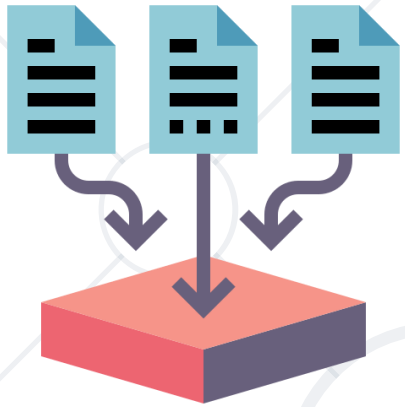
React Components – Deep Dive

Lists and Keys, Component Lifecycle, CSS Modules



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#react

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)
```

  - It won't stop your work

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}
  />
);
```

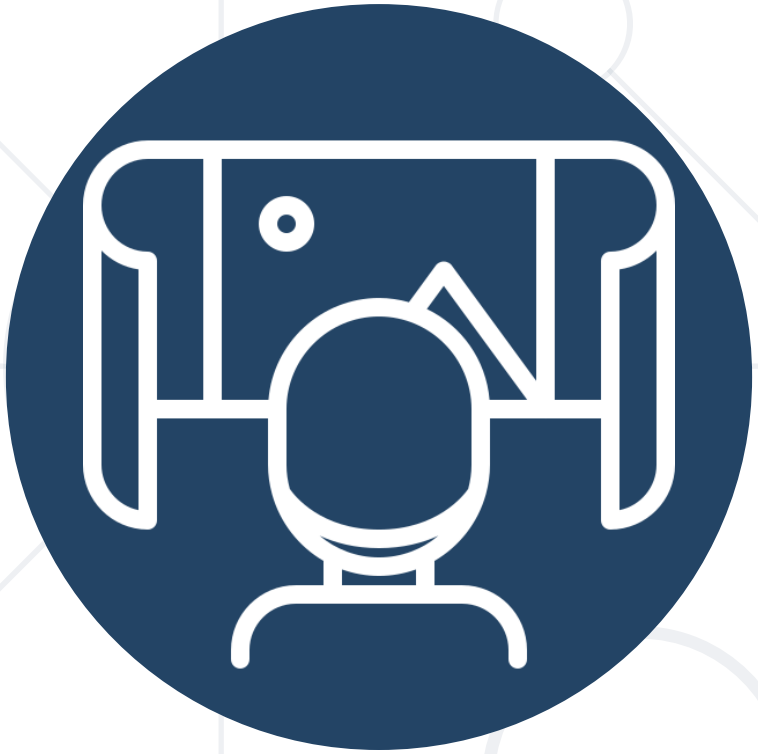
Lists and Keys

- 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>);
```



Virtual DOM

Virtual DOM

- The virtual DOM (**VDOM**)
  - Virtual representation of a UI is kept in the **memory**
  - Synced the real DOM by a library such as **ReactDOM**
  - The term **Virtual DOM** is usually associated with React elements
    - They are the objects representing the UI

Virtual DOM

- React keeps track of all elements in a **virtual DOM**
  - On change, a **diffing algorithm** is applied
  - Only the **needed** parts are updated in the browser
- React syntax is **declarative**
  - You only describe the desired result
  - ReactDOM takes care of the **order** of operations

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)

Effect Hook

Effect Hook

- You most likely perform: **data fetching**, **subscriptions** or **manually changing the DOM**
  - Operations like these are called **side effects**
  - They can **affect** other components and can't be done during the rendering
- **useEffect** hook adds the ability to perform side effects from a function component

Effect Hook

- **useEffect** hook serves the same purpose as
  - **componentDidMount**
  - **componentDidUpdate**
  - **componentWillUnmount**
- But they are bundled into a single API

```
Import { useEffect } from 'react';
```

Effect Hook

- **useEffect** hook accepts a function that contains imperative, possibly effectful code
  - That function will run **after the render** is committed to the screen
- By default effects run after **every completed render**
  - But you can choose to fire them only when certain value have changed

Effect Hook

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

const counter = () {
  const [count, setCount] = useState(0);

  // Similar to componentDidMount and componentDidUpdate
  useEffect(() => {
    document.title = `The counter reached: ${count} times`;
  });

  // ...
}
```

Effect Hook

- When you call **useEffect** you're telling React to run your "effect" function after flushing changes to the DOM
- Effects are declared inside the component so they have access to its **props** and **state**
- Effects may also optionally specify how to "clean up" after them by **returning** a **function**

Effect Hook

- Often, effects create resources that need to be **cleaned up** before the component leaves the screen
  - To do this, the function passed to **`useEffect`** may return a **clean-up function**

```
useEffect(() => {
  const subscription = props.source.subscribe();
  return () => {
    // Clean up the subscription
    subscription.unsubscribe();
  };
});
```

