KINGSLAND UNIVERSITY

React Components – Deep Dive

Lists and Keys, Component Lifecycle, CSS Modules

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Lists and Keys

Identify Items, Reconciliation

Lists and Keys

- Using **map()** we can build collections of elements and include them in JSX using **{}**
- Keys should be given to the **elements inside the array** to give the elements a **stable identity**
- Keys help React identify which items have **changed**, are **added**, or are **removed**

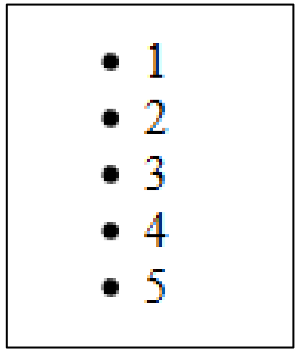
Lists and Keys

- Using **map()** to take an array of numbers and double their values

```
const numbers = [1, 2, 3, 4, 5];
const doubled = numbers.map((number) => number * 2);
console.log(doubled); // [2, 4, 6, 8, 10]
```

- Rendering Multiple Components

```
const numbers = [1, 2, 3, 4, 5];
const listItems = numbers.map((number) =>
  <li>{number}</li>
);
```



- 1
- 2
- 3
- 4
- 5

Basic List Component

- Basic List Component looks like

```
function NumberList(props) {
    const numbers = props.numbers;
    const listItems = numbers.map((number) =>
        <li>{number}</li>
    );
    return (
        <ul>{listItems}</ul>
    );
}
```

Lists and Keys

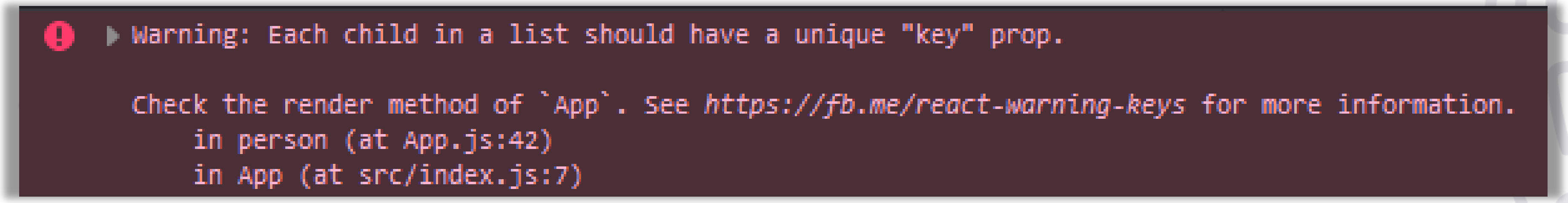
- You can build **collections** of elements and include them in **JSX** using **{}**

```
function NumberList(props) {
    const numbers = props.numbers;
    const listItems = numbers.map((number) =>
        <li>{number}</li>
    );
    return <ul>{listItems}</ul>;
}
```

- Usually lists are rendered inside a **component**

Lists and Keys

- When you render an array of elements, React needs a **key prop** to identify elements for optimization purposes
  - If they don't have it, you will get



```
Warning: Each child in a list should have a unique "key" prop.

Check the render method of `App`. See https://fb.me/react-warning-keys for more information.
    in person (at App.js:42)
    in App (at src/index.js:7)
```

Picking a Key

- The best way to pick a key is to use a **string** that **uniquely identifies** a list item among its siblings
- Most often you would use **ID**'s from your data as keys

```
const todoItems = todos.map((todo) =>
  <li key={todo.id}>
    {todo.text}
  </li>
);
```

Extracting Components with Keys

- Keys only make sense in the context of the surrounding array

```
function NumberList(props) {
    const numbers = props.numbers;
    const listItems = numbers.map((number) =>
        <ListItem key={number.toString()} value={number} />
    );
    return (
        <ul>
            {listItems}
        </ul>
    );
}
```

Keep the key on the list item

```
function ListItem(props) {
    return <li>{props.value}</li>;
}
```

