PROJECT REPORT

Project Title: Employee Management System (EMS)

Client / Organization: Invologic Software Services

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1. Executive Summary

The Employee Management System (EMS) is a web-based, role-driven enterprise application developed to digitally transform and centralize employee-related operations within an organization. In many organizations, employee management processes such as onboarding, attendance tracking, task allocation, and leave processing are handled using manual methods or disconnected software tools. These approaches often result in data inconsistencies, delayed approvals, lack of transparency, security vulnerabilities, and increased administrative workload. The Employee Management System is designed to overcome these challenges by providing a secure, centralized, and automated platform that manages the complete employee lifecycle efficiently.

The primary objective of EMS is to automate and streamline human resource and administrative processes while ensuring data accuracy, security, and operational transparency. The system supports three distinct user roles—Admin, HR, and Employee—each with clearly defined responsibilities and controlled access. Role-based access control is enforced at the middleware level to ensure that users can only access authorized features and data. This structure not only improves system security but also maintains organizational hierarchy and accountability.

The system is developed using the Django web framework and follows a modular architecture to ensure scalability and maintainability. SQLite3 is used as the relational database management system for development and deployment simplicity. The frontend is built using HTML, CSS, and Bootstrap/Tailwind to provide a responsive and user-friendly interface, while Chart.js is used to display real-time dashboards and graphical analytics. These dashboards enable management to gain insights into workforce metrics such as attendance compliance, task performance, leave trends, and salary expenditure.

Security is a core focus of the Employee Management System. The application implements OTP-based authentication during first-time login, secure password hashing, role-based authorization, CSRF protection, and audit logging of sensitive operations. Automated email notifications are integrated using an SMTP email backend to notify users about important system events such as account creation, OTP verification, task assignments, attendance approvals, leave decisions, and salary credits. This ensures timely communication and improves transparency across the organization.

From a business perspective, EMS significantly reduces manual effort and administrative overhead by automating routine HR tasks. It minimizes human errors in attendance and salary calculations, accelerates approval workflows, and improves employee satisfaction through timely updates and self-service features. The centralized data repository and real-time analytics support informed decision-making and long-term workforce planning.

In conclusion, the Employee Management System delivers a robust, secure, and scalable solution for modern workforce management. It aligns with organizational goals by improving operational efficiency, ensuring data integrity, enhancing security, and providing actionable insights. The system is designed for future extensibility, allowing seamless integration with enterprise databases, advanced analytics, and additional modules as organizational needs evolve.

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2. Project Overview

2.1 Business Problem Statement

In contemporary organizations, effective employee management is fundamental to operational efficiency, workforce satisfaction, and long-term business success. However, many organizations—especially small to medium-scale enterprises—continue to rely on traditional, manual, or semi-digital methods for managing employee-related processes. These methods typically include paper-based records, spreadsheets, email-based approvals, and disconnected software tools. While such approaches may function at a very small scale, they become increasingly inefficient, error-prone, and unmanageable as the organization grows.

One of the most significant challenges faced by organizations is the lack of a centralized system for managing employee data. Employee information such as personal details, attendance records, task assignments, leave history, and salary details are often stored across multiple platforms or maintained manually. This fragmentation leads to data inconsistency, duplication, and difficulty in retrieving accurate information when required. As a result, management struggles to maintain a single source of truth for employee records.

Attendance management is another major problem area. In manual or spreadsheet-based systems, attendance tracking is highly dependent on human input, making it susceptible to errors, manipulation, and disputes. Employees may forget to mark attendance, records may be incorrectly entered, and there is often no structured verification mechanism. The absence of a proper approval workflow makes it difficult for HR teams to validate attendance data accurately, directly affecting payroll calculations and organizational compliance.

Task management and performance tracking also present serious challenges in traditional systems. Tasks are frequently assigned verbally or through informal communication channels such as emails or messaging applications. This leads to ambiguity regarding task ownership, deadlines, priorities, and completion status. Without a structured task lifecycle, organizations lack visibility into employee workload, task progress, and overdue responsibilities. This reduces accountability and makes performance evaluation subjective rather than data-driven.

Leave management processes in many organizations are equally inefficient. Leave requests are often submitted via emails or physical forms, requiring manual tracking by HR personnel. This approach leads to delays in approvals, lack of transparency for employees, and difficulty in maintaining accurate leave balances. Inconsistent documentation and poor record maintenance further complicate compliance and reporting requirements.

Salary management and payslip generation are highly sensitive operations that demand accuracy and confidentiality. In the absence of an integrated system, salary calculations are often performed manually or using separate tools, increasing the risk of miscalculations, delayed payments, and employee dissatisfaction. The lack of automated notifications and audit trails makes it difficult to track salary-related actions and ensure transparency.

Security and access control represent another critical problem in traditional employee management practices. Sensitive employee data is often accessible to unauthorized personnel due to weak access controls. There is typically no structured authentication mechanism, no role-based authorization, and no audit logging to track system usage. This exposes organizations to data breaches, internal misuse, and compliance risks.

Additionally, organizations lack real-time visibility into workforce metrics. Management is often unable to access consolidated insights related to attendance compliance, departmental distribution, leave trends, task performance, or salary expenditure. The absence of analytical dashboards forces decision-makers to rely on incomplete or outdated data, limiting their ability to plan strategically and respond proactively to operational issues.

Communication gaps further exacerbate these challenges. Important updates such as task assignments, attendance approvals, leave decisions, and salary confirmations are often communicated manually, leading to delays and misunderstandings. Employees may remain unaware of the status of their requests, while HR teams spend excessive time responding to routine queries.

In summary, the core business problem lies in the absence of a secure, centralized, automated, and role-based employee management system. Existing approaches fail to scale with organizational growth, lack transparency and accountability, introduce security risks, and impose a heavy administrative burden on HR and management teams. These inefficiencies negatively impact operational productivity, employee satisfaction, and organizational decision-making.

The Employee Management System (EMS) is proposed to address these challenges by providing a unified digital platform that automates employee lifecycle management, enforces role-based access control, ensures data accuracy, enhances security, and delivers real-time insights. By replacing fragmented and manual processes with a structured, technology-driven solution, EMS aims to resolve the fundamental business problems associated with traditional employee management practices.

