ADDIS ABABA SCIENCE AND TECHNOLOGY UNIVERSITY

College of Electrical & Mechanical Engineering

Department of Software Engineering

Undergraduate Project proposal

Title: Biometric fingerprint Employee Management System (BFEMS)

Group members:

No	Name:	Id Number:
1.	**Firaol Bekele**	**TETS/015/10**
2.	**Firaol Amsalu**	**TETS/017/10**
3.	**Ziyad Abeti**	**TETS/040/10**
4.	**Akem Usman**	**TETS/004/10**
5.	**Ibrahim Abdi**	**TETS/020/10**

Advisor Name: - Mr. Tamru H/silassie (MSc) **Signature: -.....**

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Abstract

This project document aims at introducing the presentation phase of a system. There are six chapters introduced in these project documents, which is introduction part, System Requirement Specification part, Requirement System Analysis and Modeling part, System Design, Implementation and Testing part and conclusion part. This project is about biometric technologies and develop integrated employee attendance system that based on fingerprint recognition of employee in order to verify their attendance. The system is a web-based attendance system; it will be developing for employee to scan their fingerprint with provided hardware for a purpose to verify their attendance based on the shift stated by the company. At the same time, web-based system will be developed for admin/Employee manager to view and analyze employee attendance by generate the attendance report. The main purpose to develop this project is to replace the current traditional attendance system by provide faster, accurate, and efficient system. With this new fingerprint recognition attendance system, it can eliminate some problems such as signing for attendance, loss of attendance sheet, and control employee skip office rate. In developing this project, evolutionary prototype will be applying as methodology that guides the direction of whole project development. Besides that, few fact-finding methods will be use to collect the data for analysis such as survey interview methods, and observation method. This project planned to be develop using, Structured Query Language (SQL) Server, JQuery, java, bootstrap, Java Development Kit (JDK), and Microsoft Fingerprint Reader. Other than that, system analysis and design technique are going to be use for illustrate necessary diagrams for purpose to illustrate the whole system in more clear way. Lastly, the implementation of this system will definitely provide more efficient, reliable, and accurate way to manage the employee attendance data and other employee related tasks like payroll, report, leave and with languages English, Amharic and Afan Oromo.

Definitions, Acronyms, and Abbreviations

BFEMS	Biometric fingerprint Employee Management
PF	provident fund
ESI	Employee State Insurance
Admin	Administrator
MS Office	Microsoft Word Office
CSS3	Cascading style sheet
HTML5	Hypertext markup language
MYSQL	Structured query language
IDE	Independent developmental environment
SRS	System requirement specification
UC	Use Case
Viscode	Visual Studio code

Chapter one: Introduction

This project aimed to be developed a web application that is intend to fulfill the need and distribution of local organization to manage their employees. “Biometric Fingerprint Employee management system” is design to make the existing manual system automatic with the help of computerized equipment and full-edged computer software, fulfilling their requirements, so that their valuable data and information can be stored for a longer period with easy access and manipulation. The required software will be easily available and easy to work with. This web application can maintain and view computerized records without getting redundant entries. The project describes how to manage user data for good performance and provide better services for the client. Employee management is an aspect widely practiced in all workplaces. Day-to-day security breaches and transaction fraud increases, the need for secure identification and personal verification technologies is becoming a great concern to the organization**.** In any organization, Biometric employee management is very important. It is an aspect widely practiced in all workplaces, with in work place there are different tasks like payroll, time sheet and others. Here the paper has looked into an efficient employee management system-using fingerprint.

1.1 Background of the Project

Bio-metrics is an automated method of recognizing a person based on a physiological or behavioral characteristic[3]. Among the features measured are face, fingerprints, hand geometry, handwriting, iris, retinal, vein, and voice. Comparison of different biometric techniques has shown that fingerprint biometric is a reliable, mature and legally accepted biometric technique [5]. The term biometrics derived from the Greek words bois (meaning life) and matron (meaning measurement). Fingerprints are the oldest form of biometric identification.

Our project is mainly on fingerprint identification technology. Fingerprint belongs to a group that called "Biometric". Biometric represents automated methods for person identification based on a physiological or behavioral characteristic, Modern fingerprint-based identification is use for forensic science, and in biometric systems such as resident identification. Despite the widespread use of fingerprints, there is little statistical theory on the uniqueness of fingerprint minutiae.

In our country the use of fingerprint is not satiating based on the functionality it provides, currently there is no system in our country that provide local made web based system. This project's target mainly is to provide an efficient and reliable attendance system for employees in various sessions

throughout predetermined constrained attendance tracking method by using biometric fingerprint [6].

1.2 Statement of the problem

Employee management is a basic system for company to manage their employees at work place. Due to the complexity of managing large number of employees, the system must consider to be error tolerant, secure, fast, reliable, efficiency, effective...Etc.

So to those perspective it is need to see the problems that the existing systems faces.

1.2.1 Existing system

The existing management task on keeping employee records and information of the still has to be done manually by hand written and record it in paper document. Employee records is not always reliable because is it hand written and might cause human error for example manager might write a wrong title in a report. Data duplication problem might happen when manager can't find require information. There is a possibility that data might get misplace when doing manual filling.

In our county, employee management does by using manual systems. This manual system is use for storing employee Information, payroll, attendance, time sheet, Per-time payment, and other related data. Therefore, government and company spend huge amount of money on managing their employees due to manual systems. Those manual procedures are very costly, boring, time consuming and more manpower is needed.

Now a day in our county the use of fingerprint is encouraging, but the use of associating with the attendance system is very low, because of the cost of the hardware requirements, lack of local software to manage the employee.

There is some system found in our country like biometric attendance system and some other systems. However, this system developed by the other company out of our country, with complex features.

1.2.2 Major Problem of Existing system

1.2.2.1 Problems on manual systems

Manual administration involves working with excel spreadsheets and hard copy based systems which is an extremely challenging and cumbersome process resulting in difficulties for HR professionals.

The most common negative impact of this physical administration is the amount of effort and time taken by the people in completing these tasks.

This results in missed opportunities, higher costs, and prevents the entire team from working on something more valuable and productive.

