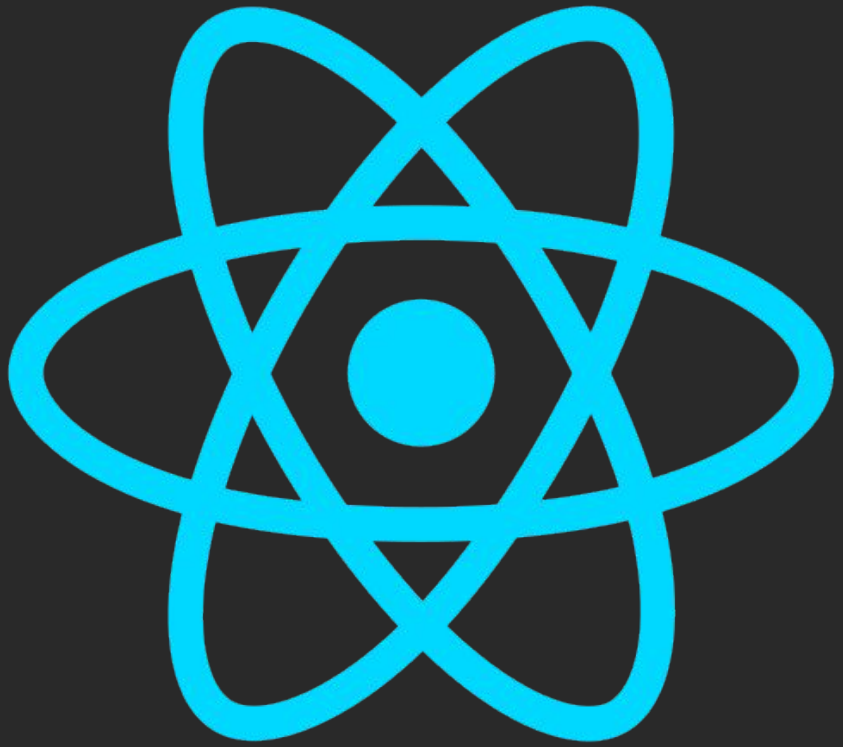
React Basics

IMY 220 ● Class Discussion



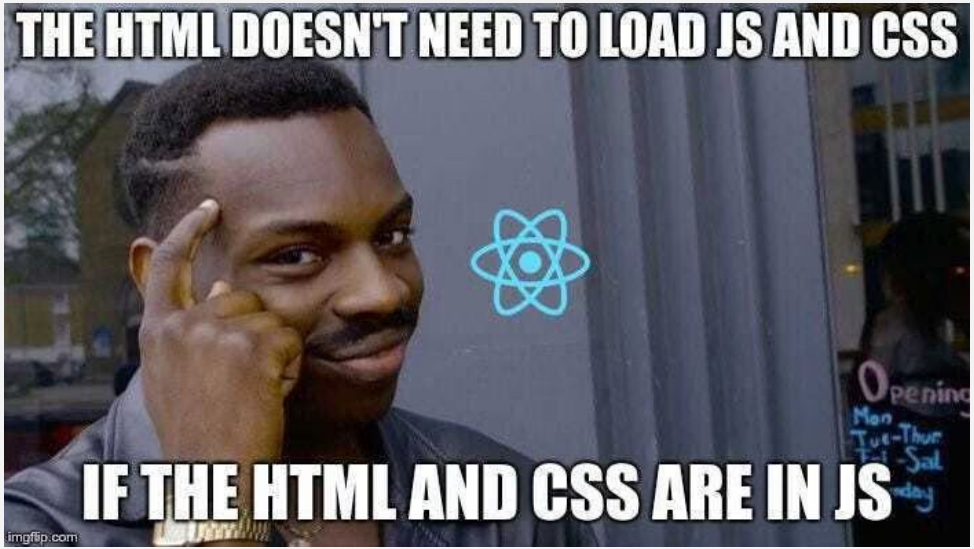
Quiz!

https://quiz.com/77046fbc-0b36-4882-84e1-48326ed70858

Lecture Recap

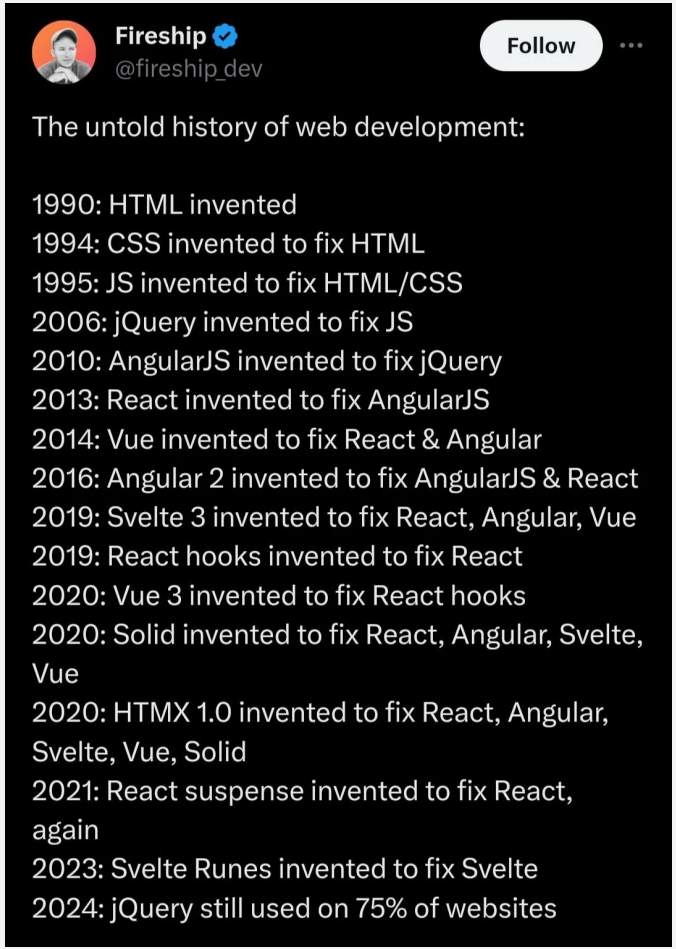
- React Basics
- Creating components
- Using components inside other components
- Props
- Types of components
- Basic component state

