Malnad College of Engineering, Hassan

(An Autonomous Institution affiliated to VTU, Belgavi)

Mini Project (22CS604)

REPORT ON

"EMPLOYEE MANAGEMENT SYSTEM"

Submitted in partial fulfillment of
the requirements for the award of the degree of

Bachelor of Engineering in
Computer Science and Engineering

Submitted by

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Certificate

This is to certify that project work entitled **"EMPLOYEE MANAGEMENT SYSTEM"** is a bonafide work carried out by in partial fulfillment for the award of Bachelor of

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Engineering in Computer Science and Engineering of the Visvesvaraya Technological University, Belagavi during the year 2024-25. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of project work prescribed for the Bachelor of Engineering Degree.

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ABSTRACT

Employee management system is a platform designed for employers and managers in company to simplify the time in asking for leave and attendance management and enhance manager engagement. It enables employers to manage leave attendance and salary while allowing easy access and time efficient for leave apply and attendance checking and attractive dashboard.

The system addresses challenges like manual registration, inefficient attendance tracking, and delayed login. It integrates time based attendance validation, and salary management and others to enhance efficiency.

Developed using the MERN (MYSQL, Express.js, React.js, Node.js), Employee management ensures scalability, security, and reliability for employee management. By offering a centralized and user-friendly interface, it enhances accessibility and simplifies administrative tasks for employee and managers.

ACKNOWLEDGEMENTS

Salutations to our beloved and highly esteemed institute “Malnad College Of Engineering” for having well qualified staff and labs furnished with necessary equipment. The successful completion of any task would be incomplete without mentioning the people who have constantly guided and inspired for the project and the report generation.

We avail this opportunity to thank all those people who have helped us in the whole process of completion of this project and the report.

We would like to express our deepest gratitude to our mentor Dr. Chandrika J, Department of Computer Science & Engineering for her daily evaluation of the work and for providing us constant encouragement with her unflinching support and valuable guidance throughout this project. We are indebted to her as she has considered us worthy of this project and invested his faith in us. It was a great privilege to work under her. We will take away a lot more than just the technical knowledge from her.

Shivakumar

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Chapter 1
Introduction

EMS is a web-based Employee Management System developed using the MERN (MYSQL, Express.js, React.js, Node.js) stack. The platform is designed to streamline employee administration and enhance organizational efficiency. It addresses common challenges faced by businesses, such as inefficient manual processes for attendance tracking, leave applications, and salary management. Traditional methods often result in increased administrative workload, processing delays, and reduced transparency About Project.

1.1 Problem Statement

Organizations often face challenges in efficiently managing employee-related tasks due to the lack of a centralized digital system. Manual processes for attendance tracking, leave management, and salary calculations result in administrative burdens, processing delays, and human errors. The absence of a structured and automated platform leads to poor transparency, increased HR workload, and reduced employee satisfaction. Without an integrated system for login, real-time monitoring, and a centralized dashboard, managing workforce operations becomes complex and inefficient for HR departments and management teams.

1.2 Objectives

The primary aim of this project is to design and develop a centralized, role-based Employee Management System (EMS) that simplifies and automates essential HR operations, while ensuring transparency, accuracy, and accessibility. Below are the detailed objectives:

- **Role-Based Access and Secure Authentication :** To implement a secure login system with role-based access control for Employees, HR/Admin. To ensure each user is presented with a personalized dashboard tailored to their specific responsibilities and access level.

- **Centralized Employee Information Management:** To provide HR/Admin the ability to create, update, and manage detailed employee records, including personal information, job roles, salary structures, and performance data.
- **Automated Attendance Tracking and Integration:** To integrate attendance data with payroll processing for accurate and timely salary calculations. To allow real-time monitoring of employee attendance and generate monthly attendance reports.
- **Simplified Leave Management Workflow:** To allow employees to submit leave applications online and track their status. To provide HR/Admin tools to view, approve/reject leave requests and manage leave balances efficiently.
- **Employee Self-Service Portal:** To empower employees with self-service access to their data including leave history, salary records, and performance evaluations. To reduce dependency on HR for routine queries by offering transparency and accessibility.
- **Real-Time HR Dashboard and Insights:** To offer HR/Admin a centralized dashboard with actionable insights on workforce statistics, attendance trends, pending tasks, and performance metrics. To support data-driven decision-making and optimize resource planning.
- **Seamless User Experience and Accessibility:** To develop an intuitive and responsive web interface accessible from desktops and mobile devices. To ensure ease of navigation and usability for all types of users regardless of their technical expertise.
- **Data Security and Integrity:** To implement best practices in web security such as data encryption, session management, and role-based authorization to protect sensitive HR data. To ensure data consistency and integrity throughout the platform.

Chapter 2

Literature Survey

An Employee Management System is designed to provide a centralized digital platform where employees can manage their personal profiles, view attendance records, apply for leave, and receive important notifications. At the same time, HR personnel and administrators are equipped to manage employee records, monitor attendance, process leave requests, manage payroll, and analyze overall workforce data. Transitioning to such a digital platform significantly enhances efficiency, accessibility, transparency, security, and scalability in managing organizational operations

P.G. Aquinas, and Aruna Doreen Menezes et al**.** [1] The paper "Implementing Employee Performance Management System: acts as a comprehensive literature review, highlighting the critical challenges and influencing factors in the successful implementation of Performance Management Systems (PMS) in organizations. It compiles scattered literature to identify various parameters and common causes for PMS implementation failures, serving as a valuable checklist for managers to avoid pitfalls. The study emphasizes that successful PMS deployment necessitates meticulous planning and careful execution, particularly acknowledging the complexities within human resource contexts. It further differentiates between technical and social factors influencing PMS effectiveness, noting the greater impact of technical elements on successful implementation.

Dr. M Nishad Nawaz et al. [2] The paper "Human Resource Information System- provides a comprehensive literature survey on Human Resource Information Systems (HRIS). It reviews existing research to establish the current body of knowledge regarding HRIS functions, applications, and core concepts. The literature highlights how HRIS significantly contributes to organizational development by streamlining HR processes, reducing costs, and enhancing information flow, thereby enabling HR managers to make more effective and productive decisions. The review underscores that successful HRIS development

and implementation are rooted in integrating insights from various related fields of study, emphasizing HRIS as an increasingly integral component of modern organizations.

S. Selvi et al. [3] The paper "HR e-Leave Tour Management System at RDCIS, SAIL highlights the inefficiencies inherent in traditional, manual leave and tour management systems, citing issues like time consumption, error susceptibility, and lack of real-time data. Its literature survey underscores the growing organizational need for adopting automated and digitized Human Resource Information Systems (HRIS) or specific e-leave modules. This transition is crucial for improving data reliability, enhancing accessibility, reducing paperwork, and ultimately streamlining HR operations and decision-making within large organizations. The paper emphasizes that such systems facilitate faster and more accurate employee services, moving away from outdated manual processes.

J. Anitha et al. [4] The paper "Determinants of employee engagement and their impact on employee performance," conducts a literature survey emphasizing the growing recognition of employee engagement as a vital driver for organizational success and competitive advantage. The review typically explores various established determinants of employee engagement, such as leadership, organizational culture, job characteristics, recognition, opportunities for growth, and communication, drawing upon existing theoretical and empirical studies. Furthermore, it delves into the crucial link between heightened employee engagement and improved employee performance, highlighting how engaged employees contribute positively to productivity, innovation, and organizational commitment. The literature survey likely aims to identify gaps in prior research, setting the context for the paper's contribution to a more comprehensive understanding of these relationships.

