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METROPOLITAN
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FACULTY OF COMPUTER SCIENCES AND IT
Software Engineering

Software Analysis and Design

Final Project Documentation

Topic: Employee Management System

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Accepted by: Ph.D Igli Hakrama

INTRODUCTION

The Employee Management System (EMS) represents a systematic and objective initiative aimed at optimizing workforce administration within the organization. This project seeks to evaluate, enhance, and redesign the existing employee management processes through a comprehensive analytical and design framework.

The imperative for this undertaking comes from the need to address identified inefficiencies in the current employee management system. This includes recruitment, onboarding, performance tracking, payroll management and more. The project's primary objective is to deliver a streamlined, user-centric, and technologically advanced EMS that aligns with organizational goals and industry best practices.

By the project's conclusion, the organization anticipates a technologically sophisticated Employee Management System that not only addresses current shortcomings but also positions itself to adapt to future organizational needs and industry advancements. In essence, this project encapsulates a pragmatic approach to enhance organizational efficiency, transparency, and employee satisfaction through the implementation of an advanced workforce management solution.

STAKEHOLDERS

Stakeholders table

Stakeholder	Stakeholder Role & Responsibility	Importance	Influence	Interests	Concerns
Executive team	• Strategic Direction • Decision-making • Resource Allocation	High	High	• Efficiency in HR operations • Cost-effectiveness	• Data security • Legal compliances • System Scalability
HR Director	• Compliance • Employee Engagement	High	High	• Streamlined HR processes • Employee satisfaction	• Data security • Data accuracy • System reliability
IT Manager	• System Development • System Maintenance	High	High	• Technical functionality • Security	• Data security • System reliability
Department Heads	• Employee management • Performance Evaluations • Resource allocation	Medium	Medium	• Efficient team management • Goal attainment	• Data accuracy • System customization
IT Support Staff	• System Maintenance • Troubleshooting • User Training	Medium	Medium	• System stability • Data security	• Technical issues • Data security • User training
Employees	• System Usage • Feedback	Low	Low	• Ease of use • Self service • Accessibility	• Privacy concerns • User training • System downtime
Regulatory Agencies	• Legal Oversight • Compliance Enforcement	Low	Low	• Employee data protection • Regulatory compliance	• Privacy concerns • Legal non-compliance • Data security

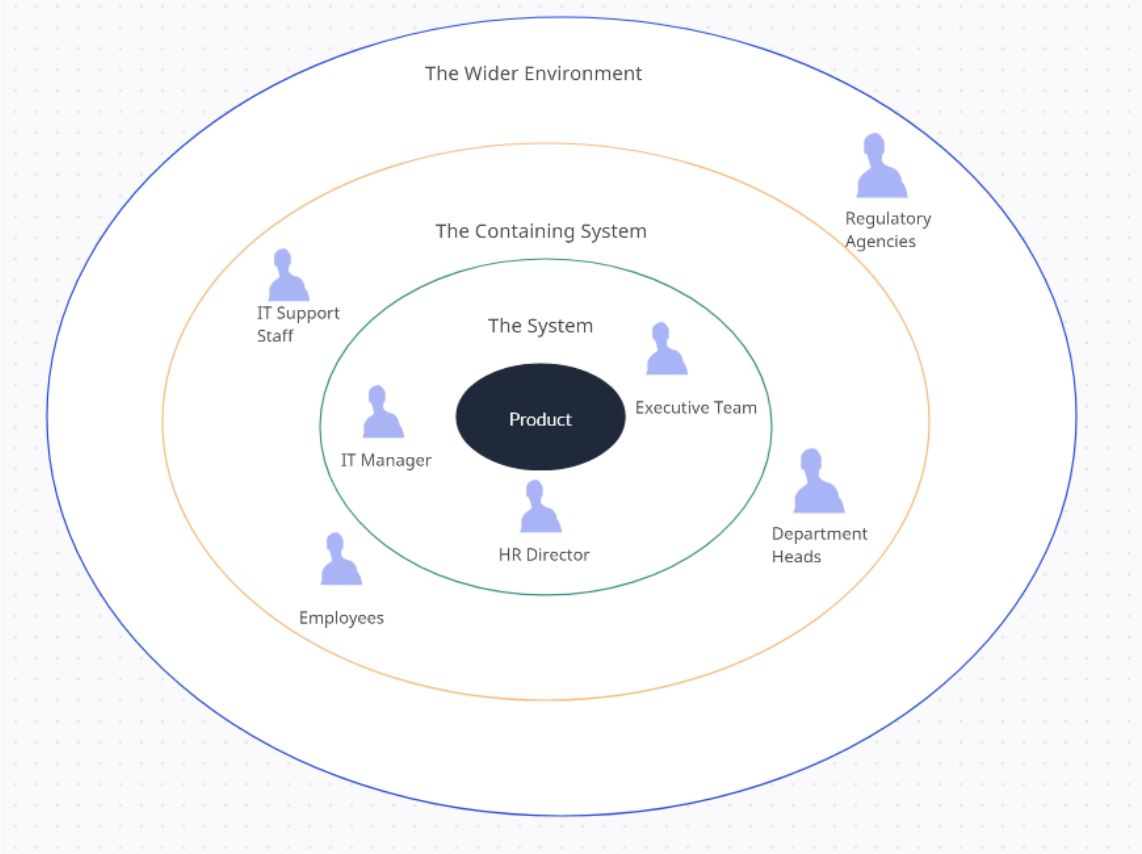
*Data security and privacy is a concern for all stakeholders

In the ecosystem of the EMS, various stakeholders play integral roles, each contributing to the system's effectiveness and alignment with organizational goals.

- The IT Manager is pivotal, overseeing the technical infrastructure, security protocols, and system integrations.
- The HR Director, as a key stakeholder, utilizes the EMS for talent acquisition, performance management, and compliance with HR policies.
- The Executive Team relies on the EMS for strategic decision-making by leveraging its reporting and analytics capabilities.
- Employees are direct users, interacting with the system for self-service, leave requests, and performance assessments.
- IT support staff ensure the system's operational efficiency, troubleshooting issues and providing technical support.
- Department Heads utilize the EMS to manage their teams, track project progress, and align workforce strategies with broader organizational objectives.

The collaborative engagement of these stakeholders ensures the comprehensive and seamless functionality of the EMS, promoting efficient workforce management throughout the organization.

STAKEHOLDERS ONION MODEL



FUNCTIONAL REQUIREMENTS

No.	Name	Description
1	User Authentication	The system should provide secure user authentication mechanisms for access control.
2	Employee Information Management	Capture and store essential employee details such as personal and job data.
3	Role-Based Access Control	Implement role-based access to ensure appropriate levels of system access for users.
4	Attendance Tracking	Record and manage employee attendance, including leave requests.
5	Performance Review	Support performance evaluation processes with features for goal setting and feedback.
6	Payroll Management	Automate payroll calculations, tax deductions, and other financial aspects accurately.
7	Task Management	Ability to create and assign tasks and projects to individual employees or groups.
8	Employee Self-Service	Offer a self-service portal for employees to access and update their personal information.
9	Leave Management	Offer an option for employees to make leave requests to their managers, keeping track of the request information.
10	Recruitment and Onboarding	Support the hiring process, from job postings to onboarding new employees.
11	Reporting and Analytics	Generate comprehensive reports and analytics on various HR metrics and key performance indicators.
12	Communication Tools	Provide tools for internal communication, including messaging, announcements, and alerts.
13	Security and Data Privacy	Implement robust security measures to safeguard employee data and ensure compliance with privacy regulations.
14	Compliance Management	Ensure adherence to legal and regulatory requirements in HR practices and policies.

NON-FUNCTIONAL REQUIREMENTS

Product Requirements

--Usability Requirements--

User Interface

- The system should have an intuitive and user-friendly interface for easy navigation.

Accessibility

- The system must comply with accessibility standards to ensure usability for employees with disabilities.

Customization

- Allow users to personalize their dashboard and display relevant information based on their role and preferences.
- Support multiple languages to cater to a diverse workforce.

Training and Onboarding

- Provide comprehensive training materials and tutorials to facilitate quick onboarding for new users.
- Implement a guided tour or help feature for users to easily understand system functionalities.

Responsive Design

- Ensure the system is responsive and adaptable to different screen sizes and devices, including desktops, tablets, and mobile phones.
- Optimize the user experience for both desktop and mobile platforms.

--Efficiency Requirements--

Performance Optimization

- The system should provide quick response times, with pages loading within acceptable time frames.

Workflow Automation

- Automate routine tasks, such as leave approvals and notifications, to streamline processes.

Search and Filtering

- Enable advanced search and filtering options to help users quickly locate relevant employee information.
- Implement search functionality that supports partial matches and filters based on multiple criteria.

--Security Requirements--

Data Encryption

- Employ strong encryption algorithms for data transmission and storage to protect sensitive employee information.
- Implement HTTPS for secure communication.

Access Control

- Enforce role-based access control to restrict system access based on user roles and responsibilities.
- Implement strong authentication mechanisms.

Audit Trail

- Maintain a detailed audit trail that logs all user activities, including login attempts, data modifications, and access history.

--Dependability Requirements--

Backup and Recovery

- Implement regular automated backups of the system data to prevent data loss.
- Develop a robust disaster recovery plan to ensure system availability in case of system failures.

Redundancy

- Ensure redundancy in critical components to minimize downtime in the event of hardware or software failures.
- Implement failover mechanisms for key system functionalities.

--Performance Requirements--

Scalability

- Design the system architecture to scale seamlessly as the organization grows in terms of users and data volume.
- Conduct load testing to ensure optimal performance under varying workloads.

Response Time

- Specify acceptable response times for common user actions (e.g., loading employee records, generating reports).
- Conduct performance testing to meet or exceed the defined response time benchmarks.

--Space Requirements--

Data Storage Capacity

- Estimate and allocate sufficient storage space to accommodate the expected growth in employee records and attachments.

Server Space

- Ensure that the server infrastructure has adequate space to store system files, logs, and backups.
- Regularly monitor server space usage and implement alerts for low disk space.

Organizational Requirements

--Operational Requirements—

Availability and Reliability

- The EMS should ensure 99.9% uptime to support critical HR and employee management functions.
- The system must have a reliable failover mechanism to minimize downtime in case of unexpected outages.

User Support

- Provide a 24/7 helpdesk or support service to address user queries, issues, and technical problems.
- Implement a ticketing system for tracking and resolving support requests in a timely manner.

Scalability

- The system should be scalable to accommodate the organization's growth in terms of the number of employees and data volume.
- Ensure that additional features and modules can be seamlessly integrated as the organization evolves.

--Environmental Requirements—

Operating System Compatibility

-The Employee Management System should be compatible with various operating systems to accommodate diverse workplace environments.

Technology: Java which provides platform independence through the use of Java Virtual Machine (JVM), allowing the system to run on different operating systems seamlessly.

Web Browser Support

-The system should be accessible through commonly used web browsers to facilitate easy and widespread access.

Technology: HTML5 and CSS3 for web interface development, ensuring compatibility with modern browsers such as Google Chrome, Mozilla Firefox, and Microsoft Edge.

Database Management System

-The system should support a robust database management system for efficient data storage and retrieval.

Technology: MySQL, providing a reliable and scalable relational database management system for handling employee data, attendance records, and other relevant information.

Mobile Accessibility

-The system should have mobile accessibility to enable employees and administrators to access functionalities on-the-go.

Technology: React Native for mobile app development, allowing the creation of cross-platform mobile applications that can run on both iOS and Android devices.

Security Measures

-The system should implement robust security measures to protect sensitive employee data and ensure data integrity.

Technology: HTTPS (SSL/TLS) for secure communication over the web, providing encryption and authentication to safeguard data during transmission.

Scalability

-The system should be scalable to accommodate the growth of the organization and increasing employee data.

Technology: Docker for containerization, enabling the deployment of the system in scalable and portable containers, facilitating efficient scaling based on demand.

Backup and Recovery

-The system should have robust backup and recovery mechanisms to prevent data loss in case of unexpected events.

Technology: Amazon S3 (Simple Storage Service) for cloud-based backup, providing a secure and scalable solution for storing backup data with easy retrieval options

--Development Requirements—

Agile Development Methodology

- Adopt an agile development approach to allow for iterative development and quick adaptation to changing organizational needs.
- Emphasize regular stakeholder feedback and collaboration throughout the development lifecycle.

Customization and Configurability

- Design the EMS with customization options to meet specific organizational requirements and workflows.
- Provide configurable settings to allow administrators to adapt the system to changing business processes.

Version Control

- Use version control systems to track code changes and manage releases.
- Establish a versioning policy to facilitate easy rollback in case of issues with new releases.

Testing and Quality Assurance

- Implement a robust testing strategy, covering unit testing, integration testing, and user acceptance testing.
- Ensure that the system meets quality standards and is free of critical bugs before each release.

External Requirements

--Regulatory Requirements—

Data Protection Authority Compliance

- The system must comply with the regulations and guidelines set by the Albanian Data Protection Authority.

General Data Protection Regulation Compliance

- The system should adhere to the General Data Protection Regulation (GDPR) principles regarding the processing and protection of personal data.

Labor Code Compliance

- The EMS must align with the Albanian Labor Code, ensuring that employment-related processes adhere to the legal requirements.

Taxation Regulations

- The system should support and adapt to any changes in the Albanian taxation regulations related to employee compensation and benefits.

--Ethical Requirements—

Confidentiality and Privacy

- The system must prioritize the confidentiality and privacy of employee information, ensuring that sensitive data is handled ethically and securely.

Non-Discrimination

- The EMS should support non-discrimination principles, ensuring fair and equitable treatment of employees regardless of gender, ethnicity, religion, sexuality or other protected characteristics.

Employee Consent

- The system must incorporate mechanisms to obtain and track employee consent for data processing activities in compliance with ethical standards.

--Legislative Requirements—

Work Hours Compliance

- The EMS should facilitate adherence to Albanian legislative requirements regarding working hours, breaks, and rest periods.

Leave Entitlements

- Ensure that the system accommodates and enforces statutory leave entitlements as per Albanian labor legislation.

Social Security Contributions

- The system must accurately calculate and manage social security contributions in accordance with Albanian laws.

Termination Procedures

- The EMS should support and enforce legal procedures related to employee termination, including notice periods and severance pay.

Employee Documentation Compliance

- Ensure that the system supports the required documentation and record-keeping mandated by Albanian employment laws.

Reporting to Authorities

- The system should generate reports as required by Albanian authorities for employment-related data, such as tax reporting and social security contributions.

SCENARIOS

User scenarios for the EMS depict various situations in which users interact with the system to accomplish specific tasks or processes. These scenarios provide a narrative that outlines the user's actions, system responses, and potential challenges. The scenarios cover functionalities such as onboarding, leave requests, payroll processing, attendance tracking, task management, performance reviews and employee self-service

1) New Employee Enrollment

A new employee joins the organization.

Normal Flow

1. HR logs into the EMS and navigates to the employee enrollment module to initiate the onboarding process for the new employee.
2. HR enters the employee's personal details, such as her full name, contact information, and emergency contacts, into the system.
3. HR assigns the employee to their designated job role, specifying their department, position, and team.
4. The system generates unique login credentials for the employee to access the EMS, ensuring secure and controlled access.
5. HR triggers an automated welcome email to the employee, containing their login details, onboarding instructions, and necessary company information.

Potential Issues

- Incorrect personal information input may result in payroll errors.
- System errors during enrollment may lead to delays.

Concurrent Activities

- The manager, receives a notification to approve the enrollment details, ensuring accuracy.
  Finish - The new employee is successfully enrolled, and HR has all necessary information in the system.

2) Leave Requests

An employee plans to take a week-long vacation.

Normal Flow

1. The employee logs into the EMS using his credentials.
2. Navigates to the "Leave Requests" section within the system.
3. Selects the desired date(s) for his leave and specifies the leave type (Personal Day).
4. He enters a brief reason for the leave request.
5. The system generates an automated notification to the manager, regarding the pending leave request.
6. The manager reviews the request, approves it, and leaves a comment.

Potential issues

- Manager is unavailable for approval, leading to a delay.
- Employee forgets to specify critical information in the leave request.

Concurrent Activities

- Other employees might be submitting leave requests simultaneously.

Finish - The employee receives a confirmation and the leave balance is updated in the system.

3) Payroll Processing

End of the month, HR is preparing for payroll processing.

Normal Flow

1. HR logs into the Employee Management System and accesses the payroll processing module.
2. The system displays a list of all employees, with their attendance records, overtime, and deductions.

3. HR verifies the accuracy of the employee salary based on their start date.
4. The system calculates net salaries, including tax deductions and bonuses.
5. HR reviews the payroll summary, ensuring compliance with company policies and legal regulations.
6. The manager of each department approves the payroll for their respective team members.
7. Once approved, HR initiates the payroll processing, and the system generates digital salary slips.
8. Employees, receive email notifications about the availability of their salary slips.

Potential issues

- Finance is conducting budget reviews for the upcoming month.
- The manager is preparing for a team-building event scheduled for the next week.

Concurrent Activities

- Finance team reviews financial reports for budgetary considerations.

Finish - Employees receive accurate salary slips, and financial records are updated

4) Attendance Tracking

Employees are required to log their daily working hours.

Normal Flow

1. The employee logs into the EMS using their provided credentials.
2. Navigates to the attendance tracking module to clock in for the day.
3. The system records the timestamp of the employee clock-in, marking them as present for the day.
4. The manager receives an automated notification indicating the employee's arrival.
5. The employee at the end of the day, logs into the EMS to clock out, and the system records the clock-out timestamp.

Potential Issues

- System downtime may lead to inaccurate recording of working hours.
- Employees forget to log in or out.

Concurrent Activities

- HR Onboarding Session: The employee is simultaneously attending an HR-led onboarding session.
- Manager Task Assignments: The manager is assigning tasks to the team during the day.

Finish - Accurate attendance records are maintained for payroll and performance evaluations

5) Task Assignment

A team is working on a project with various tasks assigned.

Normal Flow

1. Team lead logs into the EMS and accesses the task management module.
2. Creates tasks, assigns them to team members, and sets deadlines.
3. Team members receive notifications and update task statuses regularly.
4. Team lead reviews task progress and provides feedback.

Potential Issues

- Miscommunication may lead to task duplication or confusion.
- Team members face technical issues while updating task statuses.

Concurrent Activities

- Employees collaborate on tasks using the EMS's integrated communication tools.

Finish - All tasks are completed successfully, and the project progresses as planned.

6) Performance Reviews

Annual performance reviews are due for employees.

Normal Flow

1. HR sends notifications to managers and employees about the upcoming performance review.
2. The employee logs into the EMS to access the performance review module.
3. The employee completes a self-evaluation, highlighting achievements and setting goals.
4. The manager logs into the EMS, assesses the employee's performance, and provides feedback.
5. HR aggregates performance data, ensuring consistency across the organization.

Potential Issues

- Scheduling conflicts may delay review meetings.
- System errors may disrupt the submission of self-assessments.

Concurrent Activities

- HR accesses the system to monitor the overall progress of performance reviews.

Finish - Employees receive constructive feedback, and performance metrics are updated in the system.

7) Employee updates profile

A new employee, recently joined the company and needs to update the emergency contact information through the EMS.

Normal Flow

1. Employee logs into the EMS using their credentials and navigates to the self-service module.
2. Selects the "Emergency Contact" section, updates the contact details, and saves the changes.
3. Initiates a manager approval request for the updated information.
4. The manager, receives a notification, reviews the changes, and approves the updated emergency contact information.

Potential Issues

- The employee encounters issues logging in due to forgotten credentials.
- The system experiences a temporary glitch, causing a delay in updating information.

