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Design and Development of a Role-Based Industry Management System Using Modern Web Technologies.

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Abstract: The rapid development of industrial operations has led to the need for effective management systems that can effectively manage different roles and resources in an organized manner. The traditional approach to managing industrial operations is usually characterized by a lack of proper management systems, leading to inefficiency and lack of transparency in the management process.

This paper focuses on the design and development of a web-based Industry Management System (IMS) that integrates different industrial management functions such as employee management and vendor management into a single platform. The proposed system is designed with a role-based approach that includes Industry Owner, Admin, Worker, and Vendor roles that provide a secure and organized approach to accessing the system functionalities.

The proposed Industry Management System is designed with the latest web technologies and provides a range of functionalities such as data management and real-time updates that improve the management process and communication between different roles and functions.

This research provides a clear example of the importance of a well-structured management system in the management of industrial operations and the need for a well-designed management system that can improve the management process and the level of productivity in the management process.

Keywords: Industry Management System, Next.js, React, Node.js, MongoDB, Role-Based Access Control, Web-based Application, Real-Time Communication.

I. INTRODUCTION

In the current dynamic industrial scenario, proper management is necessary to attain productivity and growth. In many industries, problems like improper coordination among various departments, inefficient record management, and lack of real-time data access are major issues. Many small and medium-scale industries are still using manual and unorganized digital techniques, leading to improper and unproductive industry operations.

With the advent of advanced web technologies, there is a growing need to develop integrated systems that can manage industry operations in a centralized and organized way. An Industry Management System (IMS) is one such solution that offers various facilities like employee management, vendor management, and administration under one roof.

To address these challenges, this paper presents a structured web-based Industry Management System designed to handle industrial operations in an efficient and organized manner. The system integrates key components such as user roles, task management, and vendor coordination within a unified platform. It enables seamless interaction between different stakeholders by providing role-based access and centralized data handling. Additionally, the system supports real-time updates and structured workflows, allowing better monitoring, communication, and decision-making across industrial processes.

The main goal of this work is to show how a well-designed database schema can support efficient storage, structured retrieval, and meaningful use of academic data. The proposed architecture can be used for applications like intelligent question retrieval and practice paper generation, while keeping the focus on database design and data modelling.

The proposed system also incorporates a role-based system with the roles of Industry Owner, Admin, Worker, and Vendor. Each role has specific permissions to use the system securely. Industry Owners have full control and monitoring privileges, Admin manages activities, and workers/Vendors use the system to perform their assigned roles.

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The primary objective of this project is to design and develop a scalable and user-friendly Industry Management System to increase operational efficiency, facilitate communication, and reduce manual work. This paper focuses on the design, development, and implementation of the proposed system using modern web development technologies, along with its impact on improving industrial management processes.

II. LITERATURE REVIEW

A. Web-Based Management Systems
Web-based management systems have become popular for managing organizational activities due to their accessibility and centralization features. These systems enable users to access the information from anywhere and facilitate coordination among different departments of an organization. However, many web-based management systems do not offer proper role-based access control and do not provide a comprehensive integrated solution for managing different industrial entities such as employees, vendors, and administrators within a single platform.

B. Enterprise Resource Planning (ERP) Systems
ERP systems aim to integrate different business processes such as inventory management, human resource management, and finance management into a single system. Although ERP systems offer powerful management solutions, they are complex and expensive management systems that may not be effective for managing small and medium-scale industries. Moreover, many ERP systems are not specifically designed for the industrial sector and may contain many unnecessary features that make the system less effective for the industrial sector.

C. Role-Based Access Control Systems
Role-Based Access Control (RBAC) systems are commonly employed in modern applications for secure and managed access to the functionalities of a system. This allows different users to have different levels of permission according to their roles in the system. Although many systems have adopted RBAC systems, they do not adequately incorporate real-time industrial operations and workflow management.

D. Real-Time Communication Systems
Modern applications have started to incorporate real-time technologies for effective communication and increased system response times. Technologies such as WebSockets enable instant updates and interactions between users. However, traditional management systems do not have real-time functionalities, leading to delayed information and reduced efficiency in decision-making processes.

III. SYSTEM OVERVIEW

The proposed Industry Management System (IMS) is a web-based application that manages and streamlines industrial operations. It provides a centralized platform to manage industrial operations. It integrates all stakeholders, including the Industry Owner, Admin, Worker, and Vendor, to provide efficient coordination and communication.

A. System Overview
The proposed system has been implemented using a modern full-stack development approach with Next.js, Node.js, and MongoDB. This provides a scalable solution to manage industrial operations, including employee handling, vendor coordination, and administration. It has implemented a role-based access control mechanism to provide users access to the features of the system according to their role.