List and Keys

- Don't use indexes for keys if the order **may change**
- Keys serve as a hint to React, but they **don't get passed** to your component
  - If you need the same value, pass it explicitly as prop with a different name

```
const content = posts.map((post) =>
  <Post
    key={post.id} id={post.id} title={post.title}
  />
);
```

Lists and Keys

- Keys **don't** need to be **globally unique** (only among their siblings)

```
const sidebar = (
    <ul>
      {props.posts.map((post) =>
        <li key={post.id}>
          {post.title}
        </li>
      )}
    </ul>
);
```

```
const posts = [
  {id: 1, title: '...', content: '...'},
  {id: 2, title: '...', content: '...'}];
```

```
const content = props.posts.map((post) =>
    <div key={post.id}>
      <h3>{post.title}</h3>
      <p>{post.content}</p>
    </div>);
```

Component Lifecycle

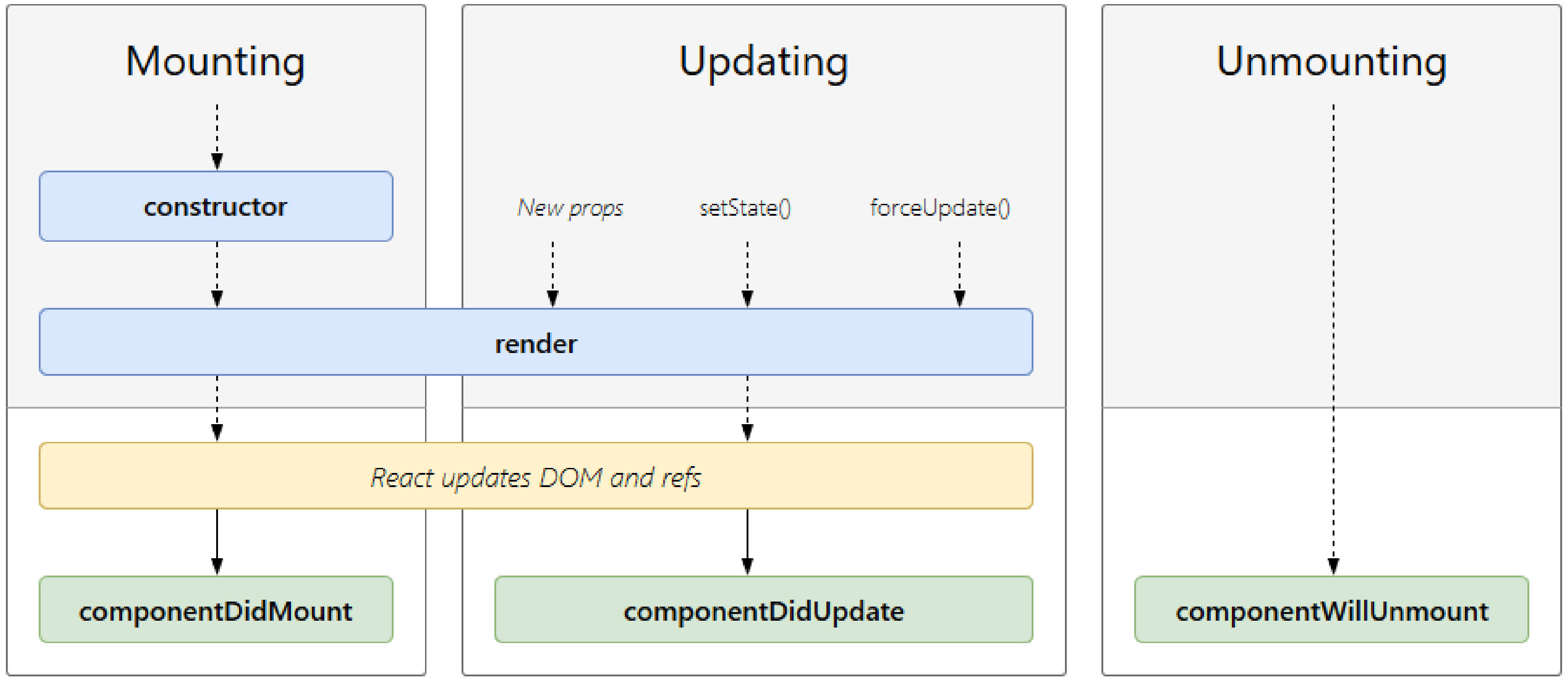
Component Lifecycle

- A component has "**lifecycle methods**" that can be overridden to run code at times in the process
- A component has **3 lifecycle** phases
  - **Mounting**
  - **Updating**
  - **Unmounting**

