React Fundamentals

Function based components

Peter Kassenaar
info@kassenaar.com

Components

Adding and using your own components

Types of components

Function Components

Class Components

First, as an example: import Bootstrap

- Import Bootstrap just to make it look nice
- Import as generic style library
- There *are* React-specific libraries
  - But we're not using them here (yet)
- https://getbootstrap.com/
- `npm install bootstrap`

Use Bootstrap in application

Update `index.js`

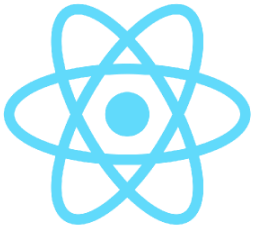
```
// bootstrap stuff
import 'bootstrap/dist/css/bootstrap.min.css'

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

Function-based components

- Components are just functions
- They are rendered to the screen by the `render()` function
  - 1st get the root
  - 2nd render the element(s) to it.

```
// We now render <HelloReact /> as Top Level Component.
const root = ReactDOM.createRoot(document.getElementById('root'));
root.render(
    <React.StrictMode>
       <HelloReact />
    </React.StrictMode>
);
```

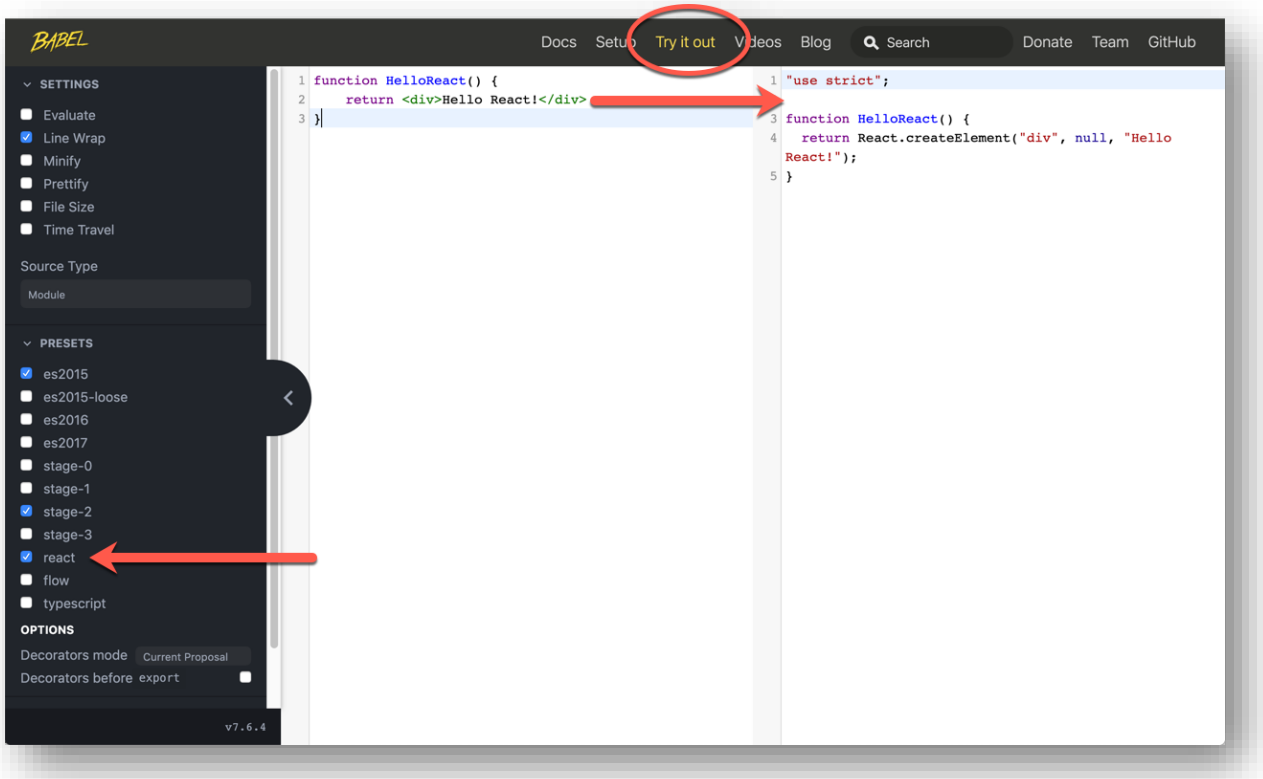
Other syntax, same result



