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Experiment 5

Student Name: Krishan Kumar Awasthi **UID: 23BCS10219**
Branch: CSE **Section/Group: KRG 3-B**
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Subject Name: Full Stack Development – II **Subject Code: 23CSH-309**

1. **Aim**: To verify the correctness and reliability of the EcoTrack React application by writing automated tests using Jest and React Testing Library, and by analyzing application behavior using debugging tools.

2. Objective:

- Understand the purpose of automated testing in frontend applications
- Write unit tests for JavaScript utility functions using Jest
- Use different Jest matchers to validate expected outputs and behaviors
- Test React components using React Testing Library
- Verify UI rendering by querying elements from the DOM
- Implement asynchronous testing using findBy and waitFor methods
- Apply mocking to simulate API or external data responses in tests
- Perform snapshot testing to detect unintended UI changes
- Debug failing tests and application logic using browser Developer Tools and breakpoints
- Analyze application behavior and errors systematically rather than manual checking

3. Implementation / Code:

- **Tools & Technologies Used:-**

  - React.js
  - JavaScript (ES6)
  - Jest Testing Framework
  - React Testing Library
  - VS Code
  - Node.js & npm
  - Web Browser (Chrome DevTools)

- **Implementation Description:-**

- The EcoTrack application is tested to ensure correctness of both logic and UI behavior.
- Unit testing is performed on utility functions (e.g., calculator function) using Jest.
- React Testing Library is used to render components and verify UI structure.
- Snapshot testing is applied to detect unintended UI changes over time.

- Automated tests improve application reliability and maintainability.
- Debugging tools such as browser DevTools and breakpoints help identify errors in logic or rendering.

- **Sample Code Snippet:-**

Tracker.test.js

src > components > Tracker.test.js > ...

```
// import { render, screen } from "@testing-library/react";
// import Tracker from "./Tracker";

// test("loads async data", async () => {
//   render(<Tracker />);

//   const text = await screen.findByText(/Eco data loaded/i, {}, { timeout: 3000 });

//   expect(text).toBeInTheDocument();
// });

import { render } from "@testing-library/react";
import Tracker from "./Tracker";

test("matches snapshot", () => {
  const { asFragment } = render(<Tracker />);
  expect(asFragment()).toMatchSnapshot();
});
```

JS calc.test.js ×

src > utils > JS calc.test.js > ...

```
1   import { add } from "./calc";
2
3   test("adds two numbers", () => {
4       expect(add(2, 3)).toBe(5);
5   });
```


4. Output:

- All Jest test cases executed successfully
- Utility function test passed
- React component snapshot test passed
- No unintended UI changes detected
- EcoTrack component rendered correctly during testing
- Debugging tools confirmed correct state updates and DOM rendering

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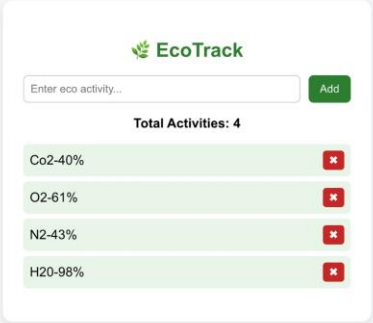

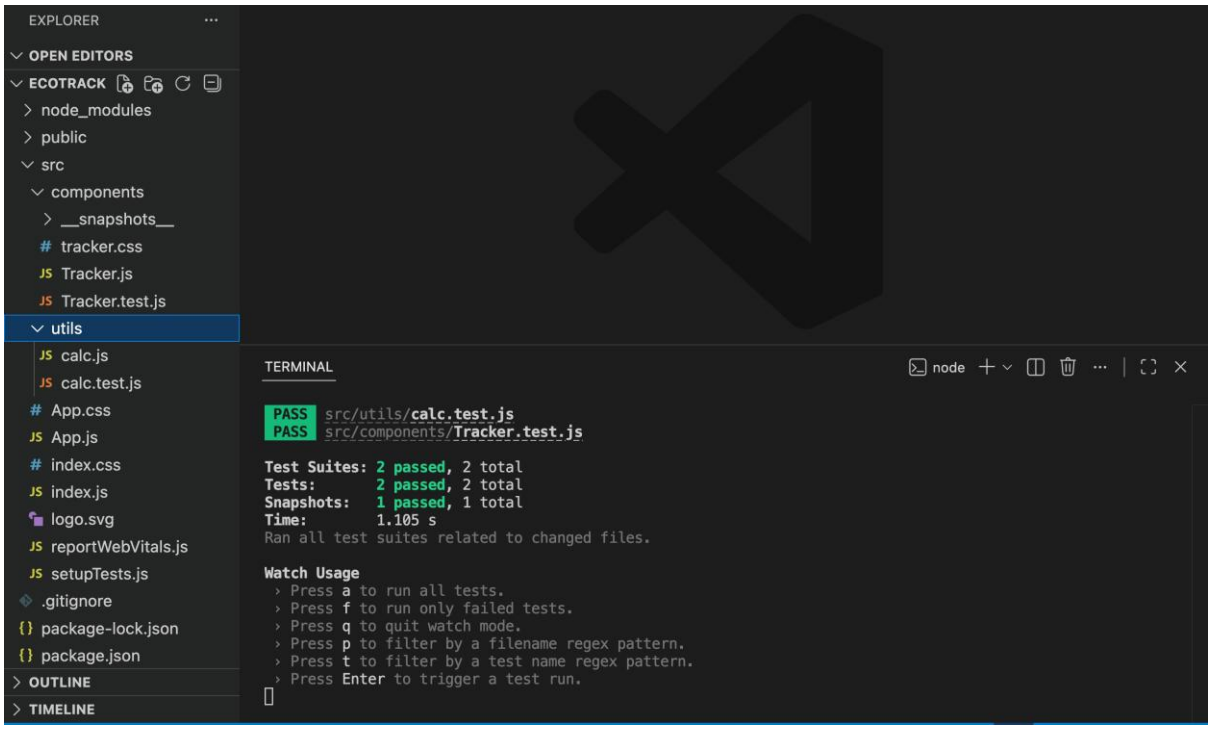

5. Learning Outcomes (What I Have Learnt):

- Importance of automated testing in frontend applications
- Writing unit tests using Jest framework
- Using matchers like toBe() and toMatchSnapshot()
- Testing React components with React Testing Library
- Validating UI rendering through DOM queries
- Understanding snapshot testing for UI stability
- Debugging React applications using DevTools and breakpoints
- Improving software reliability and maintainability through testing