**1. Define SPA and Its Benefits**

**SPA (Single-Page Application):**  
A **SPA** is a web application that loads a single HTML page and dynamically updates content as the user interacts with the app, without refreshing the entire page.

**Benefits of SPA:**

* **Faster navigation:** Only the necessary content is updated, not the whole page.
* **Improved user experience:** Smooth transitions and reduced loading times.
* **Reduced server load:** Fewer requests to the server after the initial load.
* **Easier to make into mobile apps** using frameworks like React Native.

**2. Define React and Identify Its Working**

**React:**  
React is a **JavaScript library** for building user interfaces, developed by Facebook. It is used to create **reusable UI components** and efficiently update the DOM.

**How React Works:**

* Uses a **virtual DOM** to detect changes.
* Renders UI components when state or props change.
* Updates only the parts of the DOM that need to change, making it efficient.

**3. Identify the Differences Between SPA and MPA**

| **Feature** | **SPA (Single-Page Application)** | **MPA (Multi-Page Application)** |
| --- | --- | --- |
| Page Load | Loads once, updates dynamically | Loads a new page from server on each request |
| Performance | Fast after initial load | Slower due to full page reloads |
| User Experience | Smoother transitions | Can feel slower and less fluid |
| SEO | Harder without server-side rendering | Easier for search engines |
| Tech Used | Often uses JS frameworks like React | Traditional server-rendered apps |

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

**Pros:**

* Fast and responsive UI.
* Better performance after the initial load.
* Reusable frontend code.
* Great for mobile-like experiences.

**Cons:**

* Poor SEO by default (can be improved with SSR).
* Initial load time may be longer.
* Browser back/forward buttons need manual handling.
* Security risks like XSS if not handled properly.

**5. Explain About React**

React is:

* A **component-based** library.
* Uses **JSX** (JavaScript + XML) to define UI elements.
* **Unidirectional data flow** (data flows from parent to child).
* Efficiently manages updates using the virtual DOM.
* Often used with tools like Redux, React Router, etc., for large-scale apps.

**6. Define Virtual DOM**

**Virtual DOM:**  
A **lightweight JavaScript representation** of the actual DOM. When state changes in a React component:

* React creates a new virtual DOM.
* Compares it to the previous virtual DOM.
* Calculates the difference (called **diffing**).
* Updates only the changed parts of the real DOM.

This makes updates fast and efficient.

**7. Explain Features of React**

Key Features of React:

* **JSX Syntax:** Combines HTML with JavaScript.
* **Virtual DOM:** Improves rendering performance.
* **Components:** Reusable pieces of UI.
* **One-way data binding:** Predictable data flow.
* **Declarative UI:** Describe what the UI should look like.
* **Hooks:** Allows functional components to use state and side effects.
* **React Router:** Enables navigation in SPA.