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Week 6: React HandsOn**

**1. ReactJS-HOL**

1. Define SPA and its benefits.

A Single Page Application (SPA) is a web application that interacts with the user by dynamically rewriting the current page, rather than loading entire new pages from a server. It uses JavaScript to update content without full-page reloads.

Benefits:

* Faster navigation
* No full-page reloads
* Better user experience
* Uses AJAX and Fetch APIs for server communication

1. Define React and identify it’s working.

React is an open-source JavaScript library developed by Facebook for building fast, interactive, and reusable user interfaces, especially for single-page applications.

Working:

* React breaks the UI into components.
* It uses a Virtual DOM to track changes.
* When the state of a component changes, React updates the Virtual DOM and efficiently applies changes to the real DOM using a diffing algorithm.

1. Identify the differences between SPA and MPA.

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| **SPA (Single Page Application)** | **MPA (Multi Page Application)** |
| Loads a single HTML page and updates content dynamically without full reloads. | Loads a new HTML page from the server for every interaction. |
| Uses client-side routing with JavaScript (e.g., React Router). | Uses server-side routing; each URL points to a different page. |
| Faster after initial load, with smooth navigation and updates. | Slower navigation due to full-page reloads. |
| SEO is more challenging; needs SSR or pre-rendering. | SEO-friendly by default, as content is loaded in static pages. |
| Commonly used in modern web apps (e.g., Gmail, Facebook). | Used in traditional websites (e.g., blogs, e-commerce platforms). |

1. Explain Pros & Cons of Single-Page Application.

**Pros:**

* Fast, dynamic, and interactive
* Reduced bandwidth usage
* Smooth transitions and improved UX
* Good for mobile and modern app development

**Cons:**

* Poor SEO by default (requires SSR for optimization)
* Can have longer initial load time
* JavaScript errors can break the entire app
* More complex front-end architecture (routing, state, etc.)

1. Explain about React.

React is a component-based JavaScript library used to build user interfaces. It is declarative, efficient, and flexible. It allows developers to create reusable UI components that manage their own state. React uses a Virtual DOM to efficiently update and render components when data changes, leading to better performance. It follows one-way data binding and supports Hooks to handle state and side effects in functional components. React is widely used for building single-page applications (SPAs) due to its modular structure and rich ecosystem.

1. Define virtual DOM

The virtual DOM is an in-memory representation of the real DOM elements. React maintains this virtual tree and compares it with the previous version whenever a component's state changes.

1. Explain the features of React.

* React uses JSX, which allows writing HTML-like syntax inside JavaScript.
* It follows a component-based architecture, promoting reusability and modularity.
* React uses a Virtual DOM to update only the changed parts, improving performance.
* It follows one-way data binding, where data flows from parent to child.
* React is declarative, meaning the UI updates automatically based on state changes.
* Hooks allow functional components to use state and lifecycle features.
* React DevTools helps in debugging components during development.
* React has a strong ecosystem with tools like React Router and Redux.