Download the files off ClickUP for the exercises.



What is React?

- **Frontend** JavaScript Framework
- Developed and Maintained by Facebook
- React facilitates writing code in **small isolated pieces** called components
  - Similar concept to ‘modules’
  - OOP Approach
- Very popular framework today (among many others)
  - Virtual DOM **
  - JSX



“JavaScript Framework”

“JavaScript Framework”

“JavaScript frameworks are an essential part of modern front-end web development, providing developers with tried and tested ***tools for building scalable, interactive web applications****.*

Many modern companies use frameworks as a standard part of their tooling, so many front-end development jobs now require framework experience.”

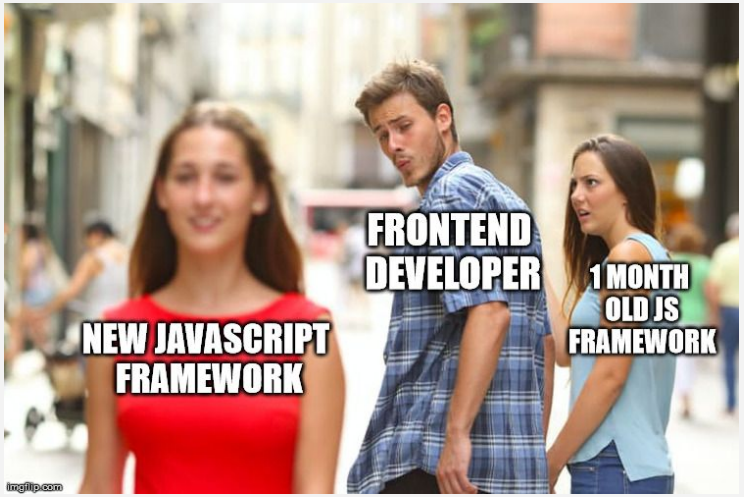
https://developer.mozilla.org/en-US/docs/Learn/Tools_and_testing/Client-side_JavaScript_frameworks

React is a **Frontend** Framework - Build UI with it

- Other JS Frameworks needed to build backend parts of applications
- Server-side features are coming soon though

“JavaScript Framework”

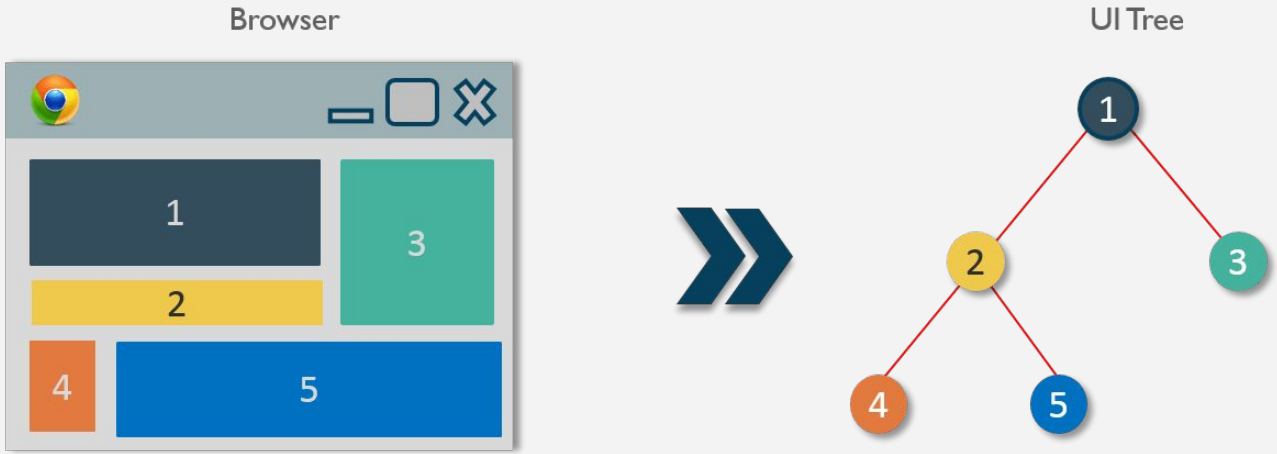
- New ones come out all the time
- Each are kind of the same, but kind of different
- Come back to this in later lectures
- **Why React?**



Components

- **Core** of every React Application
- **Reusable** pieces of code
- **Encapsulate** one ‘object’ / function.
- Like OOP **classes / objects**
- **Self-contained** (ideally).