Concurrent Activities

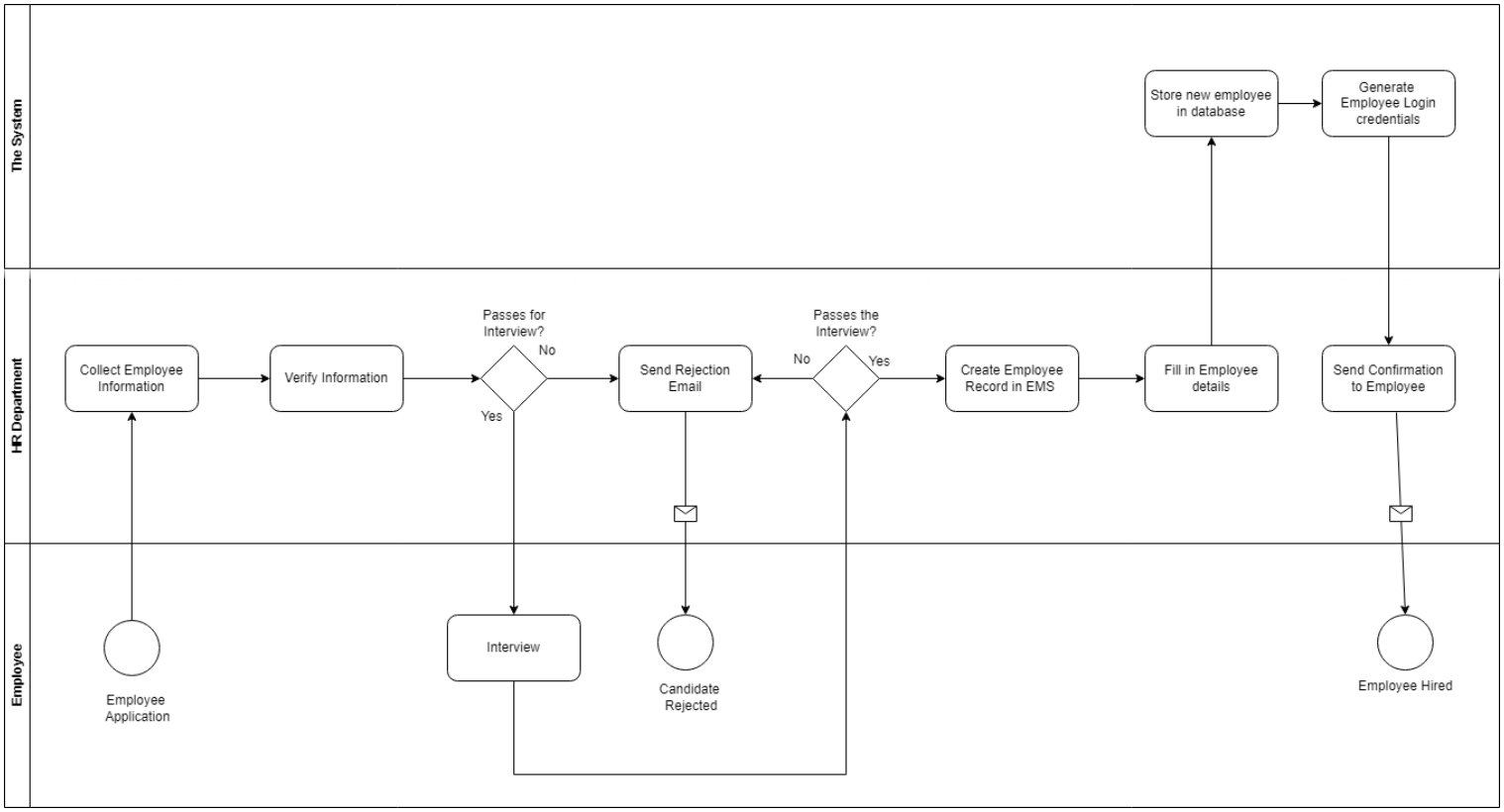
- The manager, is simultaneously assigning tasks to his team members using the EMS.

Finish - The emergency contact information is successfully updated and approved.

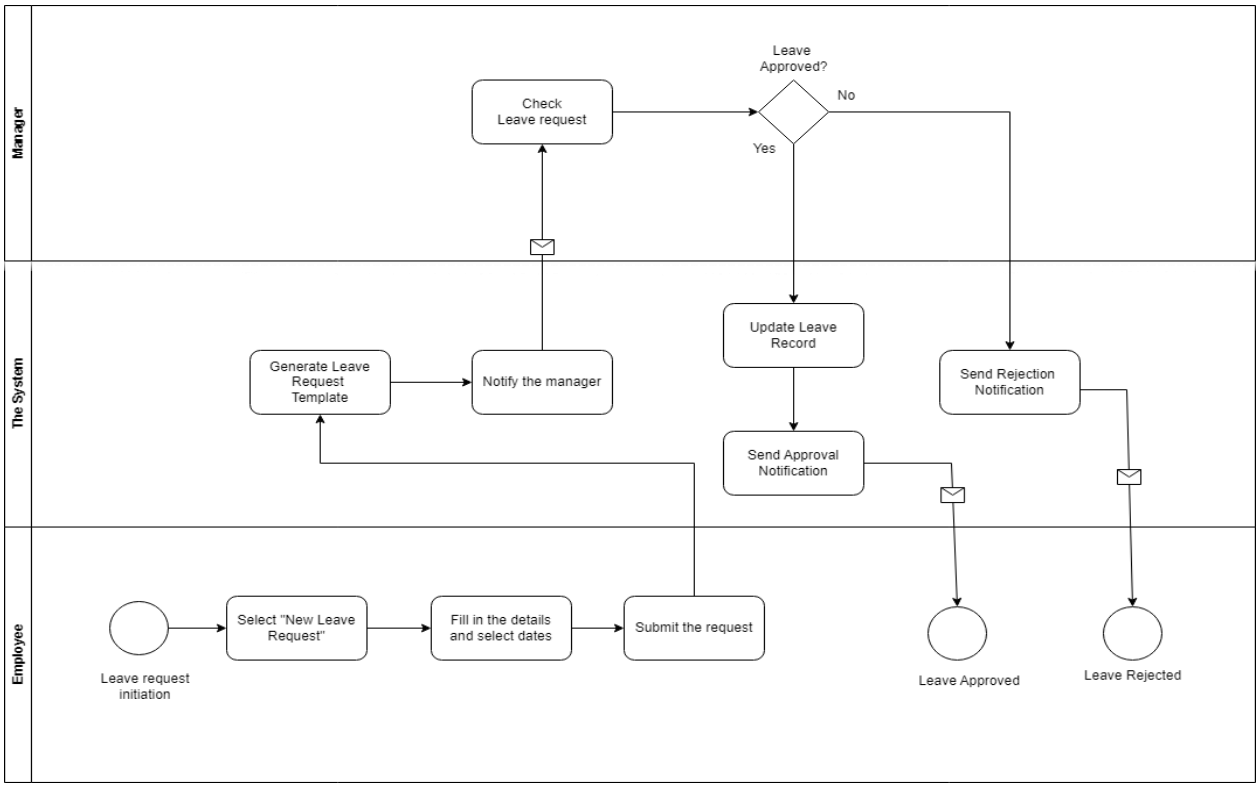
BPMN DIAGRAMS

*The login process is not covered in the BPMN diagrams but it is always among the first steps