2.2 Project Objectives

The primary objectives of the Employee Management System are:

- To centralize employee information in a secure digital system
- To automate employee onboarding and role assignment
- To implement OTP-based authentication for enhanced security
- To streamline attendance submission and verification workflows

- To automate task assignment and lifecycle management
- To manage leave requests and approvals efficiently
- To process salaries and generate payslips accurately
- To provide real-time dashboards and analytical insights

2.3 Scope of the Project

In-Scope:

- Role-based access control for Admin, HR, and Employee users
- Employee and HR account creation and management
- OTP verification during first-time login
- Attendance submission by employees and HR verification
- Task management with defined lifecycle states
- Leave management with approval workflow
- Salary management including payslip generation
- Automated email notifications and audit logging

Out-of-Scope:

- Mobile application development
- Biometric attendance hardware integration
- Third-party payroll or ERP system integration
- External identity providers (SSO)

2.4 Key Deliverables

- Fully functional Employee Management System web application
- Secure and normalized database schema
- Role-based dashboards for Admin, HR, and Employee
- Email notification and OTP authentication system
- Project documentation and deployment-ready codebase

2.5 Success Criteria

The success of the project will be measured by:

- Successful enforcement of role-based access control
- Secure and reliable OTP authentication
- Accurate attendance, leave, and salary processing
- Improved efficiency in HR operations
- Positive user feedback from Admin, HR, and Employees
- System stability and maintainability

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3. Solution Architecture & Design

3.1 System Architecture Diagram

The System Architecture Diagram represents the high-level structural design of the Employee Management System (EMS). It illustrates how different system components interact with each other, including the user interface, application logic, database, and external services. The architecture is designed to ensure security, scalability, and efficient data flow across all modules.

The system follows a layered architecture model consisting of the Presentation Layer, Application Layer, and Data Layer. Users access the system through a web browser, where role-specific interfaces are provided for Admin, HR, and Employee users. Requests from the frontend are processed by the backend server, which contains the business logic and enforces authentication and authorization rules. The backend communicates with the database to store and retrieve system data.

An email service is integrated into the architecture to support OTP-based authentication and system notifications. This modular design ensures separation of concerns, simplifies maintenance, and allows future enhancements without major architectural changes.

Architecture Flow Description

- **User Layer**: Admin, HR, and Employee access the system via a web browser.
- **Frontend Layer**: Developed using HTML, CSS, and Bootstrap for responsive user interaction.
- **Backend Layer**: Implemented using the Django framework to handle business logic, role validation, and workflows.
- **Database Layer**: Uses a relational database to store employee, attendance, task, leave, and salary data.
- **External Services**: Email service for OTP verification and notifications.

System Architecture Diagram:

```
Admin / HR / Employee
       │
       ▼
   Web Browser
       │
       ▼
Frontend (HTML, CSS, Bootstrap)
       │
       ▼
Backend (Django Application)
  ├── Authentication & Authorization
  ├── Business Logic Modules
  └── Role Management
       │
       ▼
Relational Database
       │
       ▼
Email Service (OTP & Notifications)
```

3.2 System Architecture Overview

The Employee Management System (EMS) is designed using a modular, layered, and role-driven architecture that ensures scalability, security, maintainability, and clear separation of concerns. The architecture follows the Model–View–Template (MVT) design principles as implemented by the Django framework. This architectural approach enables structured development, easier debugging, template access to system resources, and future extensibility.

At a high level, the EMS architecture consists of three primary layers: the Presentation Layer (Frontend), the Application Layer (Backend), and the Data Layer (Database). These layers interact in a well-defined manner to deliver a secure and efficient user experience.

Presentation Layer (Frontend)

The Presentation Layer represents the user-facing component of the system. It is developed using HTML5, CSS3, and Bootstrap/Tailwind CSS to provide a responsive, consistent, and intuitive user interface across different devices and screen sizes. The frontend dynamically adapts based on the authenticated user's role—Admin, HR, or Employee—ensuring that users only see menus, dashboards, and functionalities relevant to their access level.

User interactions such as form submissions, attendance marking, task actions, leave applications, and dashboard navigation originate at this layer. For analytical visualization, Chart.js is integrated to render real-time graphs and charts, such as attendance trends, task completion statistics, and salary summaries. The frontend communicates with the backend through HTTP requests, ensuring smooth and efficient data exchange.

Application Layer (Backend)

The Application Layer forms the core of the Employee Management System and is implemented using the Django web framework. This layer handles all business logic, request processing, validation, and coordination between the frontend and database.

The backend is structured into multiple Django applications to maintain modularity and clarity:

- **Core Module:** Contains shared models, utilities, and configuration settings used across the system.
- **Admin Module:** Manages system-level operations such as employee and HR account creation, role assignment, system monitoring, and organizational analytics.
- **HR Module:** Handles operational workflows including task assignment, attendance verification, leave approvals, salary management, and payslip generation.
- **Employee Module:** Provides employee-specific functionalities such as attendance submission, task interaction, leave application, and salary viewing.

Django's URL routing and view mechanisms handle incoming requests from the frontend. Each request passes through authentication and authorization middleware, which verifies user identity and role permissions before allowing access to protected resources. This ensures strict enforcement of role-based access control throughout the system.

Authentication and Authorization Mechanism

Security is deeply integrated into the system architecture. EMS uses a custom user model extending Django's authentication framework, with email-based login as the primary identifier. During first-time login, users must complete OTP-based authentication, where a time-bound one-time password is sent to the registered email address for identity verification.

Role-based access control is implemented using middleware, ensuring that Admin, HR, and Employee users cannot access unauthorized URLs or features. Additional security mechanisms such as password hashing, session management, CSRF protection, and account lockout policies further strengthen the system against unauthorized access and misuse.

Data Layer (Database)

The Data Layer is responsible for persistent storage and retrieval of system data. EMS uses SQLite3 as the relational database management system for development and deployment simplicity. The database schema is carefully designed to ensure normalization, referential integrity, and efficient querying.

Core entities such as users, employee profiles, attendance records, tasks, leaves, salaries, payslips, OTP verifications, notifications, and audit logs are stored in structured tables with defined relationships. Foreign key constraints enforce data consistency, while audit and notification logs ensure traceability of system actions.

Integration Services

The architecture integrates external services to enhance system functionality. An SMTP-based email service is used for sending OTPs and automated notifications related to system events such as account creation, task updates, attendance approvals, leave decisions, and salary credits. Chart.js is integrated at the frontend to provide visual analytics without requiring full page reloads.

3.3 Technology Stack

Frontend: HTML5, CSS3, Bootstrap/Tailwind CSS, Chart.js
Backend: Django (Python)
Database: SQLite3
Authentication: Custom Django User Model with OTP Verification
Email Services: SMTP-based email backend

3.4 Integration Points

- Email server integration for OTP delivery and notifications
- Chart.js integration for real-time dashboards
- Django middleware for authentication and authorization enforcement

3.5 Security & Compliance Considerations

- Role-based access control using middleware
- Secure password hashing using Django authentication
- OTP verification with expiry and retry limits
- CSRF protection for all forms
- Comprehensive audit logging of authentication and system events

3.6 Scalability & Performance Strategy

The modular design enables horizontal scalability and easy feature expansion. The database layer is designed to support migration to enterprise-grade databases such as PostgreSQL. Asynchronous data loading is used for dashboards to enhance performance and user experience.

