



**Tribhuvan University**

**Institute of Science and Technology**

A

Final Year Project Report

On

**Human Resource Management System**

Submitted to

Department of Computer Science and Information Technology

**Birendra Memorial College (BMC)**

Dharan, Sunsari

In Partial Fulfilment of the Requirements

For the Bachelor's Degree in Computer Science and Information Technology

(B.Sc.CSIT)

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UNDER THE SUPERVISION OF **MR. AVAY KAFLE**

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## **Supervisor's Recommendation**

I hereby recommend that this project prepared under my supervision by Aastha Bajracharya (21420/075), Kiran Nepal (21427/075) and Sandesh Adhikari (21437/075) entitled "Human Resource Management System" in partial fulfilment of the requirements for the degree of B.Sc. in Computer Science and Information Technology (BSc.CSIT) be proceed for the evaluation.

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**Signature**

**Supervisor**

**Mr. Avay Kafle**

## LETTER OF APPROVAL

This is to certify that the project carried out by Miss Aastha Bajracharya, Mr. Kiran Nepal and Mr. Sandesh Adhikari entitled “Human Resource Management System” in partial fulfilment of the requirements for the degree of B.Sc. in Computer Science and Information Technology has been well studied. In our opinion it is satisfactory in the scope and quality as a project for the required degree.

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## **ABSTRACT**

The Human Resource Management System (HRMS) is a software suite that provides a complete solution for managing HR processes throughout an employee's career. This project aims to design and develop an HRMS for a fictitious organization that can be used to manage employee data, attendance, payroll, and performance analysis. The system is designed to be web-based, allowing employees to access their information from anywhere with an internet connection. The project utilizes a range of technologies, including Flutter, Python, Django, MySQL, and APIs. The project also includes testing and result analysis to ensure the system meets the specified requirements. The proposed HRMS will streamline HR processes, boost employee productivity, and improve workplace security by incorporating the latest technology, such as face recognition for attendance monitoring.

*Keywords:* Human Resource Management System, Employee data, Attendance management, payroll, performance analysis, web-based, Flutter, Python, Django, MySQL, APIs, result analysis, Face recognition.

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## **List of Abbreviations**

API	Application Programming Interface
eHRM	electronic Human Resource Management
HR	Human Resource
HRIS	Human Resource Information System
HRMS	Human Resource Management System
SDLC	Software Development Life Cycle
UML	Unified Modelling Language



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# **Chapter 1: Introduction**

## **1.1 Introduction**

The efficient management of human resources is critical for any organization to achieve its goals and objectives. In today's fast-paced business environment, organizations must leverage technology to optimize HR operations and improve employee productivity. Human Resource Management System (HRMS) is a suite of software programs that offers a comprehensive solution to manage human resources and associated procedures throughout an employee's career.

One of the latest advancements in HRMS is the development of web-oriented software applications, commonly known as electronic HRM (eHRM). eHRM streamlines HR processes by consolidating data and automating manual and repetitive tasks such as employee information management, attendance monitoring, payroll management, and performance analysis. It also incorporates the latest technology, including face recognition, which enables efficient attendance monitoring and improves workplace security.

Recent studies have shown that organizations that implement eHRM systems have experienced significant improvements in workforce management, operational efficiency, and employee productivity [1][2]. By leveraging the power of eHRM, organizations can streamline their HR operations, reduce administrative overhead, and make data-driven decisions that support their long-term strategic goals.

## **1.2 Problem Statement**

The effective management of human resources plays a crucial role in achieving organizational goals and objectives. However, without proper HRMS software, organizations may face challenges such as inefficiencies, lack of data insights, and poor employee experience [3]. Outdated HRMS software may also pose problems related to data security, handling large amounts of data, and slow processing time [4]. These issues can hinder an organization's ability to focus on strategic aspects of HR management, such as talent acquisition and alignment of employee objectives with business goals. Therefore, there is a need for an automated HRMS platform that

can streamline HR processes and provide a centralized system for managing employees and accessing data, thus promoting transparency and cooperation between employers and employees. This project aims to provide such a solution to organizations, utilizing face recognition technology for accurate attendance monitoring and promoting efficient HR management.

### **1.3 Objectives**

- To help the organization to mark the attendance of the employee automatically by keeping records of timestamps when the employee enters the premise with the use of Face Recognition Technology.
- To help businesses manage and store employee data in a centralized location, making it easier to access and analyze data for reporting and decision-making purposes.

### **1.4 Scope and Limitation**

The scope of this HRMS project is to develop a web-based system that automates HR processes, including attendance management, employee data management, and performance analysis. The system will use Face Recognition Technology to mark employee attendance automatically, thereby reducing the manual effort required to track employee attendance. The centralized database will enable the system to manage and store employee data, making it easier to access and analyze for reporting and decision-making purposes. The system will also track and assess employee development and performance.

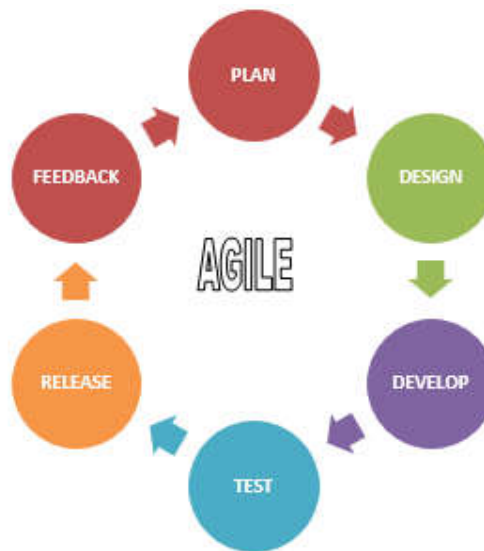
However, this project has some limitations. Some of the limitations of the project are listed below:

- The system will not be able to detect attendance for employees who are not present on the premises, such as employees working from home or on business trips.
- The HRMS system will be developed for a specific organization and may not be easily scalable to other businesses with different requirements.

- The effectiveness of the face recognition technology for attendance tracking might be affected by aspects such as lighting conditions and camera placement.
- The accuracy of the performance evaluation system may be influenced by subjective factors such as evaluator bias.
- The project will not cover every possible HR function, and some tasks may still require manual intervention or third-party tools.

## 1.5 Development Methodology

After examining the nature of our project and conducting some research, for the development of the HRMS project, the agile methodology is followed. Agile Software Development approach has six phases: plan, design, develop, test, release, and feedback. It is a flexible and iterative approach which focuses on customer satisfaction and allows for continuous improvement throughout the project lifecycle [5]. The Agile methodology is based on the principles of frequent communication, collaboration, and continuous testing and integration [6].



*Figure 1: Agile Development Life Cycle*

## 1.6 Report Organization

This report is structured to provide a comprehensive overview of the HRMS project. The report begins with an introduction, which provides a background on the project

and identifies the problem statement. This is followed by a section on the objectives of the project, which outlines the goals and outcomes that the project aims to achieve.

The development methodology used in the project is described in detail in the subsequent section which provides an overview of the agile methodology used and the rationale behind its selection. The report then moves on to discuss the scope and limitations of the project, outlining the boundaries within which the project operates. The implementation of the HRMS system is described in the following section. This section provides a detailed account of the system's functionality, including the features and tools that were used in its development. The report concludes with a section on the project's results, which presents the outcomes of the project and assesses its effectiveness in meeting its objectives.

Overall, this report is organized in a manner that is easy to follow and understand. It provides a clear and concise overview of the project and its various components, making it a valuable resource for those interested in HRMS systems and their implementation.

## **Chapter 2: Background Study and Literature Review**

### **2.1 Background Study**

The HRMS project aims to develop a system for managing employee data and attendance using face recognition technology. To understand the theoretical foundations of this project, it is important to review the concepts and terminologies related to HRMS systems.

One important concept is the role of human resources in organizations. HR is responsible for managing the organization's workforce and ensuring that the right people are in the right roles to achieve the organization's goals. HRMS systems provide a tool for managing employee data and attendance, which is a critical aspect of HR management.

Another key concept is the use of biometric technologies, such as face recognition, for authentication and identification purposes. Face recognition technology uses algorithms to match an individual's facial features with a database of known faces, allowing for automated identification and authentication. This technology has become increasingly popular in recent years and has been applied in various fields, including security and access control.

The use of Agile methodology in software development is another important concept relevant to the HRMS project. Agile methodology emphasizes flexibility, collaboration, and continuous improvement, allowing for the project to adapt to changing requirements and ensuring that the final product meets the stakeholders' needs [6].

Finally, it is important to consider the potential ethical and legal implications of implementing a system that uses biometric data. The collection, storage, and use of biometric data are subject to various laws and regulations, and organizations must ensure that they comply with these laws and protect the privacy and security of their employees' data [7].



## 2.2 Literature Review

Several studies have been conducted on HRMS systems, providing valuable insights into their design, development, and implementation. The implementation of electronic human resource management (eHRM) systems has been extensively studied for its impact on organizational performance. In this section, we review some of the key studies in this area.

Al-Hmouze [1] investigated the relationship between eHRM application and organizational performance and found a significant positive correlation. Similarly, Hosain [2] found a positive relationship between eHRM and organizational performance in the service sector of Bangladesh.

Bondarouk and Ruël [3] studied the challenges associated with the implementation of eHRM systems and emphasized the need for organizations to align their HR strategy with eHRM systems to achieve optimal benefits. Varadaraj and Al Wadi [4] investigated the impact of digital HRM on organizational performance and found that it positively influenced employee satisfaction, retention, and productivity.

Studies have also explored the use of biometric technology in HRMS. Li et al. [5] found that biometrics was effective in reducing time and attendance-related issues. Tanwar et al. [6] stressed the ethical, legal, and social implications of biometric technology and highlighted the need for organizations to address these concerns.

Abdullah et al. [7] investigated the use of cloud computing in HRM systems and found that it improved efficiency and reduced costs. Guru et al. [8] focused on HR analytics and its role in predictive decision-making for competitive advantage.

Zafar [9] highlighted the information security concerns associated with HRIS and emphasized the need for organizations to implement security measures to protect their data. Almutawa et al. [10] investigated the effect of HRMS on employee commitment and found that it positively influenced employee commitment.