Luo Biao and Lu Zhong-Liang's et al. [5] The paper, "Construction of Flexible Management of Human Resource: Study on HR Management Model in Growth Enterprise," focuses on the critical need for flexible human resource management

(HRM) models, particularly within the context of growth enterprises. While the full paper content isn't directly available for a detailed literature review, we can infer the theoretical foundations and existing literature that likely informed their work based on the title and related concepts

Beer, M., Ruh, R., Dawson, J. A., McCaa, B. B., & Kavanagh, M. J. et al. [6] The paper published in Personnel Psychology in 1978, describes a comprehensive Performance Management System (PMS) developed and implemented at Corning Glass for its managerial and professional staff. A key innovation of this system was its strong focus on employee development, moving beyond traditional evaluative approaches. It employed ipsative measurement, comparing an individual's performance against their own prior achievements, and integrated results-oriented appraisal with behavior-centered appraisal, considering both "what" was accomplished and "how." This detailed account of the PMS's research, design, introduction, and evaluation phases makes it a significant contribution to early performance management literature.

2.1 Research Gap

These papers collectively highlight the significant role of data analytics, artificial intelligence, and machine learning in enhancing road safety and preventing traffic accidents. They explore predictive models for classifying accident and injury severity by scrutinizing various factors such as weather conditions, time, age, location, driver demographics, and road surface conditions. The research evaluates multiple machine learning algorithms, including Random Forest, Gradient Boosting, XGBoost, and neural networks, to determine their effectiveness in accurate prediction and real-time risk assessment. The importance of robust data preprocessing and the development of interactive systems are emphasized to assist traffic management authorities and policymakers in making data-driven decisions to reduce fatalities and improve overall road safety.

Chapter 3

Project Design

The Employee Management System is a full-stack web application built using the MERN (MongoDB, Express.js, React.js, Node.js**)** technology stack. It is designed to simplify and automate the management of employee-related operations within an organization. The system enables employees to log in securely, view their attendance records, apply for leave, and **access** salary details through an intuitive dashboard.

Administrators and HR personnel are empowered to manage employee data, track daily attendance, approve or reject leave requests, and process payroll efficiently. The system ensures real-time data synchronization and provides visual analytics to support better decision-making and performance tracking.

3.1 System Architecture

This diagram depicts a multi-tiered system architecture where user roles (Admin, Manager, Employee) access a Frontend. The Frontend interacts with a Backend API Server for business logic, which in turn connects to a MySQL Database for data and an Authentication Service for user management.

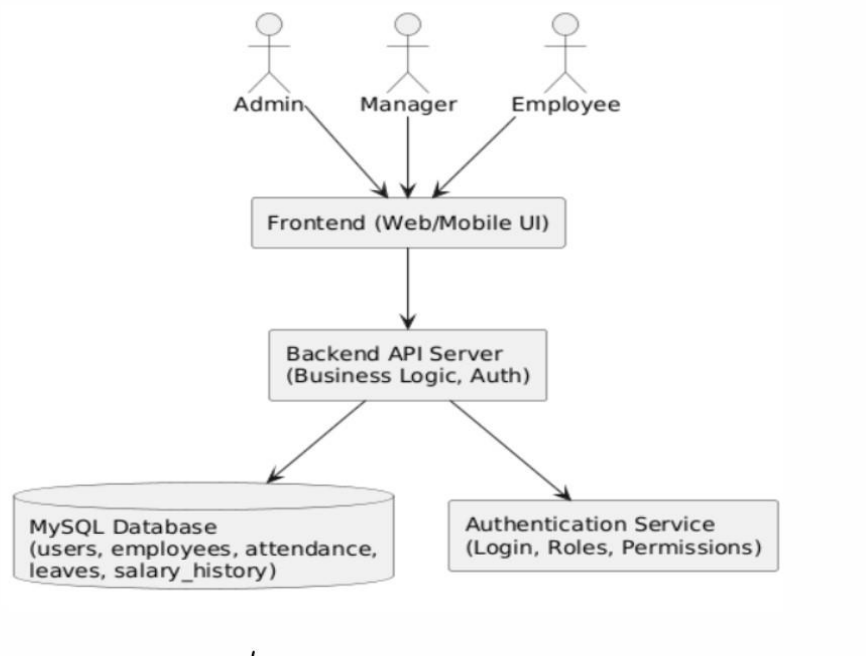


Fig 1 System design diagram

This ER diagram outlines the database schema for an employee management system. It shows interconnected tables like users, employees, managers, attendance, leaves, and salary_history, defining their attributes and relationships through foreign keys to manage user information, employee details, attendance records, leave requests, and salary history.

