class for the error boundary component and as the state keep the possible error messages. Then in the render, check the state and display the error or if no errors, just render the children (since you will use this component to wrap other components, those will be the children).

```
class ErrorBoundary extends React.Component {
    constructor(props) {
      super(props);
```



```
      this.state = { error: null, errorInfo: null };
    }
    componentDidCatch(error, errorInfo) {
      this.setState({
        error: error,
        errorInfo: errorInfo
      })
    }

    render() {
      if (this.state.errorInfo) {
        return (
          <div>
            <h2>Something went wrong.</h2>
            {this.state.error && this.state.error.toString()}
            <br />
            {this.state.errorInfo.componentStack}
          </div>
        );
      }
      // if there were no errors
      return this.props.children;
    }
  }
```

Then you will use it like a regular component. It will use of the errors thrown on the children component. If the ErrorBoundary component itself has an error it will be propagated up.



```
<ErrorBoundary>
    Some components here
</ErrorBoundary>
```

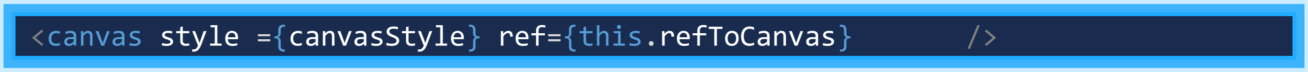
For errors in event handlers etc, just use the regular JS try catch.

Refs and Forwarding refs

React.createRef()

With refs you can access an element of your component directly. Easier to understand with an example.

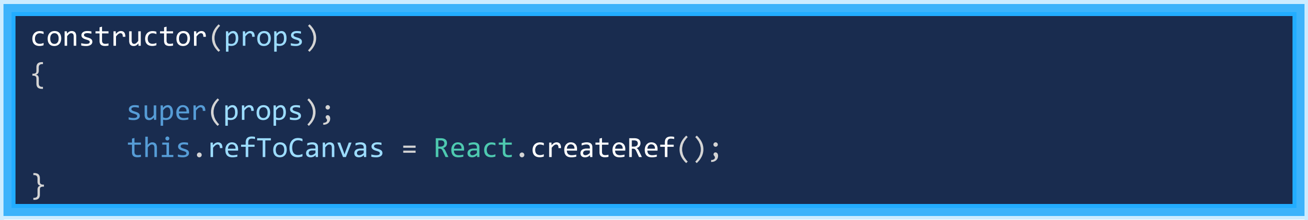
You have a canvas element in your component and you set ref to a variable in your code:



```
<canvas style ={canvasStyle} ref={this.refToCanvas}       />
```

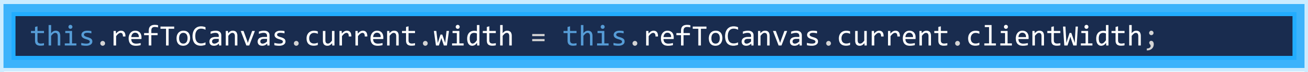
Note that you use {}, not a string.

Your variable is set in the constructor:



```
constructor(props)
{
      super(props);
      this.refToCanvas = React.createRef();
}
```

Now you can access that element directly in your code. Speaking of canvas, I do this so the points where you touch are accurate.



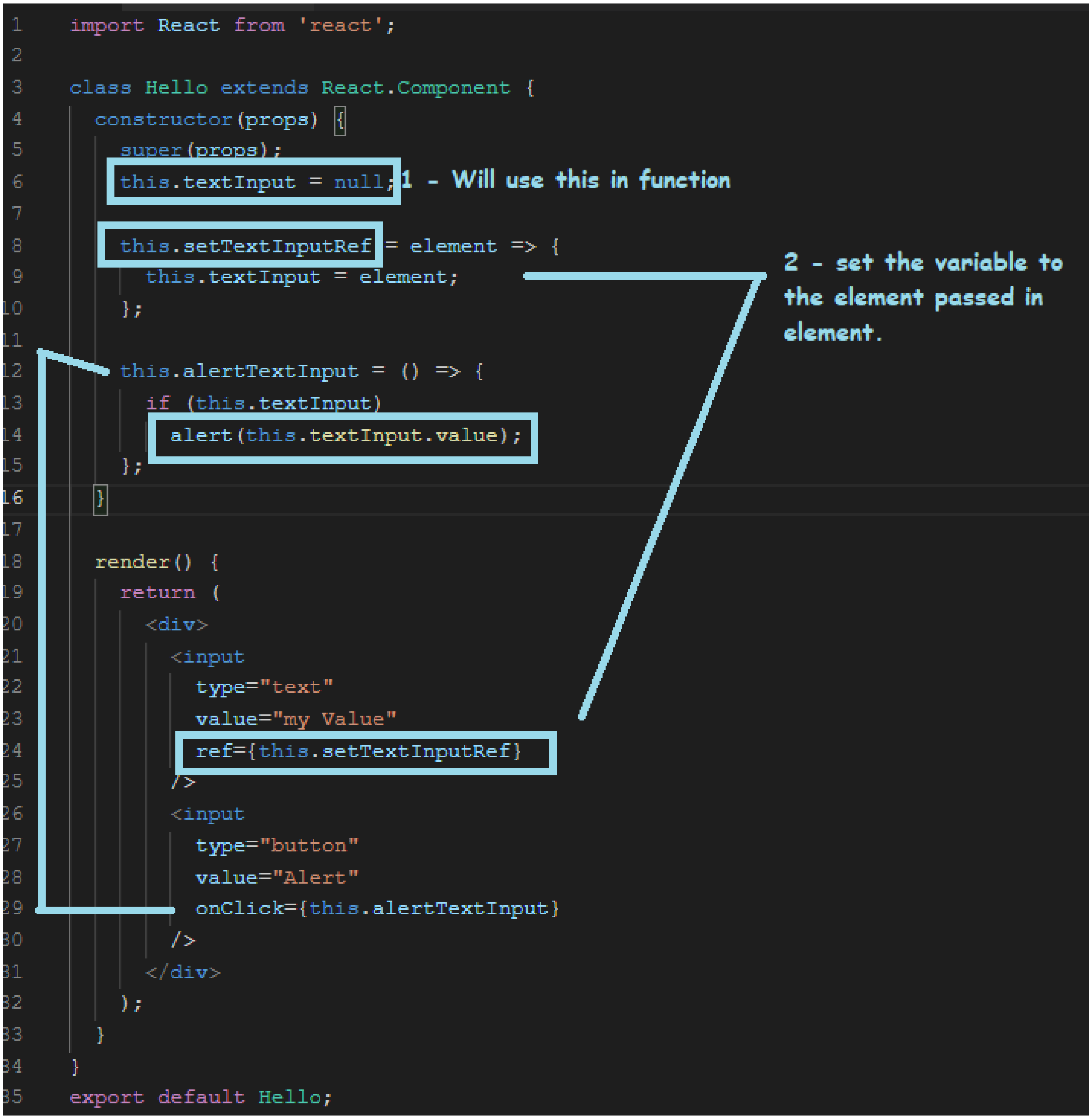
```
this.refToCanvas.current.width = this.refToCanvas.current.clientWidth;
```

Note how you access the element by using the this.refToCanvas.**current**.

You can use the refs in HTML elements and class components, but not on functions.

Callback Refs

You can accomplish the same thing as above by using callback refs. Again easier with an example:

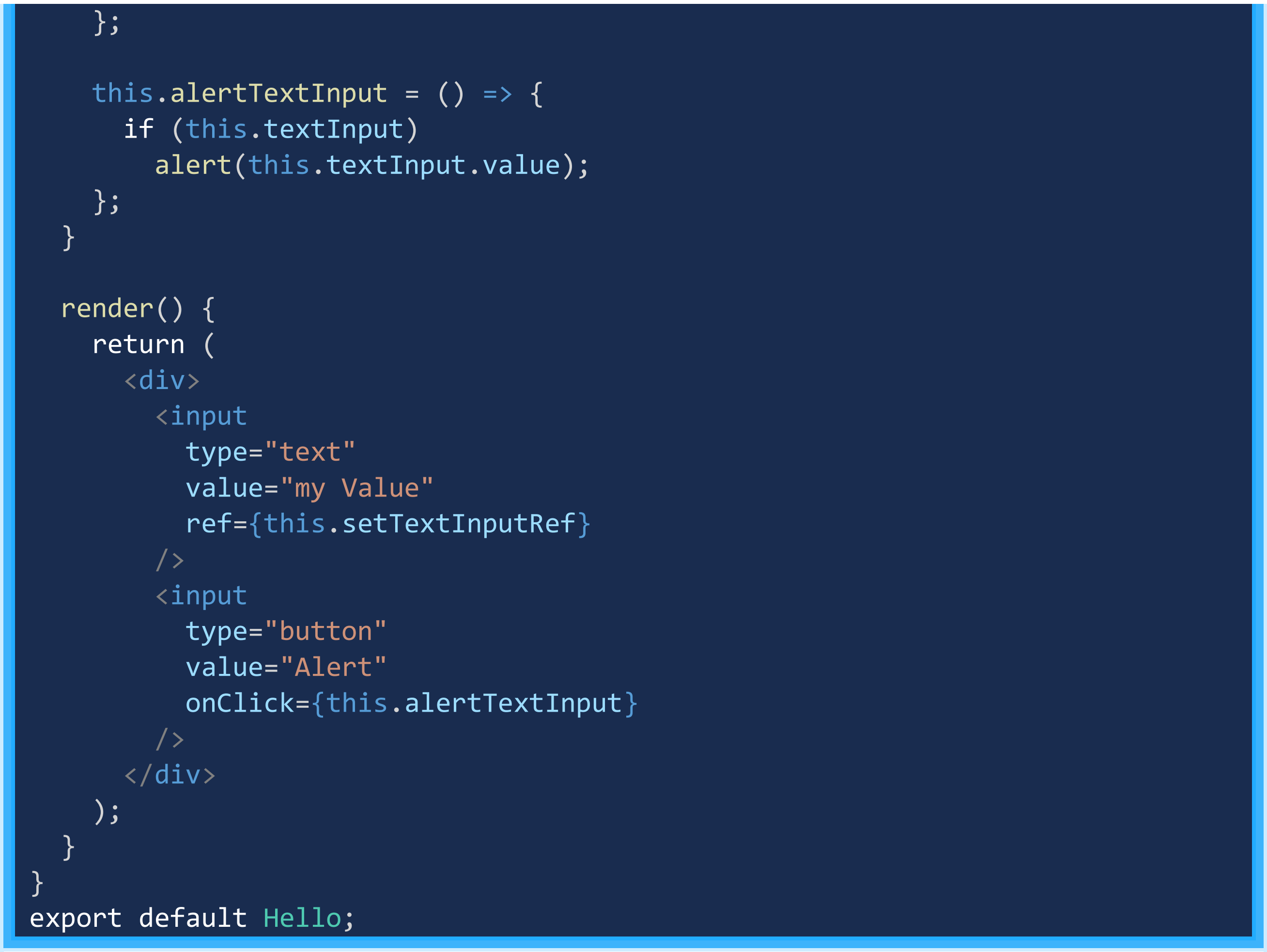


```
import React from 'react';

class Hello extends React.Component {
  constructor(props) {
    super(props);
    this.textInput = null;

    this.setTextInputRef = element => {
      this.textInput = element;
    };

    this.alertTextInput = () => {
      if (this.textInput)
        alert(this.textInput.value);
    };
  }

  render() {
    return (
      <div>
        <input
          type="text"
          value="my Value"
          ref={this.setTextInputRef}
        />
        <input
          type="button"
          value="Alert"
          onClick={this.alertTextInput}
        />
      </div>
    );
  }
}
export default Hello;
```

1 - Will use this in function

2 - set the variable to the element passed in element.

```
import React from 'react';

class Hello extends React.Component {
  constructor(props) {
    super(props);
    this.textInput = null;

    this.setTextInputRef = element => {
      this.textInput = element;
```



```
    };

    this.alertTextInput = () => {
      if (this.textInput)
        alert(this.textInput.value);
    };
  }

  render() {
    return (
      <div>
        <input
          type="text"
          value="my Value"
          ref={this.setTextInputRef}
        />
        <input
          type="button"
          value="Alert"
          onClick={this.alertTextInput}
        />
      </div>
    );
  }
}
export default Hello;
```

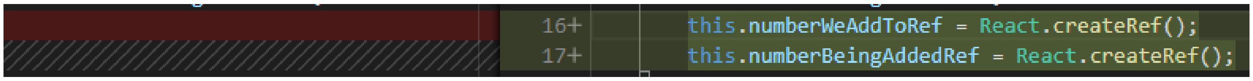
Note: Do not try to use it before the component mounts (set the code there if you need to check), or after the component unmounts.

