A Project Report On

Interactive Dashboard in a Web Application

Submitted in partial fulfilment of the requirement for the award of degree of

B. Tech

Kalinga Institute of Industrial Technology

Bhubaneswar

AT

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Oil & Natural Gas Corporation Ltd. Dehradun, India

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Declaration

I hereby declare that the work presented in this project report entitled "Interactive Dashboard in a Web Application" in partial fulfilment of requirement for the award of degree of B. Tech, is an authentic record of my work carried out during the Summer Training from 25 Jun 2024 to 25 Aug 2024, under the guidance of Mr. Bhanu Pratap Singh, Manager Programming, Computer Services, E&D Directorate, ONGC, Dehradun.

Signature of the Student
(Abhinav Bish

Certificate of completion

This is to certify that Mr. Abhinav Bisht has successfully completed his training on "Creating Interactive Dashboards in Web Application" at OIL AND NATURAL GAS CORPORATION LTD., from 25 June, 2024 to 25 Aug, 2024.

Abhinav Bisht, a student of Kalinga Institute of Industrial Technology, Bhubaneswar, pursuing B. Tech (Computer Science) has shown exceptional dedication in mastering the concepts of Web Application Development in React. His ability to grasp and apply these concepts effectively is commendable.

We congratulate Mr. Abhinav Bisht and wish him continued success in his academic and professional journey.

Bhanu Pratap Singh
(Manager programming)
Computer Services
E&D Directorate, ONGC, Dehradun

Acknowledgement

I am deeply grateful for the exceptional learning experience during my summer training at ONGC, guided by Mr. Bhanu Pratap Singh. His mentorship and expertise were crucial in shaping my understanding and successful completion of this project. I am fortunate to have had the opportunity to be mentored by an experienced and supportive professional during this journey.

I extend my sincere thanks to ONGC authorities for granting me the opportunity to undergo training in this esteemed organization. The exposure and knowledge gained under their guidance have been invaluable for my professional development.

Lastly, I express my gratitude to my parents for their unwavering moral support and encouragement throughout this endeavor. Their belief in me has been a constant source of motivation.

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1. Abstract

This project report documents the development of a web-based platform created during my summer internship at ONGC, focusing on integrating a role-based authentication system to manage secure access to a custom dashboard. The primary objective of the project was to enable different user roles within the organization to interact with and analyse data through a streamlined interface tailored to their specific needs. The dashboard, constructed using Metabase, serves as a powerful tool for visualizing and interpreting organizational data, facilitating data-driven decision-making.

The role-based authentication system was meticulously designed to ensure that users only have access to data and dashboard functionalities relevant to their roles, thereby maintaining the confidentiality and integrity of sensitive information. This report provides an in-depth account of the development process, including the design and implementation of the authentication system, the configuration and customization of the Metabase dashboard, and the integration of these components into a cohesive website.

Challenges encountered during the project, such as aligning the dashboard capabilities with organizational requirements and ensuring seamless user experience across various roles, are also discussed. The report concludes with an evaluation of the system's impact on ONGC’s operations, highlighting the enhanced efficiency and security achieved through this tailored web solution.

2. INTRODUCTION TO OIL AND NATURAL GAS CORPORATION

OIL AND NATURAL GAS CORPORATION

- The Oil and Natural Gas Corporation (ONGC) is an Indian multinational company operating in the oil and gas sector. As India's largest producer of crude oil and natural gas, ONGC contributes significantly to the country's economy, accounting for approximately 71% of India's gross domestic product. The crude oil extracted by ONGC serves as the primary raw material for its subsidiaries like IOC, BPCL, HPCL, and MRPL (the latter two being subsidiaries of ONGC), which refine it into various petroleum products including gasoline, diesel, kerosene, naphtha, and edible oil.

  ONGC operates as a public sector undertaking (PSU) under the ownership of the Government of India. Established in 1956, ONGC's primary mission is to explore, produce, and develop oil and gas resources within India.

  Some key points about ONGC are:

- ONGC's core focus lies in the exploration and extraction of oil and gas resources. The company operates across a diverse portfolio of over 100 fields, encompassing both offshore and onshore assets located within India and internationally. ONGC conducts comprehensive activities including seismic surveys to map subsurface structures, drilling wells to extract hydrocarbons, and managing the production processes of oil and gas. Through these operations, ONGC plays a critical role in meeting energy demands, contributing significantly to India's oil and gas sector and global energy markets.

- ONGC maintains a significant presence in India's oil and gas industry, operating in key sedimentary basins including Mumbai High, Krishna-Godavari Basin, Assam-Arakan Basin, and Cambay Basin. Internationally, ONGC has expanded its operations into countries like Russia, Vietnam, Iran, Myanmar, and others, demonstrating its commitment to exploring new opportunities beyond India's borders. This global expansion reflects ONGC's strategy to leverage its expertise and resources in diverse energy projects worldwide.