```
const HelloReact = () => {
    return (
        <div>Hello React!</div>
    )
}
const root = ReactDOM.createRoot(document.getElementById('root'));
root.render(
        <React.StrictMode>
            <HelloReact />
        </React.StrictMode>
);
```

HelloReact Component

- The `HelloReact` Component is NOT valid JavaScript
- It is JSX, compiled to React API calls by Babel



https://babeljs.io/,

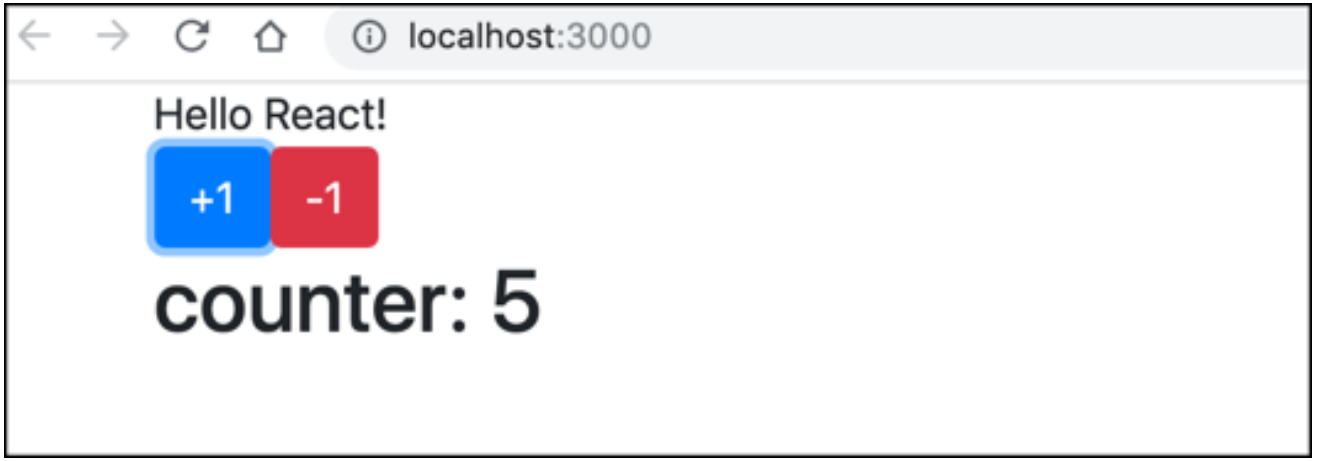
menu option *Try it out*

Convention: Component Names

- Start components with Uppercase first letter
  - `function Button() {…}` NOT
  - `function button() {…}`
- Preferred: use two words to distinguish from standard HTML elements
  - `function ReactButton() {…}`
- Opinion: React Style Guide(s)
  - AirBnB JSX Style Guide: https://github.com/airbnb/javascript/tree/master/react
  - More options: https://css-tricks.com/react-code-style-guide/

Creating a simple Counter component

Simple result:



Component functionality - Hooks

- We need *state* to hold the value of counter
  - Using a built in method `React.useState()`
  - This returns two objects – you can call them any way you like
    - First object: state object (*getter*)
    - Second object: updater function (*setter*)
- We use ES6 *destructuring* to assign them to variables
- We initialize the first variable (in our case: `counter`) with a value

```
const [counter, setCounter] = React.useState(0)
return (
    <div>
        <h2>counter: {counter}</h2>
    </div>
)
```

On JSX Syntax

- You can use variables anywhere in JSX, using the single curly brace syntax
  - `<h2>{counter}</h2>` to display the current value of `counter`
  - Other frameworks often use double curly braces `{{ … }}`
- To update the counter we use an *event handler*
  - This is the second argument that `useState()` returns
  - It looks like the DOM API, but it is case sensitive (`onClick`, `onBlur`, `onSubmit`, etc).
  - The event handler receives a function reference

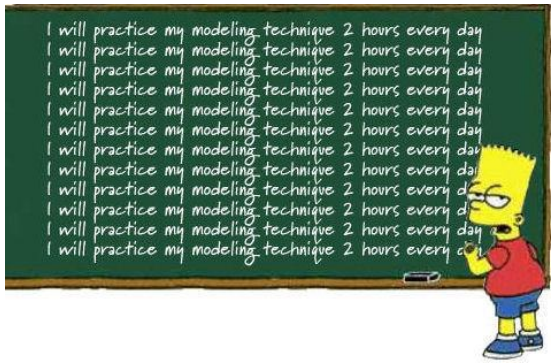
```
function Counter() {

