Day 7

React Class Components:

A Class Component in React is a JavaScript ES6 class that extends from React.Component and must include a render() method which returns JSX.

It is mainly used to:

- Display UI
- Manage component state
- Use lifecycle methods (like componentDidMount())

Note: When creating a React component, the component's name must start with an upper case letter.

i) Create a Class Component:

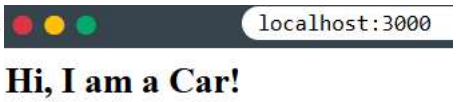
- The component has to include the extends React.Component statement, this statement creates an inheritance to React.Component, and gives your component access to React.Component's functions.
- The component also requires a render() method, this method returns HTML.

Example: Create a Class component called Car.

```
import React from 'react';
import ReactDOM from 'react-dom/client';

class Car extends React.Component {
  render() {
    return <h2>Hi, I am a Car!</h2>;
  }
}

const container = document.getElementById('root');
const root = ReactDOM.createRoot(container);
root.render(<Car />);
```



ii) Component Constructor:

- If there is a constructor() function in your component, this function will be called when the component gets initiated.
- The constructor function is where you initiate the component's properties.

- In React, component properties should be kept in an object called state.
- The constructor function is also where you honor the inheritance of the parent component by including the super() statement, which executes the parent component's constructor function, and your component has access to all the functions of the parent component (React.Component).

Example: Create a constructor function in the Car component, and add a color property. Use the color property in the render() function.

```
import React from 'react';
import ReactDOM from 'react-dom/client';

class Car extends React.Component {
  constructor() {
    super();
    this.state = {color: "red"};
  }
  render() {
    return <h2>I am a {this.state.color} Car!</h2>;
  }
}

const root = ReactDOM.createRoot(document.getElementById('root'));
root.render(<Car />);
```

iii) Props:

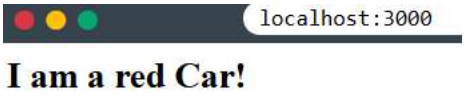
Props are like function arguments, and you send them into the component as attributes.

Example:

```
import React from 'react';
import ReactDOM from 'react-dom/client';

class Car extends React.Component {
  render() {
    return <h2>I am a {this.props.color} Car!</h2>;
  }
}

const container = document.getElementById('root');
const root = ReactDOM.createRoot(container);
root.render(<Car color="red"/>);
```



iv) Props in the Constructor:

If your component has a constructor function, the props should always be passed to the constructor and also to the React.Component via the super() method.

Example:

```
import React from 'react';
import ReactDOM from 'react-dom/client';

class Car extends React.Component {
  constructor(props) {
    super(props);
  }
  render() {
    return <h2>I am a {this.props.model}!</h2>;
  }
}

const root = ReactDOM.createRoot(document.getElementById('root'));
root.render(<Car model="Mustang"/>);
```

v) Components in Components:

We can refer to components inside other components.

Example:

```
import React from 'react';
import ReactDOM from 'react-dom/client';

class Car extends React.Component {
  render() {
    return <h2>I am a Car!</h2>;
  }
}

class Garage extends React.Component {
  render() {
    return (
      <div>
      <h1>Who lives in my Garage?</h1>
      <Car />
      </div>
    );
  }
}

const root = ReactDOM.createRoot(document.getElementById('root'));
root.render(<Garage />);
```

vi) Components in Files:

- React is all about re-using code, and it can be smart to insert some of your components in separate files.

- To do that, create a new file with a .js file extension and put the code inside it:
- Note that the file must start by importing React (as before), and it has to end with the statement export default Car;

Example:

Car.js:

```
import React from 'react';

class Car extends React.Component {
  render() {
    return <h2>Hi, I am a Car!</h2>;
  }
}

export default Car;
```

index.js: we import the Car.js file in the application.

```
import React from 'react';
import ReactDOM from 'react-dom/client';
import Car from './Car.js';

const container = document.getElementById('root');
const root = ReactDOM.createRoot(container);
root.render(<Car />);
```

vii) React Class Component State:

- React Class components have a built-in state object.
- The state object is where you store property values that belongs to the component.
- When the state object changes, the component re-renders.

a. Creating the state Object:

The state object is initialized in the constructor and it can contain as many properties as you like.