- ONGC has diverse subsidiaries operating in various segments of the oil and gas industry. Key subsidiaries include ONGC Videsh Limited (OVL), **focusing on international exploration and production; Mangalore Refinery and**

Petrochemicals Limited (MRPL), specializing in crude oil refining; and ONGC Petro additions Limited (OPaL), managing a petrochemical complex.

- ONGC possesses substantial oil and gas reserves, with proven and probable oil reserves estimated at around 5 billion metric tons and gas reserves at approximately 1.4 trillion cubic meters based on the latest data. While production levels fluctuate annually, ONGC remains consistently among India's top oil and gas producers.

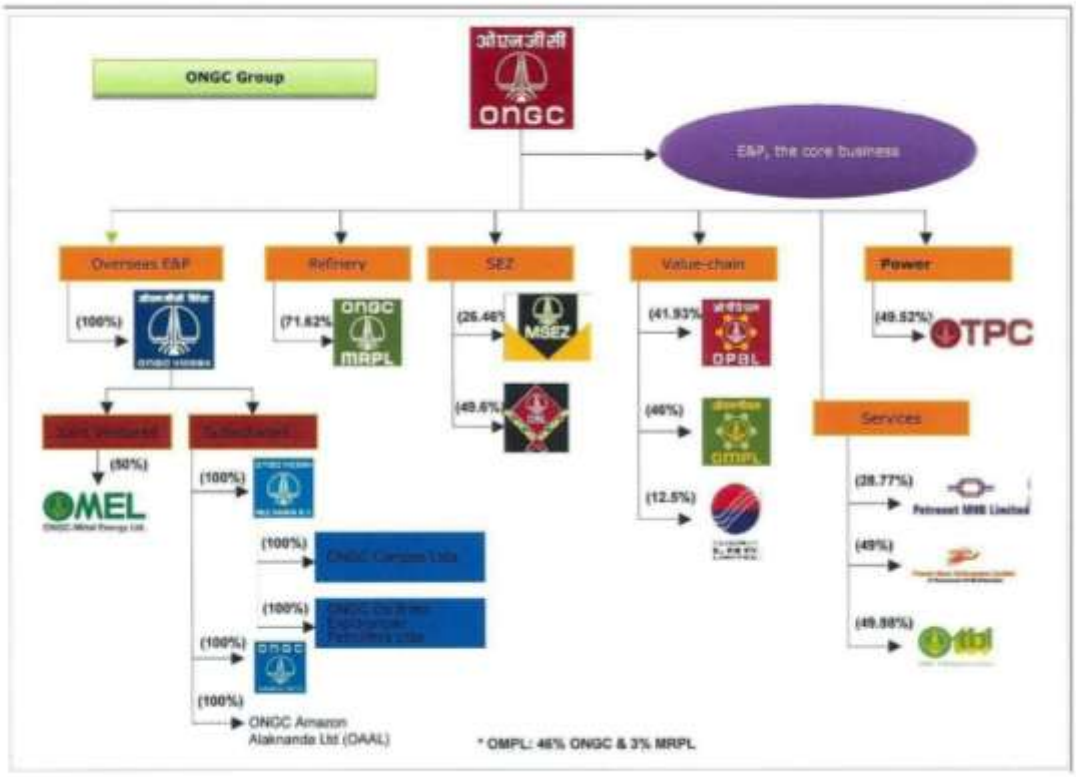


Fig 1.1-Subsidiaries of ONGC [1]

- ONGC boasts substantial oil and gas reserves, with proven and probable oil reserves totaling around 5 billion metric tons and gas reserves of approximately 1.4 trillion cubic meters based on the most recent data. Although annual production levels may fluctuate, ONGC has consistently ranked as one of India's leading oil and gas producers.

- ONGC operates a specialized research and development (R&D) center known as the Institute of Reservoir Studies (IRS), focusing on key aspects of oil and gas exploration, reservoir management, and advanced drilling

techniques. The IRS collaborates closely with national and international research institutions and universities to augment ONGC's R&D capabilities and stay at the forefront of innovation in the oil and gas industry.

Fig. 1.2-ONGC corporate office [3]

ONGC prioritizes corporate social responsibility (CSR) activities with a focus on community development, healthcare, education, environmental protection, and rural development. The company undertakes various initiatives to foster overall development in the regions where it operates, aiming to make a positive impact on society and contribute to sustainable growth.

ONGC plays a crucial role in India's energy sector by fulfilling a substantial portion of the country's oil and gas needs. Its contributions have been instrumental in driving the growth of the Indian economy. Furthermore, ONGC remains committed to exploring new opportunities both within India and internationally, aiming to further enhance its impact on the energy landscape and support economic development.

2.1 VISION AND MISSION:

ONGC, an Indian multinational oil and gas company, has a historical vision and mission. For the latest and most accurate information, it's advisable to consult the company's official sources.