Effect Hook Demo

CSS Modules

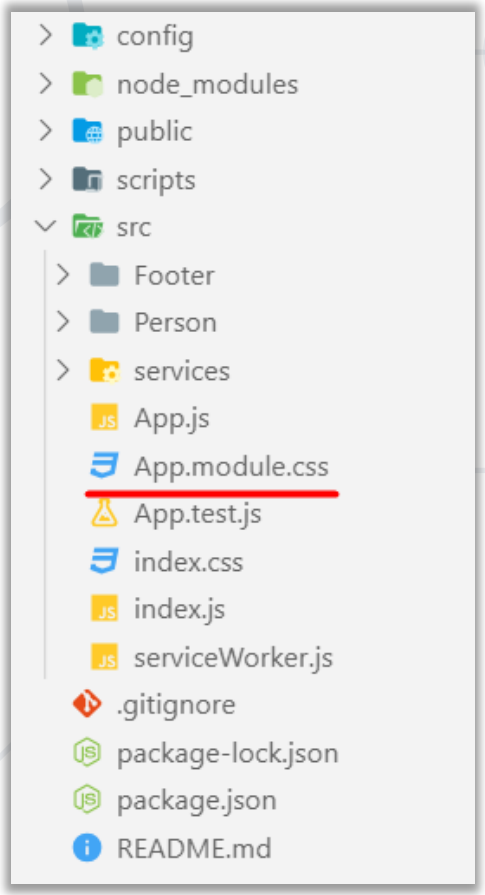
CSS Modules

- **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;
}
```



CSS Modules

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

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

CSS File called Button.module.css

```
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 useState and useEffect hooks

Import the service

Using the useState hook

Using the useEffect hook

Using the service

```
import { useState, useEffect } from 'react';
import { getData } from './services/fetching-data-
service';

function App() {
  const [state, setState] = useState({ data: [],
isLoading: false });

  useEffect(() => {
    setState((state) => ({ ...state, isLoading:
true }));
    getData().then((data) => {
      setState((state) => ({ ...state, data,
isLoading: false }));
    });
  }, []);
```

Fetch Service

Return the HTML structure

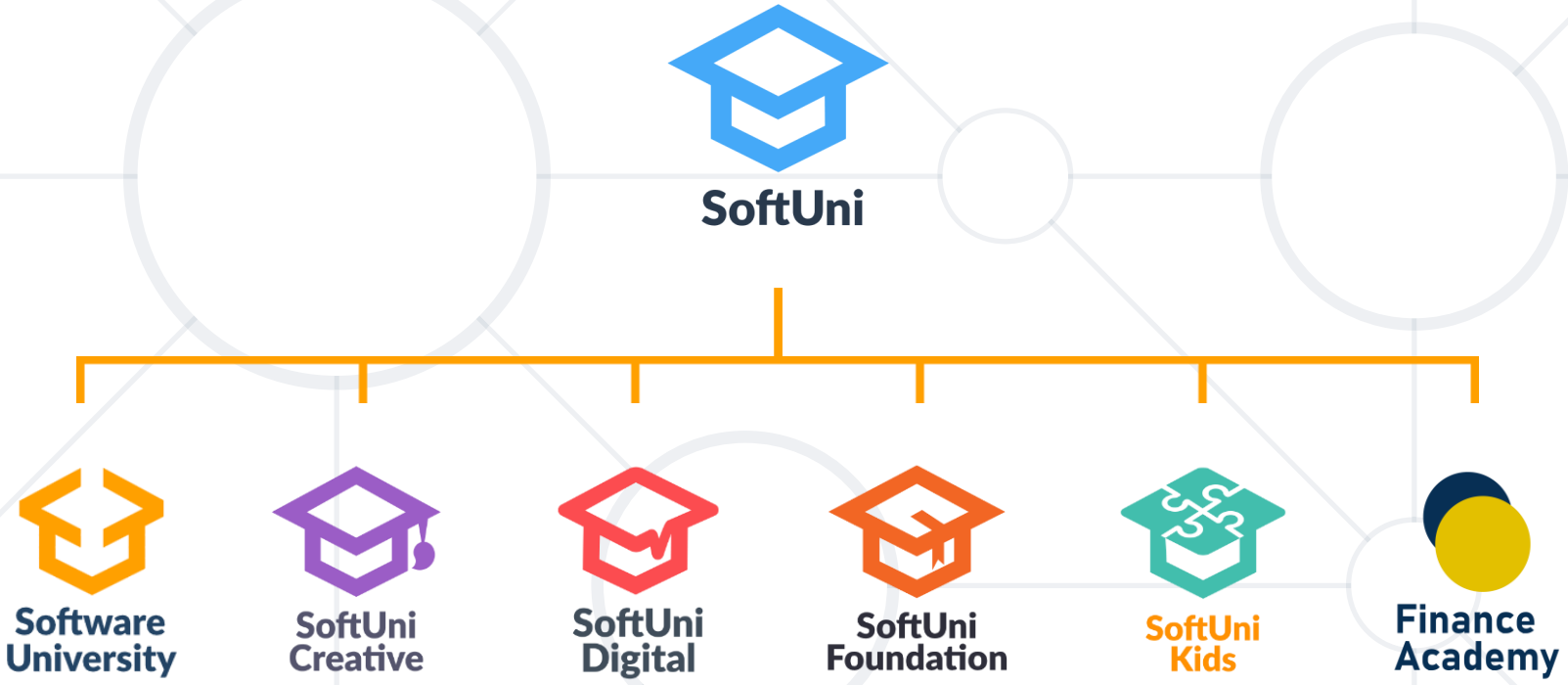
```
return (
    <div className='container'>
      {state.data.map((x) => (<p key={x.id}>
{x.text}</p>))}
    </div>
  );
}

export default App;
```

Demo

Summary

- Lists and Keys
  - Collection of components with unique key
- Component Lifecycle
  - Mounting, Update and Unmounting
- UseEffect HOOK
- CSS Modules
- Using the Fetch API

Questions?



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