Regarding software engineering practices, Pfleeger and Atlee [11] and Pressman [12] provide a comprehensive overview of software engineering principles and

practices that can be applied in the development of HRMS. These include requirements engineering, software design, testing, and maintenance.

In conclusion, the literature suggests that eHRM systems, biometric technology, cloud computing, HR analytics, and HRMS can significantly impact organizational performance. However, ethical, legal, and social implications as well as information security concerns must be addressed. Organizations must also align their HR strategy with the implementation of HRMS and apply software engineering principles and practices to develop and maintain these systems. These studies provide valuable insights into the design, development, and implementation of HRMS systems, highlighting their potential to improve organizational performance and employee engagement while also addressing important issues such as data security and privacy.

## **Chapter 3: System Analysis**

### **3.1 System Analysis**

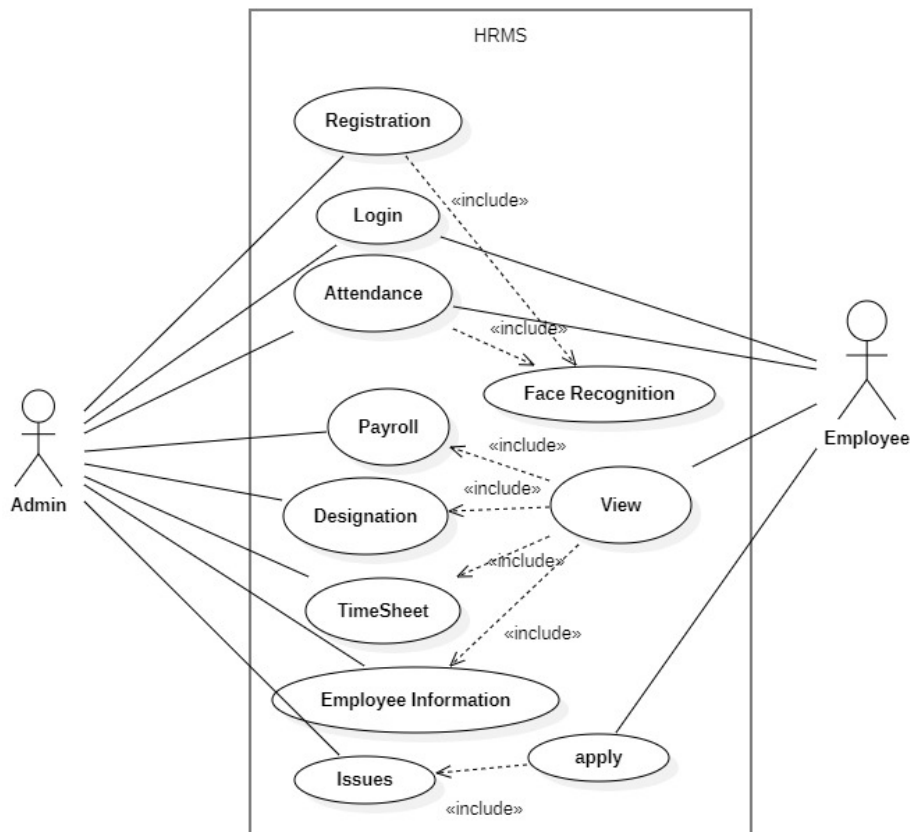
In the context of the HRMS project, systems analysis is a crucial step in the development process. It involves the study of the HRMS system to identify the requirements, model the system, and choose a logical alternative that meets the needs of the stakeholders. Systems analysis projects can be initiated for various reasons, including addressing problems, identifying opportunities, and following directives [14]. The key stakeholders involved in systems analysis for the HRMS project are the systems analysts, sponsors, and users. The systems analysts are responsible for studying the system and identifying its requirements, while the sponsors provide the necessary resources and support to the project. The users, on the other hand, provide feedback on the system's functionality and help ensure that it meets their needs [15].

#### **3.1.1 Requirement Analysis**

The requirement analysis phase is a critical step in the HRMS project, as it involves identifying and defining the functional and non-functional requirements of the system.

##### **Functional Requirements:**

Functional requirements are a set of features and capabilities that a software system must have to perform the desired functions and operations. The functional requirements of the HRMS are defined in this section of the analysis phase, including the various functionalities that the system should have to manage employee information, attendance, payroll, and other HR-related tasks. These requirements are based on the stakeholders' needs and expectations and are used to develop the HRMS software.



*Figure 2: HRMS Use Case Diagram*

Based on the use case diagram for the HRMS project, here are the functional requirements (use case descriptions) for each use case:

**i. Registration:**

The system should allow an admin to register new employees and verify their identity through face recognition. Basic employee information, such as their name, contact details, and job title, should be captured during the registration process.

**ii. Login:**

The system should allow employees and admins to log in to the HRMS using a username and password or facial recognition.

**iii. Attendance:**

The system should allow employees and admins to record employee attendance, with facial recognition used to ensure the correct employee is logging in.

**iv. Payroll:**

The system should enable admins to manage employee salaries and compensation. It should be capable of calculating employee salaries based on their working hours and compensation packages.

**v. Designation:**

The system should allow admins to manage employee job titles and responsibilities, including creating new job titles and descriptions and assigning them to employees.

**vi. TimeSheet:**

The system should allow employees to record their time spent on different tasks, enabling them to track their productivity and performance.

**vii. Employee Information:**

The system should enable admins to manage employee information, including their contact details, performance, and attendance records. The system should allow for the viewing and updating of employee information as required.

**viii. Issues:**

The system should allow employees to report workplace issues or problems, with the ability to create a new issue report and track its status until resolution.

**ix. Face Recognition:**

The system should enable admins and employees to use facial recognition to log in to the system, record attendance, and register new employees. The system should be able to recognize the faces of registered employees and deny access to unauthorized individuals.

**x. View:**

The system should allow employees and admins to view various aspects of employee information, such as payroll, designation, timesheets, and employee information, in a user-friendly and organized manner.

**xi. Apply:**

The system should enable employees to apply for various things, such as leave, promotions, or salary adjustments. The system should allow for the creation of a new application and the ability to track its status until approval or denial.

**Non-Functional Requirements:**

A non-functional requirement specifies the criteria which can be used to evaluate the operation of a system, and include attributes such as security, reliability, performance, maintainability, scalability, and usability. In the HRMS project, several non-functional requirements have been identified, including accessibility, maintainability, scalability, and portability.

**i. Accessibility:**

It refers to the degree to which a product, device, service, or environment is accessible to as many people as possible. As a web-based application, any user can access the HRMS system, making it highly accessible.

**ii. Maintainability:**

Maintainability is defined as the degree to which an application is understood, maintained, or enhanced, is another non-functional requirement. In the HRMS project, new functionalities can be added based on user requirements, and the code is simple and well-organized, making it easy to locate and correct defects or make changes.

**iii. Scalability:**

Scalability is also a crucial non-functional requirement, as it ensures that the system can handle an increased load and throughput under varying conditions.

The HRMS system is designed to function normally under low bandwidth and with a large number of users.

**iv. Portability:**

Portability, or the ability to reuse existing code when moving software from one environment to another, is another important non-functional requirement in the HRMS project. The project can be executed under different operating conditions as long as it meets the minimum configuration requirements, with only system files and dependent assemblies needing to be configured in such cases.

### **3.1.2 Feasibility Analysis**

Feasibility studies aim to discover the strengths and weaknesses of an existing or proposed system, opportunities and threats objectively and rationally as represented by the environment, the resources required to carry through and ultimately the prospects for success. In the case of the HRMS project, a feasibility analysis was conducted to assess the viability of the proposed system. This analysis considered several key considerations, including economical, technical, operational, and schedule feasibility.

**i. Technical:**

Technical feasibility is another critical consideration in the feasibility analysis, as it assesses the ability of the proposed system to be developed using existing technology. In the case of the HRMS project, the technical feasibility was determined by assessing the availability of necessary hardware, software, and infrastructure, as well as the expertise required to implement the system.

**ii. Operational:**

Operational feasibility is also an important consideration, as it determines whether the proposed system can be integrated with the existing business processes and culture. In the case of the HRMS project, the operational feasibility was determined by assessing the readiness of the company's employees to adopt the new system, as well as the potential impact on existing business processes.

**iii. Economic:**

Economic feasibility is an important aspect of the feasibility analysis, as it involves determining whether the proposed system is financially viable. In the case of the HRMS project, cost estimates were developed to determine the resources required to carry out the project, and to ensure that it would not place an undue burden on the company's finances.

**iv. Schedule:**

Schedule feasibility was assessed to determine whether the proposed system could be developed within a reasonable timeframe. To ensure the success of the project, it will be necessary to carefully plan and manage the project to ensure that it stays on track and is completed within the desired timeframe. This may involve setting clear goals and objectives, establishing a project plan and timeline, and regularly monitoring progress to identify and address any potential issues or delays. By carefully managing the project, the organization can increase the likelihood of successfully delivering the project within the desired timeframe and achieving its desired outcomes. In the case of the HRMS project, a timeline was developed to ensure that the project could be completed within a six months timeframe.



### **3.1.3 Analysis**

Analysis is a critical stage in the software development life cycle in which the system's requirements are gathered, analysed, and documented. This stage necessitates a thorough understanding of the user's requirements, the existing system, and the problem domain. The target of analysis is to identify the problem, its underlying cause, and potential solutions.

An object-oriented approach is followed in the analysis phase of the HRMS project because it provides a better understanding of the system's real-world objects and their relationships, making it easier to model and design software solutions. Object-oriented analysis allows us to identify the system's objects, their attributes, and their relationships, leading to a better understanding of the system's requirements and behaviour. Additionally, it facilitates the development of reusable and maintainable software components, which can result in cost savings and faster development times. Overall, an object-oriented approach is more suited for complex and long-term projects such as HRMS, where maintainability, scalability, and extensibility are essential requirements.

## Chapter 4: System Design

### 4.1 Design

The system specifications from the analysis phase are transformed into a more detailed and structured representation of the system during the design phase. This phase's goal is to create a design that meets the functional and non-functional requirements while also being feasible to implement. Depending on the approach used in the analysis phase, the design is object-oriented. The class, state, sequence, and activity diagrams, as well as component and deployment diagrams, are the main deliverables of this phase.