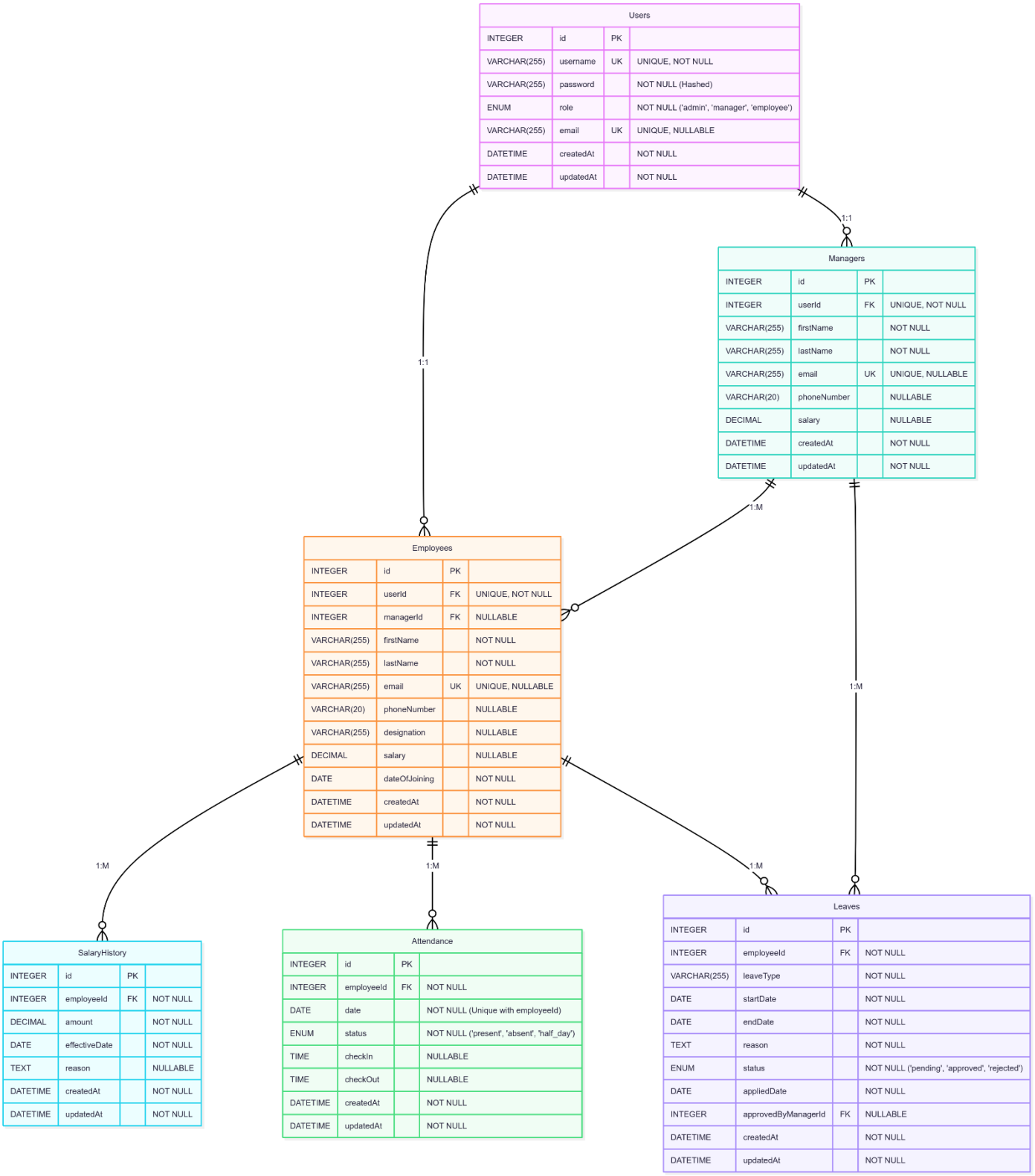


Fig 2 ER Diagram of database

This use case diagram illustrates the functions an "Admin" user can perform within a system. The Admin can manage users, assign roles, view all staff, update salary records, and view attendance reports.

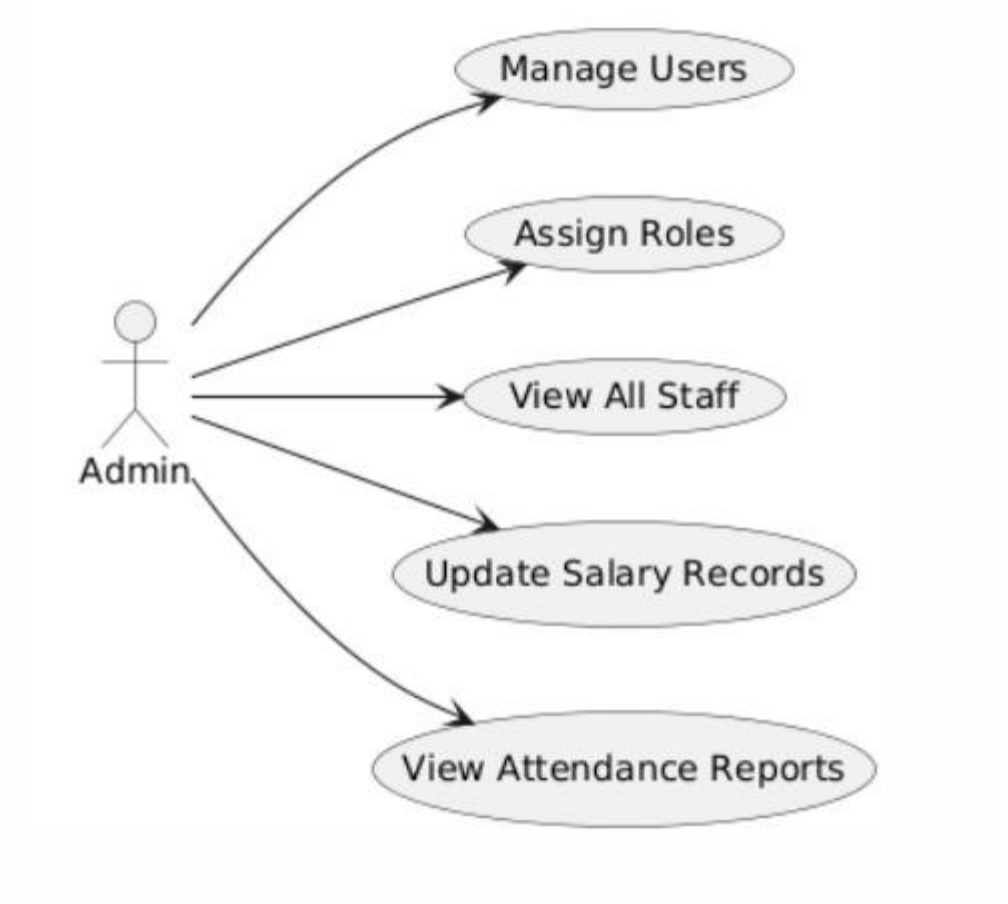


Fig 3 Use case Admin

This use case diagram illustrates the functionalities available to a "Manager" in the system. A Manager can view employees, approve or reject leaves, check attendance, and set salaries.