Lifecycle Methods

- **Mounting** - where the component and all its children are mounted (created and inserted to the DOM)
- **Updating** - component is re-rendered because changes are made to its props or state
- **Unmounting** - occurs when a component instance is unmounted (removed from the DOM)

Component Lifecycle



Component Mounting

- After preparing with basic needs, state and props a Component is ready to mount in the browser DOM
  - **constructor**
  - **static getDerivedStateFromProps**
  - **render**
  - **componentDidMount**

Component Updating

- This phase starts with the beginning of the react component and expand by receiving new updates
  - **static getDerivedStateFromProps**
  - **shouldCompoentUpdate**
  - **render**
  - **getSnapshotBeforeUpdate**
  - **componentDidUpdate**

Component Unmounting

- The component is not needed, and the component will get unmounted
  - **componentWillUnmount**
- Here React does all the **cleanups** related to the component
  - Invalidating timers
  - Canceling network requests
  - Cleaning up any subscriptions

Higher-Order Components

Advanced Composition and Decoration

Higher-Order Components

- A **higher-order component** (**HOC**) is an advanced technique in React for reusing component logic
- **HOCs** are not part of the React API
- **HOC** is a function that takes a component and returns a new component

Example: Reducer Function

- A **reducer** applies a function over a sequence of elements to produce a **single** result

```
function reduce(arr, func) {
    let result = arr[0];
    for (let nextElement of arr.slice(1))
        result = func(result, nextElement);
    return result;
}
reduce([5, 10, 20], (a, b) => a + b); // 35
reduce([5, 10, 20], (a, b) => a * b); // 1000
```

Higher-Order Functions

- Components are the primary unit of code reuse
  - Some patterns aren't straightforward for traditional components
- Whereas as component transforms props into UI
  - **HOC** component transform a component into another component

```
const EnhancedComponent = higherOrderComponent(WrappedComponent);
```

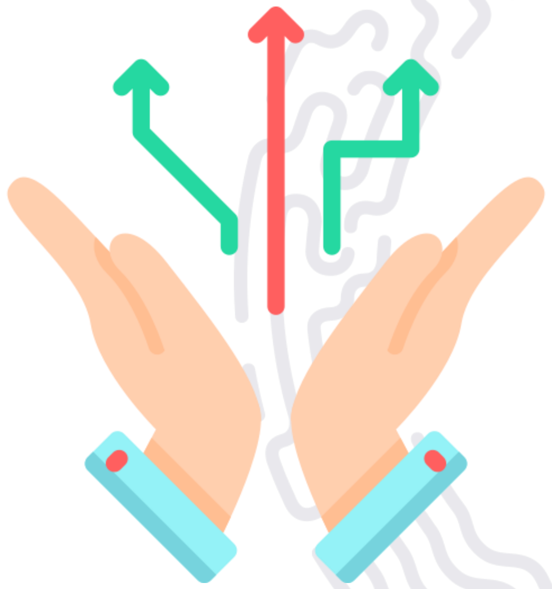
HOC Example

- Logging of component lifecycle events

```
function logged(WrappedComponent) {
    return class extends React.Component {
        componentDidMount() {
            console.log(`${WrappedComponent.displayName} mounted`);
        }
        render() {
            return <WrappedComponent {...this.props} />;
        }
    };
}
```

Advantages

- Greater **code reuse**
- Reduced **boilerplate**
- Easily handle **cross-cutting concerns**
- Commonly used for
  - Managing **form input**
  - **Binding** component props to **business logic**
  - **Automating** repetitive tasks