There is a list of unseen costs related to labor-intensive HR administration that are causing a heap of problems and sucking up resources that an organization is unable to realize.

Let us look on the disadvantages of manual HR administration:

a) Productivity Issues

With a difficult and slow process, employees at an organization tend to spend more time than actually needed in order to carry out the tasks. Some easy HR related tasks, such as organizing training programs, requesting for a leave or time-off, and more can take a lot of time when they are done manually.

This will cause a direct impact on your productivity and employees will spend most of their valuable time on doing work, which is far less useful and profitable than those tasks, which they are paid for.

b) Affecting the Quality of Work

In an expanding organization, when an HR department uses manual system it is likely that they suffer more with growing staff members and maintaining employee records. Ineffective manual processes and high HR department turnover can leave a very bad impression for your organization and HR talent.

Spending too much time on administrative work disinterests employees and as a result can leave a costly impact on your entire team. Some members even call it quits and you have to start again with the recruitment process.

And losing an employee means that other existing workers should work harder by increasing their workload for covering the gaps.

c) Fraudulent Activities

Immoral employees also cost you more through fraudulent activities and manual HR processes unintentionally make it easier for frauds to be carried out. For instance, a manger is paying salary to fifty people, but in reality, there are forty-eight employees existing on the payroll. This can be a result of improper staff management and tracking.

d) Errors in Payroll

Organizations still relying on HR to manually enter employee data to payroll can lead to some serious mistakes. Many organizations are maintaining tons of paperwork with the manual payroll system, which causes a higher risk of human error.

The Bottom Line

Despite being an outdated process and having several drawbacks, manual HR processes are still very much in practice at many business organizations.

Juggling paper forms, struggling with excel sheets and endless hardcopy files to look for important documents is getting obsolete in today's digital technology driven market.

New HR software can automate and simplify the whole process and save you a lot of your valuable time and money, enabling you to work on more productive office tasks.
Most other security systems have a higher risk of breaches caused by employee error.

1.2.2.2 Problems on systems without fingerprint

The system on the fingerprint base has problems.

- The system is not locally developed software, so it is hard to maintain and it is hard to interact with the user,

- The existing system does not support languages that are mostly spoken in our county,
- Difficulties while preparing Reports – facts are extracted manually,
- Difficult attendance file management- retrieving files is difficult and files are prone to damage,
- Difficulty in information exchange,
- Data loss while it is transferred from one office to another: - The person who transfers the file may not transfer properly. If it is so, the data or file may be lost,

1.2.3 Proposed system

The proposed system has features like employee schedule, fingerprint-based attendance, local languages, payroll, reporting, and leave management.

Employee time sheet: the system will have open schedule to set the time for the employee in what time the work starts, the work ends, shifts, duties and per times, the system will verify who is actually clocking in and clocking out of work each day.

Local language: to make the system easy and friendly we will use different language.

- International: **English**
- National: **Amharic** and **Afan -Oromo.**

Payroll: based on the attendance that the system collect it prepares the salary, wedge and bones for the employee.

Report: presenting brief report about the employees based on the schedule they are working on and the time sheet. The reports are characterized with different reporting methods.

Leave management: it manages the employees those who quiet, fired, ask for vacation, break and other related cases.

Fingerprint based attendance: the employees take attendance by using their fingerprint. The attendance is done by following the company's time sheet and shift.

Attendance history: attendance history will help the employee to view the attendance history that has taken by the system. This system will help the employee to see the dates that he/she have absent or late.

Transfer Request: the request done between the administrator and the employee mangers to transfer on employee from one of the office or branch to the other without losing the employee information.

1.2.4 Advantage of proposed system

- **Convenience:** BFEMS provide a convenient way to check-in and check-out into the system by simply scanning their fingerprint. Since BFEMS are automated and do not require any technical knowledge, Employees can check-in or out quickly and easily.

- **Saves Time**: Biometric fingerprint Employee management systems cut down the time to record Work place attendance. These systems takes attendance with automated computing per seconds that helps us to minimize the time comparing with the manual system[6][7].

- **Increases Efficiency**: Biometric systems not only eliminate errors related to tracking attendance data but also speed up data verification, which reduces administration time and creates efficiency.

- **Increases Security and Protects Privacy:** In the enrollment process, biometric systems convert scanned biometric templates to computer code and store the information in a database for matching and verification, making it virtually impossible to duplicate the original image for spoofing or fraud purposes. BFEMS use strong encryption methods to protect a database from being compromised helping to increase security and protect Employee privacy [5].

More Advantages

- It helps the users to get a secure service by giving their own makeup.
- Different company, which use these systems, can provide by secure service.
- It helps the customers to use their time properly and provides safe environment for them.
- Help customer and society to be families with these finger print systems.
- Trust the accuracy of which employee is on the clock. Biometric physiological attributes cannot be duplicate or forge. Supervisors and managers feel confident that they are tracking each employee's time and attendance accurately [6].

- Biometric fingerprint reader eliminates time theft. Companies lose tremendous amounts of work hours each year because un-proper management of attendance, calculating this lost time, and it affects the bottom line, is impossible with an old method of managing employee.
- Improve employee job satisfaction. When employees give extra time without extra privileges. Supervisors can identify those employees with data from the biometric time clock. Using the accurate attendance information captured, they can reward employees accordingly.

1.3 Motivation

Fingerprint scanning system is the most popular biometric technology (used in over half of all biometric security systems) — because of these we motive to work this biometric employee management system and it's easy to see why. We store more and more information on our computers and in ever riskier ways. Just the few hastily thought-out numbers in our passwords protect much of the time, our bank information and personal details [8].

Widespread usage of fingerprint authentication in different application has proven it to be capable enough to replace the traditional authentication methods. Fingerprint scanners being cheap, portable and easy to integrate also make fingerprinting a popular mean of authentication. Many private organizations as well as government outfits are actively using fingerprint authentication and looking at other areas where it can be deployed. Fingerprint authentication is particularly easy for users to present their biometrics for scanning. It does not t make user conscious, just a casual scan and you are done. While other methods like retina/iris scan, vein recognition makes user conscious has they may have to wear a specific posture to get their biometrics scanned. Popularity of fingerprinting as authentication method is not unfounded; it has several reasons to claim this level of reputation.