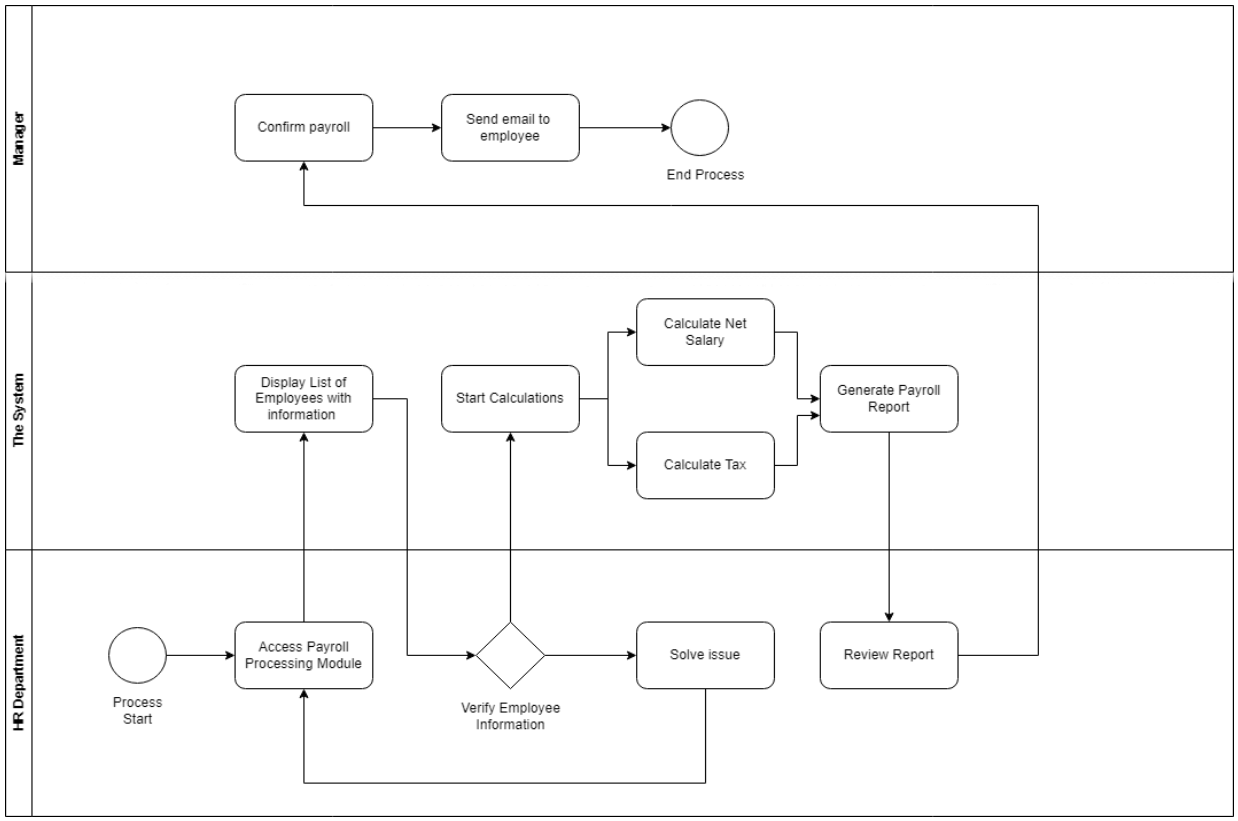
1) Enrollment



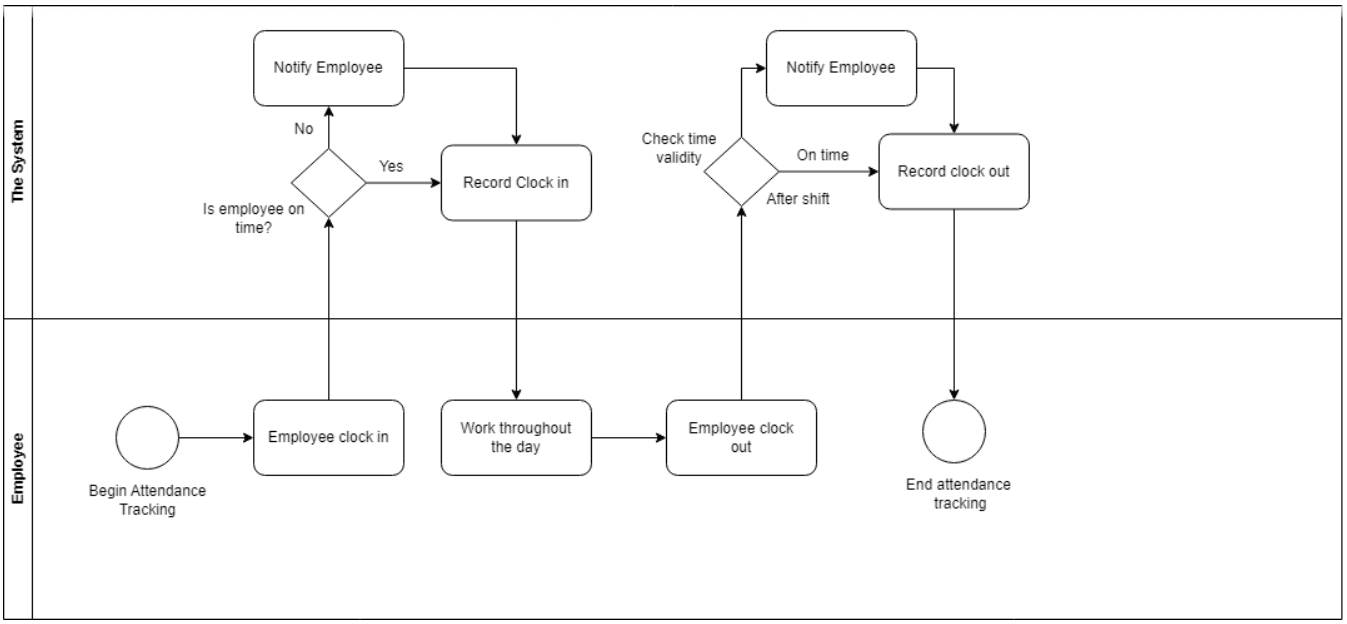
2) Leave Management



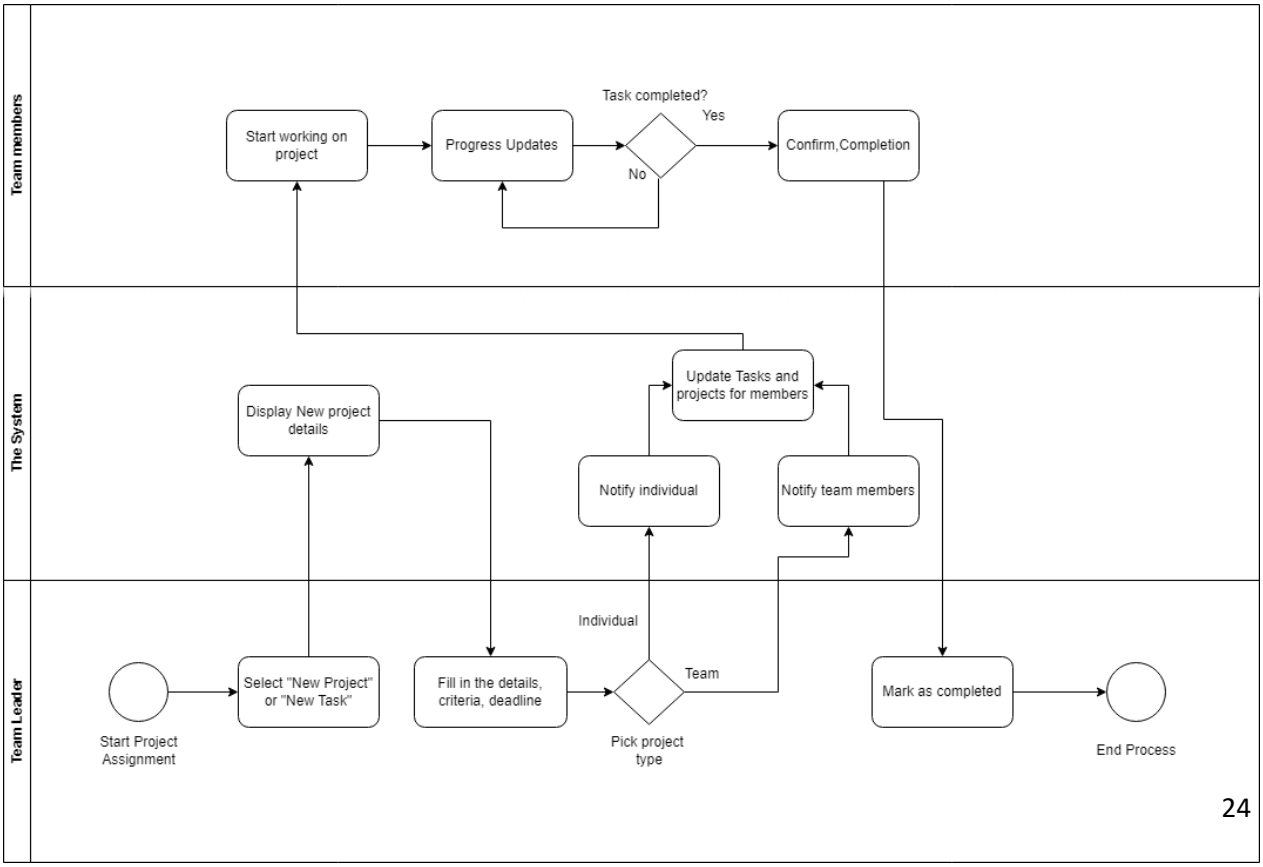
3) Payroll Management



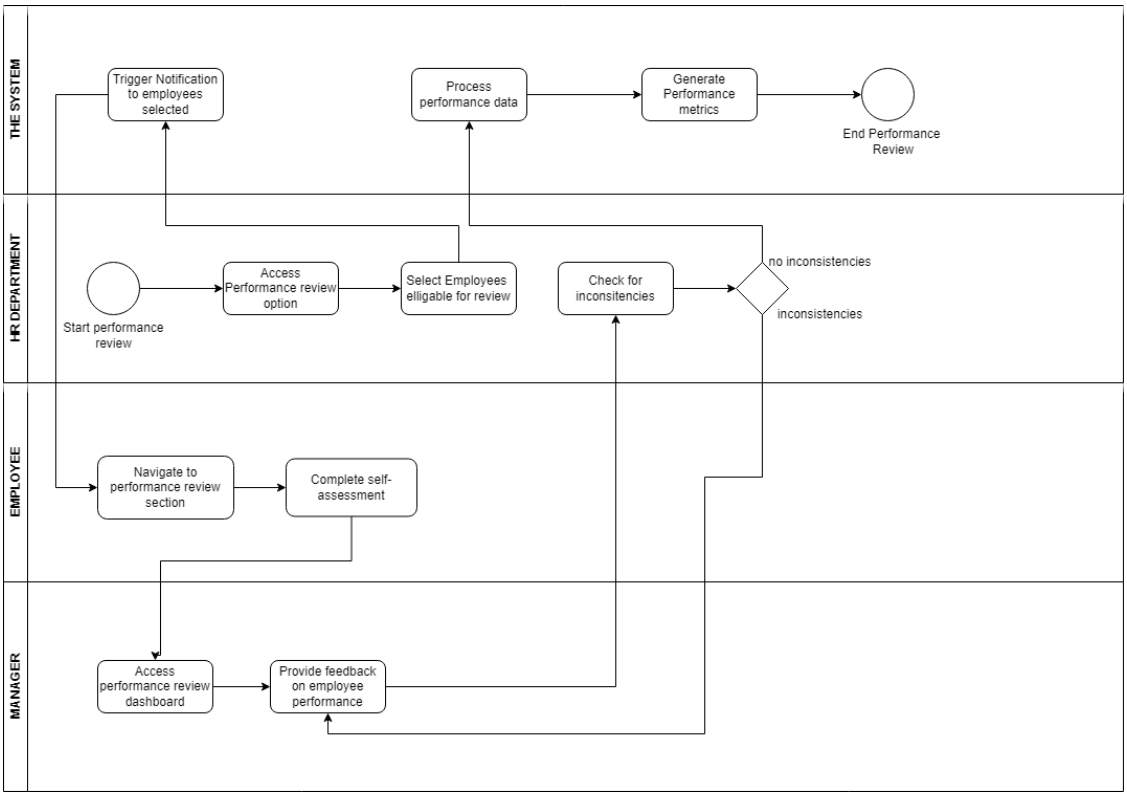
4) Attendance Tracking



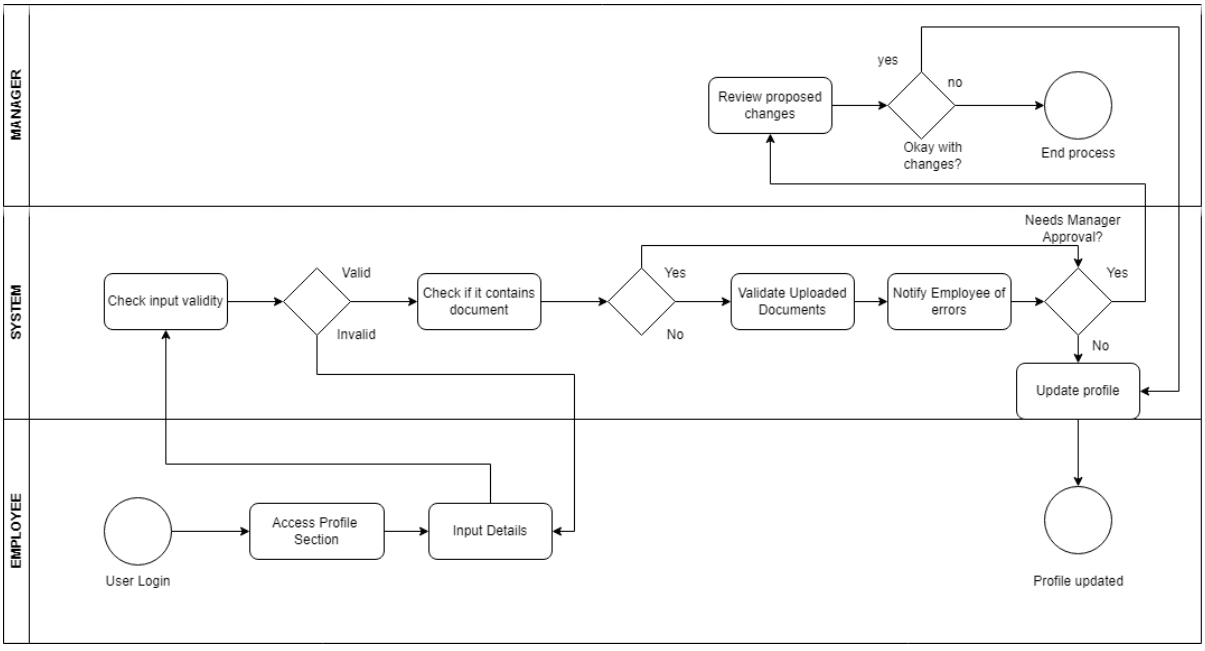
5) Task Management



6) Performance Review



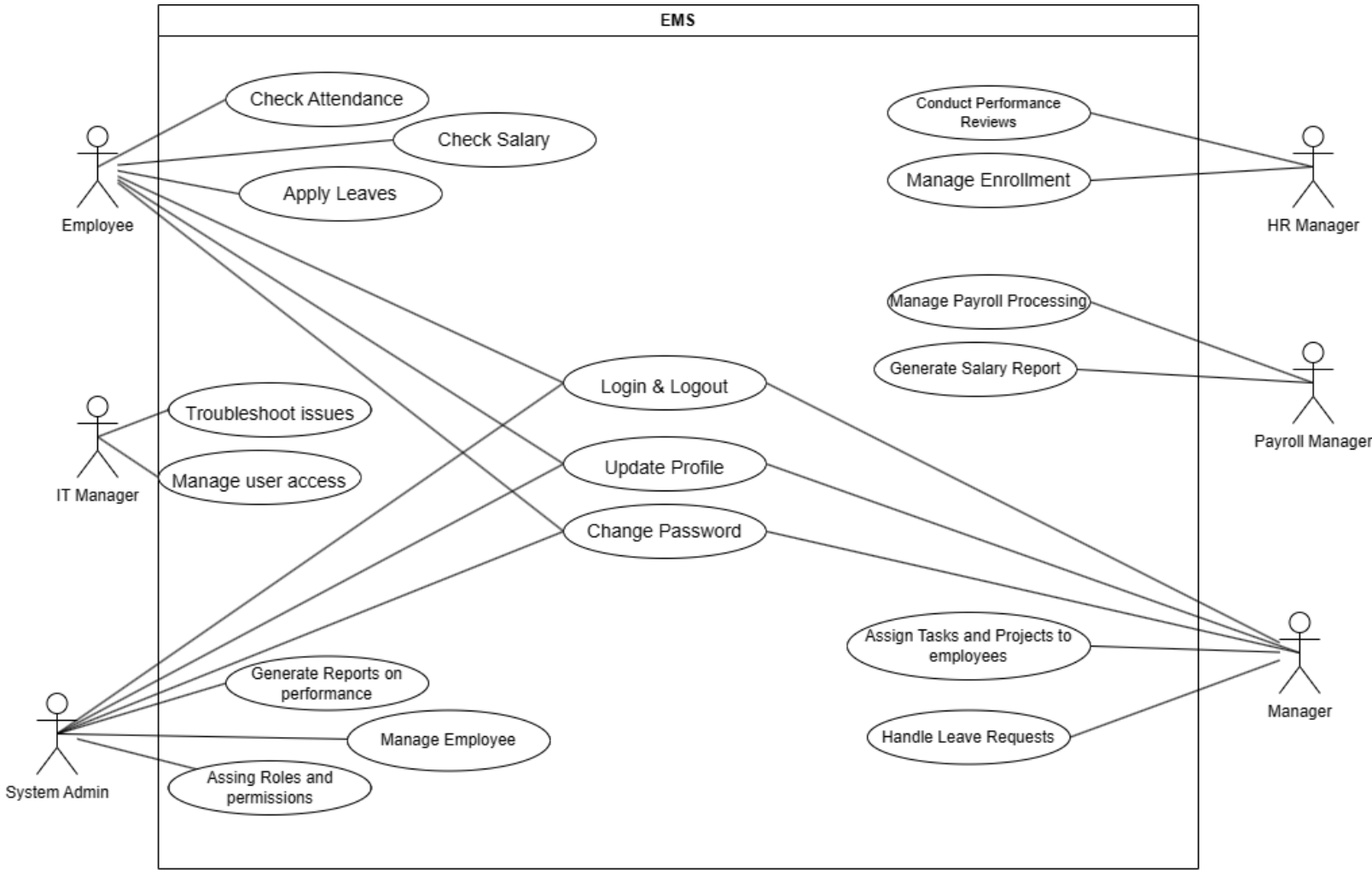
7) Employee Self-Service



USE CASES

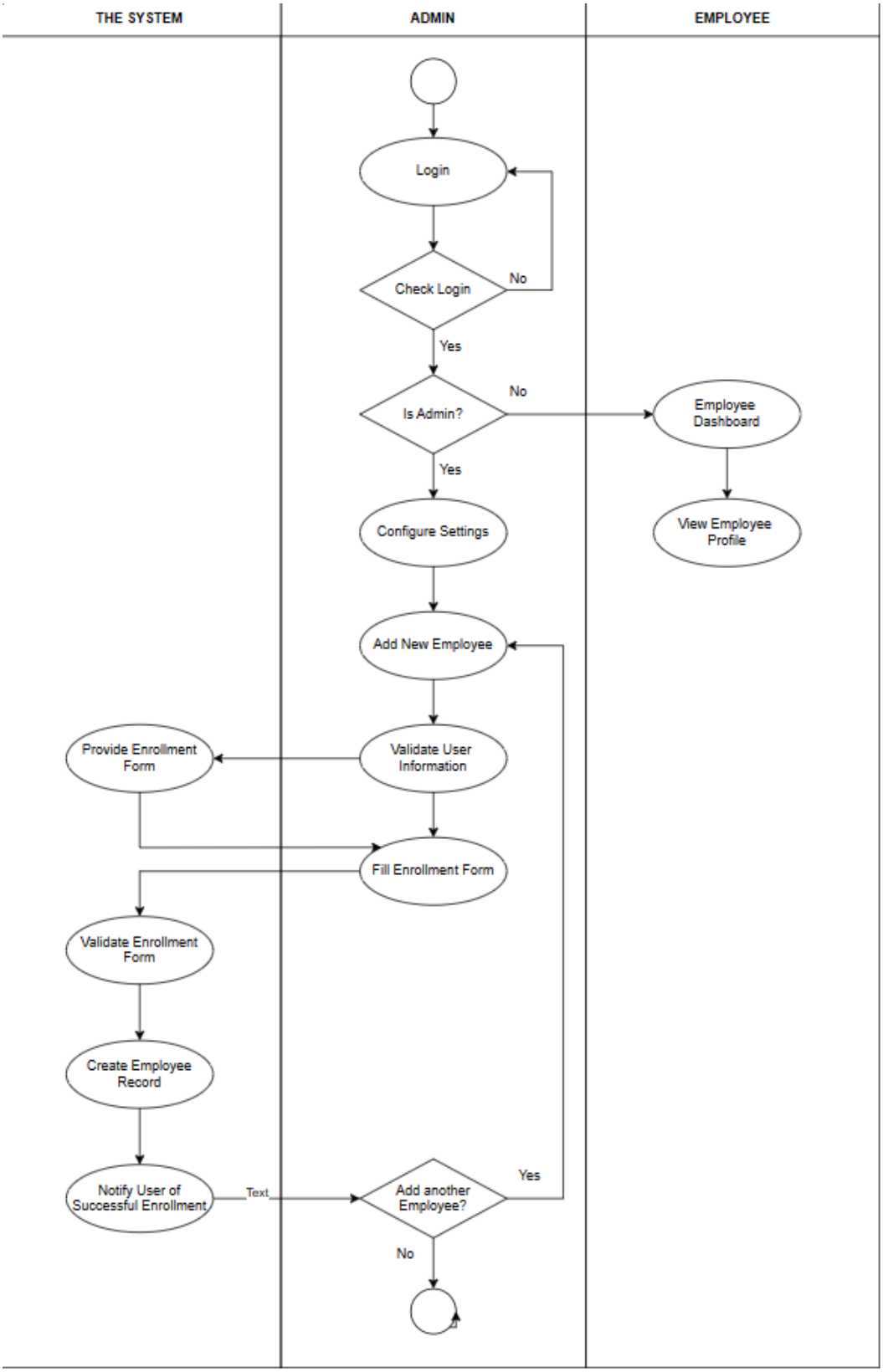
This is the general schema of the use cases inside the system with the actors participating on them.

Functionalities like logging in & out, profile updating (self-service) are available to all employees and admins.