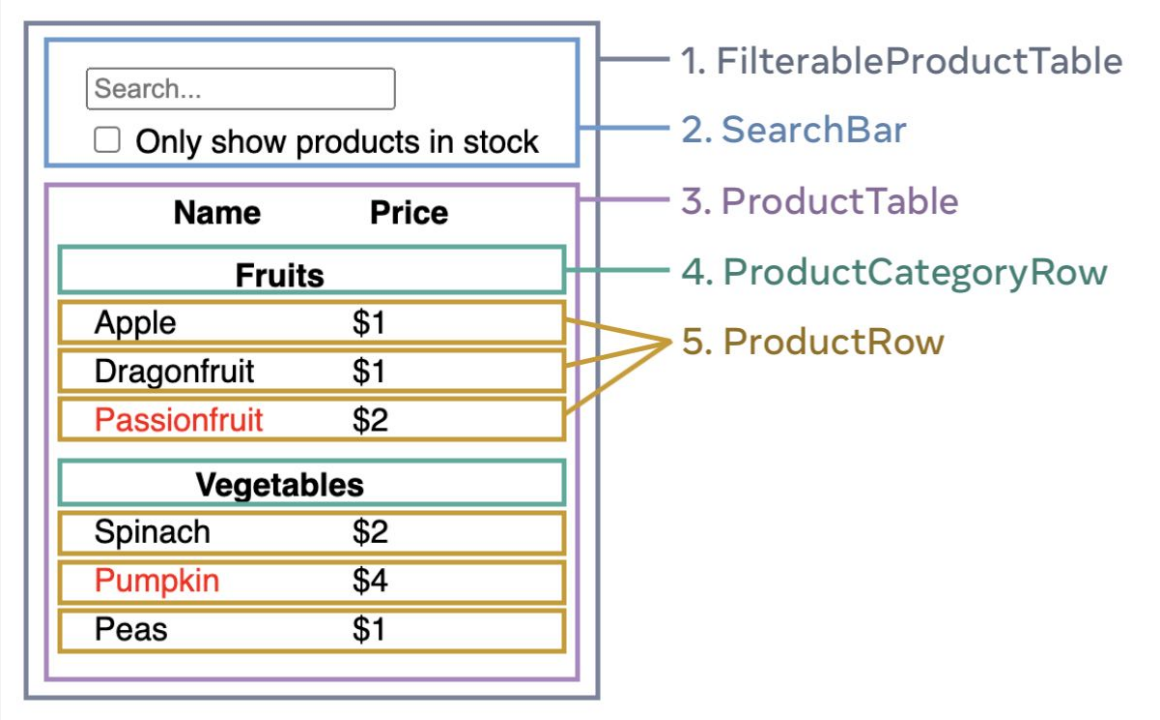
- Tell React how to Render stuff to the DOM (**Virtual DOM** **)
- **JSX** = JavaScript XML
  - Write React components more intuitively



Components

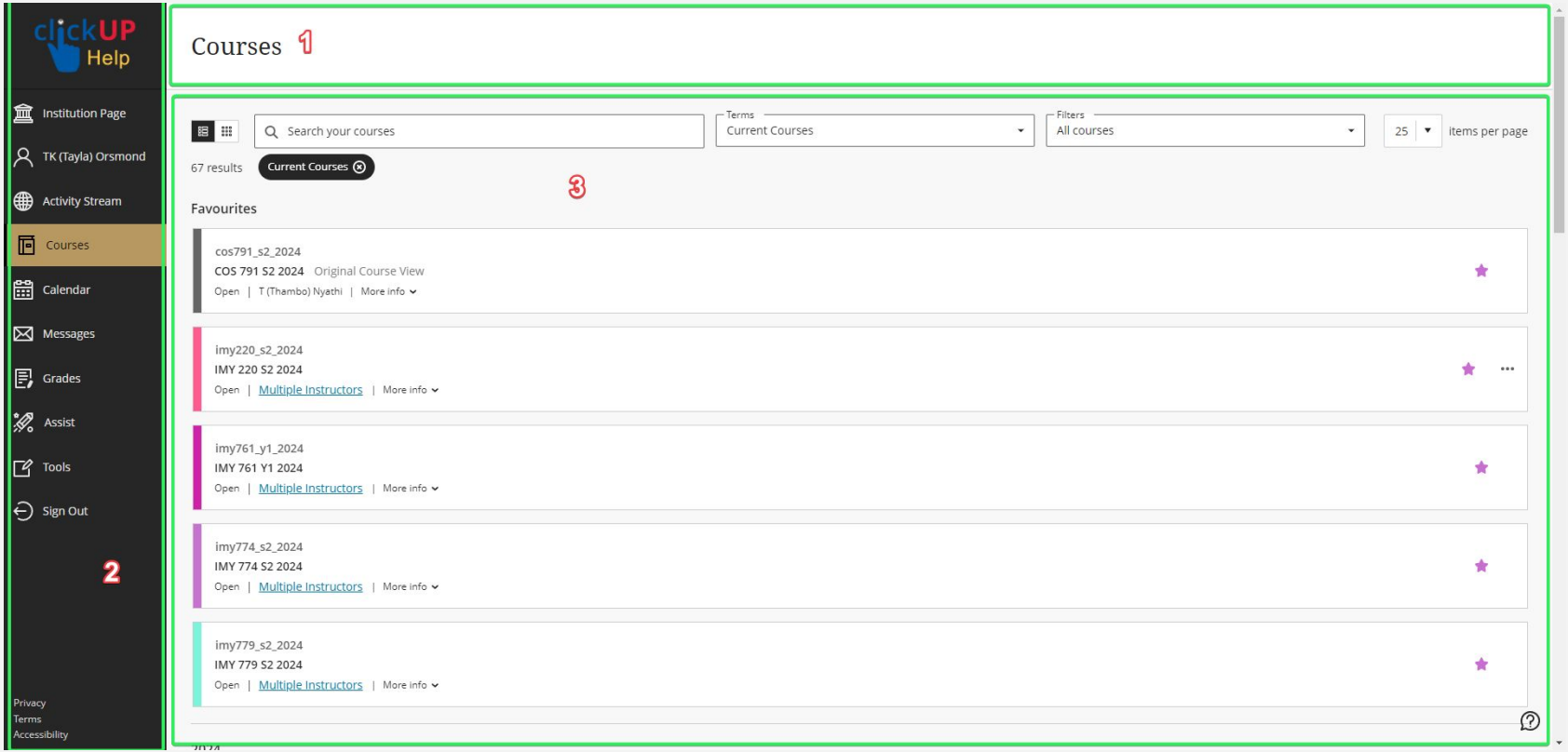
One ‘page’ doesn’t have all the functionality anymore.