This.refs – Should be refactored

React also has a **this.refs** but it is not recommended and is obsolete (used a string in the element, not the {}).

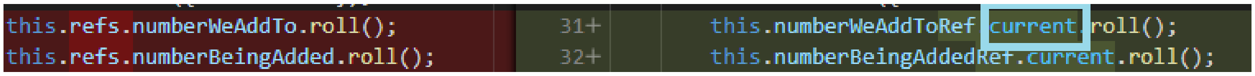
Here are some hints if you decide to refactor your this.refs to using React.createRef:

In the constructor:



```
this.numberWeAddToRef = React.createRef();
this.numberBeingAddedRef = React.createRef();
```

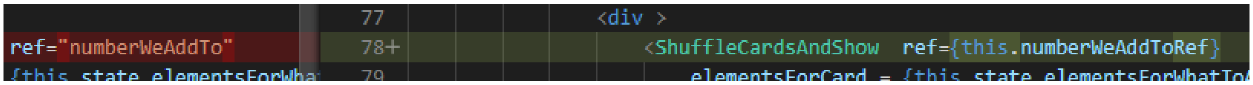
Accessing:



```
this.refs.numberWeAddTo.roll();
this.refs.numberBeingAdded.roll();
```

```
this.numberWeAddToRef.current.roll();
this.numberBeingAddedRef.current.roll();
```

In the element:



```
ref="numberWeAddTo"
{this.state.elementsForWha
```

```
<div >
  <ShuffleCardsAndShow  ref={this.numberWeAddToRef}
    elementsForCard = {this.state.elementsForWhatTo
```

Forwarding Refs

This allows us to pass refs though a component to its children. This only works when the component that receives the red is created with React.forwardRef.

Create the component with forwardRef:

```
const ButtonThatGetsARef = React.forwardRef((props, ref) => (
    <button ref={ref}>
  Something here
    </button>
  ));
```

Create the ref that will be passed to the component that takes the ref. This way the component using ButtonThatGetsARef can access the <button/> inside ButtonThatGetsARef from the ref:

```
const ref = React.createRef();
< ButtonThatGetsARef ref={ref}>Click me!</ ButtonThatGetsARef >;
```

useRef

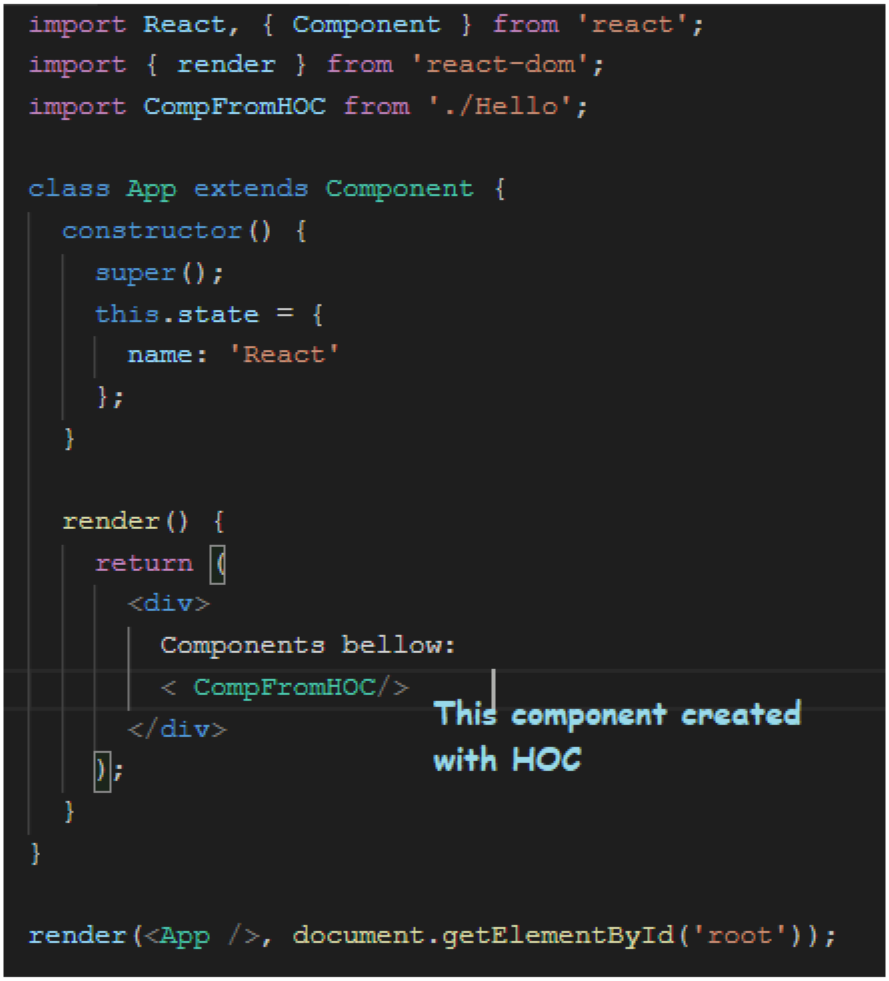
This is a React hook and will be covered later.

HOC – Higher Order Component

With this we take advantage of an existing component to create a new one which has things in common with the first one (this is not inheritance per se though it has some of its benefits). Do not do this in the render method. The new component will not have any of the static methods from the original component. Props will be passed to the new component but refs will not.

A higher-order component is a **function** that takes a component and returns a new component. It is not part of the React API.

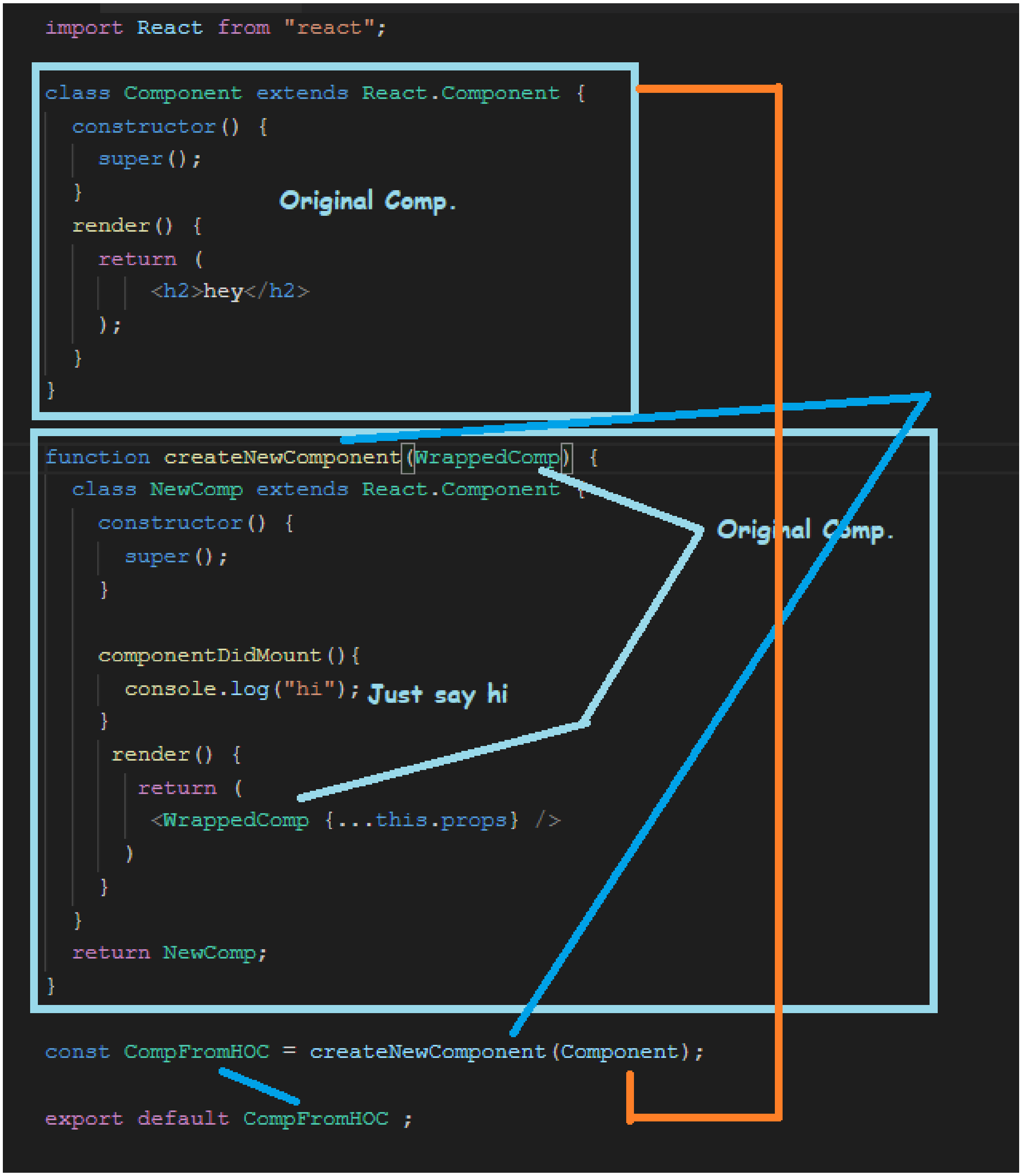
This has been very confusing to me for whatever reason so taking it one step at a time with the examples:



```
import React, { Component } from 'react';
import { render } from 'react-dom';
import CompFromHOC from './Hello';

class App extends Component {
  constructor() {
    super();
    this.state = {
      name: 'React'
    };
  }

  render() {
    return (
      <div>
        Components bellow:
        < CompFromHOC/>
      </div>
    );
  }
}

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

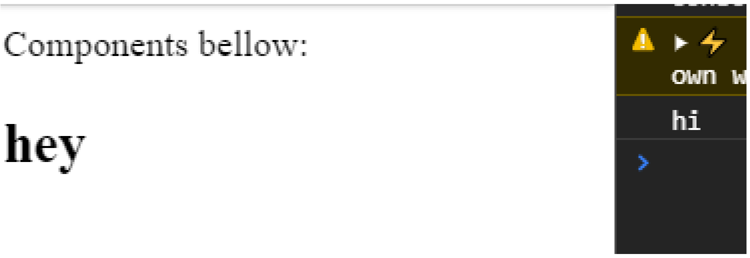
This component created with HOC

The component used only displays a “hey” and the function used to create the HOC version only has a console statement in the componentDidMount method. The file only exports the HOC component:



