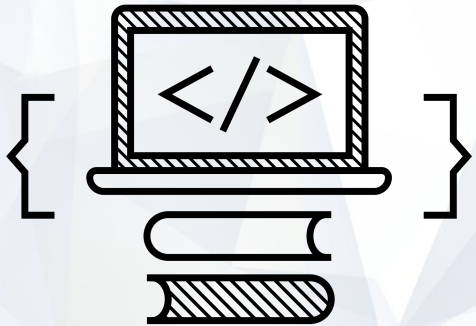
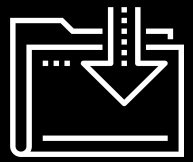


Props, Lists, and Stateful Components

Skills Bootcamp in Front-End Web Development

Lesson 13.2




WELCOME

Learning Objectives

By the end of class, you will:

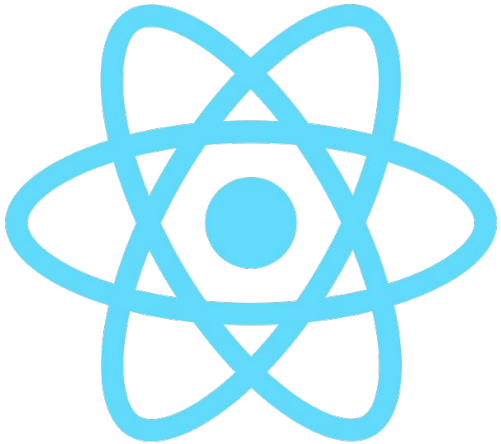
Deepen your understanding of passing props between React components.

Gain a firm understanding of the concept of child–parent relationships in React.

Programmatically render components from an array of data.

Understand the concepts of hooks and component state.

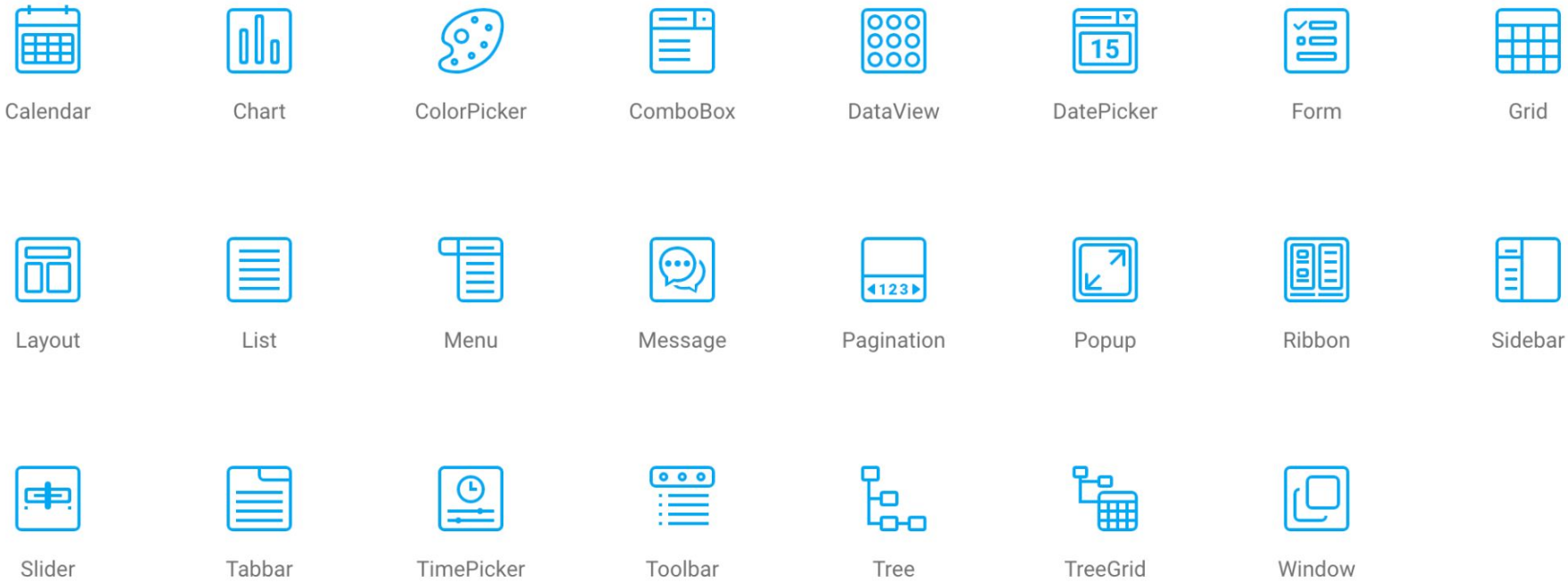
We can conceptualize React components as JavaScript functions.



Component **Function**

Props

It’s a component’s job to describe and *return* some part of our application’s UI.



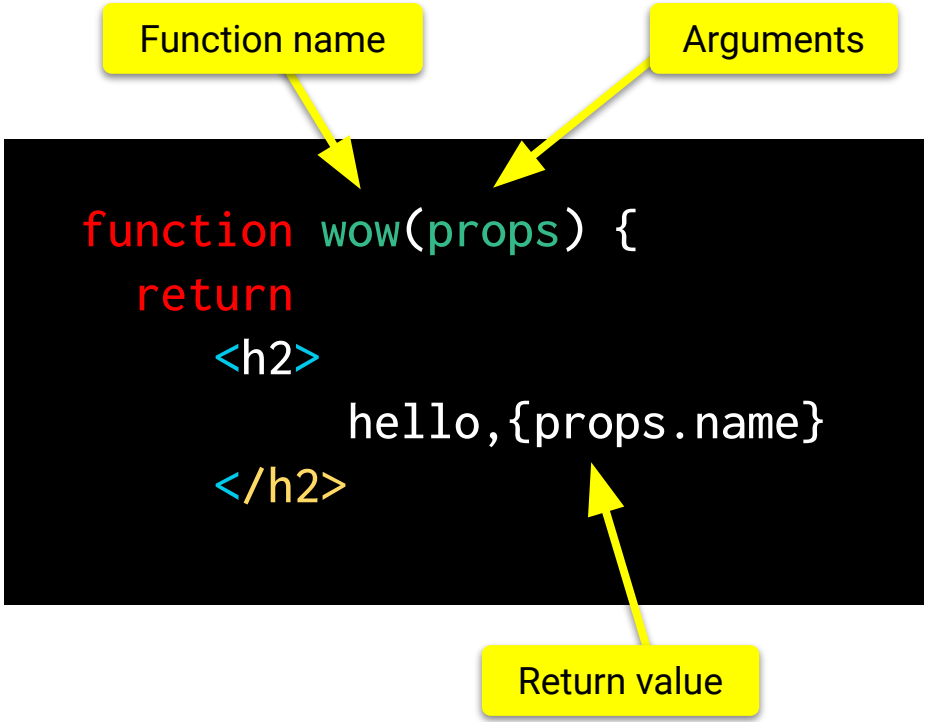
If a component is a function that *return*
some data, what else
might a component be able to do?