#### **Class and Object Diagram:**

A class diagram is a type of static structure diagram that represents the structure of a system by showing the classes of objects, their attributes, and the relationships between them. It is a crucial tool for object-oriented design and development, as it helps to visualize the relationships and dependencies between classes and objects in a system.

In object-oriented programming, an object is an instance of a class. A class is a blueprint or template that defines the attributes and behaviours that objects of that class should have. When we create an object, we are creating a specific instance of that class, with its own set of values for its attributes. We can create many objects from the same class, and each object will have its own unique set of attribute values.

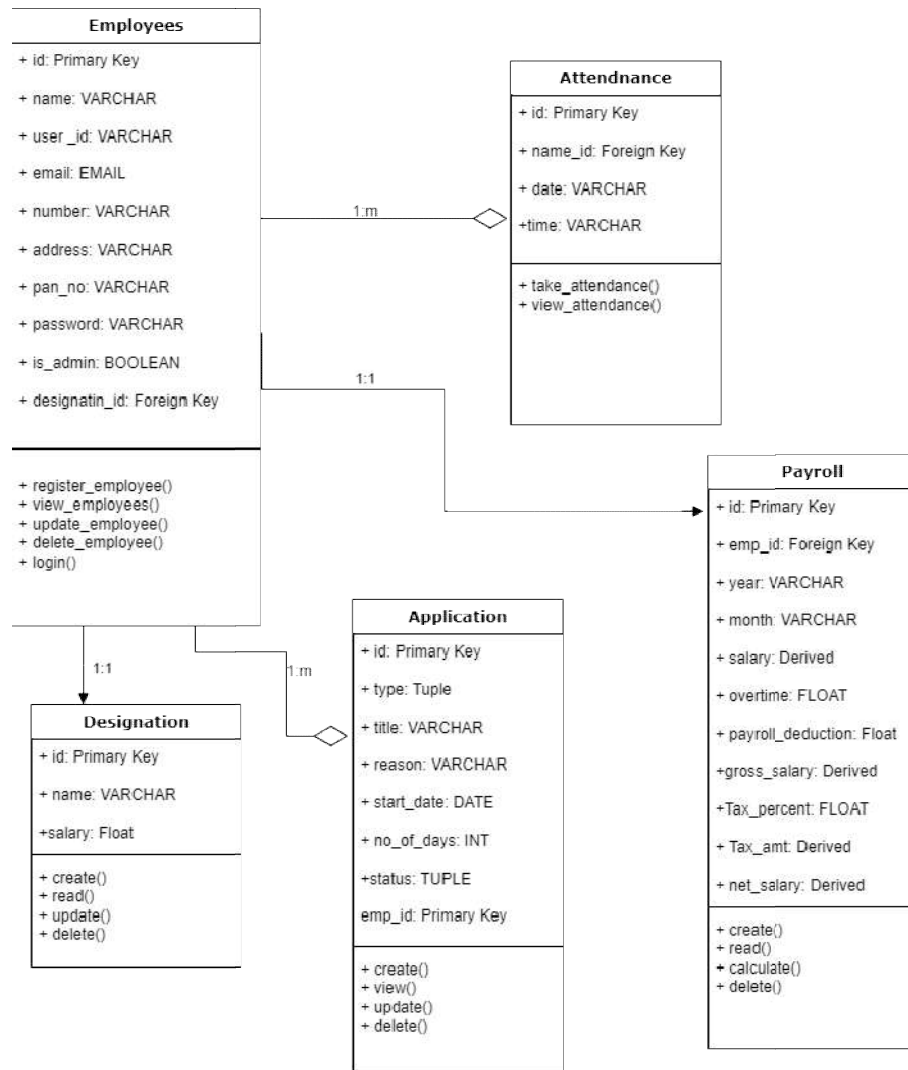


Figure 3: HRMS Class Diagram

For our HRMS project, the class diagram includes classes such as Employees, Payroll, Attendance, Designation, and Application. The attributes of these classes would include things like user\_id, name, address, salary, is\_admin, and so on. The attributes of these classes would include things like register\_employee(), take\_attendance(), calculate(), and so on.

### State Diagram:

A state diagram represents the different states that an object can be in and the transitions between those states. In our HRMS project, we can create state diagrams for the employee object, representing the various states that an employee can be in, such as "active", "on leave", "terminated", etc.

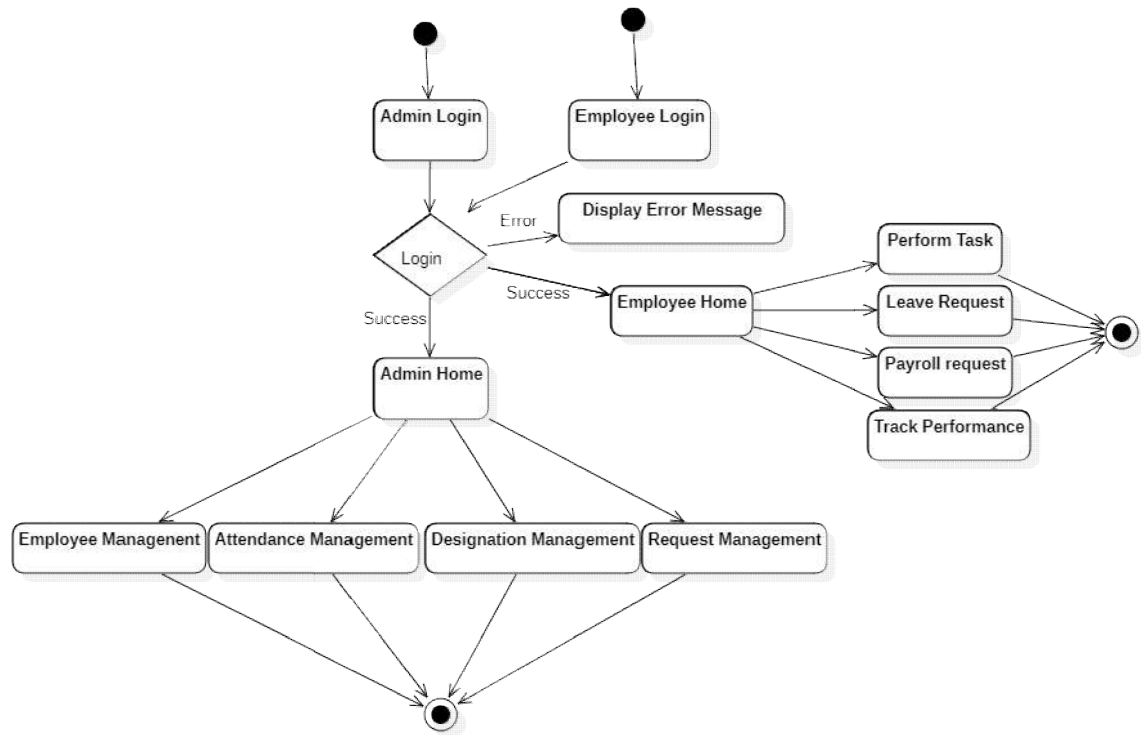
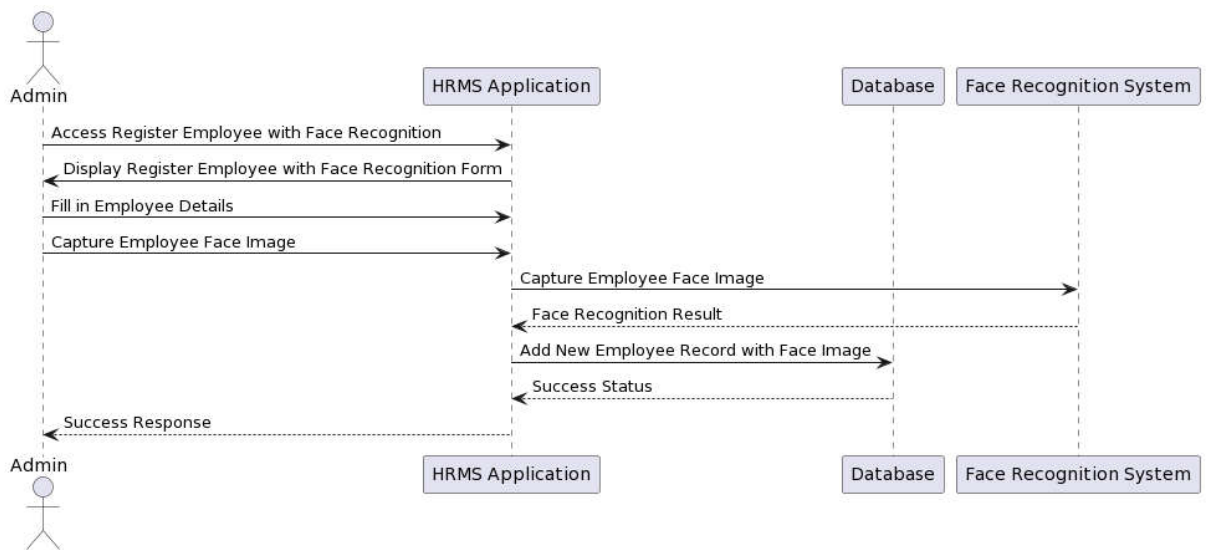


Figure 4: HRMS State Diagram

## Sequence Diagrams:

A sequence diagram illustrates the interaction between the objects in a particular scenario or use case. It shows the order in which objects interact with each other, including the messages that are sent and received. The diagram is composed of vertical lines representing objects, and horizontal lines representing messages.