```
import React from "react";

class Component extends React.Component {
  constructor() {
    super();
  }
  render() {
    return (
      <h2>hey</h2>
    );
  }
}

function createNewComponent(WrappedComp) {
  class NewComp extends React.Component {
    constructor() {
      super();
    }

    componentDidMount(){
      console.log("hi");
    }
     render() {
       return (
        <WrappedComp {...this.props} />
       )
    }
  }
  return NewComp;
}

const CompFromHOC = createNewComponent(Component);

export default CompFromHOC ;
```

We will get the hi in the console and the hey in the browser.

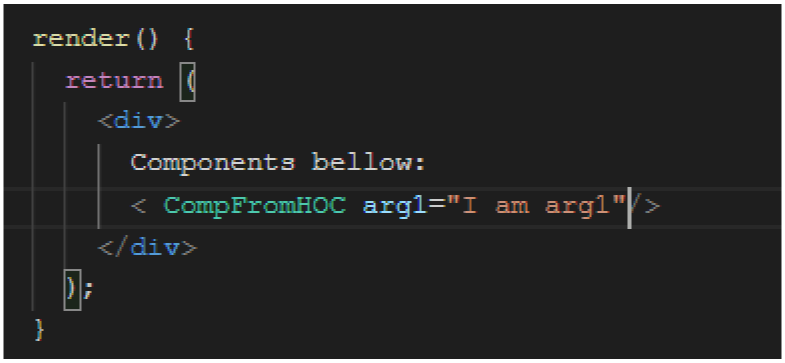


Components bellow:

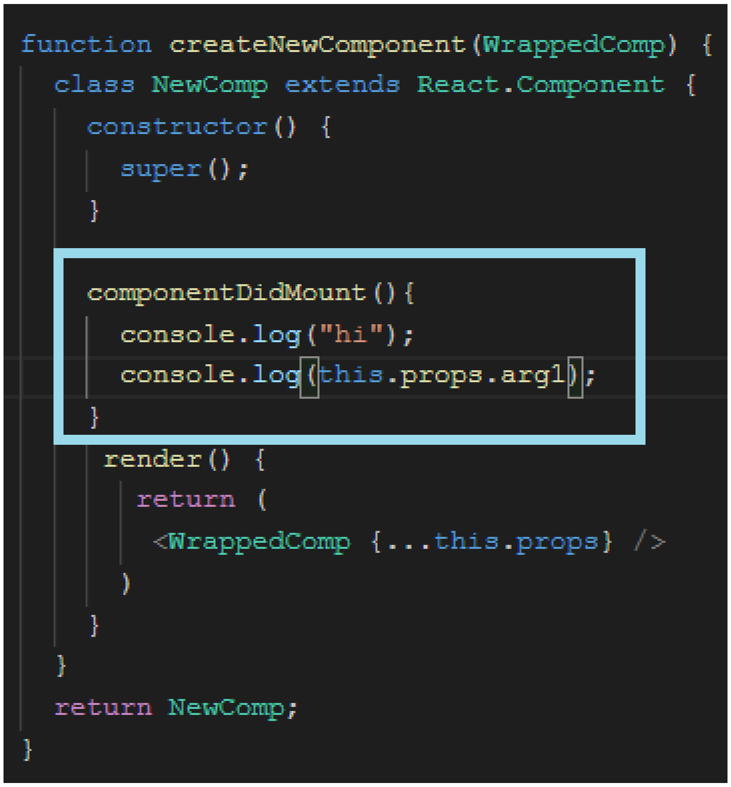
hey

```
own w
hi
>
```

Changing it a bit so we log the props passed to the component instead of just “hi”.

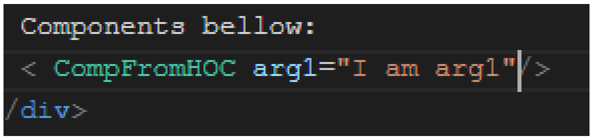


```
render() {
  return (
    <div>
      Components bellow:
      < CompFromHOC arg1="I am arg1"/>
    </div>
  );
}
```

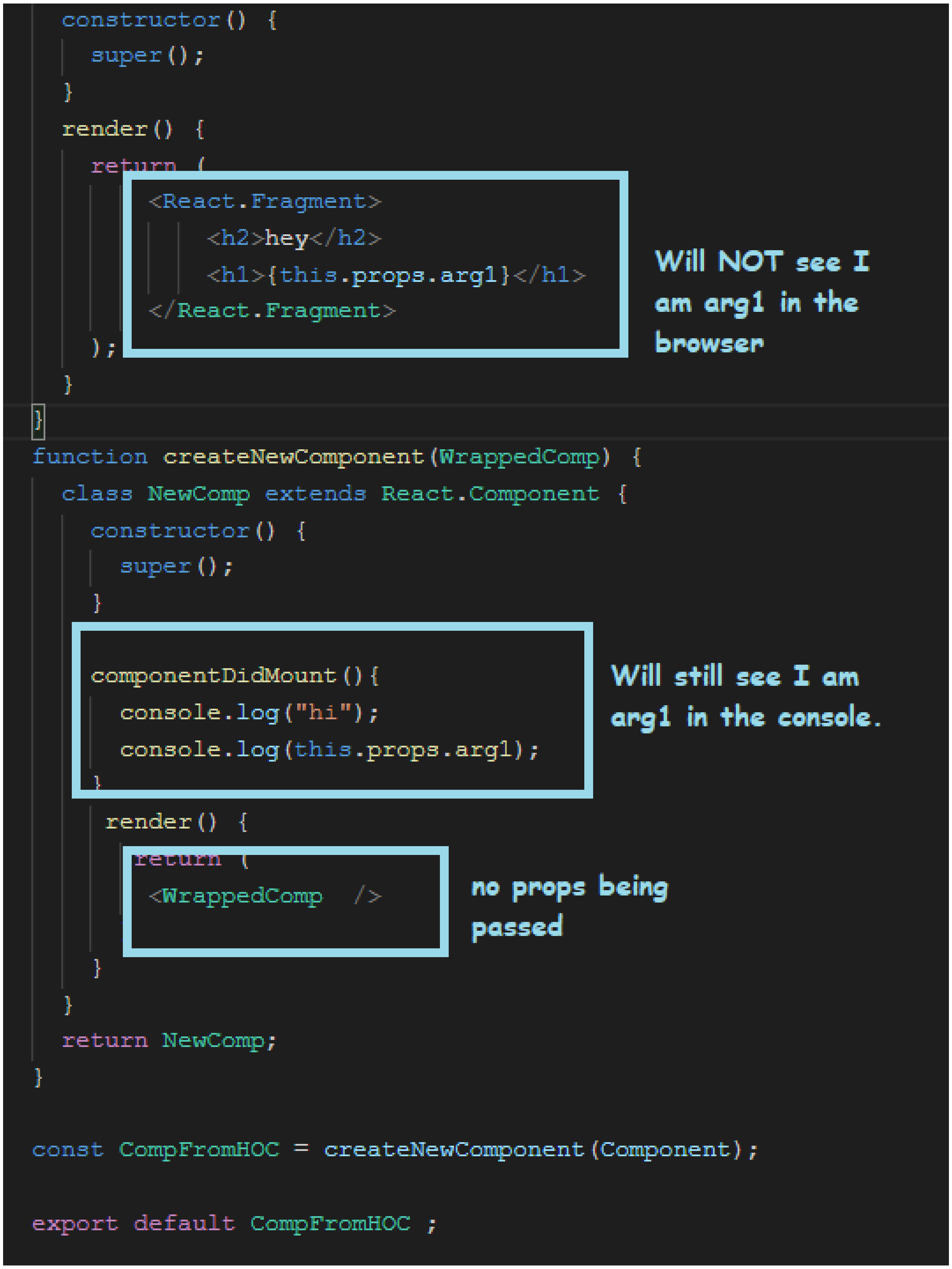


```
function createNewComponent(WrappedComp) {
  class NewComp extends React.Component {
    constructor() {
      super();
    }

    componentDidMount(){
      console.log("hi");
      console.log(this.props.arg1);
    }
     render() {
       return (
        <WrappedComp {...this.props} />
       )
    }
  }
  return NewComp;
}
```

We can use the props in the original component if we pass them in the function. If index is still using the HOC :



```
Components bellow:
< CompFromHOC arg1="I am arg1"/>
/div>
```

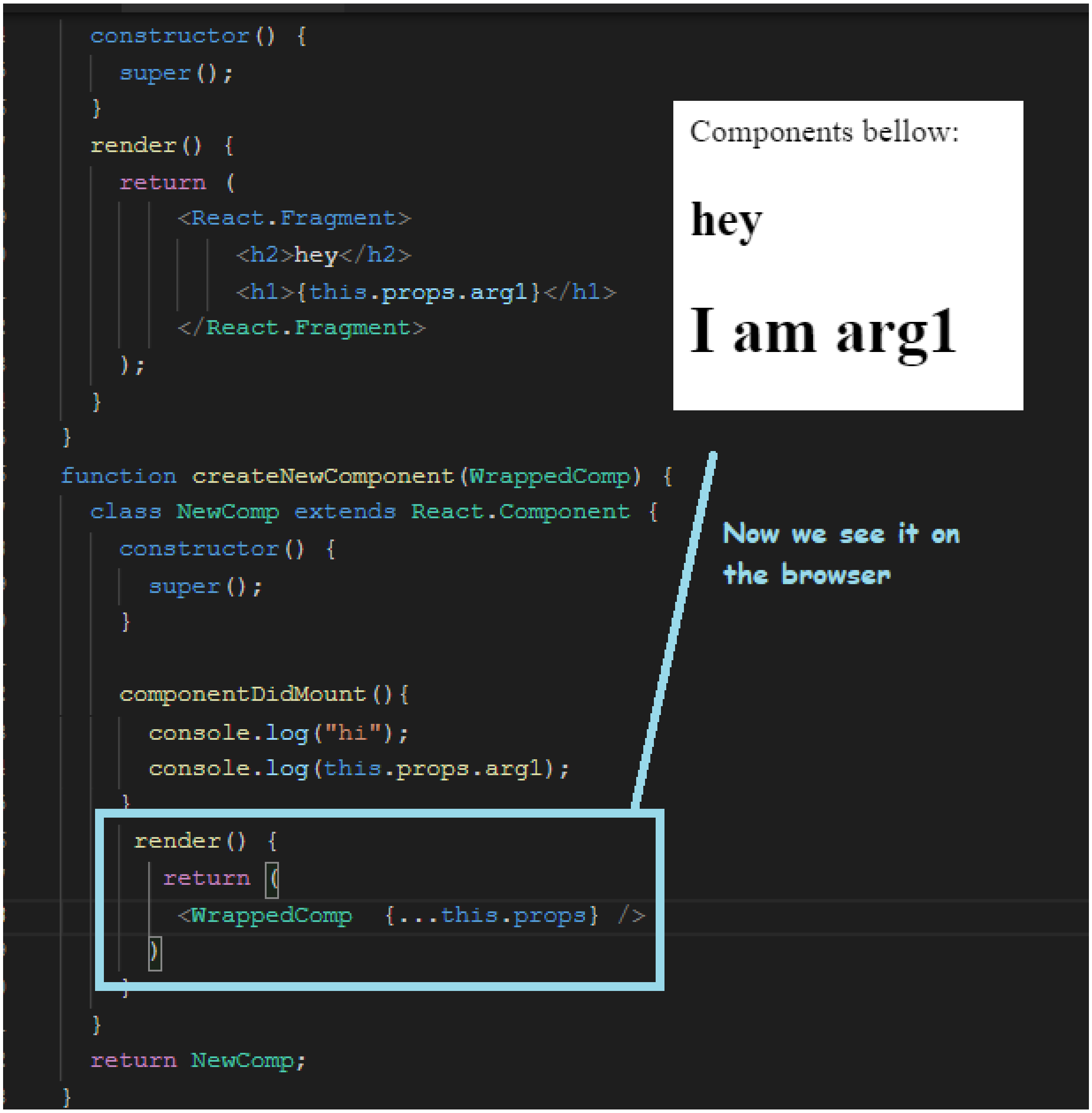