1.4 Scope and limitation of the project

1.4.1 Scope of the project

The scope of our project is providing the access for biometric employee management system users. Some users of these system are must registered in the system and can seek anything. We present

here efficient management of attendance using fingerprint identification for those area, attendance of employee is calculated at the last of month.

First enroll the employee. Store all the necessary information including id, image and fingerprint into the database. When attendance is calculated, the daily fingerprints are matched with the stored fingerprint by using the scanner. If fingerprint is matched, then attendance is accepted otherwise it is rejected [7].

we can say that this system will not only automate the process but save the valuable time of the manager or the admin which can be well utilized by his institute .and the project has limitations under the boundary of our project. After developing the system some tasks are not done by the system. Because there is lack of information in these biometric employee systems. This will be an additional advantage and management of power based on their free time from his normal duty.

1.4.2 Limitation of the Project

The project has limitations under the boundary of our project. After developing the system some tasks are not done by the system.

- If it's an education institution or large employer, you may have hundreds or thousands of employees who need to register a finger or two and that gets more complicated and requires more equipment.
- Using the fingerprint scanner does not take into consideration when a person physically changes.
- The cost of computer hardware.
- Using the fingerprint scanner can lead to false rejections.

1.5 Objective

The objective of this project is to daily attendance of employee through fingerprint. The project is design and so implements software architecture for fingerprint analysis. The system should be able to extract key features from a scanned fingerprint image and to compare these with a database of known fingerprint images and/or extracted feature sets. For this project we provided with a set of

previously acquired fingerprints and a working fingerprint sensor with driver software for Windows.

1.5.1 General objective

Biometric employee management system. This project's target mainly is to provide an efficient and reliable attendance system for employees in various sessions throughout predetermined constrained attendance tracking method.

1.5.2 Specific objective

- Build up a database that will store information such as employee working schedule, leave request, report, payroll and employee details [4].
- This objective is to analyses information that has been collected.
- Select a suitable programming language to implement the system.
- To provide capabilities for administration
- To identify problems of the existing system.
- Easy way of managing employee information.
- To include local languages like **Amharic** and **Afan Oromo.**
- Making reporting easy for the companies.
- To make user friendly working environment[1].
- To make the company’s data management

1.6. Methodology for the project

The Method and techniques used to analyze the existing system and designing electronic system includes, interview and observation our team use interview and observation to gather the required data to analyze our project and those methods selected due to the time and the organization’s willingness.

In developing this project, we have used the following standard information system development methodologies.

1.6.1 Data Collection Methodology

We have collected the data from different sources. From these sources the most known ones are the following.

- Pizza Hut Ethiopia.
- Oromia civil service office.

Interview: - to obtain basic information and background about the existing system, the team will interview some government office like Oromia civil service and other private offices like pizza hut Ethiopia.

Observation: -In addition to interviews the team will try conducting on-job observation. The teams want to observe how the current system works in the organization enable as to list out the existing system problem and we see or observation in reality.

1.6.2 System design and analysis tools

The team has chosen to follow the object oriented system analysis and design methodology. Specifically object oriented Modeling during the entire project life cycle. We have selected this system to the following advantages: -

- To simplify the design and implementation of complex program.
- To make it easier for teams of designers and programmers to work in a single software project.
- To enable a high degree of reusability of designs and software codes.
- To decrease the cost of software maintenance.
- It can be extended to add the objects and the classes.
- Increased consistency among analysis, design and programming activities

HW tools are: -.

- Computer (Laptop).
- Flash memory.
- ZKTECO fingerprint

1.6.3 System development tool

The best suited tools that we are going to use for the final and implementation process include Hardware and software tools.

Activities	Tools/Programs
Clint Side Scripting	**HTML, BootStrap(CSS), Jquery(JavaScript)**
Platform	**MS windows**
Server	**Wam**
Browser	**Chrome, Mozilla Firefox, Slim Jet ,Opera**
Running Environment	**JDK 8**
Editors	**Web Storm, Viscode**
Documentation	**MS Word 2016**
Design	**Umlet, Visual paradgram, archimate**
For Presentation	**MS power point 2016**

Table 1 System development Tools

Chapter Two: System Requirement Specification

2.1 Background Overview

Biometric represents automated methods for person identification based on a physiological or behavioral characteristic [9]. Fingerprint employee management system is very important since it will affect the employee from gaining knowledge and skills as well as their attendance. This project has related about the employee attendance system through the matching of their fingerprint to confirm their attendance [7]. The main purpose of carrying out this project is to develop employee attendance system for which web-based application is develop to obtain the attendance of employee by fingerprint and post/review the attendance results using web-based employee attendance system. As we know, there is one and only one fingerprint occurs in the world for each person which will never has duplication. So, fingerprint attendance system can be known as the best authentication to detect the individual employee attendance record. In addition, according to the technology now a day.

Now a day, most at all office are still using the traditional attendance system, which requires employee to sign on a piece of paper every time they attend on their work throughout the whole workday. Using the traditional attendance system, we can obviously see that there are lot of problems; such as there will be no backup for the attendance records once the report accidentally lost the attendance sheet. Hard in analyzing and tracking employee performances based on attendance factor, employee lack of knowledge and skills due to the poor attendance in attending at work, etc. It is important to overcome these problems since it will help in improving the work performance of employee as well as the working environment. Hence, the purpose of carrying out this project is to prevent unwanted situation occur and to find out the problems that causes these problems as well as find the solutions to overcome these problems [8].

Through the problems analyzed, the objective of this project is to develop a web-based fingerprint employee attendance system, in recording their attendance effectively in every staff in order to prevent employee skip staff.

Next, the developed system will provide the report generation regarding to the employee attendance in order to assist the staff in analyze and tracking the employee attendance.