Historically, the vision and mission of ONGC have been as follows:

Vision:

"To be the world's leading integrated energy company leveraging talent and technology, with a focus on enhancing stakeholder value."

Mission:

1.Exploration and Production: ONGC is focused on efficiently and sustainably exploring and extracting hydrocarbons to fulfill India's energy requirements. Additionally, ONGC actively seeks opportunities for exploration and production activities overseas.

2.Diversification: ONGC aims to broaden its energy portfolio by investing in alternative and renewable energy sources, including wind, solar, biofuels, and other sustainable technologies. This strategy underscores ONGC's commitment to sustainable and diversified energy solutions.

3.Leadership: ONGC is dedicated to preserving its leadership role in the oil and gas sector through the adoption of advanced technologies, the development of a skilled workforce, and a strong emphasis on innovation and research and development.

4.Ethical Practices: ONGC upholds ethical standards in its business operations, emphasizing integrity, transparency, and responsible environmental management. The company strives to minimize its environmental footprint and make positive contributions to the communities where it operates.

5.Collaboration: ONGC endeavors to form strategic alliances and partnerships with national and international organizations, governments, and stakeholders. This collaboration aims to facilitate knowledge sharing, technology transfer, and mutual growth.

6Commitment to Excellence: ONGC strives for excellence by leveraging its competitive advantages in research and development (R&D) and technology, with a focus on engaging and empowering its workforce.

7.Business Ethics and Organizational Values: ONGC adheres to high standards of business ethics and organizational values, ensuring integrity and transparency in all operations.

8.Health, Safety, and Environmental Commitment: ONGC maintains a steadfast commitment to health, safety, and environmental practices to enhance the quality of life in the communities where it operates.

It is worth noting that the specific vision and mission statements of ONGC may evolve over time to align with changing business strategies, industry dynamics, and sustainability goals.

ONGC was established under the visionary leadership of Pandit Jawaharlal Nehru, challenging the skepticism of multinational oil companies operating in India at the time, who had dismissed India as lacking in hydrocarbon resources. Pandit Nehru entrusted Shri Keshav Dev Malviya to lay the foundation of ONGC within the Oil and Gas sector, under the Geographical Survey of India, in 1955. After several months, it was transformed into an Oil and Natural Gas Directorate, which later evolved into a Commission named Oil and Natural Gas Commission on August 14, 1956. In 1994, the Oil and Natural Gas Commission was transformed into a corporation, and in 1997 it was designated as one of the NAVRATNAS by the Government of India. Subsequently, it was conferred with MAHARATNAS status in the year 2010. Over its more than 50 years of existence, ONGC has achieved numerous milestones in fulfilling India's energy aspirations. The journey of ONGC over these decades epitomizes conviction, resilience, and dedication. ONGC's exceptional efforts have transformed previously unexplored areas into productive hydrocarbon regions. Starting from humble beginnings, ONGC has grown to become one of the largest Exploration and Production (E&P) companies globally in terms of reserves and production. ONGC, as an integrated Oil and Gas Corporation, has developed in-house capabilities across all facets of the exploration and production industry, including seismic data acquisition, drilling, engineering, production, refining, transportation, marketing, applied R&D, and training

2.2 GROWTH AND EVOLUSION OF ONGC:

The Oil and Natural Gas Corporation Limited (ONGC) has evolved significantly since its establishment. Here is an overview of its evolution:

- Formation: ONGC was established on August 14, 1956, as a statutory body under the Ministry of Petroleum and Natural Gas, Government of India. It was created through the merger of various oil companies, including the Oil and Natural Gas Directorate (ONGD), which had oversight of exploration and production activities.

- Early Years: During its formative years, ONGC concentrated on exploring and developing oil and gas resources within India. The company achieved notable discoveries, including the Ankleshwar field in Gujarat and the Bombay High field in the Arabian Sea, which played pivotal roles in shaping India's oil and gas sector.

- Vertical Integration: ONGC broadened its operations by diversifying into downstream activities. The company established subsidiaries like ONGC Videsh Limited (OVL) for international exploration and production, Mangalore Refinery and Petrochemicals Limited (MRPL) for refining, and ONGC Petro Additions Limited (OPaL) for petrochemicals, thus enhancing its presence across the oil and gas value chain.

- Global Expansion: ONGC pursued an international expansion strategy to acquire energy assets overseas. ONGC Videsh Limited (OVL) acquired participating interests in multiple oil and gas blocks in countries such as Russia, Vietnam, Sudan, Mozambique, Brazil, and others. This global expansion was intended to diversify ONGC's portfolio and strengthen India's energy security.

- Technology and Innovation: ONGC is committed to adopting advanced technologies and innovative practices to enhance exploration and production efficiency. The company collaborates with international oil companies, research institutions, and technology providers to strengthen its capabilities in offshore drilling, deep-water exploration, and enhanced oil recovery techniques. This

emphasis on technology and innovation underscores ONGC's commitment to staying at the forefront of the oil and gas industry.

