



REACT INTERVIEW QUESTIONS

Zen Placements



MAY 12, 2021

GUVI GEEK NETWORK PRIVATE LIMITED

IITM Research park - phase 2, module #9, 3rd floor, D block, Kanagam Rd, Tharamani, Chennai, Tamil Nadu 600113

Table of Contents

1. What is React?	8
2. What are the major features of React?	8
3. What is JSX?	8
4. What is the difference between Element and Component?	8
5. How to create components in React?	9
6. When to use a Class Component over a Function Component?	10
7. What are Pure Components?	10
8. What is state in React?	10
9. What are props in React?	11
10. What is the difference between state and props?	12
11. Why should we not update the state directly?	12
12. What is the purpose of callback function as an argument of setState()?	12
13. What is the difference between HTML and React event handling?	12
14. How to bind methods or event handlers in JSX callbacks?	13
15. How to pass a parameter to an event handler or callback?	14
16. What are synthetic events in React?	14
17. What are inline conditional expressions?	14
18. What is "key" prop and what is the benefit of using it in arrays of elements?	14
19. What is the use of refs?	15
20. How to create refs?	15
21. What are forward refs?	16
22. Which is preferred option with in callback refs and findDOMNode()?	17
24. What is Virtual DOM?	18
25. How Virtual DOM works?	18
26. What is the difference between Shadow DOM and Virtual DOM?	20
27. What is React Fiber?	20
28. What is the main goal of React Fiber?	20
29. What are controlled components?	20
30. What are uncontrolled components?	21
31. What is the difference between createElement and cloneElement?	21
32. What is Lifting State Up in React?	22
33. What are the different phases of component lifecycle?	22
34. What are the lifecycle methods of React?	23

35. What are Higher-Order Components?.....	24
36. How to create props proxy for HOC component?	25
37. What is context?	25
38. What is children prop?.....	26
39. How to write comments in React?.....	26
40. What is the purpose of using super constructor with props argument?.....	27
41. What is reconciliation?	28
42. How to set state with a dynamic key name?	28
43. What would be the common mistake of function being called every time the component renders?	28
44. Is lazy function supports named exports?	28
45. Why React uses className over class attribute?	29
46. What are fragments?	29
47. Why fragments are better than container divs?.....	30
48. What are portals in React?	30
49. What are stateless components?	30
50. What are stateful components?	30
51. How to apply validation on props in React?	31
52. What are the advantages of React?.....	33
53. What are the limitations of React?	33
54. What are error boundaries in React v16?.....	33
55. How error boundaries handled in React v15?	34
56. What are the recommended ways for static type checking?	35
57. What is the use of react-dom package?	35
58. What is the purpose of render method of react-dom?	35
59. What is ReactDOMServer?.....	35
60. How to use innerHTML in React?.....	36
61. How to use styles in React?	36
62. How events are different in React?	37
63. What will happen if you use setState() in constructor?	37
64. What is the impact of indexes as keys?.....	37
65. Is it good to use setState() in componentWillMount() method?	38
66. What will happen if you use props in initial state?.....	38
67. How do you conditionally render components?	39
68. Why we need to be careful when spreading props on DOM elements?.....	40

69. How you use decorators in React?	40
70. How you implement Server Side Rendering or SSR?	41
71. How to enable production mode in React?	41
72. What is CRA and its benefits?	41
73. What is the lifecycle methods order in mounting?	42
74. What are the lifecycle methods going to be deprecated in React v16?	42
75. What is the purpose of getDerivedStateFromProps() lifecycle method?	43
76. What is the purpose of getSnapshotBeforeUpdate() lifecycle method?	43
77. Do Hooks replace render props and higher order components?	43
78. What is the recommended way for naming components?	44
79. What is the recommended ordering of methods in component class?	44
80. What is a switching component?	45
81. Why we need to pass a function to setState()?	45
83. What are React Mixins?	47
84. Why is isMounted() an anti-pattern and what is the proper solution?	48
85. What are the Pointer Events supported in React?	48
86. Why should component names start with capital letter?	49
87. Are custom DOM attributes supported in React v16?	50
88. What is the difference between constructor and getInitialState?	50
89. Can you force a component to re-render without calling setState?	51
90. What is the difference between super() and super(props) in React using ES6 classes?	51
91. How to loop inside JSX?	51
92. How do you access props in attribute quotes?	52
93. What is React proptype array with shape?	52
94. How to conditionally apply class attributes?	53
95. What is the difference between React and ReactDOM?	53
96. Why ReactDOM is separated from React?	53
97. How to use React label element?	53
98. How to combine multiple inline style objects?	54
99. How to re-render the view when the browser is resized?	54
100. What is the difference between setState() and replaceState() methods?	55
101. How to listen to state changes?	55
102. What is the recommended approach of removing an array element in React state?	55
103. Is it possible to use React without rendering HTML?	56

104. How to pretty print JSON with React?	56
105. Why you can't update props in React?	57
106. How to focus an input element on page load?	57
107. What are the possible ways of updating objects in state?	58
108. How can we find the version of React at runtime in the browser?	58
109. What are the approaches to include polyfills in your create-react-app?	58
110. How to use https instead of http in create-react-app?	59
111. How to avoid using relative path imports in create-react-app?	59
112. How to add Google Analytics for React Router?	59
113. How to update a component every second?	60
114. How do you apply vendor prefixes to inline styles in React?	60
115. How to import and export components using React and ES6?	60
116. Why is a component constructor called only once?	61
117. How to define constants in React?	61
118. How to programmatically trigger click event in React?	61
119. Is it possible to use async/await in plain React?	62
120. What are the common folder structures for React?	62
121. What are the popular packages for animation?	63
122. What is the benefit of styles modules?	63
123. What are the popular React-specific linters?	64
124. How to make AJAX call and in which component lifecycle methods should I make an AJAX call?	64
125. What are render props?	65
126. What is React Router?	66
127. How React Router is different from history library?	66
128. What are the <Router> components of React Router v4?	66
129. What is the purpose of push() and replace() methods of history?	66
130. How do you programmatically navigate using React Router v4?	67
131. How to get query parameters in React Router v4?	68
132. Why you get "Router may have only one child element" warning?	69
133. How to pass params to history.push method in React Router v4?	69
134. How to implement default or NotFound page?	69
135. How to get history on React Router v4?	70
136. How to perform automatic redirect after login?	70
137. What is the purpose of ReactTestUtils package?	71

138. What is Jest?	71
139. What is flux?.....	71
140. What is Redux?	72
141. What are the core principles of Redux?	72
142. What are the downsides of Redux compared to Flux?.....	72
143. What is the difference between mapStateToProps() and mapDispatchToProps()?	72
144. Can I dispatch an action in reducer?.....	73
145. How to access Redux store outside a component?	73
146. What are the drawbacks of MVW pattern?.....	74
147. Are there any similarities between Redux and RxJS?	74
148. How to dispatch an action on load?	74
149. How to use connect() from React Redux?.....	75
150. How to reset state in Redux?.....	75
151. Whats the purpose of at symbol in the Redux connect decorator?.....	77
152. What is the difference between React context and React Redux?	78
153. Why are Redux state functions called reducers?.....	78
154. How to make AJAX request in Redux?	78
155. Should I keep all component's state in Redux store?	79
156. What is the proper way to access Redux store?.....	79
157. What is the difference between component and container in React Redux?.....	80
158. What is the purpose of the constants in Redux?	80
159. What are the different ways to write mapDispatchToProps()?.....	81
160. What is the use of the ownProps parameter in mapStateToProps() and mapDispatchToProps()?.....	82
161. How to structure Redux top level directories?	82
162. What is Redux DevTools?.....	83
163. What are the features of Redux DevTools?	83
164. What are Redux selectors and why to use them?	83
165. What is Redux Form?	83
166. What are the main features of Redux Form?	83
167. How to add multiple middlewares to Redux?	84
168. How to set initial state in Redux?	84
169. How Relay is different from Redux?	84
170. What is an action in Redux?.....	84
171. What is the difference between React Native and React?	85

172. What is the difference between Flow and PropTypes?	85
173. How to use Font Awesome icons in React?	85
174. What is React Dev Tools?	86
175. Why is DevTools not loading in Chrome for local files?	86
176. What are the advantages of React over Vue.js?	86
177. What is the difference between React and Angular?	86
178. Why React tab is not showing up in DevTools?	87
179. What are Styled Components?	87
180. Give an example of Styled Components?	87
181. What is Relay?	88
182. How to use TypeScript in create-react-app application?	88
183. Can Redux only be used with React?	89
184. Do you need to have a particular build tool to use Redux?	89
185. How Redux Form initialValues get updated from state?	89
186. How React PropTypes allow different types for one prop?	90
187. What is render hijacking in react?	90
188. How to pass numbers to React component?	90
189. How to prevent unnecessary updates using setState?	90
190. What are hooks?	91
191. What are the rules needs to follow for hooks?	91
192. How to ensure hooks followed the rules in your project?	92
193. What are the differences between Flux and Redux?	92
194. What are the benefits of React Router V4?	93
195. What is the behavior of uncaught errors in react 16?	93
196. What are the possible return types of render method?	93
197. What is the main purpose of constructor?	93
198. Is it mandatory to define constructor for React component?	94
199. What are default props?	94
200. What is the browser support for react applications?	95
201. What is the benefit of strict mode?	95
202. What are Keyed Fragments?	95
203. Does React support all HTML attributes?	96
204. How do you pass an event handler to a component?	96
205. How to prevent a function from being called multiple times?	96

206. How JSX prevents Injection Attacks?	96
207. How do you pass arguments to an event handler?	97
208. What are the conditions to safely use the index as a key?	97
209. Is it keys should be globally unique?	97
210. What is dynamic import?	98
211. What are loadable components?	98
212. What is suspense component?	99
213. Give an example on How to use context?	99
214. What is the purpose of default value in context?	100
215. How do you use contextType?	101
216. What is a consumer?	102
217. How do you solve performance corner cases while using context?	102
218. Is it possible to use react without JSX?	103
219. When do you need to use refs?	104
220. What are the problems of using render props with pure components?	104
221. What is windowing technique?	104
222. How do you print falsy values in JSX?	104
223. What is the difference between Real DOM and Virtual DOM?	105
224. How to add Bootstrap to a react application?	105
225. Can you list down top websites or applications using react as front end framework?	105
226. Is it recommended to use CSS In JS technique in React?	106
227. Do I need to rewrite all my class components with hooks?	106
228. What is the stable release for hooks support?	106
229. What are the sources used for introducing hooks?	106
230. How do you access imperative API of web components?	106
231. What are typical middleware choices for handling asynchronous calls in Redux?	106
232. Do browsers understand JSX code?	107
233. Describe about data flow in react?	107
234. What is react scripts?	107
235. What are the features of create react app?	107
236. What are React Server components?	107
237. What is prop drilling?	107

1. What is React?

React is an open-source frontend JavaScript library which is used for building user interfaces especially for single page applications. It is used for handling view layer for web and mobile apps. React was created by Jordan Walke, a software engineer working for Facebook. React was first deployed on Facebook's News Feed in 2011 and on Instagram in 2012.

2. What are the major features of React?

The major features of React are:

- It uses Virtual DOM instead of Real DOM considering that Real DOM manipulations are expensive.
- Supports server-side rendering.
- Follows Unidirectional data flow or data binding.
- Uses reusable/composable UI components to develop the view.

3. What is JSX?

JSX is a XML-like syntax extension to ECMAScript (the acronym stands for JavaScript XML). Basically, it just provides syntactic sugar for the `React.createElement()` function, giving us expressiveness of JavaScript along with HTML like template syntax.

In the example below text inside `<h1>` tag is returned as JavaScript function to the render function.

```
class App extends React.Component {
  render() {
    return(
      <div>
        <h1>{'Welcome to React world!'}</h1>
      </div>
    )
  }
}
```

4. What is the difference between Element and Component?

An Element is a plain object describing what you want to appear on the screen in terms of the DOM nodes or other components. Elements can contain other Elements in their props. Creating a React element is cheap. Once an element is created, it is never mutated.

The object representation of React Element would be as follows:

```
const element = React.createElement(
  'div',
```

```
{id: 'login-btn'},
  'Login'
)
```

The above `React.createElement()` function returns an object:

```
{
  type: 'div',
  props: {
    children: 'Login',
    id: 'login-btn'
  }
}
```

And finally, it renders to the DOM using `ReactDOM.render()`:

```
<div id='login-btn'>Login</div>
```

Whereas a component can be declared in several different ways. It can be a class with a `render()` method. Alternatively, in simple cases, it can be defined as a function. In either case, it takes props as an input, and returns a JSX tree as the output:

```
const Button = ({ onLogin }) => (
  <div id={"login-btn"} onClick={onLogin}>
    Login
  </div>
);
```

Then JSX gets transpiled to a `React.createElement()` function tree:

```
const Button = ({ onLogin }) =>
  React.createElement("div", { id: "login-
    btn", onClick: onLogin }, "Login");
```

5. How to create components in React?

There are two possible ways to create a component.

- **Function Components:** This is the simplest way to create a component. Those are pure JavaScript functions that accept props object as first parameter and return React elements:

```
function Greeting({ message }) {
  return <h1> `Hello, ${message}` </h1>;
}
```

- **Class Components:** You can also use ES6 class to define a component. The above function component can be written as:

```
class Greeting extends React.Component {  
  render() {  
    return <h1> {`Hello, ${this.props.message}`}  
  </h1>  
  }  
}
```

6. When to use a Class Component over a Function Component?

If the component needs state or lifecycle methods then use class component otherwise use function component. However, from React 16.8 with the addition of Hooks, you could use state, lifecycle methods and other features that were only available in class component right in your function component.

7. What are Pure Components?

React.PureComponent is exactly the same as **React.Component** except that it handles the **shouldComponentUpdate()** method for you. When props or state changes, **PureComponent** will do a shallow comparison on both props and state. Component on the other hand won't compare current props and state to next out of the box. Thus, the component will re-render by default whenever **shouldComponentUpdate** is called.

8. What is state in React?

State of a component is an object that holds some information that may change over the lifetime of the component. We should always try to make our state as simple as possible and minimize the number of stateful components.

Let's create a user component with message state,

```
class User extends React.Component {  
  constructor(props) {  
    super(props);  
    this.state = {  
      message: "Welcome to React world",  
    };  
  }  
  
  render() {  
    return (  
      <div>  
        <h1>{this.state.message}</h1>  
      </div>  
    )  
  }  
}
```

```
);  
}  
}
```



State is similar to props, but it is private and fully controlled by the component. i.e, It is not accessible to any component other than the one that owns and sets it.

9. What are props in React?

Props are inputs to components. They are single values or objects containing a set of values that are passed to components on creation using a naming convention similar to HTML-tag attributes. They are data passed down from a parent component to a child component.

The primary purpose of props in React is to provide following component functionality:

Pass custom data to your component.

- I. Trigger state changes.
- II. Use via **this.props.reactProp** inside component's **render()** method.
- III. For example, let us create an element with **reactProp** property:

```
<Element reactProp={"1"} />
```

This **reactProp** (or whatever you came up with) name then becomes a property attached to React's native props object which originally already exists on all components created using React library.

props.reactProp

10. What is the difference between state and props?

Both props and state are plain JavaScript objects. While both of them hold information that influences the output of render, they are different in their functionality with respect to component. Props get passed to the component similar to function parameters whereas state is managed within the component similar to variables declared within a function.

11. Why should we not update the state directly?

If you try to update state directly then it won't re-render the component.

```
//Wrong  
this.state.message = 'Hello world'
```

Instead use **setState()** method. It schedules an update to a component's state object. When state changes, the component responds by re-rendering.

```
//Correct  
this.setState({ message: 'Hello World' })
```

Note: You can directly assign to the state object either in constructor or using latest javascript's class field declaration syntax.

12. What is the purpose of callback function as an argument of setState()?

The callback function is invoked when **setState** finished and the component gets rendered. Since **setState()** is asynchronous the callback function is used for any post action.

