1.ReactJS-HOL

**1. Define SPA and Its Benefits**

A **Single-Page Application (SPA)** is a type of web app that loads just one HTML page and then updates its content dynamically as users interact with it — all without reloading the entire page.

**Benefits of SPAs:**

* **Faster Navigation:** Only the data changes, not the whole page, making things quicker.
* **Better User Experience:** It feels smooth and more like a desktop app.
* **Lower Server Load:** It fetches only what’s needed, saving bandwidth and server effort.
* **Good Caching:** Once loaded, data can be stored locally for fast access later.

**2. Define React and How It Works**

**React** is a JavaScript library developed by Facebook. It’s designed to help developers build fast, interactive user interfaces — especially in single-page applications.

**How React Works:**

* React creates something called a **virtual DOM**, which is just a lightweight copy of the real DOM (the structure of the webpage).
* When something changes (like a button click), React updates only the parts of the DOM that need it.
* Everything is built using **components**, which are small, reusable pieces of the UI.

**3. Differences Between SPA and MPA**

Let’s compare **SPA (Single-Page Application)** and **MPA (Multi-Page Application)**:

**SPA:**

* **Page Reload:** No — updates happen dynamically.
* **Speed:** Faster after the initial load.
* **Backend Requests:** Only requests the data (via APIs).
* **Development:** Needs client-side routing and more setup.
* **SEO:** Can be tricky; extra configuration is needed.

**MPA:**

* **Page Reload:** Yes — every interaction reloads a new page.
* **Speed:** Slower due to full-page reloads.
* **Backend Requests:** Fetches the whole page with data.
* **Development:** Easier routing and simpler to set up.
* **SEO:** Easier to manage since each page is separate.

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

**Pros:**

* Fast and responsive after the initial load
* Feels smooth and modern for users
* Great for apps with lots of dynamic content
* Easier to adapt for mobile platforms

**Cons:**

* Not great for SEO unless extra work is done (like server-side rendering)
* Can take longer to load the first time
* Depends heavily on JavaScript working well in the browser
* Exposes APIs, which can raise security concerns

**5. Explain About React**

**React** is a popular JavaScript library that helps developers build modern, dynamic user interfaces — especially for SPAs. It focuses on writing clean, reusable code using a component-based structure.

* It was created by Facebook
* Uses **JSX**, which mixes HTML-like syntax with JavaScript
* Handles updates efficiently using the **virtual DOM**
* Follows **one-way data flow**, making data easier to manage

**6. Define Virtual DOM**

The **Virtual DOM** is a programming idea where React keeps a virtual (in-memory) copy of the actual DOM.

* It improves performance by avoiding unnecessary DOM changes
* When something changes in a component, React compares the new virtual DOM to the old one
* Then it updates only the changed parts in the real DOM, making things much faster and smoother

**7. Explain Features of React**

Here are some of the main features that make React so popular:

* **JSX:** Lets you write UI code that looks like HTML, right inside JavaScript
* **Components:** Encourages building UIs from small, reusable pieces
* **Virtual DOM:** Speeds up updates by only changing what's necessary
* **One-way Data Binding:** Data flows in one direction, making it easier to track changes
* **Performance:** React is optimized to render quickly and efficiently
* **React Hooks:** Allows functional components to use things like state and lifecycle methods
* **React Router:** Helps manage navigation and routing in single-page apps

**OUTPUT :-**