Example 1:

```
class Car extends React.Component {
  constructor(props) {
    super(props);
  this.state = {brand: "Ford"};
  }
  render() {
    return (
      <div>
        <h1>My Car</h1>
      </div>
    );
  }
}
```

Example 2:

```
class Car extends React.Component {
  constructor(props) {
    super(props);
    this.state = {
      brand: "Ford",
      model: "Mustang",
      color: "red",
      year: 1964
    };
  }
  render() {
    return (
      <div>
        <h1>My Car</h1>
      </div>
    );
  }
}
```

b. Using the state Object:

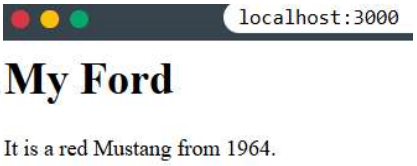
Refer to the state object anywhere in the component by using the this.state.propertyname syntax.

Example: Refer to the state object in the render() method.

```jsx
import React from 'react';
import ReactDOM from 'react-dom/client';

class Car extends React.Component {
  constructor(props) {
    super(props);
    this.state = {
      brand: "Ford",
      model: "Mustang",
      color: "red",
      year: 1964
    };
  }
  render() {
    return (
      <div>
        <h1>My {this.state.brand}</h1>
        <p>
          It is a {this.state.color}
          {this.state.model}
          from {this.state.year}.
        </p>
      </div>
    );
  }
}

const container = document.getElementById('root');
const root = ReactDOM.createRoot(container);
root.render(<Car />);
```



c. Changing the state Object:

- To change a value in the state object, use the this.setState() method.
- When a value in the state object changes, the component will re-render, meaning that the output will change according to the new value(s).

Example: Add a button with an onClick event that will change the color property.

```jsx
import React from 'react';
import ReactDOM from 'react-dom/client';

class Car extends React.Component {
  constructor(props) {
    super(props);
    this.state = {
      brand: "Ford",
      model: "Mustang",
      color: "red",
      year: 1964
    };
  }
  changeColor = () => {
    this.setState({color: "blue"});
  }

  render() {
    return (
      <div>
        <h1>My {this.state.brand}</h1>
        <p>
          It is a {this.state.color}
          {this.state.model}
          from {this.state.year}.
        </p>
        <button
          type="button"
          onClick={this.changeColor}
        >Change color</button>
      </div>
    );
  }
}

const root = ReactDOM.createRoot(document.getElementById('root'));
root.render(<Car />);
```

Output:

My Ford

It is a red Mustang from 1964.

Change color

Lifecycle of Components:

- Each component in React has a lifecycle which you can monitor and manipulate during its three main phases.

- The three phases are: Mounting, Updating, and Unmounting.

a. Mounting:

- Mounting means putting elements into the DOM.

- React has four built-in methods that gets called, in this order, when mounting a component:

I. constructor()

II. getDerivedStateFromProps()

III. render()

IV. componentDidMount()

- The render() method is required and will always be called, the others are optional and will be called if you define them.

i) constructor:

- The constructor() method is called before anything else, when the component is initiated, and it is the natural place to set up the initial state and other initial values.

- The constructor() method is called with the props, as arguments, and you should always start by calling the super(props) before anything else, this will initiate the parent's constructor method and allows the component to inherit methods from its parent (React.Component).

Example: The constructor method is called, by React, every time you make a component.

```
import React from 'react';
import ReactDOM from 'react-dom/client';

class Header extends React.Component {
  constructor(props) {
    super(props);
    this.state = {favoritecolor: "red"};
  }
  render() {
    return (
      <h1>My Favorite Color is {this.state.favoritecolor}</h1>
    );
  }
}

const root = ReactDOM.createRoot(document.getElementById('root'));
root.render(<Header />);
```

My Favorite Color is red

ii) getDerivedStateFromProps:

- The getDerivedStateFromProps() method is called right before rendering the element(s) in the DOM.
- This is the natural place to set the state object based on the initial props.
- It takes state as an argument, and returns an object with changes to the state.

Example: The getDerivedStateFromProps method is called right before the render method.

```
import React from 'react';
import ReactDOM from 'react-dom/client';

class Header extends React.Component {
  constructor(props) {
    super(props);
    this.state = {favoritecolor: "red"};
  }
  static getDerivedStateFromProps(props, state) {
    return {favoritecolor: props.favcol };
  }
  render() {
    return (
      <h1>My Favorite Color is {this.state.favoritecolor}</h1>
    );
  }
}

const root = ReactDOM.createRoot(document.getElementById('root'));
root.render(<Header favcol="yellow"/>);
```

Explanation: It starts with the favorite color being "red", but the getDerivedStateFromProps() method updates the favorite color based on the favcol attribute.

iii) render:

The render() method is required, and is the method that actually outputs the HTML to the DOM.

