

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>  
      <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>  
      ))}
```


<h3 style={{ color: "red" }}>High Carbon Activities (> 4 Kg)</h3>


```
{highCarbonActivities.map(log => (
  <li key={log.id}>
    {log.activity}: {log.carbon} Kg
  </li>
))}
```


<h3 style={{ color: "green" }}>Low Carbon Activities (≤ 4 Kg)</h3>


```
{lowCarbonActivities.map(log => (
  <li key={log.id}>
    {log.activity}: {log.carbon} Kg
  </li>
))}
```


</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:

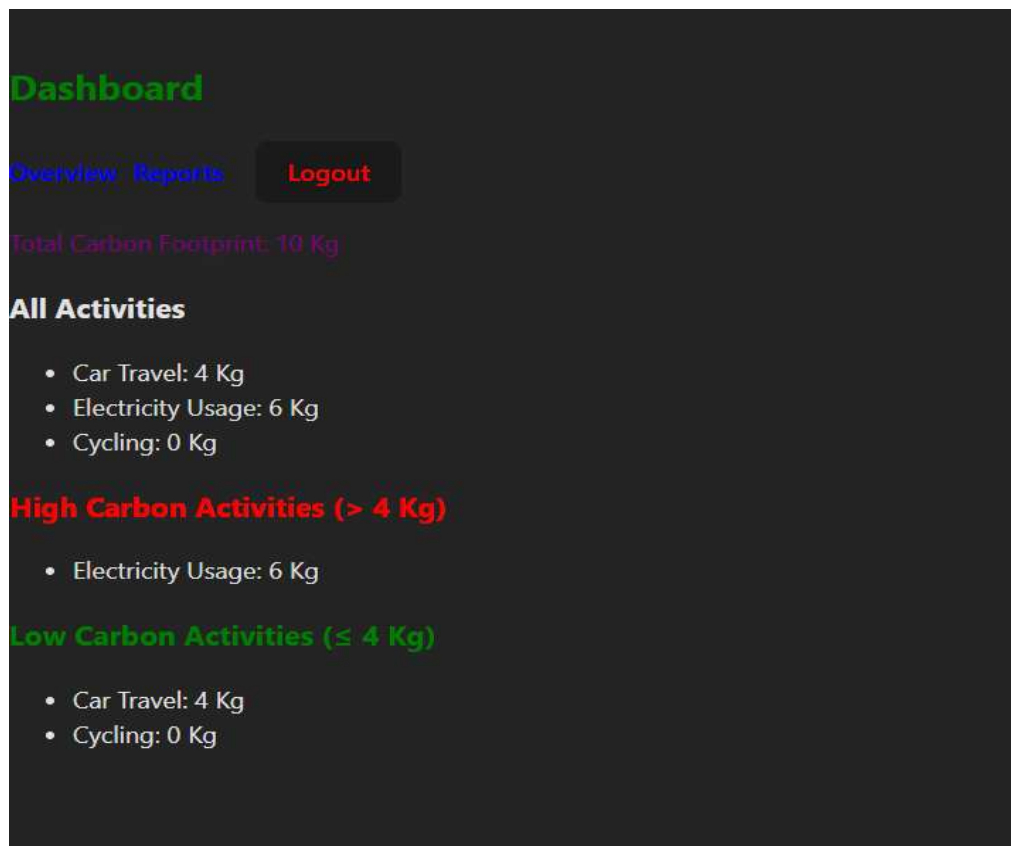
```
import { Navigate } from "react-router-dom";
import { useAuth } from "../context/AuthContext";
```

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

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

```
export default ProtectedRoute;
```

Output:



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.