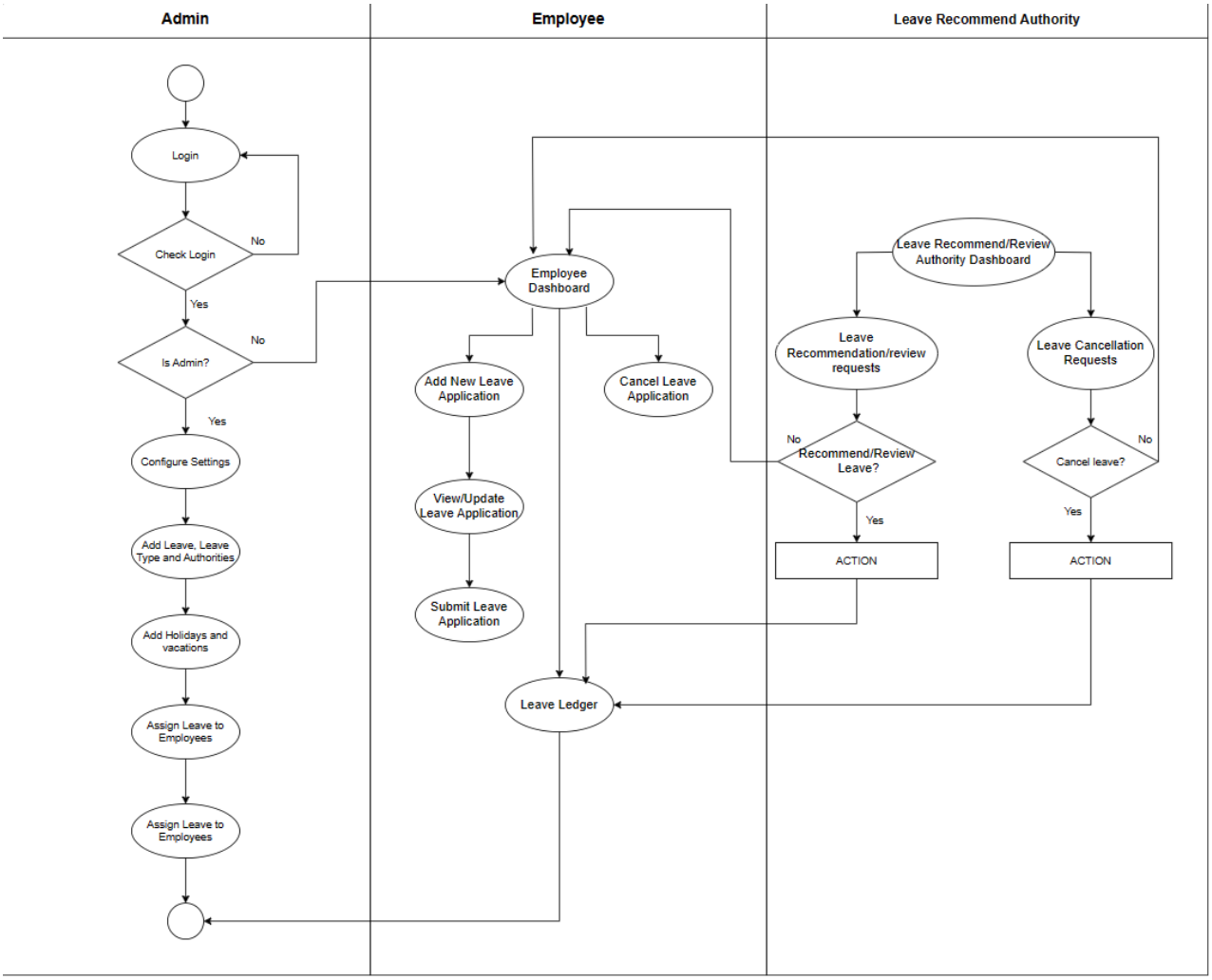


ACTIVITY DIAGRAMS

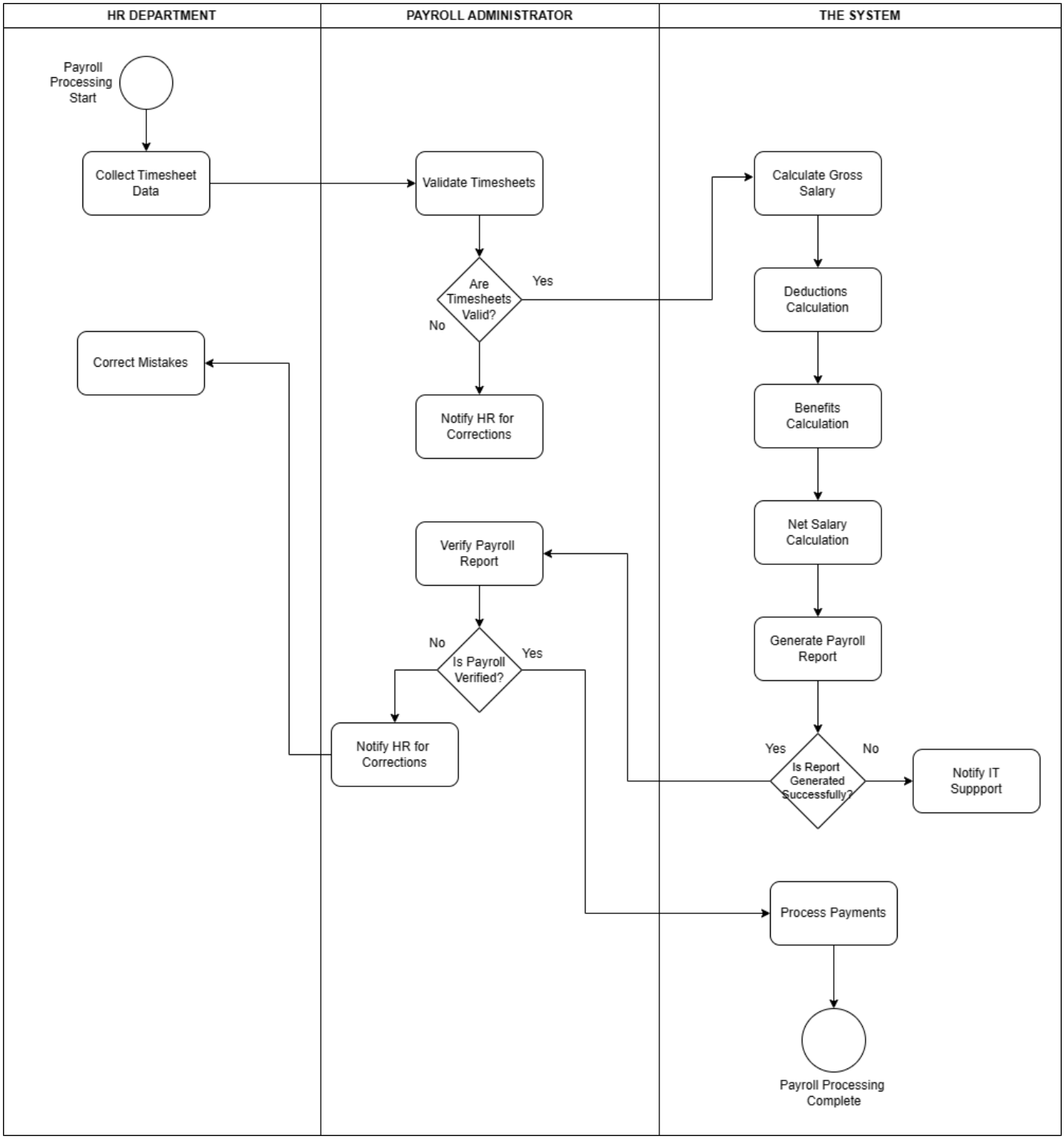
1) EMPLOYEE ENROLLMENT



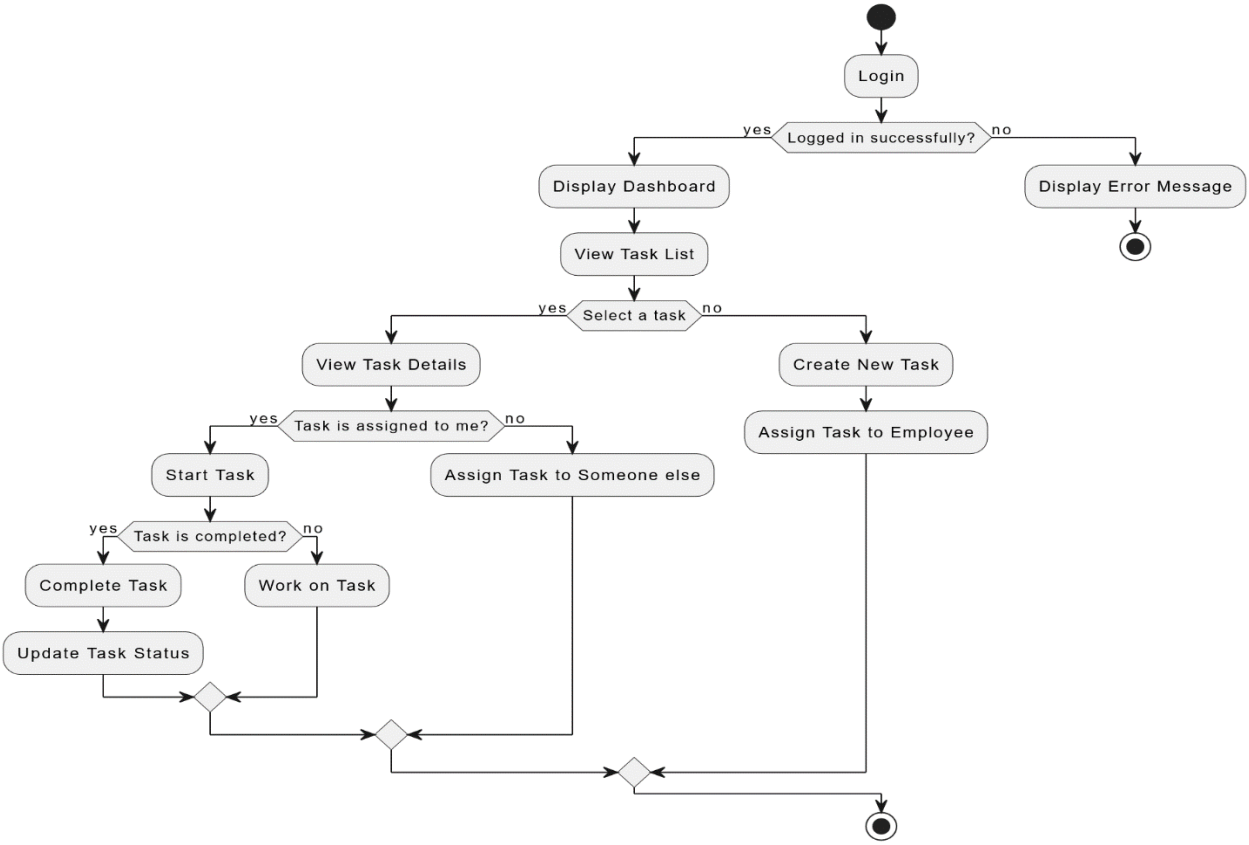
2) LEAVE MANAGEMENT



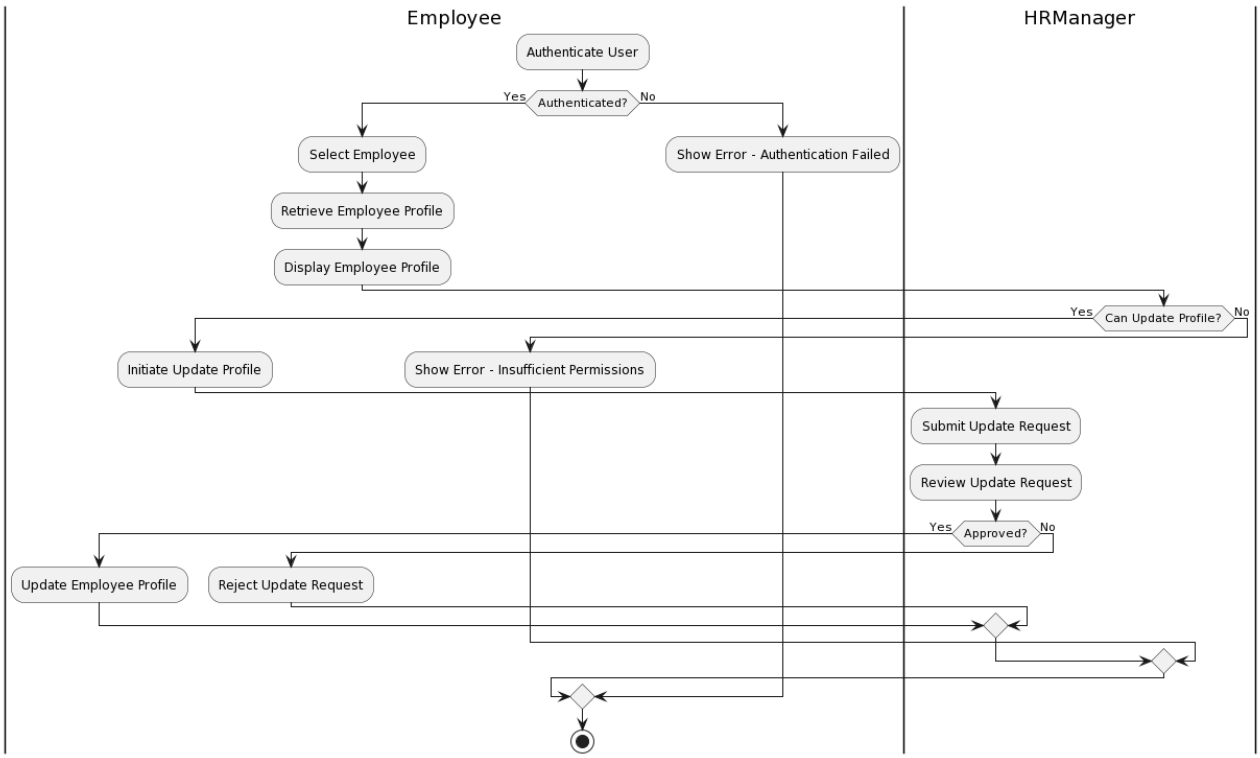
3) PAYROLL MANAGEMENT



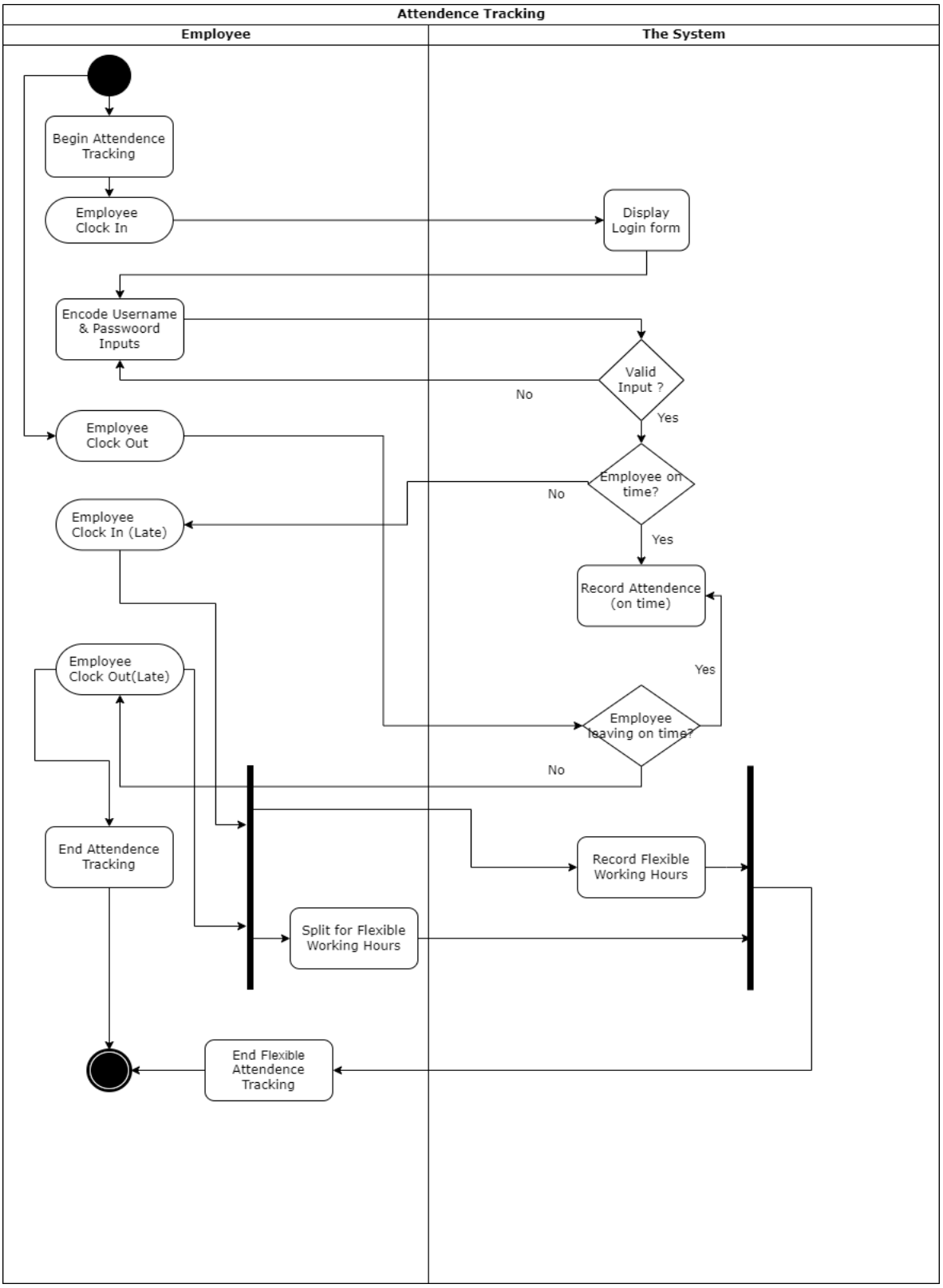
4) TASK MANAGEMENT



5) Employee Self Service

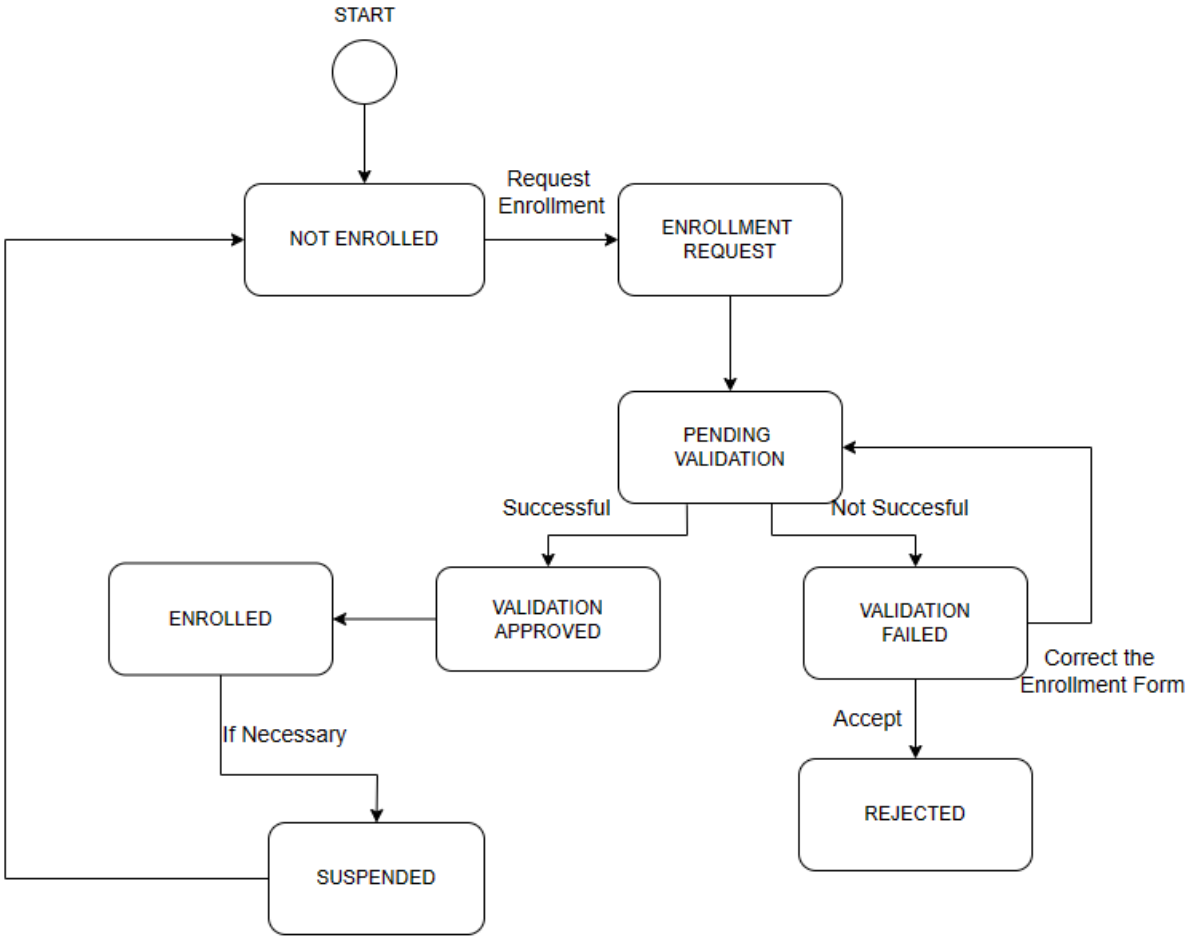


6) ATTENDANCE TRACKING

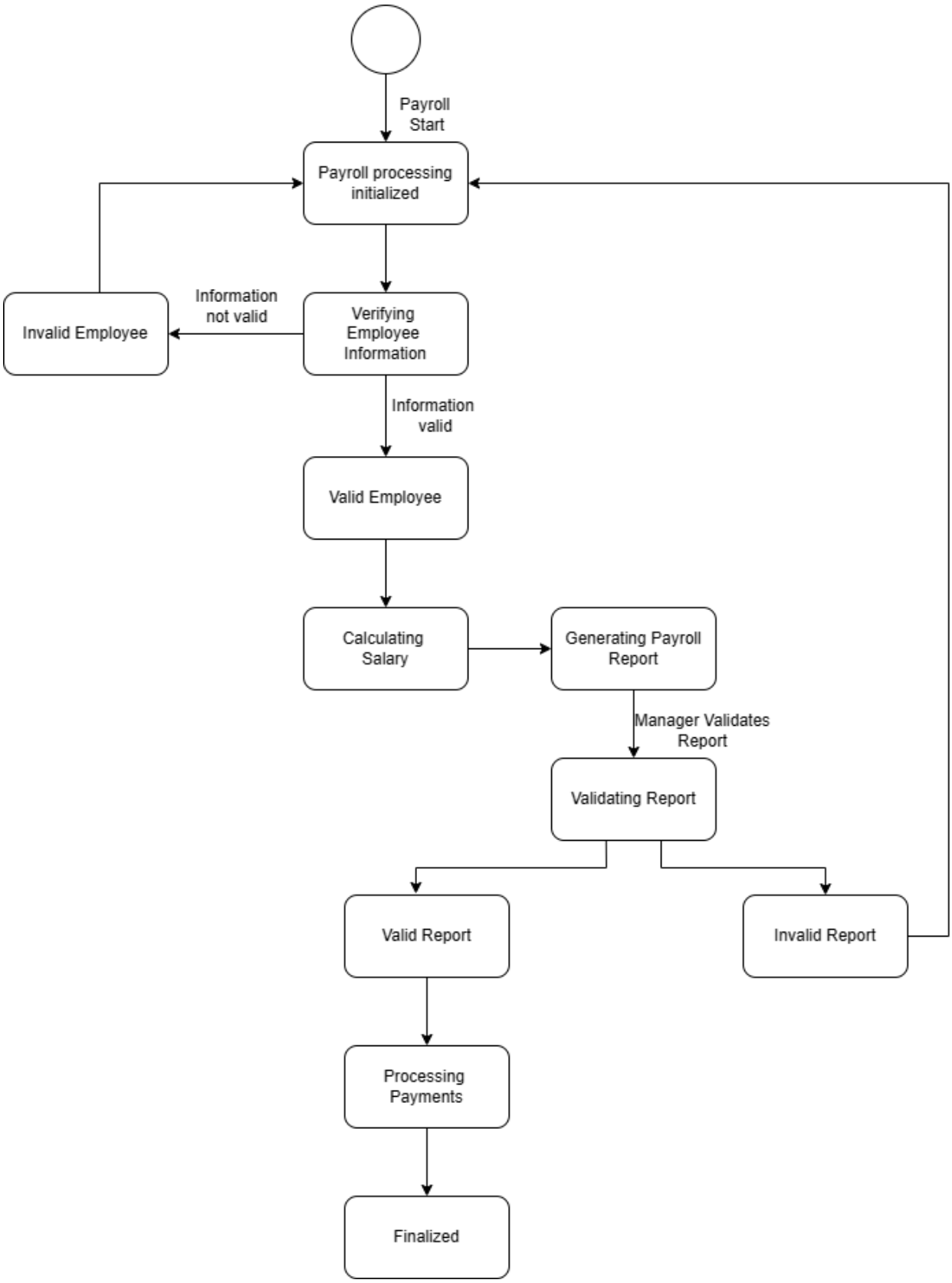


STATE DIAGRAMS

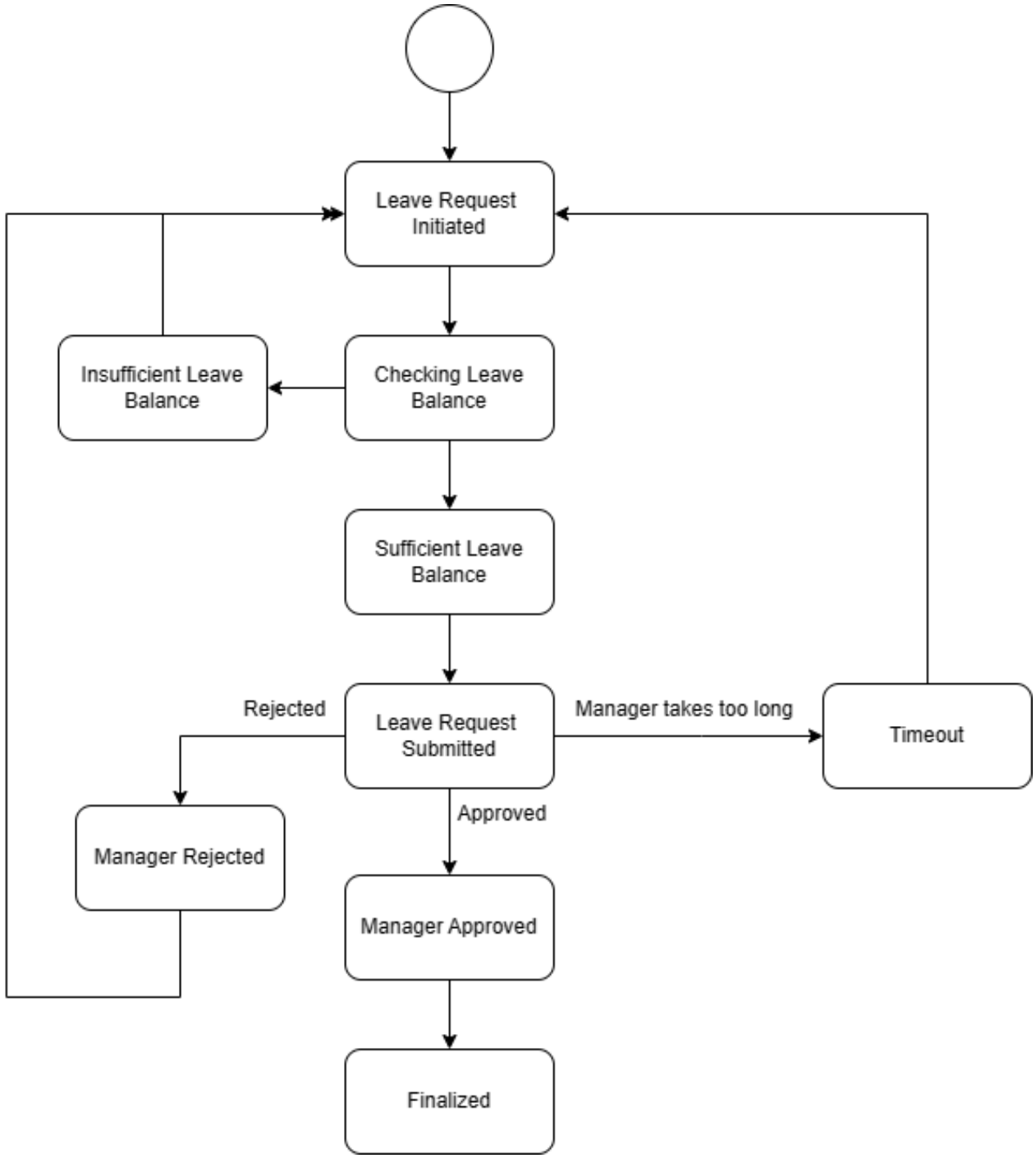
1) EMPLOYEE ENROLLMENT



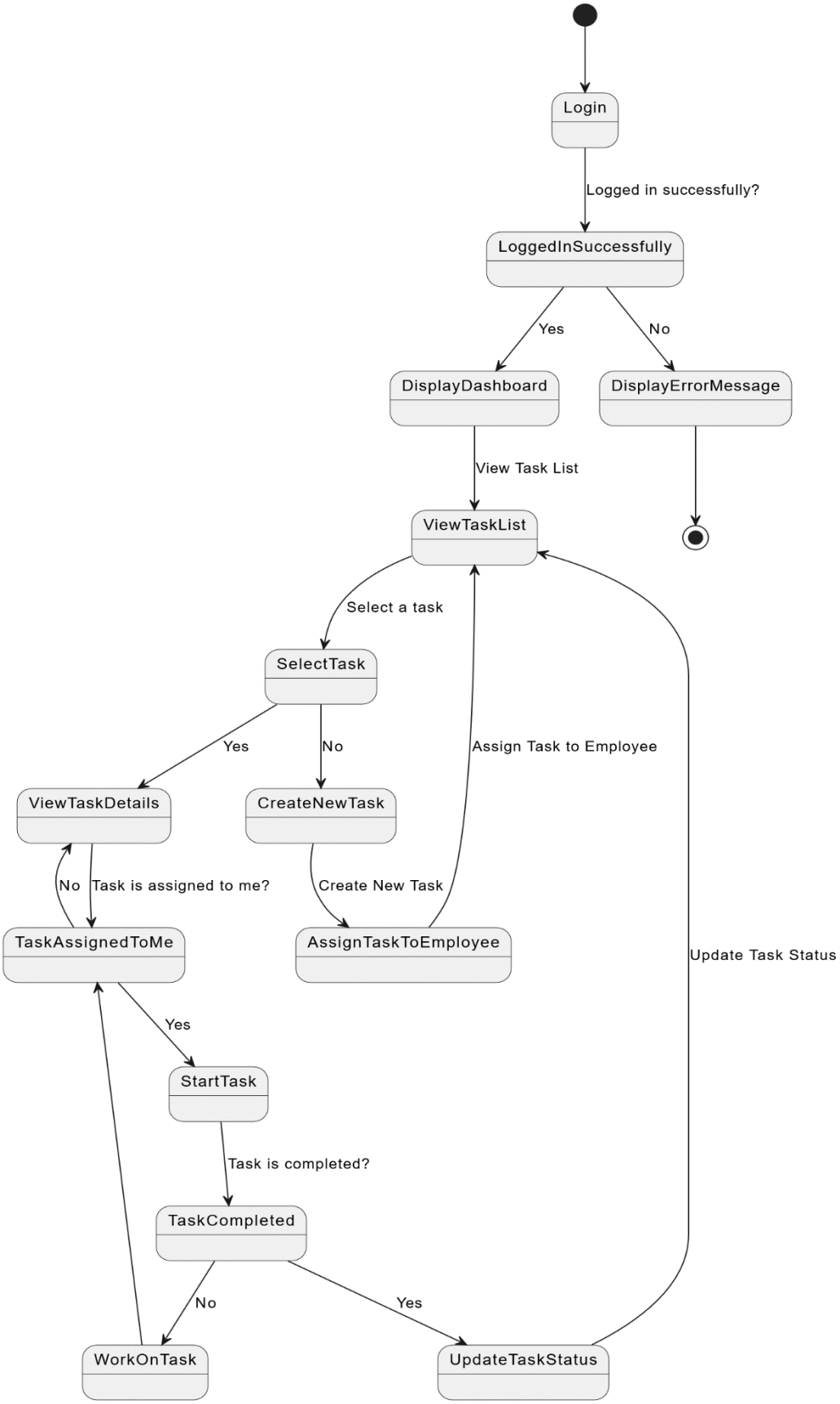
2) PAYROLL MANAGEMENT



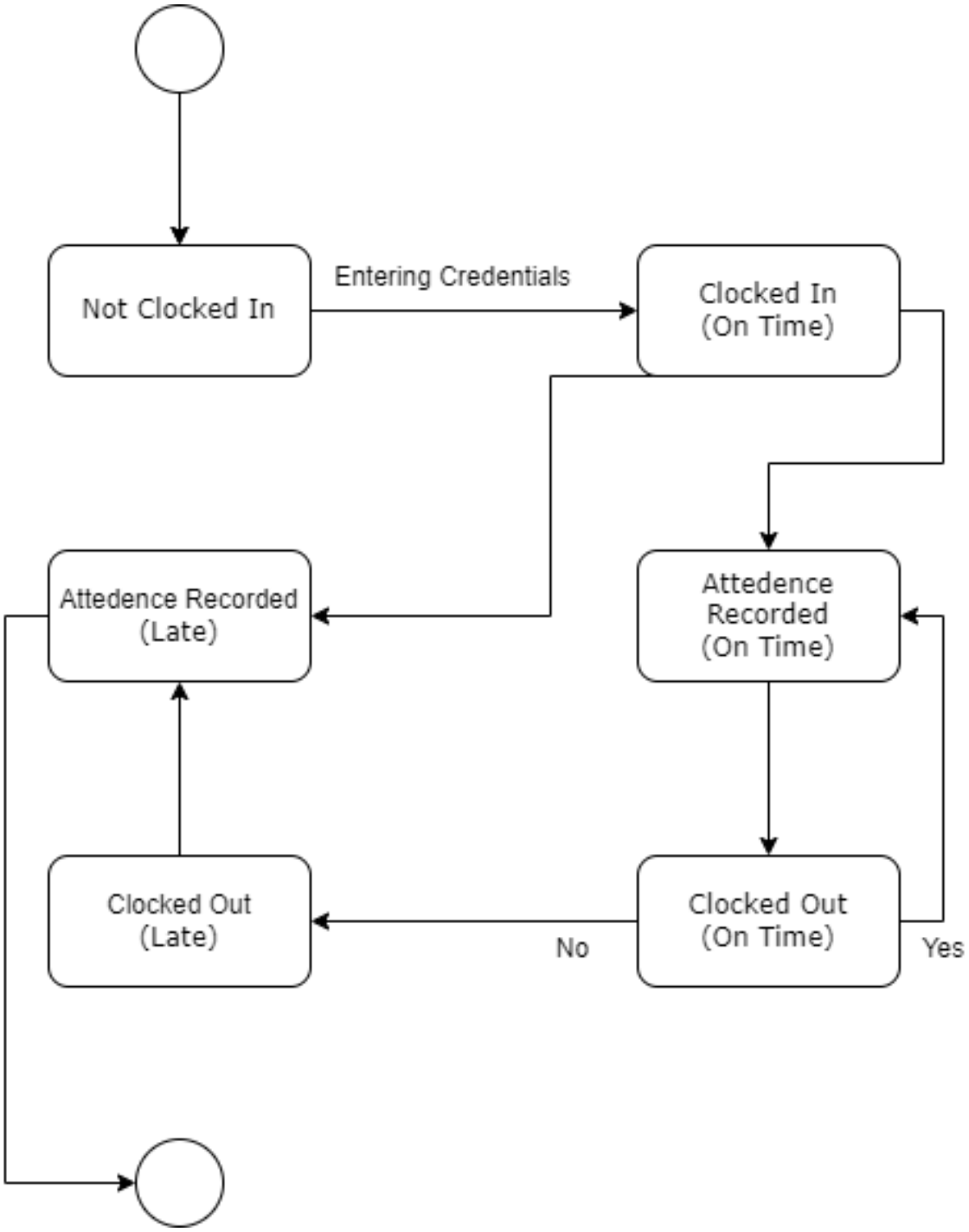
3) LEAVE MANAGEMENT



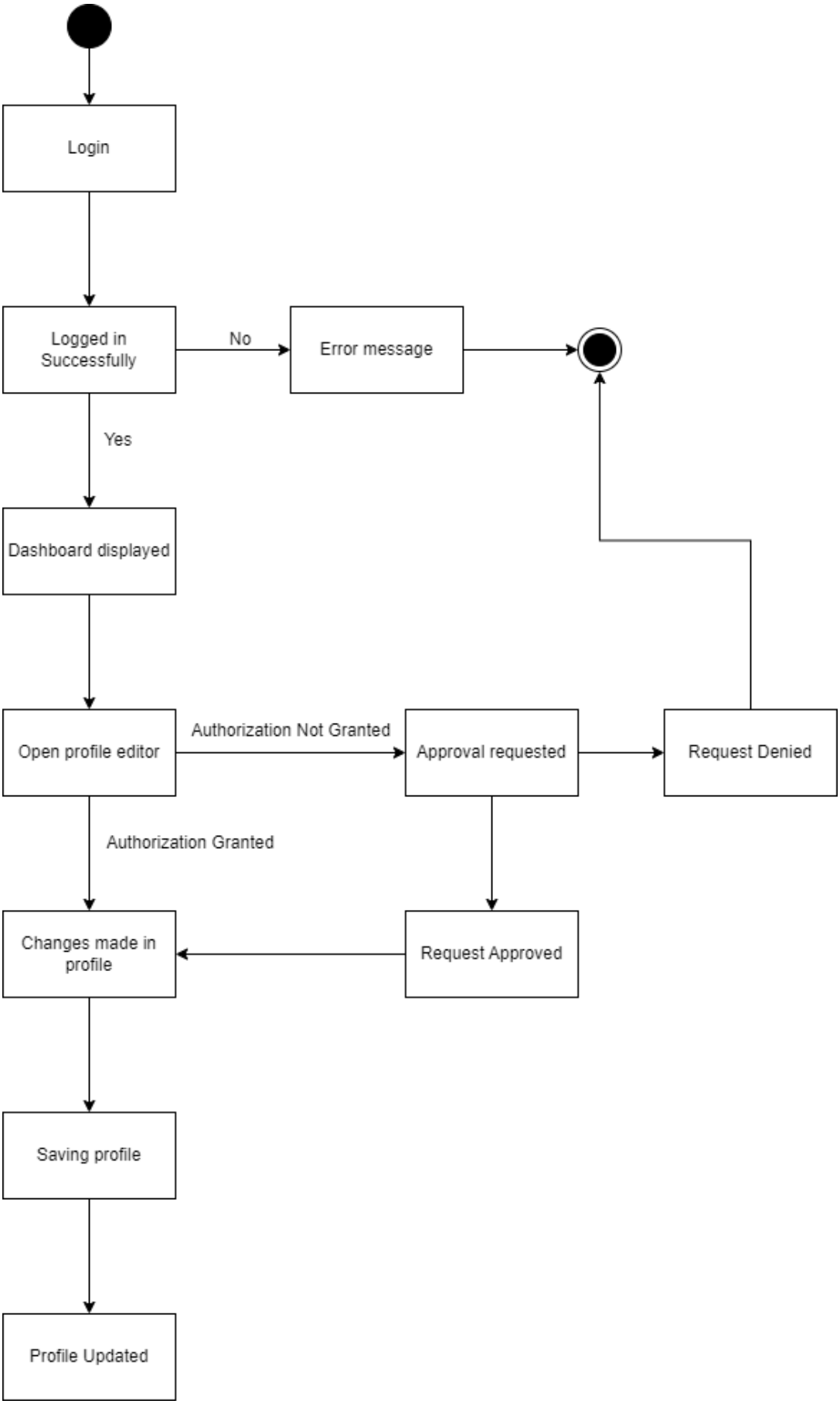
4) TASK MANAGEMENT



5) ATTENDANCE TRACKING

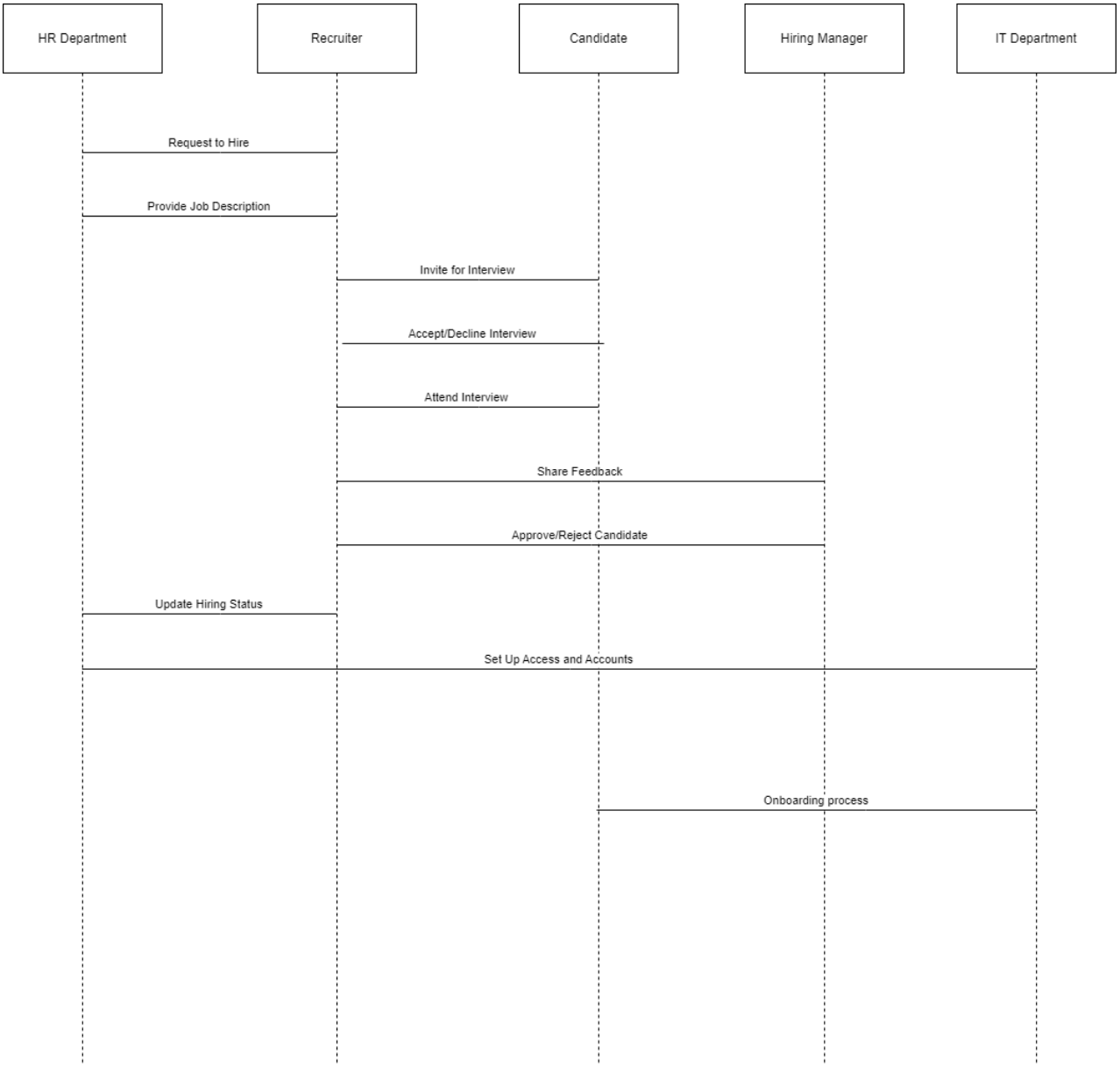


6) UPDATE EMPLOYEE PROFILE

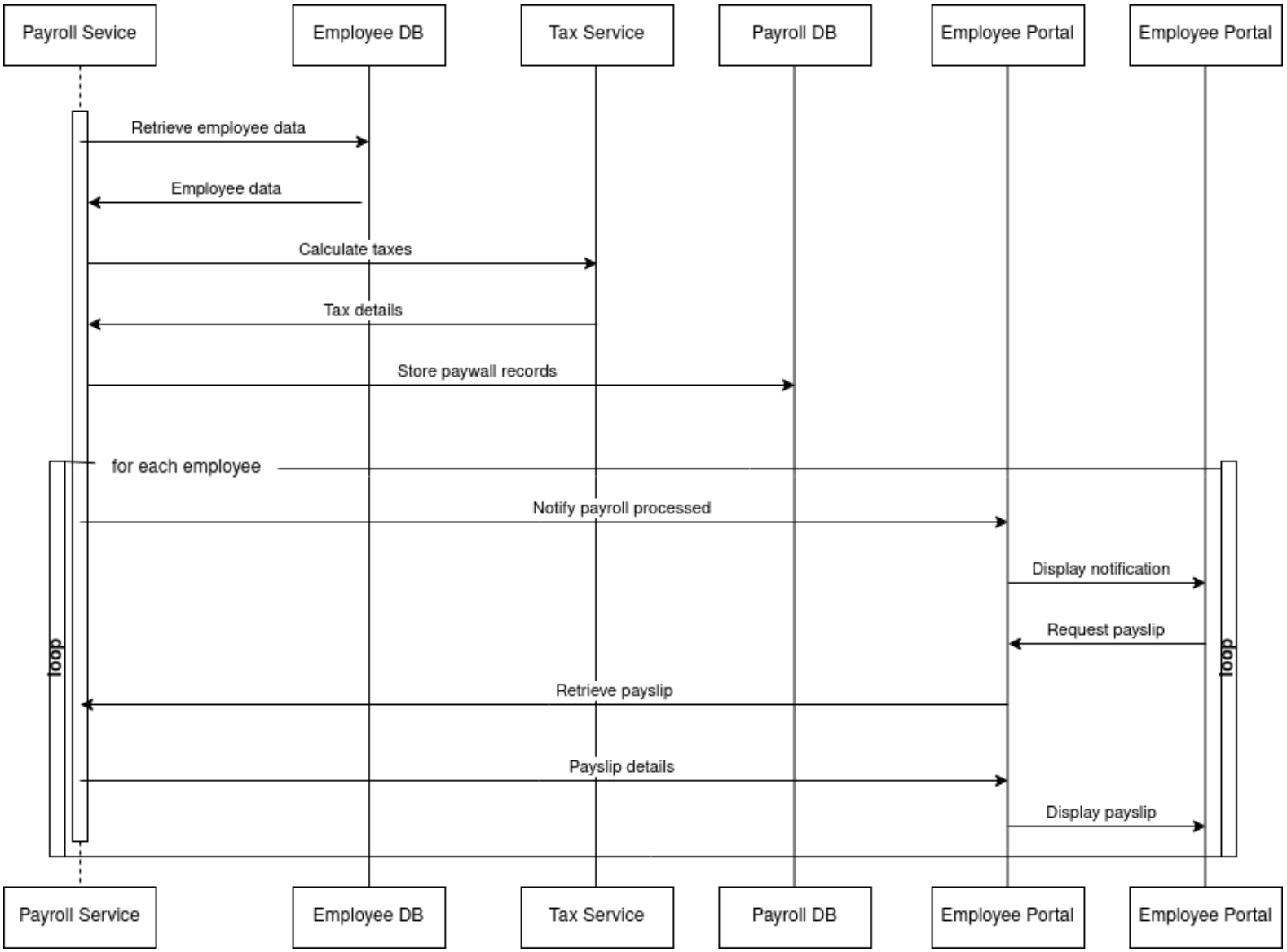


SEQUENCE DIAGRAMS