Note: It is recommended to use lifecycle method rather than this callback function.

```
setState({ name: "John" }, () =>  
  console.log("The name has updated and component re-  
rendered")  
);
```

13. What is the difference between HTML and React event handling?

Below are some of the main differences between HTML and React event handling,

In HTML, the event name usually represents in lowercase as a convention:

```
<button onclick='activateLasers() '>
```

Whereas in React it follows camelCase convention:

```
<button onClick={activateLasers}>
```

In HTML, you can return false to prevent default behavior:

```
<a href="#" onclick='console.log("The link was clicked."); r
return false;' />
```

Whereas in React you must call **preventDefault()** explicitly:

```
function handleClick(event) {
  event.preventDefault();
  console.log("The link was clicked.");
}
```

In HTML, you need to invoke the function by appending () Whereas in react you should not append () with the function name. (refer "activateLasers" function in the first point for example)

14. How to bind methods or event handlers in JSX callbacks?

There are 3 possible ways to achieve this:

Binding in Constructor: In JavaScript classes, the methods are not bound by default. The same thing applies for React event handlers defined as class methods. Normally we bind them in constructor.

```
class Component extends React.Component {
  constructor(props) {
    super(props);
    this.handleClick = this.handleClick.bind(this);
  }
  handleClick() {
    // ...
  }
}
```

Public class fields syntax: If you don't like to use bind approach then public class fields syntax can be used to correctly bind callbacks.

```
handleClick = () => {
  console.log('this is:', this)
}
<button onClick={this.handleClick}>
  'Click me'
</button>
```

Arrow functions in callbacks: You can use arrow functions directly in the callbacks.

```
<button onClick={(event) => this.handleClick(event)}>
  'Click me'
</button>
```

Note: If the callback is passed as prop to child components, those components might do an extra re-rendering. In those cases, it is preferred to go with *.bind()* or public class fields syntax approach considering performance.

15. How to pass a parameter to an event handler or callback?

You can use an arrow function to wrap around an event handler and pass parameters:

```
<button onClick={() => this.handleClick(id)} />
```

This is an equivalent to calling `.bind`:

```
<button onClick={this.handleClick.bind(this, id)} />
```

Apart from these two approaches, you can also pass arguments to a function which is defined as arrow function

```
<button onClick={this.handleClick(id)} />
handleClick = (id) => () => {
  console.log("Hello, your ticket number is", id);
};
```

16. What are synthetic events in React?

SyntheticEvent is a cross-browser wrapper around the browser's native event. It's API is same as the browser's native event, including **stopPropagation()** and **preventDefault()**, except the events work identically across all browsers.

17. What are inline conditional expressions?

You can use either if statements or ternary expressions which are available from JS to conditionally render expressions. Apart from these approaches, you can also embed any expressions in JSX by wrapping them in curly braces and then followed by JS logical operator `&&`.

```
<h1>Hello!</h1>
{
  messages.length > 0 && !isLoggedIn ? (
    <h2>You have {messages.length} unread messages.</h2>
  ) : (
    <h2>You don't have unread messages.</h2>
  );
}
```

18. What is "key" prop and what is the benefit of using it in arrays of elements?

A **key** is a special string attribute you should include when creating arrays of elements. Key prop helps React identify which items have changed, are added, or are removed.

Most often we use ID from our data as key:

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

When you don't have stable IDs for rendered items, you may use the item index as a key as a last resort:

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

Note:

- I. Using indexes for keys is not recommended if the order of items may change. This can negatively impact performance and may cause issues with component state.
- II. If you extract list item as separate component then apply keys on list component instead of li tag.
- III. There will be a warning message in the console if the key prop is not present on list items.

19. What is the use of refs?

The ref is used to return a reference to the element. They should be avoided in most cases, however, they can be useful when you need a direct access to the DOM element or an instance of a component.

20. How to create refs?

There are two approaches

1. This is a recently added approach. Refs are created using `React.createRef()` method and attached to React elements via the `ref` attribute. In order to use refs throughout the component, just assign the ref to the instance property within constructor.

```
class MyComponent extends React.Component {
  constructor(props) {
    super(props)
    this.myRef = React.createRef()
  }
  render() {
    return <div ref={this.myRef} />
  }
}
```

2. You can also use ref callbacks approach regardless of React version. For example, the search bar component's input element accessed as follows,


```
class SearchBar extends Component {
  constructor(props) {
    super(props);
    this.txtSearch = null;
    this.state = { term: '' };
    this.setInputSearchRef = e => {
      this.txtSearch = e;
    }
  }
  onChange(event) {
    this.setState({ term: this.txtSearch.value });
  }
  render() {
    return (
      <input
        value={this.state.term}
        onChange={this.onChange.bind(this)}
        ref={this.setInputSearchRef} />
    );
  }
}
```

You can also use refs in function components using closures. Note: You can also use inline ref callbacks even though it is not a recommended approach

21. What are forward refs?

Ref forwarding is a feature that lets some components take a ref they receive, and pass it further down to a child.

```
const ButtonElement = React.forwardRef((props, ref) => (
  <button ref={ref} className="CustomButton">
    {props.children}
  </button>
));

// Create ref to the DOM button:
```

```
const ref = React.createRef();  
<ButtonElement ref={ref}>{"Forward Ref"}</ButtonElement>
```

22. Which is preferred option with in callback refs and findDOMNode()?

It is preferred to use *callback refs* over **findDOMNode()** API. Because **findDOMNode()** prevents certain improvements in React in the future.

The legacy approach of using **findDOMNode**:

```
class MyComponent extends Component {  
  componentDidMount() {  
    findDOMNode(this).scrollIntoView()  
  }  
  
  render() {  
    return <div />  
  }  
}
```

The recommended approach is:

```
class MyComponent extends Component {  
  constructor(props){  
    super(props);  
    this.node = createRef();  
  }  
  componentDidMount() {  
    this.node.current.scrollIntoView();  
  }  
  
  render() {  
    return <div ref={this.node} />  
  }  
}
```

23. Why are String Refs legacy?

If you worked with React before, you might be familiar with an older API where the **ref** attribute is a string, like **ref={'textInput'}**, and the DOM node is accessed as **this.refs.textInput**. We advise against

it because string refs have below issues, and are considered legacy. String refs were removed in React v16.

- They force React to keep track of currently executing component. This is problematic because it makes react module stateful, and thus causes weird errors when react module is duplicated in the bundle.
- They are not composable — if a library puts a ref on the passed child, the user can't put another ref on it. Callback refs are perfectly composable.
- They don't work with static analysis like Flow. Flow can't guess the magic that framework does to make the string ref appear on this.refs, as well as its type (which could be different). Callback refs are friendlier to static analysis.
- It doesn't work as most people would expect with the "render callback" pattern (e.g.)

```
class MyComponent extends Component {
  renderRow = (index) => {
    // This won't work. Ref will get attached to DataTable r
    ather than MyComponent:
    return <input ref={'input-' + index} />;

    // This would work though! Callback refs are awesome.
    return <input ref={input => this['input-'
+ index] = input} />;
  }

  render() {
    return <DataTable data={this.props.data} renderRow={this
.renderRow} />
  }
}
```

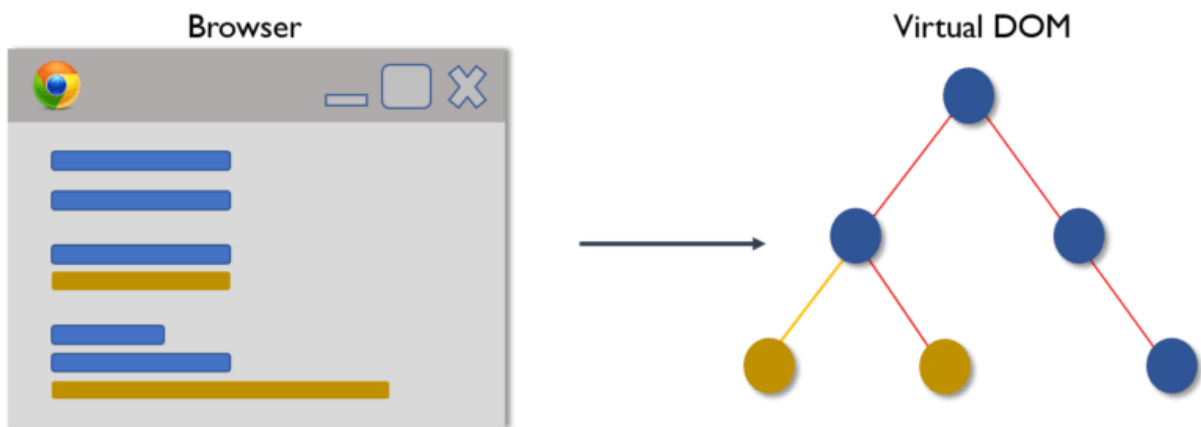
24. What is Virtual DOM?

The Virtual DOM (VDOM) is an in-memory representation of Real DOM. The representation of a UI is kept in memory and synced with the "real" DOM. It's a step that happens between the render function being called and the displaying of elements on the screen. This entire process is called reconciliation.

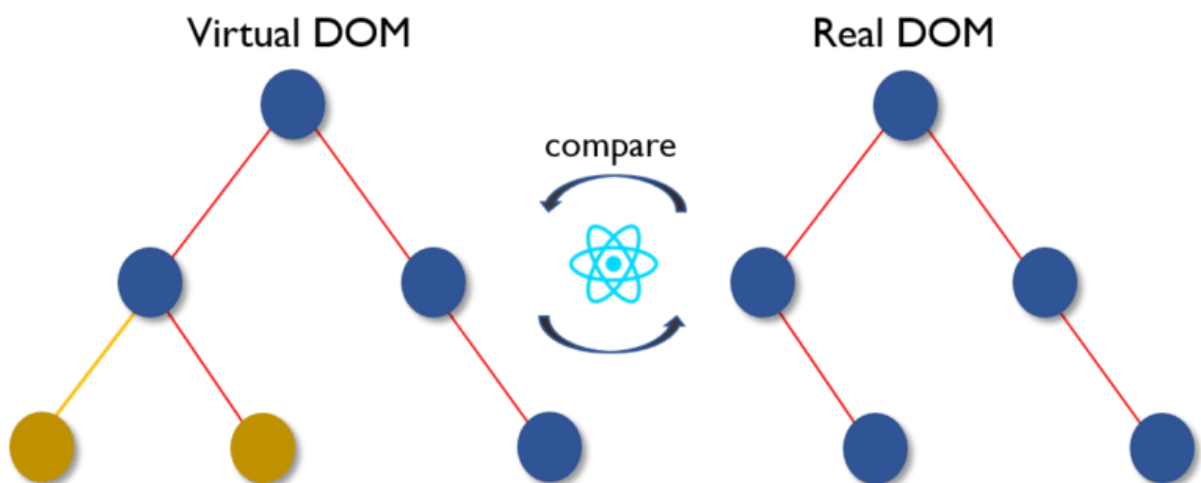
25. How Virtual DOM works?

The Virtual DOM works in three simple steps.

- Whenever any underlying data changes, the entire UI is re-rendered in Virtual DOM representation.

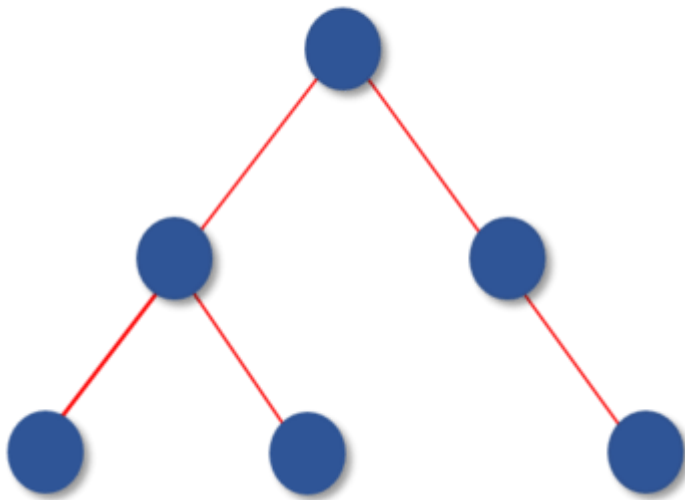


- Then the difference between the previous DOM representation and the new one is calculated.



- Once the calculations are done, the real DOM will be updated with only the things that have actually changed.

Real DOM (updated)



26. What is the difference between Shadow DOM and Virtual DOM?

The Shadow DOM is a browser technology designed primarily for scoping variables and CSS in web components. The Virtual DOM is a concept implemented by libraries in JavaScript on top of browser APIs.

27. What is React Fiber?

Fiber is the new reconciliation engine or reimplementation of core algorithm in React v16. The goal of React Fiber is to increase its suitability for areas like animation, layout, gestures, ability to pause, abort, or reuse work and assign priority to different types of updates; and new concurrency primitives.

28. What is the main goal of React Fiber?

The goal of React Fiber is to increase its suitability for areas like animation, layout, and gestures. Its headline feature is incremental rendering: the ability to split rendering work into chunks and spread it out over multiple frames.

29. What are controlled components?

A component that controls the input elements within the forms on subsequent user input is called Controlled Component, i.e., every state mutation will have an associated handler function.

For example, to write all the names in uppercase letters, we use `handleChange` as below,

```
handleChange(event) {  
  this.setState({value: event.target.value.toUpperCase()})  
}
```

30. What are uncontrolled components?

The Uncontrolled Components are the ones that store their own state internally, and you query the DOM using a ref to find its current value when you need it. This is a bit more like traditional HTML.

In the below UserProfile component, the name input is accessed using ref.

```
class UserProfile extends React.Component {
  constructor(props) {
    super(props)
    this.handleSubmit = this.handleSubmit.bind(this)
    this.input = React.createRef()
  }

  handleSubmit(event) {
    alert('A name was submitted: ' + this.input.current.value)
    event.preventDefault()
  }

  render() {
    return (
      <form onSubmit={this.handleSubmit}>
        <label>
          {'Name: '}
          <input type="text" ref={this.input} />
        </label>
        <input type="submit" value="Submit" />
      </form>
    );
  }
}
```

In most cases, it's recommended to use controlled components to implement forms.

31. What is the difference between createElement and cloneElement?

JSX elements will be transpiled to **React.createElement()** functions to create React elements which are going to be used for the object representation of UI. Whereas **cloneElement** is used to clone an element and pass it new props.

32. What is Lifting State Up in React?

When several components need to share the same changing data then it is recommended to lift the shared state up to their closest common ancestor. That means if two child components share the same data from its parent, then move the state to parent instead of maintaining local state in both of the child components.

33. What are the different phases of component lifecycle?

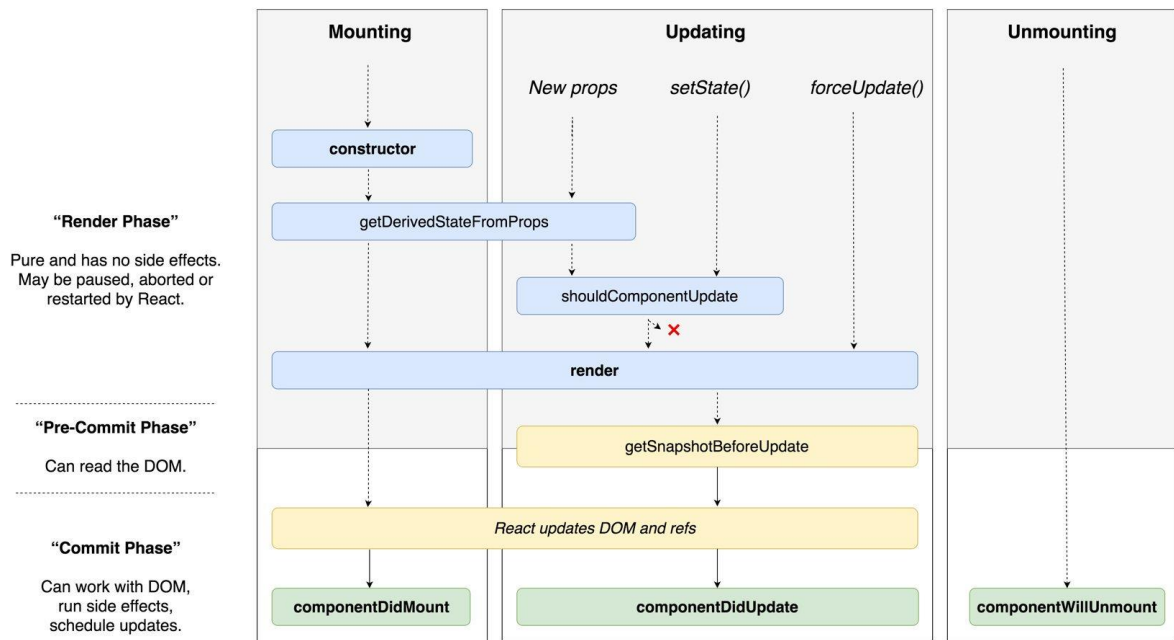
The component lifecycle has three distinct lifecycle phases:

- **Mounting:** The component is ready to mount in the browser DOM. This phase covers initialization from **constructor()**, **getDerivedStateFromProps()**, **render()**, and **componentDidMount()** lifecycle methods.
- **Updating:** In this phase, the component get updated in two ways, sending the new props and updating the state either from **setState()** or **forceUpdate()**. This phase covers **getDerivedStateFromProps()**, **shouldComponentUpdate()**, **render()**, **getSnapshotBeforeUpdate()** and **componentDidUpdate()** lifecycle methods.
- **Unmounting:** In this last phase, the component is not needed and get unmounted from the browser DOM. This phase includes **componentWillUnmount()** lifecycle method.