2.2. Functional Requirement

In software engineering, a functional requirement defines a function of a system or its component. Functional requirements define the fundamental actions that system must perform. An attendance management is an important part of company's management system. It can be link with salary of employee, work efficiency of company and even affects business image of company and staff morale. Therefore, the problem of reasonably, effectively and scientifically managing of staff, attendances has become all companies facing issue. Traditional styles of attendance management include hand-written signatures, card bell, magnetic card, IC card and RF card attendance machines. These styles cannot avoid replace checking out just because that people can be separate from cards. The great advantage of the authentication using fingerprints is the irreplaceable nature. Through the analysis of the overall and local characteristics of fingerprint such as ridges, valleys, ending, bifurcation points and ridge divergence points, we can extract enough detail data. Such data is unique to the individual and remains so throughout one's life. We can use these data to identify or verify a person operating as follows [10].

2.2.1 System Actors

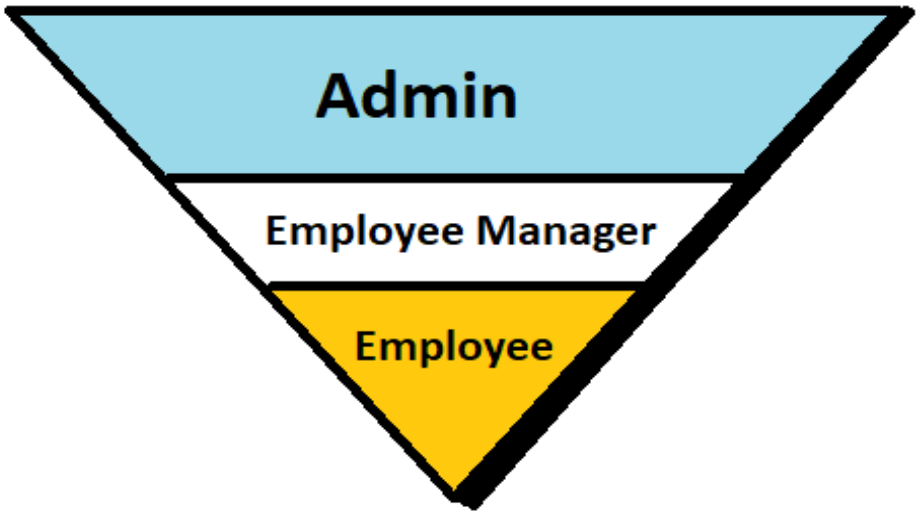


Figure 1 System Actor Hierarchy

2.2.1.1 Admin

An Admin module contains functions of admin, which that helps the administrator to enter the designation and the related description of its company information and manage the whole system. He/she is the one who assign the employee mangers, control the employee mangers, getting report from the employee mangers and completely the admin is the one who has the power over the system.

2.2.1.2 Employee mangers (EM)

An employee manager module is almost the same with the admin with lack of some functionality and features. The module helps to add the details of the employee registration, add employee personal detail, generating report, Payroll, controls the leave management, time sheet, employee transfer request with administration or with other employee managers.

2.2.1.3 Employee

Employee module is unique from the others with small features like attendance history, leave request, Message service, Notification.

2.2.2 Search

This module helps to search the employee details department wise, designation wise and with other options. The module provides easy way of searching employee based on the categories. Such us

- Department
- Timesheet
- Type (per-time or regular)
- Salary and with more options.

2.2.3 Attendance

The attendance module contains fingerprint-based attendance that tracks employee check in and check out based on the time sheet. Base on the attendance we can generate reports, remaining leaves, payroll and other functions [6][1].

2.2.4 Leave management

The leave module helps to assign those days that there is no work and helps to manage permission for leave request from the employees. Also contains Different types of leave in the year. The employee can also check their remaining leaves and apply for the leave. In addition, provides detail information to the employees depending on the company policies. It also helps the employee to enter their entry and exit time.

It also contains the like

- suspension
- Disqualification
- Yearly permission

2.2.5 Payroll

The payroll module helps to calculate the salary by adding the allowances and the basic salary and by deducting the deductions based on the leaves and also the PF, ESI. [4]. It also helps to generate the employee pay slip.

2.2.6 Report

This module helps to generate the administrative reports like the Salary Report, Attendance Report and the Employee Report, which is can be export to pdf. The report is classify based on the categories.

2.2.6.1 for the employee

- The attendance, which contains the present days and absence days' report.
- The clock in and clock out reports.
- Payroll reports.

2.2.6.2 Admin and employee manger

- Report about the employee mangers.
- Overall company report.
- Employee mangers time sheet.

- Employee mangers clock in and clock out reports.
- Payroll report
- The employee's attendance.
- Employee clock in and clock out reports.
- Leave report

2.3 Non-Function Requirement

The non-functional requirement describes constrains for implementing the project. Some of them are the central server has to be provided at secured area, the system must be maintainable and expandable, the network infrastructure has to be private network, client machines anywhere inside the city could access the system. The input value, which is use to generate the encryption key, must be provide and needs to be keep securely [10].

The non-functional requirements of our system are as follows: -

- **Performance:** our system will perform and execute its task with an optimal response time to its user. The overall system should be fast and error free. It should have built in error checking and correction facilities. The system should be able to handle large amount of data comfortably.
- **Availability:** The system should easily be available at any desired time because of the project is a web based application.
- **Robustness:** The system should able to fault tolerate (hardware and software failure) by assisting the user with brief guidance.
- **Usability:** - our system can easily be use and operate by any non-technical or technical user as the system uses a GUI user interface.

  Security: our system will use user validation during login to insure that the user is valid or not. The access to the software is give only to valid operators. We need a username and password to get access to the software. In addition, the system uses fingerprint to perform accurate attendance.

  For each actor account, we are going to use encryption framework to maximize the security in the system.

- **Backup and recovery:** -In case of any changes that may occur to the system, it should allow

users to have a hard copy or soft copy backups that will be take, as it is required.