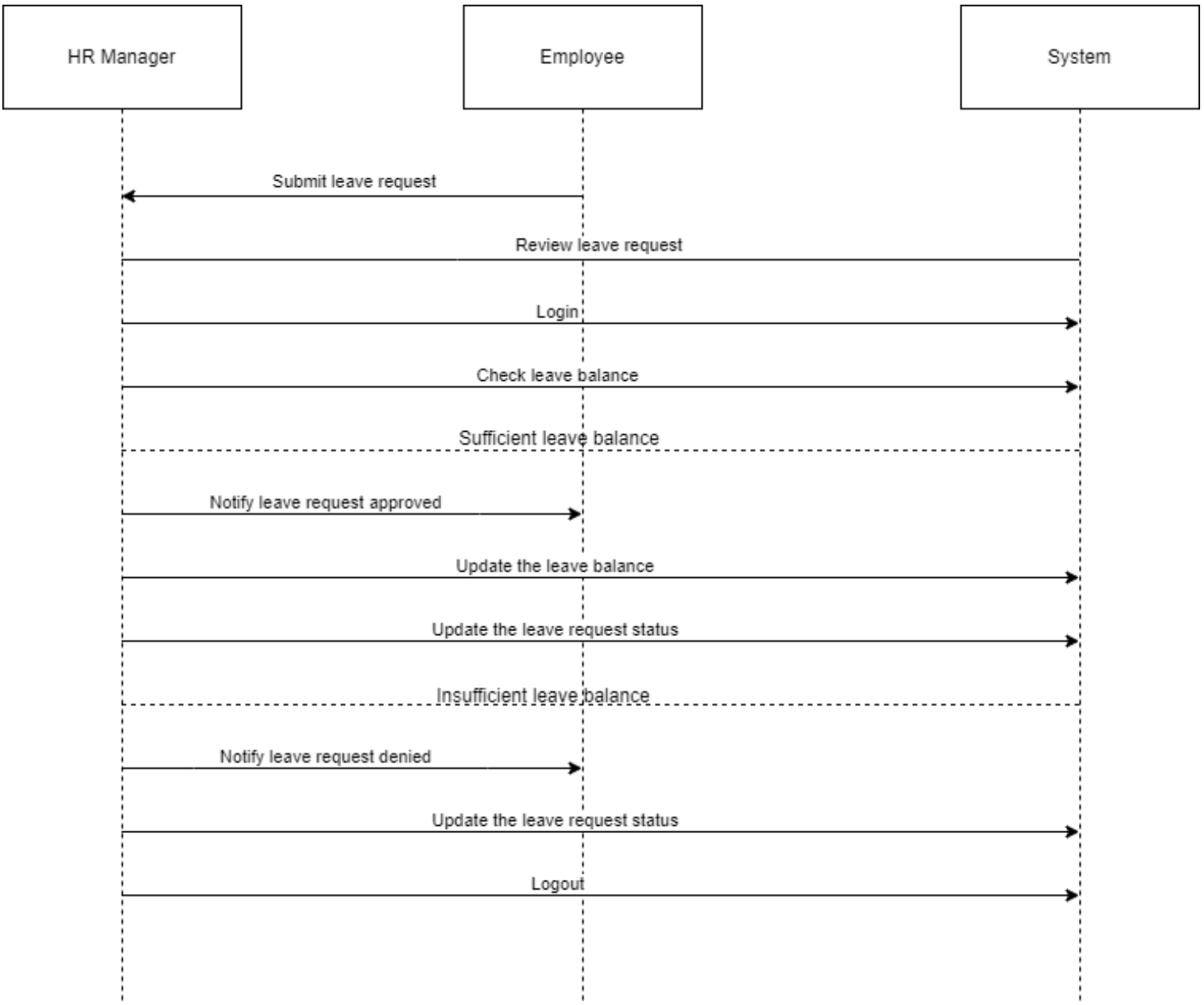
1) EMPLOYEE ENROLLMENT



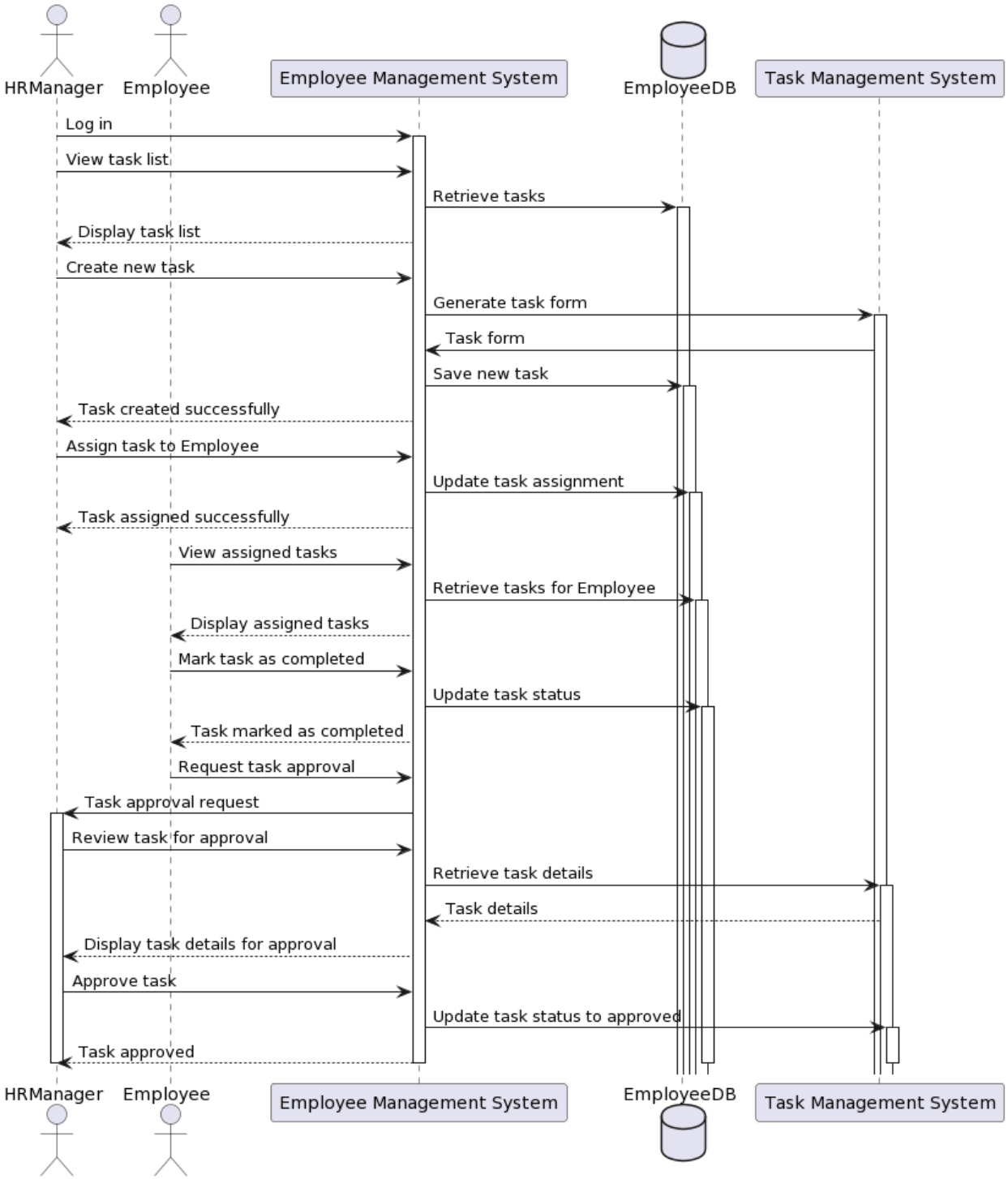
2) PAYROLL MANAGEMENT



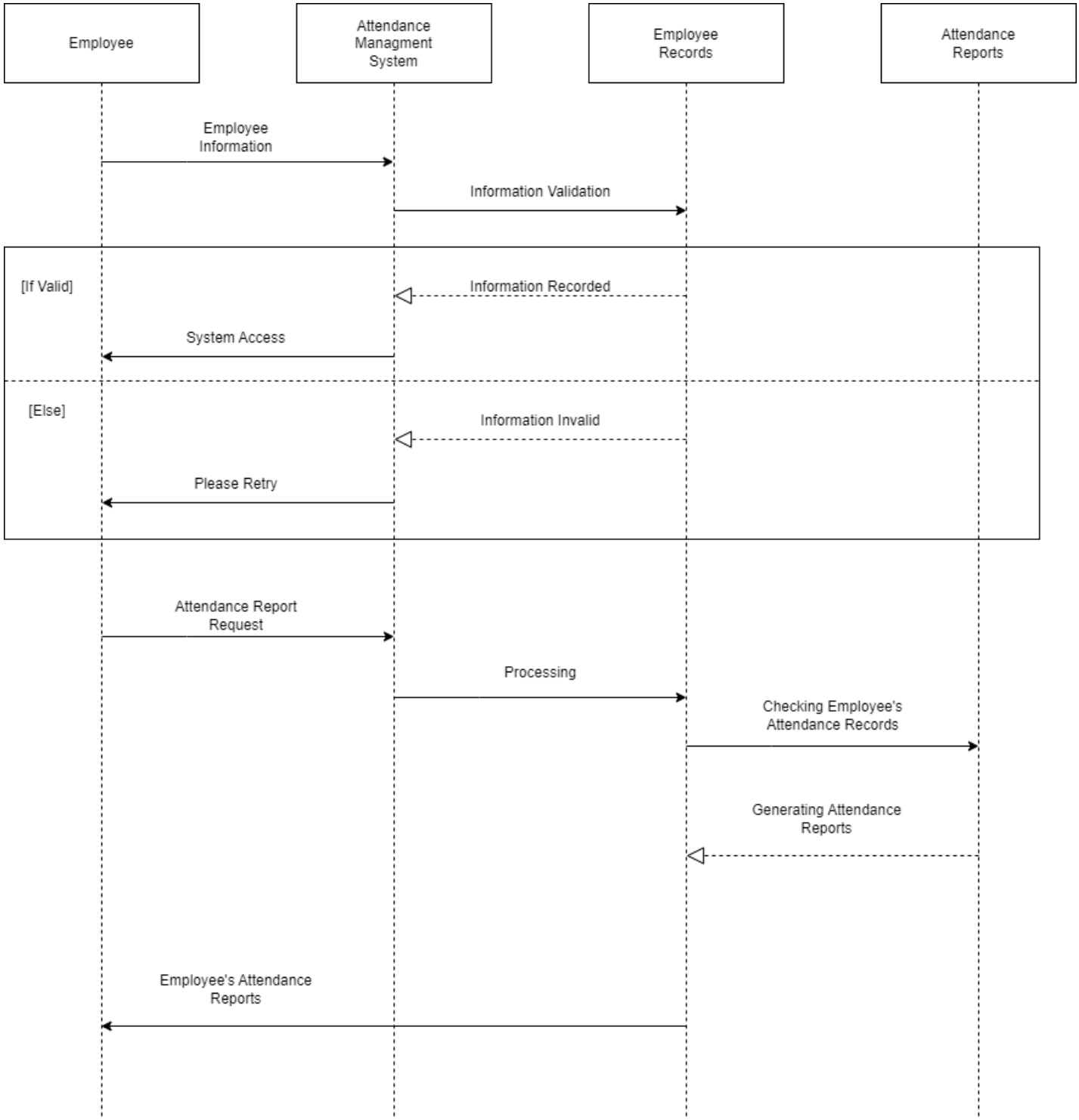
3) LEAVE MANAGEMENT



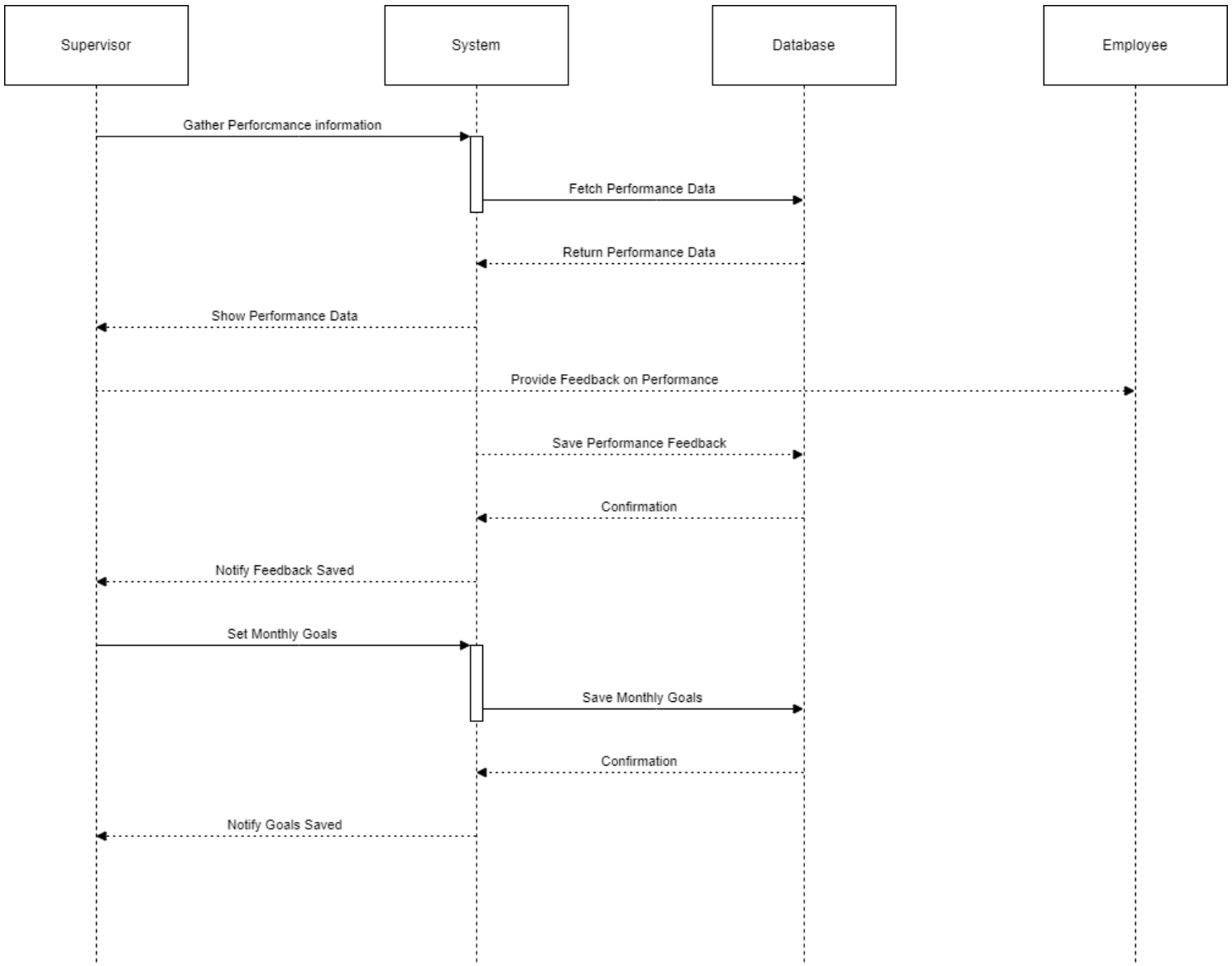
4) TASK MANAGEMENT



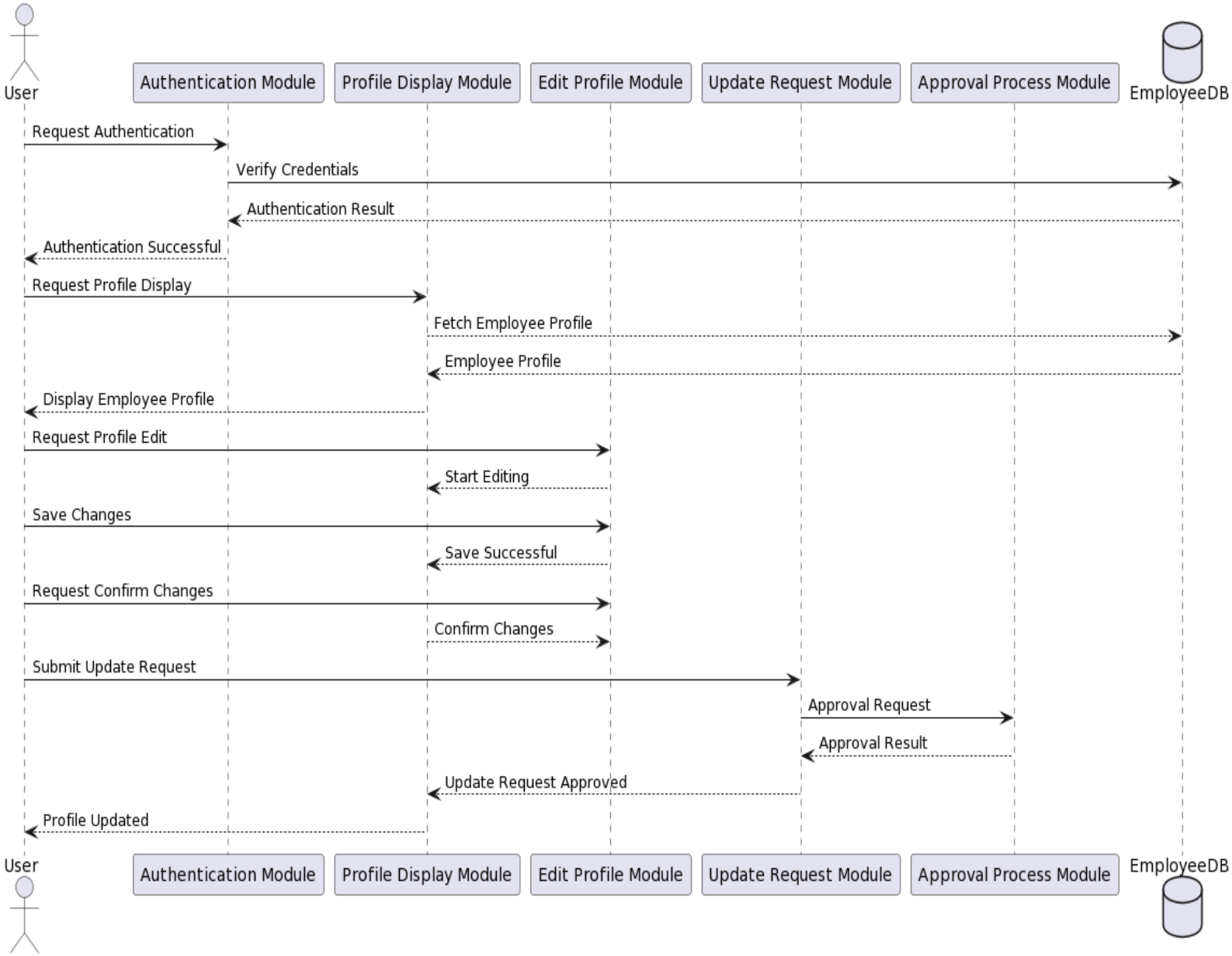
5) ATTENDANCE TRACKING



6) PERFORMANCE REVIEW

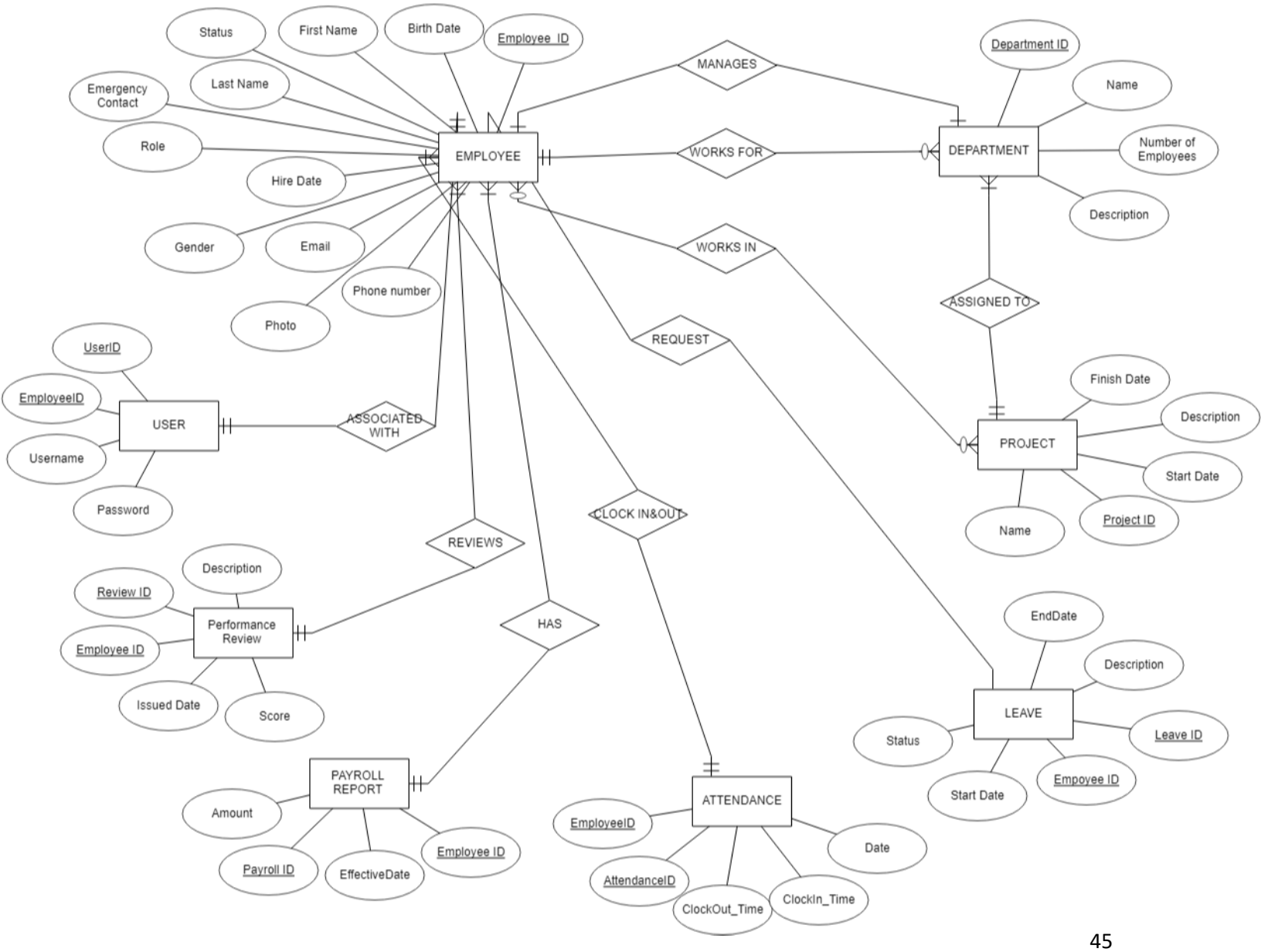


7) EMPLOYEE SELF-SERVICE



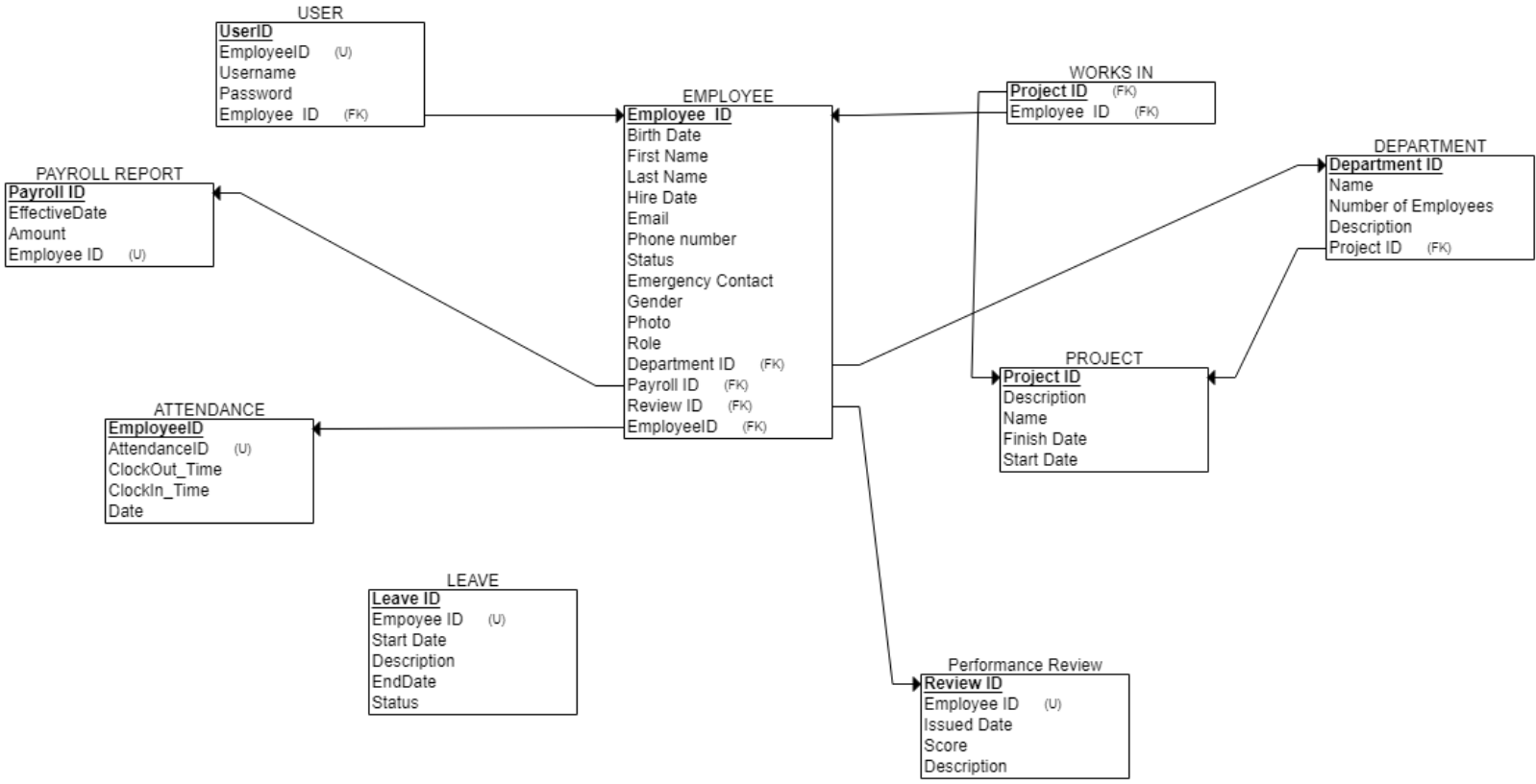
ENTITY RELATIONSHIP DIAGRAM

- One Employee belongs only to one Department.
- One Employee can be assigned to multiple Projects.
- One Employee can have multiple Salary records over time.
- One Employee can take multiple Leaves.
- One Employee can have multiple Attendance records.
- One User is associated with one Employee.
- One Employee can have many Performance Reviews.
- One Department can be assigned many Projects.



