

CSE3026– NoSQL Databases

J Component - Project Report

HRM support system

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Worklet details

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ABSTRACT

The effective management of human resources is essential for organizational success in the fast-paced world of contemporary organizations. Our project uses the power of MongoDB along with the MERN stack (MongoDB, Express.js, React, and Node.js). to build an HR Support System, streamlining and simplifying the hard work of keeping employee records. This system offers a comprehensive, user-friendly solution intended to revolutionize how businesses manage personnel information.

The main goal of this project is to discuss the difficulties and complexities that come with HR management inside an organization. HR tasks have always been labor-intensive and time-consuming, frequently relying on manual record- keeping and antiquated technologies. Our MERN stack-powered HR Support System aims to modernize and simplify these processes, bringing about a significant shift in employee information management. The system prioritizes user- friendliness, ensuring that HR professionals and employees alike can navigate the platform with ease. Each employee is represented by a detailed profile within the system, housing essential information such as personal details, job history, performance metrics, and more. This comprehensive approach to employee data ensures that HR personnel have a 360-degree view of each individual. MongoDB, as the backbone of our system, offers unparalleled flexibility and scalability. With its document-oriented architecture, MongoDB is well-suited to handle the diverse and evolving nature of employee information, making it a perfect fit for our project.

I. Introduction

In the pursuit of developing a Human Resource Support System (HRSS), it is essential to embark upon an in-depth exploration of the existing literature that forms the foundation of this project. This paper serves as a pivotal cornerstone, delving deep into the theories, concepts, approaches, methods, techniques, and technologies within the realm of HRSS development.

The literature review serves as an intellectual journey, shedding light on the rich knowledge that informs the design, implementation, and functionality of HRSS. It provides valuable insights into the theoretical frameworks and practical considerations that underpin modern HR management systems, offering a holistic understanding of the subject matter. Additionally, by scrutinizing existing technologies and systems, this review aims to draw inspiration and valuable lessons from their development trajectories, thus enriching the HRSS development process.

Since employees are the foundation of any business, how well they are managed has a big impact on how successful the enterprise is. The use of human resource management software simplifies record-keeping for the employer. The administrator can use this software to change employee information, add new employees, and assess employee performance. It is possible to manage employees effectively without having to retype their data into the database. Small and medium-sized businesses can manage their most important organizational asset—their employees—by using a versatile and user-friendly employee management software solution that includes modules for personnel information management. The integration of these components into a single application guarantees coordinating electronic human resource procedures with organizational objectives. This method makes it simple to keep track of the information on the people who work for any organization. Anyone, including those unfamiliar with the basic employees system, can utilize it because it is easy to understand.

II. OBJECTIVE

In today's rapidly evolving technological world, everything is computerized. The number of jobs available has expanded, as has the human workforce. Consequently, a system that can manage the data of such a vast number of Employees is required. The user-friendly aspect of this project makes the work of preserving records simpler. The goal of this project is to offer a comprehensive strategy for managing employee data. This will be accomplished by creating and putting into place an HR management system that will cause a significant paradigm change in the way that employee data is handled.

The system's goals include:

- Creating a web-based HR management system that satisfies demands for project management, leave administration, report creation for performance reviews, and staff training.
- An effective database for keeping track of personnel data.
- An interface that is simple for users to utilize to engage with the system.
- To create an application that addresses the daily needs of any organization.

III. Problem Statement

The problem at hand revolves around the inefficiencies inherent in manual HR processes, As evidenced by the tedious leave management system, which can take weeks or months for approvals, security concerns arising from paper- based documentation, a lack of employee self-service options in existing systems, and challenges in accessing employee information efficiently within multinational organizations. To resolve these issues, the proposed solution entails the development and implementation of a web-based HR management system that securely centralizes employee data with access controls. This system aims to enable employees to manage their information and HR administrators to efficiently handle data, fostering streamlined HR operations, enhancing data security, and improving accessibility to critical employee information.

IV. Challenges :

- **Data Migration:** Transferring existing employee data from legacy systems or manual records to the new system without errors or data loss is a substantial undertaking that demands careful planning and execution.
- If the user is not found in the database or has not yet received authorization from the HRSS admin, the login will fail.
- **Network Connectivity:** Users may face difficulties accessing the system in areas with poor or unreliable internet connectivity. Implementing strategies for offline access or optimized performance in low-bandwidth scenarios is crucial.
- **Load balancing:** For systems with heavy user loads, efficiently dividing traffic across several servers or cloud instances to guarantee constant access and performance can be challenging.
- **Mobile App Development:** If a mobile app is part of the system, creating and maintaining native mobile apps for different platforms (iOS, Android) and keeping them in sync with the web version presents challenges in terms of development and updates.

V. Literature Survey

| Sl no | Title | Author / Journal name / Year | Technique | Result |
|-------|--|---|--|---|
| 1 | MongoDB as solution for data warehousing in online HRM systems | Biljana, Radulović., Dragica, Radosav., Milan, Malić. International conference Applied Internet and Information Technologies | The authors emphasize the benefits of MongoDB in terms of flexibility, scalability, and real-time data handling . The paper also mentions the development of an information system (IS) specifically for HRM needs, utilizing MongoDB and accessible via the internet . | The paper discusses the use of MongoDB as a solution for data warehousing in online HRM systems . It highlights the increasing trend of using non-relational databases (NoSQL) for data storage in business organizations . It points out that this solution can serve as a starting point for further system evolution, aligning with the requirements of Industry 4.0 |