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4. Implementation Plan

4.1 Project Phases

1. Requirement analysis and SRS finalization
2. System architecture and database design
3. Core authentication and Admin module development

4. HR module development
5. Employee module development
6. Integration and system testing
7. Deployment and documentation

4.2 Milestones

- Architecture design and core setup
- Admin and HR module development
- Employee module and dashboards
- Testing, bug fixing, and deployment

4.3 Resource Allocation

- Project Lead / Architect: 1
- HR Module Developer: 1
- Employee Module Developer: 1
- QA Support: Shared

4.4 Risk Assessment & Mitigation

- **Security risks:** Mitigated through OTP, RBAC, and audit logging
- **Integration conflicts:** Controlled using branch-based Git workflow
- **Requirement changes:** Managed through strict SRS adherence

4.5 Testing & Quality Assurance Strategy

- Unit testing for individual modules
- Integration testing across all roles
- Role-based access validation
- Manual and functional testing

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5. Development Team Introduction

Role	Name	Experience	Responsibilities
Project Manager / Tech Lead	Akshit Jain	0 Years	Architecture, Admin module, DB design
Backend Developer (HR Module)	Shweta	0 Years	HR workflows, salary, attendance
Frontend & Employee Module Developer	Nikita	0 Years	Employee UI, dashboards
QA Engineer	Shared	0 Years	Testing and validation

6. Financial & Business Impact Analysis

6.1 Development Cost Estimation

The project is developed using open-source technologies, minimizing licensing costs. Development effort is primarily academic and internship-focused, reducing overall expenditure.

6.2 Infrastructure & Operational Costs

- Hosting and server costs (minimal)
- Email service configuration costs
- Maintenance and support efforts

6.3 Return on Investment (ROI)

- Reduction in manual HR workload
- Faster processing of attendance and salaries
- Improved employee satisfaction
- Long-term cost savings through automation

6.4 Business Impact & Value Proposition

EMS provides organizations with improved operational efficiency, data accuracy, transparency, and scalability. The system supports informed decision-making through real-time analytics and secure data handling.

7. Results and Screenshots

The Employee Management System (EMS) was successfully implemented in accordance with the defined Software Requirements Specification (SRS). The system effectively automates core organizational processes such as employee onboarding, attendance tracking, task management, leave processing, and salary management. All modules—Admin, HR, and Employee—functioned correctly during testing and demonstrated reliable performance.

Role-based access control and OTP-based authentication ensured secure system usage. Data was stored and retrieved accurately, and real-time dashboards provided meaningful insights into organizational activities. Overall, the system met its functional and security objectives and proved suitable for practical deployment.

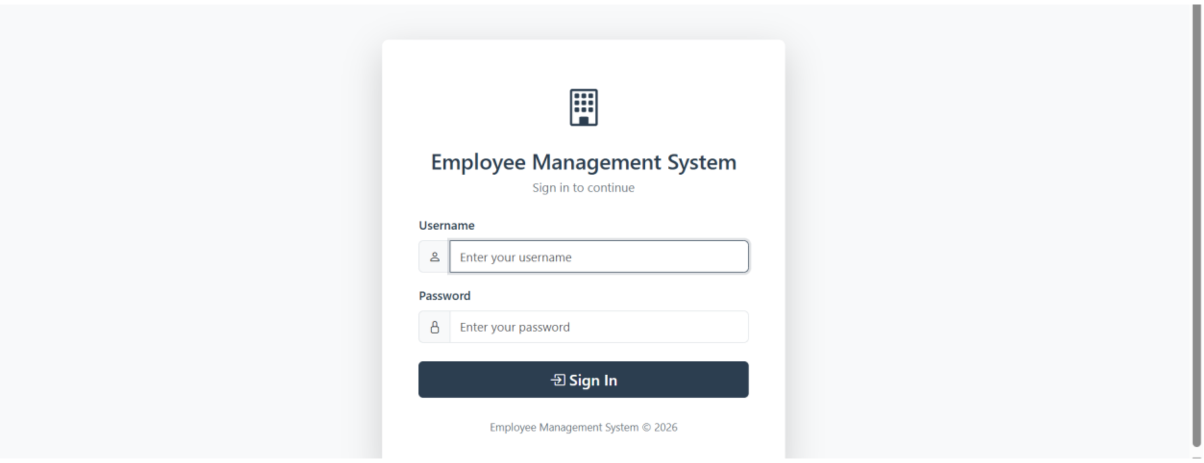
7.1 Screenshots Description

The following screenshots illustrate the working of the Employee Management System:

- Login and OTP Verification Screen: Displays secure user authentication using email and OTP.
- Admin Dashboard: Shows system overview, employee statistics, and management options.
- HR Task Assignment Module: Demonstrates task creation, assignment, and tracking.
- Employee Attendance Submission Screen: Allows employees to mark and submit attendance.
- Leave Management Screen: Shows leave application and approval workflow.

Screenshots:

Login page



Employee Management System

Sign in to continue

Username

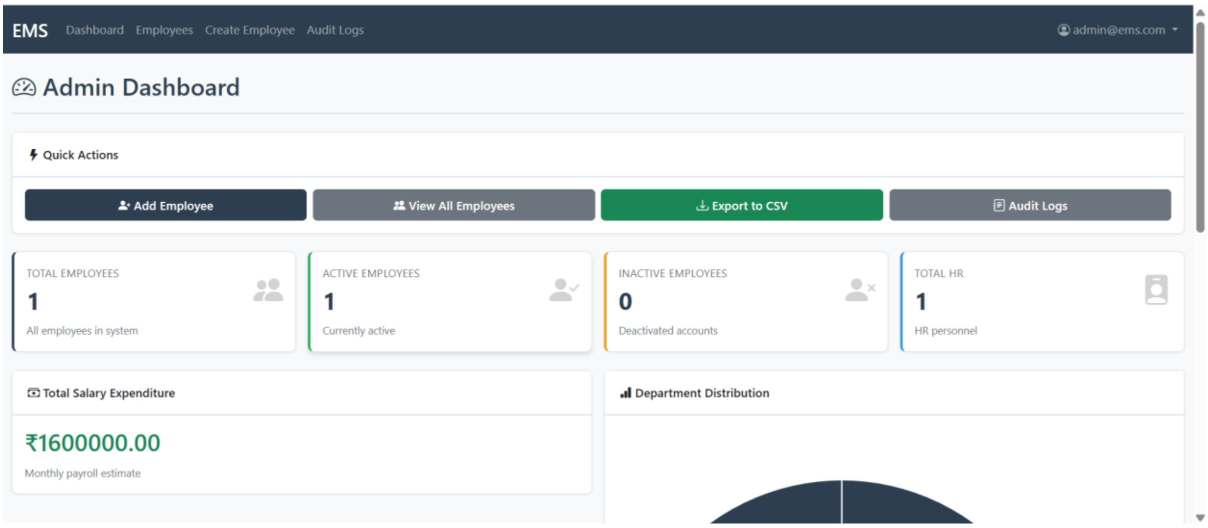
Enter your username

Password

Enter your password

Employee Management System © 2026

Admin :



