**Define SPA and Its Benefits**

SPA (Single Page Application) is a web application that dynamically rewrites the current page rather than loading entire new pages from a server. It interacts with the browser by rewriting the page content with JavaScript, providing a seamless and fast user experience.

**Benefits of SPA:**

Faster Load Times: Once loaded, only data is exchanged—not full pages.

Better User Experience: No full page reloads; smooth transitions.

Caching Capabilities: Can cache data locally for offline access.

Efficient Development: Frontend and backend can be developed independently.

Reduced Server Load: Only API calls are made, not full-page requests.

**Define React and Identify Its Working**

React is a JavaScript library developed by Facebook for building fast, interactive user interfaces. It is component-based, meaning UI is divided into reusable pieces.

**Working of React:**

React creates a virtual DOM (a lightweight copy of the actual DOM).

When state or props change, it calculates the difference (diffing) between the new virtual DOM and the old one.

Then it updates the actual DOM efficiently using a process called reconciliation.

React uses JSX (JavaScript XML) for writing UI components.

**Identify the Differences Between SPA and MPA**

|  |  |  |
| --- | --- | --- |
| Feature | SPA | MPA |
| Page Reload | No full reload; updates dynamically | Every action leads to full page reload |
| Speed | Faster after initial reload | Slower due to full-page refresh |
| Development complexity | Needs client-side routing | Server-side routing; traditional |
| SEO | Harder | Easier to optimize for SEO |

**Explain Pros & Cons of Single-Page Application**

**Pros:**

Fast performance after initial load

Better user experience and smooth transitions

Efficient usage of bandwidth (less server data)

Easier to convert into Progressive Web Apps (PWAs)

**Cons:**

Poor SEO unless server-side rendering is added

Larger initial load time

Browser history and navigation can be complex

JavaScript-heavy; requires good frontend architecture

**Explain About React**

React is a popular JavaScript library for building user interfaces, especially single-page applications. It allows developers to create reusable UI components.

**Key Concepts:**

Developed and maintained by Meta (Facebook)

Component-based architecture

Uses JSX syntax (HTML in JavaScript)

Uses Virtual DOM for fast rendering

Supports hooks for state and lifecycle management

Works with Redux, React Router, and other libraries for state and routing

**Define Virtual DOM**

Virtual DOM (VDOM) is a programming concept implemented by React that improves UI rendering performance.

It is a lightweight copy of the actual DOM in memory.

**When a change occurs, React:**

Creates a new virtual DOM tree.

Compares it (diffs) with the previous version.

Finds the minimum number of changes.

Applies only those changes to the real DOM (called reconciliation).

**Explain Features of React**

**Here are the key features of React:**

JSX - JavaScript syntax extension to write HTML-like code inside JS

Components - Reusable and composable building blocks for UI

Virtual DOM - Boosts performance by minimizing real DOM operations

One-way Data Binding - Data flows in one direction (from parent to child) for better control

Hooks - Functions like useState and useEffect to manage state/lifecycle

Unidirectional Flow - Makes debugging and maintenance easier

React Native Support - Enables mobile app development using the same React principles