```
  constructor() {
    super();
  }
  render() {
    return (
      <React.Fragment>
        <h2>hey</h2>
        <h1>{this.props.arg1}</h1>
      </React.Fragment>
    );
  }
}
function createNewComponent(WrappedComp) {
  class NewComp extends React.Component {
    constructor() {
      super();
    }

    componentDidMount(){
      console.log("hi");
      console.log(this.props.arg1);
    }
    render() {
      return (
      <WrappedComp  />

    }
  }
  return NewComp;
}

const CompFromHOC = createNewComponent(Component);

export default CompFromHOC ;
```

Will NOT see I am arg1 in the browser

Will still see I am arg1 in the console.

no props being passed



```
  constructor() {
    super();
  }
  render() {
    return (
        <React.Fragment>
            <h2>hey</h2>
            <h1>{this.props.arg1}</h1>
        </React.Fragment>
    );
  }
}
function createNewComponent(WrappedComp) {
  class NewComp extends React.Component {
    constructor() {
      super();
    }

    componentDidMount(){
      console.log("hi");
      console.log(this.props.arg1);
    }
     render() {
       return (
        <WrappedComp  {...this.props} />
      )
    }
  }
  return NewComp;
}
```

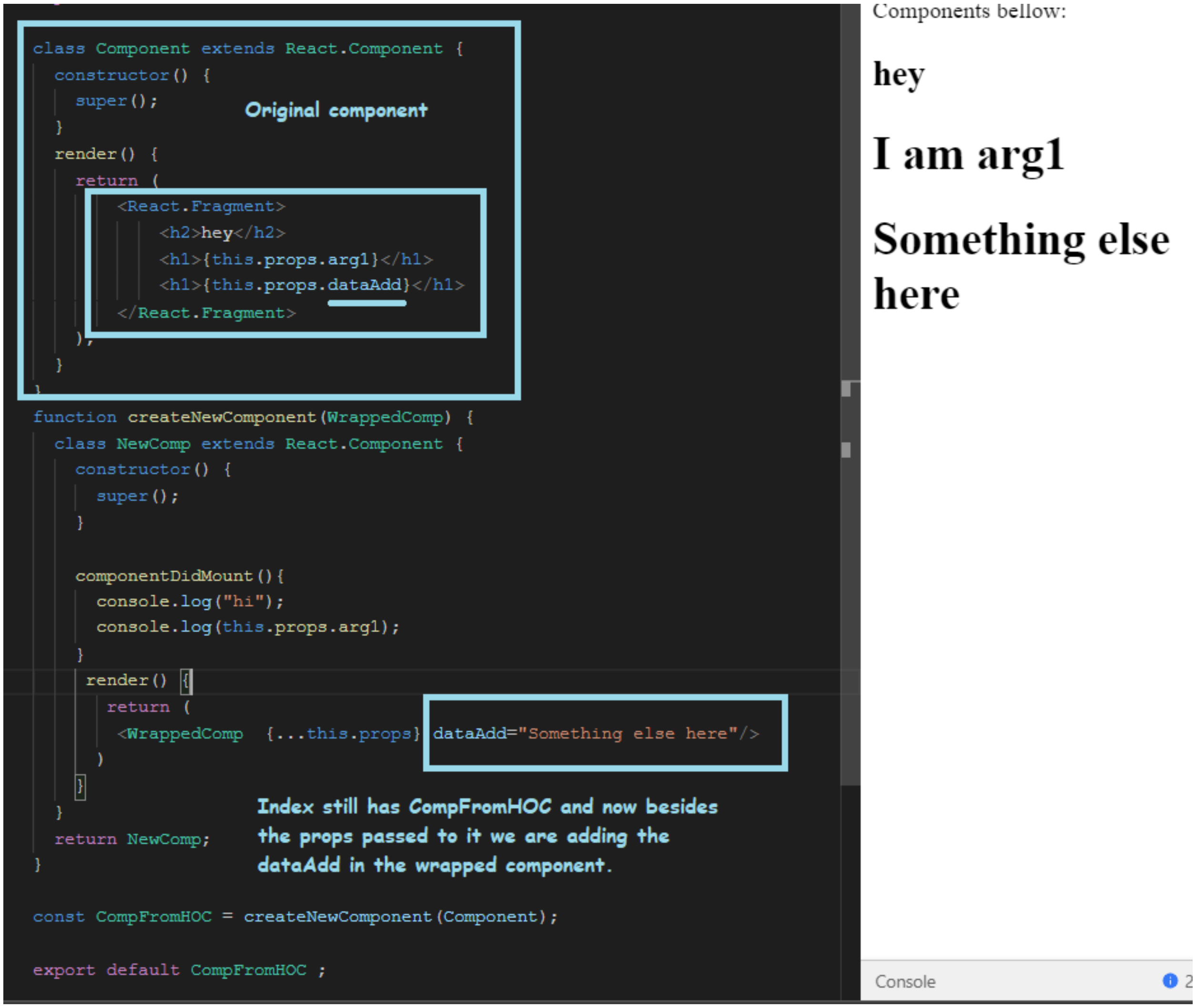
Components bellow:

hey

I am arg1

Now we see it on the browser

Besides the props, we can pass additional props this way



```
class Component extends React.Component {
  constructor() {
    super();
  }
  render() {
    return (
      <React.Fragment>
        <h2>hey</h2>
        <h1>{this.props.arg1}</h1>
        <h1>{this.props.dataAdd}</h1>
      </React.Fragment>
    );
  }
}
function createNewComponent(WrappedComp) {
  class NewComp extends React.Component {
    constructor() {
      super();
    }

    componentDidMount(){
      console.log("hi");
      console.log(this.props.arg1);
    }
     render() {
       return (
        <WrappedComp  {...this.props} dataAdd="Something else here"/>
       )
     }
  }
  return NewComp;
}

const CompFromHOC = createNewComponent(Component);

export default CompFromHOC ;
```

Original component

Index still has CompFromHOC and now besides the props passed to it we are adding the dataAdd in the wrapped component.

Components bellow:

hey

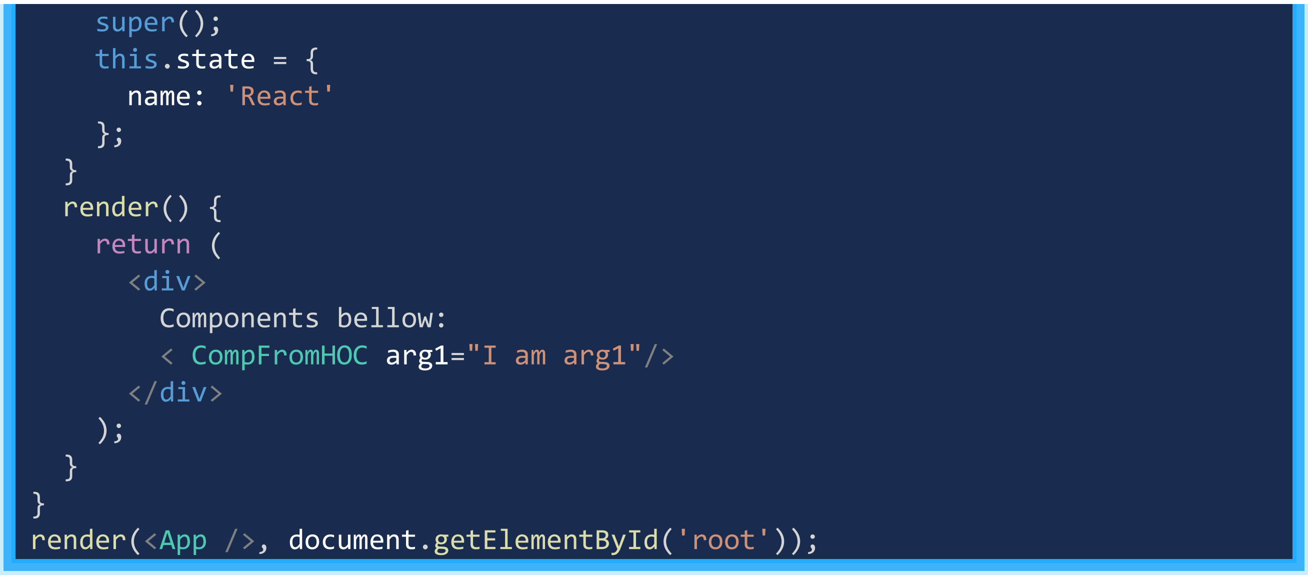
I am arg1

Something else here

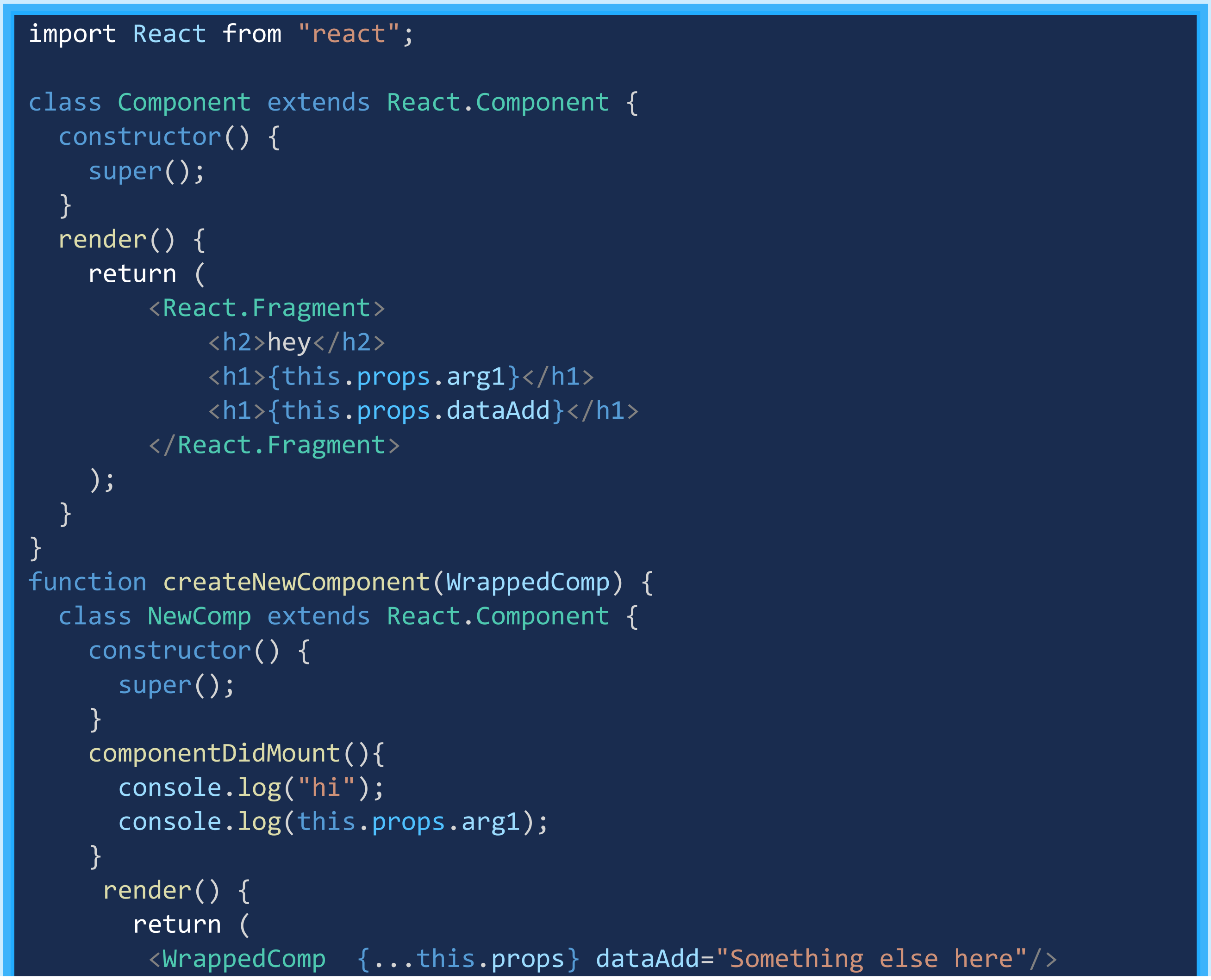
The function that creates a new component from the original component can also take other arguments and use them to do whatever in the code, then pass whatever results like we did with dataAdd=”Something else here”.

Pasting only the code form of the last example since that is the one that includes the previous ones.

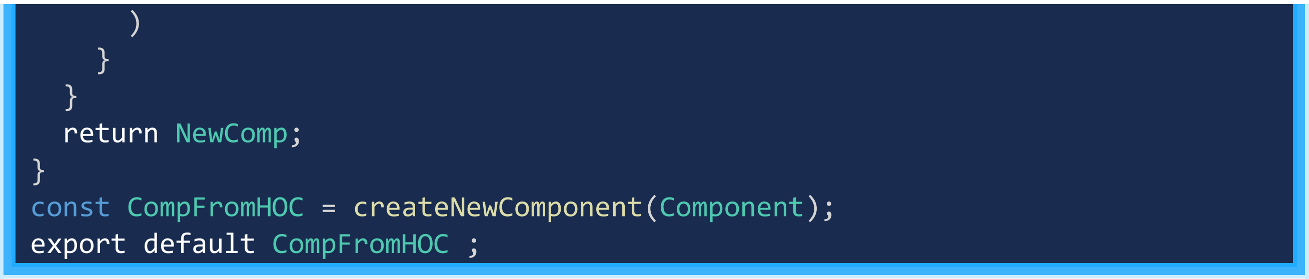
```
import React, { Component } from 'react';
import { render } from 'react-dom';
import CompFromHOC from './Hello';