Props

Since it’s a function, a component can also receive arguments.

This allows us to write components that behave differently based on the arguments that they receive.

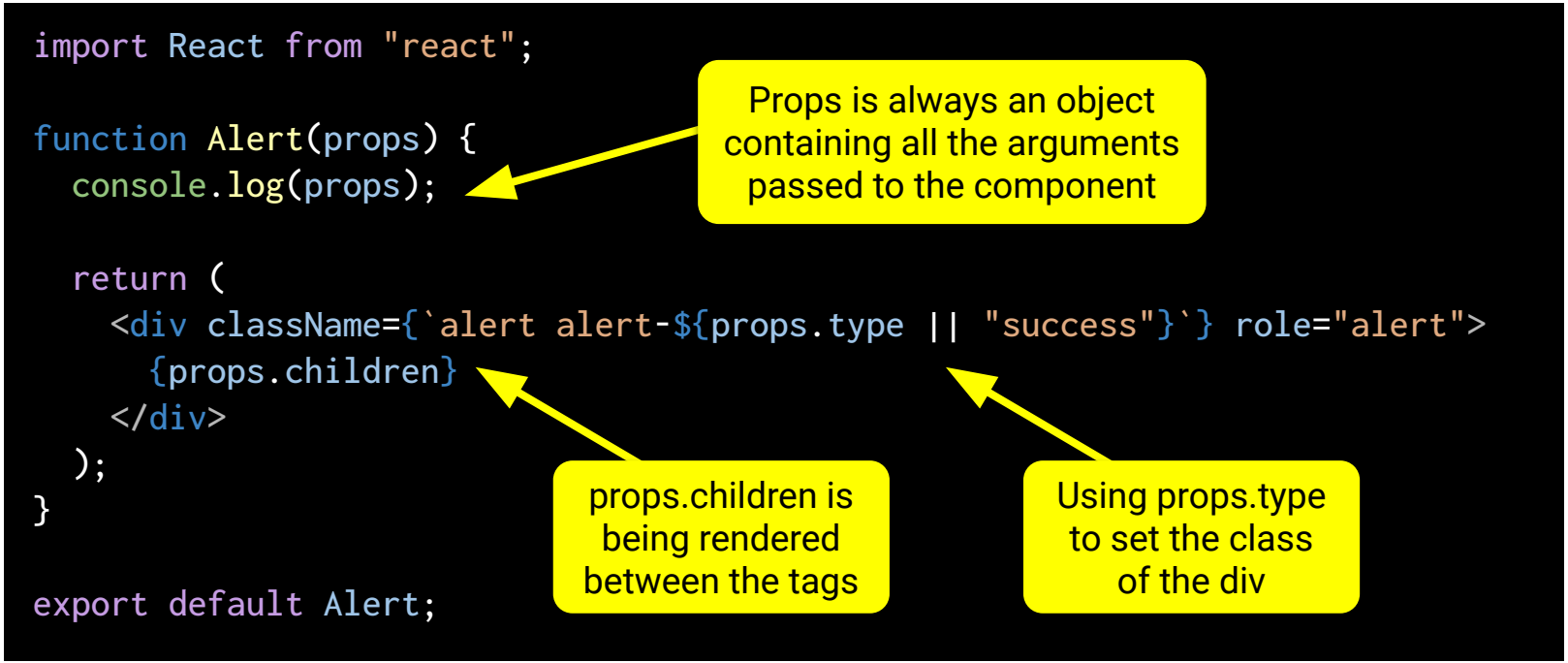
We call the arguments that we pass into React components props.



Props are like function arguments that you can pass to components for them to use.

Props

Every component has access to a `props` argument. Props are always objects containing all of the values passed to the component.



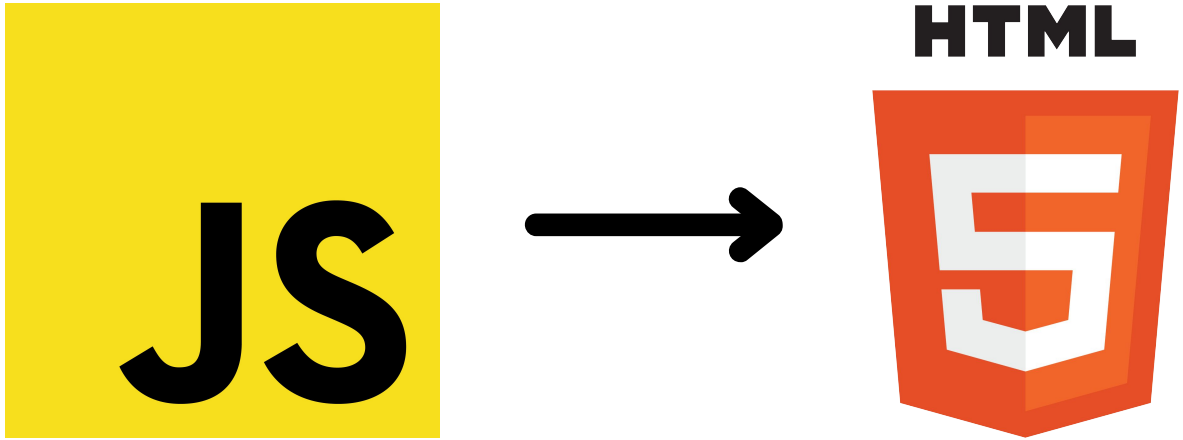
Props

These props are being passed into the Alert component.

We have two ways of passing props to components:

```
function App() {
  return <Alert type="danger">Invalid use id or password</Alert>;
}
```

Having this familiar syntax for passing props to our components is another way for JSX to be similar to HTML.



Props

Props allow us to customize our components so that we can reuse them in different situations.