CSS Modules

CSS Modules

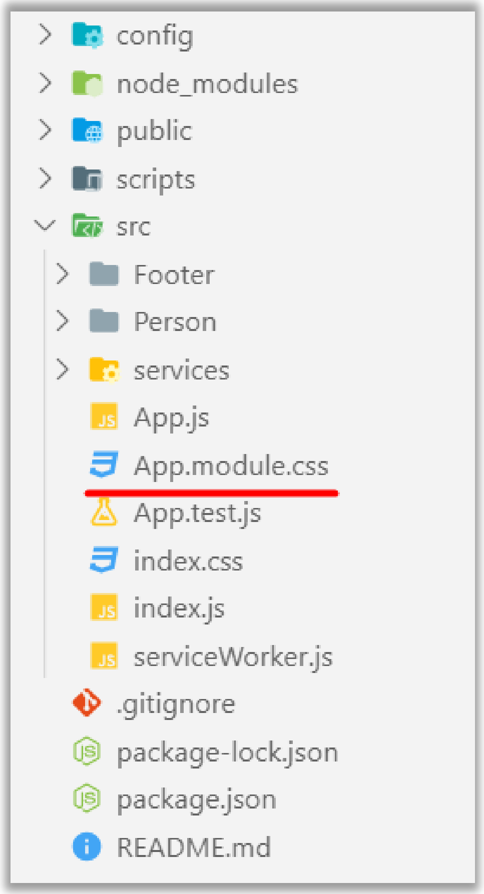
- **CSS files** in which all class names and animation names are scoped locally by default
- All **URLs** and **imports** are relative
- Importing CSS Module from a JS Module
  - Exports an **object** with all mapping from local names to global names

CSS Modules

- React supports CSS Modules alongside regular stylesheet using the **`[name].module.css`** file naming convention

```
.App {
  text-align: center;
}

.btn {
  background-color: green;
  color: white;
  border-radius: 15px;
  margin: 2%;
  padding: 0.5%;
  font-size: 24px;
  cursor: pointer;
}
```



```
> config
> node_modules
> public
> scripts
v src
  > Footer
  > Person
  > services
    App.js
    App.module.css
    App.test.js
    index.css
    index.js
    serviceWorker.js
  .gitignore
  package-lock.json
  package.json
  README.md
```

CSS Modules

- CSS Modules let you use the same CSS class name in different file without worrying about naming clashes

```css
.error {
  background-color: white;
  color: red;
}
```

CSS File called Button.module.css

```jsx
import React, { Component } from 'react';
import styles from './Button.module.css';

class Button extends Component {
  render() {
    return <button className={styles.error}>Error Button</button>;
  }
}
```

Importing all styles

Using error class from the css file

Using Fetch API

Fetching Remote Data

Fetch API

The **Fetch API** provides an interface for accessing and manipulating **requests** and **responses**

- **`fetch()`** function which provides easy way to fetch resources asynchronously
- functionality like this was previously achieved using **XMLHttpRequest**