- **Reliability:** -The system should be reliable as it handles the records of employee's personal performance. In order to ensure reliability, this system is being designed using software that is establish to be stable and easy to use.
    - The performance of the software shall be better which will increase the reliability of the Service.
    - The main pillar of reliability of the system is the backup of the database which is continually maintained and update to reflect the most recent changes.
    - Thus, the overall stability of the system depends on the stability of container.
- **Error Handling**: -When users make some error:
    - The system has capacity for error handling.
    - With minimum database redundancy.
    - If there is any error in any window or module, then it should not affect the remaining part of the software
- **Portability: -** The application is HTML and scripting language based. So the end-user part is fully portable and any system using any web browser should be able to use the future of the system, including any hardware platform that is available or will be available in the future
  The software shall work properly on the operating systems like Windows, Linux and android operating systems

2.4 Feasibility study

Feasibility study is a test of system proposal to its work ability, impact of the organization, ability to meet needs and effective use resources. The following are the major types of the feasibility study that makes our project is feasible.

2.4.1 Operational feasibility

The new system can provide sufficient and flexible (simple interface design) service for the users, there was bulky process in getting information service in another processing.

This implies that the users cannot be satisfy for the service they get. However, this proposed system is worked consequently the user can get sufficient service.

2.4.2 Technical feasibility

This means the project team has the ability to develop this system without any difficulty since the team has studied the required methodologies and tools. Therefore, the system will be technically feasible.

This software is very much concerned with specifying equipment and the software will successfully satisfy almost all the admins requirements. The technical need for this system may vary considerably but might include:

- The facility to produce output in a given time.
- Response time under certain conditions.
- Ability to process data at a particular speed.

Therefore, the basic input/output of data is identifying. Therefore, the project can easily be build up and it will be technically feasible.

2.4.3 Economic feasibility

This system is economically feasible when it is compare with the current system. It reduces the time and any other products, by reducing the labor, paper, other material costs.

The project is very much financially feasible. The implementation and development cost of this software under the reach of any company. Moreover, it requires some training for the use. Therefore, training cost can be neglect and the resources of this software are very much available. It also reduces the labor and extra cost to be pay for labor. Therefore, indeed, it is financially feasible.

Intangible benefits

- Increase employee morale.
- Increase management flexibility.
- Provide more timely information.

Tangible benefits

- Reduce the costs used for resources.
- Provides systematic way of managing employees with less cost.

- Reduction paper work.

2.4.4 Schedule feasibility

The project will be finished as per the schedule drawn by the department. Therefore, the project has schedule feasibility. The project is performing with dividing tasks through the team members with the given time schedule that we assign that maps the department's time line.

The project management will be done with briefly studied

2.4.5 Political feasibility

The system is assuming to be well receive from users and the developer perspectives. The system is applying for making the working environment to be user friendly.

The project is open for setting for the time sheet and other aspects to make the system to follow the legal principles of employee rights that makes it political feasible.

Chapter Three: Requirement System Analysis and Modeling

3.1 Overview

Requirements modeling use a combination of text and diagrammatic forms to depict requirements in a way that is relatively easy to understand. To validate Software engineering requirements, you need to examine them from a number of different points of view. In this section of the document, we will consider requirements modeling from three different perspectives: Scenario-based models, Behavioral, and Class based models. Each represents requirements in a different dimension [2].

3.2 Scenario Based Modeling

This section of document elaborates the interactions that occur between the system and those actors that will use the system

3.2.1 Use Case

In software and system engineering, a use case is a list of actors or event steps typically the interactions between a role (known in the Unified Modeling Language as an actor) and system to achieve a goal. Functional requirements are the basis for identifying use cases

Actors Identification

There are different actors involved in proposed system. These actors are entities that directly interact with the system with a certain goal in mind. Actors of the BFEMS are:

- Administrator(Admin)
- Employee manager
- Employee

Admin:

- Manage account
- Generate payroll

Employee manager:

- Add new employee
- Register

- Employee manage time sheet.
- Calculate monthly attendance
- Report management
- Leave management (in-time and out-time)
- View attendance

Employee:

- Attendance history
- Message service
- Leave request
- Notification

3.2.1.1 Use Case Identification

Use Case Identification Table		
NO	**Use Case Name**	**Use Case ID**
1	Register to System	Uc01
2	Log in	Uc02
3	Search	Uc03
4	Manage Account	Uc04
5	Modify Account	Uc05
6	Manage report	Uc06

