**Cognizant Digital Nurture 4.0**

**Week-6**

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**React Handson Exercise 1**

### 1. ****Define SPA and its Benefits****

**SPA (Single Page Application)** is a web application or website that interacts with the user by dynamically rewriting the current page, rather than loading entire new pages from the server.

#### ****Benefits:****

**Faster Navigation:** Only data is fetched; no full-page reloads.

**Better User Experience:** Smooth transitions between views.

**Efficient Data Usage:** Less bandwidth as only part of the page is updated.

**Improved Performance:** Once loaded, subsequent interactions are quicker.

### 2. ****Define React and Identify its Working****

**React** is a JavaScript library developed by Facebook for building user interfaces, especially for **SPA**.

#### ****Working of React:****

#### Uses **components** to build UI.

#### Maintains a **virtual DOM** for performance.

* Uses **JSX** (JavaScript + XML) syntax.
* React efficiently updates and renders only changed components when data changes.

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

| **Feature** | **SPA (Single Page App)** | **MPA (Multi Page App)** |
| --- | --- | --- |
| Page Reload | No reloads after initial load | Reloads entire page for every navigation |
| Speed | Faster due to dynamic updates | Slower due to full page loads |
| Development Complexity | Generally more complex | Simpler to structure |
| SEO | Harder to optimize | Better SEO due to separate pages |
| Examples | Gmail, Facebook | Amazon, Wikipedia |

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

#### ****Pros:****

Fast and responsive UI

Seamless navigation without full reloads

Better caching and offline capabilities (PWA)

#### ****Cons:****

SEO challenges (content isn't always crawled easily)

Initial loading time can be higher

Browser history and analytics can be complex to manage

### 5. ****Explain about React****

React is a **component-based JavaScript library** used to build fast, scalable, and modular front-end user interfaces.

#### Key Concepts:

**Component-Based Architecture** – UI built from reusable components.

**Unidirectional Data Flow** – Data flows from parent to child.

### ****Hooks & State Management**** – Powerful control over logic and UI behavior.

### 6. ****Define Virtual DOM****

**Virtual DOM** is a lightweight in-memory representation of the real DOM used by React.

#### How It Works:

React builds a virtual DOM tree.

On changes, it **diffs** the new virtual DOM with the previous one.

Only the **changed parts** of the actual DOM are updated.

7. **Explain Features of React**

#### **JSX:** JavaScript XML syntax for templating.

#### **Component-Based:** Build encapsulated UI elements.

#### **Virtual DOM:** Improves performance by minimizing direct DOM manipulation.

#### **Unidirectional Data Flow:** Predictable data flow.

#### **Hooks:** Functional approach to using state and side effects.

#### **Rich Ecosystem:** Tools like Redux, React Router, etc.

#### **Community Support:** Maintained by Meta (Facebook) with wide adoption.