



CHANDIGARH
UNIVERSITY

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

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Experiment 3

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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)**



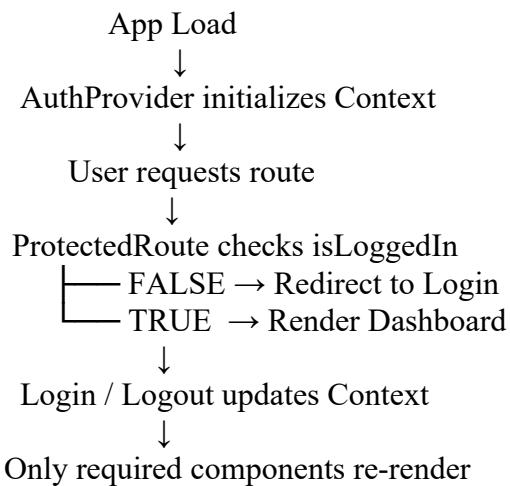
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File Structure

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

Flow of data



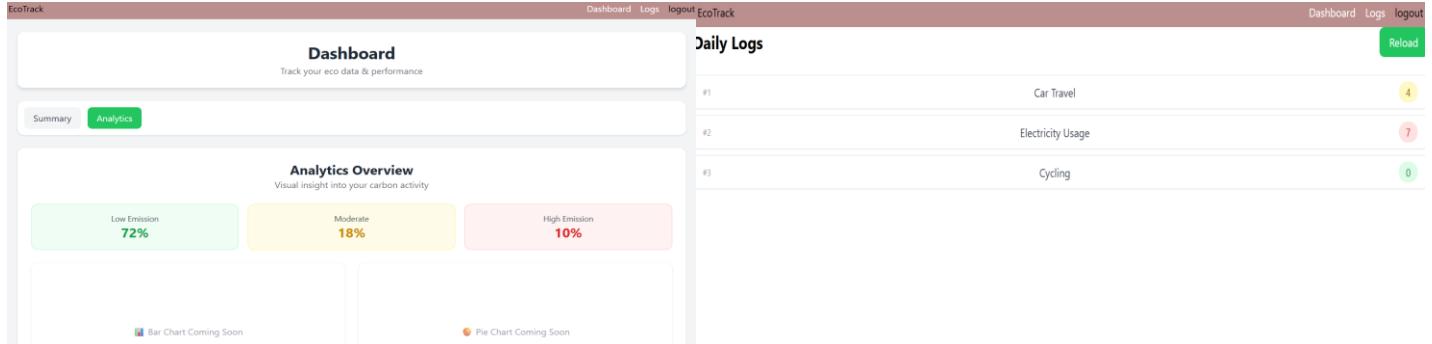
Output:

The screenshot shows two views of the EcoTrack application. On the left, the login screen displays the 'EcoTrack' logo, a sub-headline 'Track and reduce your carbon footprint.', a green 'Login' button, and a note 'Demo login (no password required)'. On the right, the dashboard view is titled 'Dashboard' with the sub-headline 'Track your eco data & performance'. It features tabs for 'Summary' and 'Analytics'. Below this is a 'Summary Overview' section with 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