Admin Dashboard

Quick Actions

TOTAL EMPLOYEES
1
All employees in system

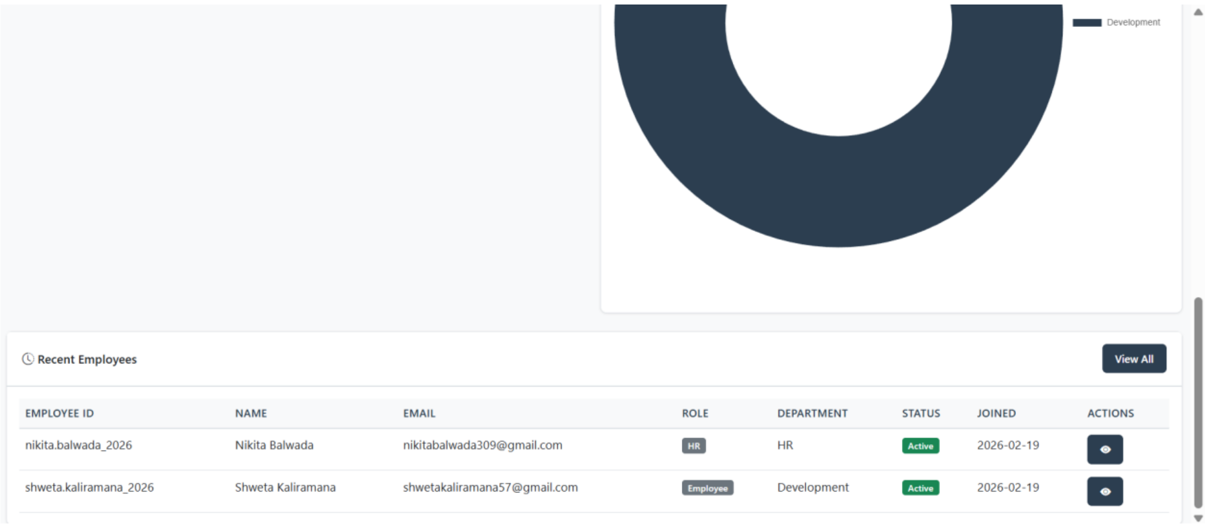
ACTIVE EMPLOYEES
1
Currently active

INACTIVE EMPLOYEES
0
Deactivated accounts

TOTAL HR
1
HR personnel

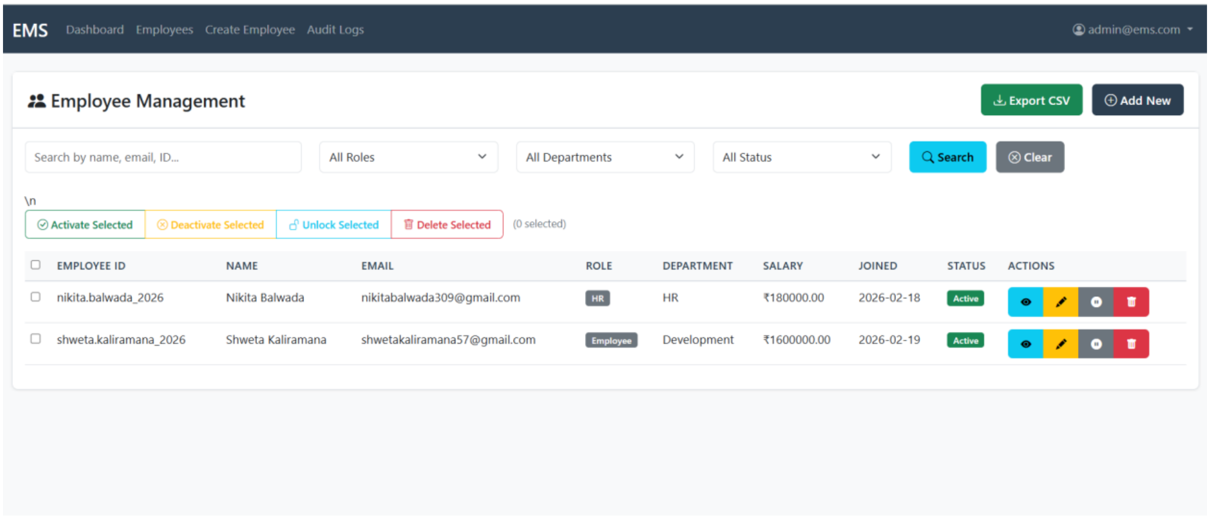
Total Salary Expenditure
₹1600000.00
Monthly payroll estimate

Department Distribution



Recent Employees

EMPLOYEE ID	NAME	EMAIL	ROLE	DEPARTMENT	STATUS	JOINED	ACTIONS
nikita.balwada_2026	Nikita Balwada	nikitabalwada309@gmail.com	HR	HR	Active	2026-02-19	
shweta.kaliramana_2026	Shweta Kaliramana	shwetakaliramana57@gmail.com	Employee	Development	Active	2026-02-19	

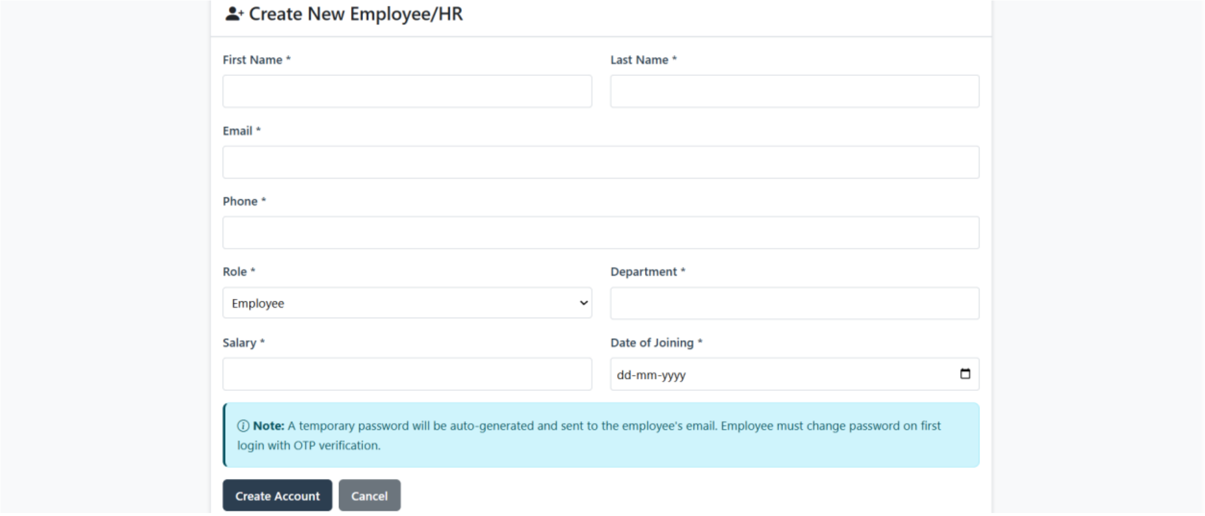


Employee Management

\n

(0 selected)