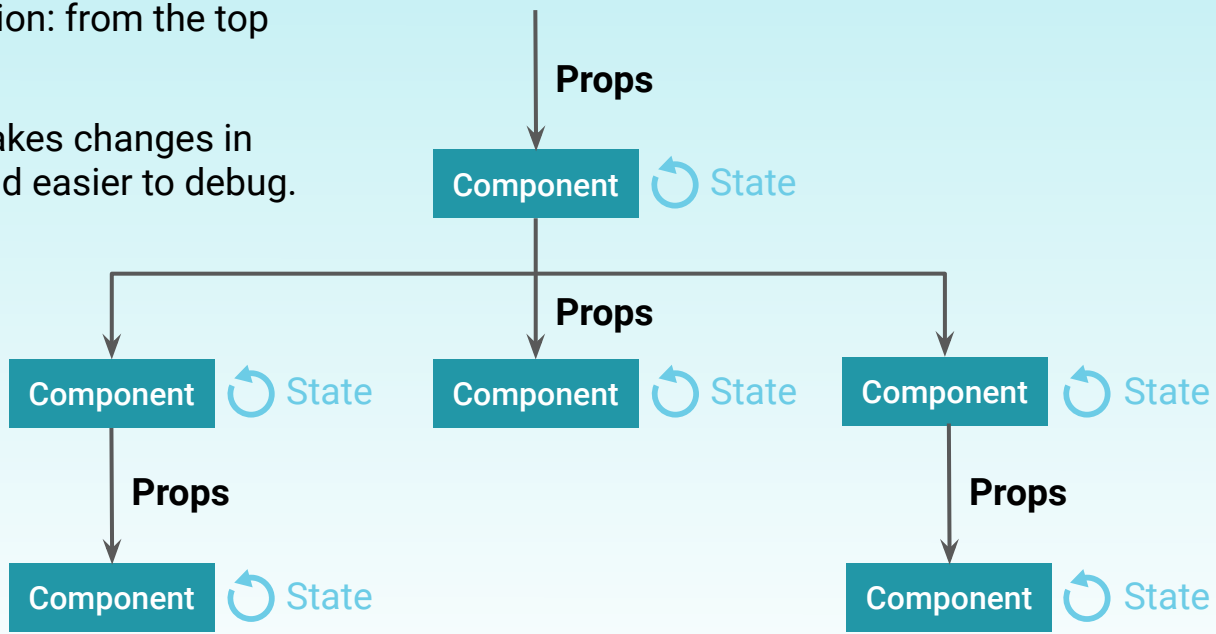
For example, we might use this `Alert` component on a sign-in page and render a different alert depending on whether or not a user has successfully logged in to their account.

Props

Props are the primary means by which we pass data around our React apps.

React utilizes a unidirectional data flow, meaning that data only flow in one direction: from the top down, parent to child.

This unidirectional data flow makes changes in React apps more predictable and easier to debug.



Source: Tarun Sharma

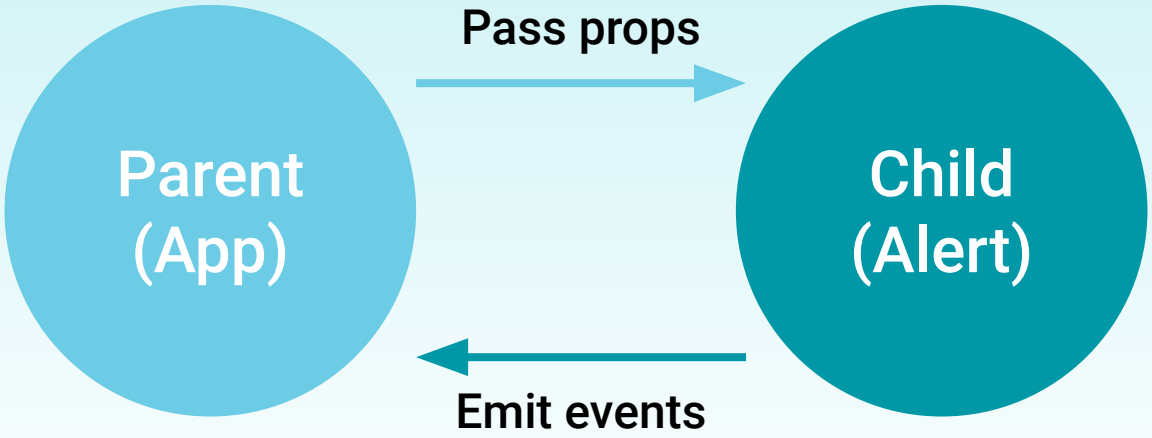
If a prop inside of our component isn't what we expect it to be, where could we look to find out why?

Props

We could look at the component's parent.

In this example, App and Alert have a parent–child relationship.

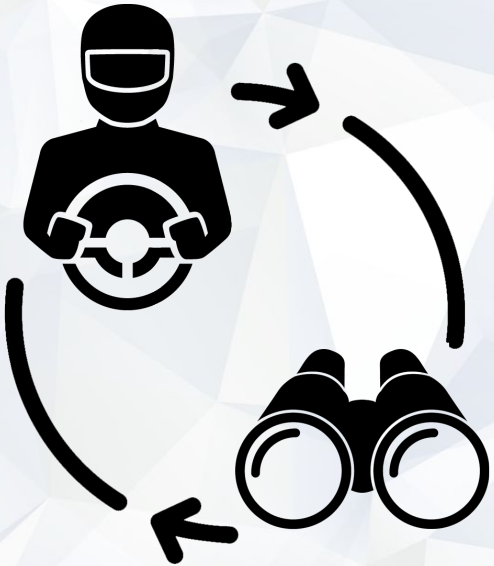
Alert is being rendered inside of App, and App is passing props to Alert.



Instructor Demonstration

Props

Questions?



Pair Programming Activity:

Calculator Props

In this activity, you will work with a partner to write a component that accepts props, performs arithmetic, and renders the result.

Suggested Time:

10 Minutes

Time's Up! Let's Review.

Review: Calculator Props

We're passing each `Math` component three props:

- `num1`
- `operator`
- `num2`

```
import React from "react";
import Math from "./Math";

// Calculator renders the Math component 4 times with different props
function Calculator() {
  return (
    <div>
      {/* Math renders a span tag containing the result */}
      {/* Each span is the font-size of the result in pixels */}
      <p>
        19 + 142 = <Math num1={19} operator="+" num2={142} />
      </p>
      <p>
        42 - 17 = <Math num1={42} operator="-" num2={17} />
      </p>
      <p>
        100 * 3 = <Math num1={100} operator="*" num2={3} />
      </p>
      <p>
        96 / 4 = <Math num1={96} operator="/" num2={4} />
      </p>
    </div>
  );
}

export default Calculator;
```

The numbers are wrapped in JSX curly braces, but the operator is in quotes.

Why do you think this is?