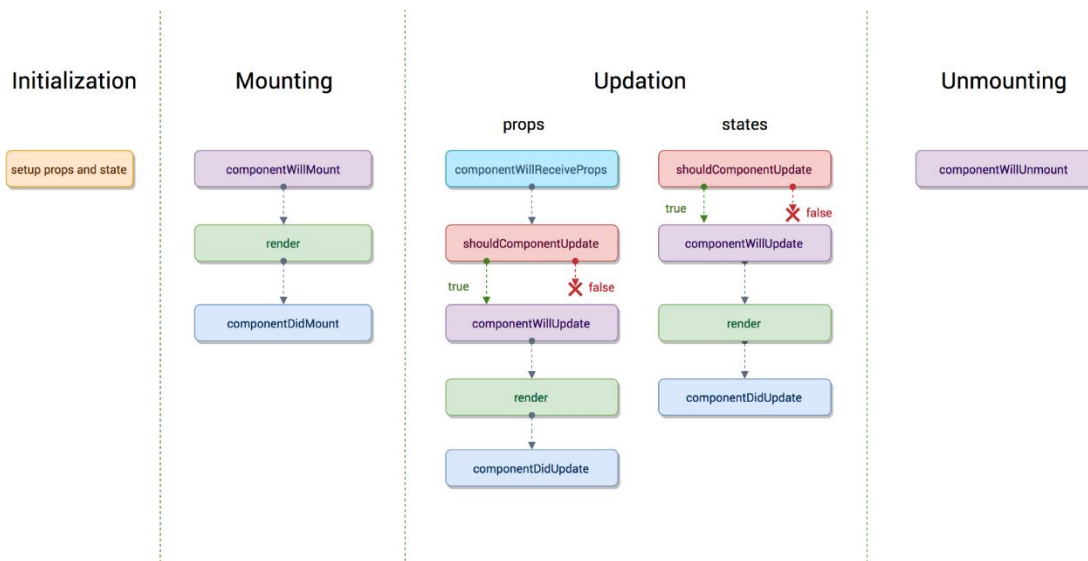
It's worth mentioning that React internally has a concept of phases when applying changes to the DOM. They are separated as follows

- **Render** The component will render without any side-effects. This applies for Pure components and in this phase, React can pause, abort, or restart the render.
- **Pre-commit** Before the component actually applies the changes to the DOM, there is a moment that allows React to read from the DOM through the **getSnapshotBeforeUpdate()**.
- **Commit** React works with the DOM and executes the final lifecycles respectively **componentDidMount()** for mounting, **componentDidUpdate()** for updating, and **componentWillUnmount()** for unmounting.

React 16.3+ Phases (or an [interactive version](#))



Before React 16.3



34. What are the lifecycle methods of React?

Before React 16.3

- **componentWillMount:** Executed before rendering and is used for App level configuration in your root component.
- **componentDidMount:** Executed after first rendering and here all AJAX requests, DOM or state updates, and set up event listeners should occur.

- **componentWillReceiveProps:** Executed when particular prop updates to trigger state transitions.
- **shouldComponentUpdate:** Determines if the component will be updated or not. By default it returns true. If you are sure that the component doesn't need to render after state or props are updated, you can return false value. It is a great place to improve performance as it allows you to prevent a re-render if component receives new prop.
- **componentWillUpdate:** Executed before re-rendering the component when there are props & state changes confirmed by **shouldComponentUpdate()** which returns true.
- **componentDidUpdate:** Mostly it is used to update the DOM in response to prop or state changes.
- **componentWillUnmount:** It will be used to cancel any outgoing network requests, or remove all event listeners associated with the component.

React 16.3+

- **getDerivedStateFromProps:** Invoked right before calling `render()` and is invoked on every render. This exists for rare use cases where you need derived state. Worth reading if you need derived state.
- **componentDidMount:** Executed after first rendering and where all AJAX requests, DOM or state updates, and set up event listeners should occur.
- **shouldComponentUpdate:** Determines if the component will be updated or not. By default it returns true. If you are sure that the component doesn't need to render after state or props are updated, you can return false value. It is a great place to improve performance as it allows you to prevent a re-render if component receives new prop.
- **getSnapshotBeforeUpdate:** Executed right before rendered output is committed to the DOM. Any value returned by this will be passed into **componentDidUpdate()**. This is useful to capture information from the DOM i.e. scroll position.
- **componentDidUpdate:** Mostly it is used to update the DOM in response to prop or state changes. This will not fire if **shouldComponentUpdate()** returns false.
- **componentWillUnmount:** It will be used to cancel any outgoing network requests, or remove all event listeners associated with the component.

35. What are Higher-Order Components?

A higher-order component (HOC) is a function that takes a component and returns a new component. Basically, it's a pattern that is derived from React's compositional nature.

We call them pure components because they can accept any dynamically provided child component but they won't modify or copy any behavior from their input components.

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

HOC can be used for many use cases:

- I. Code reuse, logic and bootstrap abstraction.
- II. Render hijacking.
- III. State abstraction and manipulation.
- IV. Props manipulation.

36. How to create props proxy for HOC component?

You can add/edit props passed to the component using props proxy pattern like this:

```
function HOC(WrappedComponent) {  
  return class Test extends Component {  
    render() {  
      const newProps = {  
        title: 'New Header',  
        footer: false,  
        showFeatureX: false,  
        showFeatureY: true  
      }  
  
      return <WrappedComponent {...this.props} {...newProps} />  
    }  
  }  
}
```

37. What is context?

Context provides a way to pass data through the component tree without having to pass props down manually at every level.

For example, authenticated user, locale preference, UI theme need to be accessed in the application by many components.

```
const { Provider, Consumer } = React.createContext(defaultValue);
```

38. What is children prop?

Children is a prop (**this.props.children**) that allow you to pass components as data to other components, just like any other prop you use. Component tree put between component's opening and closing tag will be passed to that component as **children** prop.

There are a number of methods available in the React API to work with this prop. These include **React.Children.map**, **React.Children.forEach**, **React.Children.count**, **React.Children.only**, **React.Children.toArray**.

A simple usage of children prop looks as below,

```
const MyDiv = React.createClass({
  render: function () {
    return <div>{this.props.children}</div>;
  },
});

ReactDOM.render(
  <MyDiv>
    <span>{"Hello"}</span>
    <span>{"World"}</span>
  </MyDiv>,
  node
);
```

39. How to write comments in React?

The comments in React/JSX are similar to JavaScript Multiline comments but are wrapped in curly braces.

Single-line comments:

```
<div>
  {/* Single-
line comments(In vanilla JavaScript, the single-
line comments are represented by double slash(/)) */}
  {`Welcome ${user}, let's play React`}
</div>
```

Multi-line comments:

```
<div>
  {/* Multi-line comments for more than
```

```
one line */}  
{`Welcome ${user}, let's play React`}  
</div>
```

40. What is the purpose of using super constructor with props argument?

A child class constructor cannot make use of **this** reference until **super()** method has been called.

The same applies for ES6 sub-classes as well. The main reason of passing props parameter to **super()** call is to access **this.props** in your child constructors.

Passing props:

```
class MyComponent extends React.Component {  
  constructor(props) {  
    super(props);  
  
    console.log(this.props); // prints { name: 'John', age:  
42 }  
  }  
}
```

Not passing props:

```
class MyComponent extends React.Component {  
  constructor(props) {  
    super();  
  
    console.log(this.props); // prints undefined  
  
    // but props parameter is still available  
    console.log(props); // prints { name: 'John', age: 42 }  
  }  
  
  render() {  
    // no difference outside constructor  
    console.log(this.props); // prints { name: 'John', age:  
42 }  
  }  
}
```

The above code snippets reveals that **this.props** is different only within the constructor. It would be the same outside the constructor.

41. What is reconciliation?

When a component's props or state change, React decides whether an actual DOM update is necessary by comparing the newly returned element with the previously rendered one. When they are not equal, React will update the DOM. This process is called reconciliation.

42. How to set state with a dynamic key name?

If you are using ES6 or the Babel transpiler to transform your JSX code then you can accomplish this with computed property names.

```
handleInputChange(event) {  
  this.setState({ [event.target.id]: event.target.value })  
}
```

43. What would be the common mistake of function being called every time the component renders?

You need to make sure that function is not being called while passing the function as a parameter.

```
render() {  
  // Wrong: handleClick is called instead of passed as a reference!  
  return <button onClick={this.handleClick()}>{'Click Me'}</button>  
}
```

Instead, pass the function itself without parenthesis:

```
render() {  
  // Correct: handleClick is passed as a reference!  
  return <button onClick={this.handleClick}>{'Click Me'}</button>  
}
```

44. Is lazy function supports named exports?

No, currently **React.lazy** function supports default exports only. If you would like to import modules which are named exports, you can create an intermediate module that reexports it as the default. It also ensures that tree shaking keeps working and don't pull unused components. Let's take a component file which exports multiple named components,

```
// MoreComponents.js  
export const SomeComponent = /* ... */;
```

```
export const UnusedComponent = /* ... */;
```

and reexport MoreComponents.js components in an intermediate file IntermediateComponent.js

```
// IntermediateComponent.js
export { SomeComponent as default } from "./MoreComponents.js";
```

Now you can import the module using lazy function as below,

```
import React, { lazy } from 'react';
const SomeComponent = lazy(() => import("./IntermediateComponent.js"));
```

45. Why React uses className over class attribute?

class is a keyword in JavaScript, and JSX is an extension of JavaScript. That's the principal reason why React uses **className** instead of **class**. Pass a string as the **className** prop.

```
render() {
  return <span className={'menu navigation-menu'}>{'Menu'}</span>
}
```

46. What are fragments?

It's common pattern in React which is used for a component to return multiple elements. Fragments let you group a list of children without adding extra nodes to the DOM.

```
render() {
  return (
    <React.Fragment>
      <ChildA />
      <ChildB />
      <ChildC />
    </React.Fragment>
  )
}
```

There is also a shorter syntax, but it's not supported in many tools:

```
render() {
```

```
return (  
  <>  
    <ChildA />  
    <ChildB />  
    <ChildC />  
  </>  
)  
}
```

47. Why fragments are better than container divs?

Below are the list of reasons,

- I. Fragments are a bit faster and use less memory by not creating an extra DOM node. This only has a real benefit on very large and deep trees.
- II. Some CSS mechanisms like Flexbox and CSS Grid have a special parent-child relationships, and adding divs in the middle makes it hard to keep the desired layout.
- III. The DOM Inspector is less cluttered.

48. What are portals in React?

Portal is a recommended way to render children into a DOM node that exists outside the DOM hierarchy of the parent component.

```
ReactDOM.createPortal(child, container)
```

The first argument is any render-able React child, such as an element, string, or fragment. The second argument is a DOM element.

49. What are stateless components?

If the behaviour is independent of its state then it can be a stateless component. You can use either a function or a class for creating stateless components. But unless you need to use a lifecycle hook in your components, you should go for function components. There are a lot of benefits if you decide to use function components here; they are easy to write, understand, and test, a little faster, and you can avoid the **this** keyword altogether.

50. What are stateful components?

If the behaviour of a component is dependent on the state of the component then it can be termed as stateful component. These stateful components are always class components and have a state that gets initialized in the **constructor**.

```
class App extends Component {
  constructor(props) {
    super(props)
    this.state = { count: 0 }
  }

  render() {
    // ...
  }
}
```

React 16.8 Update:

Hooks let you use state and other React features without writing classes.

The Equivalent Functional Component

```
import React, {useState} from 'react';
const App = (props) => {
  const [count, setCount] = useState(0);

  return (
    // JSX
  )
}
```

51. How to apply validation on props in React?

When the application is running in development mode, React will automatically check all props that we set on components to make sure they have correct type. If the type is incorrect, React will generate warning messages in the console. It's disabled in production mode due to performance impact. The mandatory props are defined with **isRequired**.

The set of predefined prop types:

- PropTypes.number
- PropTypes.string
- PropTypes.array
- PropTypes.object
- PropTypes.func

- PropTypes.node
- PropTypes.element
- PropTypes.bool
- PropTypes.symbol
- PropTypes.any

We can define **propTypes** for User component as below:

```
class User extends React.Component {
  static propTypes = {
    name: PropTypes.string.isRequired,
    age: PropTypes.number.isRequired
  }

  render() {
    return (
      <>
        <h1>{`Welcome, ${this.props.name}`}</h1>
        <h2>{`Age, ${this.props.age}`}</h2>
      </>
    )
  }
}
```

Note: In React v15.5 **PropTypes** were moved from **React.PropTypes** to **prop-types** library.

The Equivalent Functional Component

```
import React from 'react'
import PropTypes from 'prop-types'

function User() {
  return (
    <>
      <h1>{`Welcome, ${this.props.name}`}</h1>
```

```
    <h2>{`Age, ${this.props.age}`}</h2>
  </>
)
}

User.propTypes = {
  name: PropTypes.string.isRequired,
  age: PropTypes.number.isRequired
}
```

52. What are the advantages of React?

Below are the list of main advantages of React,

- I. Increases the application's performance with Virtual DOM.
- II. JSX makes code easy to read and write.
- III. It renders both on client and server side (SSR).
- IV. Easy to integrate with frameworks (Angular, Backbone) since it is only a view library.
- V. Easy to write unit and integration tests with tools such as Jest.

53. What are the limitations of React?

Apart from the advantages, there are few limitations of React too,

- I. React is just a view library, not a full framework.
- II. There is a learning curve for beginners who are new to web development.
- III. Integrating React into a traditional MVC framework requires some additional configuration.
- IV. The code complexity increases with inline templating and JSX.
- V. Too many smaller components leading to over engineering or boilerplate.

54. What are error boundaries in React v16?

Error boundaries are components that catch JavaScript errors anywhere in their child component tree, log those errors, and display a fallback UI instead of the component tree that crashed.

A class component becomes an error boundary if it defines a new lifecycle method called **componentDidCatch(error, info)** or **static getDerivedStateFromError()** :

```
class ErrorBoundary extends React.Component {
  constructor(props) {
    super(props)
    this.state = { hasError: false }
  }

  componentDidCatch(error, info) {
    // You can also log the error to an error reporting service
    logErrorToMyService(error, info)
  }

  static getDerivedStateFromError(error) {
    // Update state so the next render will show the fallback UI.
    return { hasError: true };
  }

  render() {
    if (this.state.hasError) {
      // You can render any custom fallback UI
      return <h1>{'Something went wrong.'}</h1>
    }
    return this.props.children
  }
}
```

After that use it as a regular component:

```
<ErrorBoundary>
  <MyWidget />
</ErrorBoundary>
```

55. How error boundaries handled in React v15?

React v15 provided very basic support for error boundaries using **unstable_handleError** method. It has been renamed to **componentDidCatch** in React v16.