Table 2 Use Case Identification table

Figure 2 Use case for system

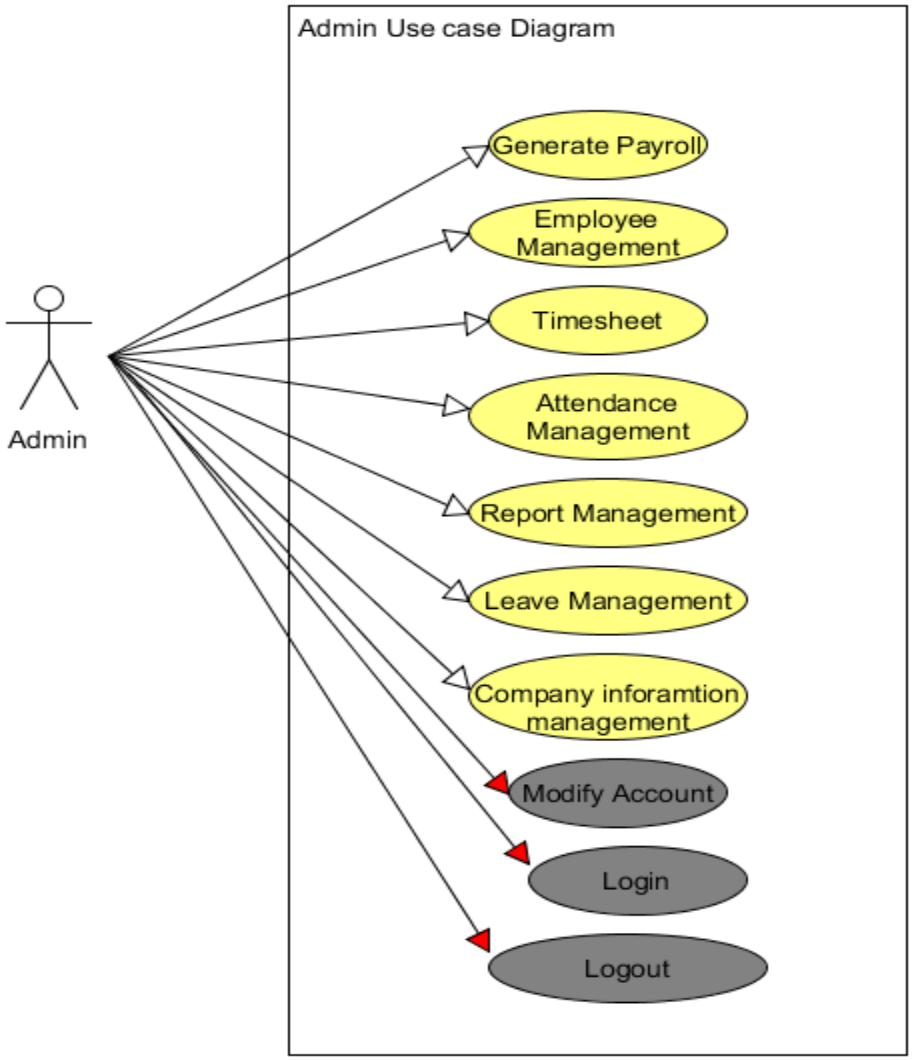


Figure 3 Use Case for Admin

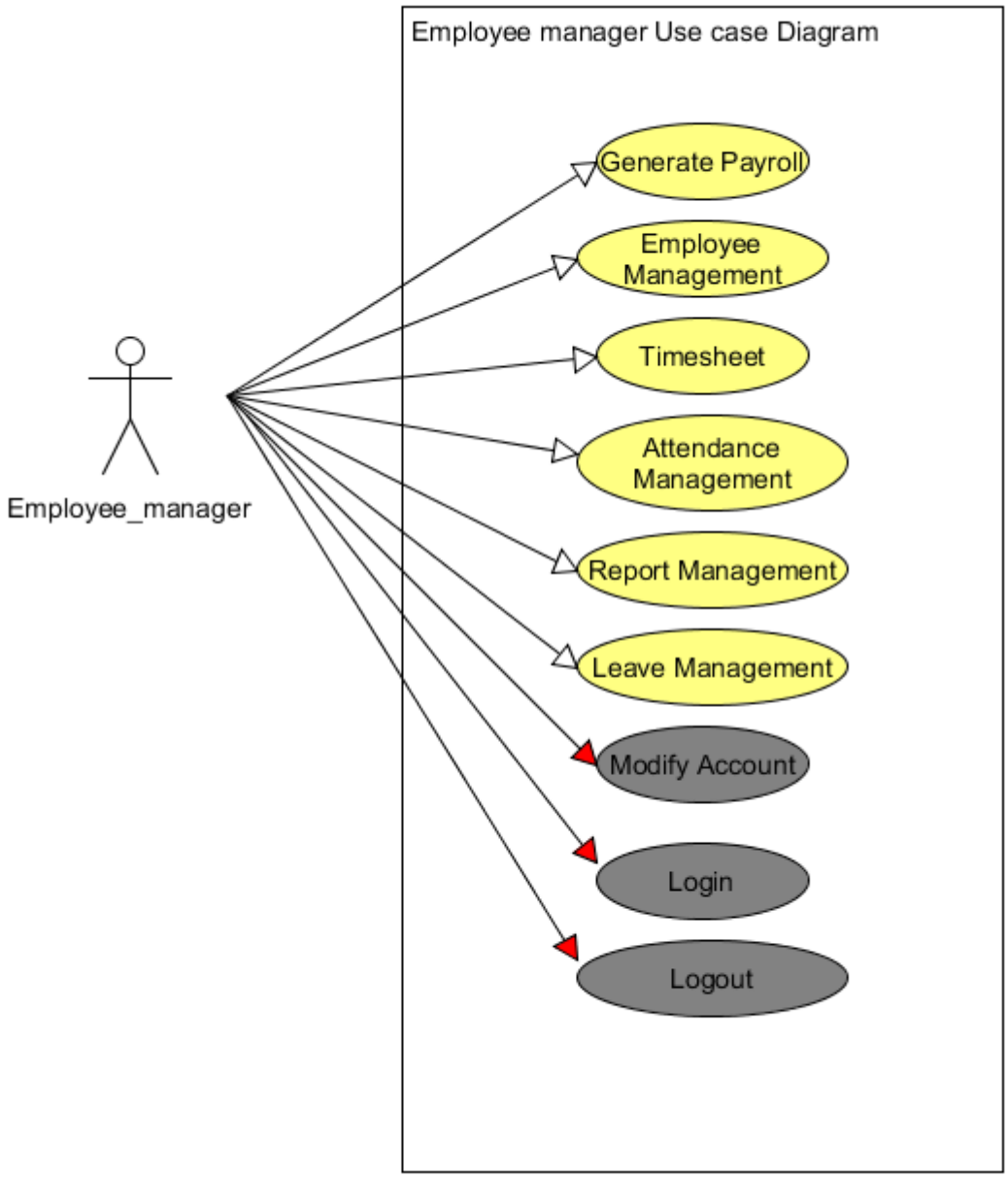


Figure 4 Use case for Employee Manager

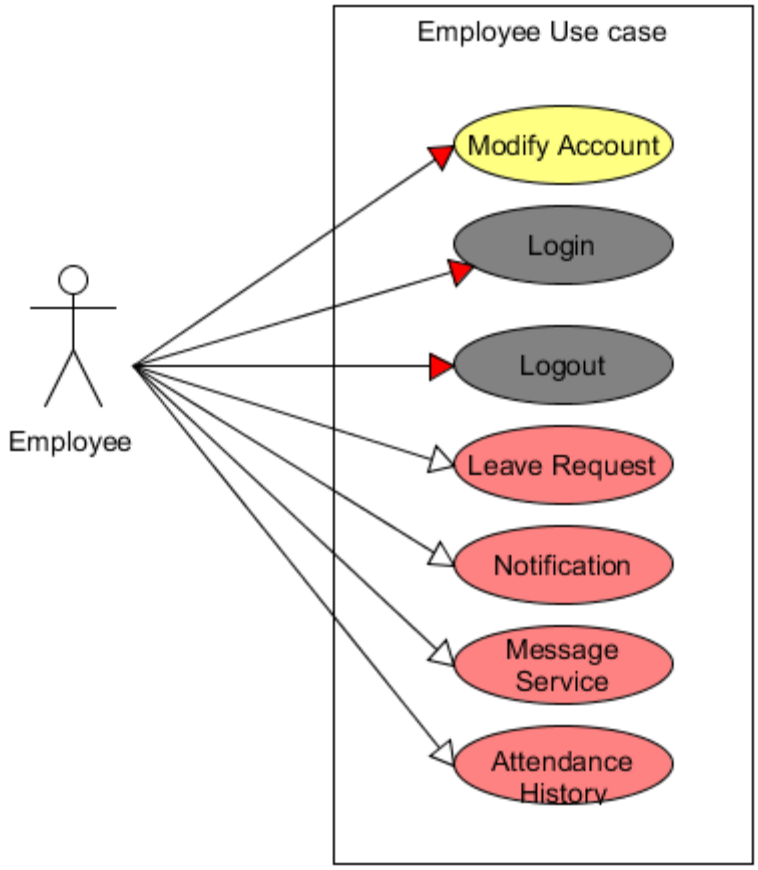


Figure 5 Use Case for Employee

3.2.1.2 Use Case Description

After identifying the use cases and the actors of the proposed system, the task is to construct a use case diagram. Use case diagrams are usually referred to as behavior diagrams used to describe a set of actions (use cases) that some system or systems (subject) should or can perform in collaboration with one more external user of the system (actors). The following diagram represents use cases for the BFEMS and their interactions with the actors involved in the system.

Use Case Name	Register to System	
Use Case ID	Uc01	
Actor	Employee	
Description	The system allow the employee to be registered	
Precondition	The employee is not registered	
Includes	Authenticate	
Extends	None	
Priority	High	
Basic flow	User action	System response
	1.click registration button 3. The user enter required information and Click register button.	2. the system display registration form 4. validates the user information 5. The system informs the user that they successfully registered.
Post condition:	The user is registered and use the website	
Alternatives Flows:	If the user enters invalid password and user-name	

Invalid system	7. go back to step3	6.The system display try again error message

Table 3 Use case for register

Use case name	Login	
Use case id	Uc02	
Actor	Employee manager, admin, employee	
Description	The system allow the employee manager, employee and the admin to Login to the system	
Precondition	The employee manager, and users must have user name and password to Login	
Includes	Authenticate	
Extends	None	
Priority	High	
Basic flow	User action	System response
	1.The admin and users click Login button 3. The admin and users enter his/her user-name and password 4.Then click Login button	2. The system display Login form 5. The system validates the entered information and display main page
Post condition:	The admin and users are their own pages	

Alternatives Flows:	If the admin and users enters invalid user name or password	
	7. employee manager and employee re-enter the correct information	6. the system displays try again error message

Table 4 use case Login System

Use case name	Payroll	
Use case id	Uc03	
Actor	Employee manager, and admin,	
Description	The system allow the employee manager and admin to generate the payroll for the employees	
Precondition	The employee manager, and admin must have user name and password to Login	
Includes	Authenticate	
Extends	None	
Priority	High	
Basic flow	User action Login button	System response
	1.The user click payroll 3. Users choose the type of payrolls to generate. 4.Then click generate button 6.End use case	2. The system display payroll form page 5. The system generates and display the result.

Post condition:	The payroll will be added to database.

Table 5 use case Login System

Use Case name	Employee management	
Use case ID	Uc04	
Actor	Admin and Employee manager	