Review: Calculator Props

The operator is a string literal, and we can express that shorthand just by using quotes without curly braces. The following are equivalent:

```
<Math num1={19} operator={"+"} num2={341} />
```

This shorthand only works for string literals. All other values that we pass as props need to be in JSX curly braces.

```
<Math num1={19} operator="+" num2={341} />
```

Review: Calculator Props

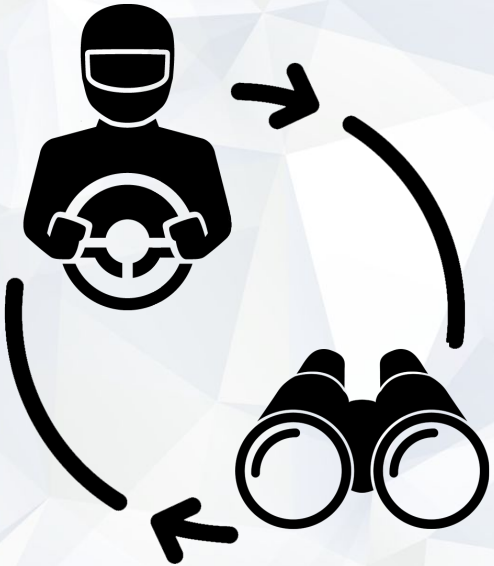
- The `props` argument should be an object containing all of the values passed to the rendered `Math` component in the `Calculator.js` file.
- At the bottom of the function, we're returning `<span>{value}</span>`.

```
// The Math function component accepts a props argument
function Math(props) {
  let value;

  // Assign value based on the operator
  switch (props.operator) {
  case "+":
    value = props.num1 + props.num2;
    break;
  case "-":
    value = props.num1 - props.num2;
    break;
  case "*":
    value = props.num1 * props.num2;
    break;
  case "/":
    value = props.num1 / props.num2;
    break;
  default:
    value = NaN;
  }

  // Return a span element containing the calculated value
  // Set the fontSize to the value in pixels
  return <span style={{ fontSize: value }}>{value}</span>;
}
```

Questions?



Pair Programming Activity:

Props Review

In this activity, you will work with a partner to make an existing React application DRIER through the use of reusable components and props.

Suggested Time:

15 Minutes

Time's Up! Let's Review.

Review: Props

The application being rendered to the browser doesn't look any different from the unsolved version, but now we've made our code DRIER by creating a reusable component, `FriendCard`, to render each friend with the appropriate prop inside of the App component.

Friends List

Name: SpongeBob

Occupation: Fry Cook

Location: A Pineapple Under the Sea

Name: Mr. Krabs

Occupation: Restaurant Owner

Location: A Giant Anchor

Name: Squidward

Occupation: Cashier

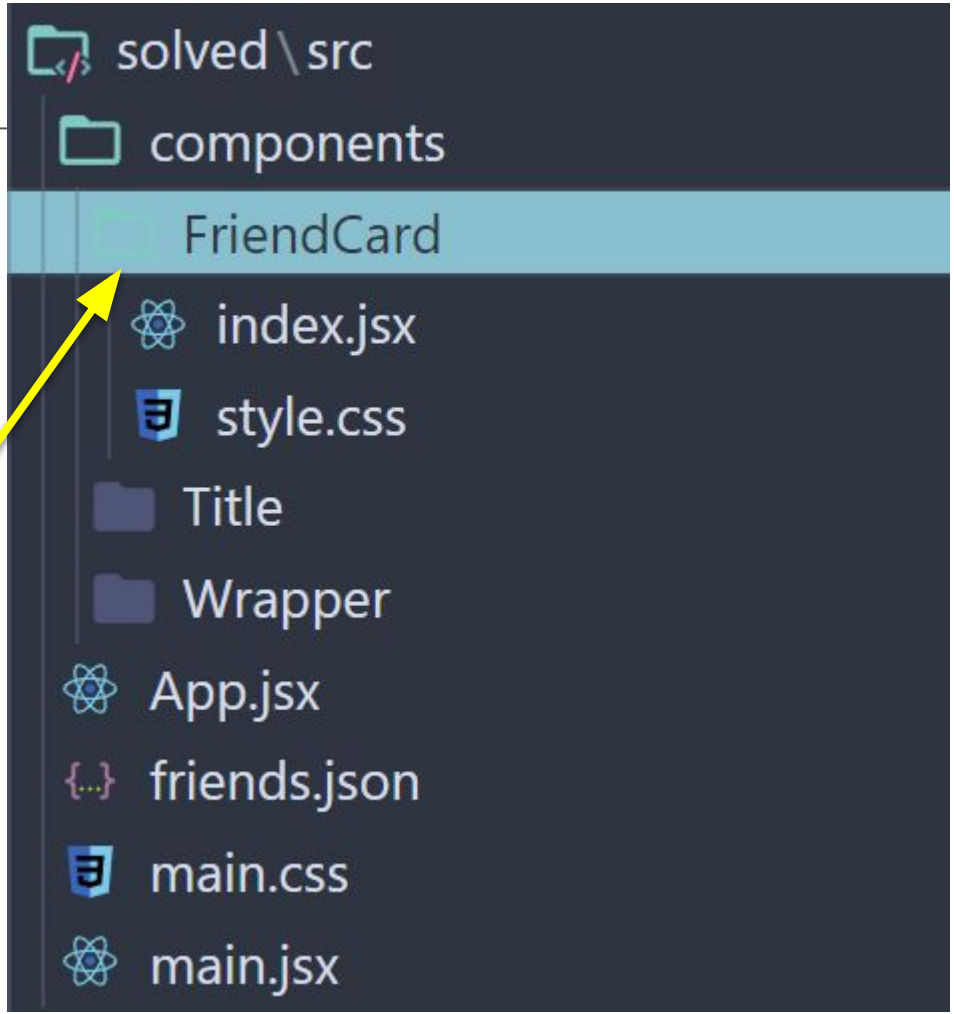
Location: An Easter Island Head

In a real application, where might all of the friend JSON data come from?

Review: Props

Normally, we might receive the friend JSON from a Fetch request and probably won't know ahead of time which friends will need to be rendered.

Each component is contained inside of its own folder containing a CSS file and an `index.jsx` file.



Why are we using `index.jsx` to hold the component instead of `FriendCard.jsx`?

Review: Props

Whenever we require/import a folder instead of a file, the folder's `index.jsx` file is required/imported by default (if it exists).

This allows us to keep our paths for importing these components short. For example, we can do:

```
import FriendCard from "./components/FriendCard";
```

instead of:

```
import FriendCard from "./components/FriendCard/FriendCard";
```

Giving all of our components their own folder is another option for organizing our React apps. Each folder could contain any CSS or other dependencies that the component will need.

Activity: Component Map

In this activity, you will utilize the map method in order to render JSX from an array of objects.

Suggested Time:

10 Minutes

Time's Up! Let's Review.