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| | | 2016 | | |
| 3 | Big Data Analysis with MongoDB for Decision Support System | Sulistyo, Heripracoyo., Roni, Kurniawan. TELKOMNIKA Telecommunication Computing | The paper mentions that big data management can create significant value for the world economy and improve productivity and competitiveness of enterprises and the public sector. | <p>The study aims to explore more information about big data and develop a prototype for big data management .</p> <p>The expected result of this research is a model or prototype of big data management that can help organizations and companies, especially in the education sector, make decisions based on various types of data.</p> |
| | | Electronics and Control Vol. 14, Iss: 3, pp 1083-1089 01 Sep 2016 | The research uses NoSQL database technology, specifically MongoDB, for the migration of Relational Database (RDBMS) into a database . | |
| 4 | Big Data Electronic Health Records Data Management and Analysis on Cloud with MongoDB: A NoSQL Database | Sreekanth, R., Golajapu, Venu, Madhava, Rao., Srinivas, Nanduri. 01 Jan 2015 | <p>The paper discusses the use of MongoDB, a NoSQL database, for managing and analyzing big data Electronic Health Records (EHR) systems on the cloud. It highlights the advantages of using NoSQL databases in a cloud computing environment, such as the ability to handle structured and unstructured data and scale horizontally by spreading data among multiple servers .</p> <p>The paper compares the performance of MongoDB with SQL-based EHR systems and demonstrates how MongoDB performs well in terms of scalability and efficiency in handling big data workloads</p> | <p>The paper emphasizes the importance of cloud computing architecture in enabling cost-effective and efficient computations for big data systems like Hadoop. It mentions that traditional relational databases are not suitable for handling the growing data, while NoSQL databases like MongoDB are designed for cloud computing environments and can handle large volumes of data effectively .</p> <p>The paper also mentions the keywords associated with the study, including Big Data, NoSQL, Cloud computing, and EHR</p> |

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| 5 | NoSQL Database: New Era of Databases for Big data Analytics - Classification, Characteristics and Comparison | <p>A, B, M, Moniruzzaman., Syed, Akhter, Hossain.</p> <p><u>arXiv: Databases</u></p> <p>(ArXiv) 30 Jun 2013</p> | <p>Discusses CAP theorem, balancing Consistency, Availability, and Partition Tolerance.</p> <p>Introduces BASE properties (Basically Available, Soft-state, Eventually consistent).</p> <p>Classifies NoSQL into four categories: Key-Value, Document, Wide-Column, and Graph databases.</p> <p>Provides a matrix-based comparison within these categories, considering design, integrity, indexing, distribution, and system characteristics.</p> <p>Highlights adoption by major companies like Facebook, Twitter, Amazon, and Google. Emphasizes NoSQL's significance in modern data management.</p> | <p>The paper doesn't present specific experimental results or data analysis. Instead, it provides an overview and classification of NoSQL databases, discusses their characteristics and use cases, and highlights the growing adoption of NoSQL technologies by major companies.</p> <p>this paper serves as a comprehensive introduction and overview of NoSQL databases, their characteristics, classification, and their importance in handling large-scale data processing and analytics. It doesn't present original research results but rather summarizes the state of NoSQL technology .</p> |
| 6 | OBDA Beyond Relational DBs: A Study for MongoDB | <p>Elena, Botoeva., Diego, Calvanese., Benjamin, Cogrel., Martin, Rezk., Guohui, Xiao.</p> <p>International Workshop Description Logics</p> <p>01 Jan 2016</p> | <p>The authors instantiate this framework to MongoDB, a popular JSON-document database, and implement a prototype extension of the virtual OBDA system Ontop for answering SPARQL queries over MongoDB</p> | <p>The paper discusses the diversification of the database landscape in the last decade, leading to the emergence of various non- relational databases such as XML and JSON-document databases, key-value stores, and graph databases .</p> <p>The paper focuses on the ontology-based data access (OBDA) framework, which allows for querying arbitrary databases through a mediating ontology .</p> |

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| 7 | Smart College Event Management System Using MERN Stack. | Nikita, Patil., Yatin, Patil. International Journal For Science Technology And Engineering 31 Mar 2023 | <p>Technologies Used:</p> <p>HTML (Hyper Text Markup Language): CSS (Cascading Style Sheets): JavaScript: Object Model (DOM).</p> <p>MERN Stack: A web development architecture consisting of MongoDB, Express.js, React.js, and Node.js, enabling three-tier web applications using JavaScript and JSON.</p> <p>System Components:</p> <p>React.js Front End: A declarative JavaScript framework for building dynamic client-side HTML interfaces.</p> <p>Express.js and Node.js Server Tier: Express.js, a fast and minimalistic Node.js web framework, manages HTTP requests and routing.</p> <p>MongoDB Database Tier: MongoDB is used for storing data, handling JSON documents, and enabling data transmission between the front end and server.</p> | <p>Developed EMS using an iterative waterfall methodology. Emphasized careful planning and design. Unit testing conducted for each module and sub-module. Integration testing performed after combining modules. Aimed to provide a comprehensive event management solution.</p> <p>The project addresses shortcomings in manual event management systems. Connects various departments within an institution, enhancing event management and automation. Offers an intuitive graphical user interface for users and administrators. Promises to reduce human effort, save time, and simplify user and admin tasks.</p> |
| 8 | Design and Implementation of an Automated Hospital Management System with MERN Stack | Jayasiri, K.C.N., Thathsarani, W.R.V.K., De, Silva, D.I., Vidhanaarachchi, S International Journal of Engineering and Management Research 31 Oct 2022 | <p>The system follows MVC architecture, separating it into Model, View, and Controller components. ReactJS, NodeJS, and ExpressJS power the front-end and back-end. MongoDB manages data storage, while Google OAuth handles authentication. The system employs Bubble Sort for sorting, email notifications, extensive data validation, GitHub for version control, SonarQube for code quality, Selenium for testing, and offers robust report generation.</p> | <p>A computerized hospital management system was developed to address issues in manual systems, offering user authentication and data management. However, it lacks features for staff management, physical assets, and laboratory management. Future research aims to expand the system to include these functionalities.</p> |

