



DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Discover. Learn. Empower.

Experiment 4

Student Name: Jetavya Singh Naruka

UID: 23BCS11171

Branch: BE CSE

Section/Group: KRG_3B

Semester: 6th

Date of Performance: 06/02/26

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)**



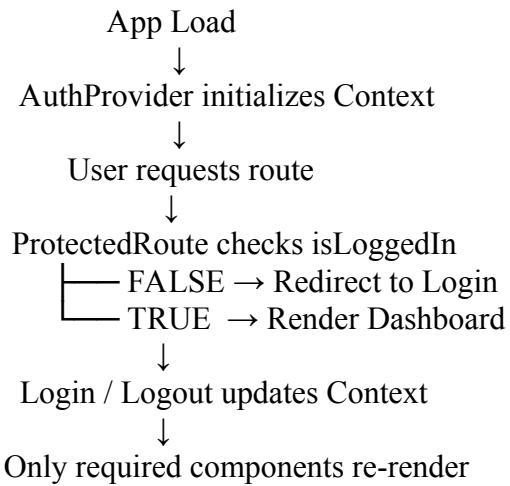
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Discover. Learn. Empower.

File Structure

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

Flow of data



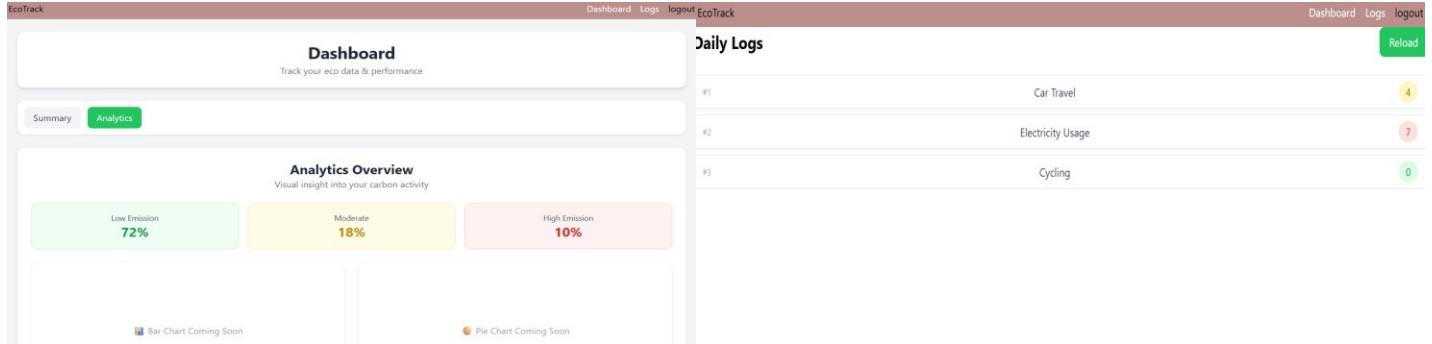
Output:

The screenshot shows the EcoTrack application interface. On the left, there is a light green sidebar with a white login box. The box contains the "EcoTrack" logo, the tagline "Track and reduce your carbon footprint.", a green "Login" button, and a note "Demo login (no password required)". At the top of the main content area, there is a navigation bar with links for "Dashboard", "Logs", and "Login". The main content area has a header "Dashboard" with the sub-header "Track your eco data & performance". Below this is a "Summary Overview" section with four cards: "Total Logs" (13), "Low Emission" (7), "High Emission" (6), and "Total Carbon" (51).



DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Discover. Learn. Empower.



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