Review: Component Map

The array of grocery objects is passed into the `List` component from inside of `App`, making it available inside of the `List` component as `props.groceries`.

```
// Whenever we try to render an array containing JSX, React knows to render each JSX element separately
const List = props => (
  <ul className="list-group">
    {props.groceries.map(item => (
      <li className="list-group-item" key={item.id}>
        {item.name}
      </li>
    ))}
  </ul>
);
```

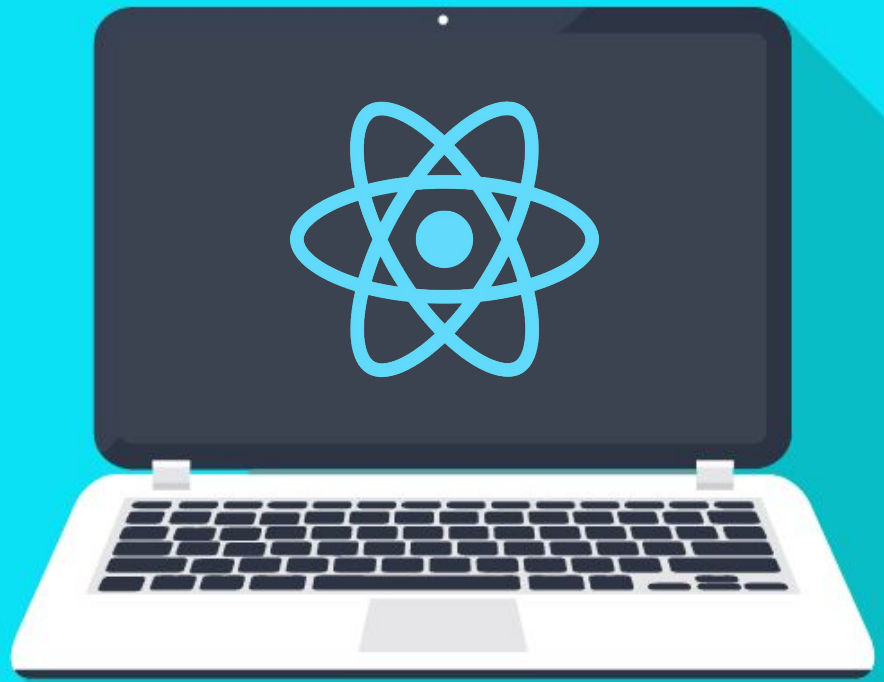
Inside of the `List` component, we insert JSX curly braces inside of the `ul` element. We map over `props.groceries` and return one `il` tag for every element in `props.groceries`.

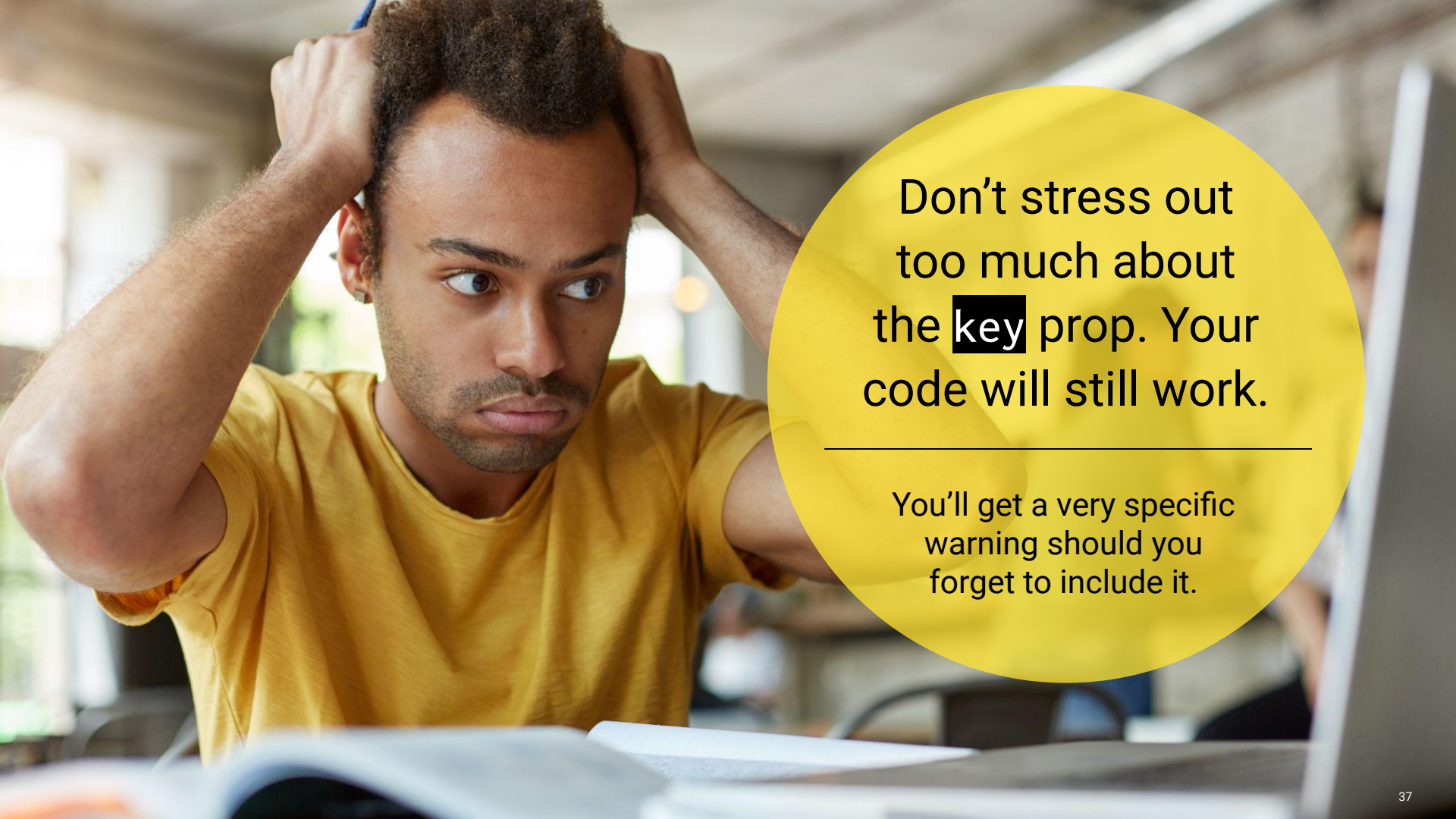
What type of value is returned by the map method here?

Review: Component Map

The map method will always return an array—in this example, it's returning an array of JSX elements.

React is smart enough to know that whenever we're rendering an array containing JSX, it should deconstruct the array and render each element inside of its parent.




Don’t stress out too much about the key prop. Your code will still work.
You’ll get a very specific warning should you forget to include it.

Questions?


Break

Stateful Components

What we've been working with so far are known as stateless, functional components

Stateless Components Can...

Stateful vs. Stateless Components

In a React application, **most** components should be stateless components.

Stateless

These are easy to test, debug, and they tend to be more reusable—even across applications—because they usually don't depend on how the rest of the application works.

Stateful

These special components are created using plain JavaScript functions, accompanied by the integration of a React feature known as Hooks.

Component State

What is state?

“State” is a specialized property that is used for component specific data storage.

A Component's "State"

- This property is recognized by React and can be used to embed data inside of a component's UI, which we want to update over time.
- Component state values differ from regular variables since updating the state triggers automatic browser updates within the React application.
- A component can set and update its own state, whereas its props are always received from up above and considered immutable (can't/shouldn't be changed).
- React components can use Hooks for state management.