☐	EMPLOYEE ID	NAME	EMAIL	ROLE	DEPARTMENT	SALARY	JOINED	STATUS	ACTIONS
☐	nikita.balwada_2026	Nikita Balwada	nikitabalwada309@gmail.com	HR	HR	₹180000.00	2026-02-18	Active	
☐	shweta.kaliramana_2026	Shweta Kaliramana	shwetakaliramana57@gmail.com	Employee	Development	₹1600000.00	2026-02-19	Active	



Create New Employee/HR

First Name *

Last Name *

Email *

Phone *

Role *

Employee

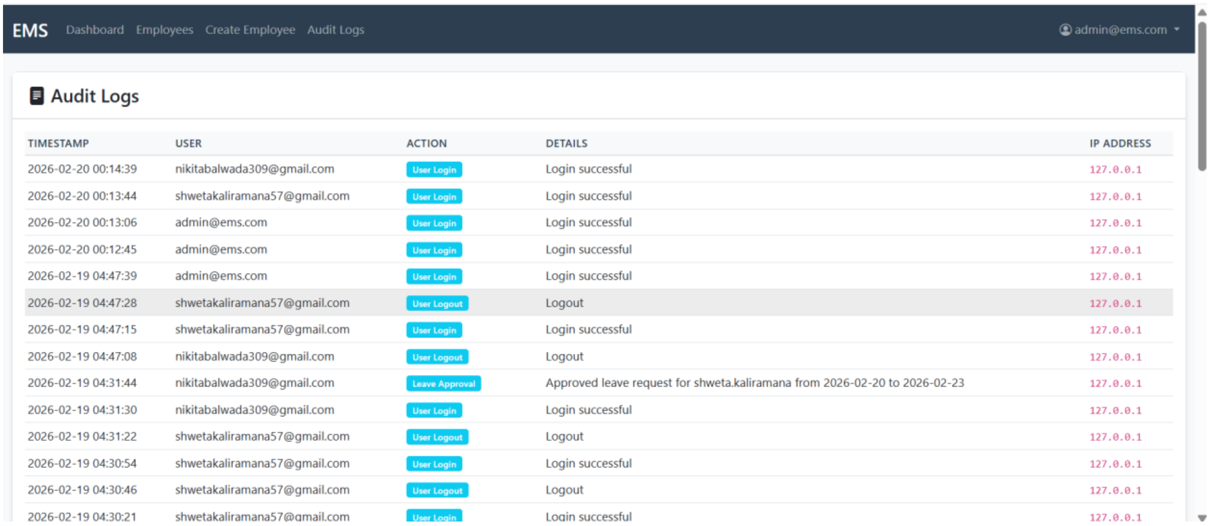
Department *

Salary *

Date of Joining *

dd-mm-yyyy

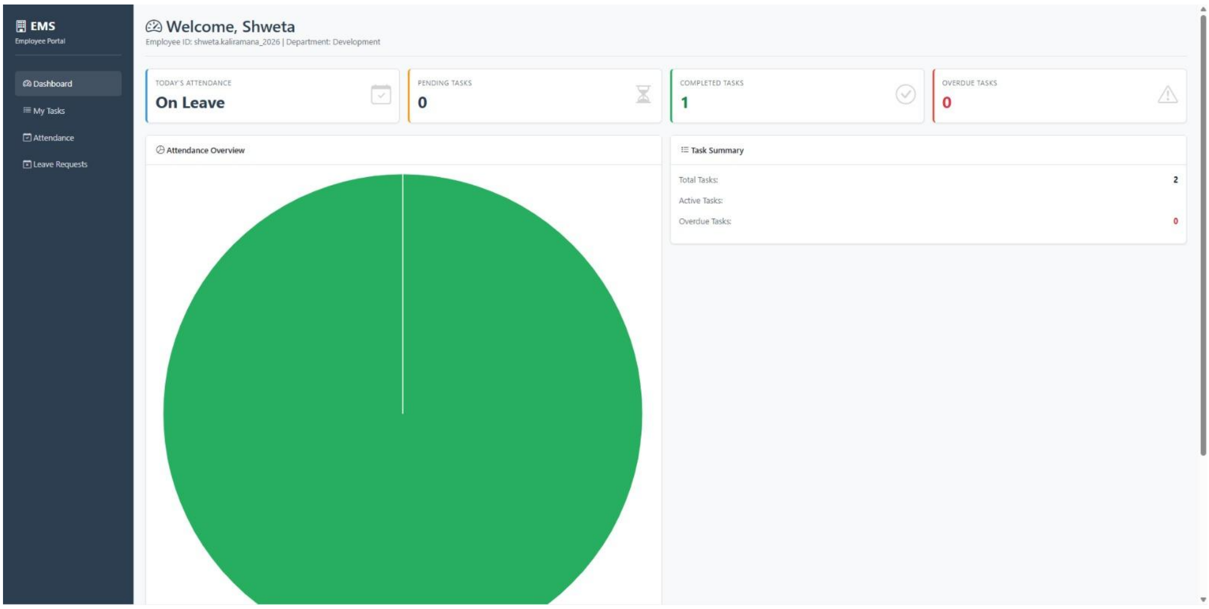
ⓘ **Note:** A temporary password will be auto-generated and sent to the employee's email. Employee must change password on first login with OTP verification.



