Development of Web Application for fire risk assessment

Project under **Prof. Jhareswar Maiti**
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Objective

- The objective of the project is to provide a web-based platform for evaluating the potential of fire risk in the industrial.

- Provide a valuable analytical result that help in decision making for the industries.

Implemented the work in the application as Full Stack Developer

The technology used in the development of the application is

- Javascript Programming language
- NodeJs framework
- React JS
- MongoDb for Database
- API building for managing the database

Home Page of application

THE FIRE AND EXPLOSION INDEX ?

The Fire and Explosion Index (**F&EI**) is a numerical representation of the potential for a fire or explosion to occur within a process unit or facility. It is a quantitative assessment tool used in the process industries to evaluate the risk posed by flammable materials and substances.

The **F&EI** considers various factors such as the type and quantity of flammable materials, the presence of ignition sources, and the design and construction of equipment and facilities.

It is usually expressed as a score or a rating on a scale that ranges from low to high, with low values indicating a low likelihood of fire or explosion and high values indicating a high likelihood of fire or explosion.

The F&EI is commonly used in hazard analysis and risk assessments for process safety management, design and construction of new facilities, and modifications to existing facilities.

Use case of fire and explosion index ?

Important Questions

How can organizations reduce their Fire and Explosion Index score? ⌄

Register user by Email ,Password

User registration code snipped (Backend)

```javascript
app.post("/register", async (req, res) => {
    const { email, password, confirmPassword } = req.body;
    try {
        if (!email || !password || !confirmPassword) {
            return res.status(400).json("Fill all the fields");
        }
        if (password !== confirmPassword) {
            return res
                .status(400)
                .json("Password and ConfirmPassword doest not matched");
        }


        const newUser = await UserModal({ email, password });
        const emailExist = await UserModal.findOne({ email });
        if (emailExist) {
            return res.status(400).json("Email already exist");
        }


        await newUser.save();
        res.status(201).json(newUser);
    } catch (error) {
        res.status(500).json(error.message);
    }
});
```

Maintain security in the application

- **Input form of registration is proper validation**
- **Maintain secure User authentication and authorization**
- **Secure the authentication by Token based system**
- **Created Responsive frontend of the application**

Store User Data in MongoDB Database

QUERY RESULTS: 1-2 OF 2

_id: ObjectId('641828018927629fd48d103e')
email: "santosh@gmail.com"
password: "$2b$10$RASiz8Vx1R3BMVaNqiqKX.dXTVvSILdTe7pur.5paHfZky2N.lwt2"
createdAt: 2023-03-20T09:31:45.446+00:00
updatedAt: 2023-03-20T09:31:45.446+00:00
__v: 0

_id: ObjectId('641828298927629fd48d1043')
email: "kunal@gmail.com"
password: "$2b$10$I2fLutc3eCAE2ELff3y6MeE9TrMW46QAbKChUBGE.f2hqktYH0Z0W"
createdAt: 2023-03-20T09:32:25.473+00:00
updatedAt: 2023-03-20T09:32:25.473+00:00
__v: 0