Divide our ‘pages’ / app into functional **pieces**.



https://react.dev/learn/thinking-in-react

Components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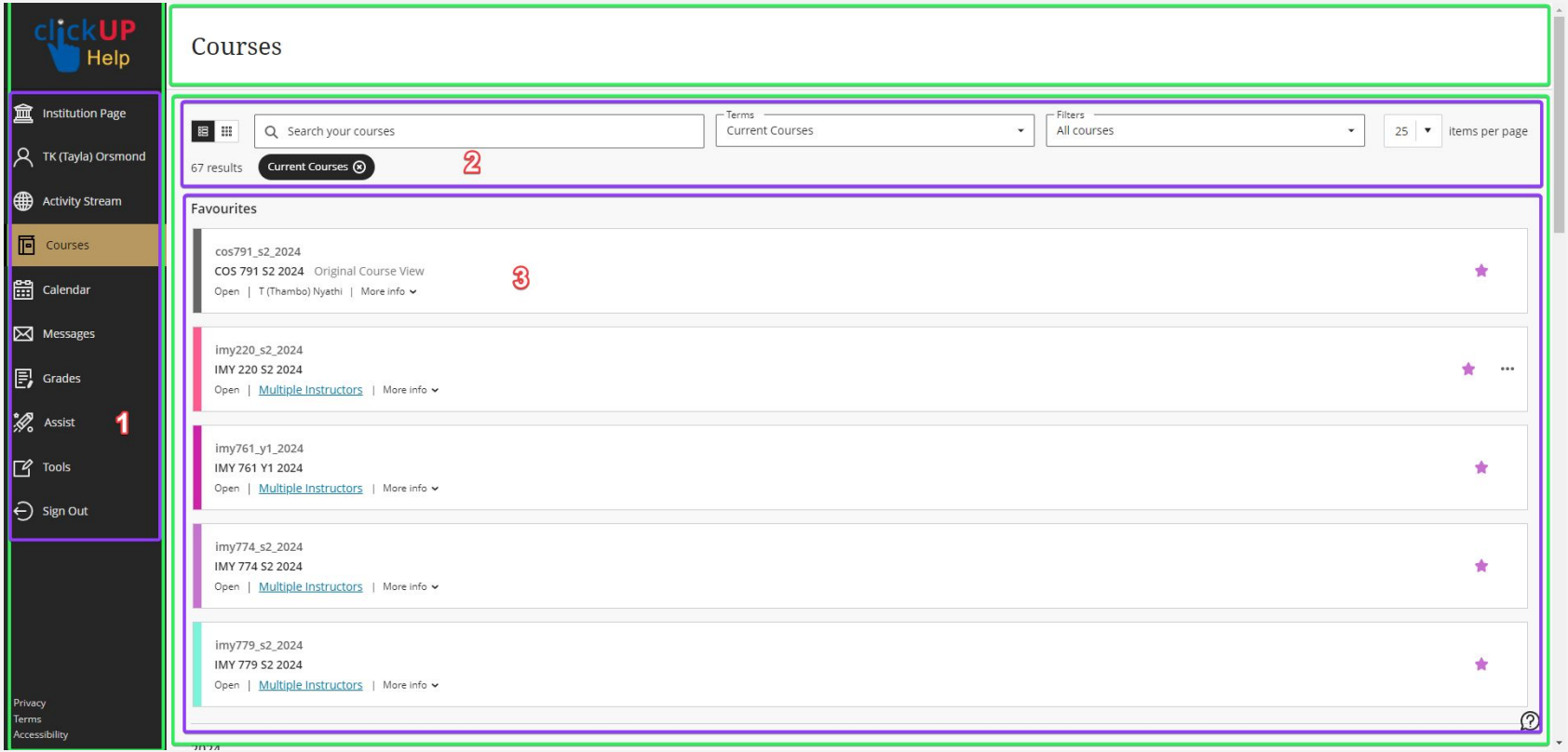
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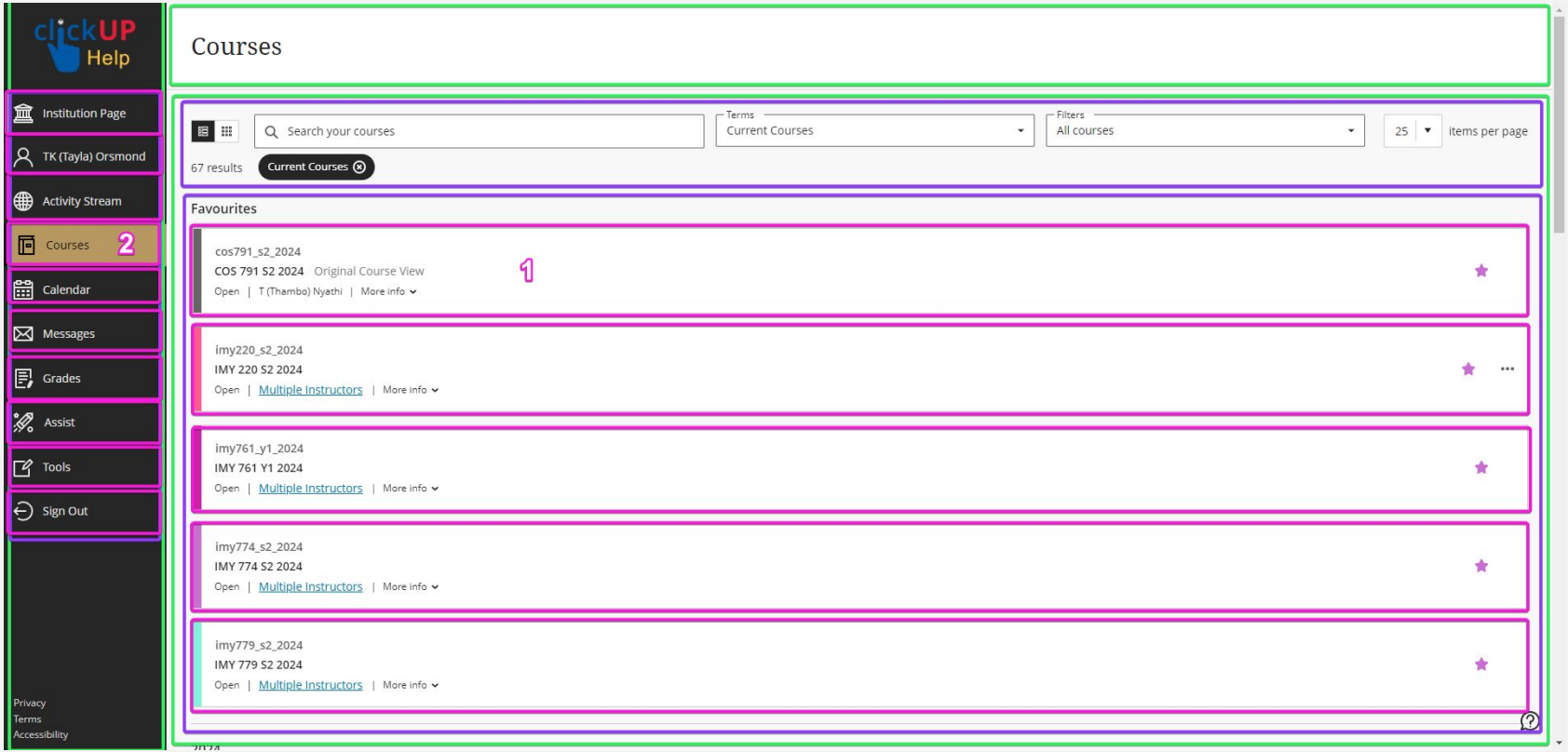
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Components


clickUP Help
Courses
Kind of unecessary - more work to pass data
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Creating Components

```
class ComponentName extends React.Component {...}
```

1. **Capital letter** (very important, React will sometimes try render an HTML element otherwise - also convention)
2. `extends React.Component` (using some of the basic React component library functionality - same thing as inheriting from a C++, Java or JS class)
3. `{...}` (JS class functionality goes here - with some added functions React provides in the base class (we'll get to this in later lectures))

Creating Components

Two must-haves:

constructor()

1. `constructor(props)` - anything you pass to the component as props…
2. `super(props)` - …must also be passed to the parent (in this case React.component)

render()

1. Returns JSX (HTML and JS in `{}`)
2. Tells React what elements to render and how

⭐ Creating Components: Exercise

Note: Using babel CDN (do NOT do this in production - very slow!)

- *Just to get used to it*

Use the files off of ClickUP. In the file called **App.js**, implement (5mins):

- A simple contact card component called `Contact` that takes a person's name, surname and email and displays it as shown here.
- The values can be **hardcoded** for now.

*Render this component on the index.html page by finishing the code in App.js to **render the Contact component inside the "#root" div**.*

Contact Alice Apple

Email: alice.apple@email.com

Using Components

Components can be used inside other components!