56. What are the recommended ways for static type checking?

Normally we use PropTypes library (**React.PropTypes** moved to a **prop-types** package since React v15.5) for type checking in the React applications. For large code bases, it is recommended to use static type checkers such as Flow or TypeScript, that perform type checking at compile time and provide auto-completion features.

57. What is the use of react-dom package?

The react-dom package provides DOM-specific methods that can be used at the top level of your app. Most of the components are not required to use this module. Some of the methods of this package are:

- I. render()
- II. hydrate()
- III. unmountComponentAtNode()
- IV. findDOMNode()
- V. createPortal()

58. What is the purpose of render method of react-dom?

This method is used to render a React element into the DOM in the supplied container and return a reference to the component. If the React element was previously rendered into container, it will perform an update on it and only mutate the DOM as necessary to reflect the latest changes.

```
ReactDOM.render(element, container[, callback])
```

If the optional callback is provided, it will be executed after the component is rendered or updated.

59. What is ReactDOMServer?

The **ReactDOMServer** object enables you to render components to static markup (typically used on node server). This object is mainly used for server-side rendering (SSR). The following methods can be used in both the server and browser environments:

- I. renderToString()
- II. renderToStaticMarkup()

For example, you generally run a Node-based web server like Express, Hapi, or Koa, and you call **renderToString** to render your root component to a string, which you then send as response.

```
// using Express
```

```
import { renderToString } from "react-dom/server";
import MyPage from "./MyPage";

app.get("/", (req, res) => {
  res.write("<!DOCTYPE html><html><head><title>My Page</title></head><body>");
  res.write('<div id="content">');
  res.write(renderToString(<MyPage />));
  res.write("</div></body></html>");
  res.end();
});
```

60. How to use innerHTML in React?

The **dangerouslySetInnerHTML** attribute is React's replacement for using innerHTML in the browser DOM. Just like innerHTML, it is risky to use this attribute considering cross-site scripting (XSS) attacks. You just need to pass a `__html` object as key and HTML text as value.

In this example MyComponent uses dangerouslySetInnerHTML attribute for setting HTML markup:

```
function createMarkup() {
  return { __html: 'First &middot; Second' }
}

function MyComponent() {
  return <div dangerouslySetInnerHTML={createMarkup()} />
}
```

61. How to use styles in React?

The **style** attribute accepts a JavaScript object with camelCased properties rather than a CSS string. This is consistent with the DOM style JavaScript property, is more efficient, and prevents XSS security holes.

```
const divStyle = {
  color: 'blue',
  backgroundImage: 'url(' + imgUrl + ')'
};
```

```
function HelloWorldComponent() {  
  return <div style={divStyle}>Hello World!</div>  
}
```

Style keys are camelCased in order to be consistent with accessing the properties on DOM nodes in JavaScript (e.g. **node.style.backgroundImage**).

62. How events are different in React?

Handling events in React elements has some syntactic differences:

- I. React event handlers are named using camelCase, rather than lowercase.
- II. With JSX you pass a function as the event handler, rather than a string.

63. What will happen if you use `setState()` in constructor?

When you use **setState()**, then apart from assigning to the object state React also re-renders the component and all its children. You would get error like this: Can only update a mounted or mounting component. So we need to use **this.state** to initialize variables inside constructor.

64. What is the impact of indexes as keys?

Keys should be stable, predictable, and unique so that React can keep track of elements.

In the below code snippet, each element's key will be based on ordering, rather than tied to the data that is being represented. This limits the optimizations that React can do.

```
{  
  todos.map((todo, index) => <Todo {...todo} key={index} />)  
;  
}
```

If you use element data for unique key, assuming `todo.id` is unique to this list and stable, React would be able to reorder elements without needing to reevaluate them as much.

```
{  
  todos.map((todo) => <Todo {...todo} key={todo.id} />);  
}
```

65. Is it good to use `setState()` in `componentWillMount()` method?

Yes, it is safe to use `setState()` inside `componentWillMount()` method. But at the same time it is recommended to avoid async initialization in `componentWillMount()` lifecycle method.

`componentWillMount()` is invoked immediately before mounting occurs. It is called before `render()`, therefore setting state in this method will not trigger a re-render. Avoid introducing any side-effects or subscriptions in this method. We need to make sure async calls for component initialization happened in `componentDidMount()` instead of `componentWillMount()`.

```
componentDidMount() {  
  axios.get(`api/todos`)  
    .then((result) => {  
      this.setState({  
        messages: [...result.data]  
      })  
    })  
}
```

66. What will happen if you use props in initial state?

If the props on the component are changed without the component being refreshed, the new prop value will never be displayed because the constructor function will never update the current state of the component. The initialization of state from props only runs when the component is first created.

The below component won't display the updated input value:

```
class MyComponent extends React.Component {  
  constructor(props) {  
    super(props);  
  
    this.state = {  
      records: [],  
      inputValue: this.props.inputValue,  
    };  
  }  
  
  render() {  
    return <div>{this.state.inputValue}</div>;  
  }  
}
```

Using props inside render method will update the value:

```
class MyComponent extends React.Component {
  constructor(props) {
    super(props)

    this.state = {
      record: []
    }
  }

  render() {
    return <div>{this.props.inputValue}</div>
  }
}
```

67. How do you conditionally render components?

In some cases, you want to render different components depending on some state. JSX does not render **false** or **undefined**, so you can use conditional short-circuiting to render a given part of your component only if a certain condition is true.

```
const MyComponent = ({ name, address }) => (
  <div>
    <h2>{name}</h2>
    {address && <p>{address}</p>}
  </div>
);
```

If you need an if-else condition then use ternary operator.

```
const MyComponent = ({ name, address }) => (
  <div>
    <h2>{name}</h2>
    {address ? <p>{address}</p> : <p>"Address is not available"</p>}
  </div>
);
```


68. Why we need to be careful when spreading props on DOM elements?

When we spread props we run into the risk of adding unknown HTML attributes, which is a bad practice. Instead we can use prop destructuring with **...rest** operator, so it will add only required props.

For example,

```
const ComponentA = () => (  
  <ComponentB isDisplay={true} className={"componentStyle"}  
/>  
);  
  
const ComponentB = ({ isDisplay, ...domProps }) => (  
  <div {...domProps}>{"ComponentB"}</div>  
);
```

69. How you use decorators in React?

You can decorate your class components, which is the same as passing the component into a function. Decorators are flexible and readable way of modifying component functionality.

```
@setTitle("Profile")  
class Profile extends React.Component {  
  //....  
}  
  
/*  
  title is a string that will be set as a document title  
  WrappedComponent is what our decorator will receive when  
  put directly above a component class as seen in the exampl  
e above  
*/  
const setTitle = (title) => (WrappedComponent) => {  
  return class extends React.Component {  
    componentDidMount() {  
      document.title = title;  
    }  
  }  
}
```

```
}  
  
render() {  
  return <WrappedComponent {...this.props} />;  
}  
};  
};
```

Note: Decorators are a feature that didn't make it into ES7, but are currently a stage 2 proposal.

70. How you implement Server Side Rendering or SSR?

React is already equipped to handle rendering on Node servers. A special version of the DOM renderer is available, which follows the same pattern as on the client side.

```
import ReactDOMServer from 'react-dom/server'  
import App from './App'  
  
ReactDOMServer.renderToString(<App />)
```

This method will output the regular HTML as a string, which can be then placed inside a page body as part of the server response. On the client side, React detects the pre-rendered content and seamlessly picks up where it left off.

71. How to enable production mode in React?

You should use Webpack's DefinePlugin method to set NODE_ENV to production, by which it strip out things like propTypes validation and extra warnings. Apart from this, if you minify the code, for example, Uglify's dead-code elimination to strip out development only code and comments, it will drastically reduce the size of your bundle.

72. What is CRA and its benefits?

The create-react-app CLI tool allows you to quickly create & run React applications with no configuration step.

Let's create Todo App using CRA:

```
# Installation
$ npm install -g create-react-app

# Create new project
$ create-react-app todo-app
$ cd todo-app

# Build, test and run
$ npm run build
$ npm run test
$ npm start
```

It includes everything we need to build a React app:

1. React, JSX, ES6, and Flow syntax support.
2. Language extras beyond ES6 like the object spread operator.
3. Autoprefixed CSS, so you don't need -webkit- or other prefixes.
4. A fast interactive unit test runner with built-in support for coverage reporting.
5. A live development server that warns about common mistakes.
6. A build script to bundle JS, CSS, and images for production, with hashes and sourcemaps.

73. What is the lifecycle methods order in mounting?

The lifecycle methods are called in the following order when an instance of a component is being created and inserted into the DOM.

- constructor()
- static getDerivedStateFromProps()
- render()
- componentDidMount()

74. What are the lifecycle methods going to be deprecated in React v16?

The following lifecycle methods going to be unsafe coding practices and will be more problematic with async rendering.

1. componentWillMount()

2. `componentWillReceiveProps()`
3. `componentWillUpdate()`

Starting with React v16.3 these methods are aliased with `UNSAFE_` prefix, and the unprefix version will be removed in React v17.

75. What is the purpose of `getDerivedStateFromProps()` lifecycle method?

The new static `getDerivedStateFromProps()` lifecycle method is invoked after a component is instantiated as well as before it is re-rendered. It can return an object to update state, or null to indicate that the new props do not require any state updates.

```
class MyComponent extends React.Component {  
  static getDerivedStateFromProps(props, state) {  
    // ...  
  }  
}
```

This lifecycle method along with `componentDidUpdate()` covers all the use cases of `componentWillReceiveProps()`.

76. What is the purpose of `getSnapshotBeforeUpdate()` lifecycle method?

The new `getSnapshotBeforeUpdate()` lifecycle method is called right before DOM updates. The return value from this method will be passed as the third parameter to `componentDidUpdate()`.

```
class MyComponent extends React.Component {  
  getSnapshotBeforeUpdate(prevProps, prevState) {  
    // ...  
  }  
}
```

This lifecycle method along with `componentDidUpdate()` covers all the use cases of `componentWillUpdate()`.

77. Do Hooks replace render props and higher order components?

Both render props and higher-order components render only a single child but in most of the cases Hooks are a simpler way to serve this by reducing nesting in your tree.

78. What is the recommended way for naming components?

It is recommended to name the component by reference instead of using displayName.

Using displayName for naming component:

```
export default React.createClass({
  displayName: "TodoApp",
  // ...
});
```

The recommended approach:

```
export default class TodoApp extends React.Component {
  // ...
}
```

79. What is the recommended ordering of methods in component class?

Recommended ordering of methods from mounting to render stage:

static methods

1. constructor()
2. getChildContext()
3. componentWillMount()
4. componentDidMount()
5. componentWillReceiveProps()
6. shouldComponentUpdate()
7. componentWillUpdate()
8. componentDidUpdate()
9. componentWillUnmount()
10. click handlers or event handlers like onClickSubmit() or onChangeDescription()
11. getter methods for render like getSelectReason() or getFooterContent()
12. optional render methods like renderNavigation() or renderProfilePicture()
13. render()

80. What is a switching component?

A switching component is a component that renders one of many components. We need to use object to map prop values to components.

For example, a switching component to display different pages based on page prop:

```
import HomePage from "./HomePage";
import AboutPage from "./AboutPage";
import ServicesPage from "./ServicesPage";
import ContactPage from "./ContactPage";

const PAGES = {
  home: HomePage,
  about: AboutPage,
  services: ServicesPage,
  contact: ContactPage,
};

const Page = (props) => {
  const Handler = PAGES[props.page] || ContactPage;

  return <Handler {...props} />;
};

// The keys of the PAGES object can be used in the prop types
// to catch dev-time errors.
Page.propTypes = {
  page: PropTypes.oneOf(Object.keys(PAGES)).isRequired,
};
```

81. Why we need to pass a function to setState()?

The reason behind for this is that `setState()` is an asynchronous operation. React batches state changes for performance reasons, so the state may not change immediately after `setState()` is called. That means you should not rely on the current state when calling `setState()` since you can't be sure what that state will be. The solution is to pass a function to `setState()`, with the previous state as an argument. By doing this you can avoid issues with the user getting the old state value on access due to the asynchronous nature of `setState()`.

Let's say the initial count value is zero. After three consecutive increment operations, the value is going to be incremented only by one.

```
// assuming this.state.count === 0
this.setState({ count: this.state.count + 1 })
this.setState({ count: this.state.count + 1 })
this.setState({ count: this.state.count + 1 })
// this.state.count === 1, not 3
```

If we pass a function to `setState()`, the count gets incremented correctly.

```
this.setState((prevState, props) => ({
  count: prevState.count + props.increment
}))
// this.state.count === 3 as expected
(OR)
```

Why function is preferred over object for `setState()`?

React may batch multiple `setState()` calls into a single update for performance. Because `this.props` and `this.state` may be updated asynchronously, you should not rely on their values for calculating the next state.

This counter example will fail to update as expected:

```
// Wrong
this.setState({
  counter: this.state.counter + this.props.increment,
})
```

The preferred approach is to call `setState()` with function rather than object. That function will receive the previous state as the first argument, and the props at the time the update is applied as the second argument.

```
// Correct
this.setState((prevState, props) => ({
  counter: prevState.counter + props.increment
}))
```

82. What is strict mode in React?

React.StrictMode is a useful component for highlighting potential problems in an application. Just like `<Fragment>`, `<StrictMode>` does not render any extra DOM elements. It activates additional checks and warnings for its descendants. These checks apply for development mode only.

```
import React from "react";

function ExampleApplication() {
  return (
    <div>
      <Header />
      <React.StrictMode>
        <div>
          <ComponentOne />
          <ComponentTwo />
        </div>
      </React.StrictMode>
      <Header />
    </div>
  );
}
```

In the example above, the strict mode checks apply to `<ComponentOne>` and `<ComponentTwo>` components only.

83. What are React Mixins?

Mixins are a way to totally separate components to have a common functionality. Mixins should not be used and can be replaced with higher-order components or decorators.

One of the most commonly used mixins is `PureRenderMixin`. You might be using it in some components to prevent unnecessary re-renders when the props and state are shallowly equal to the previous props and state:

```
const PureRenderMixin = require("react-addons-pure-render-
mixin");

const Button = React.createClass({
  mixins: [PureRenderMixin],
  // ...
});
```


84. Why is `isMounted()` an anti-pattern and what is the proper solution?

The primary use case for `isMounted()` is to avoid calling `setState()` after a component has been unmounted, because it will emit a warning.

```
if (this.isMounted()) {  
  this.setState({...})  
}
```

Checking `isMounted()` before calling `setState()` does eliminate the warning, but it also defeats the purpose of the warning. Using `isMounted()` is a code smell because the only reason you would check is because you think you might be holding a reference after the component has unmounted.

An optimal solution would be to find places where `setState()` might be called after a component has unmounted, and fix them. Such situations most commonly occur due to callbacks, when a component is waiting for some data and gets unmounted before the data arrives. Ideally, any callbacks should be canceled in `componentWillUnmount()`, prior to unmounting.

85. What are the Pointer Events supported in React?

Pointer Events provide a unified way of handling all input events. In the old days we had a mouse and respective event listeners to handle them but nowadays we have many devices which don't correlate to having a mouse, like phones with touch surface or pens. We need to remember that these events will only work in browsers that support the Pointer Events specification.

The following event types are now available in React DOM:

- I. `onPointerDown`
- II. `onPointerMove`
- III. `onPointerUp`
- IV. `onPointerCancel`
- V. `onGotPointerCapture`
- VI. `onLostPointerCapture`
- VII. `onPointerEnter`
- VIII. `onPointerLeave`
- IX. `onPointerOver`
- X. `onPointerOut`

86. Why should component names start with capital letter?

If you are rendering your component using JSX, the name of that component has to begin with a capital letter otherwise React will throw an error as unrecognized tag. This convention is because only HTML elements and SVG tags can begin with a lowercase letter.

```
class SomeComponent extends Component {  
  // Code goes here  
}
```

You can define component class which name starts with lowercase letter, but when it's imported it should have capital letter. Here lowercase is fine:

```
class myComponent extends Component {  
  render() {  
    return <div />  
  }  
}  
  
export default myComponent
```

While when imported in another file it should start with capital letter:

```
import MyComponent from './MyComponent'
```

What are the exceptions on React component naming?