*Figure 5: Employee Registration with Face Recognition Sequence Diagram*

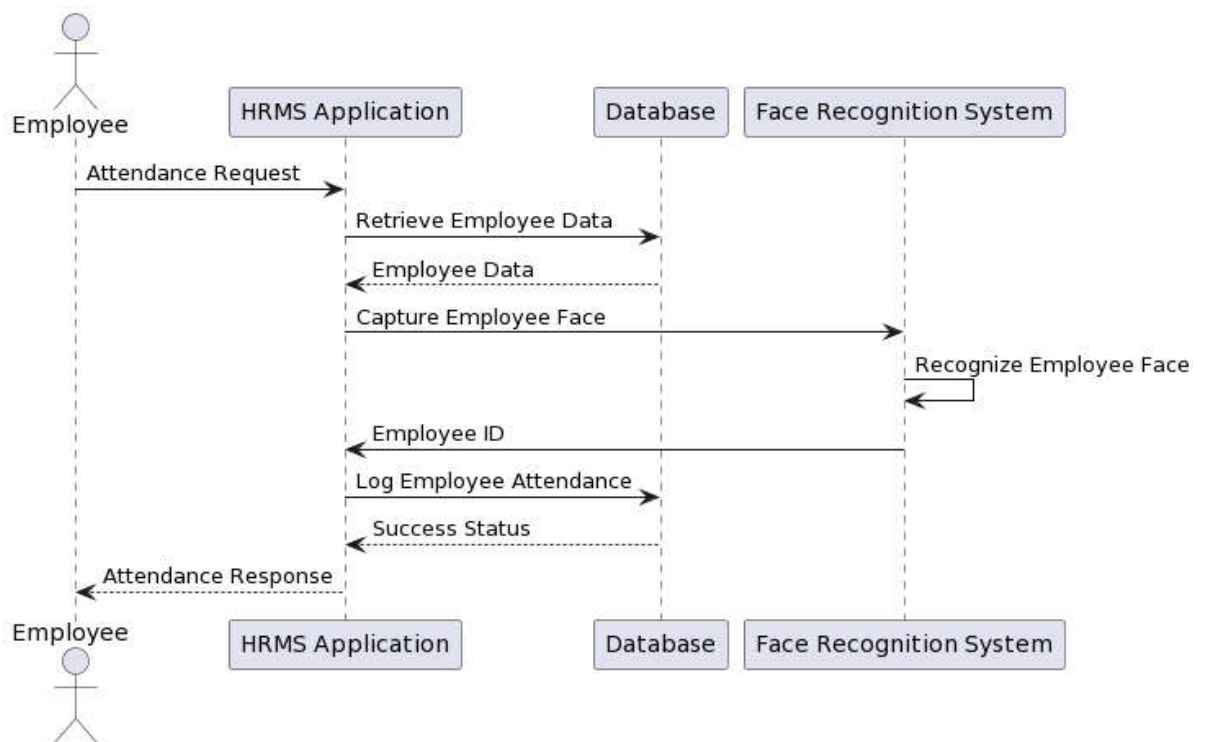


Figure 6: Attendance with Face Recognition Sequence Diagram

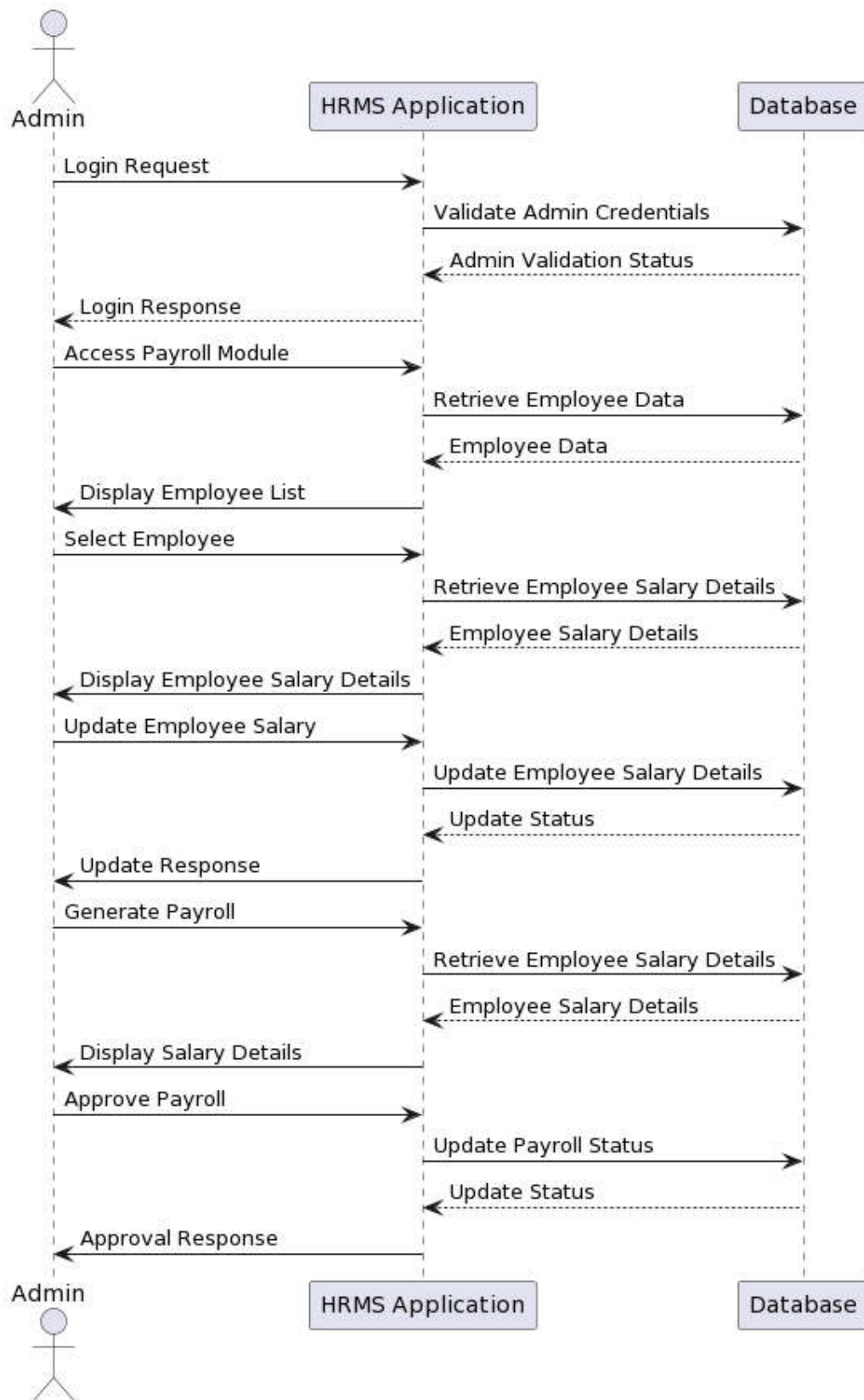


Figure 7: Admin Payroll Management Sequence Diagram

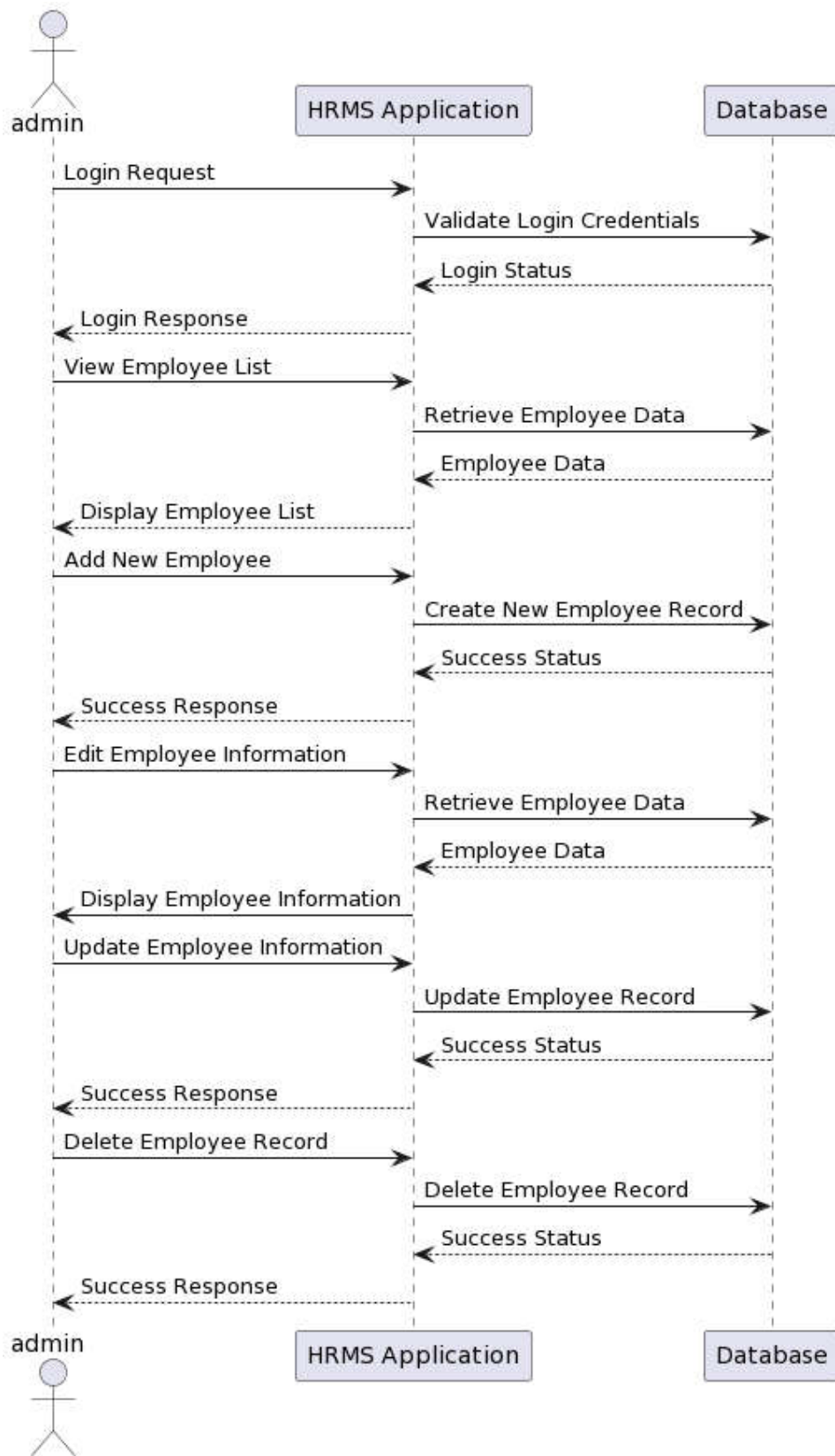


Figure 8: Admin Employee Management Sequence Diagram



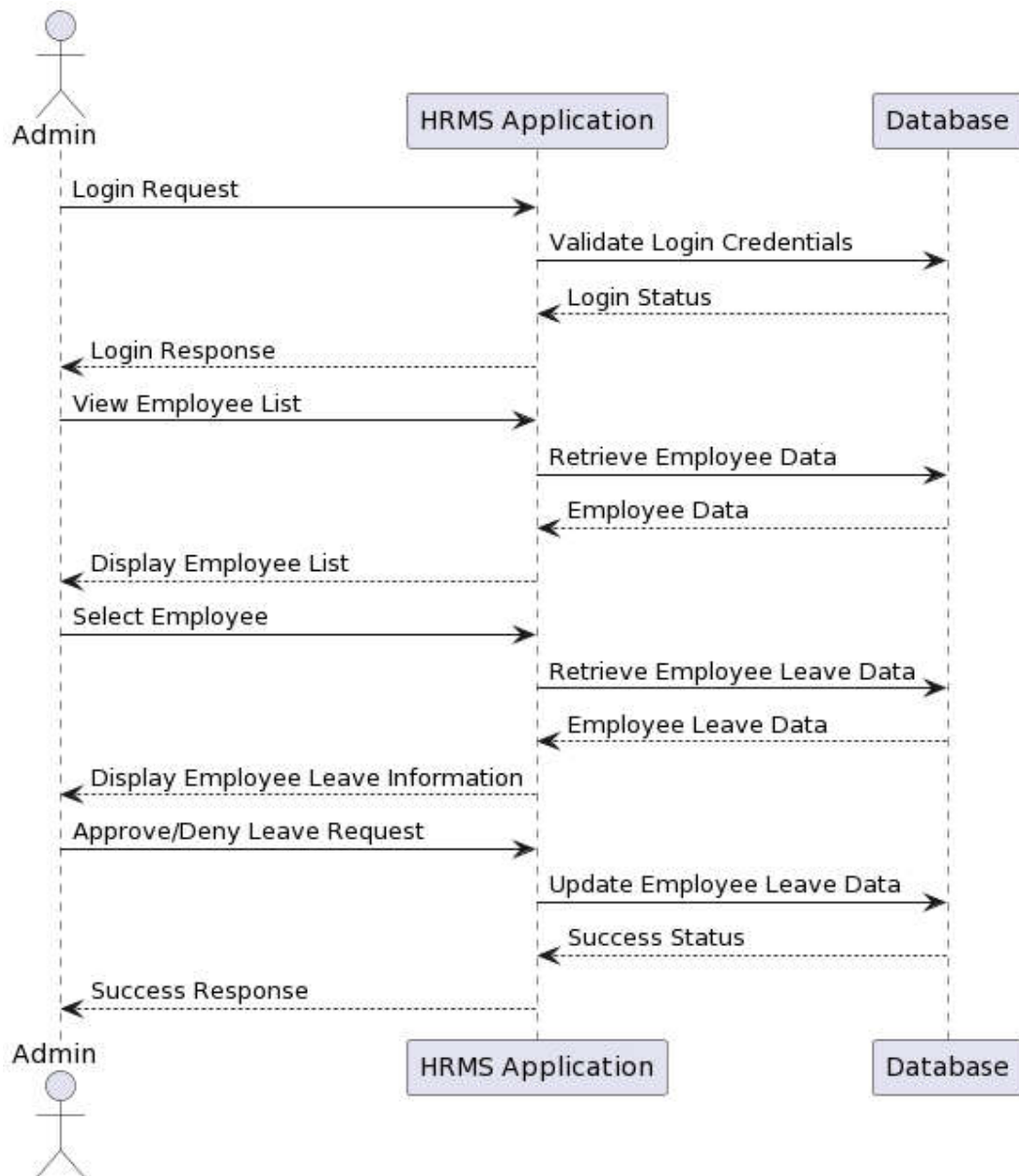
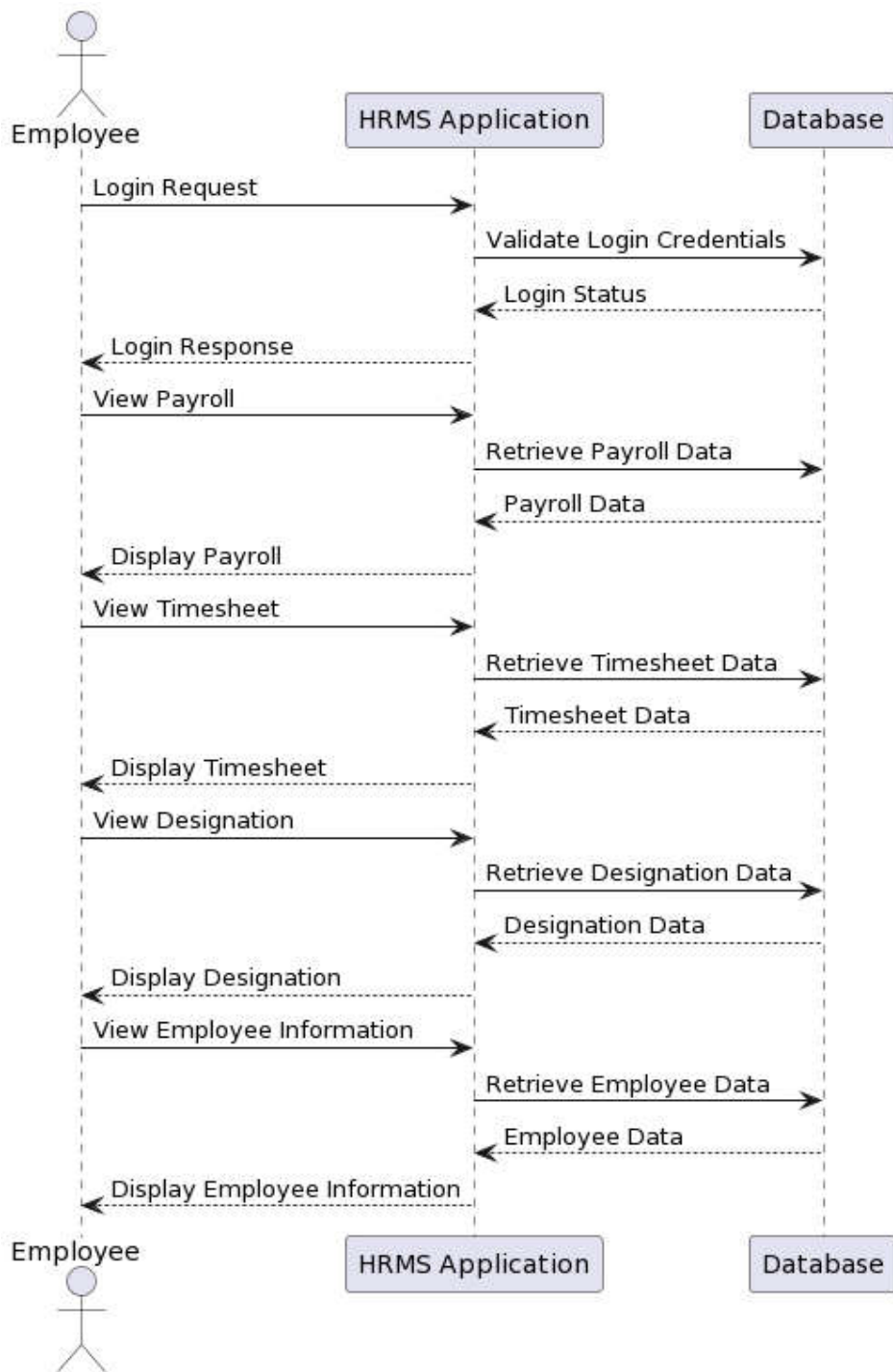
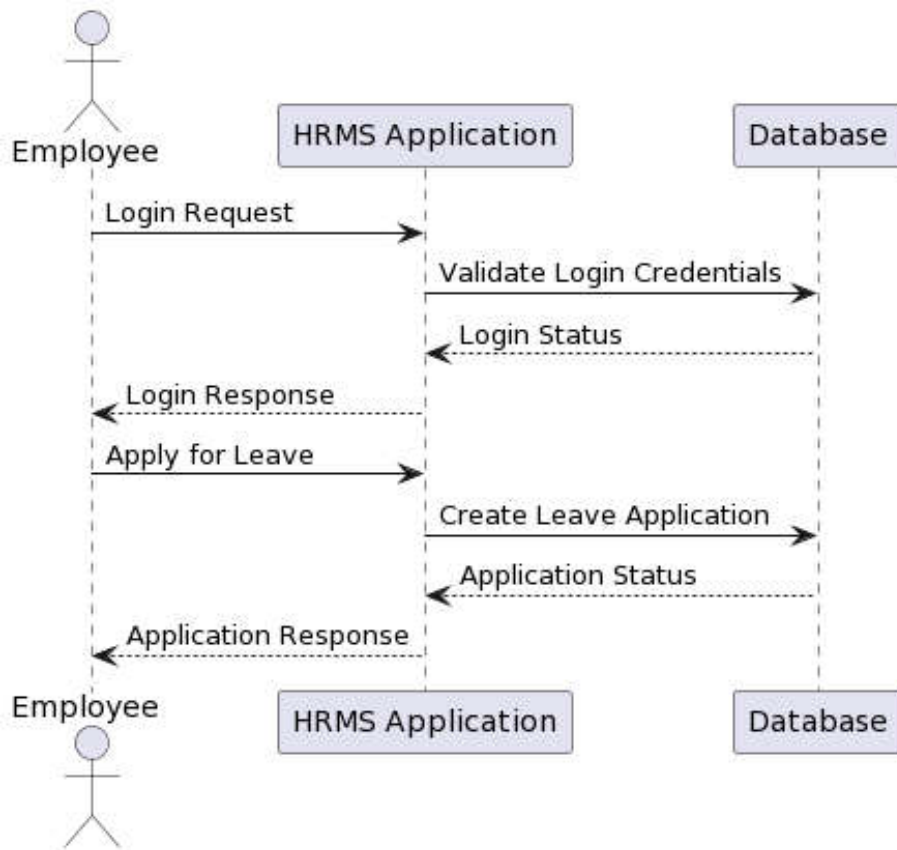


Figure 9: Admin Leave Management Sequence Diagram



*Figure 10: Employee View Payroll, Timesheet, Designation and Employee Information Sequence Diagram*



*Figure 11: Employee Apply for Leave Sequence Diagram*

### **Activity Diagram:**

The flow of activities or tasks in a system or process is represented by an activity diagram. Activity diagrams can be used in the HRMS project to depict processes such as employee onboarding, payroll processing, attendance management, and leave management. They can assist in visualizing the steps involved in each process as well as the conditions that govern the flow of activities. Developers and stakeholders can use these diagrams to understand the system's logic and identify areas for optimization and improvement.