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| 9 | An hrms system for small and medium enterprises (sme)s based on cloud computing technology | <p>Pavel, Y., Abdullah., Subhi, R., M., Zeebaree., Karwan, Jacksi., Rizgar, R., Zeabri</p> <p>International Journal of Research</p> <p>20 Aug 2020</p> | <p>Cloud Integration: System integrates with AWS using EC2 for secure cloud-based storage and access.</p> <p>Security Measures: SSL ensures secure data transmission, bcrypt encrypts sensitive information, and access control is based on user roles.</p> <p>Modules: The system consists of 16 modules, including Staff Management, HR Core, Timesheet, Payroll, Training, Performance, Recruitment, Calendar, Ticket, File, Project, Asset, Events, Reports, and System Configuration.</p> <p>File Management: The module allows for uploading, storing, and managing departmental files and documents.</p> <p>Evaluation and Testing: User satisfaction, proficiency, and usability are measured using a ten-question SUS questionnaire.</p> | <p>The EHRMS system requires software components like Apache server, MySQL, PHP, and web browsers. Hardware prerequisites are a 1.8 GHz processor, 3GB RAM, and 200GB hard disk. It integrates with Amazon Web Services (AWS) using EC2 for secure cloud storage and access. Security measures include SSL, bcrypt encryption for passwords, and role-based access control. The system consists of 16 modules, including staff management, payroll, training, and file management. It provides easy data access, monitors KPIs, reduces costs, and has a positive user evaluation. The system ensures file security and integrates with AWS for scalability and data security.</p> |
| 10 | Enhancing Data Management with MongoDB and its Rest API | <p>Raghu, Ramakrishnan.</p> <p>International Journal For Science Technology And Engineering</p> <p>31 Jul 2023</p> | <p>MongoDB supports CRUD operations (Create, Read, Update, Delete) for data manipulation. The aggregation pipeline enables complex data processing.</p> <p>Authentication options (Basic, JWT, OAuth) secure access. TLS encrypts data in transit. Access control mechanisms ensure authorized REST API resource access</p> | <p>integration of MongoDB with its REST API, emphasizing its benefits for data management, scalability, and building RESTful web services. It highlights key features such as CRUD operations, aggregation pipeline support, and various authentication options (Basic, JWT, OAuth) for security. The text also addresses secure communication through TLS encryption and access control mechanisms. However, specific techniques or results are not provided; rather, it presents an overview and insights into MongoDB's REST API capabilities.</p> |

VI. Data dictionary

The system's data design is its most crucial component. The data must be arranged in accordance with the needs of the system. When creating the system, the data is stored and organized using a database technique. The database is a comprehensive collection of information housed in many kinds of tables. In this project,

the database is MongoDB. The following are some general goals for creating a database: integrating all data, making it simple to incorporate updates, and offering data security against unauthorized users.

| SNO | COLUMN NAME | DATA TYPE | DESCRIPTION |
|--------------|-------------|-------------------------|--------------|
| empid | varchar | Employee Identification | empid |
| fname | varchar | Employee First Name | fname |
| lname | varchar | Employee Last Name | lname |
| address | varchar | Employee Address | address |
| drpdd | varchar | Date of Birth (Day) | drpdd |
| drpmm | varchar | Date of Birth (Month) | drpmm |
| drpyyyy | varchar | Date of Birth (Year) | drpyyyy |
| email | varchar | Email | email |
| phone | varchar | Phone No | phone |
| quali | varchar | Qualification | quali |
| desig | varchar | Designation | desig |
| deptno | varchar | Department Number | deptno |
| txtwpassword | varchar | Password | txtwpassword |
| gender | varchar | Gender | gender |
| mstatus | varchar | Marital Status | mstatus |

VII. Database and Technologies

For the comprehensive management of employee information and HR processes, this HR Support System project uses MongoDB as the database management system and the MERN stack (MongoDB, Express.js, React, and Node.js) as the foundational technology stack. The dynamic and varied nature of HR data may be accommodated by MongoDB's document-oriented, NoSQL design, enabling flexible data storage and retrieval. The MERN stack, on the other hand, offers a responsive user interface through React on the frontend, effective data processing via Node.js and Express.js on the backend, and real-time interaction, all of which improve the user experience for both HR administrators and employees. This technological stack is the best option to modernize HR operations and boost organizational effectiveness because it not only makes data administration simpler but also guarantees scalability, security, and adaptability.

VIII. Algorithms / Techniques description

1. Project Planning and Requirements Gathering:

- Defining the scope of the HRMS, including features like employee profiles, attendance tracking, payroll management, and reporting.
- Create wireframes and user stories to visualize the application's interface and functionality.
- Plan the data models for MongoDB collections to store employee data, attendance records, and other HR- related information.

2. Backend Development (Node.js and Express.js):

- Setting up Node.js server using Express.js for handling HTTP requests.
- Implementing user authentication and authorization using technologies like JWT (JSON Web

Tokens) for secure access to HR data.

- Create RESTful APIs for CRUD operations on employee data, attendance, and other HR-related entities.
- Implement data validation and error handling to ensure data integrity.
- Setting up routes for user management, employee profiles, attendance tracking, and payroll management.

3. Database Design (MongoDB):

- Designing MongoDB schemas for storing HR data. Use Mongoose, an ODM (Object Data Modeling) library for MongoDB, to define data models.
- Optimize data structure for efficient querying and indexing, considering the specific HR use cases.
- Ensure data security by setting up appropriate access controls and encryption where necessary.

4. Frontend Development (React.js):

- Creating a responsive and user-friendly UI using React.js and a UI library or framework like Material-UI, Ant Design, or Bootstrap.
- Implement components for user registration, login, employee profiles, attendance tracking, and payroll management.
- Using React Router for client-side routing to navigate between different sections of the application.
- Implement state management using tools like Redux or the Context API for maintaining application-wide state.

5. User Authentication and Authorization:

- Integrating authentication mechanisms, allowing users to sign up, log in, and reset passwords.
- Implementing role-based access control (RBAC) to restrict access to certain features and data based on user roles (e.g., admin, manager, employee).

6. Testing and Quality Assurance:

- Write unit tests and integration tests for both the frontend and backend to ensure application reliability.
- Perform user acceptance testing (UAT) to validate that the HRMS meets the client's requirements.

8. Deployment and Scalability:

- Deploying the MERN HRMS application to a cloud platform like AWS, Azure, or Heroku.
- Implement load balancing and auto-scaling to handle increased user traffic.

9. Monitoring and Maintenance:

- Set up logging and monitoring tools (e.g., ELK Stack, Prometheus, Grafana) to monitor application health and performance.
- Regularly updating dependencies and apply security patches to ensure system security.

10. Documentation and Training:

- Documenting the application's architecture, API endpoints, and deployment process.
- Providing training for administrators and end-users on how to use the HRMS effectively.

11. Post-launch Support:

- Offer ongoing support and maintenance to address issues, implement new features, and ensure the system remains up-to-date.