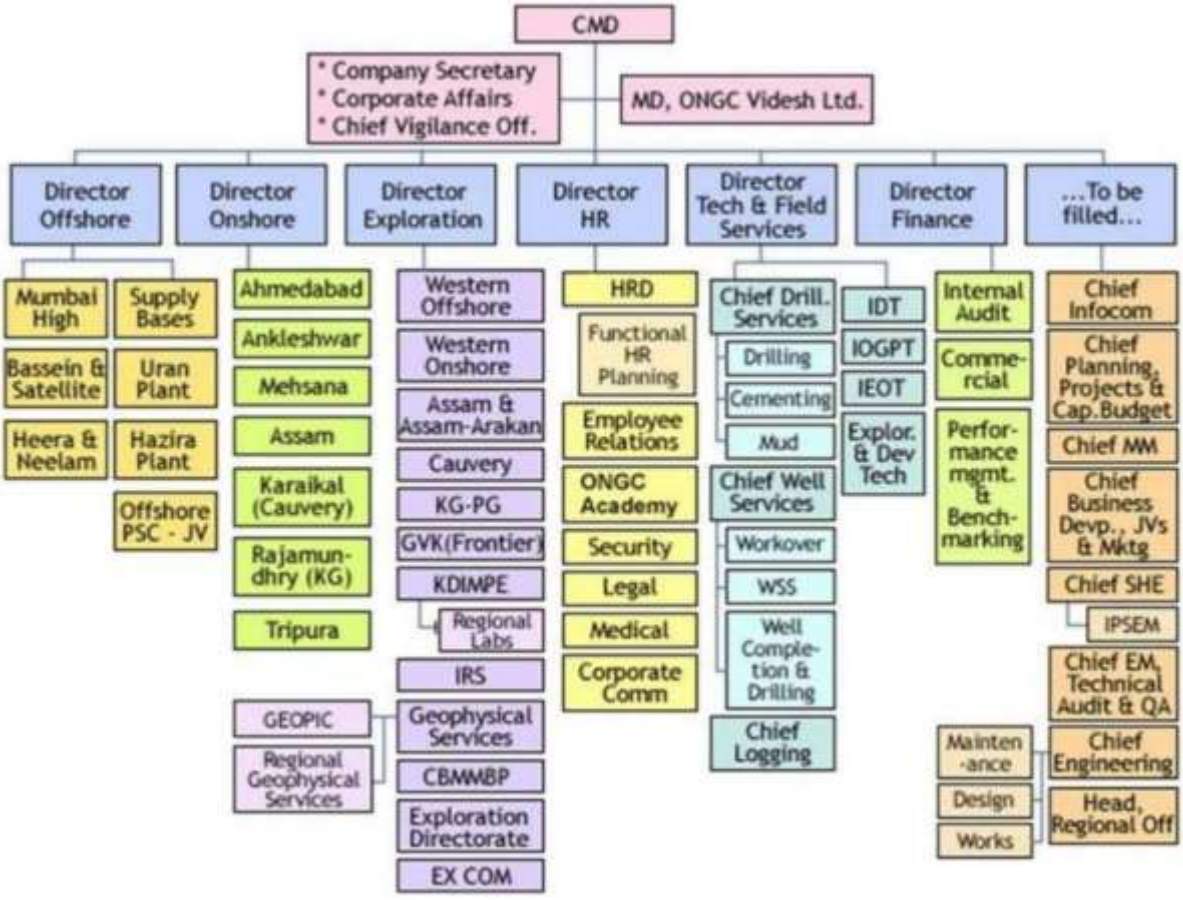
- Sustainability and Renewable Energy: ONGC has prioritized sustainability and renewable energy in recent years. The company has made significant investments in renewable projects, including wind and solar power, and has launched research and development initiatives focused on biofuels, carbon capture, and storage. ONGC is committed to reducing its carbon footprint and supporting India's transition towards clean energy.

- Integration and Diversification: ONGC has actively pursued integration across the energy value chain. The company has entered into partnerships and acquisitions to broaden its footprint in refining, petrochemicals, and natural gas marketing. ONGC has also diversified into new areas such as shale gas exploration, coal-bed methane, and city gas distribution, demonstrating its commitment to expanding and diversifying its operations within the energy sector.

- Social Initiatives: ONGC is deeply committed to corporate social responsibility (CSR) initiatives, with a focus on education, healthcare, rural development, and environmental conservation. The company aims to make a positive impact on the lives of communities in its operational areas and promote sustainable development through its social initiatives.

- ONGC's evolution is ongoing, shaped by shifts in the global energy landscape, technological advancements, and sustainability priorities. The company continually adapts its strategies to stay competitive in the oil and gas industry and explores opportunities in renewable energy and emerging sectors to maintain its position at the
- forefront of the energy transition.