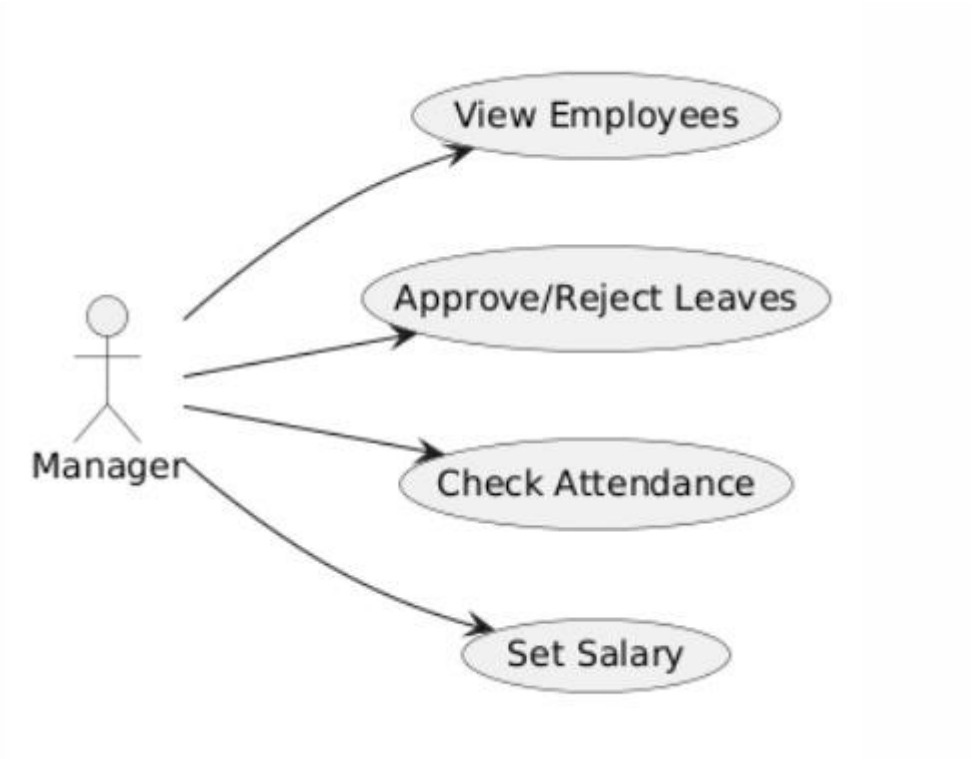


Fig 4 Use case Manager

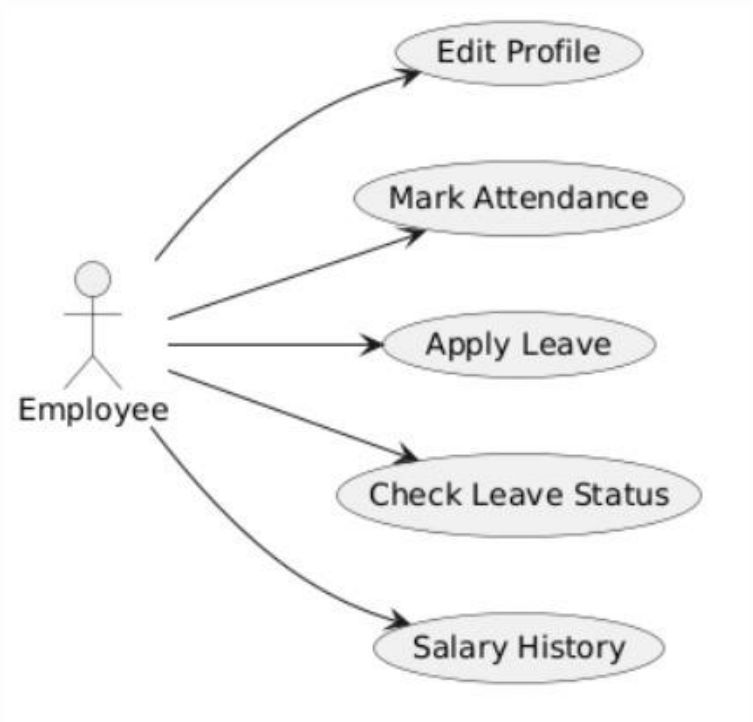


Fig 5 Use case Employee

Chapter 4

Implementation

4.1 Frontend Development

- **Technology Stack:** The frontend is developed using modern web technologies such as HTML5, CSS3, JavaScript, and React.js to ensure a responsive, dynamic, and user-friendly interface.
- **Role-Based Dashboards:** Personalized dashboards are implemented for Employees and HR/Admin based on login roles. Each dashboard displays relevant modules like attendance status, leave summary, salary info, or employee management tools.
- **Responsive Design:** The UI is designed to be mobile-friendly and responsive, ensuring compatibility across desktops, tablets, and smartphones using frameworks like Bootstrap or Tailwind CSS.
- **Component-Based Architecture:** Using React.js, the frontend is divided into reusable components such as Navbar, Sidebar, Attendance Table, Leave Form, SalarySlipCard, etc., allowing better maintainability and scalability.
- **Form Validation & User Feedback:** Client-side form validations are implemented for login, leave applications, and employee data input, with meaningful error messages and success confirmations for better UX.
- **API Integration:** The frontend communicates with the backend through RESTful APIs to fetch and submit data like login credentials, attendance records, leave requests, and salary slips securely and efficiently.
- **Authentication & Authorization:** Access to certain routes and components is protected using JWT-based session tokens and React Router to prevent unauthorized access to restricted areas.
- **UI/UX Design Considerations:** Emphasis is placed on clean layouts, intuitive navigation, and interactive elements (e.g., modals, dropdowns, alerts) to create an efficient user experience for all roles.

4.2 Backend Development

Technologies Used:

Node.js + Express.js: Backend runtime and framework used to handle routing, business logic, and communication with the database.

1. Express Routes

The backend exposes various RESTful API endpoints to manage different functionalities of the Employee Management System. Each module has its own route group:

- **AuthRoutes**
  Handles login, registration, and JWT-based authentication for secure access.
- **UserRoutes**
  Used to fetch, update, or manage employee profiles, including personal details and role-based permissions.
- **AttendanceRoutes**
  Enable daily attendance tracking, with options to view, mark, or edit attendance records.
- **LeaveRoutes**
  Allow employees to apply for leave, and let admins or HR approve, reject, or track leave status.
- **SalaryRoutes**
  Manage salary information, generate monthly pay slips, and calculate net pay based on attendance and leave data.
- **DashboardRoutes**

  Fetch summary data like total employees, pending leave requests, salary overview, and recent act

4.3 Database Design

MySQL is a robust, open-source relational database management system used in this Employee Management System (EMS) to store and manage structured HR-related data efficiently.This document details the relational database design for the Employee Management System, outlining the tables, their attributes, and the relationships that connect them. This schema is designed to

support the core functionalities of user authentication, employee management, attendance tracking, leave applications, and salary history.

Users Table

This table stores basic authentication and role information for all users (Admin, Manager, Employee) in the system.

Column Name	Data Type	Constraints	Description
`id`	INTEGER	PRIMARY KEY, AUTO_INCREMENT	Unique ID for the user
`username`	VARCHAR(255)	UNIQUE, NOT NULL	User's login username
`password`	VARCHAR(255)	NOT NULL	Hashed password
`role`	ENUM	NOT NULL, ('admin', 'manager', 'employee')	Role of the user (e.g., 'admin')
`email`	VARCHAR(255)	UNIQUE, NULLABLE	User's email address
`createdAt`	DATETIME	NOT NULL, DEFAULT CURRENT_TIMESTAMP	Timestamp of creation
`updatedAt`	DATETIME	NOT NULL, DEFAULT CURRENT_TIMESTAMP ON UPDATE CURRENT_TIMESTAMP	Timestamp of last update

Managers Table

The Managers table extends the core Users table by holding specific profile details pertinent to individuals holding managerial roles within the organization. This architectural separation allows for distinct attributes, responsibilities, and reporting lines to be exclusively assigned to managers without unnecessarily cluttering the generic user profile, maintaining a clean and logical data

Column Name	Data Type	Constraints	Description
`id`	INTEGER	PRIMARY KEY, AUTO_INCREMENT	Unique ID for the manager profile
`userId`	INTEGER	UNIQUE, NOT NULL, FOREIGN KEY (`Users.id`)	Links to the user's ID
`firstName`	VARCHAR(255)	NOT NULL	Manager's first name
`lastName`	VARCHAR(255)	NOT NULL	Manager's last name
`email`	VARCHAR(255)	UNIQUE, NULLABLE	Manager's work email
`phoneNumber`	VARCHAR(20)	NULLABLE	Manager's phone number
`salary`	DECIMAL(10,2)	NULLABLE	Manager's current salary
`createdAt`	DATETIME	NOT NULL, DEFAULT CURRENT_TIMESTAMP	Timestamp of creation

model.

Employees Table

The Employees table serves as the central repository for detailed and comprehensive information about every non-managerial employee within the organization. It's a critical component for organizing personnel data and establishing reporting structures.

Column Name	Data Type	Constraints	Description
`id`	INTEGER	PRIMARY KEY, AUTO_INCREMENT	Unique employee profile ID; primary key and foreign key in other tables.
`userId`	INTEGER	UNIQUE, NOT NULL, FOREIGN KEY (`Users.id`)	Foreign key to `Users.id` , `UNIQUE` for one-to-one user link.
`managerId`	INTEGER	NULLABLE, FOREIGN KEY (`Managers.id`)	Foreign key to `Managers.id` (nullable), defines reporting hierarchy.
`firstName`	VARCHAR(255)	NOT NULL	Employee's first name.
`lastName`	VARCHAR(255)	NOT NULL	Employee's last name.
`email`	VARCHAR(255)	UNIQUE, NULLABLE	Employee's work email.
`phoneNumber`	VARCHAR(20)	NULLABLE	Employee's phone number.
`designation`	VARCHAR(255)	NULLABLE	Employee's job title, important for organization and responsibilities.