- Encapsulate functionality and reuse it in other parts of your code
- `export class ComponentName {…} // like with Node modules`
- `export default ComponentName // if only one component in file`
- `import ComponentName from ‘./Component’ // .js is implicit`
- Use component JSX in **render()**

Important:

- Only **one** root element (`React.createElement` function under the hood only takes one root parameter)
- To not bloat the HTML with s, use React **fragments**
  - OLD method in videos: <React.fragment>
  - ⭐⭐⭐ **NEW method: `<Fragment></Fragment>` or `<></>`**

Using Components

How do we pass data between components?

- **props**
  - Basically like arguments in a function
  - Used in the constructor to set state - state used in **render()**
  - For simple components, props can be used right in **render()**
  - In the component **JSX passed in like 'attributes'**
    - *Aside: className not class*

```
<ClassName prop1="primitive prop" prop2={Js prop} />
```

As many props as we want.

⭐ Using Components: Exercise

Note: Using babel CDN (do NOT do this in production - very slow!)

- *Just to get used to it*

Use the same files off of ClickUP. Implement in **App.js** (5-10mins):

- Pass name, surname and email values to `Contact` component using **props**. Props can be used directly in render() since this component doesn't need state.
- Create a `ContactList` **component** list that takes a JS array of contact objects as its prop and renders a list of **Contact** components.

***Render** the **ContactList** component to index.html using the same method as before (but instead of Contact, it's ContactList). Pass in the provided list as a **prop**.*

You do not need to export / import since they are in the same file.

Contact Peter Plum

Email: peter.plum@email.com

Contact Alice Apple

Email: alice.apple@email.com

Contact Percy Pear

Email: percy.pear@email.com

Contact Olive Orange

Email: olive.orange@email.com

Contact Beatrice Banana

Email: beatrice.banana@email.com

Contact Graham Grape

Email: graham.grape@email.com

Contact Fiona Fig

Email: fiona.fig@email.com

Component State

Components can have **state**

- **React interactivity**
- Tells React what state the application is in at a point, and **when React should re-render the browser (update DOM) to reflect the updated state**.

Several things can trigger state change / re-render:

1. **Initial** component load (first-time)
2. Page **reload** (same as initial)
3. State variable updates to a **different value** than its current one
4. **Forcing** reload (not recommended)

Component State

This gets pretty complicated pretty fast.

We will talk about this again in future lectures.

For now, let’s look at simple state.

Component State

`this.state`

- `state` is similar to `props` but has built-in functionality for updating / re-rendering (using virtual DOM)
  - **VERY BAD IDEA to mutate (change) `props`**
- **Has to be initialised as a JS object in the constructor `{}`**

Modify state:

- **Must call `setState()` NOT modify state variables directly (i.e., like vars)**
- React handles the state for you - automatically updates the elements for you whenever you call setState() - will NOT work if you try modify directly
- Complexities: Batch updates, value comparison, etc. (Future Lecture)

Component State - Events

JS event handlers to handle user input

- `onclick` => `onClick` (React version of the event handler)
- Define the function used onClick in the class (self-contained functionality)

JS Class functions **not automatically bound to class** (does not have access to component's `this`)

- Have to manually bind them

`.bind()` - change what `this` refers to in a specific function

- Set the scope of `this` to that of the passed in argument - i.e., change what `this` refers to
- Correct place to bind = **constructor**

Functions can then modify state with `setState()`

Component State - Refs

Refs = Interact with child elements

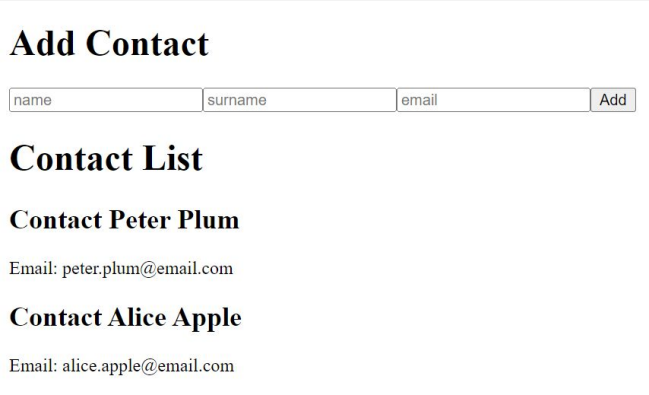
- Access values from child elements such as inputs / focus inputs
- **Refs are created with `React.createRef()`**

```
this.refName = React.createRef()
```

```
<input … ref={this.refName} />
```

- Access element: `this.refName.current`
- Access element value (if input): `this.refName.current.value`

⭐ Component State - Exercise



Note: Using babel CDN (do NOT do this in production - very slow!)

