

## Experiment 2

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**Subject Name:** Full Stack Development

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### **Aim:**

To implement Single Page Application (SPA) navigation in the EcoTrack application using React Router, secure application routes using context-based authentication, and extend nested dashboard routing through follow-up enhancements.

### **Objective:**

After completing this experiment and its follow-up tasks, the students will be able to:

- Configure client-side routing in a React application using React Router
- Implement SPA navigation without full page reloads
- Design and apply protected routes using route-guard patterns
- Manage shared authentication state using React Context API
- Implement nested routing to build dashboard-style layouts
- Extend existing nested routes by adding new dashboard sections
- Implement logout functionality by updating shared context state
- Analyze route access behavior and explain redirection logic
- Understand the role of Context API in shared state management and its comparison with Redux at an introductory level

### **Implementation/Code:**

#### **Dashboard.jsx:**

```
import { logs } from "../data/logs"; import { Link, useNavigate } from "react-router-dom"; import { useAuth } from "../context/AuthContext";

const Dashboard = () => {  const totalCarbon = logs.reduce((total, log) => total + log.carbon, 0); const highCarbonActivities = logs.filter(log => log.carbon > 4);
```

```
const lowCarbonActivities = logs.filter(log => log.carbon <= 4);

const { logout } = useAuth();
const navigate = useNavigate();

const handleLogout = () => {
  logout();
  navigate("/login");
};

return (
  <div>
    <h2 style={{ color: "green" }}>Dashboard</h2>

    <nav>
      <Link style={{ color: "blue", marginRight: "10px" }} to="/overview">
        Overview
      </Link>
      <Link style={{ color: "blue", marginRight: "10px" }} to="/reports">
        Reports
      </Link>
    </nav>

    <button
      onClick={handleLogout}
      style={{ color: "red", marginLeft: "10px" }}
    >
      Logout
    </button>
  </nav>

  <p style={{ color: "purple" }}>
    Total Carbon Footprint: {totalCarbon} Kg
  </p>

  <h3>All Activities</h3>
  <ul>
    {logs.map(log => (
      <li key={log.id}>
        {log.activity}: {log.carbon} Kg
      </li>
    ))}
  </ul>
)
```

```
</li>
))}
</ul>

<h3 style={{ color: "red" }}>High Carbon Activities (&gt; 4 Kg)</h3>
<ul>
  {highCarbonActivities.map(log => (
    <li key={log.id}>
      {log.activity}: {log.carbon} Kg
    </li>
  )))
</ul>

<h3 style={{ color: "green" }}>Low Carbon Activities (<= 4 Kg)</h3>
<ul>
  {lowCarbonActivities.map(log => (
    <li key={log.id}>
      {log.activity}: {log.carbon} Kg
    </li>
  )))
</ul>
</div>
);

};
```

export default Dashboard;

```
Login.jsx: import { useAuth } from
"../context/AuthContext";
import { useNavigate } from "react-router-dom";

const Login = () => {
  const
  { login } = useAuth();
  const navigate = useNavigate();

  const handleLogin = () => {
    login();
    navigate("/dashboard");
}
```

```
};

return (
  <div>
    <h2>Login</h2>
    <button onClick={handleLogin}>Login to EcoTrack</button>
  </div>
);

};

export default Login;
```

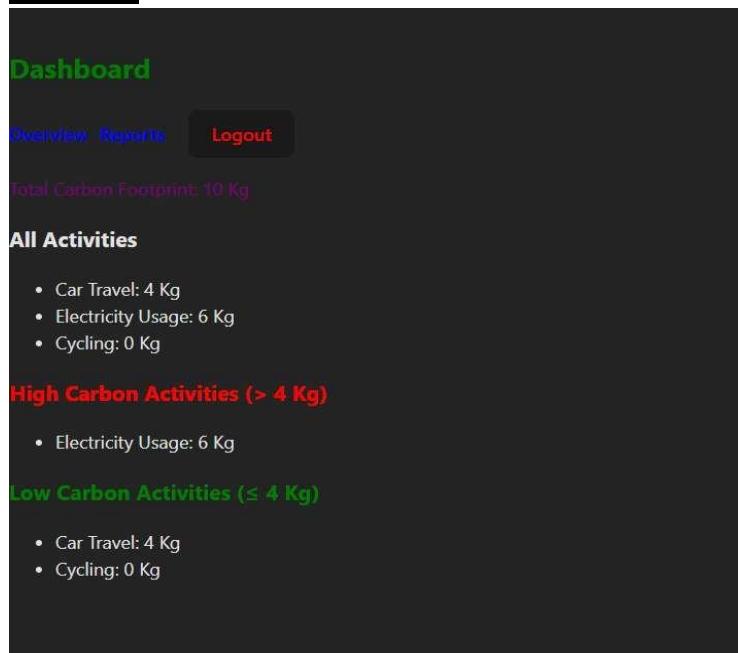
**ProtectedRoute.jsx:** import { Navigate } from "react-router-dom"; import { useAuth } from "../context/AuthContext";

```
const ProtectedRoute = ({ children }) => {
  const { isAuthenticated } = useAuth();

  return isAuthenticated ? children : <Navigate to="/login" />;
};
```

```
export default ProtectedRoute;
```

## Output:



The screenshot shows the EcoTrack dashboard interface. At the top, there's a navigation bar with 'Dashboard' in green, 'Overview', 'Reports', and a red 'Logout' button. Below the navigation, the total carbon footprint is displayed as 'Total Carbon Footprint: 10 Kg'. Under the heading 'All Activities', there's a list of activities with their respective carbon footprints: 'Car Travel: 4 Kg', 'Electricity Usage: 6 Kg', and 'Cycling: 0 Kg'. Below this, under 'High Carbon Activities (> 4 Kg)', is 'Electricity Usage: 6 Kg'. Under 'Low Carbon Activities (<= 4 Kg)', are 'Car Travel: 4 Kg' and 'Cycling: 0 Kg'.



## Login

[Login to EcoTrack](#)

## Reports Page

This is the Analytics page of EcoTrack.

## Overview Page

This is the Overview page of EcoTrack.

### Learning Outcome:

- Implement SPA navigation in React using React Router without full page reloads.
- Design and apply protected routes using authentication state with Context API.
- Manage shared authentication state and implement login/logout functionality.
- Build and extend nested dashboard routes for modular layouts.
- Filter, display, and analyze data dynamically while understanding route access behavior.