**React Handson 1**

**1. Define SPA and Its Benefits**

A **SPA (Single-Page Application)** is a web application that loads a single HTML page and dynamically updates content without refreshing the entire page.

**Benefits of SPA:**

* **Fast Performance**: Only the required data is fetched, not the whole page.
* **Smooth User Experience**: Navigation feels like a desktop app.
* **Efficient Bandwidth Usage**: Less server load after initial page load.
* **Frontend Control**: Better separation of frontend and backend logic.

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

**React** is a JavaScript library developed by Meta (Facebook) for building user interfaces. It's used for building SPA applications with reusable components.

**🔄 How React Works:**

* React uses **components** to divide UI into reusable pieces.
* It uses a **virtual DOM** to track changes efficiently.
* When data changes, React **re-renders only the changed parts**, not the whole page.

| **Feature** | **SPA (Single-Page Application)** | **MPA (Multi-Page Application)** |
| --- | --- | --- |
| Page Loading | Loads once | Loads each page separately |
| Speed | Faster after initial load | Slower due to full page reloads |
| User Experience | Smooth and dynamic | Traditional, with page flickers |
| Server Load | Lower | Higher |
| SEO Optimization | Needs special handling | SEO-friendly by default |
|  |  |  |

**3. Differences Between SPA and MPA**

**4. Pros & Cons of Single-Page Applications**

**Pros:**

* Fast and responsive
* Better user experience
* Reduced server load
* Seamless navigation without reloads

**Cons:**

* Not SEO-friendly by default
* Initial load can be large
* Browser history & back button handling needs extra work

**5. Explain About React**

**React** is a powerful front-end JavaScript library for building component-based UIs. It promotes a declarative style of coding and manages complex UIs efficiently.

* Developed by Facebook in 2013
* Based on **components**, **JSX**, and **unidirectional data flow**
* Widely used in companies like Instagram, WhatsApp Web, Netflix

**6. Define Virtual DOM**

The **Virtual DOM (VDOM)** is a lightweight JavaScript copy of the actual DOM.

**How it helps:**

* React compares the current virtual DOM with the previous one (a process called **diffing**)
* Only the **changed elements are updated** in the real DOM
* This makes updates faster and more efficient

**7. Features of React**

* **Virtual DOM**:  
  React uses a virtual representation of the real DOM, allowing it to update only the parts of the page that change. This improves performance and efficiency.
* **Component-Based Architecture**:  
  React applications are built using small, reusable components. Each component manages its own logic and rendering, which makes development more organized and scalable.
* **JSX Syntax**:  
  JSX is a syntax extension that allows developers to write HTML-like code within JavaScript. This makes it easier to visualize and manage UI code.
* **One-way Data Binding**:  
  React uses unidirectional data flow, meaning data flows from parent to child components. This simplifies debugging and enhances control over data changes.
* **React Hooks**:  
  Hooks are functions that allow developers to use state and other React features in functional components, making them more powerful and concise.
* **Fast Rendering**:  
  React uses a diffing algorithm to detect changes in the virtual DOM and updates only the changed elements in the real DOM, resulting in faster rendering.
* **Ecosystem Support**:  
  React has strong support for third-party libraries like Redux for state management and React Router for routing, allowing developers to build complex applications efficiently.