Block Diagram of the proposed work



Fig1 : The level-0 Diagram

It is a system that uses a database to store and retrieve information about employees. The system has three main components: the user, the database, and the HR management software.

- The user is the person who interacts with the system. They can use the system to enter new employee information, update existing information, and retrieve information about employees.
- The database stores all of the information about employees. This information can include things like name, address, phone number, job title, salary, and benefits.
- The HR management software is the program that allows the user to interact with the database. The software provides a user-friendly interface that makes it easy to enter, update, and retrieve information about employees.

The workflow indicates that the system has two levels of security: admin and user. The admin- level has access to all of the information in the database, while the user level only has access to certain information.



Fig2 : User login process is the Level-1 DFD

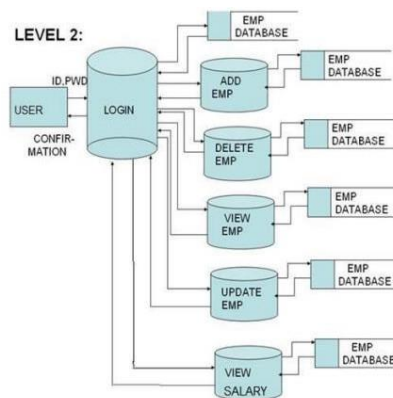


Fig3 : The different processes done by the user

The different processes are:

- **User login:** The user logs in to the system using their ID and password.
- **View employee data:** The user can view employee data, such as name, address, phone number, job title, and salary.
- **Add employee:** The user can add a new employee to the system.
- **Delete employee:** The user can delete an existing employee from the system.
- **Update employee data:** The user can update the data for an existing employee.
- **View salary data:** The user can view salary data for employees.

The system has two levels of security: admin and user. The admin-level has access to all of the processes, while the user level only has access to the view employee data process.

User login: The user enters their ID and password into the login form. If the credentials are valid, the user is granted access to the system.

View employee data: The user can view employee data by entering the employee's ID or name. The system will then display the employee's data, such as name, address, phone number, job title, and salary.

Add employee: The user can add a new employee to the system by entering the employee's data, such as name, address, phone number, job title, and salary. The system will then create a new record for the employee in the database.

Delete employee: The user can delete an existing employee from the system by entering the employee's ID. The system will then delete the employee's record from the database.

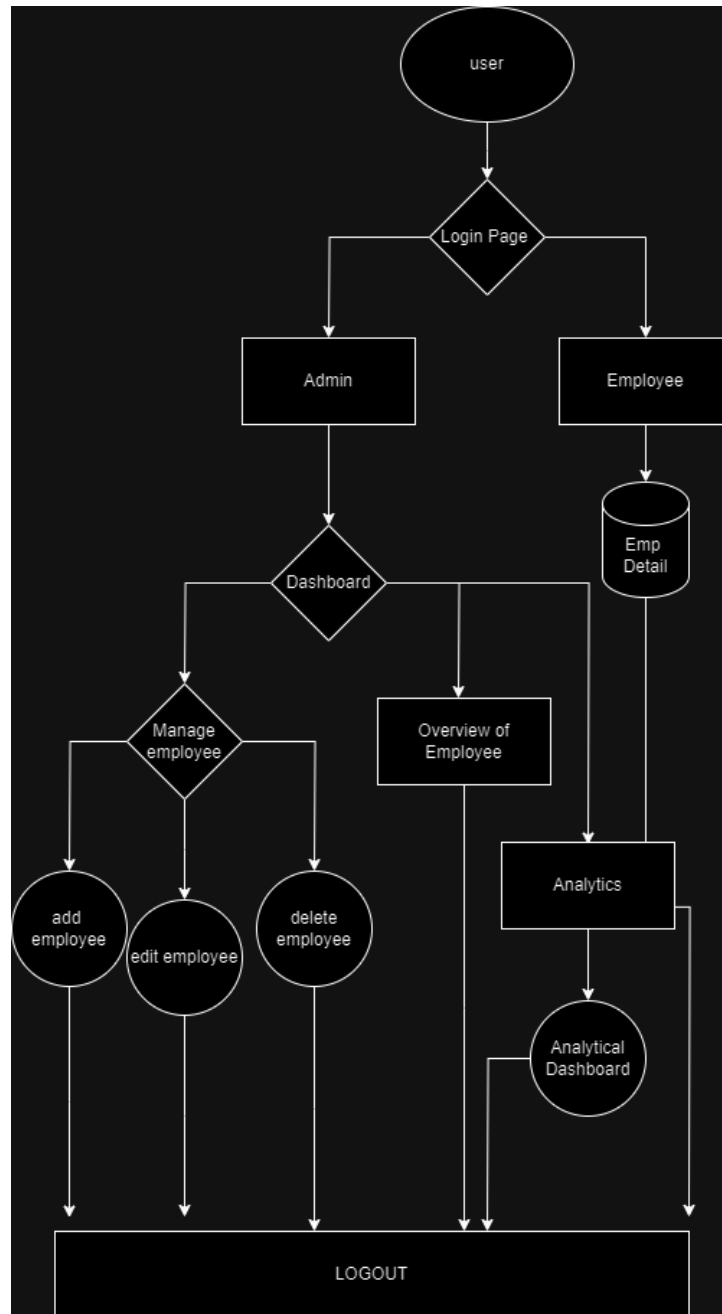
Update employee data: The user can update the data for an existing employee by entering the employee's ID and the new data. The system will then update the employee's record in the database.

View salary data: The user can view salary data for employees by entering a range of dates. The system will then display the salary data for all employees who were employed during the specified dates.

