1. Define SPA and its Benefits

SPA (Single Page Application) is a type of web application or website that dynamically rewrites the current page rather than loading entire new pages from the server. It interacts with the browser by dynamically rewriting the content from the web server.

Benefits of SPA:

- **Fast Performance:** Only required data is fetched, reducing page reload time.
- **Smooth User Experience:** No page flicker or full reload, providing an app-like experience.
- **Reduced Server Load:** Only one HTML page is served initially, with subsequent requests handled via APIs.
- **Offline Support:** Better offline capabilities with client-side caching (e.g., using service workers).
- **Ease in Frontend-Backend Separation:** Clear separation makes it ideal for using APIs (REST, GraphQL).

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2. Define React and Identify Its Working

React is an open-source JavaScript library developed by Facebook for building user interfaces, especially for single-page applications. It enables developers to create reusable UI components.

How React Works:

- React uses a **component-based architecture**, where UI is broken down into small, manageable pieces (components).
- It uses a **virtual DOM** to efficiently update and render only the changed parts of the UI.
- Data flows **unidirectionally** (from parent to child components), which makes the application predictable.
- React uses **JSX**, a syntax extension that allows writing HTML-like code in JavaScript.

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3. Identify the Differences Between SPA and MPA

Feature	SPA (Single Page Application)	MPA (Multi Page Application)
Page Load	Single initial load	Reloads for every page
Speed	Fast due to less server communication	Slower due to full page reloads
Routing	Handled by JavaScript (client-side)	Handled by server
SEO	Challenging but can be managed	Naturally SEO-friendly
User Experience	App-like experience	Traditional web navigation
Complexity	More front-end complexity	More back-end complexity

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4. Explain Pros & Cons of Single-Page Application

Pros:

- Faster navigation and responsiveness
- Better user experience
- Reusable components and scalable frontend architecture
- Suitable for mobile and desktop apps

Cons:

- Poor SEO without additional setup
- Initial load time may be high
- JavaScript must be enabled
- Requires more client-side security management

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5. Explain About React

React is a JavaScript library used for building **interactive, dynamic, and reusable UI components** for web and mobile applications. It's designed for performance and scalability in large-scale applications. React's component-based structure allows developers to build complex UIs from isolated pieces of code called “components.”

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6. Define Virtual DOM

Virtual DOM is a lightweight JavaScript representation of the actual DOM. React uses it to optimize performance:

- When state or props change, React updates the Virtual DOM first.
- It then compares the new Virtual DOM with the previous version using a process called **diffing**.
- Only the changed parts are updated in the actual DOM, improving rendering speed and efficiency.

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7. Explain Features of React

Key Features of React:

1. **Component-Based Architecture:** Encourages code reusability and modularity.
2. **JSX:** JavaScript syntax extension that lets you write HTML-like code.
3. **Virtual DOM:** Enhances performance by minimizing actual DOM manipulation.
4. **One-Way Data Binding:** Ensures data flows in one direction for better control.
5. **React Hooks:** Enables functional components to use state and lifecycle features.
6. **Declarative UI:** Makes code more predictable and easier to debug.
7. **React Developer Tools:** A browser extension that helps in debugging and inspecting React components.
8. **Cross-Platform:** Can be used with React Native for building mobile applications.