Attendance Table

The Attendance table is a foundational component for tracking employee work patterns, crucial for ensuring accountability, maintaining punctuality, and providing accurate data essential for payroll processing and compliance reporting. It meticulously captures daily presence, absence, and specific timings when applicable.

Column Name	Data Type	Constraints	Description
`id`	INTEGER	PRIMARY KEY, AUTO_INCREMENT	Unique attendance record ID.
`employeeId`	INTEGER	NOT NULL, FOREIGN KEY (`Employees.id`)	Foreign key to `Employees.id`, links record to employee.
`date`	DATE	NOT NULL	Date of attendance, unique composite key with `employeeId`.
`status`	ENUM	NOT NULL, ('present', 'absent', 'half_day')	Employee's attendance status ('present', 'absent', 'half_day'), crucial for payroll and reporting.
`checkIn`	TIME	NULLABLE	Time of check-in (nullable), for tracking working hours.
`checkOut`	TIME	NULLABLE	Time of check-out (nullable), for tracking working hours.
`createdAt`	DATETIME	NOT NULL, DEFAULT CURRENT_TIMESTAMP	Record creation timestamp.
`updatedAt`	DATETIME	NOT NULL, DEFAULT CURRENT_TIMESTAMP ON UPDATE CURRENT_TIMESTAMP	Last modification timestamp.

Leaves Table

The Leaves table is specifically designed to meticulously manage and track all leave applications submitted by employees, providing a structured system for requests, approvals, and a comprehensive history of leave usage.

Column Name	Data Type	Constraints	Description
`id`	INTEGER	PRIMARY KEY, AUTO_INCREMENT	Unique leave application ID.
`employeeId`	INTEGER	NOT NULL, FOREIGN KEY (`Employees.id`)	Foreign key to `Employees.id`, links application to employee.
`leaveType`	VARCHAR(255)	NOT NULL	Category of leave (e.g., 'Casual', 'Sick'), crucial for policy and balances.
`startDate`	DATE	NOT NULL	Start date of the leave period.
`endDate`	DATE	NOT NULL	End date of the leave period.
`reason`	TEXT	NOT NULL	Detailed reason for leave, important for approval and records.
`status`	ENUM	NOT NULL, ('pending', 'approved', 'rejected')	Current state ('pending', 'approved', 'rejected'), drives workflow.
`appliedDate`	DATE	NOT NULL	Date leave was applied, vital for tracking and deadlines.

SalaryHistory Table

The SalaryHistory table is a crucial auditing component of the system, providing a precise and chronological record of all compensation adjustments made for each employee throughout their tenure. This ensures complete transparency and robust accountability regarding all salary changes.

Column Name	Data Type	Constraints	Description
`id`	INTEGER	PRIMARY KEY, AUTO_INCREMENT	Unique salary history record ID.
`employeeId`	INTEGER	NOT NULL, FOREIGN KEY (`Employees.id`)	Foreign key to `Employees.id`, ties record to employee.
`amount`	DECIMAL (10,2)	NOT NULL	Exact salary amount with high precision.
`effectiveDate`	DATE	NOT NULL	Date salary amount became applicable, vital for payroll.
`reason`	TEXT	NULLABLE	Descriptive reason for salary change (e.g., 'Annual Increment').
`createdAt`	DATETIME	NOT NULL, DEFAULT CURRENT_TIMESTAMP	Record creation timestamp.
`updatedAt`	DATETIME	NOT NULL, DEFAULT CURRENT_TIMESTAMP ON UPDATE CURRENT_TIMESTAMP	Last modification timestamp.

4.4 Controllers

Controllers contain the business logic.

They receive input from the Express routes, perform necessary operations such as data validation, calculations (e.g., salary computation), and interact with the database through Models.

Once the processing is complete, the controllers send the appropriate response back to the client (frontend).

4.5 Models

These define the schema and structure for the database using MYSQL.

Models include:

- **User Model:** Manages login credentials and roles.
- **Manager Model:** Stores specific details for managerial staff.
- **Employee Model:** Holds comprehensive details for non-managerial employees.

- **SalaryHistory Model:** Tracks all historical salary adjustments.
- **Attendance Model:** Records daily employee attendance.
- **Leaves Model:** Manages and tracks all employee leave applications.

4.6 Security Features

- JWTs are used for secure authentication and attendance token generation.
- Middleware ensures role-based access to protected routes.
- Time-limited QR codes help prevent misuse or repeated attendance logging.

Chapter 5

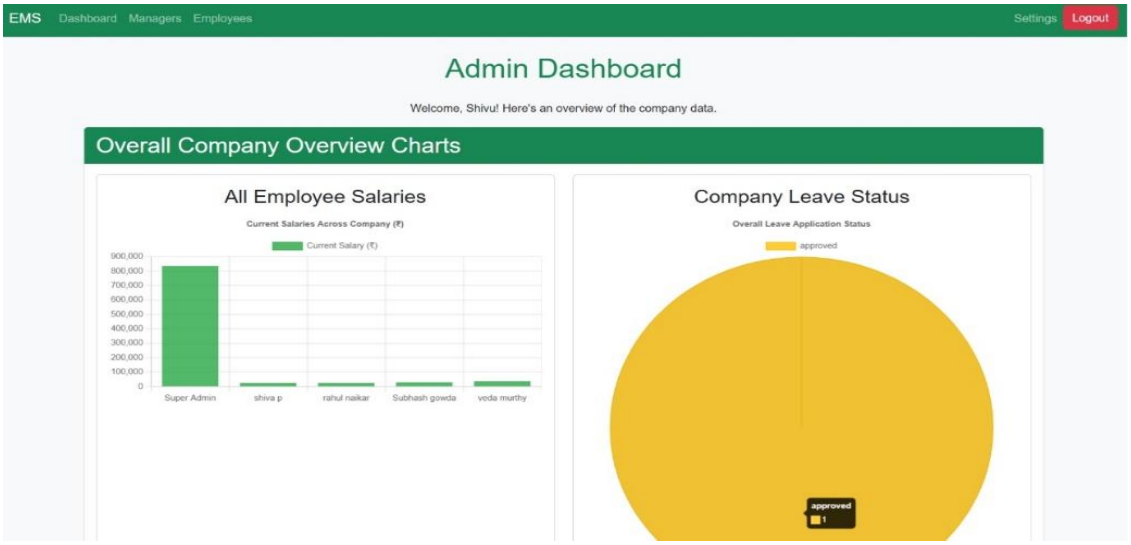
User Interface

The image displays a login page for an Employee Management System. It features fields for "Username" and "Password," along with a "Login" button.

Fig 06. Login page

This image depicts the "Admin - Managers" section of an Employee Management System.

Fig 07. Admin Dashboard



The image displays an "Admin - Employee Management" page for an Employee Management System. It presents a form to "Add New Employee," requiring details such as Username, Password, Name, Contact Information, Designation, Salary, and an assigned Manager.