   const [counter, setCounter] = React.useState(0);

   function updateCounter() {
      return setCounter(counter + 1);
   }

   return (
      <div>
         <button onClick={updateCounter}>+1</button>
         <h2>counter: {counter}</h2>
      </div>
   )
}
```

Or, use arrow function notation:

```
const updateCounter = () => setCounter(counter + 1);
```

Workshop

- Continue with your own project, or use the sample project.
- Implement the subtract function (`-1`) for the counter component.
- Create a new button, that doubles (`*2`) the current value of the counter.
- Create a Reset button, that sets the counter back to `0`.
- Example `../110-counter-component`

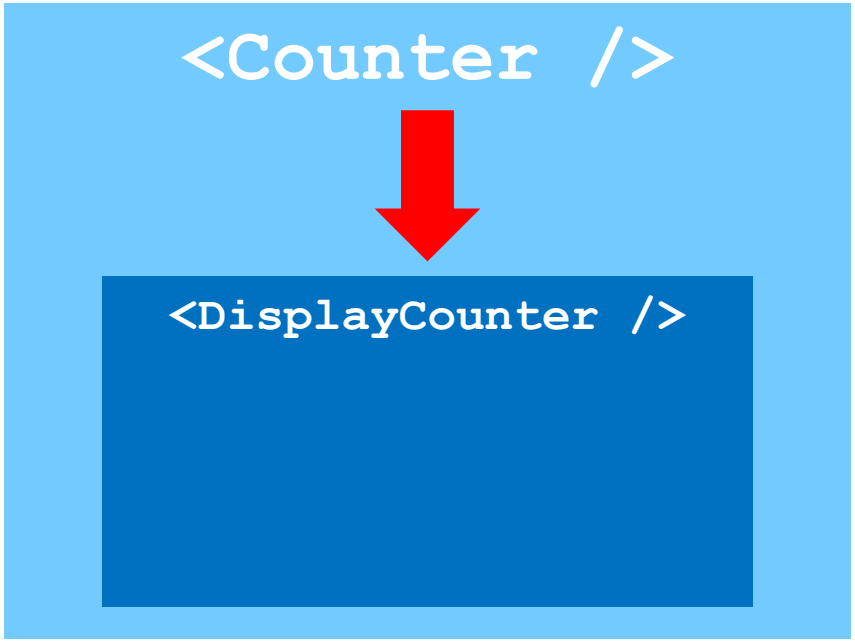


Using Props

Passing data down to other components

Passing state – One-way-dataflow

- SoC: We want to create a new component for showing the value of the counter:
  - `<Counter />` functional component (it updates the state)
  - `<DisplayCounter />` display component (it just displays the counter)
- But: state is unique to each component
- We need to pass the counter state to new component
- Introducing the *props* object



Pass `props` down. In this case the value of `counter`

We can pass as many props as we need.

Every prop becomes an *attribute* on the receiving component

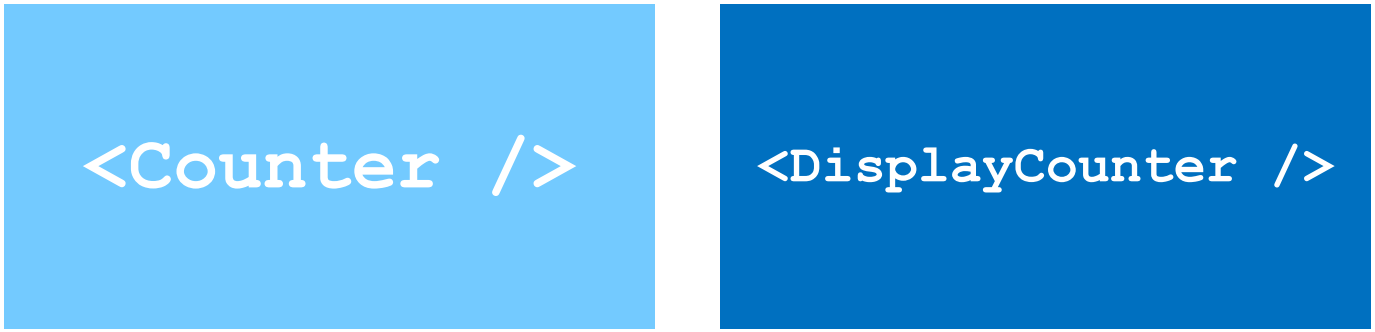
Props

- Every component receives a `props` object
  - Again, you can name it anything you want
  - But it is commonly named `props`
- It holds key/value-pairs for every property passed down
- In `Counter.js` we create a prop `counter` and pass it the current value of `counter`:
  - `<DisplayCounter counter={counter}/>`

Receiving props