The Industry Owner has access to all features to monitor and control the system. The Admin role manages operational activities, including task handling, workers, and vendor coordination. The Worker role interacts with the system to perform their assigned tasks. The Vendor role manages supply activities and interacts with the industry.

B. System Components
The system has been designed to comprise several key modules to ensure modularity and efficient functioning. Some of the key modules include:

- User Management Module
- Employee Management Module
- Vendor Management Module
- Admin Control Module
- Communication Module

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C. System Workflow

The system has been designed to follow a structured workflow based on user roles. In this system, the Industry Owner manages the operations of the system. The Admin manages and coordinates activities between the Workers and Vendors. The Vendors handle the activities related to supply, and the Workers handle the assigned tasks.

The workflow of the system begins with user authentication. Once the user gets authenticated, he/she can access the system based on their role. The user can then interact with the system, and the data gets processed and stored in a centralized database. This ensures efficient interaction and real-time updates among all the modules.

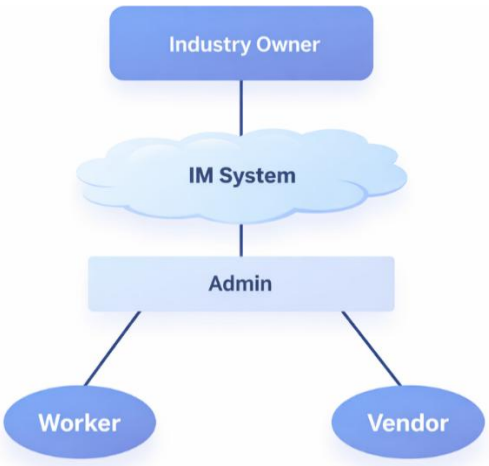

Fig. 1: Role-Based Architecture of Industry Management System

IV. DATABASE ARCHITECTURE

A. Database Design Goals

The proposed Industry Management System's database is designed to efficiently and effectively manage industrial data in a structured way. The main goal here is to effectively manage data concerning users, tasks, vendors, and system operations. The database design focuses on data consistency, reduction of data redundancy, and real-time system interactions. The database system is implemented with MongoDB, a NoSQL database system. This NoSQL database system provides greater flexibility and scalability to manage dynamic and large volumes of industrial data.

B. Core Entity Groups

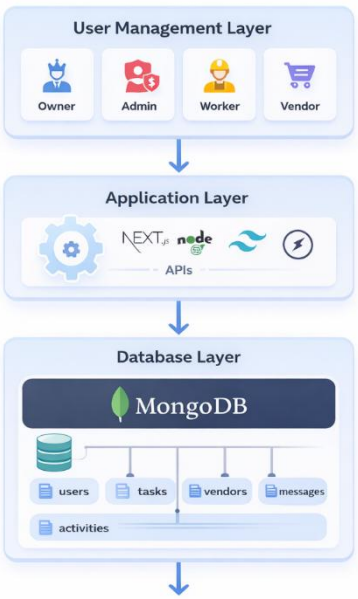

Fig. 2: Layered Database Architecture of Industry Management System

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The above diagram represents the layered architecture of the proposed Industry Management System. The User Management Layer consists of different roles such as Owner, Admin, Worker, and Vendor. The Application Layer handles business logic using modern web technologies. The Database Layer utilizes MongoDB to store and manage system data such as users, tasks, vendors, and activities. This layered approach ensures scalability, modularity, and efficient data management.

The proposed database system consists of logical entity groups to maintain modularity and data clarity. The entity groups are as follows:

- User Management Layer: The user management layer manages all user data. It includes data concerning Industry Owner, Admin, Worker, and Vendor.
- Employee and Task Management Layer: This layer manages worker data. It includes data concerning worker tasks and worker performance.
- Vendor Management Layer: This layer manages vendor data. It includes data concerning vendor profiles and communication with the admin.
- Communication and Activity Layer: This layer manages real-time interactions and system activities. It enables smooth communication between users.

C. Conceptual Data Model

The system has a structured data model that maintains the relationship between various entities in the system:

• The system has various roles for the user (Owner, Admin, Worker, Vendor)
• The Admin role manages the Worker and Vendor roles
• The Worker role assigns tasks and updates task status
• The Vendor role works with the Admin role for supply and service operations
• The system logs track all operations and interactions in the system

This data model maintains efficient data flow and relationships between various components of the system.

D. Schema Design Rationale

The proposed database schema is modular and scalable in its design. The use of MongoDB for the schema allows for flexibility in handling various data types for each collection in the schema. The schema maintains the relationship between various entities in the system using reference keys and embedded documents as necessary. The schema maintains data normalization as necessary while leveraging the advantages of NoSQL for optimizing system performance. The various layers of data in the schema improve its maintainability and scalability.