The system is designed to be user-friendly and secure. The user login process helps to protect the

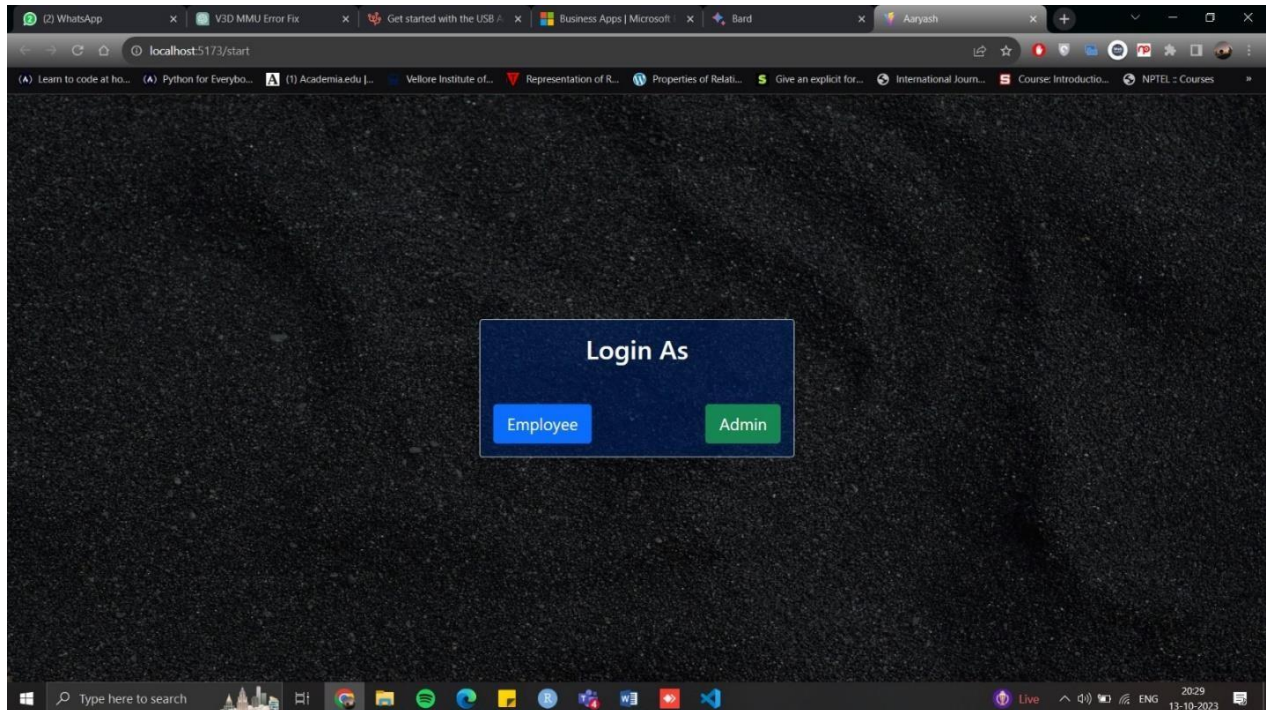
privacy of employee data. The two levels of security ensure that only authorized users can access the system.

MODEL DIAGRAM ::

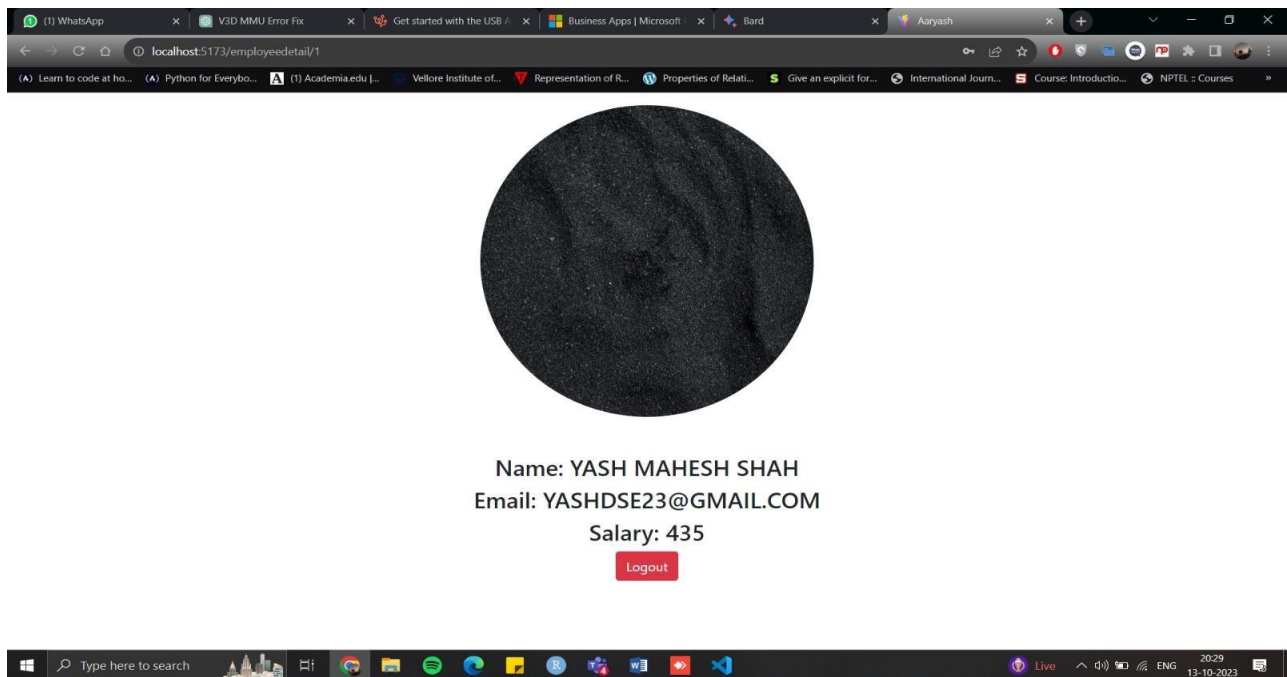


IX. RESULTS:

LOGIN PAGE TO OUR HRM system:



It is the login page for a HRM support system. Our system is accessed by both the company and the admin. The admin can handle the employee details and update or delete the existing or new employee details in the database.



It shows us the details of an employee named “yash Mahesh shah”, who has logged in as an employee in the system. He can view his current salary and his registered email with the company.