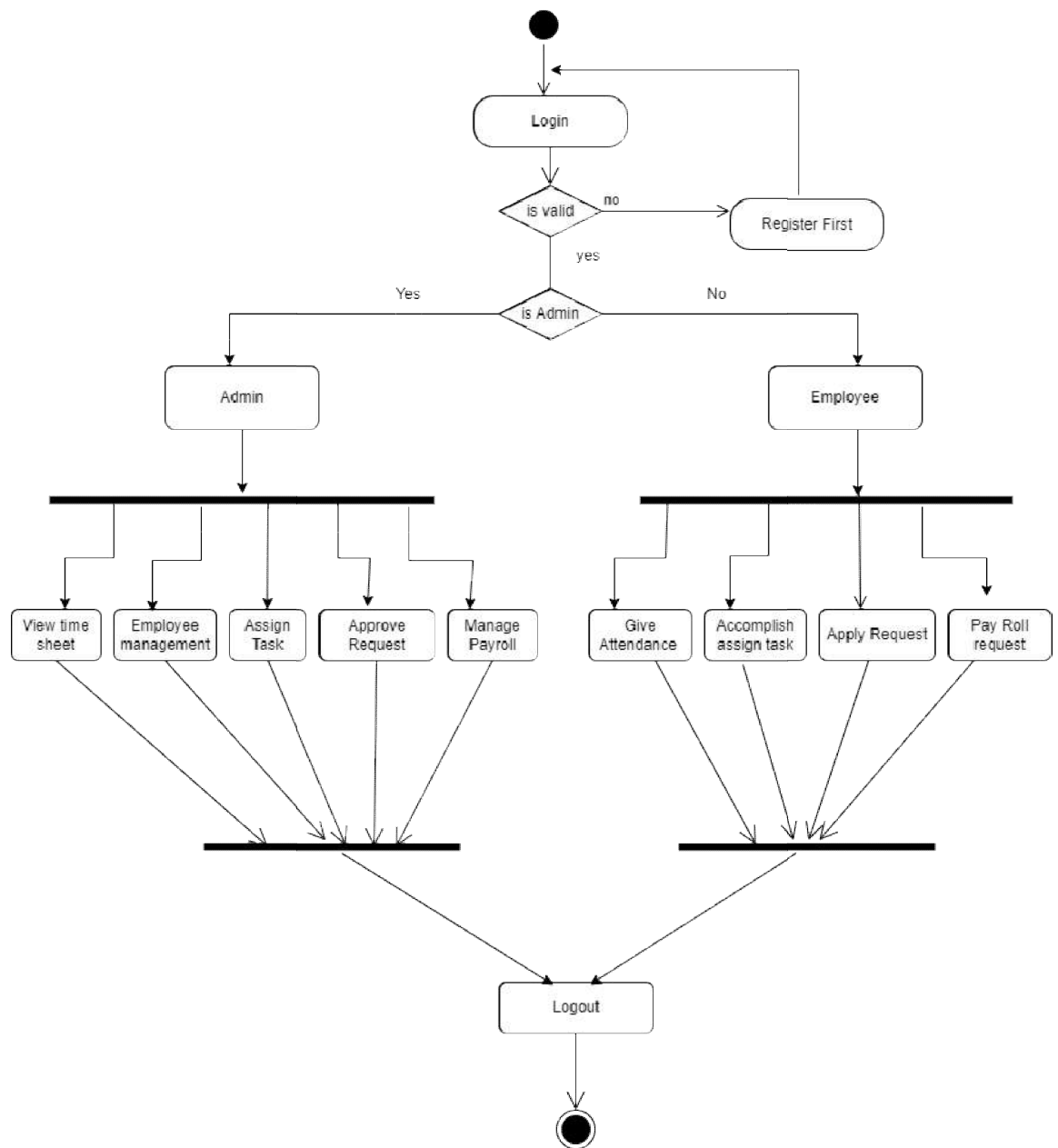


Figure 12: HRMS Activity Diagram

### Component Diagram:

Component diagrams in software engineering are used to describe the high-level structure of a system and the components that make up that system. In a component diagram, components are represented as rectangles with dependency depicted as lines connecting them. This diagram helps to illustrate the dependencies between the different components in the system and their interactions. In our HRMS project, the component diagram can be used to represent the different components that make up the HRMS application, such as the Login Access, payroll management, leave management, system database component, and so on.

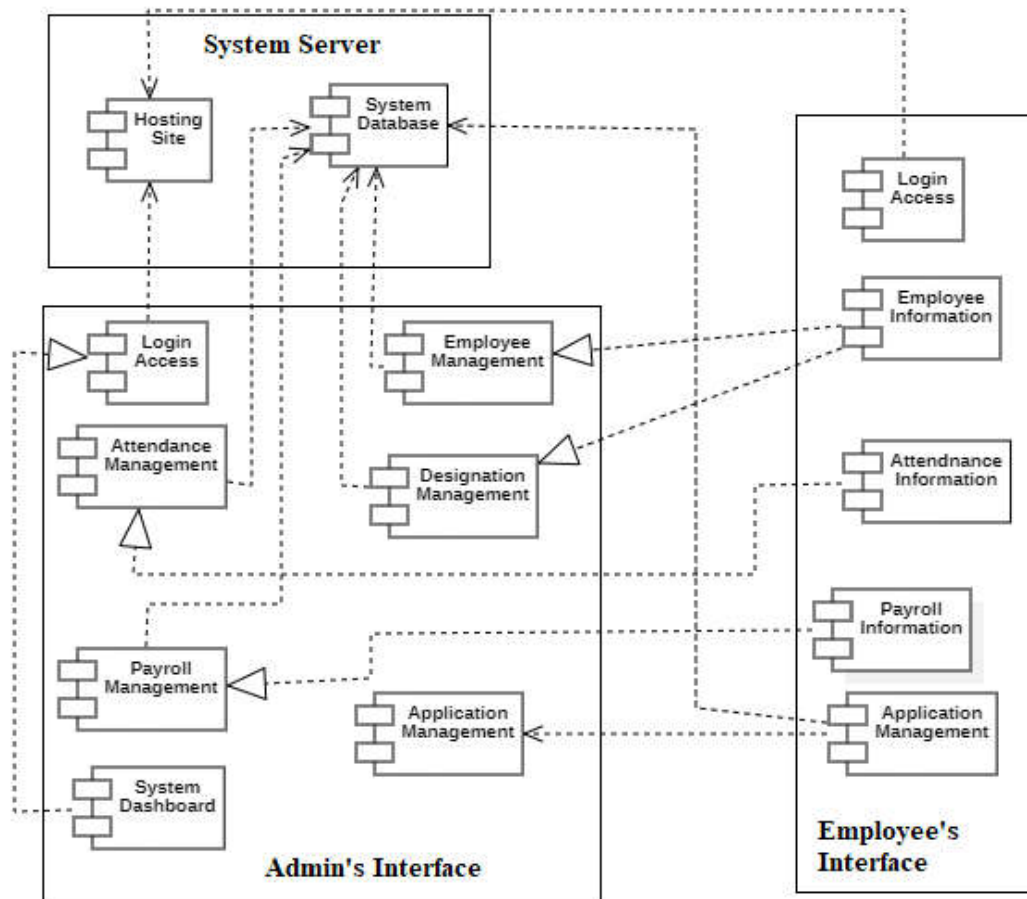
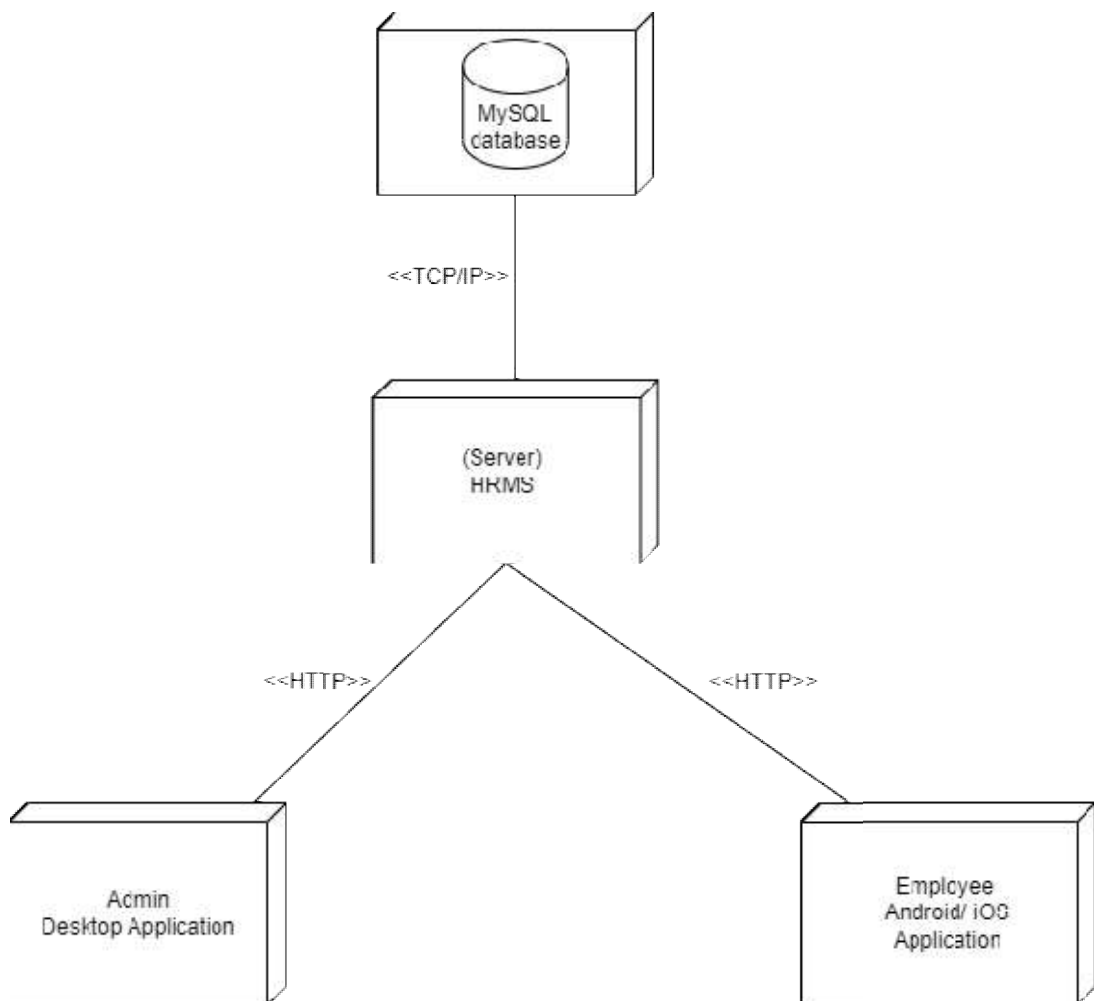


Figure 13: HRMS Component Diagram

### Deployment Diagram:

A deployment diagram in software engineering illustrates the physical deployment of software artifacts to nodes. It shows the configuration of run-time processing nodes and the components that lie on them. In the context of HRMS, the deployment diagram shows the software components are deployed on hardware and network infrastructure. It provides an overview of the physical hardware used, network topology, and the software components deployed on each node.