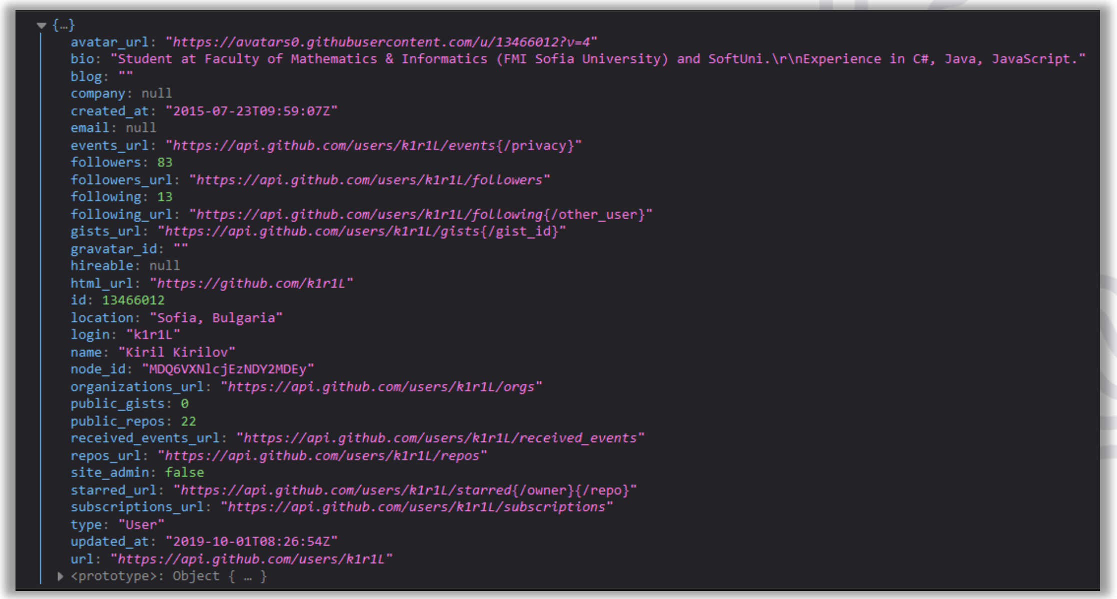
Fetch API

- `fetch()` takes one mandatory argument (the path to the resource you want to fetch)
  - second argument is optionally (init options - object)
- **returns** a **promise**
- once **response** is **retrieved**, there are several **methods** that defines what and how should be handled

Fetch API

- Fetch API with then/catch example

```
fetch('https://api.github.com/users/k1r1L')
    .then((response) => response.json())
    .then((myJson) => console.log(myJson))
    .catch((myErr) => console.error(myErr));
```

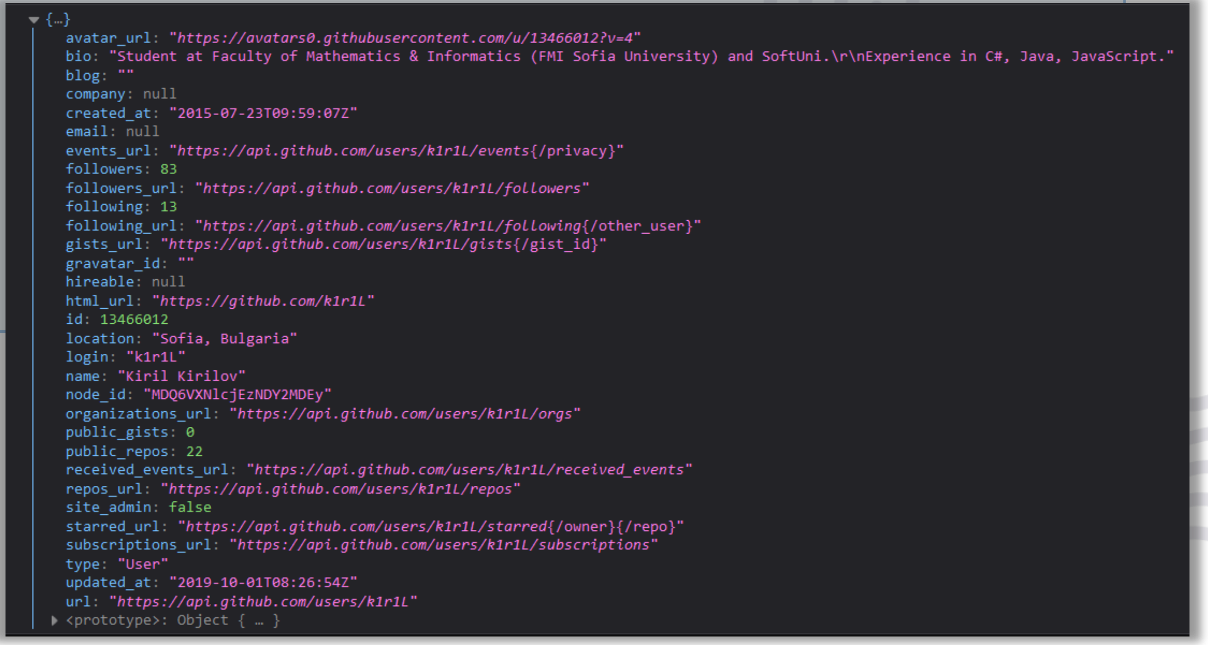


```
▼ {…}
    avatar_url: "https://avatars0.githubusercontent.com/u/13466012?v=4"
    bio: "Student at Faculty of Mathematics & Informatics (FMI Sofia University) and SoftUni.\r\nExperience in C#, Java, JavaScript."
    blog: ""
    company: null
    created_at: "2015-07-23T09:59:07Z"
    email: null
    events_url: "https://api.github.com/users/k1r1L/events{/privacy}"
    followers: 83
    followers_url: "https://api.github.com/users/k1r1L/followers"
    following: 13
    following_url: "https://api.github.com/users/k1r1L/following{/other_user}"
    gists_url: "https://api.github.com/users/k1r1L/gists{/gist_id}"
    gravatar_id: ""
    hireable: null
    html_url: "https://github.com/k1r1L"
    id: 13466012
    location: "Sofia, Bulgaria"
    login: "k1r1L"
    name: "Kiril Kirilov"
    node_id: "MDQ6VXNlcjEzNDY2MDEy"
    organizations_url: "https://api.github.com/users/k1r1L/orgs"
    public_gists: 0
    public_repos: 22
    received_events_url: "https://api.github.com/users/k1r1L/received_events"
    repos_url: "https://api.github.com/users/k1r1L/repos"
    site_admin: false
    starred_url: "https://api.github.com/users/k1r1L/starred{/owner}{/repo}"
    subscriptions_url: "https://api.github.com/users/k1r1L/subscriptions"
    type: "User"
    updated_at: "2019-10-01T08:26:54Z"
    url: "https://api.github.com/users/k1r1L"
  ▶ <prototype>: Object { … }
```