Login to Aaryash

Email
yashdse23@gmail.com

Password

Log in

☒ You agree to our terms and policies

Admin Dashboard

- Dashboard
- Manage Employees
- Analytics
- Logout

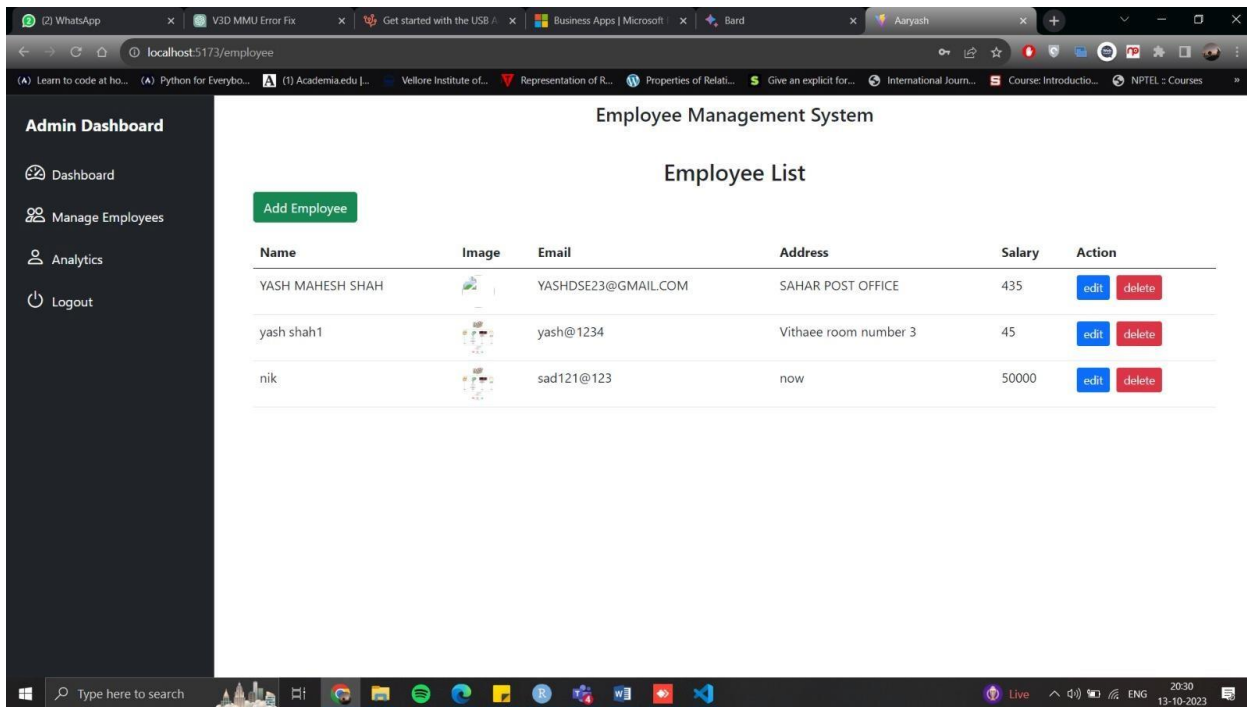
Employee Management System

| Admin | Employee | Salary |
|----------|----------|--------------|
| Total: 2 | Total: 3 | Total: 50480 |

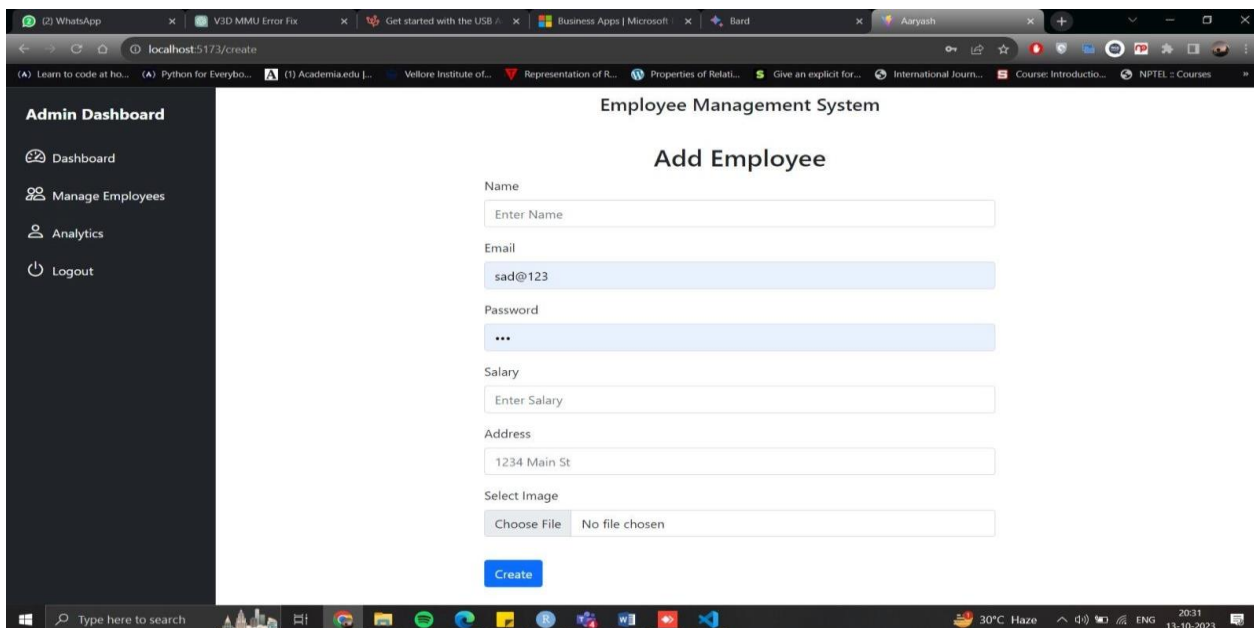
Current Admin Session

| Email | Role |
|---------|-------|
| sad@123 | Admin |

We have created a dashboard of the system which reflects the changes that are made in our database. It changes in real-time. It shows the database structure which is as of now contains 3 employees and 2 admin and total salary for the employee is 50480. This dashboard will change instantly like when there will be any update or deletion or any operations in the database. It also shows the details of the admin who has last logged into the system. This is the admin dashboard and can only be accessed by the admin only.

