1. **What is react.**

React is is a open-source javascript library for building user interfaces. It is develop and maintain by facebook or meta and a community of developers. React uses component based

Architecture, where the user interface broken down into reusable and independent component.

React js is used to build single page application. A single-page application loads only a single HTML document on the first request. Then it updates the specific portion, content, or body of the webpage that needs updating using javascript.

This pattern is known as client side routing because the client doesnt have to reload the full webpage to get a new page each tim a user makes a new request.

Controlled and uncontrolled components

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| Controlled | Uncontrolled |
| Controlled component doesn’t maintain the interval state. | It maintains its internal state |
| In controlled components, the state of the input elements is managed by react. The components state holds the current value of input. | In uncontrolled component the form input elements state are mange by dom. react doesn’t control the value of the input elements. |
| In controlled component data flows from the components state to the input elements. Any changes in input are reflected in the components state. | In uncontrolled component the data flow in not strictly one way from the component state to input element. Instead the input element can directly affect the state, but it doesn’t always reflects changes immediately in the state. |
| In controlled component, we cant directly modify the value of the input elemenet. Instead we update the state, which causes a rerender of the components with the new value. | Uncontrolled components don’t enforce immutability, we can directly manipulate the input elements value in the dom without going through react state. |
| Controlled components are suitable for implementing custom validation and controlled behavior, such as disabling or enabling inputs based on the state. | Uncontrolled components can still implement validation, but its often done directly on the input elements using event handlers or DOM API. It doesn’t take advantage of react buitin validation feature. |
| Controlled components are generally easier to test because the state can be easily manipulated in tests. | uncontrolled components can be less straightforward to test because we are dealing with the dom directly, not react state. |
| Controlled components leverage react feature like react virtual dom, which optimize rendering performance. | Uncontrolled components don’t fully utilize react feature like state management and the one way data flow concept. |

React pure component

React pure components are the components that don’t rerender when the value of props and state has been updated with the same values. It performs the shallow comparison of its props and state before rendering. If the props and state haven’t changed, a pure component will not rerender, which can provide performance optimization in some cases.

React functional component uses React.memo which will perform a shallow comparison of the props to determine whether they should rerender.

React error boundaries

React error boundaries in react that allows us to handle javascript errors that may occur within the component tree of a react application. Error boundary is created by defining a react component that includes lifecycle method componentDidCatch.