class App extends Component {
  constructor() {
```



```
    super();
    this.state = {
      name: 'React'
    };
  }
  render() {
    return (
      <div>
        Components bellow:
        < CompFromHOC arg1="I am arg1"/>
      </div>
    );
  }
}
render(<App />, document.getElementById('root'));
```



```
import React from "react";

class Component extends React.Component {
  constructor() {
    super();
  }
  render() {
    return (
        <React.Fragment>
            <h2>hey</h2>
            <h1>{this.props.arg1}</h1>
            <h1>{this.props.dataAdd}</h1>
        </React.Fragment>
    );
  }
}
function createNewComponent(WrappedComp) {
  class NewComp extends React.Component {
    constructor() {
      super();
    }
    componentDidMount(){
      console.log("hi");
      console.log(this.props.arg1);
    }
     render() {
       return (
        <WrappedComp  {...this.props} dataAdd="Something else here"/>
```

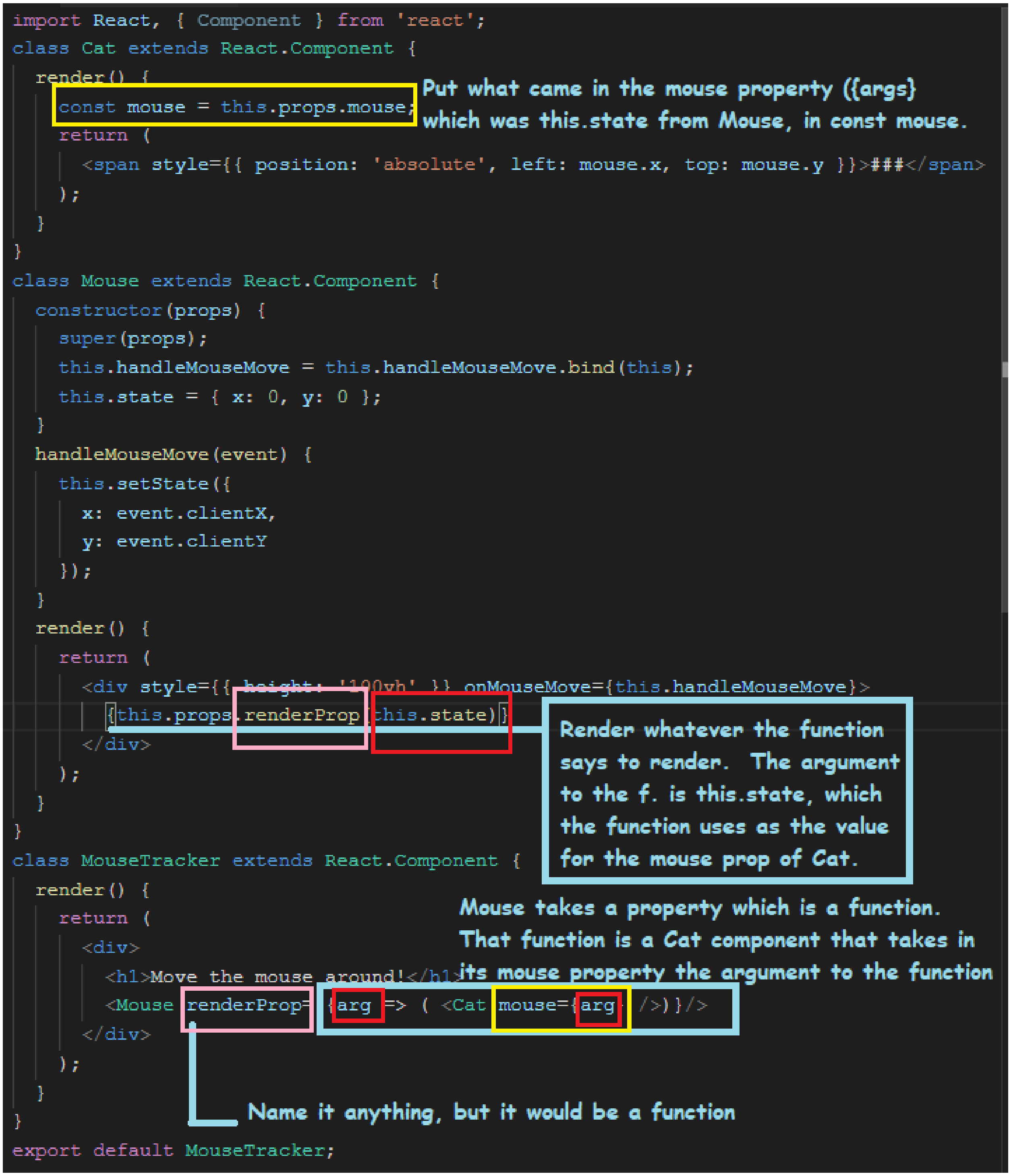


```
      )
    }
  }
  return NewComp;
}
const CompFromHOC = createNewComponent(Component);
export default CompFromHOC ;
```

Render Props

It is a technique used to share code between React components. It is done though the use of a prop with a function value.

A component with a render prop passed to it will take a function which will return a React element. It will call this function instead of implementing its own logic.



```
import React, { Component } from 'react';
class Cat extends React.Component {
  render() {
    const mouse = this.props.mouse;
    return (
      <span style={{ position: 'absolute', left: mouse.x, top: mouse.y }}>###</span>
    );
  }
}
class Mouse extends React.Component {
  constructor(props) {
    super(props);
    this.handleMouseMove = this.handleMouseMove.bind(this);
    this.state = { x: 0, y: 0 };
  }
  handleMouseMove(event) {
    this.setState({
      x: event.clientX,
      y: event.clientY
    });
  }
  render() {
    return (
      <div style={{ height: '100vh' }} onMouseMove={this.handleMouseMove}>
        {this.props.renderProp(this.state)}
      </div>
    );
  }
}
class MouseTracker extends React.Component {
  render() {
    return (
      <div>
        <h1>Move the mouse around!</h1>
        <Mouse renderProp={arg => ( <Cat mouse={arg} />)}/>
      </div>
    );
  }
}
export default MouseTracker;
```

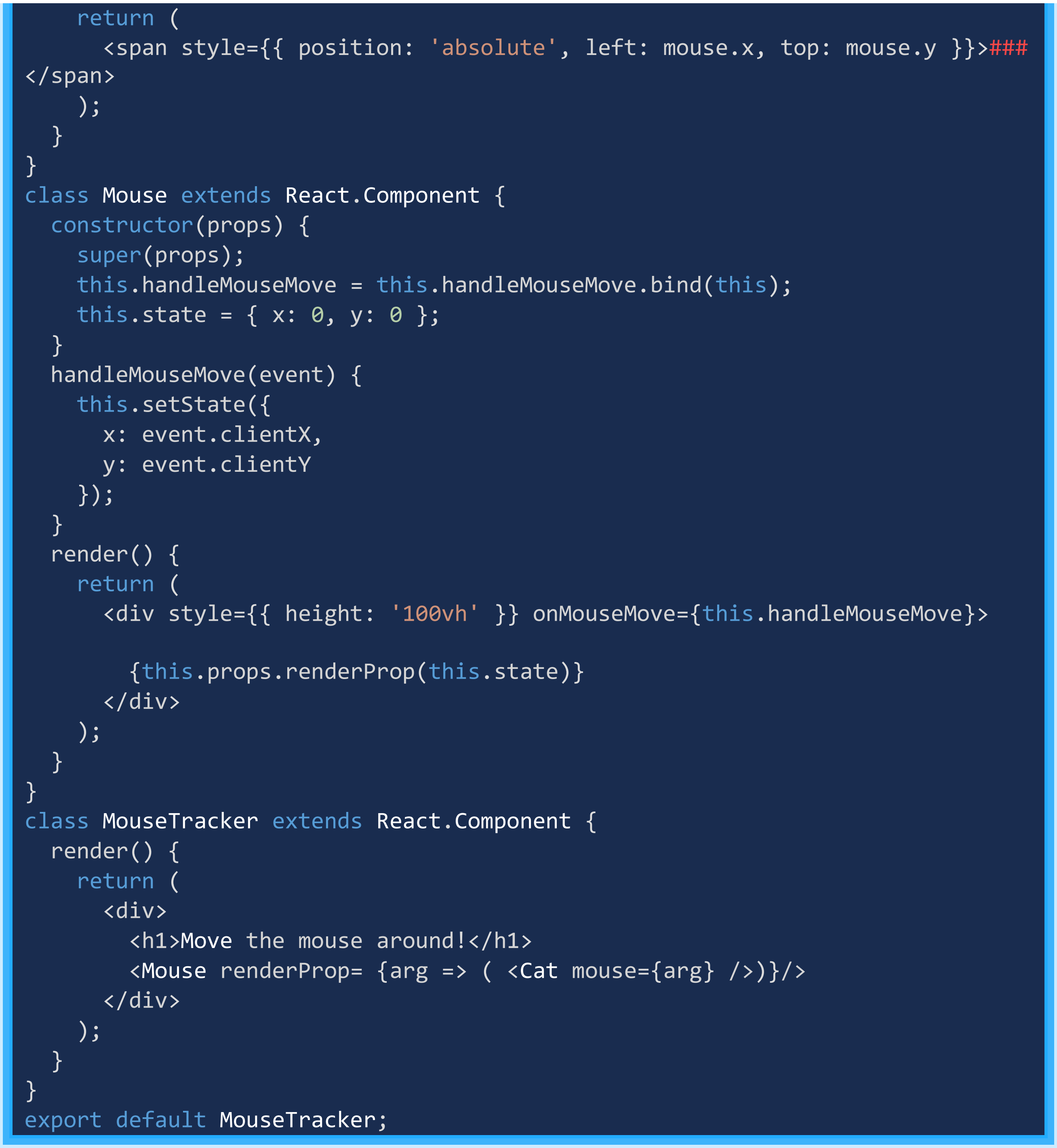
Put what came in the mouse property ({args}) which was this.state from Mouse, in const mouse.

Render whatever the function says to render. The argument to the f. is this.state, which the function uses as the value for the mouse prop of Cat.

Mouse takes a property which is a function. That function is a Cat component that takes in its mouse property the argument to the function

Name it anything, but it would be a function