ORGANIZATIONAL STRUCTURE



Corporate Responsibility

ONGC's mission emphasizes a sustainable commitment to health, safety, and the environment, aiming to enhance the quality of life in communities. This mission is evident in our Corporate Social Responsibility (CSR) initiatives. Initially, CSR at ONGC began as philanthropic efforts, supporting various socio-economic development programs such as school and hospital construction, agriculture and cottage industry development, and infrastructure projects. ONGC is a pioneer participant of the United Nations Global Compact, the world's largest corporate citizenship initiative that brings together industry, United Nations agencies, NGOs, civil society, and businesses on a unified platform.

In recent years, ONGC has implemented diverse CSR projects at both the workplace and corporate levels. The corporate-level CSR program focuses on disaster relief management and water management projects. The Global Compact initiative was launched in July 2000 by United Nations Secretary-General Kofi Annan with the aim of establishing an international corporate citizenship network to promote universal social and environmental principles. ONGC's participation in this program underscores its commitment to responsible business practices and sustainability.

ONGC VIDESH

ONGC Videsh Ltd.

ONGC Videsh Limited, a Miniratna Schedule “A” Central Public Sector Enterprise (CPSE) of the Government of India under the administrative control of the Ministry of Petroleum & Natural Gas, is the wholly owned subsidiary and overseas arm of Oil and Natural Gas Corporation Limited (ONGC), the flagship national oil company (NOC) of India. The primary business of ONGC Videsh is to prospect for oil and gas acreages outside India, including exploration, development and production of oil and gas. ONGC Videsh owns Participating Interests in 32 oil and gas assets in 15 countries. In terms of reserves and production, ONGC Videsh is the second largest petroleum company of India, next only to its parent ONGC.

ONGC Videsh produced 6.349 MMT of Oil & 10.171 MMTOE of Oil & Gas in FY'23 which is 21.7% and 16.0% of India's domestic production respectively. (Source: PPAC)

3. Problem Statement

Develop a web-based platform for visualizing and interacting with data provided in an Excel sheet, using Metabase to create a dashboard. The application should include a role-based authentication system to ensure secure access to the dashboard. Key objectives include:

- Implementing a web-based platform to display and interact with data retrieved from an Excel sheet, using Metabase for dashboard creation.
- Designing a role-based authentication system to manage access and ensure that only authorized users can log in and view the dashboard.
- Ensuring a user-friendly interface that allows users to easily navigate the dashboard and understand the data presented.
- Providing clear and concise data visualization, enhancing user engagement and decision-making based on the dataset.

This project aims to deliver a secure and user-friendly platform for data visualization, facilitating efficient data analysis and decision-making within ONGC.

4. Scope and Objectives of Project

Scope of the Project:

- The scope of this project includes the development of a comprehensive web-based platform that integrates data visualization and secure access management for ONGC. The project involves:

- Data Handling: Utilizing an Excel sheet containing specific datasets relevant to ONGC operations.

- Dashboard Creation: Implementing Metabase to design and deploy an interactive dashboard that visualizes key data insights.

- Web Development: Building a web application to host the Metabase dashboard, ensuring it is accessible through a secure, user-friendly interface.

- Authentication System: Developing and integrating a role-based authentication mechanism that allows only authorized users to log in and view the dashboard.

User Experience: Focusing on creating an intuitive user interface that facilitates easy navigation and interaction with the data.
Objectives of the Project.

The main objectives of the project are:

- To develop a secure and efficient web platform that displays the dashboard created in Metabase, allowing users to interact with and analyze the data provided in the Excel sheet.

- To implement a role-based authentication system that ensures secure access to the dashboard, restricting access based on user roles.

- To design a user-friendly interface that enables users to easily navigate the dashboard and derive meaningful insights from the data.

- To ensure data integrity and accuracy by correctly implementing the Excel dataset into the Metabase dashboard, maintaining consistency in data presentation.

- To facilitate decision-making and data analysis for ONGC stakeholders by providing a clear and concise visualization of key metrics and trends within the dataset.

This project seeks to enhance ONGC's data analysis capabilities by providing a robust, secure, and user-friendly platform for data visualization.

5. The Dataset

The dataset comprises key information related to various oil and gas fields, including details on reserves, production, and hydrocarbon types. Below is a description of each column in the dataset:

Assessment date: The date on which the assessment of the field was conducted.

BASIN: The geological basin in which the field is located.

ASSET: The asset identifier associated with the field.

FIELD: The name or identifier of the oil or gas field.

COMBINED_HORIZON: A combined designation of the geological horizon.

HORIZON: The specific geological horizon related to the field.

BLOCK: The block within the basin where the field is located.

HYDROCARBON_TYPE: The type of hydrocarbons present in the field (e.g., oil, gas, sgas, fgas).

HC_CATEGORY: The category of the hydrocarbon based on assessment criteria.