Audit Logs

TIMESTAMP	USER	ACTION	DETAILS	IP ADDRESS
2026-02-20 00:14:39	nikitabalwada309@gmail.com	User Login	Login successful	127.0.0.1
2026-02-20 00:13:44	shwetakaliramana57@gmail.com	User Login	Login successful	127.0.0.1
2026-02-20 00:13:06	admin@ems.com	User Login	Login successful	127.0.0.1
2026-02-20 00:12:45	admin@ems.com	User Login	Login successful	127.0.0.1
2026-02-19 04:47:39	admin@ems.com	User Login	Login successful	127.0.0.1
2026-02-19 04:47:28	shwetakaliramana57@gmail.com	User Logout	Logout	127.0.0.1
2026-02-19 04:47:15	shwetakaliramana57@gmail.com	User Login	Login successful	127.0.0.1
2026-02-19 04:47:08	nikitabalwada309@gmail.com	User Logout	Logout	127.0.0.1
2026-02-19 04:31:44	nikitabalwada309@gmail.com	Leave Approval	Approved leave request for shweta.kaliramana from 2026-02-20 to 2026-02-23	127.0.0.1
2026-02-19 04:31:30	nikitabalwada309@gmail.com	User Login	Login successful	127.0.0.1
2026-02-19 04:31:22	shwetakaliramana57@gmail.com	User Logout	Logout	127.0.0.1
2026-02-19 04:30:54	shwetakaliramana57@gmail.com	User Login	Login successful	127.0.0.1
2026-02-19 04:30:46	shwetakaliramana57@gmail.com	User Logout	Logout	127.0.0.1
2026-02-19 04:30:21	shwetakaliramana57@gmail.com	User Login	Login successful	127.0.0.1

Employee Dashboard:



Welcome, Shweta

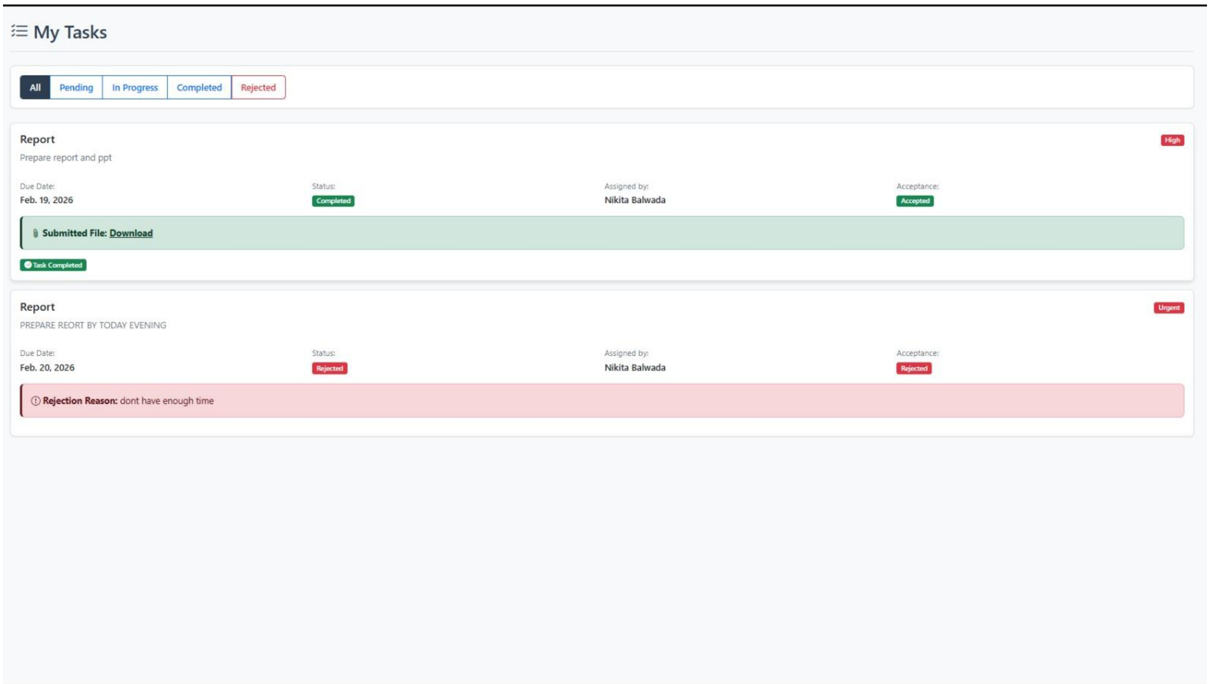
Employee ID: shweta.kaliramana_2026 | Department: Development

TODAY'S ATTENDANCE	PENDING TASKS	COMPLETED TASKS	OVERDUE TASKS
On Leave	0	1	0

Attendance Overview

Task Summary

Total Tasks:	2
Active Tasks:	
Overdue Tasks:	0



My Tasks

All | Pending | In Progress | Completed | Rejected

Report High

Prepare report and ppt

Due Date:	Status:	Assigned by:	Acceptance:
Feb. 19, 2026	Completed	Nikita Balwada	Accepted

Submitted File: Download

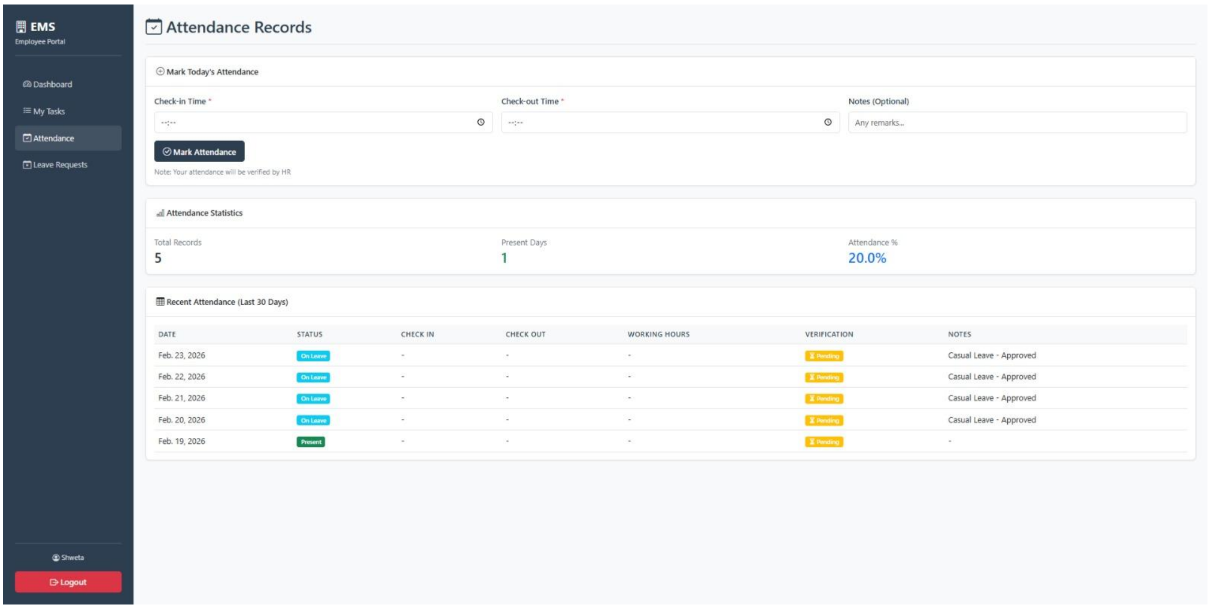
✓ Task Completed

Report Urgent

PREPARE REORT BY TODAY EVENING

Due Date:	Status:	Assigned by:	Acceptance:
Feb. 20, 2026	Rejected	Nikita Balwada	Rejected

Rejection Reason: dont have enough time



Attendance Records

Mark Today's Attendance

Check-in Time * --:--

Check-out Time * --:--

Notes (Optional) Any remarks...

