**Define SPA and its benefits**  
A Single-Page Application (SPA) is a web application that loads a single HTML page and dynamically updates content without refreshing the entire page. It interacts with the web browser by rewriting the current page with new data from the web server, typically using JavaScript frameworks such as React, Angular, or Vue. The main benefits of SPAs include faster user interactions due to partial page updates, improved performance as assets are loaded once, seamless user experience without full page reloads, and easier implementation of mobile app-like behavior.

**Define React and identify its working**  
React is an open-source JavaScript library developed by Facebook for building user interfaces, especially single-page applications. It allows developers to create reusable UI components and manage the state of the application efficiently. React works by creating a virtual DOM in memory, which it uses to determine the most efficient way to update the real DOM. When the state of a component changes, React compares the new virtual DOM with the previous one, calculates the minimal set of changes, and updates only those parts of the real DOM, resulting in high performance and responsiveness.

**Identify the differences between SPA and MPA**  
A Single-Page Application (SPA) loads a single HTML page and updates content dynamically without reloading the page, whereas a Multi-Page Application (MPA) involves multiple HTML pages and each user interaction leads to a full page reload. SPAs typically offer a smoother user experience with faster navigation and less server load, but may have complexities in SEO and initial load time. MPAs are better suited for large websites with distinct sections, offer better SEO support by default, but can be slower due to full page reloads on every user interaction.

**Explain Pros & Cons of Single-Page Application**  
Single-Page Applications offer advantages such as improved performance after the initial load, faster interactions through partial page updates, and a more fluid and responsive user experience. They reduce server load by handling most of the UI rendering on the client side. However, SPAs also have drawbacks, including challenges in SEO due to client-side rendering, increased complexity in browser history and routing management, potential initial load time delays, and possible security concerns if not properly handled.

**Explain about React**  
React is a JavaScript library used for building interactive and dynamic user interfaces, especially in single-page applications. It emphasizes the use of components—independent and reusable pieces of code that define how a portion of the UI should appear and behave. React allows developers to manage state and props effectively, and it uses a virtual DOM to optimize rendering. React’s declarative approach simplifies the process of building complex UIs by focusing on what the UI should look like rather than how to manipulate the DOM directly.

**Define virtual DOM**  
The virtual DOM is a lightweight in-memory representation of the real DOM used by React and similar libraries. When the state of an application changes, React creates a new virtual DOM tree and compares it with the previous one using a process called "diffing." It then calculates the minimal number of changes required and efficiently updates only those parts of the real DOM. This approach improves performance and responsiveness by avoiding unnecessary manipulation of the actual DOM, which is typically slower.

**Explain Features of React**  
React provides several key features that support efficient UI development. These include a component-based architecture that promotes reusability and modularity, a virtual DOM for efficient updates, and JSX syntax that allows developers to write HTML-like code within JavaScript. It supports one-way data binding, which simplifies data flow and debugging. React also provides powerful tools for managing state and side effects, such as the useState and useEffect hooks. In addition, React's ecosystem supports server-side rendering, routing, and integration with other libraries, making it suitable for both simple and complex applications.