Description	The system allow the admin and employee manager to add, delete and update. After adding the employee the system gives username and password to the employee.	
Precondition	The admin and employee manager must Login to the our page	
Includes	None	
Extends	None	
Priority	High	
Basic flow	User action	System response
	1.Click employee management link 3.The users click add, delete, update button 5.The admin or employee manager add, delete, update information 7. End use case	2.the system display the add, delete, update 4. the system display account list 6. Validates entered information and informs the employee that they successfully added, delete and update.

Post condition:	The account list will be add, delete and update

Table 6 Use case employee management

Use case name	Time sheet	
Use case id	Uc05	
Actor	Employee manager, Admin	
Description	The system allow the employee manager and admin to set of timesheet to the system	
Precondition	The user must first login to the system	
Includes	None	
Extends	None	
Priority	High	
Basic flow	User action	System response
	1.The users are click timesheet button 3. The users fill of the form 4.Then click submit button	2. The system display timesheet form 5. The system validates the entered information and display main page

Post condition:	The timesheet will be added to database	
Alternatives Flows:	If the admin and employee manager enter invalid information	
	7. Back to step 3.	6. the system displays error message

Table 7 Use case time sheet

Use Case name	Attendance Management	
Use case ID	Uc06	
Actor	Admin and Employee manager	
Description	The system allow the users to manage the attendance of the employees.	
Precondition	The users must Login to the our page	
Includes	None	
Extends	None	
Priority	High	
Basic flow	User action	System response
	1.Click attendance management link 3.The user choose attendance report option 4. Click submit button.	2.The system display the Attendance report 5. The system display the requested attendance view.

Post condition:	The report attendance will be view to the user.	

Table 8 Use case attendance management

Use Case name	Report Management	
Use case ID	Uc07	
Actor	Admin and Employee manager	
Description	The system allow the users to see report	
Precondition	The users must Login to the page	
Includes	None	
Extends	None	
Priority	Medium	
Basic flow	User action	System response
	1.Click report link 3. the user fill the reporting type form 4. click the submit button	2. The system display the report option form. 5. The system fetches and display report

Post condition:	Users view daily, weekly and monthly reports

Table 9 Use case report management

Use Case name	Leave Management	
Use case ID	Uc08	
Actor	Admin and Employee manager	
Description	The system allow the users to received leave request from the employee.	
Precondition	The users must Login	
Includes	None	
Extends	None	
Priority	High	
Basic flow	User action	System response
	1.Click leave management link 3. view the description button 4. Give response to the leave request.	2. The system display the leave the requests from the employees. 5. Use case end.
Post condition:	Replay massage have successfully.	