RELATIONAL SCHEMA

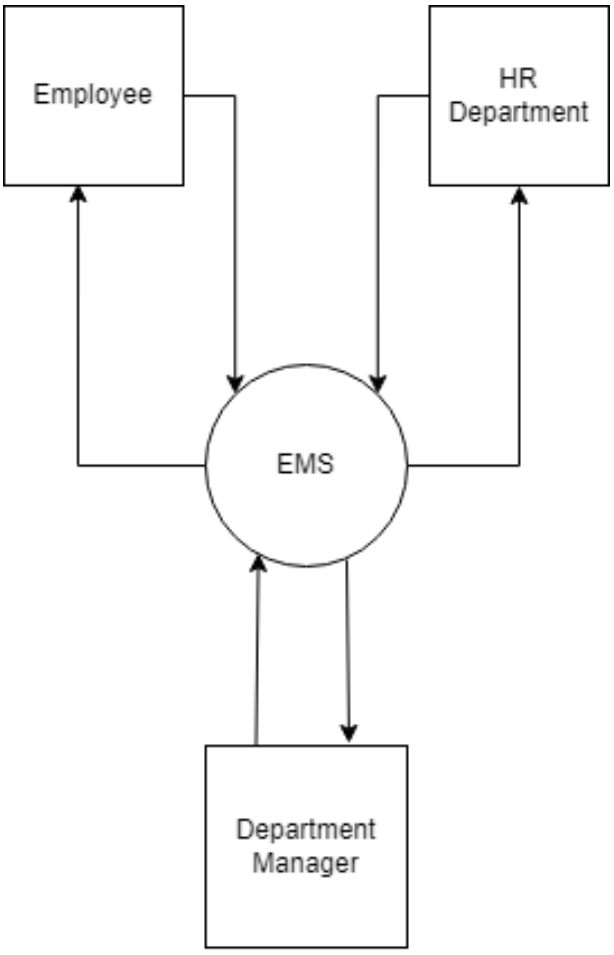
The relational schema of the EMS is a structured representation of the database design that organizes and defines the relationships among various entities within the system. In this schema, the primary entity is the Employee table, which serves as the central repository for information related to each employee. This table includes attributes such as employee ID, name, contact details, and other relevant personal information. The Department table is linked to the Employee table through a foreign key, establishing a one-to-many relationship, as one department can have multiple employees. The Employee table is linked to several other smaller tables.



DATA FLOW DIAGRAM

DFD LEVEL 0 – CONTEXT DIAGRAM