Encrypted password

Calculation Page

Find Fire & Explosion Index

Select Material ▼

Select General Process Hazards ⬅ **Penalty Factor Range**

☐ Exothermic Chemical Reactions   Enter value between 0.30 to 1.25

☐ Endothermic Processes   Enter value between 0.20 to 0.40

Safety   Home   Find F&EI   Report   Contact Us   LOGIN

localhost:3000/findF&EI

Calculation Page

Safety
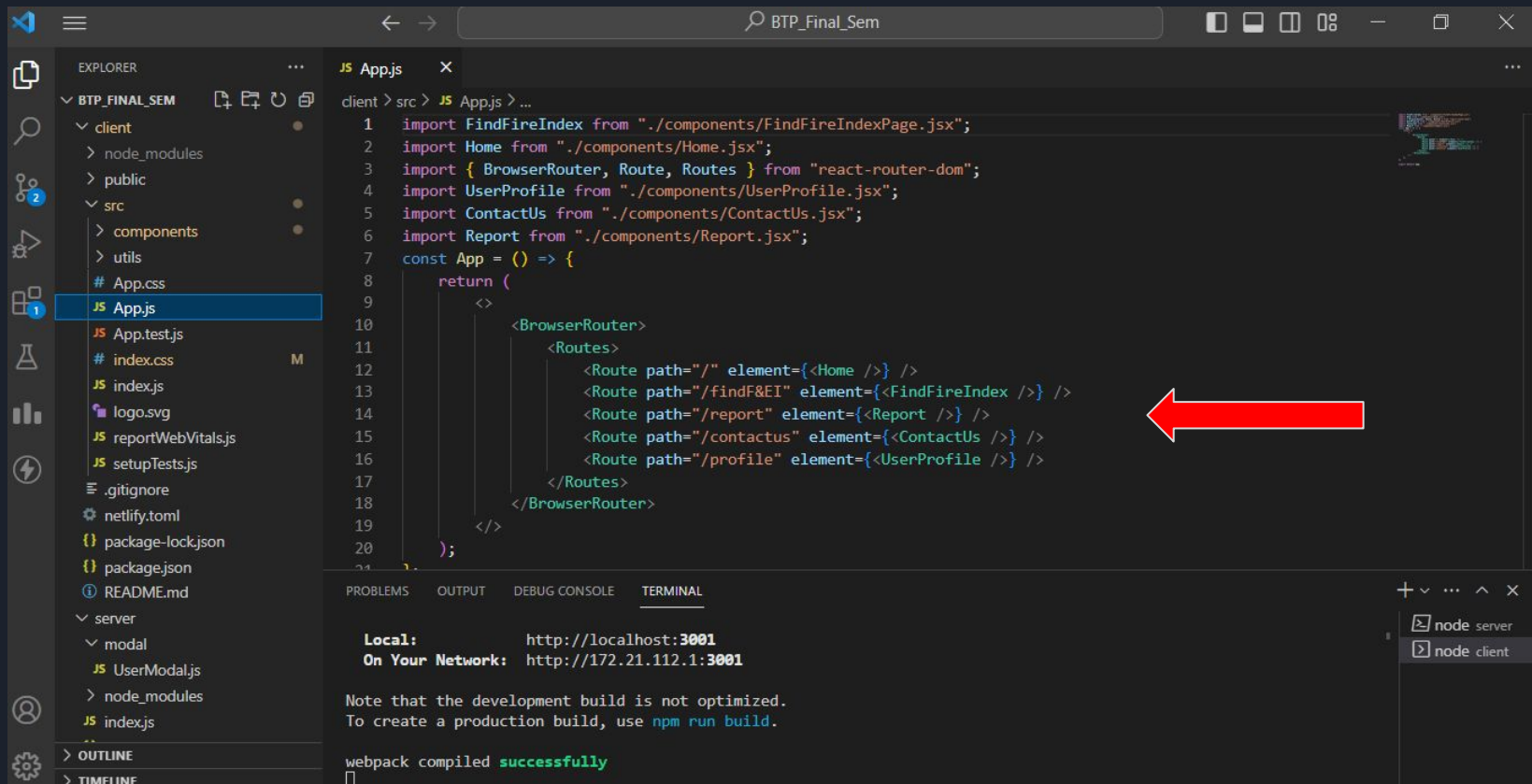
Home | Find F&EI | Report | Contact Us | LOGIN

☐ Exothermic Chemical Reactions

Enter value between 0.30 to 1.25

☐ Endothermic Processes

Enter value between 0.20 to 0.40

☐ Material Handling and Transfer

Enter value between 0.25 to 1.05

☑ Enclosed or Indoor Process Untts

Enter value between 0.25 to 0.90

0.1

☐ Access

Enter value between 0.20 to 0.35

☐ Drainage and Spill Contro

Enter value between 0.25 to 0.50

Select Special Process Hazards

Penalty Factor Range

Frontend code implementation


```javascript
import FindFireIndex from "./components/FindFireIndexPage.jsx";
import Home from "./components/Home.jsx";
import { BrowserRouter, Route, Routes } from "react-router-dom";
import UserProfile from "./components/UserProfile.jsx";
import ContactUs from "./components/ContactUs.jsx";
import Report from "./components/Report.jsx";
const App = () => {
  return (
    <>
      <BrowserRouter>
        <Routes>
          <Route path="/" element={<Home />} />
          <Route path="/findF&EI" element={<FindFireIndex />} />
          <Route path="/report" element={<Report />} />
          <Route path="/contactus" element={<ContactUs />} />
          <Route path="/profile" element={<UserProfile />} />
        </Routes>
      </BrowserRouter>
    </>
  );
```

Calculation Page

localhost:3000/findF&EI

Safety

Home | Find F&EI | Report | Contact Us | LOGIN

Select Special Process Hazards ⬅ | **Penalty Factor Range**

☐ Toxic Material(s) | Enter value between 0.20 to 0.80

☐ Sub-Atmospheric Pressure « 500 mm Hg) | Enter value 0.50

☐ Dust Explosion | Enter value between 0.25 to 2.00

☐ Low Temperature | Enter value between 0.20 to 0.30

☐ Corrosion and Erosion | Enter value between 0.10 to 0.75

☐ Leakage - Joints and Packing | Enter value between 0.10 to 1.50

Result of Fire & Explosion Index

Safety   Home   Find F&EI   Report   Contact Us   LOGIN

localhost:3000/findF&EI

SUBMIT

Result

Selected Material
Acetic Acid   14(Material Factor)