React State Management

01

State is the data that is currently in memory—including numbers, strings, objects, etc.

02

At rest, state doesn’t change.

03

State changes through events—such as UI interactions, application starts and stops, and background requests.

React State Management

Most software bugs are the result of bad state. More accurately, they're the result of bad assumptions about state. We assume that some bit of data could never happen or that some sequence of state changes is impossible.

Then we write code with those assumptions baked in.

Even if our code is perfect, troubles can arise.

If our code isn't the only code managing state, another process or step can modify state into something that our code didn't anticipate.

That's a bug.

React State Management

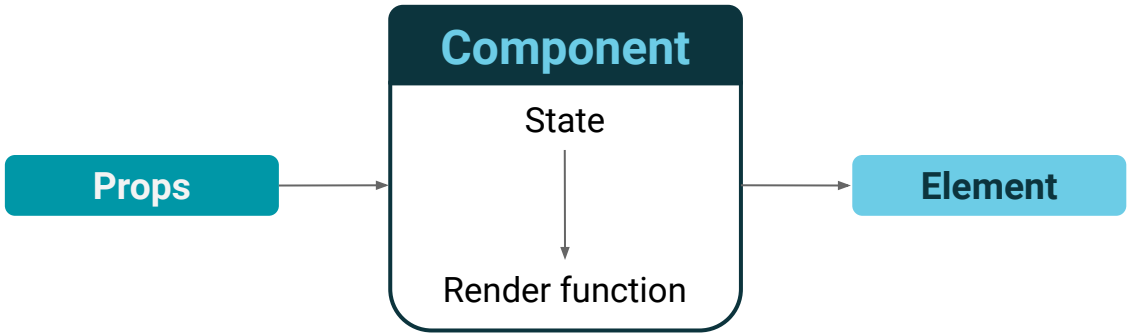
React state management protects us from a lot of that.

Science hasn’t figured out how to create truly bug-free code, but React state management gets us a little closer.

React's State Flow

At its core, React is conceptually simple.

- Component instances track their own private state.
- Components may cautiously share their state with a child via props.
- Any change to state (and by proxy, props) triggers a re-render.



React's State Flow

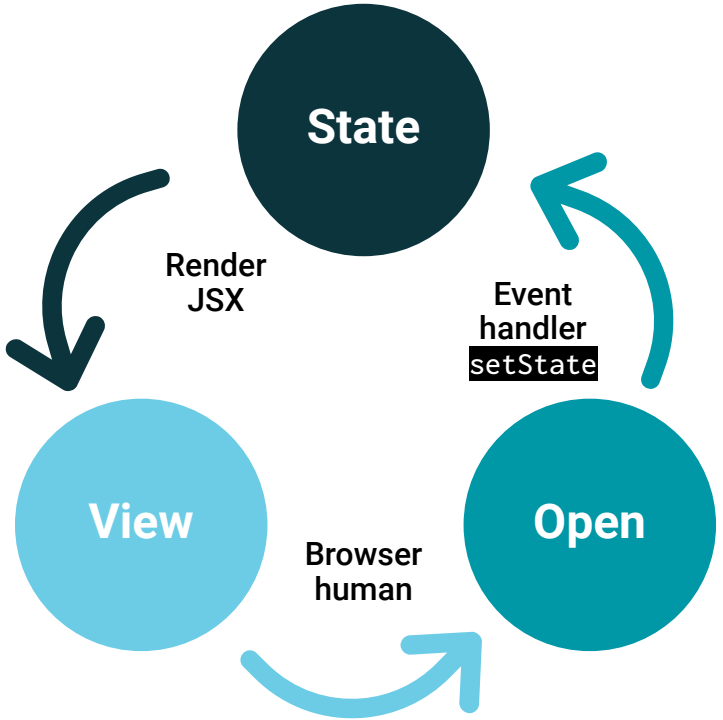
This happens over and over in the following process:

01 State drives UI rendering. React reacts to state.

02 Events modify state.

03 Return to Step 1.

But the devil is in the details.

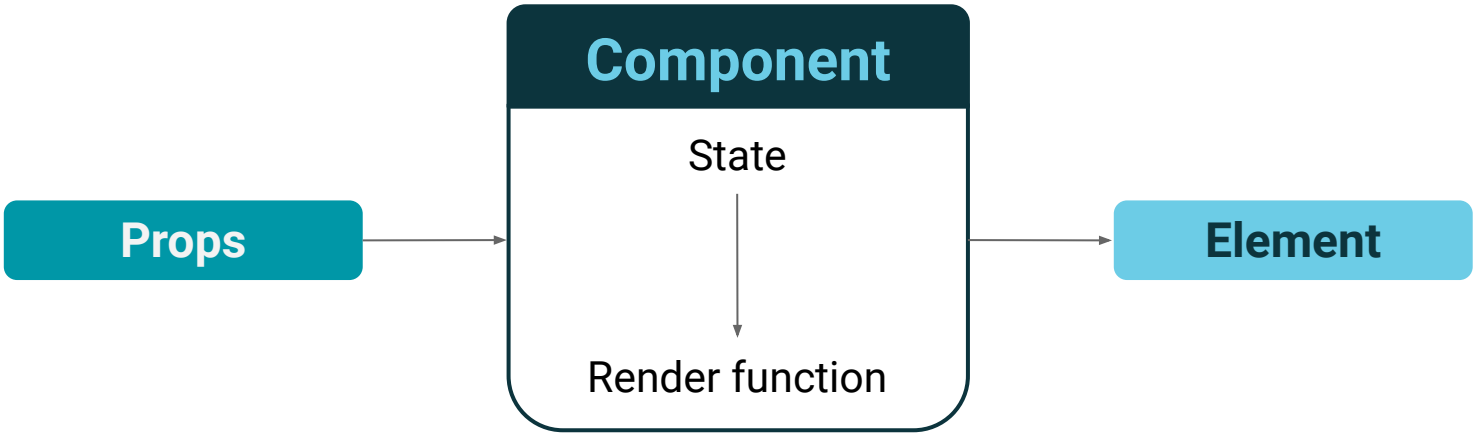


Sharing State

Sharing State

Components need a way to share messages, which is just a different way of saying that components need a way to share changes in state.