Example:

```
import React from 'react';
import ReactDOM from 'react-dom/client';

class Header extends React.Component {
  render() {
    return (
      <h1>This is the content of the Header component</h1>
    );
  }
}

const root = ReactDOM.createRoot(document.getElementById('root'));
root.render(<Header />);
```

Output:

iv) componentDidMount:

The componentDidMount() method is called after the component is rendered.

This is where you run statements that requires that the component is already placed in the DOM.

Example:

```
import React from 'react';
import ReactDOM from 'react-dom/client';

class Header extends React.Component {
  constructor(props) {
    super(props);
    this.state = {favoritecolor: "red"};
  }
  componentDidMount() {
    setTimeout(() => {
      this.setState({favoritecolor: "yellow"})
    }, 1000)
  }
  render() {
    return (
      <h1>My Favorite Color is {this.state.favoritecolor}</h1>
    );
  }
}

const root = ReactDOM.createRoot(document.getElementById('root'));
root.render(<Header />);
```

Output:

My Favorite Color is yellow

b. Updating:

- The next phase in the lifecycle is when a component is updated.
- A component is updated whenever there is a change in the component's state or props.
- React has five built-in methods that gets called, in this order, when a component is updated:

I. getDerivedStateFromProps()

II. shouldComponentUpdate()

III. render()

IV. getSnapshotBeforeUpdate()

V. componentDidUpdate()

- The render() method is required and will always be called, the others are optional and will be called if you define them.

i) getDerivedStateFromProps:

- Also at updates the getDerivedStateFromProps method is called. This is the first method that is called when a component gets updated.
- This is still the natural place to set the state object based on the initial props.

Example: If the component gets updated, the getDerivedStateFromProps() method is called.

```
import React from 'react';
import ReactDOM from 'react-dom/client';

class Header extends React.Component {
  constructor(props) {
    super(props);
    this.state = {favoritecolor: "red"};
  }
  static getDerivedStateFromProps(props, state) {
    return {favoritecolor: props.favcol };
  }
  changeColor = () => {
    this.setState({favoritecolor: "blue"});
  }
  render() {
    return (
      <div>
      <h1>My Favorite Color is {this.state.favoritecolor}</h1>
      <button type="button" onClick={this.changeColor}>Change color</button>
      </div>
    );
  }
}

const root = ReactDOM.createRoot(document.getElementById('root'));
root.render(<Header favcol="yellow" />);
```

Output:

Explanation:

This example has a button that changes the favorite color to blue, but since the getDerivedStateFromProps() method is called, which updates the state with the color from the favcol attribute, the favorite color is still rendered as yellow.

ii) shouldComponentUpdate:

- In the shouldComponentUpdate() method you can return a Boolean value that specifies whether React should continue with the rendering or not.
- The default value is true.

Example: Stop the component from rendering at any update.

```
import React from 'react';
import ReactDOM from 'react-dom/client';

class Header extends React.Component {
  constructor(props) {
    super(props);
    this.state = {favoritecolor: "red"};
  }
  shouldComponentUpdate() {
    return false;
  }
  changeColor = () => {
    this.setState({favoritecolor: "blue"});
  }
  render() {
    return (
      <div>
      <h1>My Favorite Color is {this.state.favoritecolor}</h1>
      <button type="button" onClick={this.changeColor}>Change color</button>
      </div>
    );
  }
}

const root = ReactDOM.createRoot(document.getElementById('root'));
root.render(<Header />);
```

Output:

Example 2: Same example as above, but this time the shouldComponentUpdate() method returns true instead:

```
import React from 'react';
import ReactDOM from 'react-dom/client';

class Header extends React.Component {
  constructor(props) {
    super(props);
    this.state = {favoritecolor: "red"};
  }
  shouldComponentUpdate() {
    return true;
  }
  changeColor = () => {
    this.setState({favoritecolor: "blue"});
  }
  render() {
    return (
      <div>
      <h1>My Favorite Color is {this.state.favoritecolor}</h1>
      <button type="button" onClick={this.changeColor}>Change color</button>
      </div>
    );
  }
}

const root = ReactDOM.createRoot(document.getElementById('root'));
root.render(<Header />);
```

Output:

iii) render:

The render() method is of course called when a component gets updated, it has to re-render the HTML to the DOM, with the new changes.