Mark Attendance

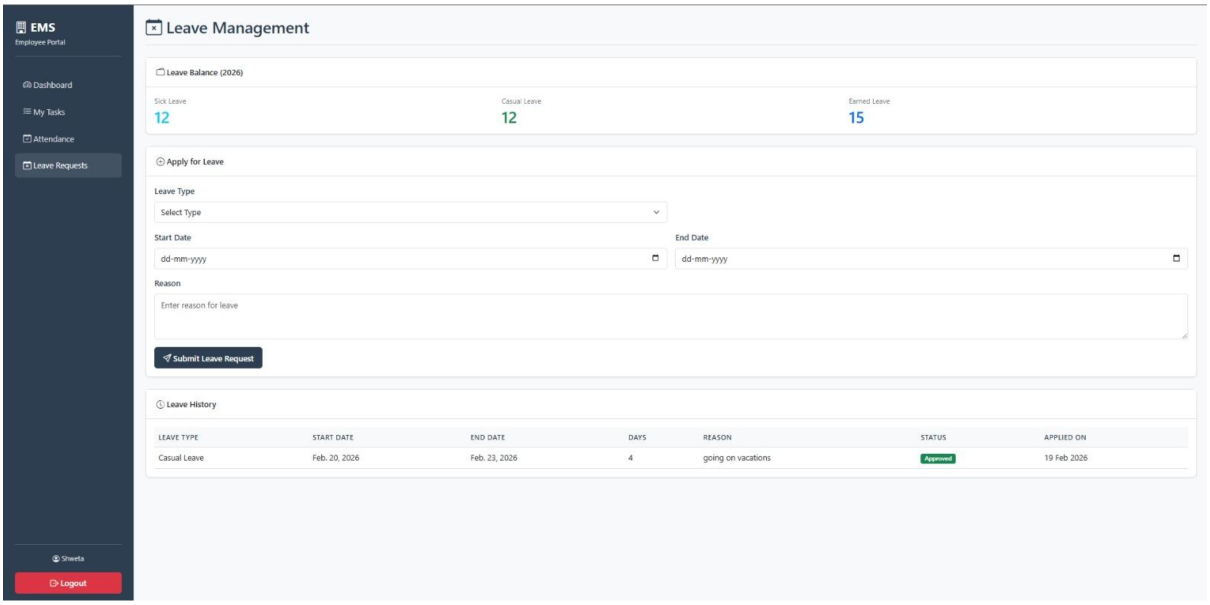
Note: Your attendance will be verified by HR

Attendance Statistics

Total Records	Present Days	Attendance %
5	1	20.0%

Recent Attendance (Last 30 Days)

DATE	STATUS	CHECK IN	CHECK OUT	WORKING HOURS	VERIFICATION	NOTES
Feb. 23, 2026	On Leave	-	-	-	Pending	Casual Leave - Approved
Feb. 22, 2026	On Leave	-	-	-	Pending	Casual Leave - Approved
Feb. 21, 2026	On Leave	-	-	-	Pending	Casual Leave - Approved
Feb. 20, 2026	On Leave	-	-	-	Pending	Casual Leave - Approved
Feb. 19, 2026	Present	-	-	-	Pending	-



Leave Management

Leave Balance (2026)

Sick Leave	Casual Leave	Earned Leave
12	12	15

Apply for Leave

Leave Type: Select Type

Start Date: dd-mm-yyyy

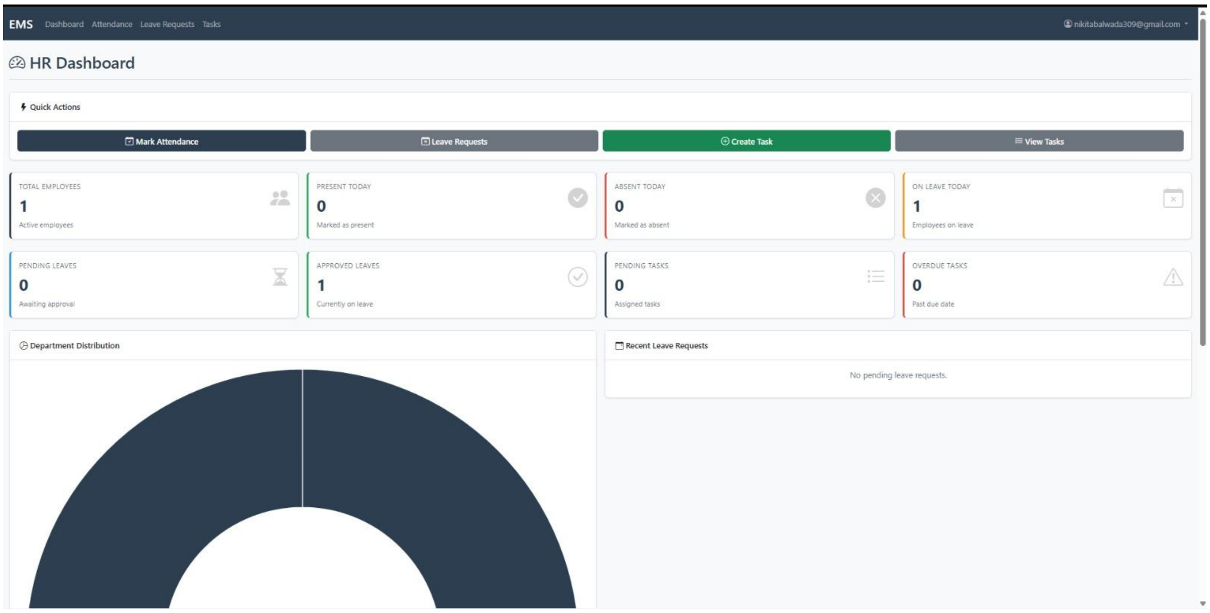
End Date: dd-mm-yyyy

Reason: Enter reason for leave

Leave History

LEAVE TYPE	START DATE	END DATE	DAYS	REASON	STATUS	APPLIED ON
Casual Leave	Feb. 20, 2026	Feb. 23, 2026	4	going on vacations	Approved	19 Feb 2026

HR Dashboard:



HR Dashboard

Quick Actions

TOTAL EMPLOYEES
1
Active employees

PRESENT TODAY
0
Marked as present

ABSENT TODAY
0
Marked as absent

ON LEAVE TODAY
1
Employees on leave

PENDING LEAVES
0
Awaiting approval

APPROVED LEAVES
1
Currently on leave

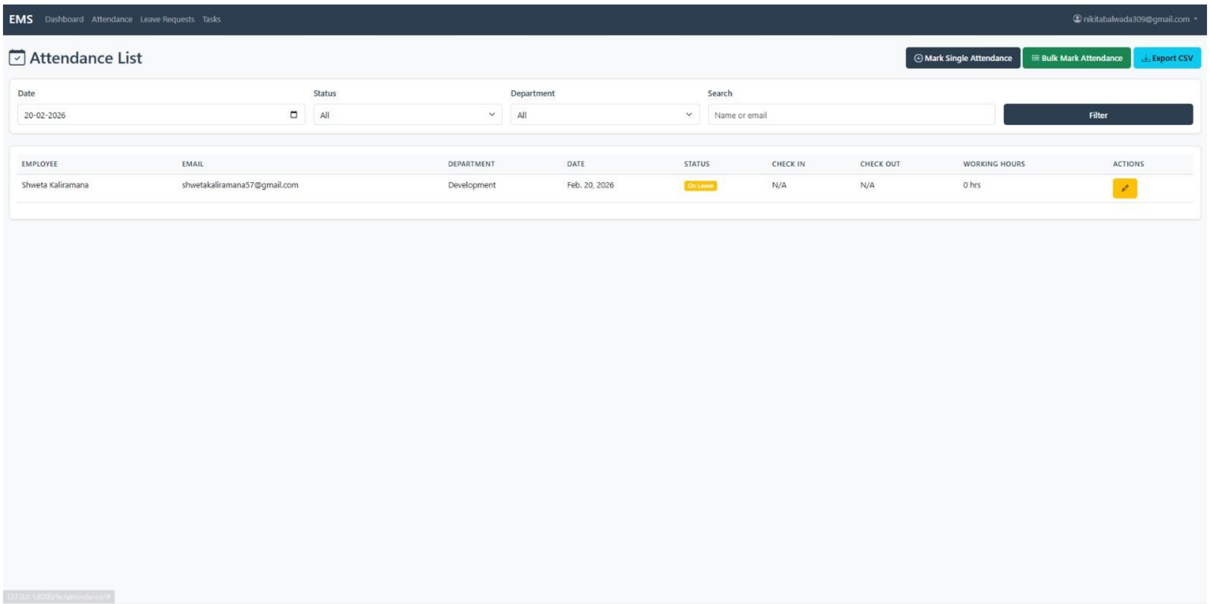
PENDING TASKS
0
Assigned tasks

OVERDUE TASKS
0
Past due date

Department Distribution

Recent Leave Requests

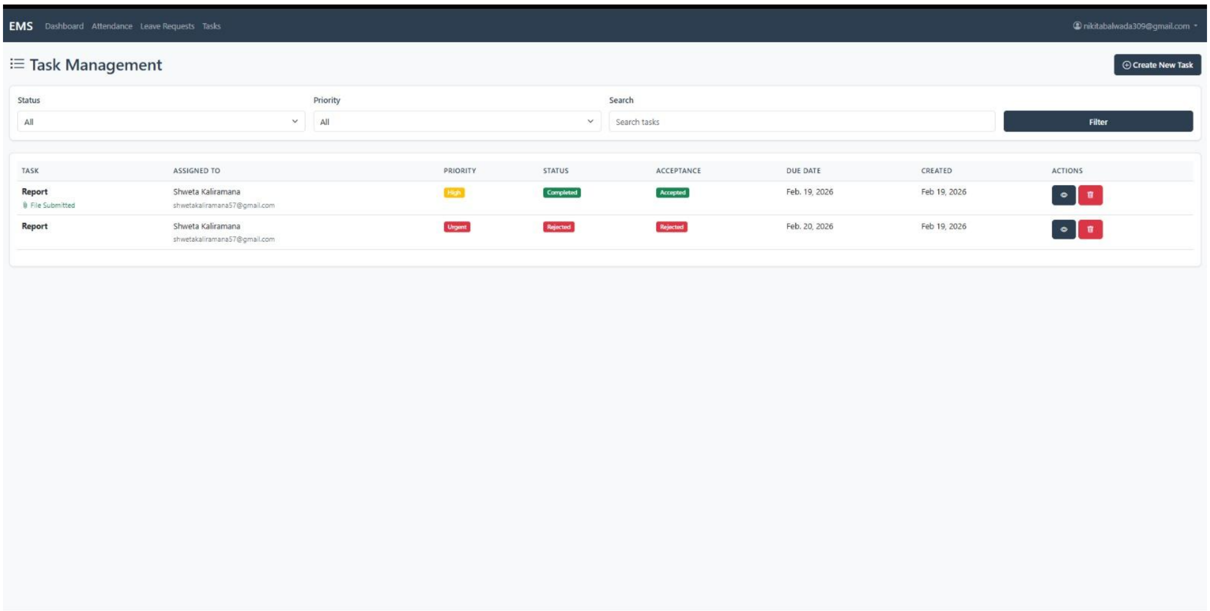
No pending leave requests.



Attendance List

Date: 20-02-2026
Status: All
Department: All
Search: Name or email

EMPLOYEE	EMAIL	DEPARTMENT	DATE	STATUS	CHECK IN	CHECK OUT	WORKING HOURS	ACTIONS
Shweta Kaliramana	shwetakaliramana57@gmail.com	Development	Feb. 20, 2026	On Leave	N/A	N/A	0 hrs	✎



Task Management

Status: All
Priority: All
Search: Search tasks

TASK	ASSIGNED TO	PRIORITY	STATUS	ACCEPTANCE	DUE DATE	CREATED	ACTIONS
Report File Submitted	Shweta Kaliramana shwetakaliramana57@gmail.com	High	Completed	Accepted	Feb. 19, 2026	Feb 19, 2026	👁 🗑
Report	Shweta Kaliramana shwetakaliramana57@gmail.com	Urgent	Rejected	Rejected	Feb. 20, 2026	Feb 19, 2026	👁 🗑

8. Conclusion & Next Steps

The Employee Management System (EMS) was successfully designed and developed to automate and streamline essential organizational processes. The system effectively addresses the limitations of traditional manual employee management by providing a centralized, secure, and role-based digital platform.

Through the implementation of modules for Admin, HR, and Employee roles, the system ensures efficient handling of employee data, attendance tracking, task management, leave processing, and salary generation. OTP-based authentication and role-based access control enhance system security and protect sensitive information.

The project demonstrates how modern web technologies can be leveraged to build scalable and maintainable enterprise applications. The successful testing and implementation of EMS confirm that it meets the requirements outlined in the Software Requirements Specification (SRS). Overall, the system improves operational efficiency, reduces manual effort, and enhances transparency, making it suitable for deployment in real-world organizational environments.

Next Steps:

- Stakeholder review and approval
- Production deployment
- User training and onboarding
- Future enhancements including mobile support and advanced analytics