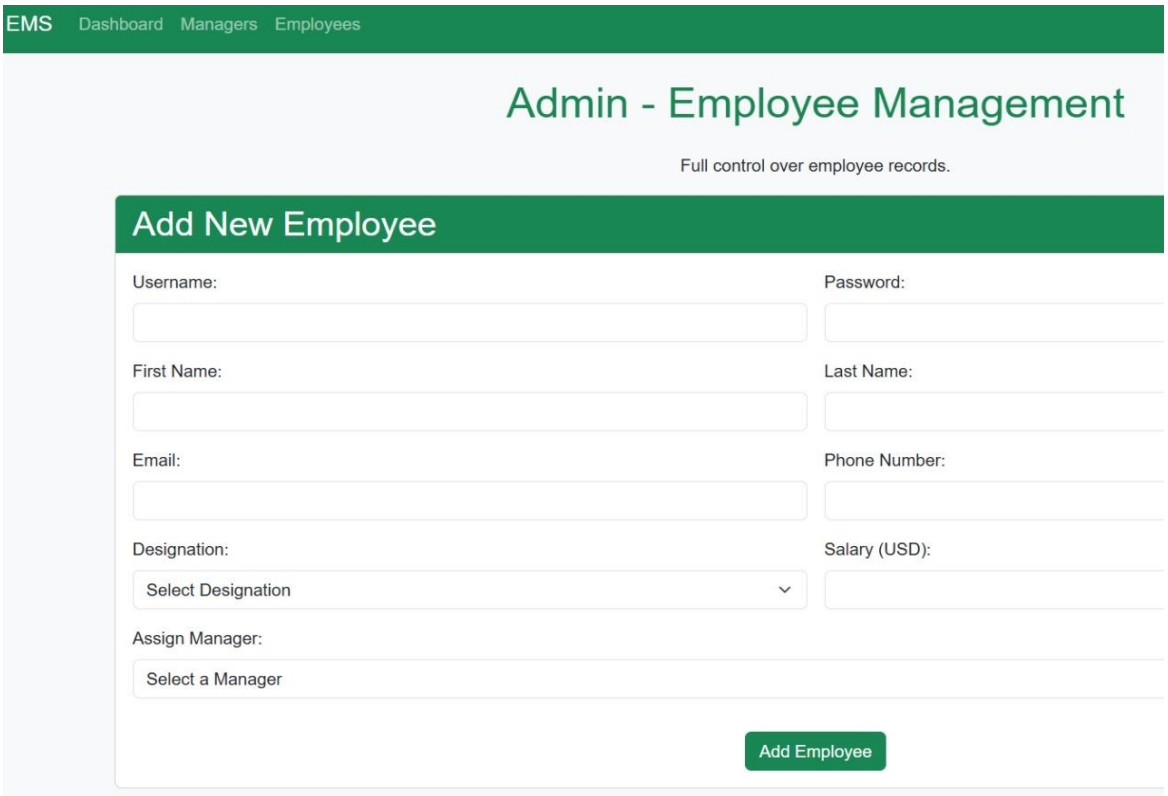


Fig 08. Admin-Employee Management

This image shows a "Change Credentials" form, allowing users to update their login information. It includes fields for "Current Password," optional "New Username," "New Password," and "Confirm New Password," along with an "Update Credentials

Fig 09. Change Credentials

The image displays an All-Employees table, listing employees with their ID, Username, Name, Designation, Manager, and Salary in INR. Each employee entry also includes action buttons for ‘View Details’, ‘Change Manager’, ‘Update Salary’, and ‘Delete’.

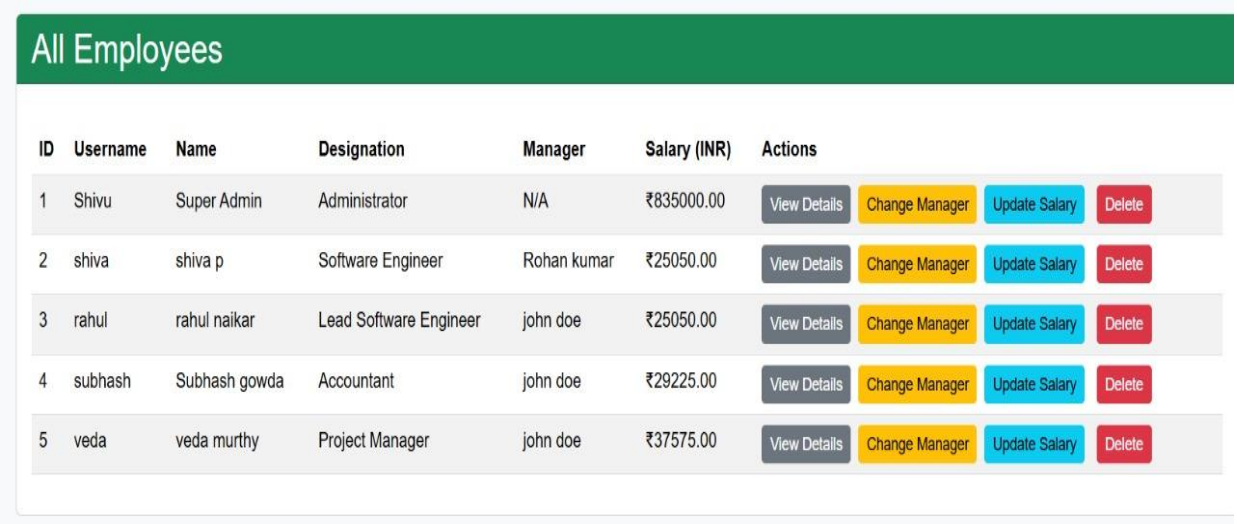


Fig 10. Employee Information Table

This "Employee Details" page for "rahul naikar" presents their profile, current monthly salary breakdown including deductions and net pay, an empty salary history section, and a bar chart visualizing the current salary.