INPLACE: The number of hydrocarbons present in place within the field (measured in certain units).

RESERVES: The quantity of hydrocarbons that can be extracted from the field.

EUR: Estimated Ultimate Recovery (EUR) representing the total amount of hydrocarbon that is expected to be economically recoverable.

CONTINGENT: Contingent resources that are potentially recoverable but not yet considered commercially viable.

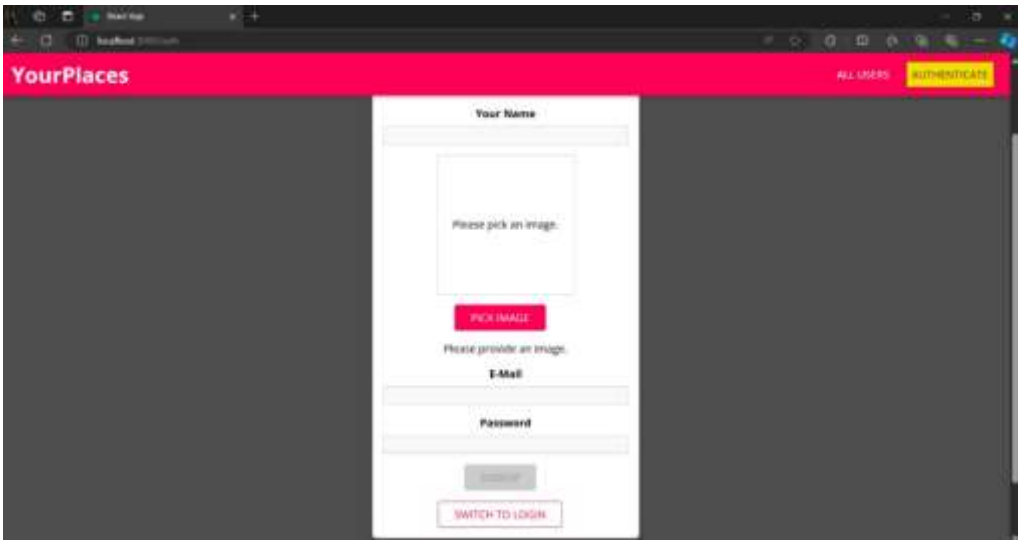
PRODUCTION: The number of hydrocarbons already produced from the field.

This dataset provides a comprehensive overview of the resources available within various fields, helping in analyzing and visualizing different aspects of hydrocarbon production and reserves.

6. Solution Design

1. Website Development

For this project, we will develop a role-based authentication website that integrates with a Metabase dashboard. The technology stack includes Node.js with Express as the backend, React for the frontend, and PostgreSQL for the database. Authentication will be managed using JWT with Passport.js. The development environment will be set up using Node.js and npm, and we will configure the database connection through environment variables.



The database schema will include tables for Users, Roles, Permissions, and Role Permissions, with relationships established to manage role-based access. Users will register and be assigned default roles, and secure login will be implemented using JWT authentication. Authorization middleware will protect routes, ensuring that only users with the appropriate roles can access specific resources.

```
    const createdUser = new User({
        name,
        email,
        password: hashedPassword,
        image: req.file.path,
        places: []
    });

    try {
        await createdUser.save();
    } catch (err) {
        return next(new HttpError('Signing up failed, please try again later.', 500));
    };

    let token;
    try {

        token = jwt.sign({ userId: createdUser.id, email: createdUser.email },
            process.env.JWT_KEY,
            { expiresIn: '1h' }
        );

    } catch (err) {
        return next(new HttpError('Signing up failed, please try again later.', 500));
    }


    res.status(201).json({ userId: createdUser.id, email: createdUser.email, token: token });
};
```

The Metabase dashboard will be embedded into the frontend, and access to the dashboard will be restricted based on user roles. For example, only Admins will be allowed to view certain dashboards. The website will be deployed on platforms like Heroku, and HTTPS will be enforced using SSL certificates.

Thorough testing will ensure that role-based access controls function correctly, and the website will be maintained through regular updates. Comprehensive documentation will be provided to ensure easy handover and future reference. This solution design outlines a robust and scalable approach to building the website while ensuring secure and controlled access to sensitive data through role-based authentication

2. Creating dashboards

In this project, the focus is on creating visualizations using Metabase, starting with setting up a data source. By connecting the desired database, such as MySQL or PostgreSQL, and configuring connection details, the foundation is established for exploring data within Metabase. The process involves building queries, referred to as "Questions," through either simple selections or custom SQL queries. Once the data is retrieved, visualizations are created by choosing from various chart types, like bar, line, or pie charts, and customizing settings such as labels, filters, and colors to enhance clarity.