- *Just to get used to it*

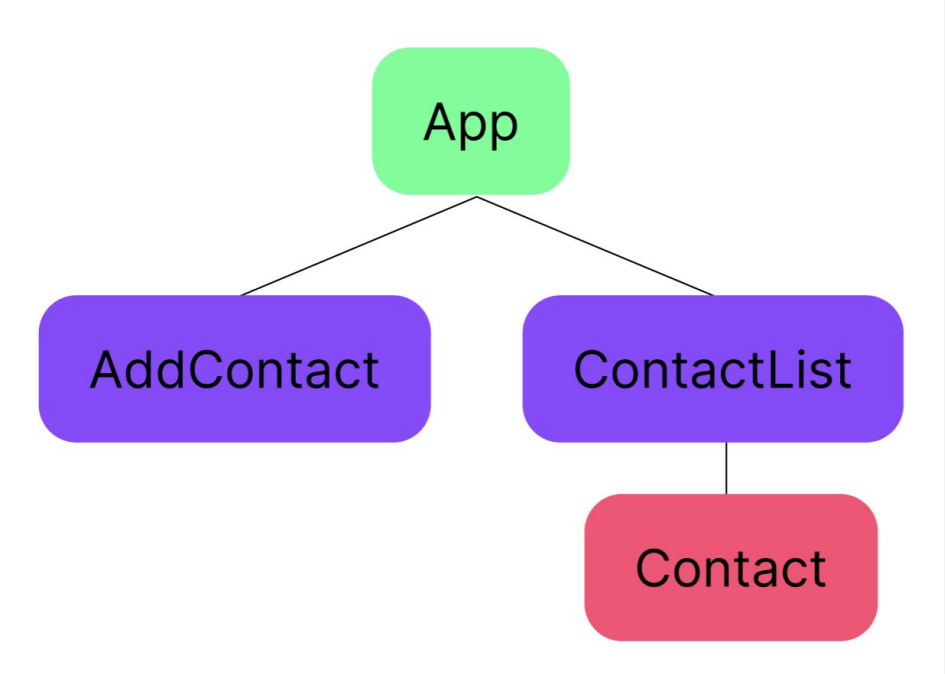
Use the same files off of ClickUP. In the file called **App.js** implement (10-15mins):

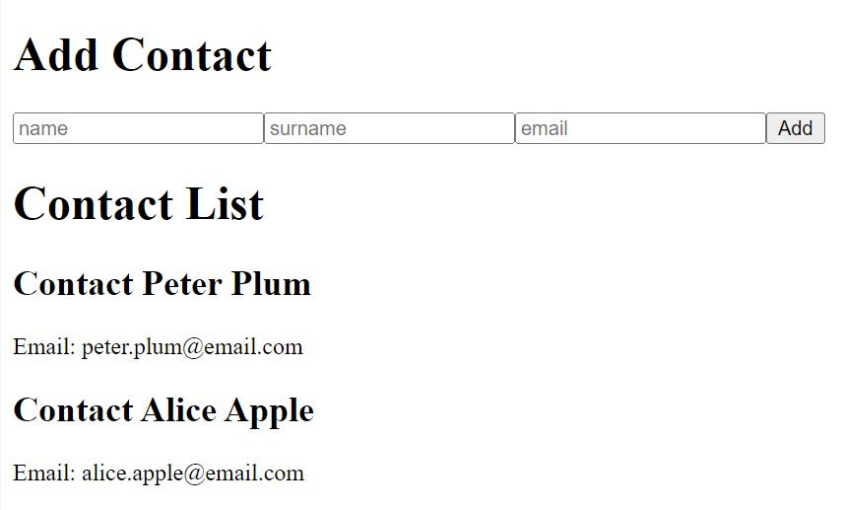
- A component called **`AddContact`** that contains a **form** to add contacts to the list. It should define a function called **addContact** that it uses to add contacts to the list by **getting the form values (hint: ref)**, and then calling **onContactAdded** that is passed in as a prop.
- A component called **App** that acts as the parent component.
  - It should have two children: **AddContact** and **ContactList**.
  - It should take in a list of contacts as its prop and use this to initialize its state. It should pass this state to its child **ContactList**.
  - It should also define a **onContactAdded** function which updates its state (adds a contact to the array). It should pass this function to its other child **AddContact**.

*Render the **App** component to index.html, passing it the provided list of contacts.*

⭐ Components - Exercise

Final structure should look like this:





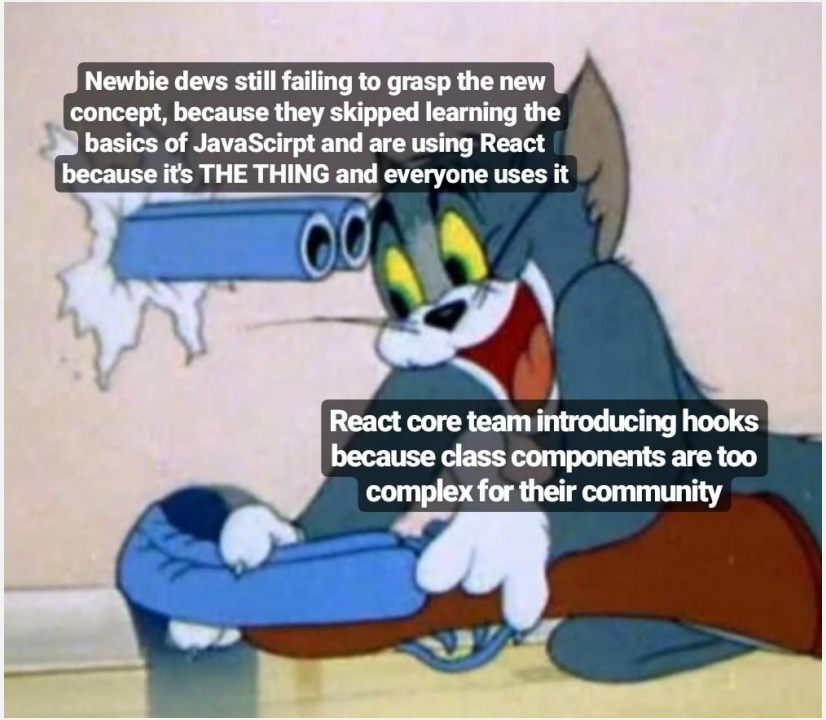
Types of Components (in the Wild)