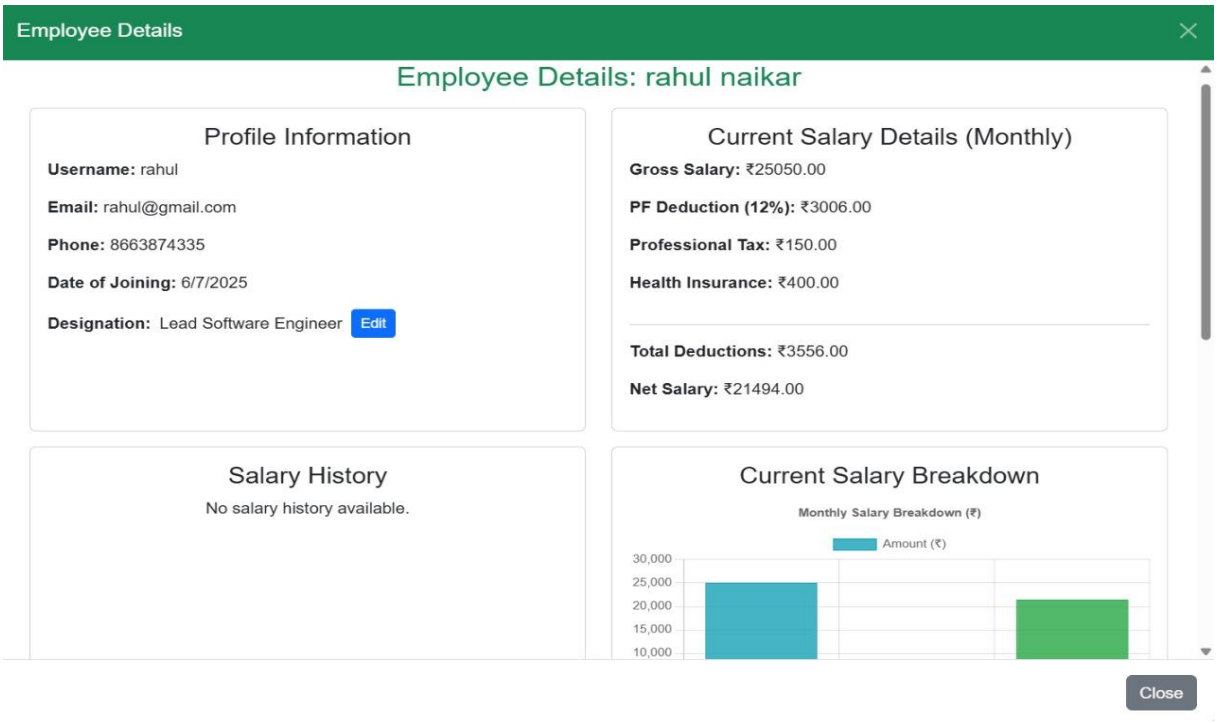
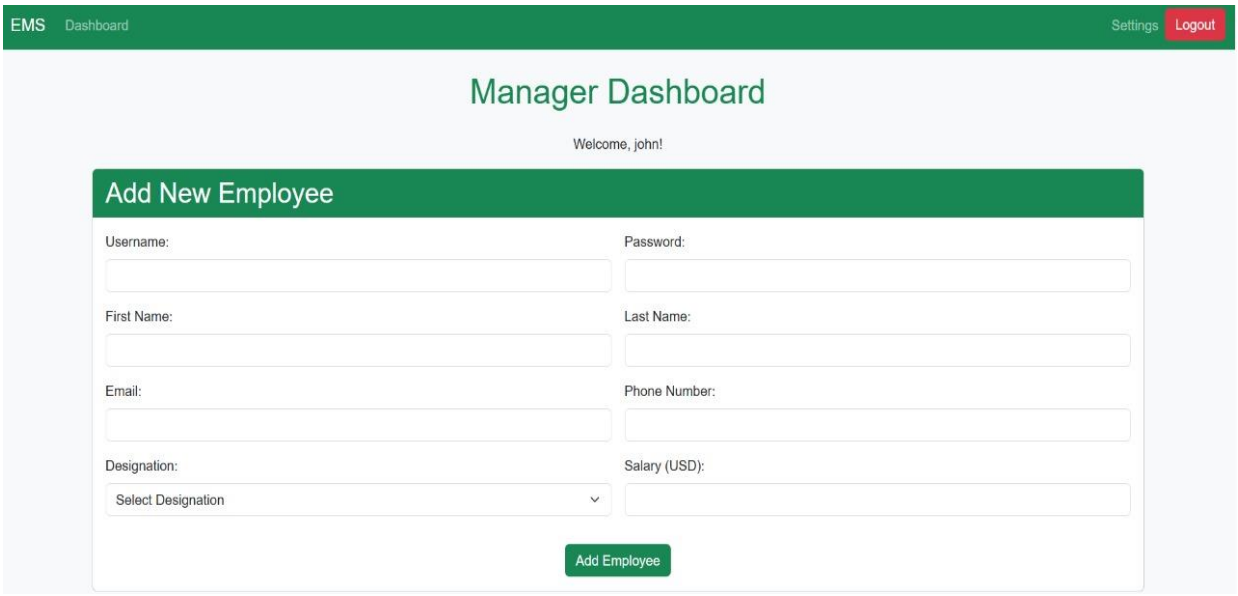


Fig 11. Employee Description

This image displays a "Manager Dashboard" within an Employee Management System (EMS), welcoming "john." It features a form to "Add New Employee" with fields for username, password, name, contact details, designation, and salary, and also includes "Settings" and "Logout" options in the top right.

Fig 12. Manager Dashboard



This image displays an employee dashboard featuring three main sections: "My Employees" with a table to view and manage subordinate details, a "Mark Attendance" form for recording employee presence, and "Employee Leave Applications" showing leave requests with their status and actions.

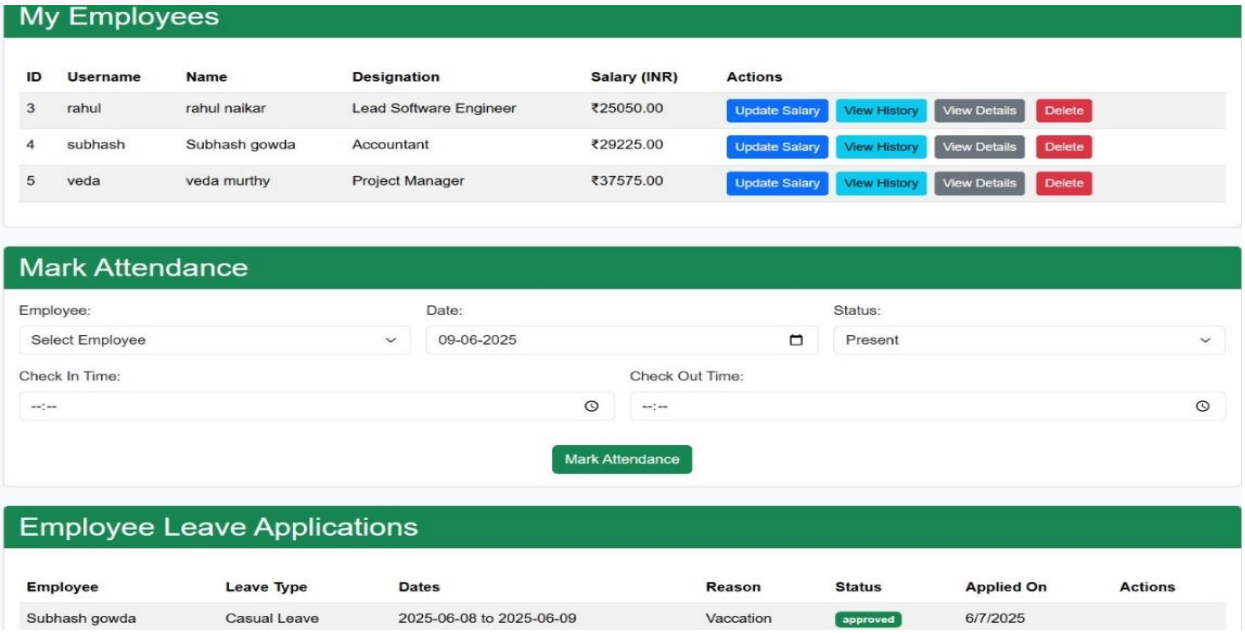


Fig 13. Employee Salary, Attendance, Leave Application

This image presents a "Charts Overview (Your Team)" with two visualizations. On the left, an "Employee Salary Distribution" bar chart shows the current salaries of individual team members.

On the right, a "Team Leave Application Status" pie chart indicates that all leave applications are currently approved.