```
// import React from 'reac'

function DisplayCounter(props) {
    return(
        <div>
            {props.counter}
        </div>
    )
}
export default DisplayCounter
```

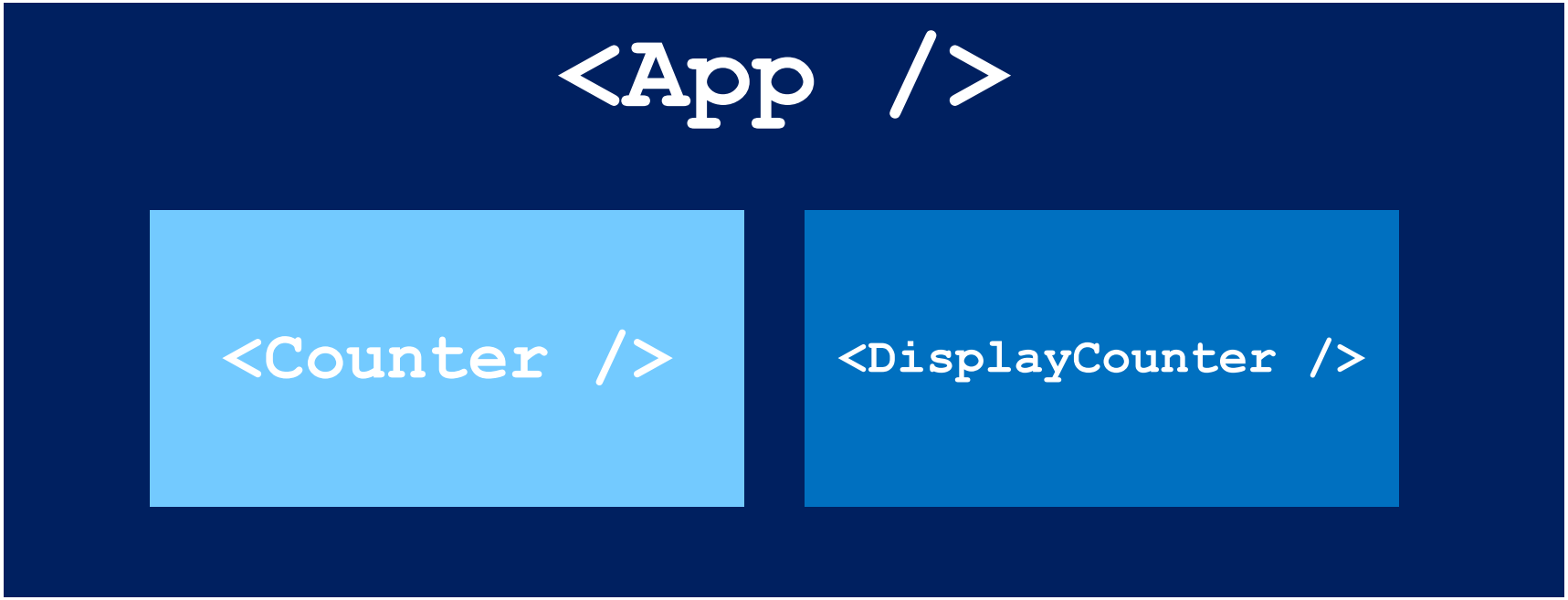
But what if the components are siblings?



We need an enclosing *parent* component that holds the state.

React: *“We are lifting state up”*

But what if the components are siblings?



Now `<App />` holds the state.

It is passing *functionality* down to `<Counter />`

and *data* down to `<DisplayCounter />`

Next – passing functionality down

- We can also pass *functions* as props
  - After all: functions are just JavaScript objects
- Lift state up from `<Counter />` to `<App />`