```
import React, { Component } from 'react';
class Cat extends React.Component {
  render() {
    const mouse = this.props.mouse;
```



```
    return (
      <span style={{ position: 'absolute', left: mouse.x, top: mouse.y }}>###
</span>
    );
  }
}
class Mouse extends React.Component {
  constructor(props) {
    super(props);
    this.handleMouseMove = this.handleMouseMove.bind(this);
    this.state = { x: 0, y: 0 };
  }
  handleMouseMove(event) {
    this.setState({
      x: event.clientX,
      y: event.clientY
    });
  }
  render() {
    return (
      <div style={{ height: '100vh' }} onMouseMove={this.handleMouseMove}>

        {this.props.renderProp(this.state)}
      </div>
    );
  }
}
class MouseTracker extends React.Component {
  render() {
    return (
      <div>
        <h1>Move the mouse around!</h1>
        <Mouse renderProp= {arg => ( <Cat mouse={arg} />)}/>
      </div>
    );
  }
}
export default MouseTracker;
```

Routing

You need to install a package to use React routing. There are three packages that you have available:

React-router has the core components and we don’t install it directly, it will get there with any of the other two packages.

React-router-dom for web apps

React-router-native for mobile.

Install the one you need with “npm install” and the package name.

The react-router library has various components, the most common ones being:

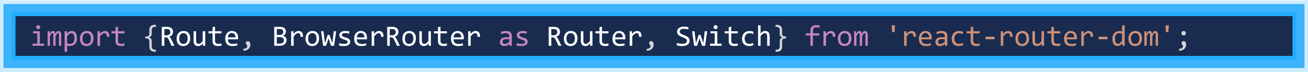
BrowserRouter: It uses the HTML5 history API (pushState, replaceState and the popstate event) to keep your UI in sync with the URL. It is the parent component that is used to store all the other components.

Route: Route is the conditionally shown component that renders some UI when its path matches the current URL.

Link: Link component is used to create links to different routes and implement navigation around the application. Similar to <a href…>

Switch: Switch component is used to render only the first route that matches the location rather than rendering all matching routes.

This is how you would import some of those components:



```
import {Route, BrowserRouter as Router, Switch} from 'react-router-dom';
```

Note: if using **github pages** you can have problems with the routes since github requires that you provide the index file. You can create a custom 404.html file to indicate to the user what to do. This file should be at the root.

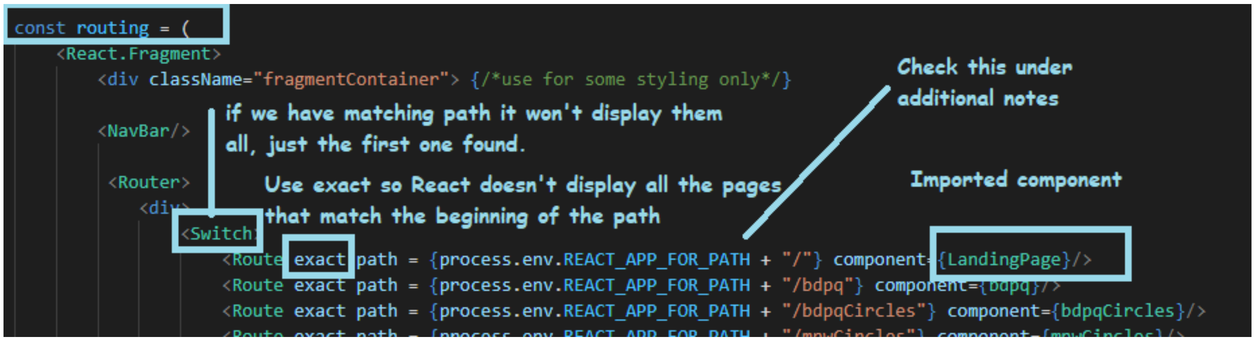
There is a solution that you can find by using what somebody else came up with. Copy the 404.html file at spa-github-pages/404.html at gh-pages · rafgraph/spa-github-pages. And add the section about Apps for github pages in this file here spa-github-pages/index.html at e3a4c70c574b339bbc4c38c43ab2f2f91bcd5cf2 · rafgraph/spa-github-pages.

In you index.js file you can have a const with the routing options and then use that on the render.

At the end of the index.js:

```
ReactDOM.render(
        routing ,
    document.getElementById('root'));
```

The routing above is created with route options like these:



```
const routing = (
    <React.Fragment>
        <div className="fragmentContainer"> {/*use for some styling only*/}

        <NavBar/>

         <Router>
           <div>
            <Switch>
              <Route exact path = {process.env.REACT_APP_FOR_PATH + "/"} component={LandingPage}/>
              <Route exact path = {process.env.REACT_APP_FOR_PATH + "/bdpq"} component={bdpq}/>
              <Route exact path = {process.env.REACT_APP_FOR_PATH + "/bdpqCircles"} component={bdpqCircles}/>
              <Route exact path = {process.env.REACT_APP_FOR_PATH + "/mpwCircles"} component={mpwCircles}/>
```

Check this under additional notes

if we have matching path it won't display them all, just the first one found.

Use exact so React doesn't display all the pages that match the beginning of the path

Imported component

In the above screenshot, when the path indicated is the browser's url, the corresponding component will be displayed.

If you want to include the navigation bar on all the pages, include the navigation component before the Router as above.

The above code provides routes to pages in the application (main components) but note that as of right now this will not work on github pages.

You may also want to use links in your pages. This is how.

```
import {Link} from 'react-router-dom';
```

```
<Link to= {path + "/bdpq"}>
  <!—other things you may need here, such as the text for the link→
/Link>
```

Notice that link will work like an anchor tag (<a href) and notice that the above path is the same as it was used in one of the ROUTE components. One is a link, the other one will take you to the right place from the url in the browser.

Hooks

Like I mentioned, you can use functions or classes to create React components, but classes come with more functionality. Hooks is React way to provide some of that functionality to functions.

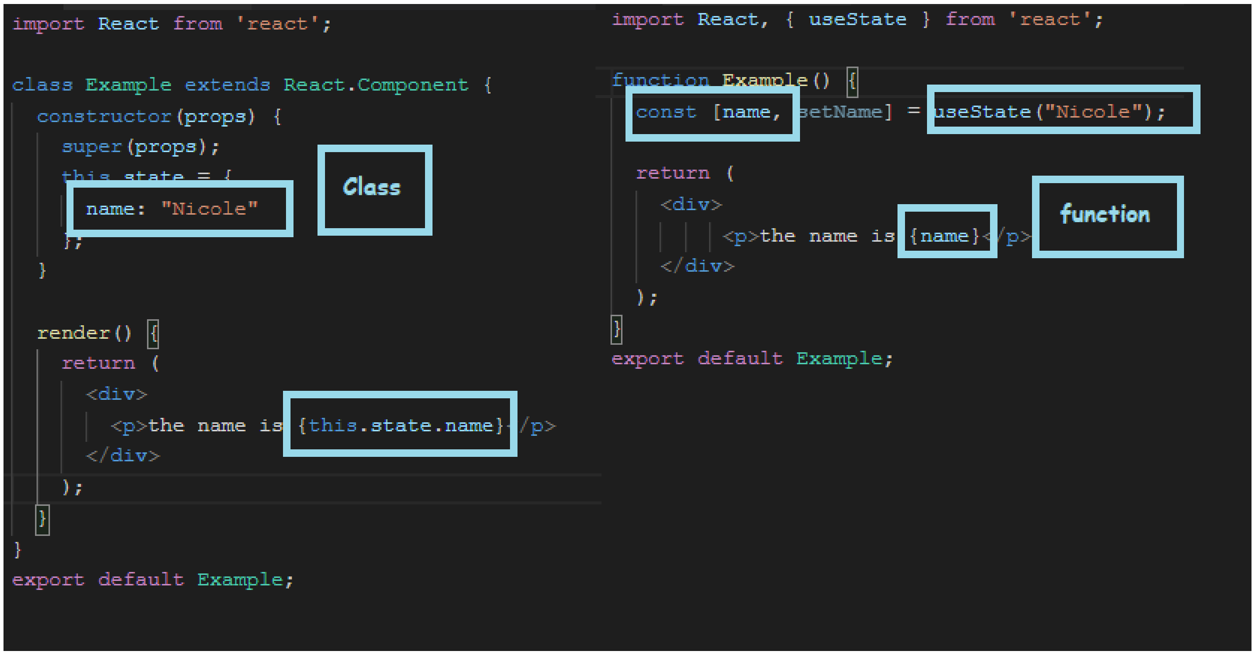
React says they are not planning on replacing classes with hooks, and it is OK to just start using hooks in new code, leaving existing code the way it is.

Hooks are mainly used to deal with state and effect. You can also create your own custom hooks. There are other less used React hooks so check the documentation for those.

Hooks are JavaScript functions but they have a few rules: call them at top level (not inside code blocks), call them only from React functions.

State Hook

This is the same example as both a class using state and a function using the hook for state (handling initial state):

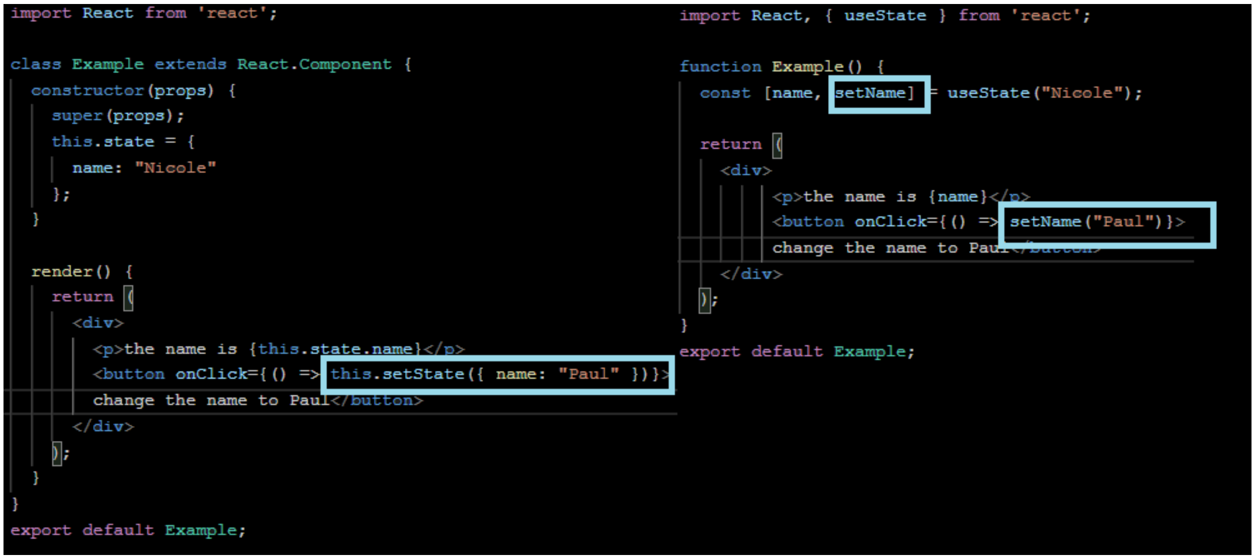


```
import React from 'react';

class Example extends React.Component {
  constructor(props) {
    super(props);
    this.state = {
      name: "Nicole"
    };
  }

  render() {
    return (
      <div>
        <p>the name is {this.state.name}</p>
      </div>
    );
  }
}
export default Example;
```

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

function Example() {
  const [name, setName] = useState("Nicole");

  return (
    <div>
      <p>the name is {name}</p>
    </div>
  );
}
export default Example;
```

Notice that for the hook you need to import it (useState).