Example: The example below has a button that changes the favorite color to blue.

```
import React from 'react';
import ReactDOM from 'react-dom/client';

class Header extends React.Component {
  constructor(props) {
    super(props);
    this.state = {favoritecolor: "red"};
  }
  changeColor = () => {
    this.setState({favoritecolor: "blue"});
  }
  render() {
    return (
      <div>
      <h1>My Favorite Color is {this.state.favoritecolor}</h1>
      <button type="button" onClick={this.changeColor}>Change color</button>
      </div>
    );
  }
}

const root = ReactDOM.createRoot(document.getElementById('root'));
root.render(<Header />);
```

Output:

iv) getSnapshotBeforeUpdate:

- In the getSnapshotBeforeUpdate() method you have access to the props and state before the update, meaning that even after the update, you can check what the values were before the update.
- If the getSnapshotBeforeUpdate() method is present, you should also include the componentDidUpdate() method, otherwise you will get an error.
- The example below might seem complicated, but all it does is this:
- When the component is mounting it is rendered with the favorite color "red".
- When the component has been mounted, a timer changes the state, and after one

second, the favorite color becomes "yellow".

- This action triggers the update phase, and since this component has a getSnapshotBeforeUpdate() method, this method is executed, and writes a message to the empty DIV1 element.

- Then the componentDidUpdate() method is executed and writes a message in the empty DIV2 element:

Example: Use the getSnapshotBeforeUpdate() method to find out what the state object looked like before the update:

```
import React from 'react';
import ReactDOM from 'react-dom/client';

class Header extends React.Component {
  constructor(props) {
    super(props);
    this.state = {favoritecolor: "red"};
  }
  componentDidMount() {
    setTimeout(() => {
      this.setState({favoritecolor: "yellow"})
    }, 1000)
  }
  getSnapshotBeforeUpdate(prevProps, prevState) {
    document.getElementById("div1").innerHTML =
    "Before the update, the favorite was " + prevState.favoritecolor;
  }
  componentDidUpdate() {
    document.getElementById("div2").innerHTML =
    "The updated favorite is " + this.state.favoritecolor;
  }

  render() {
    return (
      <div>
      <h1>My Favorite Color is {this.state.favoritecolor}</h1>
      <div id="div1"></div>
      <div id="div2"></div>
      </div>
    );
  }
}

const root = ReactDOM.createRoot(document.getElementById('root'));
root.render(<Header />);
```

Output:

After 1 Second:

Before the update, the favorite was red
The updated favorite is yellow

v) componentDidUpdate:

- The componentDidUpdate method is called after the component is updated in the DOM.
- The example below might seem complicated, but all it does is this:
- When the component is mounting it is rendered with the favorite color "red".
- When the component has been mounted, a timer changes the state, and the color becomes "yellow".
- This action triggers the update phase, and since this component has a componentDidUpdate method, this method is executed and writes a message in the empty DIV element:

Example: The componentDidUpdate method is called after the update has been rendered in the DOM:

```
import React from 'react';
import ReactDOM from 'react-dom/client';

class Header extends React.Component {
  constructor(props) {
    super(props);
    this.state = {favoritecolor: "red"};
  }
  componentDidMount() {
    setTimeout(() => {
      this.setState({favoritecolor: "yellow"})
    }, 1000)
  }
  componentDidUpdate() {
    document.getElementById("mydiv").innerHTML =
    "The updated favorite is " + this.state.favoritecolor;
  }
  render() {
    return (
      <div>
      <h1>My Favorite Color is {this.state.favoritecolor}</h1>
      <div id="mydiv"></div>
      </div>
    );
  }
}

const root = ReactDOM.createRoot(document.getElementById('root'));
root.render(<Header />);
```

Output:

After 1 second:

c. Unmounting:

- The next phase in the lifecycle is when a component is removed from the DOM, or unmounting as React likes to call it.

- React has only one built-in method that gets called when a component is unmounted:

I. componentWillUnmount()

i) componentWillUnmount:

The componentWillUnmount method is called when the component is about to be removed from the DOM.

Example: Click the button to delete the header.

```
import React from 'react';
import ReactDOM from 'react-dom/client';

class Container extends React.Component {
  constructor(props) {
    super(props);
    this.state = {show: true};
  }
  delHeader = () => {
    this.setState({show: false});
  }
  render() {
    let myheader;
    if (this.state.show) {
      myheader = <Child />;
    };
    return (
      <div>
      {myheader}
      <button type="button" onClick={this.delHeader}>Delete Header</button>
      </div>
    );
  }
}

class Child extends React.Component {
  componentWillUnmount() {
    alert("The component named Header is about to be unmounted.");
  }
  render() {
    return (
      <h1>Hello World!</h1>
    );
  }
}

const root = ReactDOM.createRoot(document.getElementById('root'));
root.render(<Container />);
```

Output:

After clicking the Deleter Header button: It shows alert message and delete the Header.