```
// Our parent component - it holds the state for the child components
function App() {
    const [counter, setCounter] = React.useState(0);

    const incrementCounter = () => setCounter(counter + 1);

    return (
      …
    );
}
```

Send props down to child components

```
function App() {
    const [counter, setCounter] = React.useState(0);

    const incrementCounter = () => setCounter(counter + 1);

    return (
        <div className="container">
            <h2>Hello React</h2>

            <Counter increment={incrementCounter}/>
            <DisplayCounter counter={counter}/>
        </div>
    );
}
```

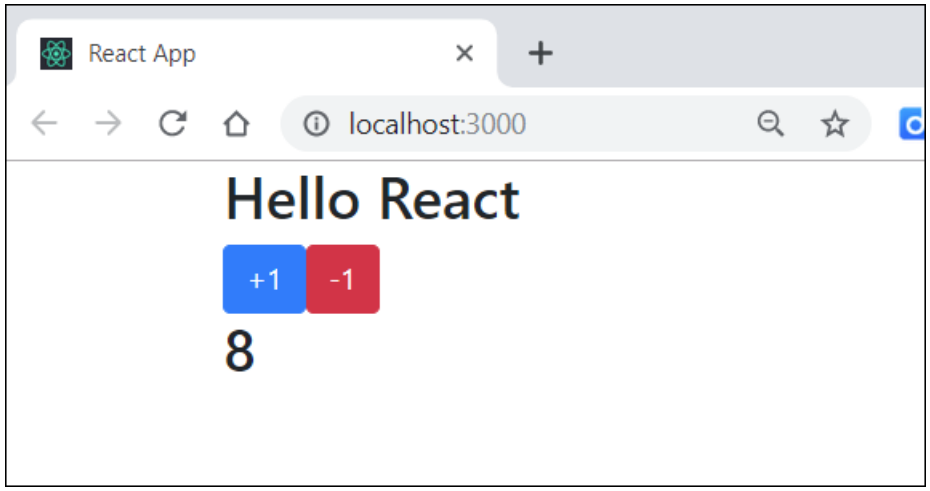
Update `<Counter />` to receive `props`

```
function Counter(props) {
   return (
      <div>
         <button className="btn btn-primary"
               onClick={props.increment}>+1</button>
      </div>
   )
}
```

`props.increment` is just a function pointer here.

It points to the function in the parent component

Result



Result is the same visually,

but with a different, more flexible architecture

Alternate notation

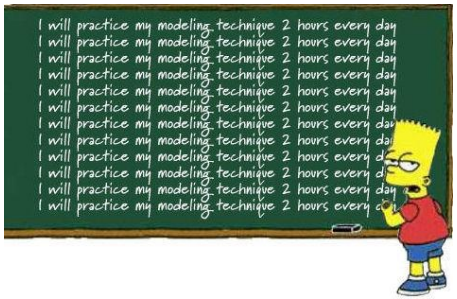
- We can also destructure the props into their own object
- This is just a different notation for the same functionality

```
// counter.js(x)
function Counter({increment}) {
   return (
      <div>
         <button className="btn btn-primary"
               onClick={increment}>+1</button>
          …
      </div>
   )
}