*Figure 14: HRMS Deployment Diagram*

## 4.2 Algorithm Details

The Local Binary Pattern Histogram (LBPH) algorithm is a widely used method for facial recognition [16]. The LBPH algorithm extracts local features from an image by dividing it into small regions and computing the local binary pattern (LBP) for each pixel in the region [16][17]. The LBP is a binary code that represents the relationship between the gray values of a central pixel and its neighbouring pixels.

The LBPH algorithm then constructs a histogram of the LBP codes for each region and concatenates the histograms to form a feature vector that represents the entire image [16][17]. The feature vector is then used to compare the image to a database of known images to determine if there is a match.

One advantage of the LBPH algorithm is its simplicity and computational efficiency, which make it well-suited for real-time applications [16]. However, it may not perform as well as more complex algorithms on large datasets or in situations with significant variation in lighting or facial expressions [17].

## **Chapter 5: Implementation and Testing**

### **5.1 Implementation**

Software implementation is the process of introducing new software into an organization's workflow, which involves complex tasks such as planning, designing, coding, and building the project. The implementation phase is the final step of the software development lifecycle and requires careful planning and execution to ensure a smooth transition from development status to production status.

#### **5.1.1 Tools Used**

The development of the HRMS project involved the extensive use of various tools to enhance the efficiency and effectiveness of the development process. The tools used in this project are listed below along with a brief description of their functionalities.

##### **i. Flutter:**

Flutter is an open-source mobile application development framework which allows developer to create high-performance, visually attractive mobile apps for Android and iOS platforms using a single codebase. It offers widgets, frameworks, and tools for building beautiful and fast apps.

##### **ii. Python:**

Python is a high-level, general-purpose programming language which offers excellent readability and ease of use. It is widely used for web development, artificial intelligence, data analysis, and scientific computing. Python offers a vast collection of libraries and frameworks that make it a popular choice among developers.

##### **iii. Django:**

Django is a high-level Python web framework which allows developers to build complex web applications and easily. It provides a strong set of tools and libraries



that handle various aspects of web development, including URL routing, authentication, and database modelling.

**iv. MySQL:**

MySQL is a popular open-source relational database management system that is widely used for web applications. It is a fast, reliable, and scalable database that offers excellent security and data management capabilities.

**v. APIs:**

APIs (Application Programming Interfaces) are a set of protocols and standards that allow different software applications to communicate with each other. In the HRMS project, APIs were used to integrate different modules and components of the system, enabling seamless data transfer and processing.

**vi. StarUML:**

StarUML is a powerful UML modelling tool which allows developers to create diagrams, models, and documentation for software systems. It provides support for various diagram types, including class, sequence, use case, and activity diagrams.

**vii. Draw.io:**

Draw.io is an open-source cross-platform graph drawing software that allows developers to create various types of diagrams, including network diagrams, flowcharts and UML diagrams. It provides a simple and intuitive interface that makes it easy to create professional-looking diagrams.

**viii. PlantUML:**

PlantUML is a well-known open-source tool for creating different types of UML diagrams, such as sequence diagrams, class diagrams, , activity diagrams, and others. It generates diagrams using a simple, text-based syntax, making it simple to learn and use for both technical and non-technical users. PlantUML has been used in a wide range of software engineering projects, as well as in research and education.

**ix. Office 365:**

Office 365 is a suite of cloud-based productivity tools that include Word, Excel, PowerPoint, and other tools. It provides features such as real-time collaboration, cloud storage, and integration with other tools and services.

**5.1.2 Implementation Details of Modules**

The implementation of the HRMS project involved the development of various modules, each with its specific functionality. The following are the implementation details of the main modules:

**i. Employee Management Module:**

This module manages the employee's personal information, including name, contact details, address, and job-related details such as salary, position, and department. The module includes the following functions: add employee, view employee, update employee, and delete employee.

**ii. Attendance Management Module:**

This module handles the attendance of the employees. It has functions to record attendance, view attendance, and generate attendance reports.

**iii. Leave Management Module:**

The leave management module handles employee leave applications and approvals. The module includes functions to apply for leave, view leave history, approve or reject leave applications, and generate leave reports.

**iv. Performance Management Module:**

This module evaluates the employee's performance based on various criteria such as productivity, punctuality, and quality of work. It includes functions to set performance goals, evaluate performance, and generate performance reports.

**v. Payroll Management Module:**

The payroll management module handles the calculation of salaries and other financial benefits such as bonuses, taxes, and deductions. The module includes functions to calculate payroll, generate payslips, and generate payroll reports.

## 5.2 Testing

Testing is the process of analyzing a software system or application to identify defects, errors, or vulnerabilities. It involves executing software programs or application with the aim of finding bugs and verifying whether the software meets the intended specifications and requirements. Software Testing comprises Verification and Validation.[18]

### 5.2.1 Test Cases for Unit Testing

Unit testing is a software development process in where the smallest components of the system are individually tested for proper operation. The main objective of unit testing is to find out that each individual part is working perfectly as it is supposed to work. The entire system will only be able to work if the units are working well. [19]

After the completion of the HRMS project till this phase, unit testing is conducted, this involves testing individual components or modules such as employee management, attendance tracking, payroll processing, etc.

Here is a unit testing scenario for the employee management module:

*Table 1: Unit Testing Test Case 1*

Test Case1	Input	Output	Test Result
Employee ID  Input	Employee ID - 123	Employee details such as name, designation, department, etc.	The employee details were displayed correctly.

*Table 2: Unit Testing Test Case 2*

TestCase2	Input	Output	Test Result
Payroll Processing Error Handling	Invalid input such as negative salary or invalid employee ID	Error message indicating the issue with the input	The system correctly displayed an error message when invalid input was provided.

### **5.2.2 Test Cases for System Testing**

After the successful completion of unit testing, the system as a whole was tested to ensure whether the developed system was working well, and that the system meets its requirements or not. The test results were positive which means that the system was working perfectly fine and has met the system requirements which were analyzed during the analysis and requirement phase.

### **5.3 Result Analysis**

During unit testing, each module or component of our project was tested independently to ensure that it is functioning as expected. The results of each test case were recorded in a table, and any issues or defects were identified and addressed before moving on to system testing.

System testing involves testing the entire system to ensure that all the individual components are integrated correctly and working together to meet the system requirements.

Overall, the combination of unit testing and system testing provided confidence in the quality and functionality of the HRMS system. The system was able to handle different inputs, produce expected outputs, and meet the requirements specified by the stakeholders. Any issues or defects were identified and resolved before deployment, ensuring the smooth operation of the HRMS system.

## **Chapter 6: Conclusion and Future Recommendations**

### **6.1 Conclusion:**

The HRMS project has the potential to significantly improve the efficiency and effectiveness of the company's HR processes. The feasibility analysis showed that the project is economically, technically, operationally, and schedule feasible, and the implementation phase was completed successfully. The system was tested and evaluated, and it met the requirements and expectations of the stakeholders. The project team worked closely with the end-users to ensure that the system was user-friendly and intuitive.

### **6.2 Future Recommendations**

While the HRMS project has shown promise in improving the HR functions of the organization, there are several limitations that should be addressed in future recommendations.

- The system should be further developed to accommodate remote workers and those on business trips, as the current system is limited to tracking attendance of employees on the premises.
- The HRMS system should be designed with scalability in mind, to ensure that it can be easily adapted for use by other businesses with different requirements.
- The system could be integrated with other organizational systems, such as finance and accounting, to further streamline processes and reduce duplication of effort.
- The subjective nature of the performance evaluation system should also be addressed, by incorporating multiple evaluators and implementing measures to prevent evaluator bias.
- Future recommendations should explore the possibility of expanding the project to cover additional HR functions and automating more tasks, to reduce the need for manual intervention or third-party tools.