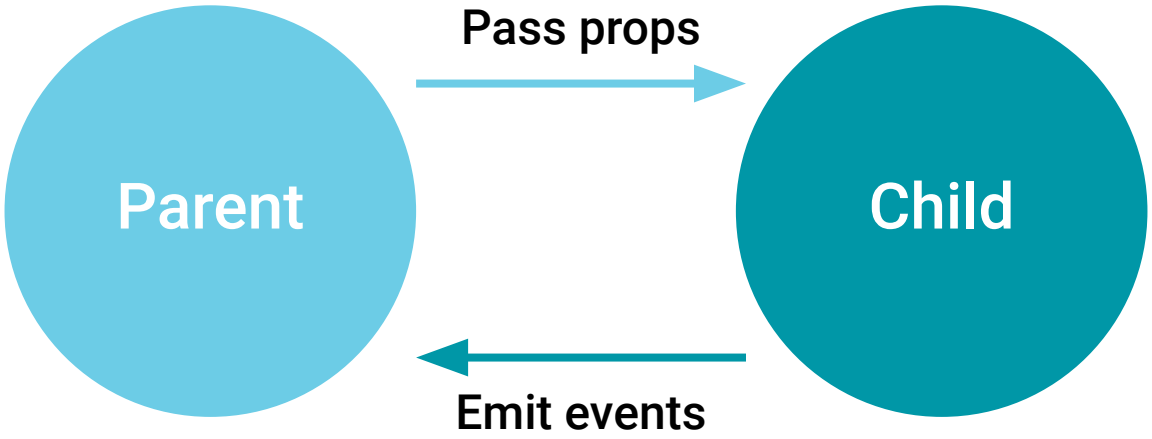
We've already seen an example of parent-to-child state sharing through props.



Children communicate with their parent via events.

Sharing State

When components communicate in both directions, they can solve interesting problems.

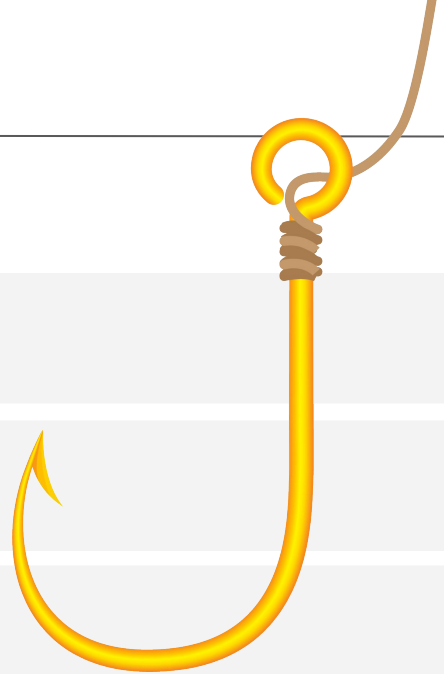


Managing state can be difficult because there is no one-size-fits-all solution.

React Hooks offer a practical solution.

React Hooks

React Hooks



- A Hook is a Javascript function.
- Hook names always start with the `use` prefix.
- Hooks allow us to extend the capabilities of our components.
- Hooks allow us to add state and utilize other react features within our components. Functional components use Hooks for state management.
- The `useState` Hook is used for component state management.

React Hook Rules

There are two rules of Hooks that must be complied with:

01

Only call Hooks from top-level components.

- This means that you should never call Hooks from within loops, conditionals, or nested functions.
- This rule ensures that hooks are called in the same order on every render.
- It is also what makes it possible for React to associate stateful values with their respective hooks.

02

Hooks may only be called from React components.

- Never call a Hook from a regular JavaScript function.
- This makes it so that all stateful logic is easy to find for the developer.

If we vary from these rules, our components will not work properly.

These rules apply to all Hooks, not just to `useState`.

useState Hook

useState Hook

The `useState` Hook offers a way for components to manage state directly, eliminating the need for data retrieval through prop drilling.

When called the useState hook accepts an initial value as an argument. Afterwards, it returns an array containing a stateful value and a function that can be used to update it.

The array returned from useState is destructured into two values: `state` and `setState`.

useState can be called with any type of value. This includes primitive data types like string, number, and boolean, as well as the data types array, object, and function.

useState Hook

Array Destructuring Assignment:

```
const [state, setState] = useState(initialValue)
```

Instructor Demonstration

Basic State

Questions?

Stateful Components

Takeaways

01

We can use state to associate data with our components and keep track of any values that we want to update the UI when changed.

02

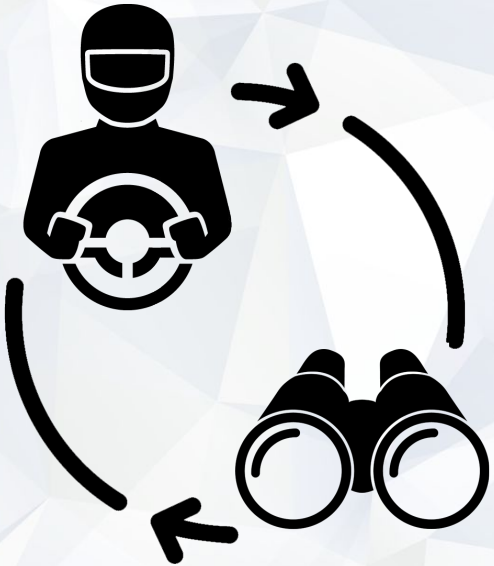
We can define functions on a component and pass them as props.

03

The onClick prop can be used to set a click event listener to an element.

Stateful vs. Stateless Components

Use a stateless component when:	Use a stateful component when:
You just need to present the prop.	Building an element that accepts user input.
You don’t need a state or any internal variables.	Building an element that is interactive on the page.
Creating an element that does not need to be interactive.	Dependent on state for rendering, such as fetching data before rendering.
You want reusable code.	Dependent on any data that cannot be passed down as props.



Pair Programming Activity:

Decrement Counter

In this activity, you will will add a “Decrement” button and event handler to the previous click counter example.

(Instructions sent via Slack)

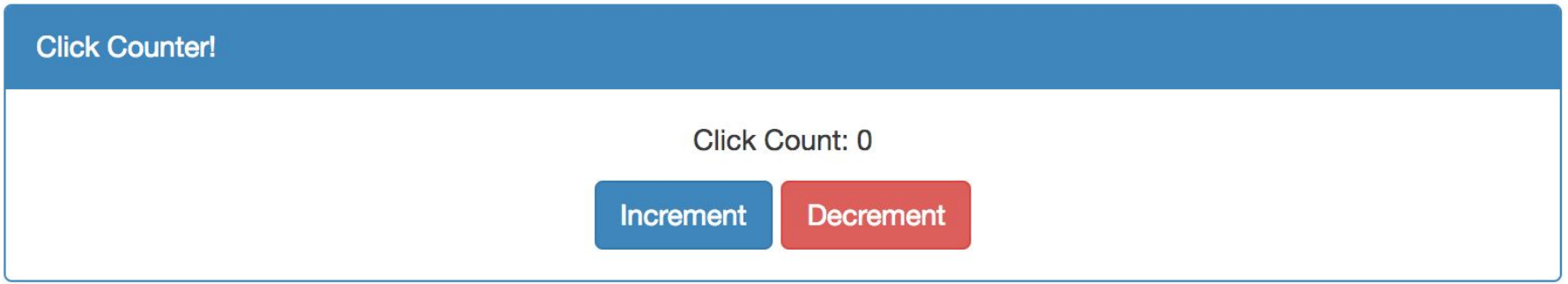
Suggested Time:

10 Minutes

Time's Up! Let's Review.