The component names should start with a uppercase letter but there are few exceptions on this convention. The lowercase tag names with a dot (property accessors) are still considered as valid component names. For example the below tag can be compiled to a valid component,

```
render() {  
  return (  
    <obj.component/> // `React.createElement(obj.component)`  
  )  
}
```

87. Are custom DOM attributes supported in React v16?

Yes. In the past, React used to ignore unknown DOM attributes. If you wrote JSX with an attribute that React doesn't recognize, React would just skip it.

For example, let's take a look at the below attribute:

```
<div mycustomattribute={'something'} />
```

Would render an empty div to the DOM with React v15:

```
<div />
```

In React v16 any unknown attributes will end up in the DOM:

```
<div mycustomattribute='something' />
```

This is useful for supplying browser-specific non-standard attributes, trying new DOM APIs, and integrating with opinionated third-party libraries.

88. What is the difference between constructor and getInitialState?

You should initialize state in the constructor when using ES6 classes, and `getInitialState()` method when using `React.createClass()`.

Using ES6 classes:

```
class MyComponent extends React.Component {
  constructor(props) {
    super(props)
    this.state = { /* initial state */ }
  }
}
```

Using `React.createClass()`:

```
const MyComponent = React.createClass({
  getInitialState() {
    return { /* initial state */ }
  }
})
```

Note: `React.createClass()` is deprecated and removed in React v16. Use plain JavaScript classes instead.

89. Can you force a component to re-render without calling `setState`?

By default, when your component's state or props change, your component will re-render. If your `render()` method depends on some other data, you can tell React that the component needs re-rendering by calling `forceUpdate()`.

`component.forceUpdate(callback)`

It is recommended to avoid all uses of `forceUpdate()` and only read from `this.props` and `this.state` in `render()`.

90. What is the difference between `super()` and `super(props)` in React using ES6 classes?

When you want to access `this.props` in `constructor()` then you should pass props to `super()` method.

Using `super(props)`:

```
class MyComponent extends React.Component {
  constructor(props) {
    super(props);
    console.log(this.props); // { name: 'John', ... }
  }
}
```

Using `super()`:

```
class MyComponent extends React.Component {
  constructor(props) {
    super()
    console.log(this.props) // undefined
  }
}
```

Outside `constructor()` both will display same value for `this.props`.

91. How to loop inside JSX?

You can simply use **`Array.prototype.map`** with ES6 arrow function syntax.

For example, the items array of objects is mapped into an array of components:

```
<tbody>
  {items.map(item => <SomeComponent key={item.id} name={item.name} />)}
</tbody>
```

But you can't iterate using for loop:

```
<tbody>
  for (let i = 0; i < items.length; i++) {
    <SomeComponent key={items[i].id} name={items[i].name} />
  }
</tbody>
```

This is because JSX tags are transpiled into function calls, and you can't use statements inside expressions. This may change thanks to do expressions which are stage 1 proposal.

92. How do you access props in attribute quotes?

React (or JSX) doesn't support variable interpolation inside an attribute value. The below representation won't work:

```
<img className='image' src='images/{this.props.image}' />
```

But you can put any JS expression inside curly braces as the entire attribute value. So the below expression works:

```
<img className='image' src={'images/' + this.props.image} />
```

Using template strings will also work:

```
<img className='image' src={`images/${this.props.image}`} />
```

93. What is React proptype array with shape?

If you want to pass an array of objects to a component with a particular shape then use **React.PropTypes.shape()** as an argument to **React.PropTypes.arrayOf()**.

```
ReactComponent.propTypes = {
  arrayWithShape: React.PropTypes.arrayOf(
    React.PropTypes.shape({
      color: React.PropTypes.string.isRequired,
      fontSize: React.PropTypes.number.isRequired,
    })
  )
}
```

```
    ).isRequired,  
  };
```

94. How to conditionally apply class attributes?

You shouldn't use curly braces inside quotes because it is going to be evaluated as a string.

```
<div className="btn-  
panel {this.props.visible ? 'show' : 'hidden'}">
```

Instead you need to move curly braces outside (don't forget to include spaces between class names):

```
<div className={'btn-  
panel ' + (this.props.visible ? 'show' : 'hidden')}>
```

Template strings will also work:

```
<div className={`btn-  
panel ${this.props.visible ? 'show' : 'hidden'}}>
```

95. What is the difference between React and ReactDOM?

The react package contains `React.createElement()`, `React.Component`, `React.Children`, and other helpers related to elements and component classes. You can think of these as the isomorphic or universal helpers that you need to build components. The react-dom package contains `ReactDOM.render()`, and in react-dom/server we have server-side rendering support with `ReactDOMServer.renderToString()` and `ReactDOMServer.renderToStaticMarkup()`.

96. Why ReactDOM is separated from React?

The React team worked on extracting all DOM-related features into a separate library called ReactDOM. React v0.14 is the first release in which the libraries are split. By looking at some of the packages, react-native, react-art, react-canvas, and react-three, it has become clear that the beauty and essence of React has nothing to do with browsers or the DOM.

To build more environments that React can render to, React team planned to split the main React package into two: react and react-dom. This paves the way to writing components that can be shared between the web version of React and React Native.

97. How to use React label element?

If you try to render a `<label>` element bound to a text input using the standard for attribute, then it produces HTML missing that attribute and prints a warning to the console.

```
<label for={'user'}>{'User'}</label>  
<input type={'text'} id={'user'} />
```

Since for is a reserved keyword in JavaScript, use htmlFor instead.

```
<label htmlFor={'user'}>{'User'}</label>  
<input type={'text'} id={'user'} />
```

98. How to combine multiple inline style objects?

You can use spread operator in regular React:

```
<button style={{...styles.panel.button, ...styles.panel.submitButton}}>{'Submit'}</button>
```

If you're using React Native then you can use the array notation:

```
<button style={[styles.panel.button, styles.panel.submitButton]}>{'Submit'}</button>
```

99. How to re-render the view when the browser is resized?

You can listen to the resize event in componentDidMount() and then update the dimensions (width and height). You should remove the listener in componentWillUnmount() method.

```
class WindowDimensions extends React.Component {  
  constructor(props) {  
    super(props);  
    this.updateDimensions = this.updateDimensions.bind(this)  
  };  
  
  componentWillMount() {  
    this.updateDimensions();  
  }  
  
  componentDidMount() {  
    window.addEventListener("resize", this.updateDimensions)  
  };  
}
```

```
componentWillUnmount() {
  window.removeEventListener("resize", this.updateDimensions);
}

updateDimensions() {
  this.setState({ width: window.innerWidth, height: window.innerHeight });
}

render() {
  return (
    <span>
      {this.state.width} x {this.state.height}
    </span>
  );
}
```

100. What is the difference between `setState()` and `replaceState()` methods?

When you use `setState()` the current and previous states are merged. `replaceState()` throws out the current state, and replaces it with only what you provide. Usually `setState()` is used unless you really need to remove all previous keys for some reason. You can also set state to `false/null` in `setState()` instead of using `replaceState()`.

101. How to listen to state changes?

The `componentDidUpdate` lifecycle method will be called when state changes. You can compare provided state and props values with current state and props to determine if something meaningful changed.

`componentDidUpdate(object prevProps, object prevState)`

Note: The previous releases of ReactJS also uses `componentWillUpdate(object nextProps, object nextState)` for state changes. It has been deprecated in latest releases.

102. What is the recommended approach of removing an array element in React state?

The better approach is to use **`Array.prototype.filter()`** method.

For example, let's create a **removeItem()** method for updating the state.

```
removeItem(index) {  
  this.setState({  
    data: this.state.data.filter((item, i) => i !== index)  
  })  
}
```

103. Is it possible to use React without rendering HTML?

It is possible with latest version (≥ 16.2). Below are the possible options:

```
render() {  
  return false  
}  
render() {  
  return null  
}  
render() {  
  return []  
}  
render() {  
  return <React.Fragment></React.Fragment>  
}  
render() {  
  return <></>  
}
```

Returning undefined won't work.

104. How to pretty print JSON with React?

We can use `<pre>` tag so that the formatting of the **JSON.stringify()** is retained:

```
const data = { name: 'John', age: 42 }  
  
class User extends React.Component {  
  render() {  
    return (  

```

```
    <pre>
      {JSON.stringify(data, null, 2)}
    </pre>
  )
}
}

React.render(<User />, document.getElementById('container'))
```

105. Why you can't update props in React?

The React philosophy is that props should be immutable and top-down. This means that a parent can send any prop values to a child, but the child can't modify received props.

106. How to focus an input element on page load?

You can do it by creating ref for input element and using it in componentDidMount():

```
class App extends React.Component {
  componentDidMount() {
    this.nameInput.focus();
  }

  render() {
    return (
      <div>
        <input defaultValue={"Won't focus"} />
        <input
          ref={(input) => (this.nameInput = input)}
          defaultValue={"Will focus"}
        />
      </div>
    );
  }
}

ReactDOM.render(<App />, document.getElementById("app"));
```

107. What are the possible ways of updating objects in state?

Calling **setState()** with an object to merge with state:

1. Using **Object.assign()** to create a copy of the object:

```
const user = Object.assign({}, this.state.user, { age: 42 });  
this.setState({ user });
```

2. Using spread operator:

```
const user = { ...this.state.user, age: 42 };  
this.setState({ user });
```

3. Calling **setState()** with a function:

```
this.setState((prevState) => ({  
  user: {  
    ...prevState.user,  
    age: 42,  
  },  
}));
```

108. How can we find the version of React at runtime in the browser?

You can use `React.version` to get the version.

```
const REACT_VERSION = React.version;  
  
ReactDOM.render(  
  <div>`React version: ${REACT_VERSION}`</div>,  
  document.getElementById("app")  
)
```

109. What are the approaches to include polyfills in your create-react-app?

There are approaches to include polyfills in create-react-app,

- Manual import from core-js:
Create a file called (something like) `polyfills.js` and import it into root `index.js` file.
Run `npm install core-js` or `yarn add core-js` and import your specific required features.

```
import 'core-js/fn/array/find'  
import 'core-js/fn/array/includes'  
import 'core-js/fn/number/is-nan'
```

- Using Polyfill service:

Use the polyfill.io CDN to retrieve custom, browser-specific polyfills by adding this line to index.html:

```
<script src='https://cdn.polyfill.io/v2/polyfill.min.js  
?features=default,Array.prototype.includes'></script>
```

In the above script we had to explicitly request the Array.prototype.includes feature as it is not included in the default feature set.

110. How to use https instead of http in create-react-app?

You just need to use HTTPS=true configuration. You can edit your package.json scripts section:

```
"scripts": {  
  "start": "set HTTPS=true && react-scripts start"  
}
```

or just run set HTTPS=true && npm start

111. How to avoid using relative path imports in create-react-app?

Create a file called .env in the project root and write the import path:

```
NODE_PATH=src/app
```

After that restart the development server. Now you should be able to import anything inside src/app without relative paths.

112. How to add Google Analytics for React Router?

Add a listener on the history object to record each page view:

```
history.listen(function (location) {  
  window.ga("set", "page", location.pathname + location.search);  
  window.ga("send", "pageview", location.pathname + location.search);  
});
```

```
});
```

113. How to update a component every second?

You need to use `setInterval()` to trigger the change, but you also need to clear the timer when the component unmounts to prevent errors and memory leaks.

```
componentDidMount() {  
  this.interval = setInterval(() => this.setState({ time: Date.now() }), 1000)  
}  
  
componentWillUnmount() {  
  clearInterval(this.interval)  
}
```

114. How do you apply vendor prefixes to inline styles in React?

React does not apply vendor prefixes automatically. You need to add vendor prefixes manually.

```
<div style={{  
  transform: 'rotate(90deg)',  
  WebkitTransform: 'rotate(90deg)', // note the capital 'W' here  
  msTransform: 'rotate(90deg)' // 'ms' is the only lowercase vendor prefix  
}} />
```

115. How to import and export components using React and ES6?

You should use default for exporting the components

```
import React from 'react'  
import User from 'user'  
  
export default class MyProfile extends React.Component {  
  render(){  
    return (  

```

```
    <User type="customer">
      //...
    </User>
  )
}
```

With the export specifier, the MyProfile is going to be the member and exported to this module and the same can be imported without mentioning the name in other components.

116. Why is a component constructor called only once?

React's reconciliation algorithm assumes that without any information to the contrary, if a custom component appears in the same place on subsequent renders, it's the same component as before, so reuses the previous instance rather than creating a new one.

117. How to define constants in React?

You can use ES7 static field to define constant.

```
class MyComponent extends React.Component {
  static DEFAULT_PAGINATION = 10
}
```

Static fields are part of the Class Fields stage 3 proposal.

118. How to programmatically trigger click event in React?

You could use the ref prop to acquire a reference to the underlying HTMLInputElement object through a callback, store the reference as a class property, then use that reference to later trigger a click from your event handlers using the HTMLInputElement.click method.

This can be done in two steps:

Create ref in render method:

```
<input ref={input => this.inputElement = input} />
```

Apply click event in your event handler:

```
this.inputElement.click()
```

119. Is it possible to use async/await in plain React?

If you want to use async/await in React, you will need Babel and transform-async-to-generator plugin. React Native ships with Babel and a set of transforms.

120. What are the common folder structures for React?

There are two common practices for React project file structure.

Grouping by features or routes:

One common way to structure projects is locate CSS, JS, and tests together, grouped by feature or route.

common/

├─ Avatar.js

├─ Avatar.css

├─ APIUtils.js

└─ APIUtils.test.js

feed/

├─ index.js

├─ Feed.js

├─ Feed.css

├─ FeedStory.js

├─ FeedStory.test.js

└─ FeedAPI.js

profile/

├─ index.js

├─ Profile.js

├─ ProfileHeader.js

└─ ProfileHeader.css

└ ProfileAPI.js

Grouping by file type:

Another popular way to structure projects is to group similar files together.

api/

└ APIUtils.js

└ APIUtils.test.js

└ ProfileAPI.js

└ UserAPI.js

components/

└ Avatar.js

└ Avatar.css

└ Feed.js

└ Feed.css

└ FeedStory.js

└ FeedStory.test.js

└ Profile.js

└ ProfileHeader.js

└ ProfileHeader.css

121. What are the popular packages for animation?

React Transition Group and **React Motion** are popular animation packages in React ecosystem.

122. What is the benefit of styles modules?

It is recommended to avoid hard coding style values in components. Any values that are likely to be used across different UI components should be extracted into their own modules.

For example, these styles could be extracted into a separate component:

```
export const colors = {  
  white,
```



```
    black,  
    blue,  
  };  
  
export const space = [0, 8, 16, 32, 64];
```

And then imported individually in other components:

```
import { space, colors } from './styles'
```

123. What are the popular React-specific linters?

ESLint is a popular JavaScript linter. There are plugins available that analyse specific code styles. One of the most common for React is an npm package called `eslint-plugin-react`. By default, it will check a number of best practices, with rules checking things from keys in iterators to a complete set of prop types.

Another popular plugin is `eslint-plugin-jsx-a11y`, which will help fix common issues with accessibility. As JSX offers slightly different syntax to regular HTML, issues with alt text and tabindex, for example, will not be picked up by regular plugins.

124. How to make AJAX call and in which component lifecycle methods should I make an AJAX call?

You can use AJAX libraries such as Axios, jQuery AJAX, and the browser built-in fetch. You should fetch data in the **`componentDidMount()`** lifecycle method. This is so you can use **`setState()`** to update your component when the data is retrieved.

For example, the employees list fetched from API and set local state:

```
class MyComponent extends React.Component {  
  constructor(props) {  
    super(props);  
    this.state = {  
      employees: [],  
      error: null,  
    };  
  }  
}
```

```
componentDidMount() {
  fetch("https://api.example.com/items")
    .then((res) => res.json())
    .then(
      (result) => {
        this.setState({
          employees: result.employees,
        });
      },
      (error) => {
        this.setState({ error });
      }
    );
}

render() {
  const { error, employees } = this.state;
  if (error) {
    return <div>Error: {error.message}</div>;
  } else {
    return (
      <ul>
        {employees.map((employee) => (
          <li key={employee.name}>
            {employee.name}-{employee.experience}
          </li>
        ))}
      </ul>
    );
  }
}
```

125. What are render props?

Render Props is a simple technique for sharing code between components using a prop whose value is a function. The below component uses render prop which returns a React element.

```
<DataProvider render={data => (  
  <h1>`Hello ${data.target}`</h1>  
)}>
```

Libraries such as React Router and DownShift are using this pattern.