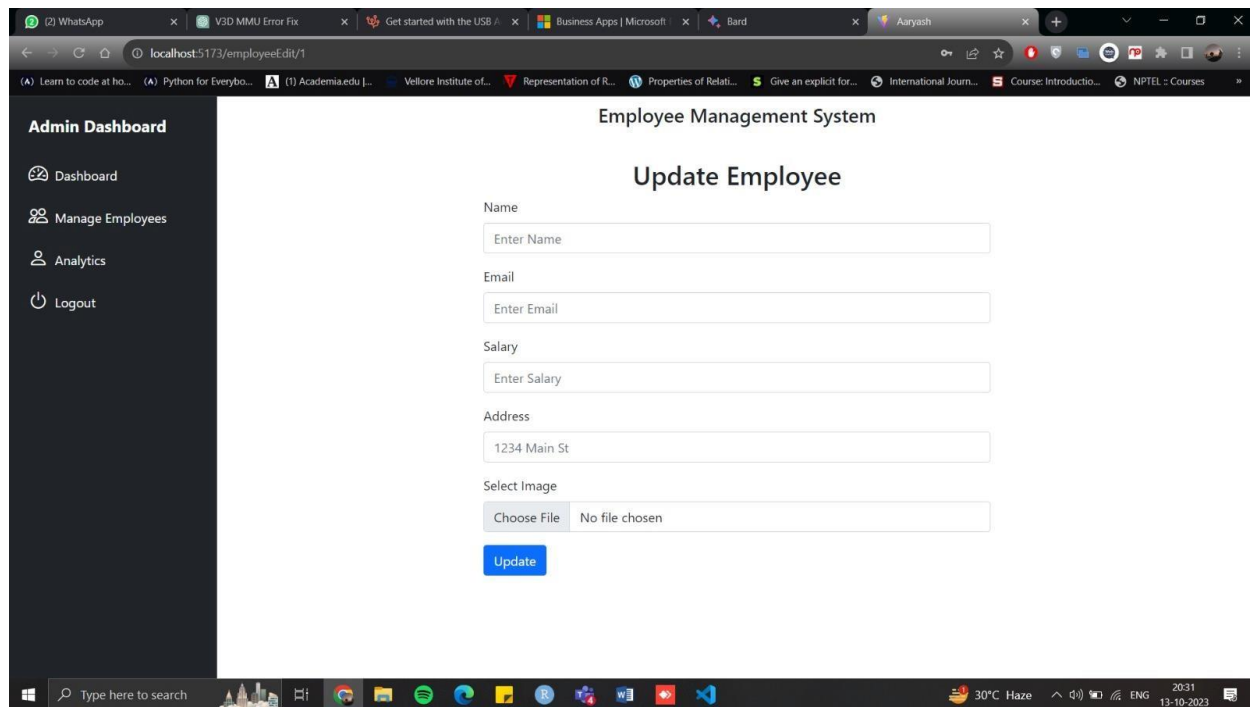


This shows us the image about the manage employees categories section. It shows us the details about the existing employees with their image, email, address, salary. We can perform edit operation if we need to perform any updates or any modification to the details of the employee.



The above image shows us the option to perform Add option in-order to add new employee details in the database of the company. It has fields to be filled like name, email, password, salary, address, his/her image.

This change will automatically be updated in the actual database.

The screenshot displays a web browser window with the URL 'localhost:5173/employeeEdit/1'. The page is titled 'Employee Management System' and features a sidebar on the left with the 'Admin Dashboard' menu. The main content area is titled 'Update Employee' and contains a form with the following fields: 'Name' (with placeholder 'Enter Name'), 'Email' (with placeholder 'Enter Email'), 'Salary' (with placeholder 'Enter Salary'), 'Address' (with placeholder '1234 Main St'), and 'Select Image' (with a 'Choose File' button and 'No file chosen' text). A blue 'Update' button is located at the bottom of the form. The browser's taskbar at the bottom shows the system clock as 20:31 on 13-10-2023.

The above image shows us that our dashboard is flexible enough to make any changes to the database for an existing employee also. It can make changes to the name, email, salary, address, or the image fields.

The above results show us how much scalable and flexible our system which can perform any CRUD operations and the results are instantly updated in the actual database.

X. HRM managements system data analytics :

In Figure A we can see the data analytics that has been performed to analysis the dataset properly . The Graph 1 shows the Bar plot to analysis the different types of Employment Type that are there in the dataset. It shows the dataset has two types of employment type , Part-time and Full-time employees. The count for the number of Full-time employees is around 30000 which is more higher than the part-time employees which is below 5000.

Graph 2 shows the scatterplot to show the relation between hourly rate and typical hours . It shows the relationship how hourly rate is affected by Typical Hours . It shows that as the typical hours increases, the hourly rate also increase.