export default Counter
```

```
// DisplayCounter.js(x)
function DisplayCounter({counter}) {
   return(
      <h2>
         {counter}
      </h2>
   )
}
export default DisplayCounter
```

Workshop

- 1. Lift state up in your own application, passing `props` and `functions` to child components
- OR: start with the sample application, and implement the `decrement` function
- 2. Optional: pass the `className` for the button as a prop (for instance: `btn-primary`, `btn-success`, `btn-info`,…)
- Update the `<App />` component
  - Use both notations for props
- Example `../120-props`



Passing arguments for props

What if your functions (passed down as props) needs parameters?

Component Reusability

- Let's say we want to make the `<Counter />` more generic and reusable
- We want to pass in a `value` to add or subtract from the `counter`
- We need to pass parameters to the function!

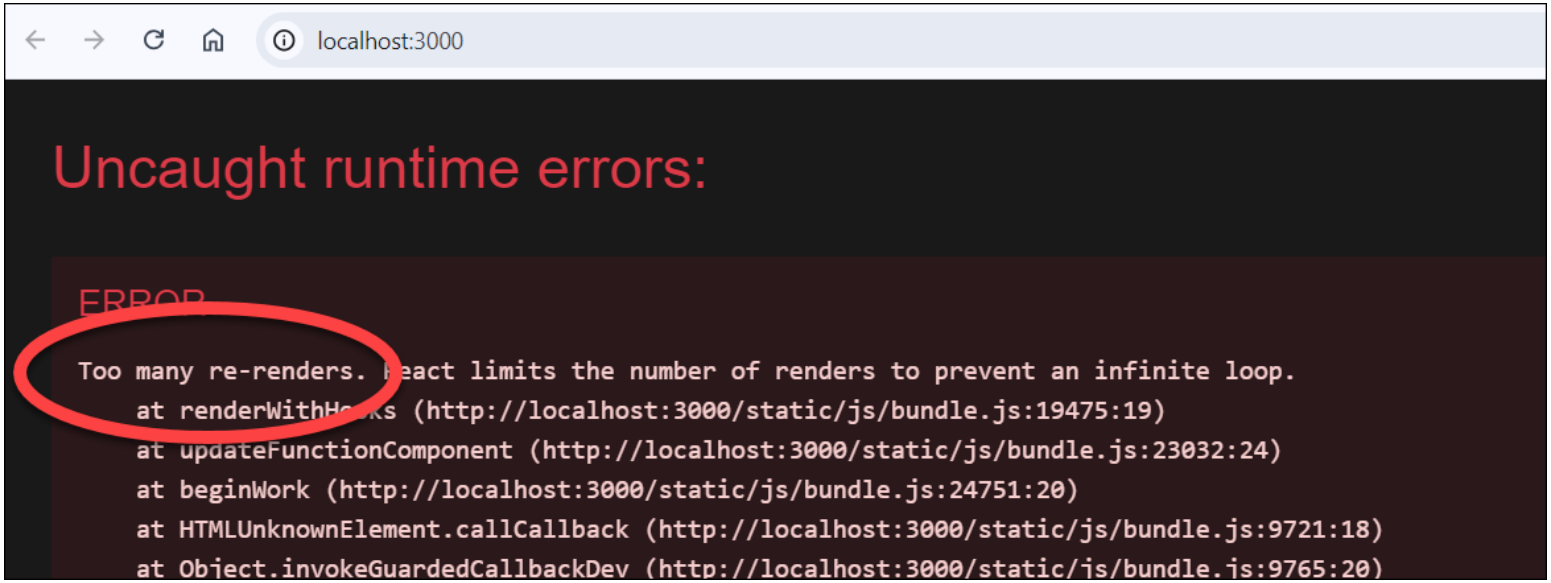
Update the parent component

1. Update the `incrementCounter` function in the parent component (`<App />`)

```
const incrementCounter = (val) => setCounter(counter + val);
```

2. Update the `prop` that is passed. However, this is invalid!:

```
<Counter increment={incrementCounter(30)} />
```



This is also invalid

```
function Counter(props) {
    return (
        <div>
            <button className="btn …"
                    onClick={props.increment(30)}>+30</button>
        </div>
    )
}
```

Error: Maximum update depth exceeded. This can happen when a component repeatedly calls setState inside componentWillUpdate or componentDidUpdate. React limits the number of nested updates to prevent infinite loops.

▶ 3 stack frames were collapsed.

incrementCounter [as increment]
C:/Users/Gebruiker/Desktop/react-fundamentals/training-app/src/components/App.js:12

