



DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

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Experiment 4

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Branch: BE CSE

Section/Group: KRG_3B

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Subject Name: Full Stack - II

Subject Code: 23CSH-309

Aim: To develop a secure navigation system using Context-based authentication, protected routing, and optimized React hooks to improve performance and UI using Material UI..

Objective:

- To manage **user authentication state globally** using Context
- To implement **routing for page navigation**
- To restrict access to protected routes for unauthenticated users
- To allow page switching **only after successful login**
- To redirect unauthenticated users automatically to the **login page**
- To improve application security and user experience
- To maintain clean, scalable, and reusable code structure

Input/Apparatus Used:

- Programming Language: JavaScript (ES6+)
- Framework / Library: React (Functional Components)
- Build Tool: Vite
- Code Editor: Visual Studio Code
- Web Browser: Google Chrome

Tools & Tech Used

- **React (Functional Components)**
- **React Router DOM**
- **Context API**
- **Optimized Hooks: React.memo, useMemo, useCallback**
- **Material UI (MUI)**



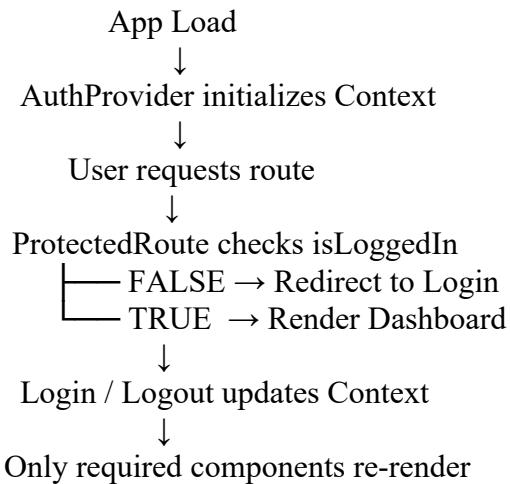
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File Structure

```
src/
  └── main.jsx
  └── App.jsx
  └── context/
    └── AuthContext.jsx
  └── components/
    ├── Login.jsx
    └── Dashboard.jsx
      └── ProtectedRoute.jsx
```

Flow of data



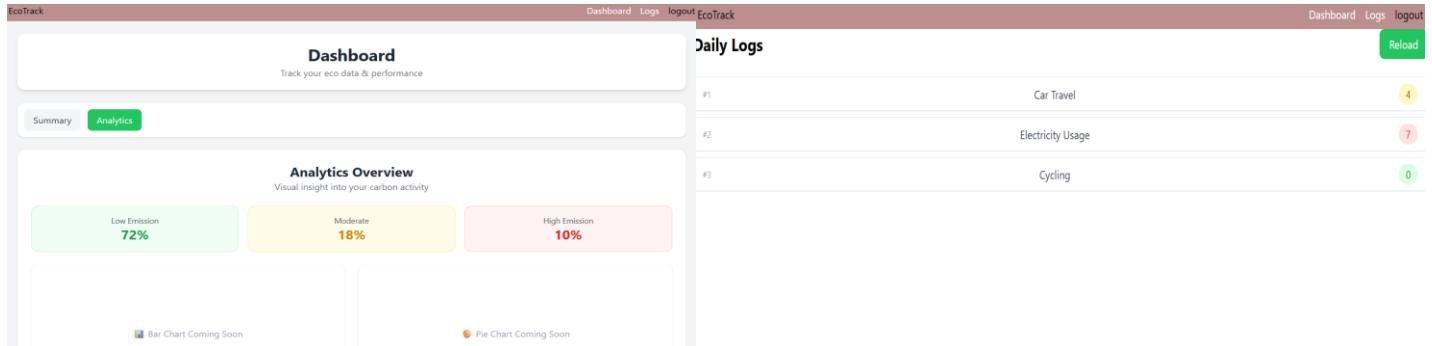
Output:

The screenshot shows two views of the EcoTrack application. On the left, the login screen displays the 'EcoTrack' logo and the tagline 'Track and reduce your carbon footprint.' Below this is a green button labeled 'Login'. At the bottom of the screen, there is a small note: 'Demo login (no password required)'. On the right, the dashboard view is shown. The top navigation bar includes links for 'Dashboard', 'Logs', and 'Login'. The main dashboard area has a title 'Dashboard' with the subtitle 'Track your eco data & performance'. Below this are two tabs: 'Summary' and 'Analytics'. Under the 'Summary' tab, there is a section titled 'Summary Overview' containing four cards: 'Total Logs' (13), 'Low Emission' (7), 'High Emission' (6), and 'Total Carbon' (51).



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Learning Outcomes

- Learned performance optimization using React.memo, useMemo, and useCallback
- Implemented secure routing with Context API
- Reduced unnecessary re-renders
- Built modern UI using Material UI
- Improved scalability and maintainability