126. What is React Router?

React Router is a powerful routing library built on top of React that helps you add new screens and flows to your application incredibly quickly, all while keeping the URL in sync with what's being displayed on the page.

127. How React Router is different from history library?

React Router is a wrapper around the history library which handles interaction with the browser's window.history with its browser and hash histories. It also provides memory history which is useful for environments that don't have global history, such as mobile app development (React Native) and unit testing with Node.

128. What are the <Router> components of React Router v4?

React Router v4 provides below 3 <Router> components:

- I. `<BrowserRouter>`
- II. `<HashRouter>`
- III. `<MemoryRouter>`

The above components will create browser, hash, and memory history instances. React Router v4 makes the properties and methods of the history instance associated with your router available through the context in the router object.

129. What is the purpose of push() and replace() methods of history?

A history instance has two methods for navigation purpose.

- **push()**
- **replace()**

If you think of the history as an array of visited locations, push() will add a new location to the array and replace() will replace the current location in the array with the new one.

130. How do you programmatically navigate using React Router v4?

There are three different ways to achieve programmatic routing/navigation within components.

1. Using the withRouter() higher-order function:

The withRouter() higher-order function will inject the history object as a prop of the component. This object provides push() and replace() methods to avoid the usage of context.

```
import { withRouter } from "react-router-dom"; // this also works with 'react-router-native'

const Button = withRouter(({ history }) => (
  <button
    type="button"
    onClick={() => {
      history.push("/new-location");
    }}
  >
    {"Click Me!"}
  </button>
));
```

2. Using <Route> component and render props pattern:

The <Route> component passes the same props as withRouter(), so you will be able to access the history methods through the history prop.

```
import { Route } from "react-router-dom";

const Button = () => (
  <Route
    render={({ history }) => (
      <button
        type="button"
        onClick={() => {
          history.push("/new-location");
        }}
      >
```

```
    }}  
  >  
    {"Click Me!"}  
  </button>  
)}  
/>  
);
```

3. Using context:

This option is not recommended and treated as unstable API.

```
const Button = (props, context) => (  
  <button  
    type="button"  
    onClick={() => {  
      context.history.push("/new-location");  
    }}  
  >  
    {"Click Me!"}  
  </button>  
);  
  
Button.contextTypes = {  
  history: React.PropTypes.shape({  
    push: React.PropTypes.func.isRequired,  
  }),  
};
```

131. How to get query parameters in React Router v4?

The ability to parse query strings was taken out of React Router v4 because there have been user requests over the years to support different implementation. So the decision has been given to users to choose the implementation they like. The recommended approach is to use query strings library.

```
const queryString = require("query-string");  
const parsed = queryString.parse(props.location.search);
```

You can also use `URLSearchParams` if you want something native:

```
const params = new URLSearchParams(props.location.search);  
const foo = params.get("name");
```

You should use a polyfill for IE11.

132. Why you get "Router may have only one child element" warning?

You have to wrap your Route's in a `<Switch>` block because `<Switch>` is unique in that it renders a route exclusively.

At first you need to add `Switch` to your imports:

```
import { Switch, Router, Route } from 'react-router'
```

Then define the routes within `<Switch>` block:

```
<Router>  
  <Switch>  
    <Route { /* ... */ } />  
    <Route { /* ... */ } />  
  </Switch>  
</Router>
```

133. How to pass params to `history.push` method in React Router v4?

While navigating you can pass props to the history object:

```
this.props.history.push({  
  pathname: "/template",  
  search: "?name=sudheer",  
  state: { detail: response.data },  
});
```

The search property is used to pass query params in `push()` method.

134. How to implement default or NotFound page?

A `<Switch>` renders the first child `<Route>` that matches. A `<Route>` with no path always matches. So you just need to simply drop path attribute as below

```
<Switch>
  <Route exact path="/" component={Home} />
  <Route path="/user" component={User} />
  <Route component={NotFound} />
</Switch>
```

135. How to get history on React Router v4?

Below are the list of steps to get history object on React Router v4,

- I. Create a module that exports a history object and import this module across the project.

For example, create history.js file:

```
import { createBrowserHistory } from "history";
export default createBrowserHistory({
  /* pass a configuration object here if needed */
});
```

- II. You should use the <Router> component instead of built-in routers. Imported the above history.js inside index.js file:

```
import { Router } from "react-router-dom";
import history from "./history";
import App from "./App";
ReactDOM.render(
  <Router history={history}>
    <App />
  </Router>,
  holder
);
```

- III. You can also use push method of history object similar to built-in history object:

```
// some-other-file.js
import history from './history'
history.push('/go-here')
```

136. How to perform automatic redirect after login?

The react-router package provides <Redirect> component in React Router. Rendering a <Redirect> will navigate to a new location. Like server-side redirects, the new location will override the current location in the history stack.

```
import React, { Component } from "react";
import { Redirect } from "react-router";
export default class LoginComponent extends Component {
  render() {
    if (this.state.isLoggedIn === true) {
      return <Redirect to="/your/redirect/page" />;
    } else {
      return <div>{"Login Please"}</div>;
    }
  }
}
```

137. What is the purpose of ReactTestUtils package?

ReactTestUtils are provided in the with-addons package and allow you to perform actions against a simulated DOM for the purpose of unit testing.

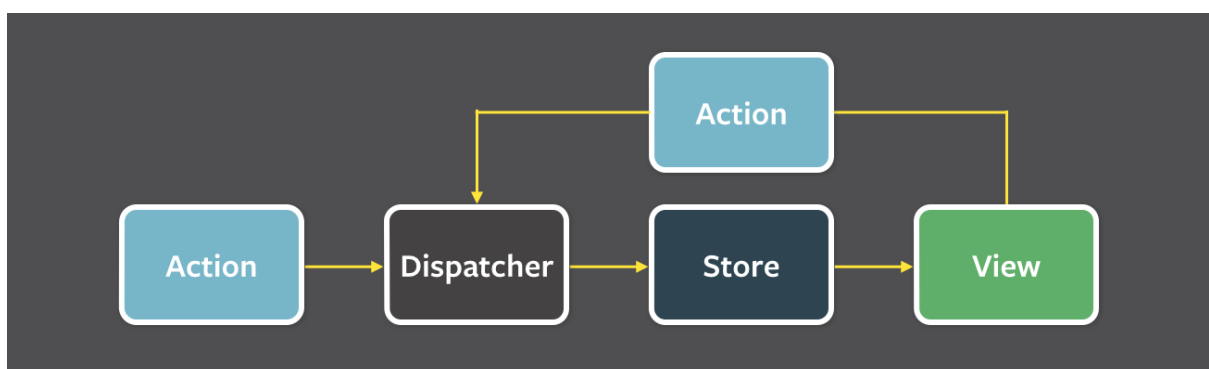
138. What is Jest?

Jest is a JavaScript unit testing framework created by Facebook based on Jasmine and provides automated mock creation and a jsdom environment. It's often used for testing components.

139. What is flux?

Flux is an application design paradigm used as a replacement for the more traditional MVC pattern. It is not a framework or a library but a new kind of architecture that complements React and the concept of Unidirectional Data Flow. Facebook uses this pattern internally when working with React.

The workflow between dispatcher, stores and views components with distinct inputs and outputs as follows:



140. What is Redux?

Redux is a predictable state container for JavaScript apps based on the *Flux design pattern*. Redux can be used together with React, or with any other view library. It is tiny (about 2kB) and has no dependencies.

141. What are the core principles of Redux?

Redux follows three fundamental principles:

- i. **Single source of truth:** The state of your whole application is stored in an object tree within a single store. The single state tree makes it easier to keep track of changes over time and debug or inspect the application.
- ii. **State is read-only:** The only way to change the state is to emit an action, an object describing what happened. This ensures that neither the views nor the network callbacks will ever write directly to the state.
- iii. **Changes are made with pure functions:** To specify how the state tree is transformed by actions, you write reducers. Reducers are just pure functions that take the previous state and an action as parameters, and return the next state.

142. What are the downsides of Redux compared to Flux?

Instead of saying downsides we can say that there are few compromises of using Redux over Flux. Those are as follows:

- i. **You will need to learn to avoid mutations:** Flux is un-opinionated about mutating data, but Redux doesn't like mutations and many packages complementary to Redux assume you never mutate the state. You can enforce this with dev-only packages like *redux-immutable-state-invariant*, *Immutable.js*, or instructing your team to write non-mutating code.
- i. **You're going to have to carefully pick your packages:** While Flux explicitly doesn't try to solve problems such as undo/redo, persistence, or forms, Redux has extension points such as middleware and store enhancers, and it has spawned a rich ecosystem.
- ii. **There is no nice Flow integration yet:** Flux currently lets you do very impressive static type checks which Redux doesn't support yet.

143. What is the difference between `mapStateToProps()` and `mapDispatchToProps()`?

`mapStateToProps()` is a utility which helps your component get updated state (which is updated by some other components):

```
const mapStateToProps = (state) => {  
  return {
```

```
    todos: getVisibleTodos(state.todos, state.visibilityFilter)
  }
}
```

mapDispatchToProps() is a utility which will help your component to fire an action event (dispatching action which may cause change of application state):

```
const mapDispatchToProps = (dispatch) => {
  return {
    onTodoClick: (id) => {
      dispatch(toggleTodo(id));
    }
  };
};
```

Recommend always using the “object shorthand” form for the mapDispatchToProps

Redux wrap it in another function that looks like (...args) => dispatch(onTodoClick(...args)), and pass that wrapper function as a prop to your component.

```
const mapDispatchToProps = ({
  onTodoClick
})
```

144. Can I dispatch an action in reducer?

Dispatching an action within a reducer is an anti-pattern. Your reducer should be without side effects, simply digesting the action payload and returning a new state object. Adding listeners and dispatching actions within the reducer can lead to chained actions and other side effects.

145. How to access Redux store outside a component?

You just need to export the store from the module where it created with createStore(). Also, it shouldn't pollute the global window object.

```
store = createStore(myReducer)
```

```
export default store
```

146. What are the drawbacks of MVW pattern?

- DOM manipulation is very expensive which causes applications to behave slow and inefficient.
- Due to circular dependencies, a complicated model was created around models and views.
- Lot of data changes happens for collaborative applications(like Google Docs).
- No way to do undo (travel back in time) easily without adding so much extra code.

147. Are there any similarities between Redux and RxJS?

These libraries are very different for very different purposes, but there are some vague similarities.

Redux is a tool for managing state throughout the application. It is usually used as an architecture for UIs. Think of it as an alternative to (half of) Angular. RxJS is a reactive programming library. It is usually used as a tool to accomplish asynchronous tasks in JavaScript. Think of it as an alternative to Promises. Redux uses the Reactive paradigm because the Store is reactive. The Store observes actions from a distance, and changes itself. RxJS also uses the Reactive paradigm, but instead of being an architecture, it gives you basic building blocks, Observables, to accomplish this pattern.

148. How to dispatch an action on load?

You can dispatch an action in `componentDidMount()` method and in `render()` method you can verify the data.

```
class App extends Component {
  componentDidMount() {
    this.props.fetchData();
  }

  render() {
    return this.props.isLoading ? (
      <div>{"Loaded"}</div>
    ) : (
      <div>{"Not Loaded"}</div>
    );
  }
}
```

```
const mapStateToProps = (state) => ({
  isLoading: state.isLoading,
});

const mapDispatchToProps = { fetchData };

export default connect(mapStateToProps, mapDispatchToProps)(App);
```

149. How to use connect() from React Redux?

You need to follow two steps to use your store in your container:

- i. Use mapStateToProps(): It maps the state variables from your store to the props that you specify.
- ii. Connect the above props to your container: The object returned by the mapStateToProps function is connected to the container. You can import connect() from react-redux.

```
class App extends React.Component {
  render() {
    return <div>{this.props.containerData}</div>;
  }
}

function mapStateToProps(state) {
  return { containerData: state.data };
}

export default connect(mapStateToProps)(App);
```

150. How to reset state in Redux?

You need to write a root reducer in your application which delegate handling the action to the reducer generated by combineReducers().

For example, let us take rootReducer() to return the initial state after USER_LOGOUT action. As we know, reducers are supposed to return the initial state when they are called with undefined as the first argument, no matter the action.

```
import React from "react";
import { connect } from "react-redux";

const appReducer = combineReducers({
  /* your app's top-level reducers */
})

const rootReducer = (state, action) => {
  if (action.type === 'USER_LOGOUT') {
    state = undefined
  }

  return appReducer(state, action)
}
```

In case of using redux-persist, you may also need to clean your storage. redux-persist keeps a copy of your state in a storage engine. First, you need to import the appropriate storage engine and then, to parse the state before setting it to undefined and clean each storage state key.

```
const appReducer = combineReducers({
  /* your app's top-level reducers */
});

const rootReducer = (state, action) => {
  if (action.type === "USER_LOGOUT") {
    Object.keys(state).forEach((key) => {
      storage.removeItem(`persist:${key}`);
    });

    state = undefined;
  }

  return appReducer(state, action);
};
```

151. Whats the purpose of @ symbol in the Redux connect decorator?

The @ symbol is in fact a JavaScript expression used to signify decorators. Decorators make it possible to annotate and modify classes and properties at design time.

Let's take an example setting up Redux without and with a decorator.

Without decorator:

```
import React from "react";
import * as actionCreators from "../actionCreators";
import { bindActionCreators } from "redux";
import { connect } from "react-redux";

function mapStateToProps(state) {
  return { todos: state.todos };
}

function mapDispatchToProps(dispatch) {
  return { actions: bindActionCreators(actionCreators, dispatch) };
}

class MyApp extends React.Component {
  // ...define your main app here
}

export default connect(mapStateToProps, mapDispatchToProps)(MyApp);
```

With decorator:

```
import React from "react";
import * as actionCreators from "../actionCreators";
import { bindActionCreators } from "redux";
import { connect } from "react-redux";
```

```
function mapStateToProps(state) {  
  return { todos: state.todos };  
}  
  
function mapDispatchToProps(dispatch) {  
  return { actions: bindActionCreators(actionCreators, dispatch) };  
}  
  
@connect(mapStateToProps, mapDispatchToProps)  
export default class MyApp extends React.Component {  
  // ...define your main app here  
}
```

The above examples are almost similar except the usage of decorator. The decorator syntax isn't built into any JavaScript runtimes yet, and is still experimental and subject to change. You can use babel for the decorators support.

152. What is the difference between React context and React Redux?

You can use Context in your application directly and is going to be great for passing down data to deeply nested components which what it was designed for.

Whereas Redux is much more powerful and provides a large number of features that the Context API doesn't provide. Also, React Redux uses context internally but it doesn't expose this fact in the public API.

153. Why are Redux state functions called reducers?

Reducers always return the accumulation of the state (based on all previous and current actions). Therefore, they act as a reducer of state. Each time a Redux reducer is called, the state and action are passed as parameters. This state is then reduced (or accumulated) based on the action, and then the next state is returned. You could reduce a collection of actions and an initial state (of the store) on which to perform these actions to get the resulting final state.

154. How to make AJAX request in Redux?

You can use redux-thunk middleware which allows you to define async actions.

Let's take an example of fetching specific account as an AJAX call using fetch API:

```
export function fetchAccount(id) {
  return (dispatch) => {
    dispatch(setLoadingAccountState()); // Show a loading spinner
    fetch(`/account/${id}`, (response) => {
      dispatch(doneFetchingAccount()); // Hide loading spinner
      if (response.status === 200) {
        dispatch(setAccount(response.json)); // Use a normal function to set the received state
      } else {
        dispatch(someError);
      }
    });
  };
}

function setAccount(data) {
  return { type: "SET_Account", data: data };
}
```

155. Should I keep all component's state in Redux store?

Keep your data in the Redux store, and the UI related state internally in the component.