Functional components

- Newer
- Generally preferred (even by React themselves)
- Two forms: `function()=` and `const = () =>`

Class components

- Simpler to understand (OOP)
- Still run into some of the same errors if you use functional over class
- Recommended for you



Types of Components (in the Wild) - Differences

Class

```
class App extends React.component {
  constructor(props) {
    super(props);
  }
  render() {
    return (
      <div>
        <h1>My App</h1>
        <p>My app is awesome</p>
      </div>
    );
  }
}
```

Functional

```
function App(props) {
  return (
    <div>
      <h1>My App</h1>
      <p>My app is awesome</p>
    </div>
  );
}
```

Types of Components (in the Wild) - Differences

Class

```
class App extends React.component {
  constructor(props) {
    super(props);
    this.state = {
      prop1: this.props.prop1,
    };
    this.ref1 = React.createRef();
    this.function1 = this.function1.bind(this);
  }

  function1() {
    this.setState({ prop1: "new value" });
  }

  render() {
    return (
      <div>
        <h1>My App</h1>
        <p>My app is awesome</p>
        <p>Prop1 {this.state.prop1}</p>
        <button onClick={this.function1}>Change</button>
      </div>
    );
  }
}
```

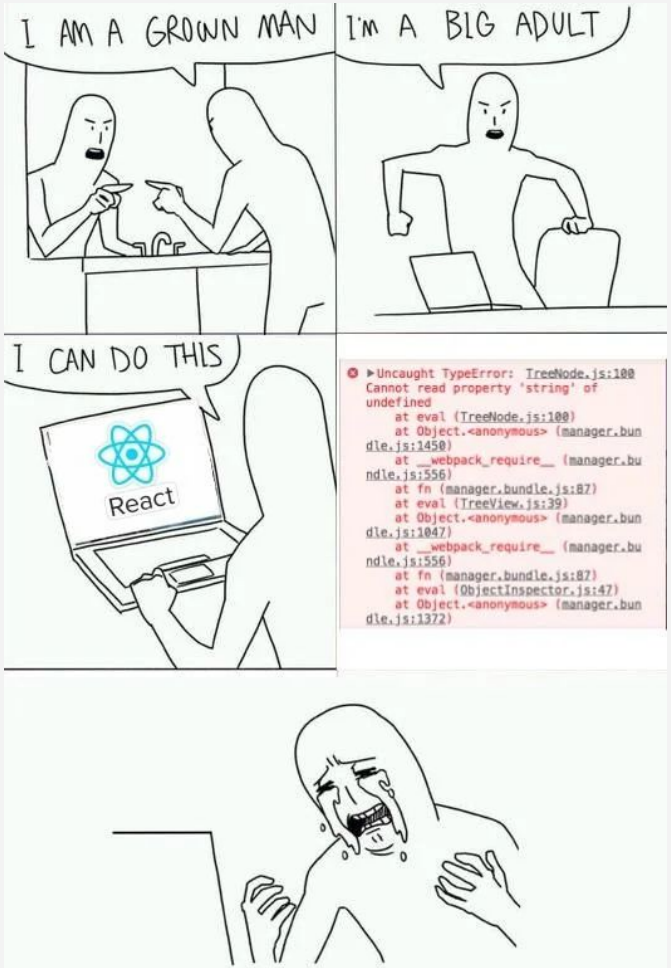
Functional

```
function App({prop1}) {
  const [state1, setState1] = useState(prop1);
  const ref1 = useRef();

  //const function1 = () => { setState1("new value"); };

  useEffect(() => {
    ref1.current = "new value";
    setState1("new value");
  }, []);

  return (
    <div>
      <h1>My App</h1>
      <p>My app is awesome</p>
      <p>Prop1 {state1}</p>
      <p>Ref1 {ref1.current}</p>
      <button onClick={function1}>Change</button>
    </div>
  );
}
```

Troubleshooting React 🔥🔥🔥

You are likely to run into issues when dealing with React State and Asynchronous behaviour

- COS 226 is your friend when understanding WHY these issues arise.
- I will try my best to guide you through some of these issues when we get there.
- Lots of frameworks exist for managing React's state for more complex applications.
- For our simple application (semester project) you will be fine without them.



Extension Exercises We Don’t have Time for:

- Edit Contact with a form that auto-populates values
- Reverse the Contact list
- Search to filter the list
- Display one Contact from a list of clickable Contact items (requires adding a new component)
- React Assignments

React docs (be aware they use functional components): https://react.dev/learn/tutorial-tic-tac-toe

Questions?

bufferhead-code / **nextjs-use-php**

Public

Use PHP code right within your React / Next.js App. With "use php";

```
return (
    <button
        formAction={async () => {
            'use php'
            (new PDO('mysql:host=loca
                ->prepare("INSERT INT
                ->execute(array('new'
            }}>
        Insert Bookmark
    </button>
)
```