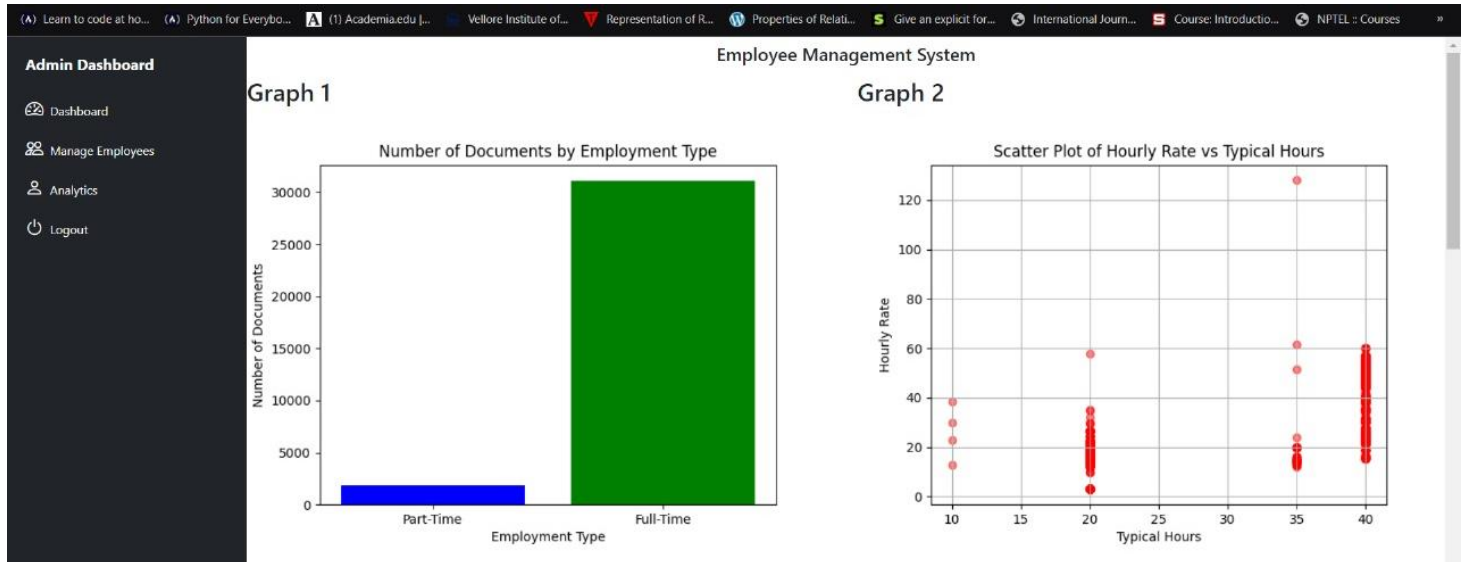


Figure A

In Graph 3 it shows that the company wanted to analysis the no. of employees that has a payment type on hourly basis and who has fixed salary type. It shows that the company has more full-time employees with a fixed salary around 25000 whereas around 7000 has hourly basis payment type.

Graph 4 shows the Histogram for distribution of salary range provided by the company. It shows that there is more employees with salary in the range of 1,00,000 to 1,50,000.

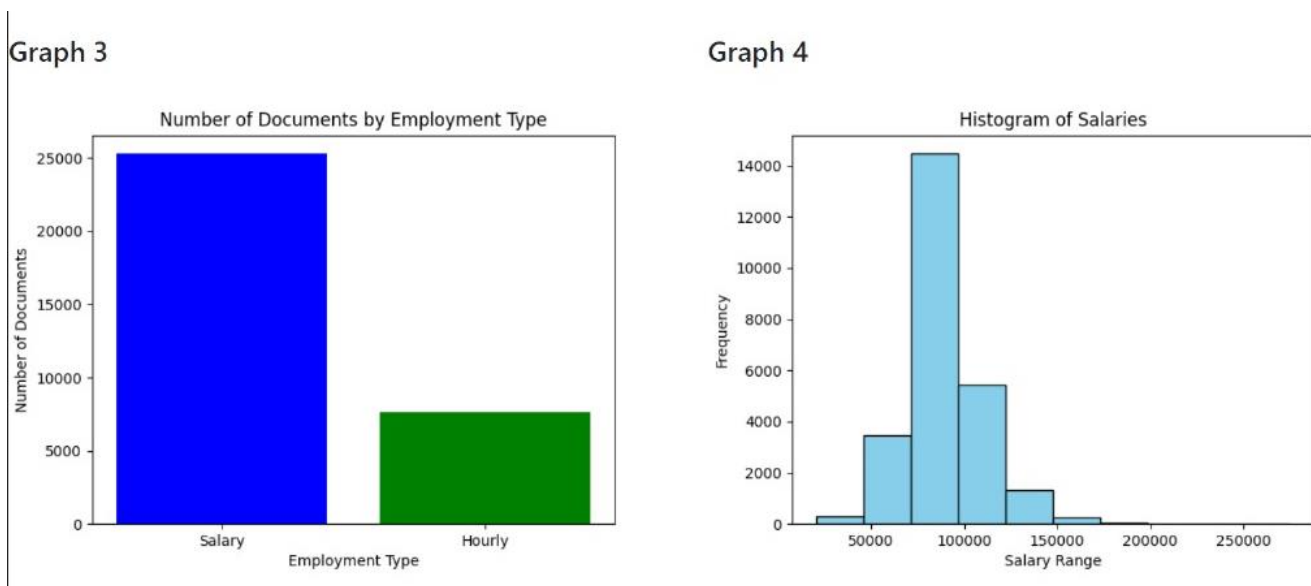


Figure B

The Data Table 1 shows the different job title the employee poses. It indicates that the Police Officer employee are more around 9557 count whereas motor truck driver has lowest count of 1004.

A box plot titled "Box Plot of Salary Distribution" showing the salary distribution for a single category (labeled '1' on the x-axis). The y-axis is labeled "Salary" and ranges from 0 to 250,000. The box plot shows a median salary of approximately 90,000, with the interquartile range (IQR) spanning from about 75,000 to 100,000. The whiskers extend from approximately 40,000 to 130,000. There are numerous outliers, with several points clustered between 150,000 and 200,000, and two extreme outliers near 260,000.

| Job Title | Count |
|--|-------|
| POLICE OFFICER | 9557 |
| FIREFIGHTER-EMT | 1411 |
| SERGEANT | 1296 |
| POLICE OFFICER (ASSIGNED AS DETECTIVE) | 1136 |
| MOTOR TRUCK DRIVER | 1004 |

| Department | Count |
|---------------|-------|
| POLICE | 13590 |
| FIRE | 4726 |
| STREETS & SAN | 2009 |
| WATER MGMNT | 1863 |
| OEMC | 1699 |

| Type | Value |
|---------|-------|
| highest | 128 |
| lowest | 3 |

| Department | Average Salary |
|------------------------|----------------|
| IT | \$85,000 |
| HR | \$82,000 |
| Finance | \$95,000 |
| Marketing | \$92,000 |
| Sales | \$35,000 |
| Operations | \$95,000 |
| Engineering | \$85,000 |
| Product Development | \$92,000 |
| Customer Support | \$88,000 |
| Quality Assurance | \$88,000 |
| Research & Development | \$88,000 |
| Data Science | \$98,000 |
| Analytics | \$88,000 |
| Compliance | \$88,000 |
| Legal | \$78,000 |
| Human Resources | \$82,000 |
| Facilities Management | \$78,000 |
| Information Systems | \$92,000 |
| Training & Development | \$95,000 |
| Procurement | \$78,000 |
| Logistics | \$95,000 |
| Manufacturing | \$98,000 |
| Maintenance | \$98,000 |
| Security | \$75,000 |

In Graph-5 the box plot shows us the distribution of the salaries of the Employee.

XI. Github Repository Link (where your j comp project work can be seen for assessment) <https://github.com/dager23/MERN-HRM-System>

XII. REFERENCES

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