The external entities include the system users such as Employees, HR Department and Managers. In the system the HR and managers are assigned the admin user role. Administrators manage the system and its functionalities. while employees interact with the system to access these functionalities.



PROCESSES

1.1 Employee Information Management

Handles storing and displaying employee data. Employees input their information. Admins update and retrieve employee data. This is done with the employee data records.

1.2 Leave Management

Handles leave requests and approvals. Employees submit leave requests and admins approve/deny them. After this is done, the leave records updates.

1.3 Attendance Tracking

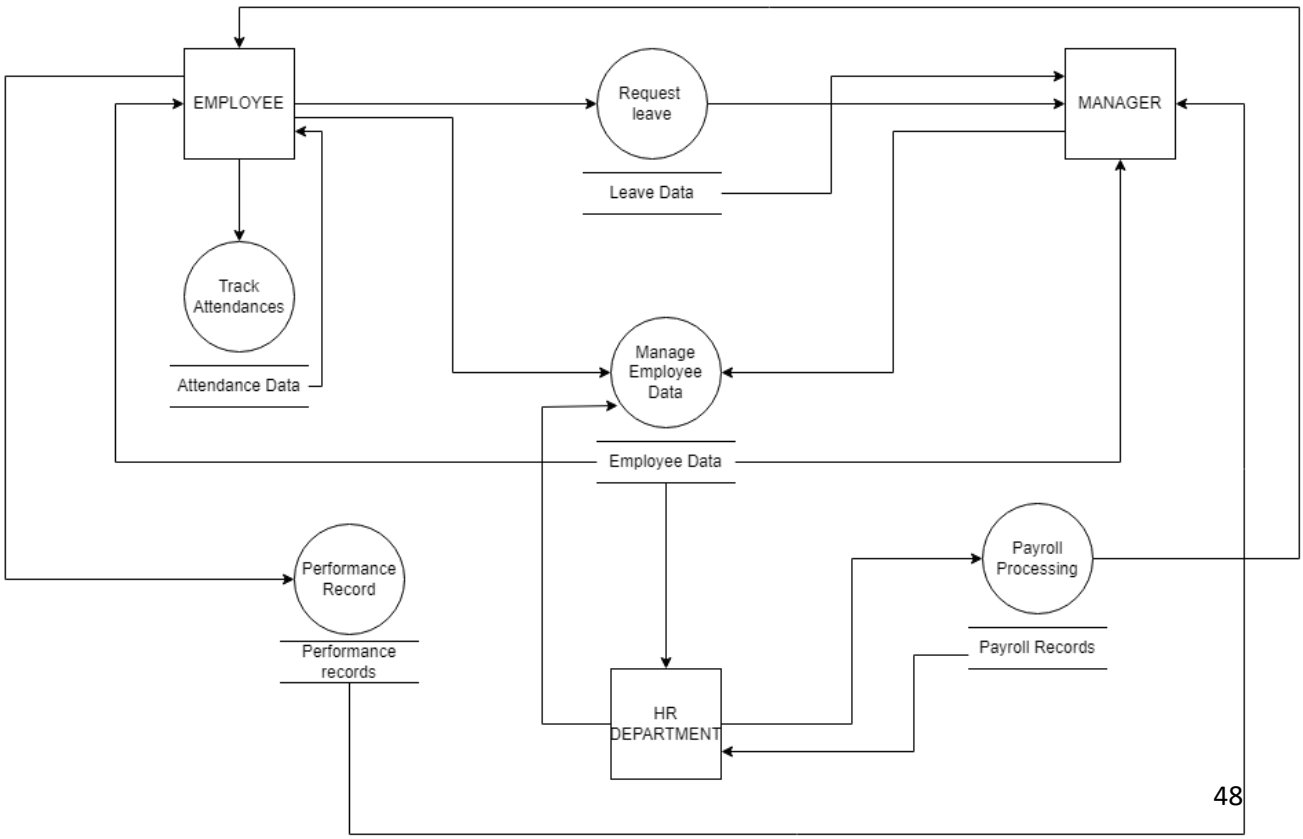
Manages employee attendance records. Employees clock in and out and the attendance records keep track of it.

1.4 Manage Payroll

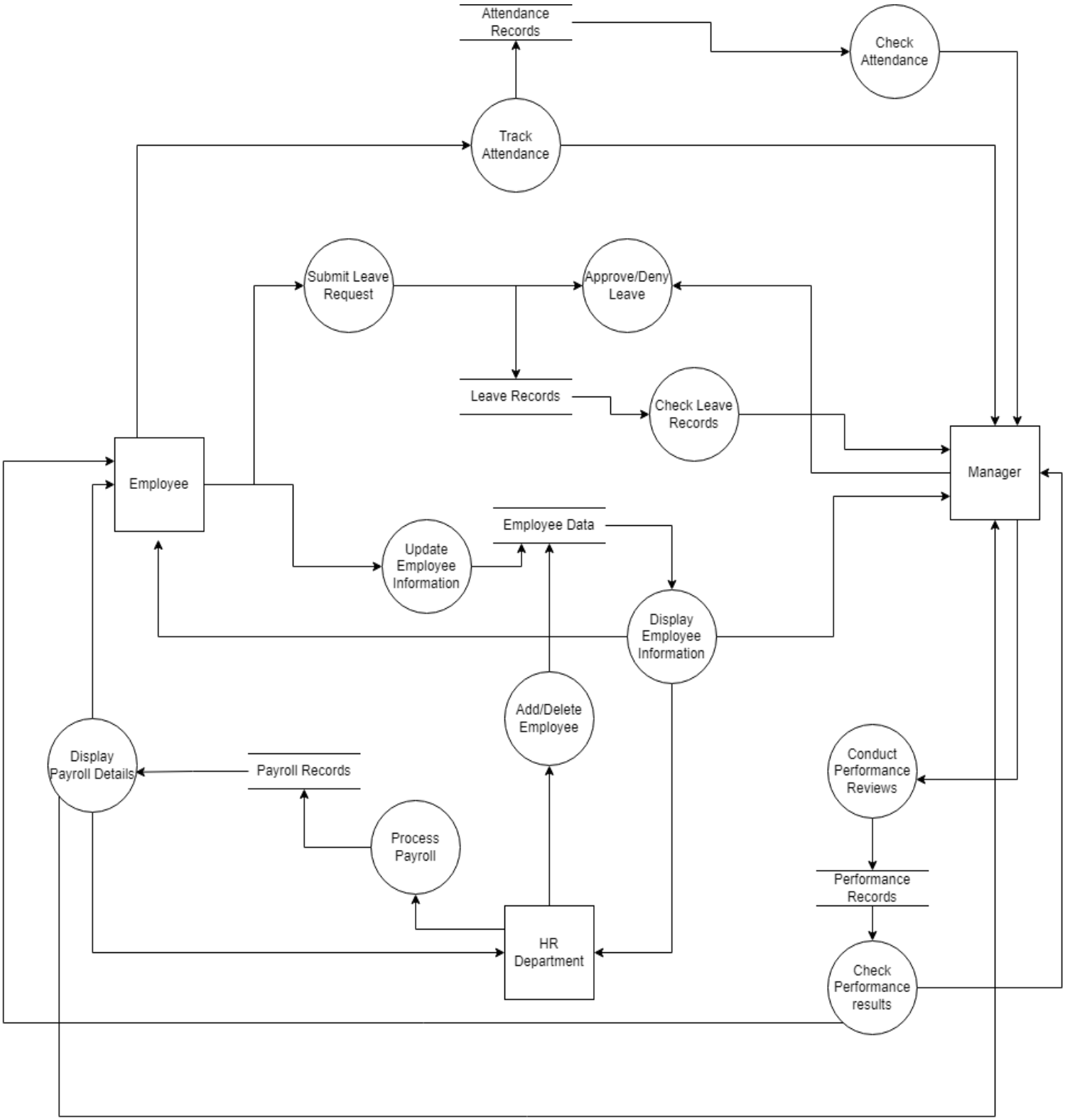
Handles payroll processing. Employees view payroll details while admins process payroll using the system.

