



MITBOTS TASK - 4

DOCUMENT - 2

Understanding of React and Its Usage

1. Introduction

React is a **JavaScript library** created by Facebook (now Meta) in 2013. It is mainly used for building **user interfaces (UIs)** for web and mobile applications. Instead of being a complete framework, React focuses only on the **view layer**, making it lightweight, flexible, and highly adaptable.

Today, React is one of the most popular tools in modern front-end development. Big companies like **Netflix, Instagram, and Uber** rely on React because of its speed, reusability, and scalability.

2. Why React is Used

- **Reusable Components** – UI is broken down into small, reusable parts.
- **Performance with Virtual DOM**—Updates only the parts that change, not the whole page.
- **Fast Development**—Developers can build applications quickly and efficiently.
- **Ecosystem Support**—Works well with tools like Redux, Next.js, and Vite.
- **Cross-Platform**—React Native allows mobile apps to use the same logic as web apps.
- **SEO-Friendly** – Supports server-side rendering for better ranking.

3. Key Features of React

1. **JSX (JavaScript XML)**—A syntax extension that allows writing HTML-like code inside JavaScript.

```
function Hello() {  
  return <h1>Hello, React!</h1>;  
}
```

2. **Virtual DOM**—React creates a lightweight copy of the actual DOM and updates it efficiently.
3. **One-Way Data Binding**—Data flows in a single direction, which makes applications predictable.
—Data
4. **Hooks**—Functions like `useState` and `useEffect` simplify state and lifecycle management.

```
import { useState } from "react";  
  
function Counter() {  
  const [count, setCount] = useState(0);  
  return (  
    <div>  
      <p>You clicked {count} times</p>  
      <button onClick={() => setCount(count + 1)}>Click Me</button>  
    </div>  
  );  
}
```

Declarative Approach—Developers describe what the UI should look like, and React takes care of rendering it.

4. How Virtual DOM Works (Diagram Explanation)

Instead of updating the real DOM directly (which is slow), React:

1. Creates a **virtual DOM copy** of the UI.
2. Compares it with the previous Virtual DOM (called “diffing”).
3. Updates only the changed parts in the real DOM.

👉 Imagine a classroom attendance sheet: instead of rewriting the whole sheet when one student is absent, you just mark that student. That's exactly how React updates the UI efficiently.

5. React vs Other Frameworks

- **React vs. Angular**—**Angular** is a complete framework; React is just a UI library (lighter, more flexible)
 - **React vs. Vue**—**Vue** is simpler for beginners, but React has a larger ecosystem and more job opportunities.
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6. Setting up React with Vite

Traditionally, people used **Create React App (CRA)**, but now **Vite** is preferred because:

- It is **blazing fast**.
- Provides **instant Hot Module Replacement (HMR)**.
- Has smaller and more optimized builds.

Steps to create a React app with Vite, and

```
npm create vite@latest my-app
cd my-app
npm install
npm run dev
```

7. Real-World Usage of React

- **Facebook & Instagram**—React's birthplace.
 - **Netflix**—Faster streaming interface with React.
 - **Airbnb & Uber**—scalable booking platforms.
 - **WhatsApp Web**—Built with React for real-time updates.
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8. Advantages and Disadvantages

✓ Advantages

- High performance with Virtual DOM
- Component reusability
- Large ecosystem and community support
- Easy integration with other libraries

⚠ Disadvantages

- Learning curve with JSX
 - Too many options (state management tools, routing libraries) can confuse beginners
 - React focuses only on the UI layer (not a full framework)
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9. Future of React

- **React Server Components (RSC)**—aimed at better performance.
 - **React 19 (upcoming)**—Will introduce an improved developer experience and optimizations.
 - **Integration with AI-powered tools**—React is being combined with AI-driven frontends.
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10. Conclusion

React is not just another JavaScript library—it is a **powerful, flexible, and widely adopted tool** for building modern web and mobile applications. Its **component-based architecture, virtual DOM, and strong ecosystem** make it a developer's favorite.

With tools like **Vite**, React projects become faster and more efficient, ensuring React will remain a **top choice for years to come**.

NAME: ABIRAMI R

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