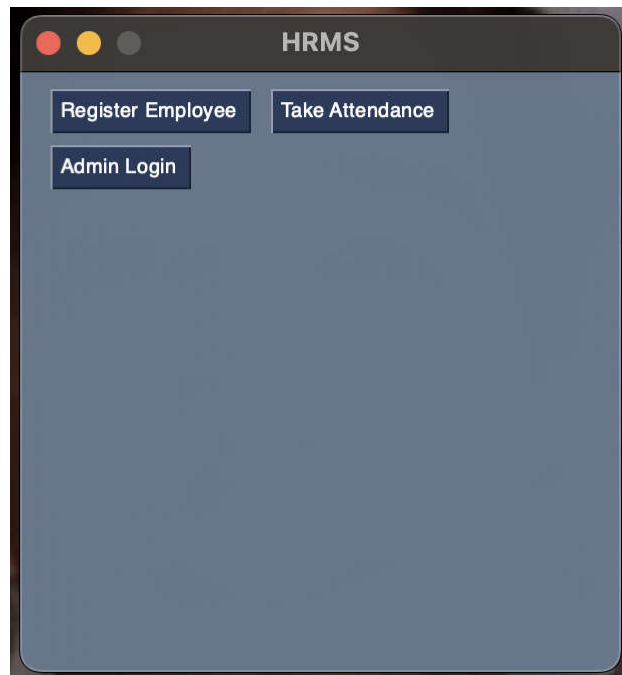
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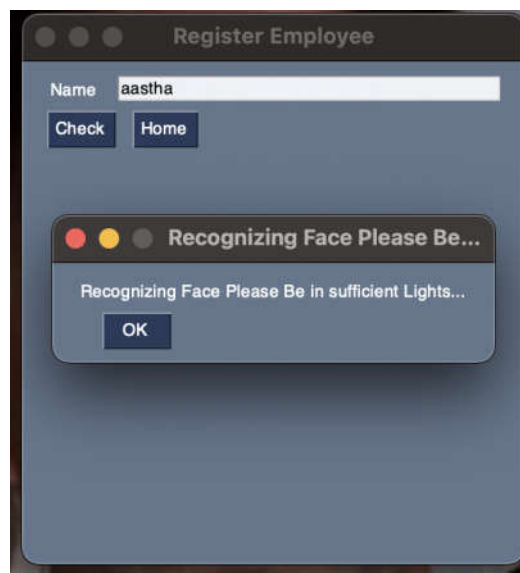
## Appendix

### Appendix A



*Figure 15: HRMS Admin Panel*

### Appendix B



*Figure 16: Taking attendance using Face Recognizing*



## Appendix C



A screenshot of a macOS-style window titled "Register Employee". The window has a dark title bar with red, yellow, and grey window control buttons. The main area is a light blue-grey color. It contains a form with six text input fields stacked vertically, each preceded by a label: "Full Name", "username", "email", "phone number", "address", and "Pan no". Below the input fields are two buttons: "Next" and "Exit".

*Figure 17: Employee Registration*

## Appendix D



A screenshot of a macOS-style window titled "Payrolls". The window has a dark title bar with red, yellow, and grey window control buttons. The main area is a light blue-grey color. At the top, there is a table with 11 columns and 2 rows. The first row contains headers: "id", "name\_id", "year", "month", "salary", "overtime", "payroll\_deduction", "gross\_salary", "tax", "tax\_amt", and "net\_salary". The second row contains values: "1", "2", "1904", "Bhadra", "30000.0", "300.0", "400.0", "29900.0", "0.15", "4485.0", and "25415.0". Below the table is a large empty area.

id	name_id	year	month	salary	overtime	payroll_deduction	gross_salary	tax	tax_amt	net_salary
1	2	1904	Bhadra	30000.0	300.0	400.0	29900.0	0.15	4485.0	25415.0

*Figure 18: Pay Roll Calculation*

## Appendix E

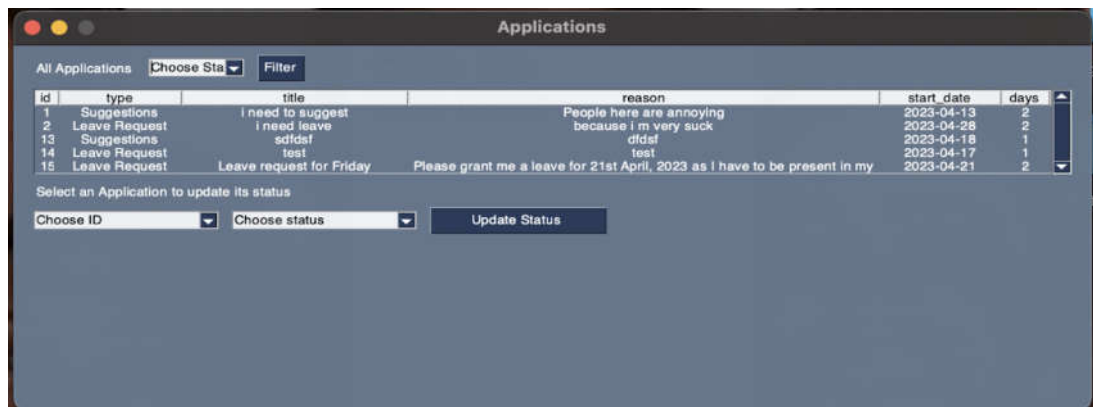


Figure 19: Application Handling

## Appendix F

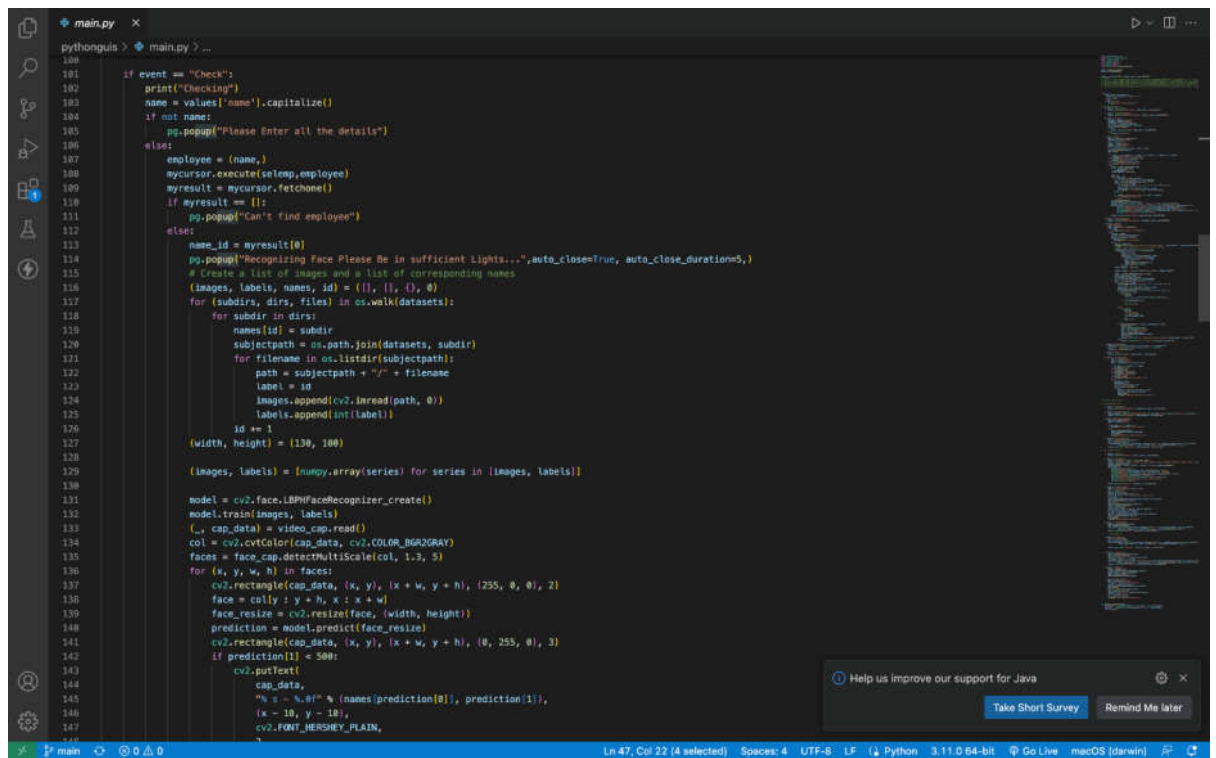


Figure 20: Code for Face Recognition

Appendix G

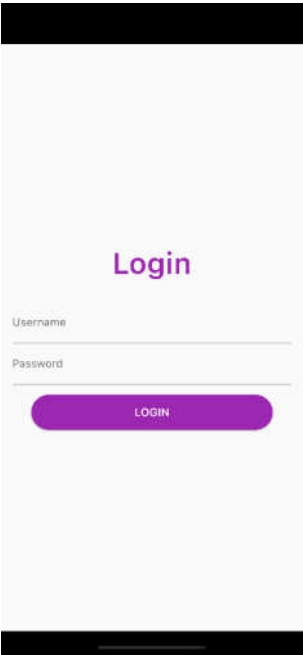


Figure 21: Employee Mobile app Login Interface

Appendix H



Figure 22: Employee Mobile App Home Interface

Appendix I

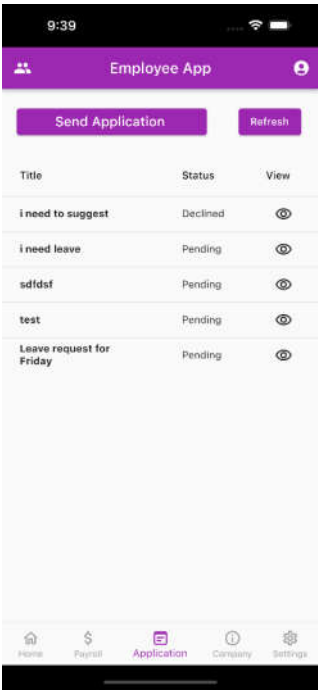


Figure 23: Employee Mobile App Application Interface

Appendix J

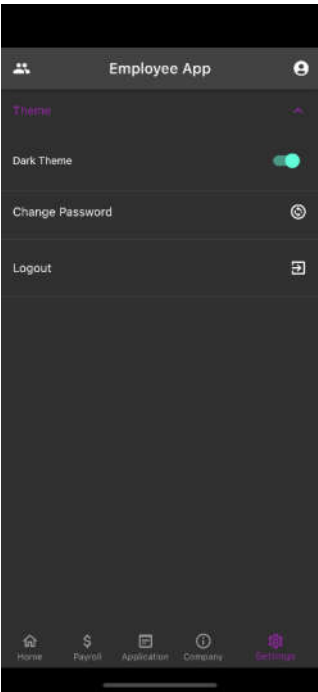


Figure 24: Employee Mobile App Settings Interface

## Appendix K

Using the URLconf defined in `fyp.urls`, Django tried these URL patterns, in this order:

1. `api/ company/` [name='company']
2. `api/ employees/` [name='employee']
3. `api/ employee/<int:pk>/` [name='employee-view']
4. `api/ designations/` [name='designation']
5. `api/ attendances/` [name='attendance']
6. `api/ employeeattendance/<int:name_id>/` [name='attendance-view']
7. `api/ payrolls/` [name='payroll']
8. `api/ employeepayroll/<int:name_id>/` [name='payroll-view']
9. `api/ applications/` [name='applications']
10. `api/ employeeapplication/<int:pk>` [name='application-view']
11. `api/ login/` [name='login']
12. `api/ logout/` [name='logout']
13. `api/ logoutall/` [name='logoutall']

*Figure 25: List of APIs*