156. What is the proper way to access Redux store?

The best way to access your store in a component is to use the `connect()` function, that creates a new component that wraps around your existing one. This pattern is called Higher-Order Components, and is generally the preferred way of extending a component's functionality in React. This allows you to map state and action creators to your component, and have them passed in automatically as your store updates.

Let's take an example of `<FilterLink>` component using `connect`:

```
import { connect } from "react-redux";
import { setVisibilityFilter } from "../actions";
```



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

const mapStateToProps = (state, ownProps) => ({
  active: ownProps.filter === state.visibilityFilter,
});

const mapDispatchToProps = (dispatch, ownProps) => ({
  onClick: () => dispatch(setVisibilityFilter(ownProps.filter)),
});

const FilterLink = connect(mapStateToProps, mapDispatchToProps)(Link);

export default FilterLink;
```

Due to it having quite a few performance optimizations and generally being less likely to cause bugs, the Redux developers almost always recommend using `connect()` over accessing the store directly (using context API).

```
class MyComponent {
  someMethod() {
    doSomethingWith(this.context.store)
  }
}
```

157. What is the difference between component and container in React Redux?

Component is a class or function component that describes the presentational part of your application.

Container is an informal term for a component that is connected to a Redux store. Containers subscribe to Redux state updates and dispatch actions, and they usually don't render DOM elements; they delegate rendering to presentational child components.

158. What is the purpose of the constants in Redux?

Constants allows you to easily find all usages of that specific functionality across the project when you use an IDE. It also prevents you from introducing silly bugs caused by typos – in which case, you will get a `ReferenceError` immediately.

Normally we will save them in a single file (constants.js or actionTypes.js).

```
export const ADD_TODO = 'ADD_TODO'
export const DELETE_TODO = 'DELETE_TODO'
export const EDIT_TODO = 'EDIT_TODO'
export const COMPLETE_TODO = 'COMPLETE_TODO'
export const COMPLETE_ALL = 'COMPLETE_ALL'
export const CLEAR_COMPLETED = 'CLEAR_COMPLETED'
```

In Redux, you use them in two places:

i. During action creation:

Let's take actions.js:

```
import { ADD_TODO } from './actionTypes';
export function addTodo(text) {
  return { type: ADD_TODO, text }
}
```

ii. In reducers:

Let's create reducer.js:

```
import { ADD_TODO } from "./actionTypes";
export default (state = [], action) => {
  switch (action.type) {
    case ADD_TODO:
      return [
        ...state,
        {
          text: action.text,
          completed: false,
        },
      ];
    default:
      return state;
  }
};
```

159. What are the different ways to write `mapDispatchToProps()`?

There are a few ways of binding action creators to `dispatch()` in `mapDispatchToProps()`.

Below are the possible options:

```
const mapDispatchToProps = (dispatch) => ({
  action: () => dispatch(action()),
});
const mapDispatchToProps = (dispatch) => ({
  action: bindActionCreators(action, dispatch),
});
const mapDispatchToProps = { action };
```

The third option is just a shorthand for the first one.

160. What is the use of the ownProps parameter in mapStateToProps() and mapDispatchToProps()?

If the ownProps parameter is specified, React Redux will pass the props that were passed to the component into your connect functions. So, if you use a connected component:

```
import ConnectedComponent from './containers/ConnectedComponent';
<ConnectedComponent user={'john'} />
```

The ownProps inside your mapStateToProps() and mapDispatchToProps() functions will be an object:

```
{ user: 'john' }
```

You can use this object to decide what to return from those functions.

161. How to structure Redux top level directories?

Most of the applications has several top-level directories as below:

- i. **Components:** Used for dumb components unaware of Redux.
- ii. **Containers:** Used for smart components connected to Redux.
- iii. **Actions:** Used for all action creators, where file names correspond to part of the app.
- iv. **Reducers:** Used for all reducers, where files name correspond to state key.
- v. **Store:** Used for store initialization.

This structure works well for small and medium size apps.

162. What is Redux DevTools?

Redux DevTools is a live-editing time travel environment for Redux with hot reloading, action replay, and customizable UI. If you don't want to bother with installing Redux DevTools and integrating it into your project, consider using Redux DevTools Extension for Chrome and Firefox.

163. What are the features of Redux DevTools?

Some of the main features of Redux DevTools are below,

- i. Lets you inspect every state and action payload.
- ii. Lets you go back in time by cancelling actions.
- iii. If you change the reducer code, each staged action will be re-evaluated.
- iv. If the reducers throw, you will see during which action this happened, and what the error was.
- v. With `persistState()` store enhancer, you can persist debug sessions across page reloads.

164. What are Redux selectors and why to use them?

Selectors are functions that take Redux state as an argument and return some data to pass to the component.

For example, to get user details from the state:

```
const getUserData = state => state.user.data
```

These selectors have two main benefits,

- i. The selector can compute derived data, allowing Redux to store the minimal possible state
- ii. The selector is not recomputed unless one of its arguments changes

165. What is Redux Form?

Redux Form works with React and Redux to enable a form in React to use Redux to store all of its state. Redux Form can be used with raw HTML5 inputs, but it also works very well with common UI frameworks like Material UI, React Widgets and React Bootstrap.

166. What are the main features of Redux Form?

Some of the main features of Redux Form are:

- i. Field values persistence via Redux store.
- ii. Validation (sync/async) and submission.
- iii. Formatting, parsing and normalization of field values.

167. How to add multiple middlewares to Redux?

You can use `applyMiddleware()`.

For example, you can add `redux-thunk` and `logger` passing them as arguments to `applyMiddleware()`:

```
import { createStore, applyMiddleware } from 'redux'
const createStoreWithMiddleware = applyMiddleware(ReduxThunk
, logger)(createStore)
```

168. How to set initial state in Redux?

You need to pass initial state as second argument to `createStore`:

```
const rootReducer = combineReducers({
  todos: todos,
  visibilityFilter: visibilityFilter
})

const initialState = {
  todos: [{ id: 123, name: 'example', completed: false }]
}

const store = createStore(
  rootReducer,
  initialState
)
```

169. How Relay is different from Redux?

Relay is similar to Redux in that they both use a single store. The main difference is that relay only manages state originated from the server, and all access to the state is used via GraphQL queries (for reading data) and mutations (for changing data). Relay caches the data for you and optimizes data fetching for you, by fetching only changed data and nothing more.

170. What is an action in Redux?

Actions are plain JavaScript objects or payloads of information that send data from your application to your store. They are the only source of information for the store. Actions must have a `type` property that indicates the type of action being performed.

For example, let's take an action which represents adding a new todo item:

```
{  
  type: ADD_TODO,  
  text: 'Add todo item'  
}
```

171. What is the difference between React Native and React?

React is a JavaScript library, supporting both front end web and being run on the server, for building user interfaces and web applications.

React Native is a mobile framework that compiles to native app components, allowing you to build native mobile applications (iOS, Android, and Windows) in JavaScript that allows you to use React to build your components, and implements React under the hood.

172. What is the difference between Flow and PropTypes?

Flow is a static analysis tool (static checker) which uses a superset of the language, allowing you to add type annotations to all of your code and catch an entire class of bugs at compile time.

PropTypes is a basic type checker (runtime checker) which has been patched onto React. It can't check anything other than the types of the props being passed to a given component. If you want more flexible typechecking for your entire project Flow/TypeScript are appropriate choices.

173. How to use Font Awesome icons in React?

The below steps followed to include Font Awesome in React:

Install font-awesome:

```
$ npm install --save font-awesome
```

Import font-awesome in your index.js file:

```
import 'font-awesome/css/font-awesome.min.css'
```

Add Font Awesome classes in className:

```
render() {  
  return <div><i className={'fa fa-spinner'} /></div>  
}
```

174. What is React Dev Tools?

React Developer Tools let you inspect the component hierarchy, including component props and state. It exists both as a browser extension (for Chrome and Firefox), and as a standalone app (works with other environments including Safari, IE, and React Native).

The official extensions available for different browsers or environments.

- i. Chrome extension
- ii. Firefox extension
- iii. Standalone app (Safari, React Native, etc)

175. Why is DevTools not loading in Chrome for local files?

If you opened a local HTML file in your browser (file:///...) then you must first open Chrome Extensions and check Allow access to file URLs.

176. What are the advantages of React over Vue.js?

React has the following advantages over Vue.js:

- i. Gives more flexibility in large apps developing.
- ii. Easier to test.
- iii. Suitable for mobile apps creating.
- iv. More information and solutions available.

Note: The above list of advantages are purely opinionated and it vary based on the professional experience. But they are helpful as base parameters.

177. What is the difference between React and Angular?

Let's see the difference between React and Angular in a table format.

React	Angular
React is a library and has only the View layer	Angular is a framework and has complete MVC functionality
React handles rendering on the server side	AngularJS renders only on the client side but Angular 2 and above renders on the server side

React	Angular
React uses JSX that looks like HTML in JS which can be confusing	Angular follows the template approach for HTML, which makes code shorter and easy to understand
React Native, which is a React type to build mobile applications are faster and more stable	Ionic, Angular's mobile native app is relatively less stable and slower
In React, data flows only in one way and hence debugging is easy	In Angular, data flows both way i.e it has two-way data binding between children and parent and hence debugging is often difficult

Note: The above list of differences are purely opinionated and it vary based on the professional experience. But they are helpful as base parameters.

178. Why React tab is not showing up in DevTools?

When the page loads, React DevTools sets a global named `__REACT_DEVTOOLS_GLOBAL_HOOK__`, then React communicates with that hook during initialization. If the website is not using React or if React fails to communicate with DevTools then it won't show up the tab.

179. What are Styled Components?

styled-components is a JavaScript library for styling React applications. It removes the mapping between styles and components, and lets you write actual CSS augmented with JavaScript.

180. Give an example of Styled Components?

Lets create `<Title>` and `<Wrapper>` components with specific styles for each.

```
import React from 'react'
import styled from 'styled-components'

// Create a <Title> component that renders an <h1> which is
// centered, red and sized at 1.5em
```



```
const Title = styled.h1`
  font-size: 1.5em;
  text-align: center;
  color: palevioletred;
`

// Create a <Wrapper> component that renders a <section> with
// some padding and a papayawhip background
const Wrapper = styled.section`
  padding: 4em;
  background: papayawhip;
`
```

These two variables, Title and Wrapper, are now components that you can render just like any other react component.

```
<Wrapper>
  <Title>{'Lets start first styled component!'}</Title>
</Wrapper>
```

181. What is Relay?

Relay is a JavaScript framework for providing a data layer and client-server communication to web applications using the React view layer.

182. How to use TypeScript in create-react-app application?

Starting from react-scripts@2.1.0 or higher, there is a built-in support for typescript. i.e, create-react-app now supports typescript natively. You can just pass --typescript option as below

```
npx create-react-app my-app --typescript
```

or

```
yarn create react-app my-app --typescript
```

But for lower versions of react scripts, just supply --scripts-version option as react-scripts-ts while you create a new project. react-scripts-ts is a set of adjustments to take the standard create-react-app project pipeline and bring TypeScript into the mix.

Now the project layout should look like the following:

my-app/

├─ .gitignore

├─ images.d.ts

├─ node_modules/

├─ public/

├─ src/

| └─ ...

├─ package.json

├─ tsconfig.json

├─ tsconfig.prod.json

├─ tsconfig.test.json

└─ tslint.json

183. Can Redux only be used with React?

Redux can be used as a data store for any UI layer. The most common usage is with React and React Native, but there are bindings available for Angular, Angular 2, Vue, Mithril, and more. Redux simply provides a subscription mechanism which can be used by any other code.

184. Do you need to have a particular build tool to use Redux?

Redux is originally written in ES6 and transpiled for production into ES5 with Webpack and Babel. You should be able to use it regardless of your JavaScript build process. Redux also offers a UMD build that can be used directly without any build process at all.

185. How Redux Form initialValues get updated from state?

You need to add `enableReinitialize : true` setting.

```
const InitializeFromStateForm = reduxForm({  
  form: 'initializeFromState',  
  enableReinitialize : true
```

```
})(UserEdit)
```

If your `initialValues` prop gets updated, your form will update too.

186. How React PropTypes allow different types for one prop?

You can use **`oneOfType()`** method of `PropTypes`.

For example, the `height` property can be defined with either string or number type as below:

```
Component.propTypes = {  
  size: PropTypes.oneOfType([  
    PropTypes.string,  
    PropTypes.number  
  ])  
}
```

187. What is render hijacking in react?

The concept of render hijacking is the ability to control what a component will output from another component. It actually means that you decorate your component by wrapping it into a Higher-Order component. By wrapping you can inject additional props or make other changes, which can cause changing logic of rendering. It does not actually enable hijacking, but by using HOC you make your component behave in a different way.

188. How to pass numbers to React component?

You should be passing the numbers via curly braces({}) where as strings in quotes

```
React.render(  
  <User age={30} department={"IT"} />,  
  document.getElementById("container")  
);
```

189. How to prevent unnecessary updates using `setState`?

You can compare current value of the state with an existing state value and decide whether to rerender the page or not. If the values are same then you need to return null to stop re-rendering otherwise return the latest state value.

For example, the user profile information is conditionally rendered as follows,

```
getUserProfile = (user) => {  
  const latestAddress = user.address;  
  this.setState((state) => {  
    if (state.address === latestAddress) {  
      return null;  
    } else {  
      return { title: latestAddress };  
    }  
  });  
};
```

190. What are hooks?

Hooks is a new feature(React 16.8) that lets you use state and other React features without writing a class.

Let's see an example of useState hook example,

```
import { useState } from "react";  
  
function Example() {  
  // Declare a new state variable, which we'll call "count"  
  const [count, setCount] = useState(0);  
  
  return (  
    <div>  
      <p>You clicked {count} times</p>  
      <button onClick={() => setCount(count + 1)}>Click me</  
button>  
    </div>  
  );  
}
```

191. What are the rules needs to follow for hooks?

You need to follow two rules in order to use hooks,

- i. Call Hooks only at the top level of your react functions. i.e, You shouldn't call Hooks inside loops, conditions, or nested functions. This will ensure that Hooks are called in the same order each time a component renders and it preserves the state of Hooks between multiple useState and useEffect calls.
- ii. Call Hooks from React Functions only. i.e, You shouldn't call Hooks from regular JavaScript functions.

192. How to ensure hooks followed the rules in your project?

React team released an ESLint plugin called eslint-plugin-react-hooks that enforces these two rules. You can add this plugin to your project using the below command,

```
npm install eslint-plugin-react-hooks@next
```

And apply the below config in your ESLint config file,

```
// Your ESLint configuration
{
  "plugins": [
    // ...
    "react-hooks"
  ],
  "rules": {
    // ...
    "react-hooks/rules-of-hooks": "error"
  }
}
```

Note: This plugin is intended to use in Create React App by default.

193. What are the differences between Flux and Redux?

Below are the major differences between Flux and Redux

Flux	Redux
State is mutable	State is immutable
The Store contains both state and change logic	The Store and change logic are separate
There are multiple stores exist	There is only one store exist

Flux	Redux
All the stores are disconnected and flat	Single store with hierarchical reducers
It has a singleton dispatcher	There is no concept of dispatcher
React components subscribe to the store	Container components uses connect function

194. What are the benefits of React Router V4?

Below are the main benefits of React Router V4 module,

- In React Router v4(version 4), the API is completely about components. A router can be visualized as a single component(<BrowserRouter>) which wraps specific child router components(<Route>).
- You don't need to manually set history. The router module will take care history by wrapping routes with <BrowserRouter> component.
- The application size is reduced by adding only the specific router module(Web, core, or native)

195. What is the behavior of uncaught errors in react 16?

In React 16, errors that were not caught by any error boundary will result in unmounting of the whole React component tree. The reason behind this decision is that it is worse to leave corrupted UI in place than to completely remove it. For example, it is worse for a payments app to display a wrong amount than to render nothing.

196. What are the possible return types of render method?

Below are the list of following types used and return from render method,

- React elements:** Elements that instruct React to render a DOM node. It includes html elements such as <div/> and user defined elements.
- Arrays and fragments:** Return multiple elements to render as Arrays and Fragments to wrap multiple elements
- Portals:** Render children into a different DOM subtree.
- String and numbers:** Render both Strings and Numbers as text nodes in the DOM
- Booleans or null:** Doesn't render anything but these types are used to conditionally render content.

197. What is the main purpose of constructor?

The constructor is mainly used for two purposes,

To initialize local state by assigning object to this.state

For binding event handler methods to the instance For example, the below code covers both the above cases,