E. Key Collections and Their Roles

TABLE I CORE DATABASE COLLECTIONS AND THEIR FUNCTIONAL ROLES

1. Collection Name Role Purpose
2. users User management Stores user details and roles
3. tasks Task management Stores task assignments and status
4. vendors Vendor management Stores vendor information
5. messages Communication Stores communication data
6. activities System logs Tracks system activities

F. Database Workflow

The database workflow for the Industry Management System includes the following processes:

• The database stores user data and performs authentication through role-based access control.
• Admin assigns tasks to workers and manages vendors.
• Workers can update their task progress and status in real time.
• Vendors can communicate through the system.
• The system records all activities for monitoring and analysis.

The workflow process ensures efficient data processing, real-time updates, and smooth interactions between the various components of the Industry Management System.

V. DATA PROCESSING AND TASK MANAGEMENT

The proposed Industry Management System (IMS) processes and manages industrial data in a structured manner to effectively execute tasks. This ensures proper coordination among different user roles. The system processes raw data to provide meaningful information. It does this by utilizing role-based logic and real-time processing.

A. Data Processing Mechanism

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The system processes different types of data, including user data, task information, vendor information, and communication information. Data entered in the system is validated and processed using backend logic. Each data entity has specific roles assigned to it.

B. Task Assignment and Tracking

The Admin assigns tasks to the Worker. Each task has specific attributes, including task description, task priority, task deadline, and task status. The Worker can see assigned tasks and update their task status in real time. Task status is continuously monitored in the system.

C. Vendor Interaction Processing

The vendors interact with the system for service provision or resource allocation. The Admin handles the vendors' activities. All the vendors' interactions with the system are recorded and processed for transparency and coordination.

D. Real-Time Data Handling

The system incorporates real-time communication technologies for immediate update and communication among all the modules of the system. When a task is allocated or updated, the system is immediately updated for proper interaction among the users.

E. Activity Logging and Monitoring

All the activities that take place in the system, such as users' activities and communication activities, are recorded and stored in the database for processing and analysis of the system for the sake of monitoring the activities and improving the system's efficiency.

The above processing framework provides a structure for the proper and effective running of the system with the aim of ensuring coordination among the Industry Owner, Admin, Workers, and Vendors.

VI. RESULTS AND DISCUSSION

The proposed Industry Management System (IMS) was successfully developed and tested to assess its performance in managing industrial operations. It is evident that the proposed system efficiently manages user roles, tasks, vendors, and communication.

From the implementation, it is clear that the proposed role-based access control mechanism efficiently restricts and manages user roles and access. All users, such as Industry Owner, Admin, Worker, and Vendor, can efficiently access their required functionality in the system.

The proposed task management module efficiently manages tasks by Admin, and Workers can efficiently update their task status in real time, eliminating any potential delays in completing tasks. Similarly, the proposed vendor management module efficiently coordinates between Admin and Vendors, ensuring efficient supply-related operations.

The use of real-time communication technology improves system response time by providing instant updates to all users of the system.

In general, it is evident that the system is efficient, reduces manual work, and is better in organizing data compared to other traditional management practices. From the results, it is clear that the proposed system is scalable, reliable, and applicable in real-world industrial scenarios

VII. CONCLUSION

In summary, this paper discussed the design and development of a web-based Industry Management System (IMS) that integrates various industrial operations. The developed system successfully integrated role-based access control, real-time communication, and data management. This paper demonstrated a solution to various problems faced by industries, such as poor coordination, inefficient data handling, and lack of transparency. This system provides a structured solution to improve communication between various stakeholders, such as Industry Owner, Admin, Workers, and Vendors. This paper employed modern web technologies to make the system flexible, responsive, and capable of handling real-time industrial requirements. This paper proved that such a system can be developed to reduce manual effort and increase productivity. In the future, such a system can be improved by incorporating advanced features such as data analytics, artificial intelligence, and mobile application support. This can make the system more intelligent and adaptable to industrial needs.

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REFERENCES

[1]. A. Silberschatz, H. F. Korth, and S. Sudarshan, "Database System Concepts," McGraw-Hill, 2019.
[2]. M. Fowler, "Patterns of Enterprise Application Architecture," Addison-Wesley, 2002.
[3]. MongoDB Inc., "MongoDB Documentation," [Online]. Available: https://www.mongodb.com/docs
[4]. Next.js Documentation, "Next.js Official Website," [Online]. Available: https://nextjs.org/docs
[5]. R. Sandhu et al., "Role-Based Access Control Models," IEEE Computer, 1996.
[6]. Node.js Foundation, "Node.js Documentation," [Online]. Available: https://nodejs.org
[7]. Socket.IO, "Real-Time Communication Library," [Online]. Available: https://socket.io