1.5 Performance Review

Manages employee performance evaluations. Admins conduct performance reviews and employees view the feedback. This is stored in performance data



Level 2 DFD


Attendance Records
Check Attendance
Track Attendance
Submit Leave Request
Approve/Deny Leave
Leave Records
Check Leave Records
Employee
Manager
Employee Data
Update Employee Information
Display Employee Information
Add/Delete Employee
Display Payroll Details
Payroll Records
Process Payroll
Conduct Performance Reviews
Performance Records
HR Department
Check Performance results

CLASS RESPONSIBILITY CARDS

EMPLOYEE	
Responsibilities	**Collaborators**
Store and display personal information.	Employee Database
Assign employee to a department.	Department Class
Submit leave requests.	Leave Class
Clock in and out to record attendance.	Attendance Class
Participate in performance evaluations.	PerformanceReview Class
Associate with a User for authentication.	User Class
Create projects and collaborate on projects.	Project Class

DEPARTMENT	
Responsibilities	**Collaborators**
Maintain a list of employees associated with the department.	Employee Database
Provide methods to add, remove, and retrieve employee data.	Employee Database, Employee Class
Collaborate with the Project class to initiate and oversee projects within the department.	Project Class

PROJECT	
Responsibilities	**Collaborators**
Store project-related information, including project name, description, and start/end dates.	
Create and manage tasks within the project.	
Assign employees to specific tasks within the project.	Employee Database

PAYROLL	
Responsibilities	**Collaborators**
Calculate employee salaries based on attendance and performance.	Attendance Records, Performance Records
Manage the payroll processing for all employees.	Employee Database
Store and maintain records of payroll-related information.	Payroll Records

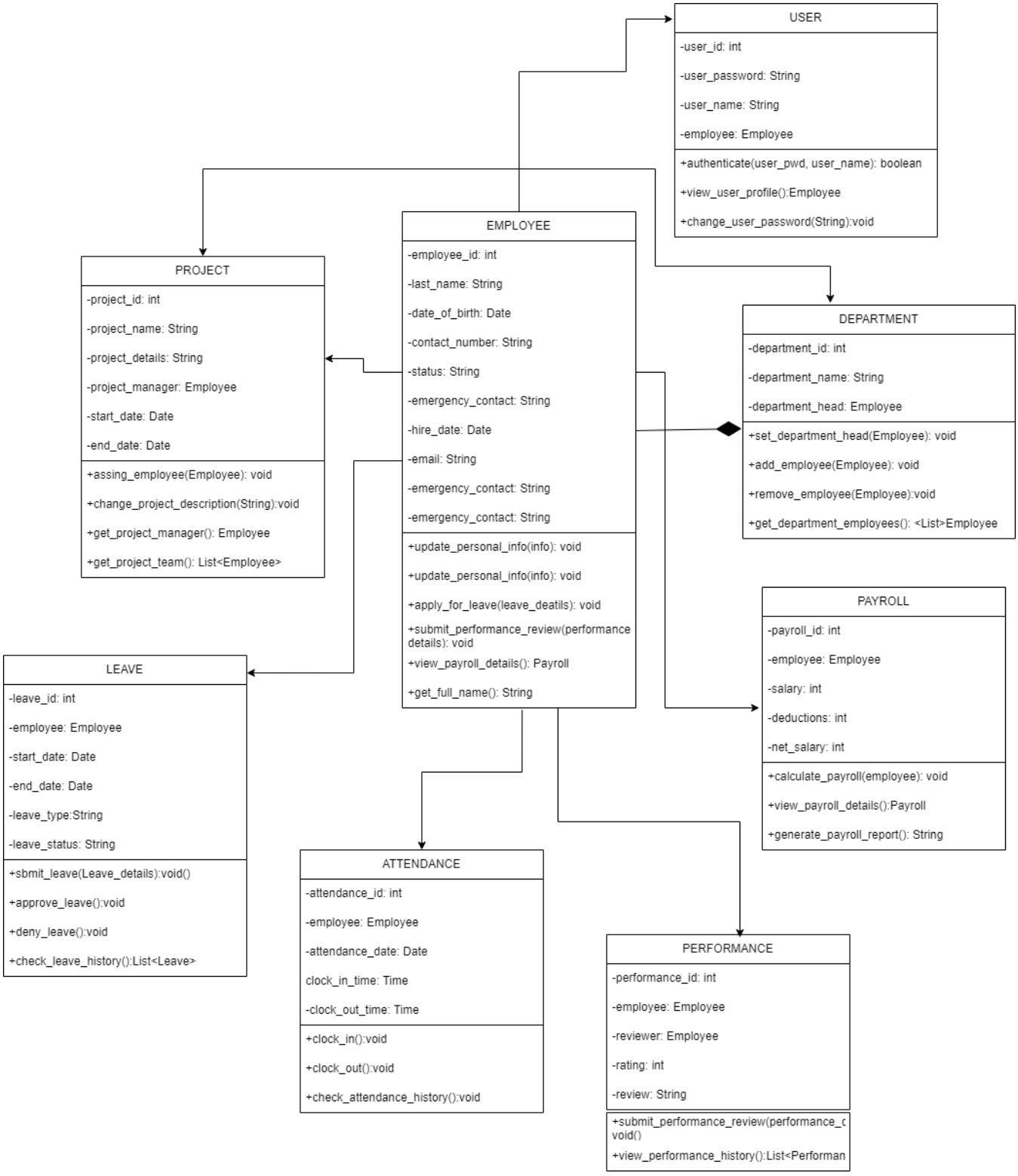
LEAVE	
Responsibilities	**Collaborators**
Store details of leave requests, including start date, end date, and type of leave.	Leave Records
Update the status of leave requests based on approval or rejection.	Employee Class

ATTENDANCE	
Responsibilities	**Collaborators**
Track and record employee attendance.	Attendance Records, Employee Class
Calculate attendance metrics, such as hours worked, overtime, etc.	Attendance Records

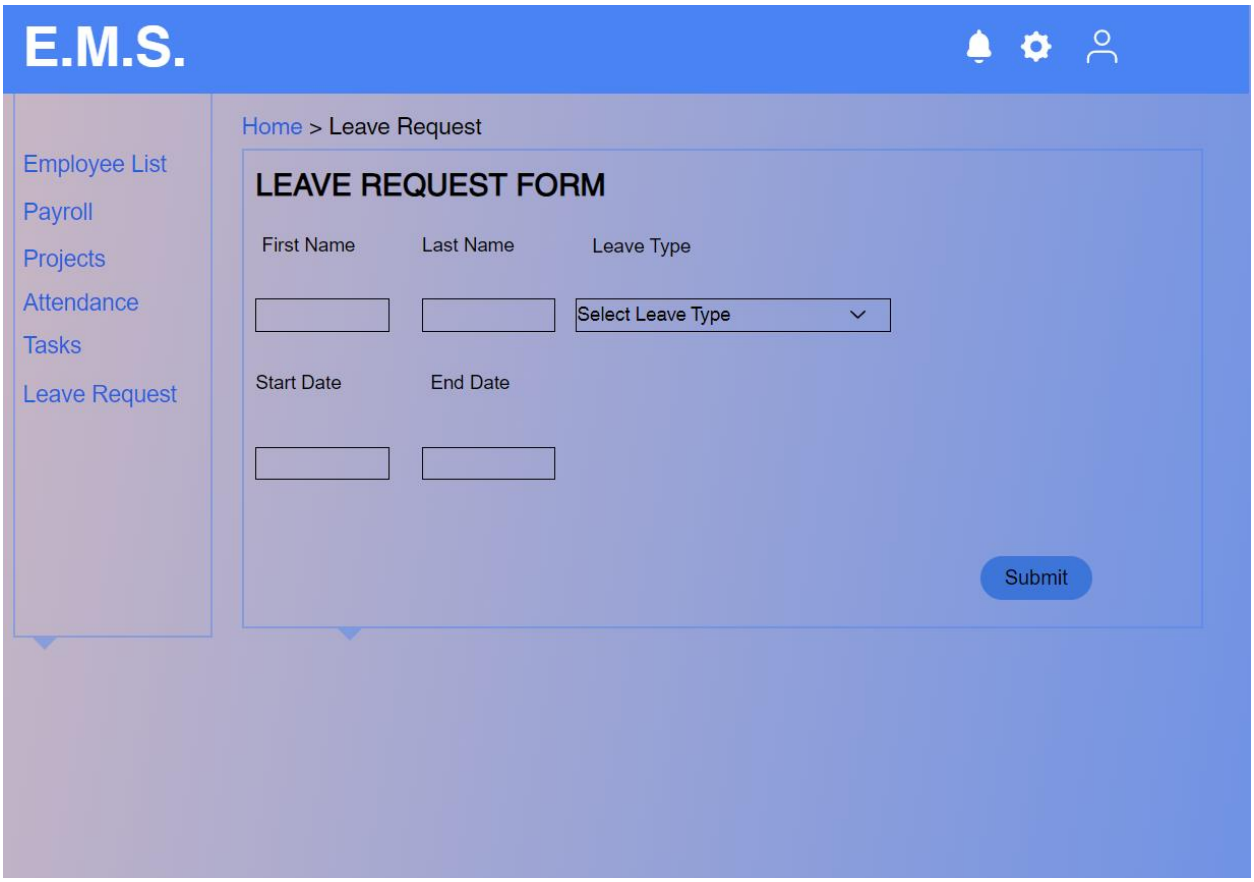
PERFORMACE_REVIEW	
Responsibilities	**Collaborators**
Store and manage performance-related information for employees.	Performance Data
Conduct and document performance reviews.	Employee Class
Provide feedback on employee performance.	Performance Data

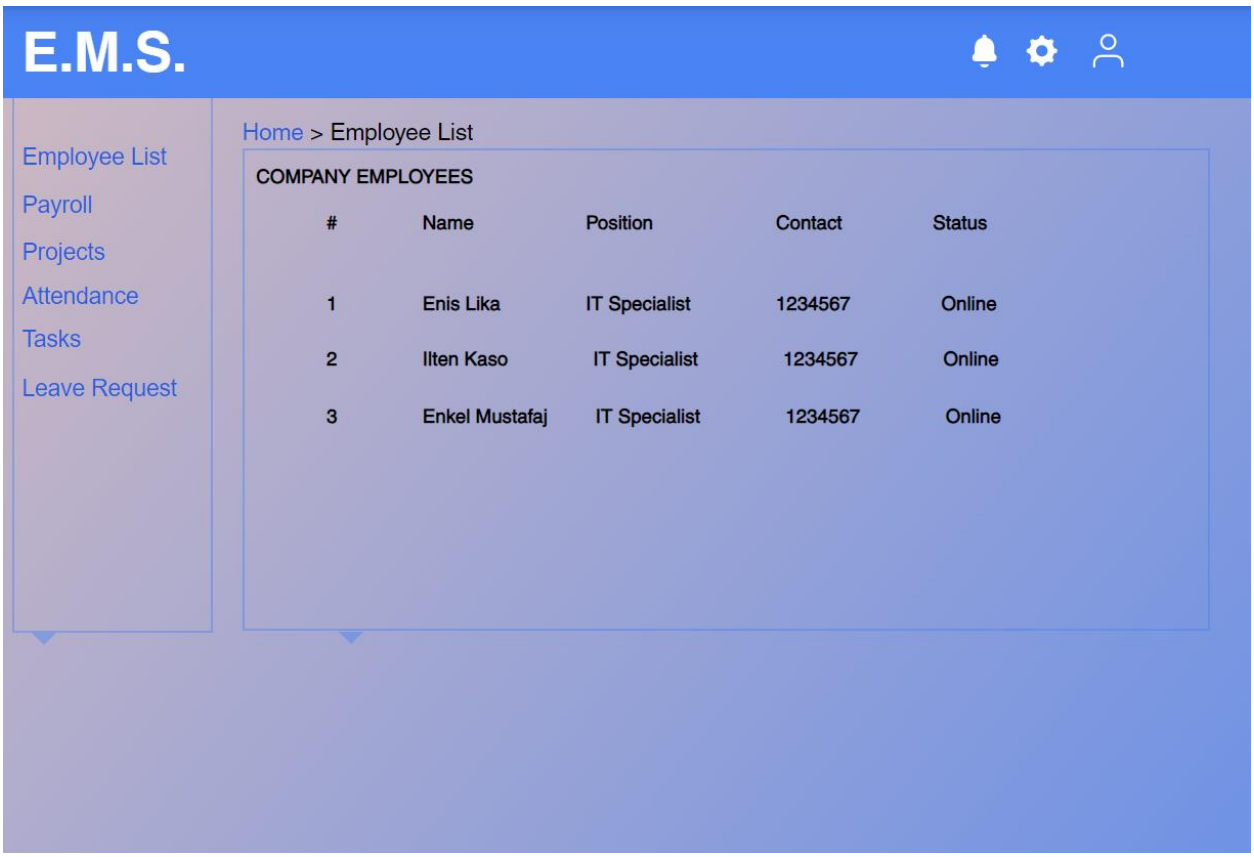
USER	
Responsibilities	**Collaborators**
Handles Employee authentication process.	Employee Database

CLASS DIAGRAM

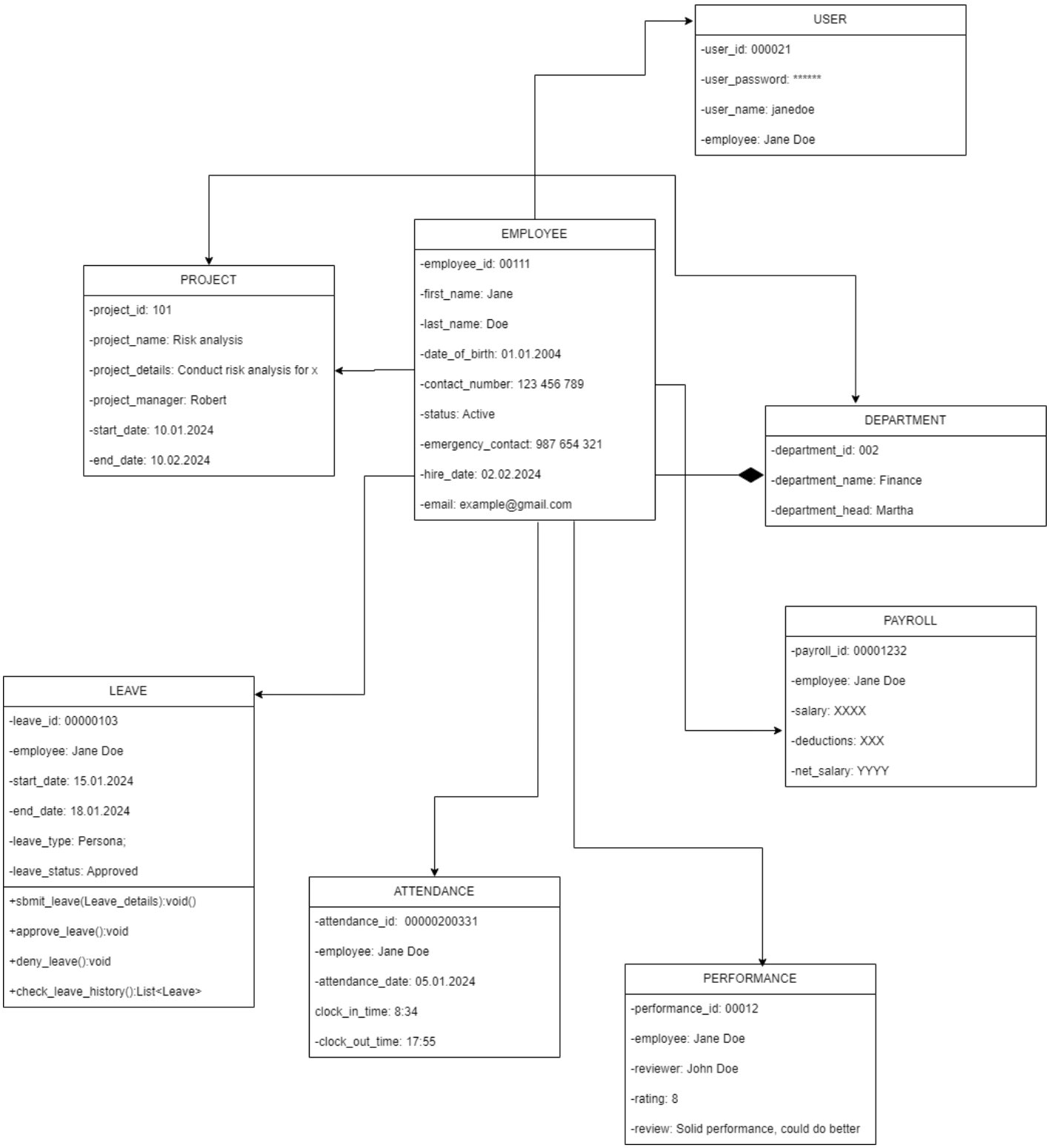


INTERFACE EXAMPLE





OBJECT DIAGRAM

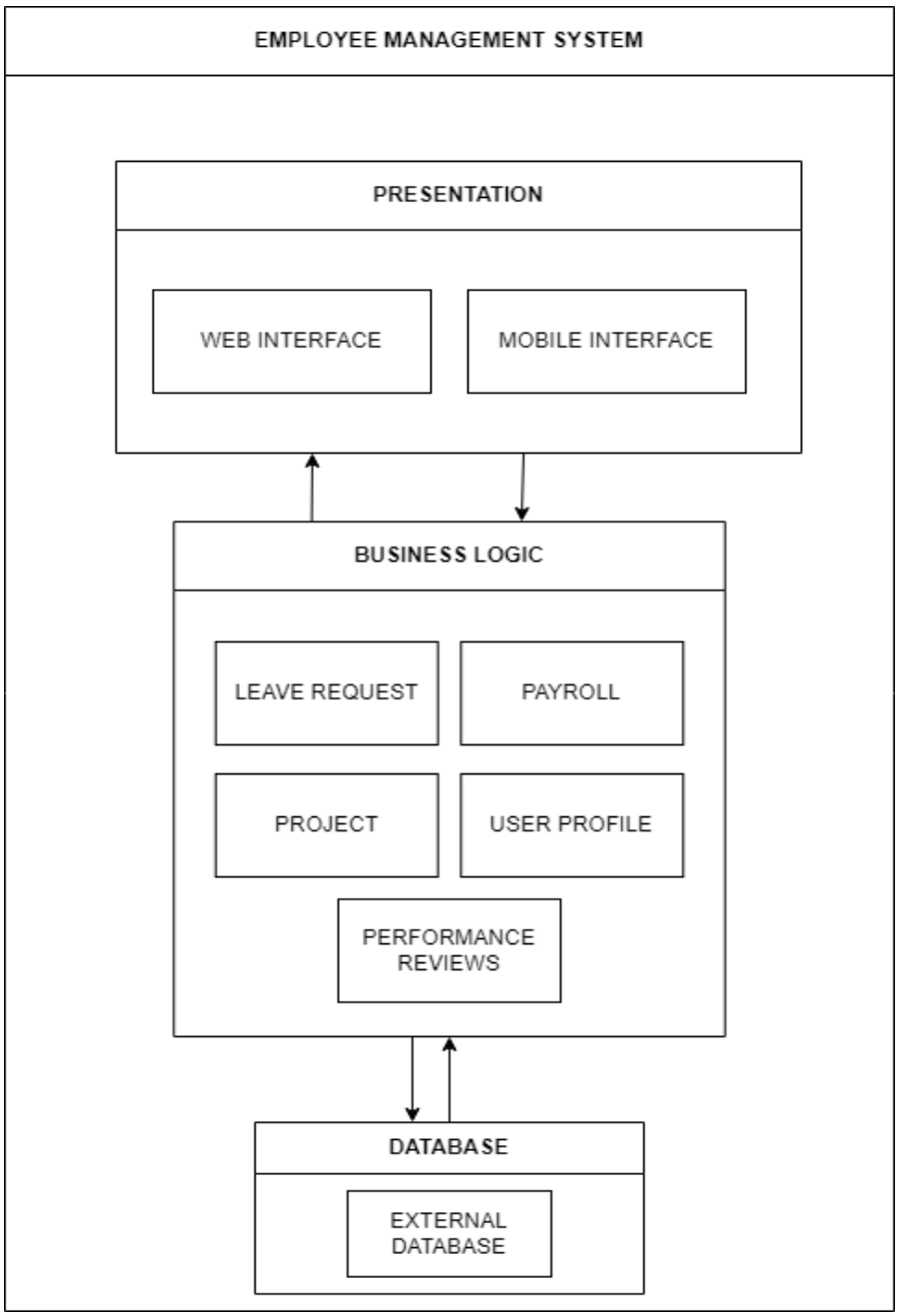


COMPONENT DIAGRAM

Presentation Layer -Represents the user interfaces, such as web and mobile interfaces.

Business Logic Layer

Contains the core functionality of the Employee Management System.

Components include Employee, Department, Leave, Project, Payroll, User, and Performance.

External Database -Represents an external database that the Employee Management System may utilize.