Fetch API

- Fetch API with async/await example

```
(async () => {
  try {
    const response = await fetch('https://api.github.com/users/k1r1L');
    const myJson = await response.json();
    console.log(myJson);
  } catch (myErr) {
    console.error(myErr);
  }
})();
```



```
▼ {…}
    avatar_url: "https://avatars0.githubusercontent.com/u/13466012?v=4"
    bio: "Student at Faculty of Mathematics & Informatics (FMI Sofia University) and SoftUni.\r\nExperience in C#, Java, JavaScript."
    blog: ""
    company: null
    created_at: "2015-07-23T09:59:07Z"
    email: null
    events_url: "https://api.github.com/users/k1r1L/events{/privacy}"
    followers: 83
    followers_url: "https://api.github.com/users/k1r1L/followers"
    following: 13
    following_url: "https://api.github.com/users/k1r1L/following{/other_user}"
    gists_url: "https://api.github.com/users/k1r1L/gists{/gist_id}"
    gravatar_id: ""
    hireable: null
    html_url: "https://github.com/k1r1L"
    id: 13466012
    location: "Sofia, Bulgaria"
    login: "k1r1L"
    name: "Kiril Kirilov"
    node_id: "MDQ6VXNlcjEzNDY2MDEy"
    organizations_url: "https://api.github.com/users/k1r1L/orgs"
    public_gists: 0
    public_repos: 22
    received_events_url: "https://api.github.com/users/k1r1L/received_events"
    repos_url: "https://api.github.com/users/k1r1L/repos"
    site_admin: false
    starred_url: "https://api.github.com/users/k1r1L/starred{/owner}{/repo}"
    subscriptions_url: "https://api.github.com/users/k1r1L/subscriptions"
    type: "User"
    updated_at: "2019-10-01T08:26:54Z"
    url: "https://api.github.com/users/k1r1L"
  ▶ <prototype>: Object { … }
```

Fetch Services

- The basic idea is to **isolate** the concern of fetching data inside components
  - Fetching data logic should separated as **service**

```
const apiUrl = '...';

export const getData = () => {
    return fetch(apiUrl)
        .then(res => res.json())
        .then(data => data.results)
        .catch(error => console.error(error))
};
```

Fetch Service

Import the service

Using the service

```
import { getData } from
'./services/fetching-data-service';

class App extends Component {
  state = {
    data: ...
  };
  componentDidMount() {
    getData().then((data) => {
      this.setState({ data })
    });
  }
  render() {
    return ...;
  }
}
```

Summary

- Lists and Keys
  - Collection of components with unique key
- Component Lifecycle
  - Mounting, Update and Unmounting
- Higher-Order Component (HOC)
- CSS Modules
- Using the Fetch API

Questions?

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