Selected General Process Hazards
Enclosed or Indoor Process Untts	0.3
Endothermic Processes	0.2
Drainage and Spill Contro	0.4

Selected Special Process Hazards
Sub-Atmospheric Pressure « 500 mm Hg)	0.5
Leakage - Joints and Packing	0.3
Low Temperature	0.3

Fire & Explosion Index
Output   55.86

Contact Us Page

Home   Find F&EI   Report   Contact Us   LOGIN

Prof. Jhareswar Maiti
Head of the Department
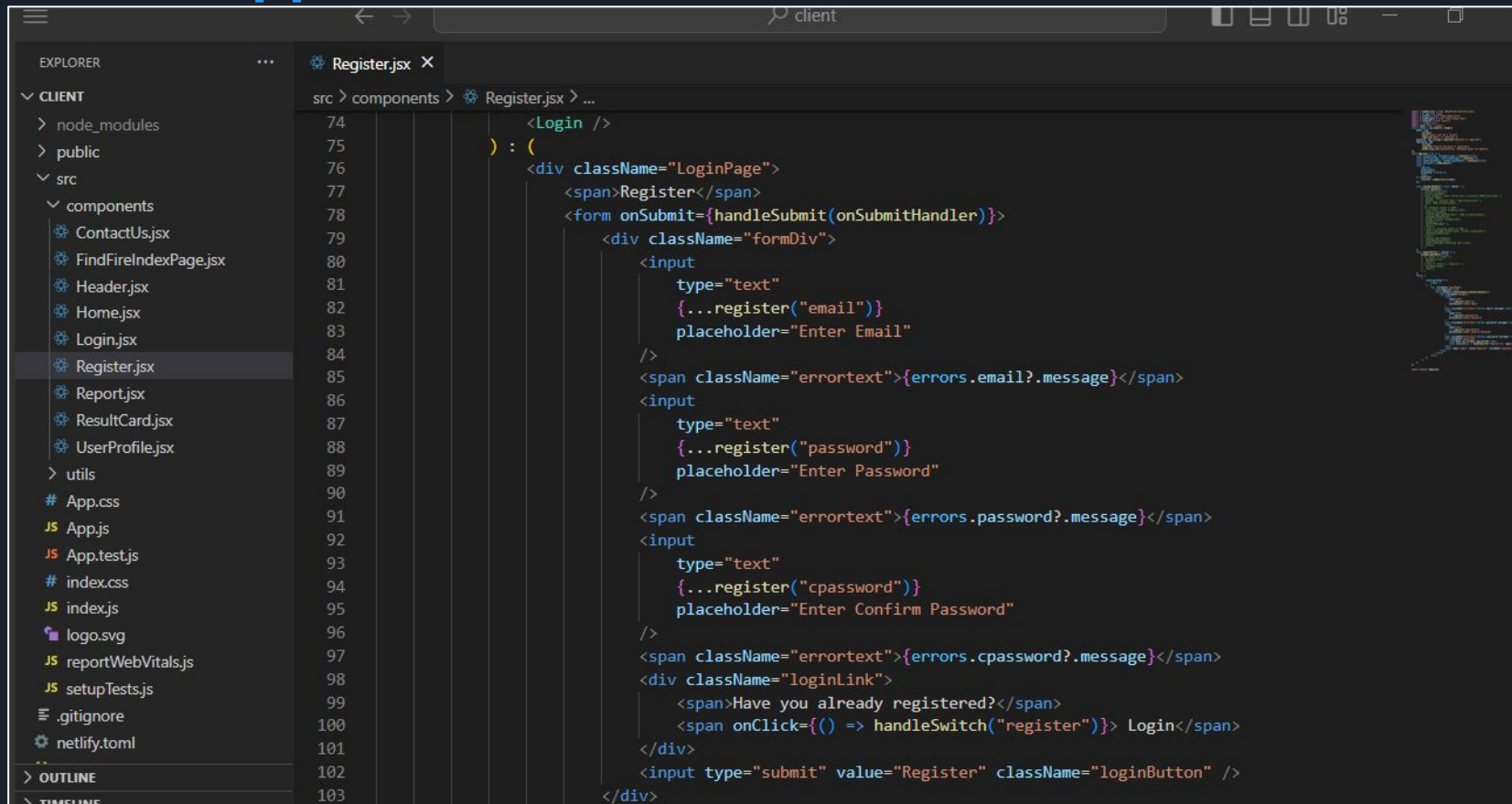
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Code snippet of frontend

Future Plan

- Build full Backend for the application and it's architecture

- Integrating the API into the front end of the application

- Deploy in the server so that everyone can use it

- Other factor of fire risk will find out and provide analytical insight in the form of table visualization or graph .

Thank You