These visualizations are then saved and organized into dashboards, where multiple questions can be displayed and arranged to suit the desired layout. Interactivity is added to dashboards through global filters and drill-through actions, allowing users to refine the displayed data or explore deeper insights. Once complete, dashboards can be shared within the organization or embedded into a website using the embedding options provided by Metabase. Regular monitoring and updates ensure that the visualizations remain accurate and relevant as data evolves. This solution design provides a comprehensive approach to creating, managing, and sharing data visualizations using Metabase.

3. API Linkage

In this project, we will embed a Metabase dashboard within a website, ensuring that the integration is both secure and seamless. The first step involves enabling embedding in Metabase by configuring settings in the Admin Panel, allowing dashboards to be embedded in external applications. Once enabled, the dashboard's embed code is generated, with options for setting permissions and parameters. This embed code, typically an iframe, will be integrated into the HTML of the website by placing it within the desired section of the webpage.

For enhanced security, the project will implement signed embedding, where a secure token is generated on the server using JWT (JSON Web Token). This token is appended to the iframe URL, ensuring that only authorized users can view the embedded dashboard. The integration will be tested locally to confirm that the dashboard displays correctly and is fully interactive. Once verified, the website will be deployed to a hosting platform, such as AWS or Heroku, with the necessary configurations to securely load the dashboard.

Access control can also be managed by implementing role-based checks on the backend, ensuring that only users with the appropriate permissions can access the embedded dashboard. This solution design provides a comprehensive approach to embedding Metabase dashboards in a website, balancing ease of integration with robust security measures.

7. Implementation Technologies and Platforms

Metabase:

Purpose: Metabase is used to create the interactive dashboard that visualizes the data provided in the Excel sheet. It allows for the design of customizable and dynamic visualizations that are essential for data analysis.
Features: Supports SQL queries, data filtering, drill-downs, and various types of charts and graphs to enhance data presentation.

React:

Purpose: React is utilized for building the front-end of the web application. Its component-based architecture allows for the development of a responsive and interactive user interface.
Features: Offers fast rendering through its virtual DOM, reusable components, and a strong developer community, ensuring the platform is robust and scalable.

Node.js and Express.js:

Purpose: Node.js, along with the Express.js framework, is used for the back-end development of the web application. It handles server-side logic, including routing, API integration, and communication with the front-end.
Features: Provides a lightweight and efficient runtime environment, suitable for building scalable web applications with high performance.

Authentication System:

Platform: The authentication system is implemented using libraries like **JWT (JSON Web Tokens)** for secure token-based authentication, and **Passport.js** for role-based access control.
Purpose: Ensures that only authorized users can access the dashboard, with roles and permissions managed effectively.

Database Management:

Platform: Depending on the complexity and needs, a **SQL database** (e.g., PostgreSQL) or **NoSQL database** (e.g., MongoDB) may be used to store user credentials, roles, and other relevant data.
Purpose: To manage user data securely and efficiently, ensuring that the authentication system functions correctly.

Version Control:

Platform: **Git** and **GitHub** are used for version control, ensuring that the codebase is managed efficiently with proper tracking of changes and collaboration.

8. User interface

7.1 Descriptions of the User Interface

The user interface of the application is designed to offer users an intuitive and seamless experience, facilitating easy access to the dashboard and the underlying data. The interface is centered around a clean and organized layout that prioritizes usability and data clarity. Key elements include:

- **Login Page**: The initial screen where users authenticate themselves. This page is simple yet secure, with fields for entering a username and password. The page also includes options for password recovery and user registration, depending on the role.
- **Dashboard Home Page**: Once logged in, users are greeted by the Dashboard Home Page, which presents a comprehensive overview of key data metrics. The page features a series of interactive charts, graphs, and tables, created using Metabase, that visualize the data from the Excel sheet. These visualizations are organized into sections, each focused on a specific aspect of the data, providing users with a clear and immediate understanding of the information.
- **Navigation Menu**: A persistent side or top navigation menu allows users to easily access different sections of the application, such as additional dashboards, user settings, and help documentation. The menu is designed to be unobtrusive yet accessible, ensuring smooth navigation throughout the platform.
- **Role-Based Dashboard Views**: The dashboard adapts dynamically based on the user's role. For instance, an admin might see additional controls for managing user roles and permissions, while a standard user might have a more streamlined view focused solely on data analysis.
- **Data Filters and Customization Panel**: Users can refine the data displayed on the dashboard using a set of filters and customization options. This panel typically includes dropdowns or sliders that allow users to select specific date ranges, data categories, or other criteria relevant to their analysis.
- **Export and Reporting Features**: The interface includes buttons and options for exporting data visualizations or generating reports. These can be accessed directly from the dashboard, enabling users to download data in various formats (e.g., CSV, PDF) or create customized reports for further analysis or sharing.

- **User Profile and Settings**: The user profile section is accessible from the navigation menu and allows users to manage their account details, such as changing passwords, updating personal information, and setting notification preferences.
- **Notification System**: The application includes a notification system that alerts users to important updates, such as new data uploads, system maintenance, or changes in user roles. Notifications are displayed prominently yet unobtrusively, ensuring users stay informed without being overwhelmed.