Review: Decrement Counter

You'll get more practice with working with class components.



Questions?

Activity: Friend Refactor

In this activity, you will further refactor the friends list application from earlier to use class components, events, and programmatically render the `FriendCard` components.

(Instructions sent via Slack)

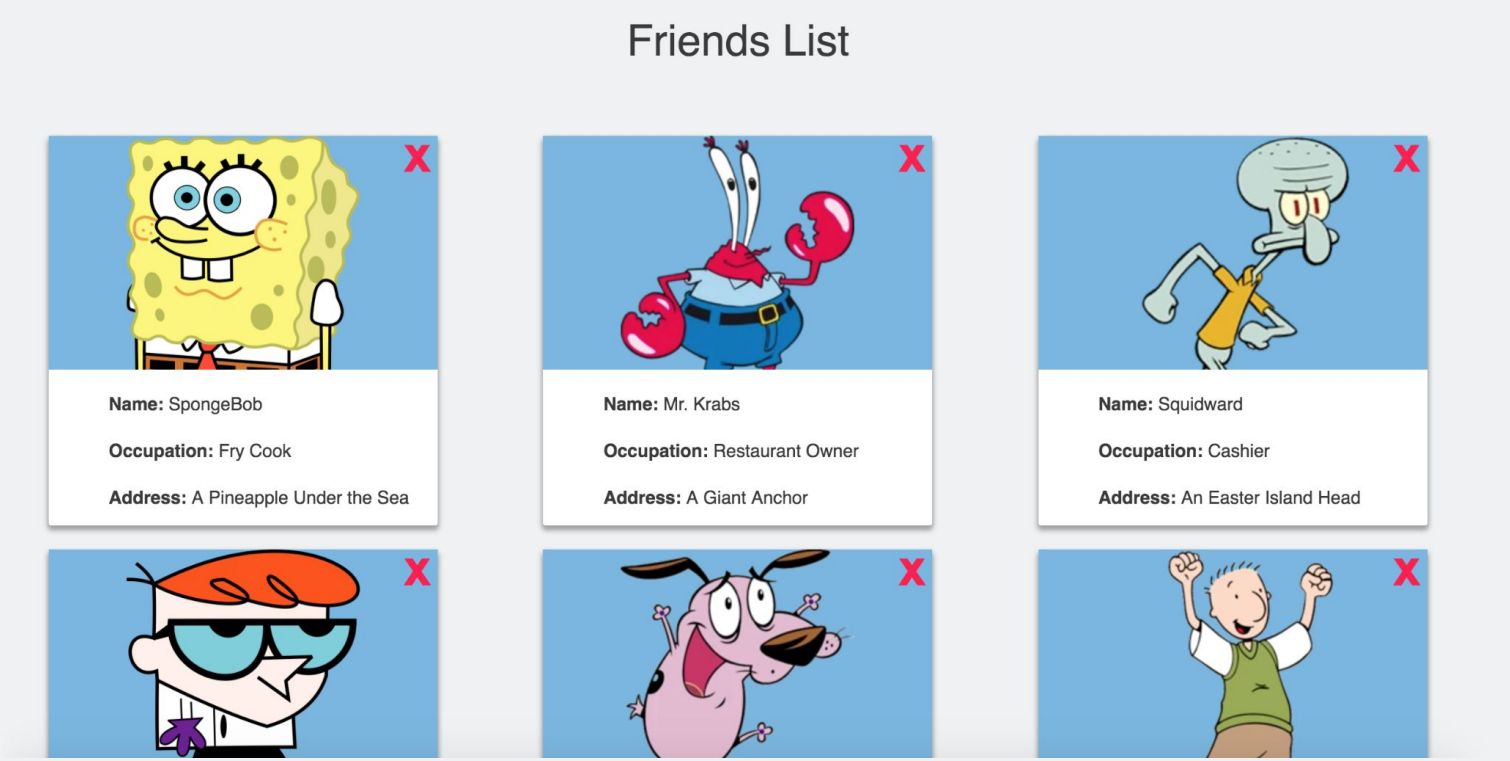
Suggested Time:

20 Minutes

Time's Up! Let's Review.

Review: Friend Refractor

We can remove friends by clicking the red **X** icon.



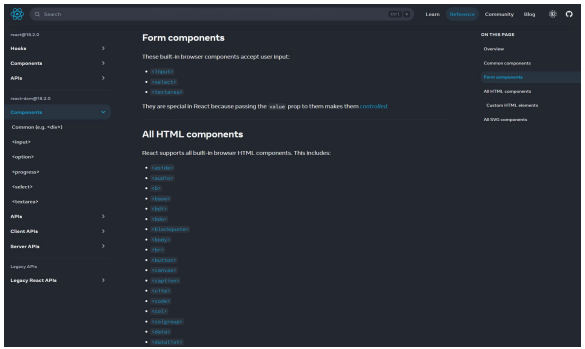
Questions?

We'll continue to go through forms in the next lesson.

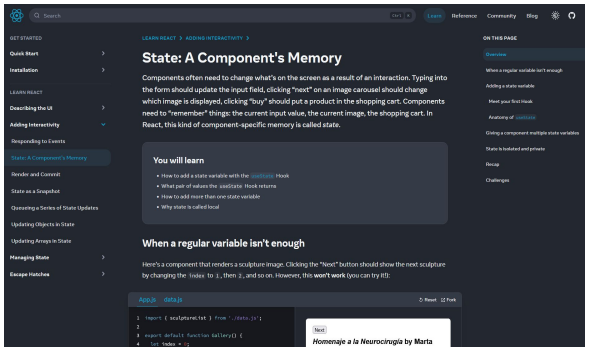
Next Class

Do your best to go through the following sections of the React documentation before the next class:

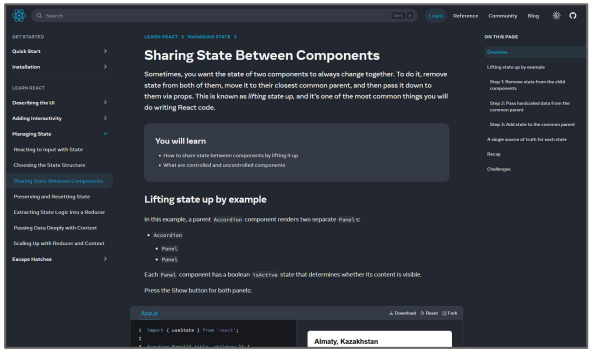
Form Components



Component State



Sharing State




The End