When we need to change the state:

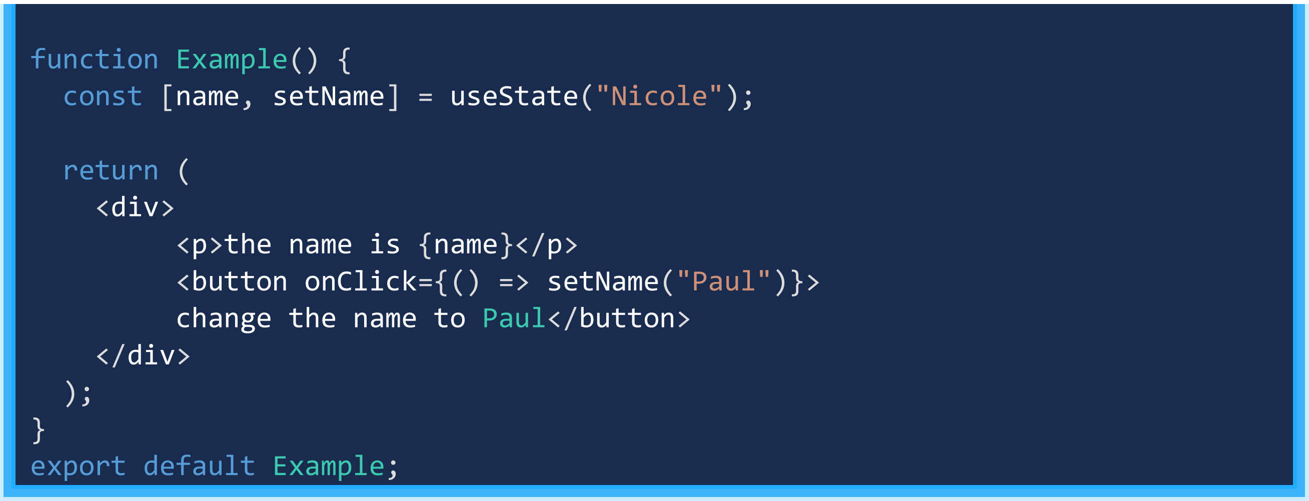


```
import React from 'react';

class Example extends React.Component {
  constructor(props) {
    super(props);
    this.state = {
      name: "Nicole"
    };
  }

  render() {
    return (
      <div>
        <p>the name is {this.state.name}</p>
        <button onClick={() => this.setState({ name: "Paul" })}>
        change the name to Paul</button>
      </div>
    );
  }
}
export default Example;
```

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

function Example() {
  const [name, setName] = useState("Nicole");

  return (
    <div>
      <p>the name is {name}</p>
      <button onClick={() => setName("Paul")}>
      change the name to Paul</button>
    </div>
  );
}
export default Example;
```

```
import React from 'react';

class Example extends React.Component {
  constructor(props) {
    super(props);
    this.state = {
      name: "Nicole"
    };
  }

  render() {
    return (
      <div>
        <p>the name is {this.state.name}</p>
        <button onClick={() => this.setState({ name: "Paul" })}>
        change the name to Paul</button>
      </div>
    );
  }
}
export default Example;
```

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



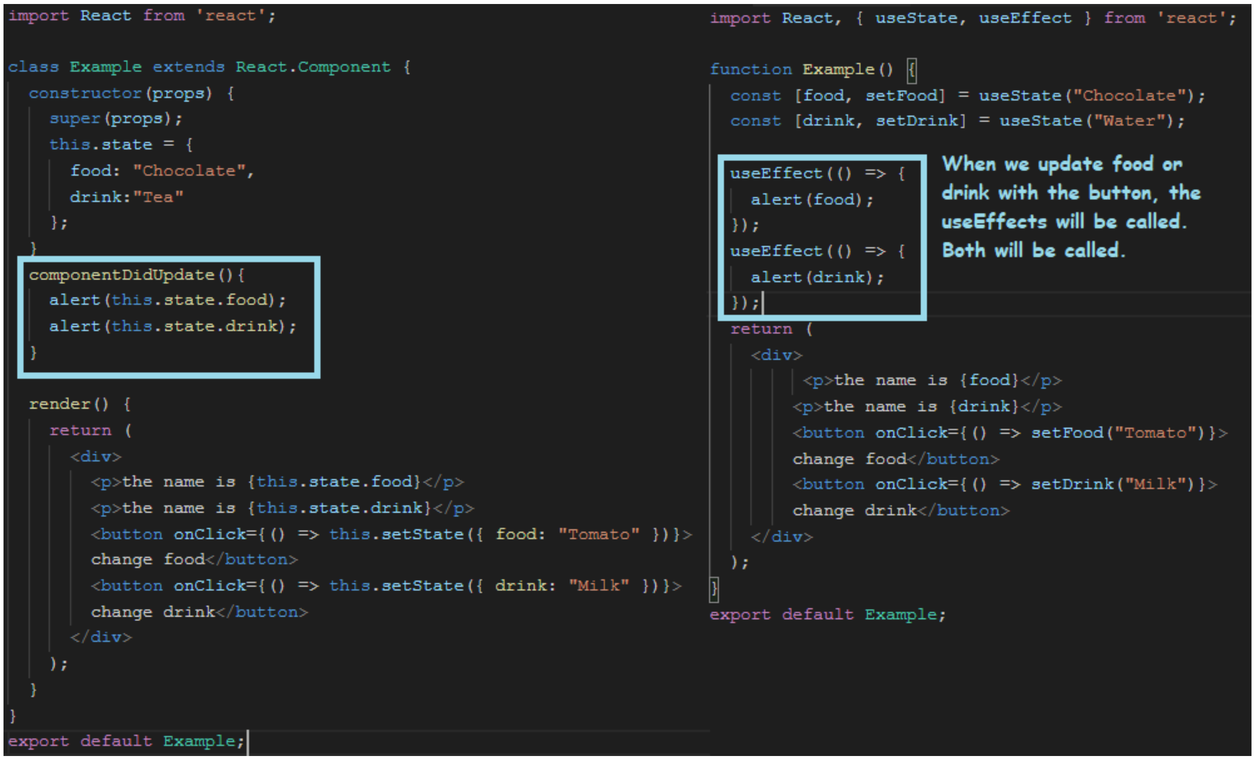
```
function Example() {
  const [name, setName] = useState("Nicole");

  return (
    <div>
         <p>the name is {name}</p>
         <button onClick={() => setName("Paul")}>
         change the name to Paul</button>
    </div>
  );
}
export default Example;
```

You can have multiple variables created by useState on the same function.

Effect Hook

The effect hook lets you perform side effects in function components. This hook takes the job of componentDidMount and componentDidUpdate since it will happen after the component is rendered (or re-rendered).

As before, here is the same example with both using a class and using a function. Note that we now must import useEffect.



```
import React from 'react';

class Example extends React.Component {
  constructor(props) {
    super(props);
    this.state = {
      food: "Chocolate",
      drink:"Tea"
    };
  }
  componentDidUpdate(){
    alert(this.state.food);
    alert(this.state.drink);
  }

  render() {
    return (
      <div>
        <p>the name is {this.state.food}</p>
        <p>the name is {this.state.drink}</p>
        <button onClick={() => this.setState({ food: "Tomato" })}>
        change food</button>
        <button onClick={() => this.setState({ drink: "Milk" })}>
        change drink</button>
      </div>
    );
  }
}
export default Example;
```

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

function Example() {
  const [food, setFood] = useState("Chocolate");
  const [drink, setDrink] = useState("Water");

  useEffect(() => {
    alert(food);
  });
  useEffect(() => {
    alert(drink);
  });
  return (
    <div>
      <p>the name is {food}</p>
      <p>the name is {drink}</p>
      <button onClick={() => setFood("Tomato")}>
      change food</button>
      <button onClick={() => setDrink("Milk")}>
      change drink</button>
    </div>
  );
}
export default Example;
```

When we update food or drink with the button, the useEffects will be called. Both will be called.

```
import React from 'react';

class Example extends React.Component {
  constructor(props) {
    super(props);
    this.state = {
      food: "Chocolate",
      drink:"Tea"
    };
  }
  componentDidUpdate(){
    alert(this.state.food);
    alert(this.state.drink);
  }

  render() {
    return (
      <div>
        <p>the name is {this.state.food}</p>
        <p>the name is {this.state.drink}</p>
        <button onClick={() => this.setState({ food: "Tomato" })}>
        change food</button>
        <button onClick={() => this.setState({ drink: "Milk" })}>
        change drink</button>
      </div>
    );
  }
}
export default Example;
```

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

function Example() {
  const [food, setFood] = useState("Chocolate");
  const [drink, setDrink] = useState("Water");

  useEffect(() => {
    alert(food);
  });
  useEffect(() => {
    alert(drink);
  });
  return (
    <div>
         <p>the name is {food}</p>
        <p>the name is {drink}</p>
        <button onClick={() => setFood("Tomato")}>
        change food</button>
        <button onClick={() => setDrink("Milk")}>
        change drink</button>
    </div>
  );
}
export default Example;
```

It seems weird that React will still the useEffect that only refers to a variable that has not changed. To change that pass an array with the variables to skip if unchanged as a second argument:

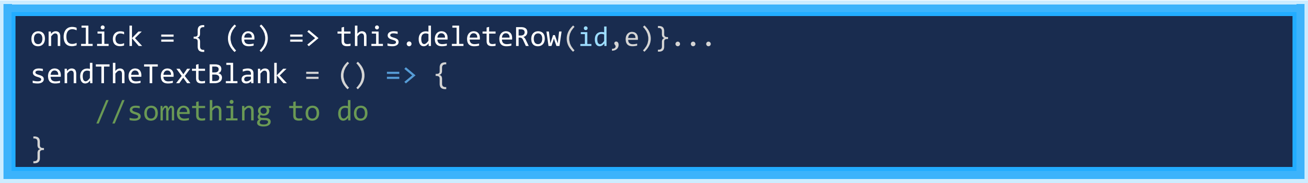
```
 useEffect( () => {alert(drink);}, [drink]);
```

If there are multiple elements in the array passed as the argument, useEffect will be called when at least one changed.

Additional Notes

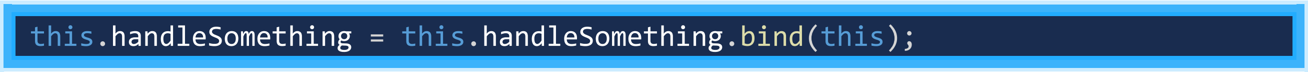
Functions in React components

Most of the time, when creating functions in React components we will be using the arrow function format:



```
onClick = { (e) => this.deleteRow(id,e)}...
sendTheTextBlank = () => {
    //something to do
}
```

If we use regular functions we need to remember to bind them or we will run into problems. You can do that in the constructor.