```
  9 | function App() {
 10 |     const [counter, setCounter] = React.useState(0);
 11 |
> 12 |     const incrementCounter = (val) => setCounter(counter + val);
 13 |
 14 |     return (
 15 |         <div className="container">
```

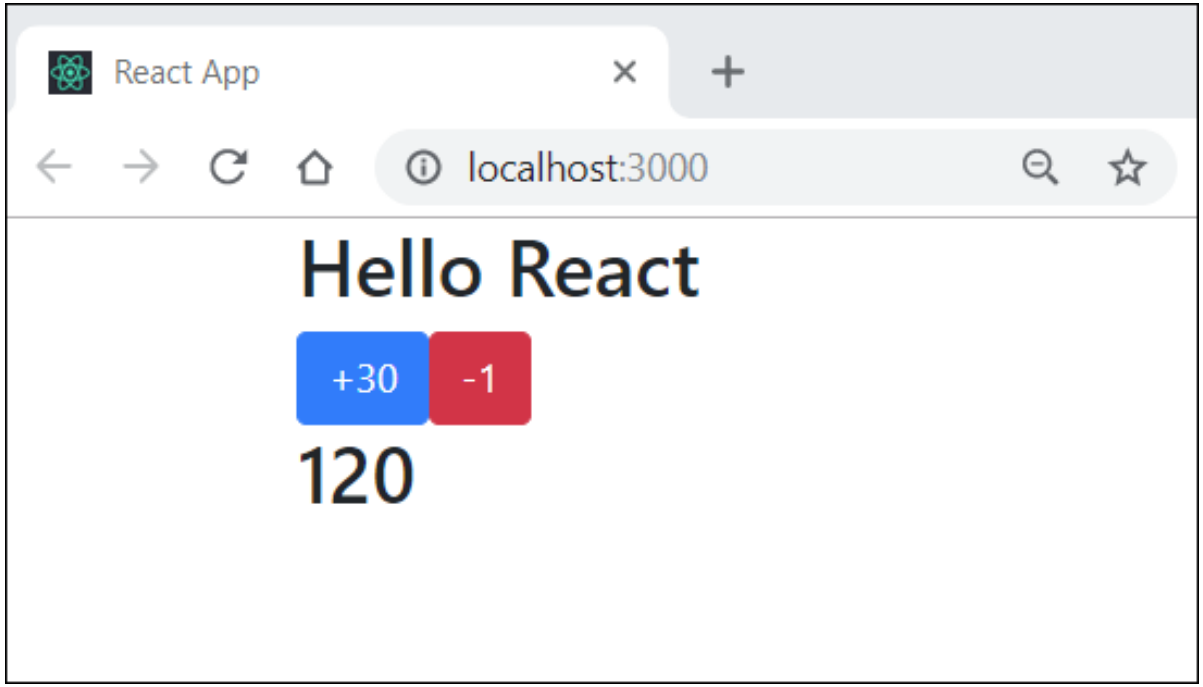
View compiled

Solution: create a prop and inline function

```
<Counter increment={incrementCounter} val={30} />
```

```
function Counter(props) {
    return (
        <div>
            <button className="btn …"
                    onClick={() => props.increment(props.val)}>
               +{props.val}
            </button>
        </div>
    )
}
```

Result



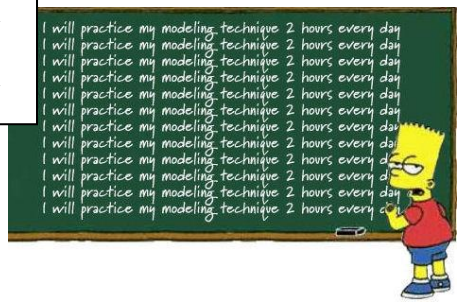
Example `../130-props-parameters`

Workshop

- Create a more generic `<Counter />` component, so you can add/subtract a random number from the counter.
- Start from `../130-props-parameters`
- You should be able to call it like this:

```
<Counter increment={incrementCounter} val={1}/>
<Counter increment={incrementCounter} val={5}/>
<Counter increment={incrementCounter} val={10}/>
<Counter increment={incrementCounter} val={50}/>
```

(workshops: `../1-generic-counter`)



Checkpoint

- There are two types of components. `function`-based and `class`-based
  - We're going to use class-based components next.
- You know how to load 3rd party libraries.
- You can add and use as many components as you like.
- You know about component state and React Hooks
- You know how to pass state and functionality as `props` to child components.