The interface is designed to be user-friendly and visually engaging, ensuring that users can interact with the data effectively while enjoying a smooth and intuitive experience.

7.2 Explanation of User Interactions and Functionalities

User interactions within the application are crafted to be intuitive and responsive, fostering an engaging experience as users explore and analyze data through the Metabase dashboard. The primary interactions include:

- **Login and Authentication**: Users begin their journey by logging into the platform using their credentials. The authentication process is secure and straightforward, guiding users smoothly into the application based on their role.
- **Interactive Dashboard Navigation**: Upon accessing the dashboard, users can interact with various data visualizations. They can click on charts and graphs to drill down into more detailed data or hover over elements to view additional information such as specific data points or trends.
- **Customizing Data Views**: Users can interact with the data filters and customization panel to tailor the data displayed on the dashboard. For instance, they might adjust the date range or select specific categories to focus their analysis on particular aspects of the dataset. The dashboard updates in real-time to reflect these changes, providing immediate feedback.
- **Role-Based Access**: Depending on their role, users have access to different functionalities. Admin users can manage other users, adjust dashboard settings, and configure role permissions, while standard users focus on data exploration and analysis.

- **Data Export and Reporting**: Users can generate reports or export data visualizations directly from the dashboard. This interaction is designed to be simple, with just a few clicks required to download the desired format or create a tailored report.
- **Profile Management**: Users can interact with their profile settings to update personal information, change passwords, or set notification preferences. This section is designed for ease of use, with clear instructions and options that guide users through the process.
- **Notifications**: The notification system keeps users informed about important updates, such as new data availability or system changes. Users can click on notification icons to view details or dismiss alerts, ensuring they stay informed without being distracted

9. Future Enhancements

As the project progresses and the needs of ONGC evolve, several future enhancements can be considered to further optimize the platform's capabilities, security, and user experience. One significant enhancement could be the integration of advanced data analytics and artificial intelligence. By incorporating machine learning algorithms, the platform could offer predictive insights and trend analysis, enabling ONGC to make more informed decisions by identifying patterns and forecasting future scenarios. Additionally, enhancing the role-based access control system to include more granular permissions could further secure the platform, ensuring that users only access information pertinent to their roles, thereby minimizing the risk of data breaches.

Developing a mobile application version of the platform would also be a valuable enhancement, allowing users to access the dashboard and its features on the go. This mobile app could be optimized for smaller screens while maintaining the core functionalities of the desktop version, thus increasing accessibility and convenience for users. Another key enhancement could involve integrating real-time data feeds into the platform, allowing for live updates to the dashboard. This would be particularly beneficial for monitoring dynamic data or situations requiring up-to-the-minute information, thereby enhancing the platform’s relevance and responsiveness.

Moreover, implementing a feedback and support system within the platform could greatly improve user satisfaction. This system could include live chat support, a knowledge base, and a feedback form, allowing users to report issues, suggest improvements, and receive help directly within the application. Customizable dashboards and reports could also be introduced, enabling users to create and arrange their own data views according to their preferences, which would enhance the platform’s flexibility and personalization.

Furthermore, integrating the platform with other existing ONGC systems, such as ERP or CRM systems, could streamline data flow and provide a more comprehensive view of operations. This integration would enable better-coordinated decision-making by allowing comprehensive data analysis across multiple systems. Enhanced data visualization options, such as heatmaps, geospatial maps, and interactive timelines, could also be added to provide deeper insights and a more engaging user experience, making complex data easier to interpret.

Introducing multilingual support would make the platform more accessible to a broader audience within ONGC, accommodating users who prefer to interact with the platform in different languages, thereby promoting inclusivity and user adoption. Lastly,

implementing automated reporting and notification features could allow users to receive regular updates and reports based on predefined criteria or events, ensuring they remain informed without the need for manual checks. These enhancements would significantly increase the platform's value, making it more robust, flexible, and aligned with the evolving needs of ONGC, ultimately ensuring that it remains an essential tool for data-driven decision-making.

10. Conclusion

This project successfully developed a robust and user-friendly platform for ONGC, leveraging Metabase to create dynamic dashboards that provide clear and insightful data visualizations. The implementation of role-based access ensures that users interact with data relevant to their specific roles, enhancing both security and efficiency. The integration of various functionalities, such as customizable dashboards, data export options, and a user-friendly interface, has made the platform a valuable tool for data analysis and decision-making within the organization.

Looking forward, the platform offers significant potential for further enhancements. By incorporating advanced analytics, real-time data integration, and mobile accessibility, the platform can evolve into an even more powerful resource for ONGC. Additional features, such as enhanced role-based controls, multilingual support, and automated reporting, would not only improve user experience but also extend the platform's reach and effectiveness across different user groups and operational need.

11 References

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