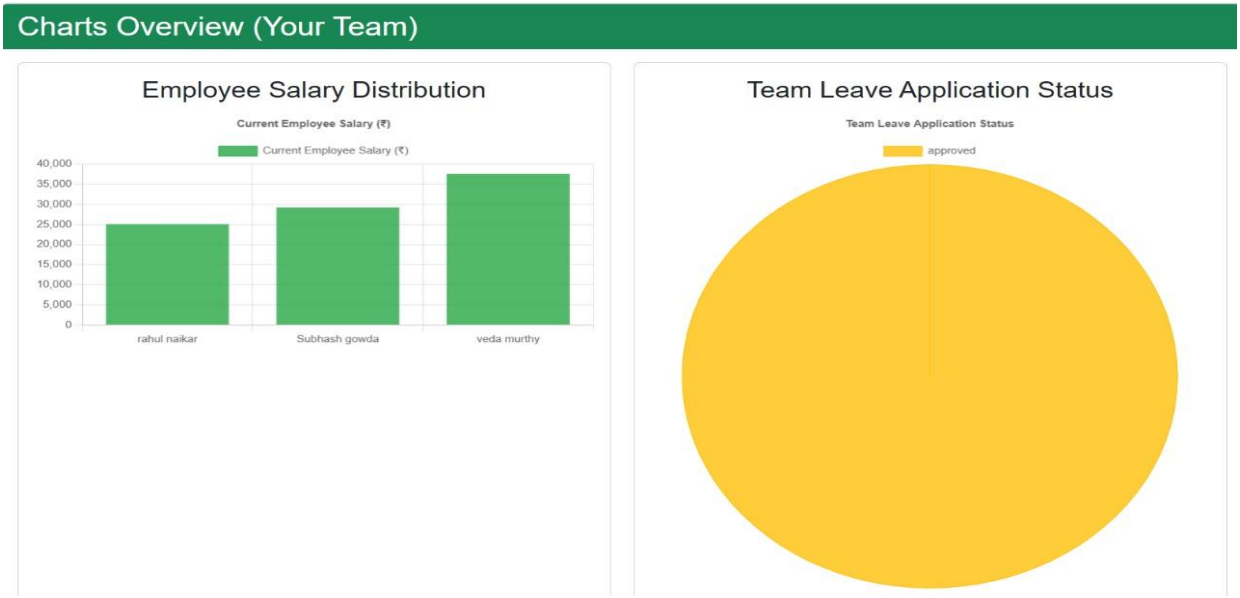


Fig 14. Bar Chart- Emp salary & Pie chart Leave Application

This image displays an "Employee Dashboard" welcoming "rahul!" It prominently features a "My Profile & Salary Breakdown" section, providing personal details such as name, email, phone, designation, and date of joining, alongside a detailed monthly salary breakdown including gross salary, deductions, and net salary.

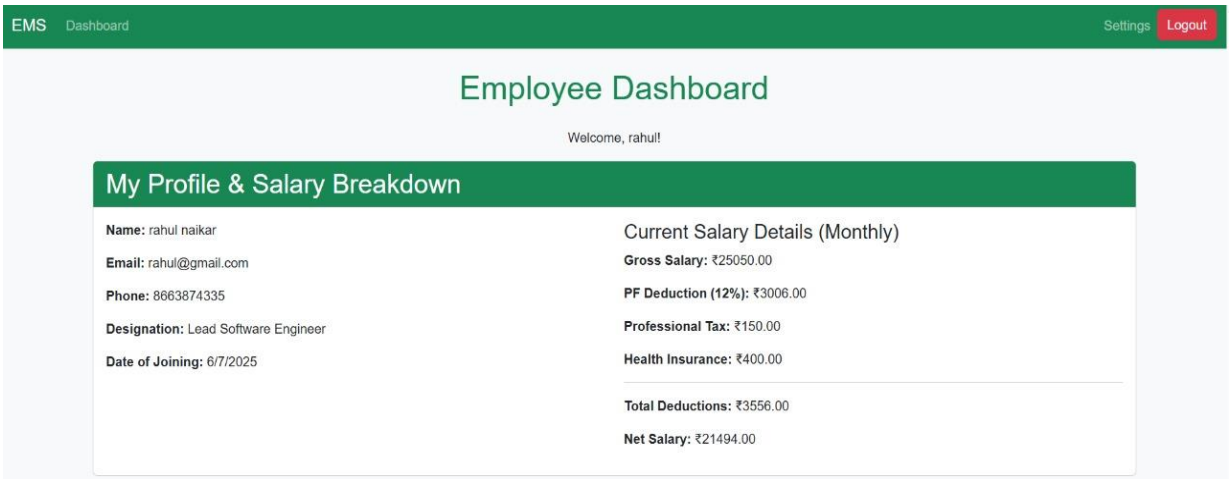


Fig 15. profile and Salary Details

The image displays an "Apply for Leave" form where users can select leave type, start/end dates, and provide a reason, with an "Apply Leave" button. Below this, there are sections for "My Leave

History" (currently empty) and "My Attendance Records" showing a single entry for June 9, 2025.

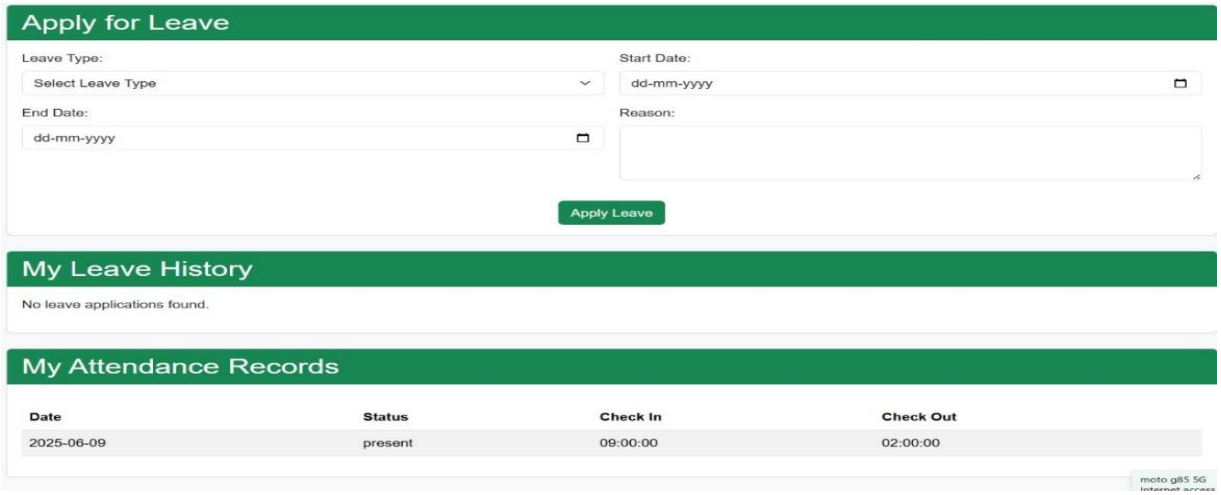


Fig 16. Employee Apply for leave, History and Attendance records

Conclusion

The Employee Management System effectively addresses the challenges of traditional HR processes by providing an automated, centralized, and user-friendly digital platform. It streamlines core functions such as employee profile management, attendance tracking, leave processing, and salary administration. By leveraging modern web technologies like React, Node.js, and MYSQL, along with cloud storage for documents, the system ensures scalability, real-time data interaction, and efficient management of employee information.

This platform enhances the user experience for both employees and HR administrators, reduces administrative workload, improves transparency, and supports better workforce management. With future enhancements, it can be extended to include mobile accessibility, real-time notifications, and advanced analytics, making it a comprehensive solution for organizational employee management.

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