```
constructor(props) {  
  super(props);  
  // Don't call this.setState() here!  
  this.state = { counter: 0 };  
  this.handleClick = this.handleClick.bind(this);  
}
```

198. Is it mandatory to define constructor for React component?

No, it is not mandatory. i.e, If you don't initialize state and you don't bind methods, you don't need to implement a constructor for your React component.

199. What are default props?

The defaultProps are defined as a property on the component class to set the default props for the class. This is used for undefined props, but not for null props.

For example, let us create color default prop for the button component,

```
class MyButton extends React.Component {  
  // ...  
}  
  
MyButton.defaultProps = {  
  color: "red",  
};
```

If props.color is not provided then it will set the default value to 'red'. i.e, Whenever you try to access the color prop it uses default value

```
render() {  
  return <MyButton /> ; // props.color will be set to red  
}
```

Note: If you provide null value then it remains null value.

200. What is the browser support for react applications?

React supports all popular browsers, including Internet Explorer 9 and above, although some polyfills are required for older browsers such as IE 9 and IE 10. If you use es5-shim and es5-sham polyfill then it even support old browsers that doesn't support ES5 methods.

201. What is the benefit of strict mode?

It will be helpful in the below cases

- i. Identifying components with unsafe lifecycle methods.
- ii. Warning about legacy string ref API usage.
- iii. Detecting unexpected side effects.
- iv. Detecting legacy context API.
- v. Warning about deprecated findDOMNode usage

202. What are Keyed Fragments?

The Fragments declared with the explicit `<React.Fragment>` syntax may have keys. The general use case is mapping a collection to an array of fragments as below,

```
function Glossary(props) {
  return (
    <dl>
      {props.items.map((item) => (
        // Without the `key`, React will fire a key warning
        <React.Fragment key={item.id}>
          <dt>{item.term}</dt>
          <dd>{item.description}</dd>
        </React.Fragment>
      ))}
    </dl>
  );
}
```

Note: key is the only attribute that can be passed to Fragment. In the future, there might be a support for additional attributes, such as event handlers.

203. Does React support all HTML attributes?

As of React 16, both standard or custom DOM attributes are fully supported. Since React components often take both custom and DOM-related props, React uses the camelCase convention just like the DOM APIs.

Let us take few props with respect to standard HTML attributes,

```
<div tabIndex="-1" /> // Just like node.tabIndex DOM API
<div className="Button" /> // Just like node.className DOM API
<input readOnly={true} /> // Just like node.readOnly DOM API
```

These props work similarly to the corresponding HTML attributes, with the exception of the special cases. It also support all SVG attributes.

204. How do you pass an event handler to a component?

You can pass event handlers and other functions as props to child components. It can be used in child component as below,

```
<button onClick={this.handleClick}>
```

205. How to prevent a function from being called multiple times?

If you use an event handler such as onClick or onScroll and want to prevent the callback from being fired too quickly, then you can limit the rate at which callback is executed. This can be achieved in the below possible ways,

- i. **Throttling:** Changes based on a time based frequency. For example, it can be used using `_throttle` lodash function
- ii. **Debouncing:** Publish changes after a period of inactivity. For example, it can be used using `_debounce` lodash function
- iii. **RequestAnimationFrame throttling:** Changes based on requestAnimationFrame. For example, it can be used using `raf-schd` lodash function

206. How JSX prevents Injection Attacks?

React DOM escapes any values embedded in JSX before rendering them. Thus it ensures that you can never inject anything that's not explicitly written in your application. Everything is converted to a string before being rendered.

For example, you can embed user input as below,

```
const name = response.potentiallyMaliciousInput;  
const element = <h1>{name}</h1>;
```

This way you can prevent XSS(Cross-site-scripting) attacks in the application.

207. How do you pass arguments to an event handler?

During iterations or loops, it is common to pass an extra parameter to an event handler. This can be achieved through arrow functions or bind method.

Let us take an example of user details updated in a grid,

```
<button onClick={ (e) => this.updateUser(userId, e)}>Update U  
ser details</button>  
<button onClick={this.updateUser.bind(this, userId)}>Update  
User details</button>
```

In both the approaches, the synthetic argument e is passed as a second argument. You need to pass it explicitly for arrow functions and it forwarded automatically for bind method.

208. What are the conditions to safely use the index as a key?

There are three conditions to make sure, it is safe use the index as a key.

- i. The list and items are static– they are not computed and do not change
- ii. The items in the list have no ids
- iii. The list is never reordered or filtered.

209. Is it keys should be globally unique?

Keys used within arrays should be unique among their siblings but they don't need to be globally unique. i.e, You can use the same keys with two different arrays.

For example, the below book component uses two arrays with different arrays,

```
function Book(props) {  
  const index = (  
    <ul>  
      {props.pages.map((page) => (  
        <li key={page.id}>{page.title}</li>  
      ))}  
    </ul>  
  );  
  const content = props.pages.map((page) => (  

```

```
    <div key={page.id}>
      <h3>{page.title}</h3>
      <p>{page.content}</p>
      <p>{page.pageNumber}</p>
    </div>
  ));
  return (
    <div>
      {index}
      <hr />
      {content}
    </div>
  );
}
```

210. What is dynamic import?

The dynamic import() syntax is a ECMAScript proposal not currently part of the language standard. It is expected to be accepted in the near future. You can achieve code-splitting into your app using dynamic import.

Let's take an example of addition,

i. **Normal Import**

```
import { add } from './math';
console.log(add(10, 20));
```

ii. **Dynamic Import**

```
import("./math").then((math) => {
  console.log(math.add(10, 20));
});
```

211. What are loadable components?

If you want to do code-splitting in a server rendered app, it is recommend to use Loadable Components because React.lazy and Suspense is not yet available for server-side rendering. Loadable lets you render a dynamic import as a regular component.

Lets take an example,

```
import loadable from "@loadable/component";

const OtherComponent = loadable(() => import("./OtherComponent"));
```

```
function MyComponent() {  
  return (  
    <div>  
      <OtherComponent />  
    </div>  
  );  
}
```

Now OtherComponent will be loaded in a separated bundle

212. What is suspense component?

If the module containing the dynamic import is not yet loaded by the time parent component renders, you must show some fallback content while you're waiting for it to load using a loading indicator. This can be done using Suspense component.

For example, the below code uses suspense component,

```
const OtherComponent = React.lazy(() => import('./OtherComponent'));  
  
function MyComponent() {  
  return (  
    <div>  
      <Suspense fallback={<div>Loading...</div>}>  
        <OtherComponent />  
      </Suspense>  
    </div>  
  );  
}
```

As mentioned in the above code, Suspense is wrapped above the lazy component.

213. Give an example on How to use context?

Context is designed to share data that can be considered global for a tree of React components.

For example, in the code below lets manually thread through a "theme" prop in order to style the Button component.

```
// Lets create a context with a default theme value "luna"
const ThemeContext = React.createContext('luna');
// Create App component where it uses provider to pass theme
// value in the tree
class App extends React.Component {
  render() {
    return (
      <ThemeContext.Provider value="nova">
        <Toolbar />
      </ThemeContext.Provider>
    );
  }
}
// A middle component where you don't need to pass theme prop anymore
function Toolbar(props) {
  return (
    <div>
      <ThemedButton />
    </div>
  );
}
// Lets read theme value in the button component to use
class ThemedButton extends React.Component {
  static contextType = ThemeContext;
  render() {
    return <Button theme={this.context} />;
  }
}
```

214. What is the purpose of default value in context?

The `defaultValue` argument is only used when a component does not have a matching Provider above it in the tree. This can be helpful for testing components in isolation without wrapping them.

Below code snippet provides default theme value as Luna.

```
const MyContext = React.createContext(defaultValue);
```

215. How do you use contextType?

ContextType is used to consume the context object. The contextType property can be used in two ways,

contextType as property of class: The contextType property on a class can be assigned a Context object created by React.createContext(). After that, you can consume the nearest current value of that Context type using this.context in any of the lifecycle methods and render function.

Lets assign contextType property on MyClass as below,

```
class MyClass extends React.Component {
  componentDidMount() {
    let value = this.context;
    /* perform a side-
effect at mount using the value of MyContext */
  }
  componentDidUpdate() {
    let value = this.context;
    /* ... */
  }
  componentWillUnmount() {
    let value = this.context;
    /* ... */
  }
  render() {
    let value = this.context;
    /* render something based on the value of MyContext */
  }
}
MyClass.contextType = MyContext;
```

Static field You can use a static class field to initialize your contextType using public class field syntax.

```
class MyClass extends React.Component {
  static contextType = MyContext;
  render() {
    let value = this.context;
```

```
    /* render something based on the value */  
  }  
}
```

216. What is a consumer?

A Consumer is a React component that subscribes to context changes. It requires a function as a child which receives current context value as argument and returns a react node. The value argument passed to the function will be equal to the value prop of the closest Provider for this context above in the tree.

Lets take a simple example,

```
<MyContext.Consumer>  
  {value => /* render something based on the context value */  
}/  
</MyContext.Consumer>
```

217. How do you solve performance corner cases while using context?

The context uses reference identity to determine when to re-render, there are some gotchas that could trigger unintentional renders in consumers when a provider's parent re-renders.

For example, the code below will re-render all consumers every time the Provider re-renders because a new object is always created for value.

```
class App extends React.Component {  
  render() {  
    return (  
      <Provider value={{something: 'something'}}>  
        <Toolbar />  
      </Provider>  
    );  
  }  
}
```

This can be solved by lifting up the value to parent state,

```
class App extends React.Component {  
  constructor(props) {  
    super(props);
```

```
this.state = {
  value: {something: 'something'},
};
}

render() {
  return (
    <Provider value={this.state.value}>
      <Toolbar />
    </Provider>
  );
}
}
```

218. Is it possible to use react without JSX?

Yes, JSX is not mandatory for using React. Actually it is convenient when you don't want to set up compilation in your build environment. Each JSX element is just syntactic sugar for calling `React.createElement(component, props, ...children)`.

For example, let us take a greeting example with JSX,

```
class Greeting extends React.Component {
  render() {
    return <div>Hello {this.props.message}</div>;
  }
}

ReactDOM.render(
  <Greeting message="World" />,
  document.getElementById('root')
);
```

You can write the same code without JSX as below,

```
class Greeting extends React.Component {
  render() {
```



```
    return React.createElement('div', null, `Hello ${this.props.message}`);
  }
}

ReactDOM.render(
  React.createElement(Greeting, {message: 'World'}, null),
  document.getElementById('root')
);
```

219. When do you need to use refs?

There are few use cases to go for refs,

- i. Managing focus, text selection, or media playback.
- ii. Triggering imperative animations.
- iii. Integrating with third-party DOM libraries.

220. What are the problems of using render props with pure components?

If you create a function inside a render method, it negates the purpose of pure component. Because the shallow prop comparison will always return false for new props, and each render in this case will generate a new value for the render prop. You can solve this issue by defining the render function as instance method.

221. What is windowing technique?

Windowing is a technique that only renders a small subset of your rows at any given time, and can dramatically reduce the time it takes to re-render the components as well as the number of DOM nodes created. If your application renders long lists of data then this technique is recommended. Both react-window and react-virtualized are popular windowing libraries which provides several reusable components for displaying lists, grids, and tabular data.

222. How do you print falsy values in JSX?

The falsy values such as false, null, undefined, and true are valid children but they don't render anything. If you still want to display them then you need to convert it to string. Let's take an example on how to convert to a string,

```
<div>
  My JavaScript variable is {String(myVariable)}.
</div>
```

223. What is the difference between Real DOM and Virtual DOM?

Below are the main differences between Real DOM and Virtual DOM,

Real DOM	Virtual DOM
Updates are slow	Updates are fast
DOM manipulation is very expensive.	DOM manipulation is very easy
You can update HTML directly.	You Can't directly update HTML
It causes too much of memory wastage	There is no memory wastage
Creates a new DOM if element updates	It updates the JSX if element update

224. How to add Bootstrap to a react application?

Bootstrap can be added to your React app in a three possible ways,

- i. Using the Bootstrap CDN: This is the easiest way to add bootstrap. Add both bootstrap CSS and JS resources in a head tag.
- ii. Bootstrap as Dependency: If you are using a build tool or a module bundler such as Webpack, then this is the preferred option for adding Bootstrap to your React application

```
npm install bootstrap
```
- iii. React Bootstrap Package: In this case, you can add Bootstrap to our React app is by using a package that has rebuilt Bootstrap components to work particularly as React components. Below packages are popular in this category,
 - a. react-bootstrap
 - b. reactstrap

225. Can you list down top websites or applications using react as front end framework?

Below are the top 10 websites using React as their front-end framework,

- I. Facebook
- II. Uber
- III. Instagram
- IV. WhatsApp
- V. Khan Academy
- VI. Airbnb
- VII. Dropbox

- VIII. Flipboard
- IX. Netflix
- X. PayPal

226. Is it recommended to use CSS In JS technique in React?

React does not have any opinion about how styles are defined but if you are a beginner then good starting point is to define your styles in a separate *.css file as usual and refer to them using className. This functionality is not part of React but came from third-party libraries. But If you want to try a different approach(CSS-In-JS) then styled-components library is a good option.

227. Do I need to rewrite all my class components with hooks?

No. But you can try Hooks in a few components(or new components) without rewriting any existing code. Because there are no plans to remove classes in ReactJS.

228. What is the stable release for hooks support?

React includes a stable implementation of React Hooks in 16.8 release for below packages

- I. React DOM
- II. React DOM Server
- III. React Test Renderer
- IV. React Shallow Renderer

229. What are the sources used for introducing hooks?

Hooks got the ideas from several different sources. Below are some of them,

- I. Previous experiments with functional APIs in the react-future repository
- II. Community experiments with render prop APIs such as Reactions Component
- III. State variables and state cells in DisplayScript.
- IV. Subscriptions in Rx.
- V. Reducer components in ReasonReact.

230. How do you access imperative API of web components?

Web Components often expose an imperative API to implement its functions. You will need to use a ref to interact with the DOM node directly if you want to access imperative API of a web component. But if you are using third-party Web Components, the best solution is to write a React component that behaves as a wrapper for your Web Component.

231. What are typical middleware choices for handling asynchronous calls in Redux?

Some of the popular middleware choices for handling asynchronous calls in Redux eco system are Redux Thunk, Redux Promise, Redux Saga.

232. Do browsers understand JSX code?

No, browsers can't understand JSX code. You need a transpiler to convert your JSX to regular Javascript that browsers can understand. The most widely used transpiler right now is Babel.

233. Describe about data flow in react?

React implements one-way reactive data flow using props which reduce boilerplate and is easier to understand than traditional two-way data binding.

234. What is react scripts?

The **react-scripts** package is a set of scripts from the create-react-app starter pack which helps you kick off projects without configuring. The react-scripts start command sets up the development environment and starts a server, as well as hot module reloading.

235. What are the features of create react app?

Below are the list of some of the features provided by create react app.

- I. React, JSX, ES6, Typescript and Flow syntax support.
- II. Autoprefixed CSS
- III. CSS Reset/Normalize
- IV. A live development server
- V. A fast interactive unit test runner with built-in support for coverage reporting
- VI. A build script to bundle JS, CSS, and images for production, with hashes and sourcemaps
- VII. An offline-first service worker and a web app manifest, meeting all the Progressive Web App criteria.

236. What are React Server components?

React Server Component is a way to write React component that gets rendered in the server-side with the purpose of improving React app performance. These components allow us to load components from the backend.

Note: React Server Components is still under development and not recommended for production yet.

237. What is prop drilling?

Prop Drilling is the process by which you pass data from one component of the React Component tree to another by going through other components that do not need the data but only help in passing it around.