```
this.handleSomething = this.handleSomething.bind(this);
```

The reason for this is that arrow functions do not their own “this” so there is no confusion about what “this” we are referring to inside the function.

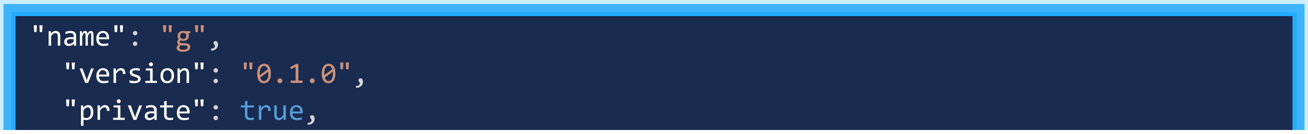
github pages with .env

This was very confusing to me so here is the summary of it.

If you have not done so, install the github pages package (inside your app folder or with the -g option for all):

```
npm install gh-pages – save-dev
```

In the package.json of your app, add this:



```
"name": "g",
  "version": "0.1.0",
  "private": true,
  "homepage": ".",
  "dependencies": {
```

Some articles say to include the github repo where the page will be hosted (https://{username}.github.io/{repo-name}), but then it will not work when you run locally. Instead, set it that way and use a .env file.

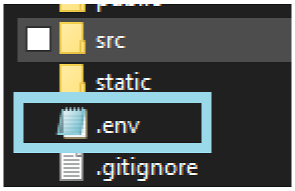
You also need to modify the package.json here:

```
"scripts": {
    "start": "react-scripts start",
    "build": "react-scripts build",
    "test": "react-scripts test",
    "eject": "react-scripts eject",
    "deploy": "gh-pages -d build"
  },
```

Optionally you can also add a predeploy so you don't have to run the build manually before you deploy it. I prefer to just build and deploy manually. You would add this to the scripts section of the package.json.

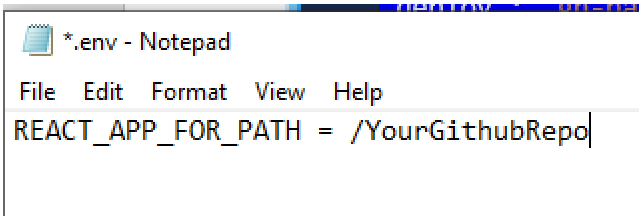
```
“predeploy”: “npm run build”
```

Create a file .env and put it in the root directory of your app. This is what will allow you to have the homepage set to “.” On your package.json so you don't have to be changing it to run locally. You will still have to remember to change this file but personally I find this more organized.



src
static
.env
.gitignore

You can use this file to set environment variables that you can use in your app's code:



```
REACT_APP_FOR_PATH = /YourGithubRepo
```

Now wherever you need to use paths in your code, you can do this:

```
const path = process.env.REACT_APP_FOR_PATH;
….

<img src= {path +"/images/YourImage.png"
```

You can name the variables anything you want, but they must start with REACT_APP

Remember to change the variable to what you need before you build and before you run locally.

Npm start → remember to set the .env file to

```
REACT_APP_FOR_PATH =
```

To deploy to github pages → .env set to your github repo.

```
npm run build

npm run deploy
```

MEDIUM Github Pages ARTICLE

```
npm install gh-pages — save-dev
```

You will need to add a homepage attribute to your existing file as a top level one.:

```
“homepage”: “.”,
```

Many articles I read said to put your GitHub repo in the homepage attribute instead of just the dot, but then it will not run locally. If you prefer that you would write “https://{username}.github.io/{repo-name}” instead of “.”.

I prefer to just have the “.” here and use a .env file to switch between different environments (more in this later).

You also need to add this to your package.json, under the scripts section:

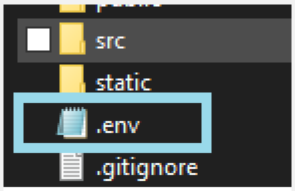
```
‶deploy”: “gh-pages -d build”
```

If you want your deploy to also build first, you need to add this too:

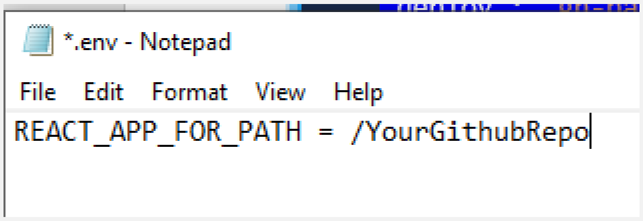
```
“predeploy”: “npm run build”
```

I prefer to just run the build myself and then the deploy manually so I don’t have the predeploy one on my package.json.

Create a file .env and put it in the root directory of your app. This is what will allow you to have the homepage set to “.” in the package.json file.



You can use this file to set environment variables that you can use in your app’s code. You can name the variables anything you want, but they must start with **REACT_APP**. You can use this to set the path that your code should be using:



```
REACT_APP_FOR_PATH = /YourGithubRepo
```

Now wherever you need to use paths in your code (including React routing), you can do this:

```
const path = process.env.REACT_APP_FOR_PATH;
```

and use that path in the code, like this:

```
path = {process.env.REACT_APP_FOR_PATH + “/CanvasTrace”}
```

I also have a variable there for my images because depending on the type of routing you use (coming later), you can share the same variable for routing and images or not.

```
<img src= {pathPic +"/images/YourImage.png"
```

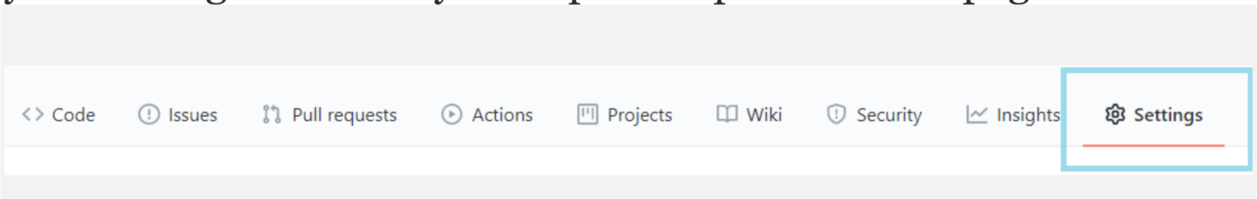
Instead of changing the homepage attribute in package.json I prefer to change the variable in the .env file.

To run locally, your .env file should be like the one shown bellow. (no "", just nothing):

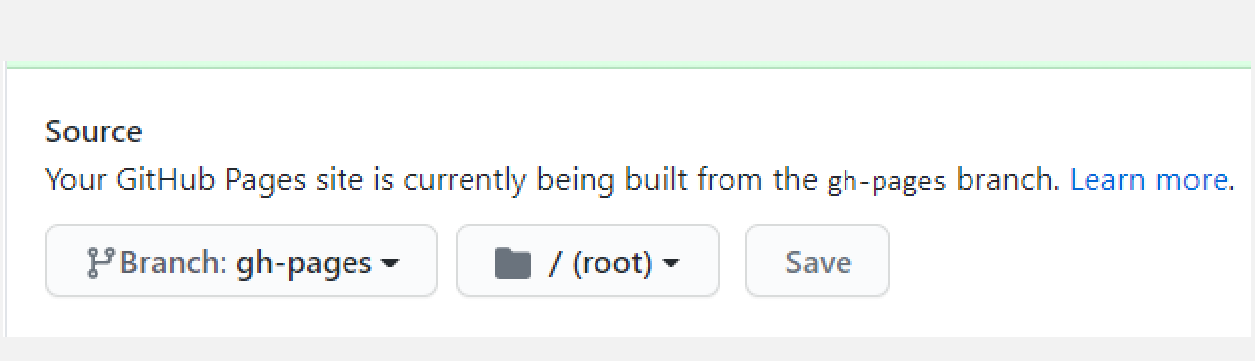
```
REACT_APP_FOR_PATH =
```

Just as an additional note, remember to change the .env file before you run locally (npm start) to have the variable set to nothing. If you are using Routing with BrowserRouter you need to set the variable to your GitHub repo before you build and deploy (npm run build, npm run deploy).

With the above set up your page is going to be deployed to the gh-pages branch on your repository. In GitHub, make sure to check your settings and have your repo set up for GitHub pages.



scroll down almost to the end:



Source

Your GitHub Pages site is currently being built from the gh-pages branch. Learn more.

Branch: gh-pages

/ (root)

MAKE SURE you choose the gh-pages branch and not master. I did that by mistake and created a huge mess for myself. The files that you will push with the deploy script are very different from the code files and if you mix those two branches is going to be a mess.

Now you can access your page at https://gmfuster.github.io/Bonico/ (of course replace with your own user and repository :-))

Make sure you provide the path for your images so GitHub knows where to look for them. This is so you can run both locally and on GitHub. In my case I have this for GitHub:

```
REACT_APP_FOR_PATH_FOR_PICS = /Bonico
```

And this for local:

```
REACT_APP_FOR_PATH_FOR_PICS =
```

This has been tricky to say the least :-).

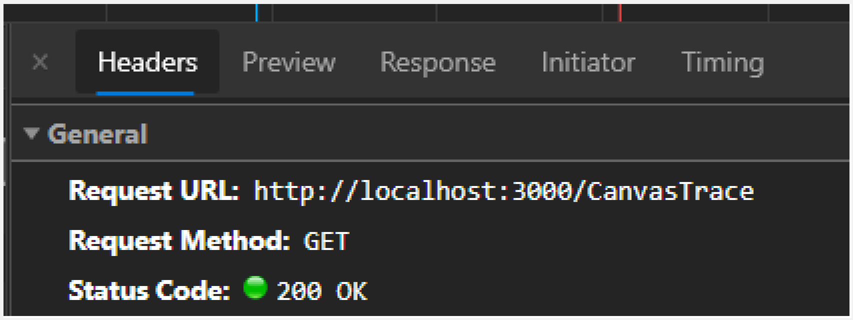
The common way to handle routing in React is with the **BrowserRouter** but for GitHub Pages we will get 404 errors when reloading a page that is not the index one. Or with just entering the link directly to something other than the main index page. In addition, legacy browsers don't support it.

These are some examples of what the URLs look like with **BrowserRouter**:

http://localhost:3000/

http://localhost:3000/CanvasTrace

On **BrowserRouter**, if you check the DevTools on your browser and go to the network tab, you will see this:



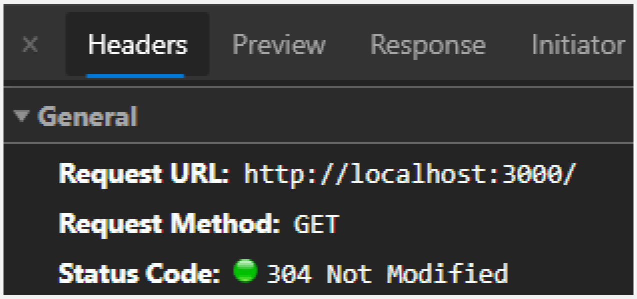
Request URL: http://localhost:3000/CanvasTrace
Request Method: GET
Status Code: ● 200 OK

Another way to do routing is with the **HashRouter**. React recommends using the BrowserRouter but that is not going to work with GitHub pages unless you always go in from the main page (index). With **HashRouter**, a hash symbol is added to the URL, which makes the server ignore what comes after that. The URLs will look something like this now:

http://localhost:3000/#/

http://localhost:3000/#/CanvasTrace

If you check the network tab now, you will see this. Notice it still goes to localhost and not CanvasTrace:



Request URL: http://localhost:3000/
Request Method: GET
Status Code: ● 304 Not Modified

The routing will be done on the client side now, not the server side, which would not find the requested URL and therefore throw the 404 error.

To use the HashRoute I have this:

```
import {Route, HashRouter as Router, Switch} from ‘react-router-dom’;
```

```
<Router baseline=”/”>
```

Everything else is the same as for BrowserRouter.

It is still a good idea to customize your own **404.html** file. You just need to add it to your gh-pages branch and display whatever message you want and a link back to your URL.

One more note on the routing. When you are using HashRoute you don’t need to change the REACT_APP_FOR_PATH to change between building locally and building for GitHub pages. I just have it there anyway and have the code using the path on the links in case I switch back later.

I was also having issues with my <Nav.Link>s because those were not using the routing with the hash symbol. What I did was replace those inside the nav with the React <Link> and give them my own styling.

```
import {Link as ReactLink} from ‘react-router-dom’;
```

```
<ReactLink style={reactLinkSt} to= {path + “/”} >Home</ReactLink>
```

When you are changing things, make sure to remember to use `to` instead of `href`. I did not and it took my a while to realize that was the reason it was not working.

If you still have errors with the navbar, include it inside the router. I have the NavBar component before the <Switch> inside the <HasRouter>.

And that should be it! I really hope so because this took me a while.

Thank you for checking this out! I hope it helps.