Table 10 Use case leave management

Use case name	Company information
Use case id	Uc09
Actor	Admin
Description	The system allow the admin to set the company information

Precondition	The user must first login to the system	
Includes	None	
Extends	None	
Priority	High	
Basic flow	User action	System response
	1.The admin clicks company information link 3. The admin fill the form 4.Then click submit button	2. The system display company information form 5. The system validates the entered information and display main page
Post condition:	The company information will be added to database	
Alternatives Flows:	If the admin enter invalid information	
	7. go back to step 3	6. the system displays error message

Table 11 Use case company information

Use case name:	Modify Account
Use case id	Uc10

Actor	Employee, Employee manager and Admin	
Description	The actors can change password and user name	
Precondition	Actors must be login the system.	
Includes	None	
Extends	None	
Priority	High	
	User action	System response
Basic course of action	1: Actor login to the system. 3: Actor clicks modify account. 5: Actor edits the account.	2: The system shows the modify account by the actors. 4: System displays account modify form. 6: system modifies the account.
Alternative flow	.	5.1: if the information is in correct, the system modify account the user. 5.2: use case continuous at step 2 of basic course of action.
Post condition	Modify account successfully.	

Table 12 Use case modify account

Use case name:	notification
Use case id	Uc11

Actor	Employee	
Description	See the notification	
Precondition	Employee must be login the system.	
Includes	None	
Extends	None	
Priority	Medium	
	User action	System response
Basic course of action	1: click the notification button 3: use case end	2: The system display the notifications
Post condition	Close notification page	

Table 13 Use case notification

Use case name:	Attendance History
Use case id	Uc12
Actor	Employee, Employee manager
Description	The actors can view their attendance history.
Precondition	Actors must be login the system.
Includes	None
Extends	None
Priority	High

	User action	System response
Basic course of action	1: click the attendance history button 3: use case end	2: The system display the attendance history.
Post condition	Close attendance history page.	

Table 14 Use case attendance history

3.2.2 Activity Diagram

Activity diagram illustrates the dynamic nature of a system by modeling the flow of control from activity to activity. An activity represents an operation on some class in the system that results in a change in the state of the system. Typically, activity diagrams are used to model work flow or business processes and internal operation. Because an activity diagram is a special kind of state chart diagram, it uses some of the same modeling conventions. Activity diagrams are mainly used as a flow chart consists of activities performed by the system. An Activity Diagram is similar to a flow chart; the one key difference is that activity diagrams can show parallel processing.

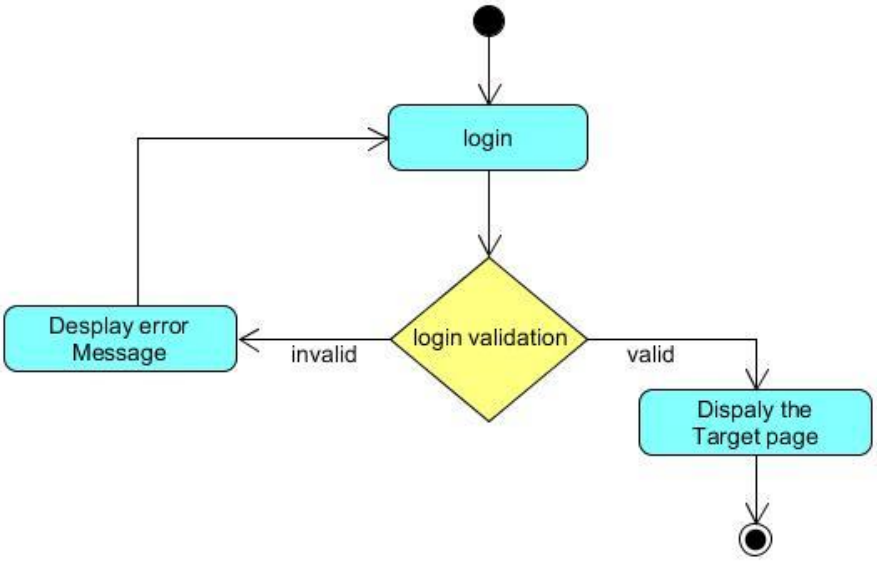


Figure 6 Activity Diagram for Login

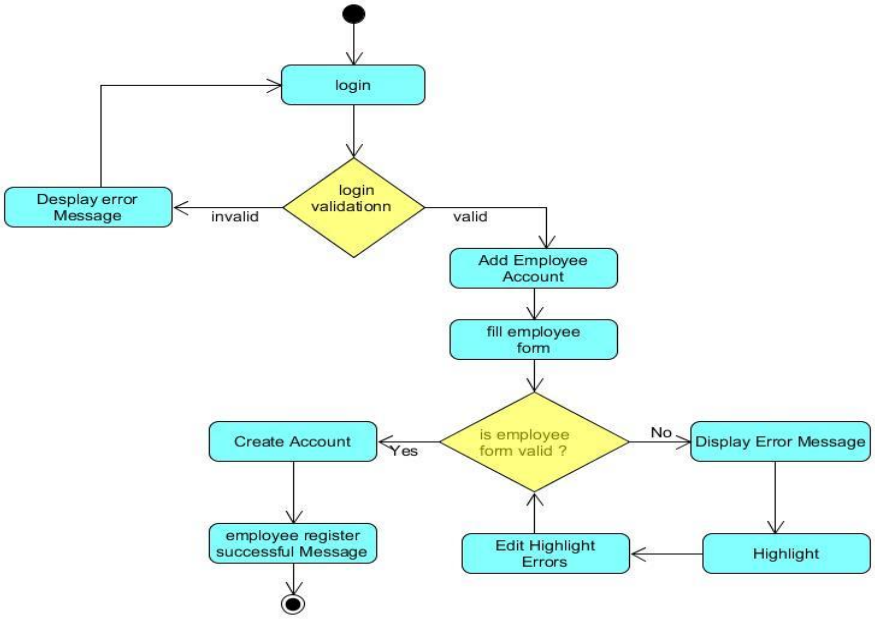


Figure 7 Activity Diagram for employee Registration

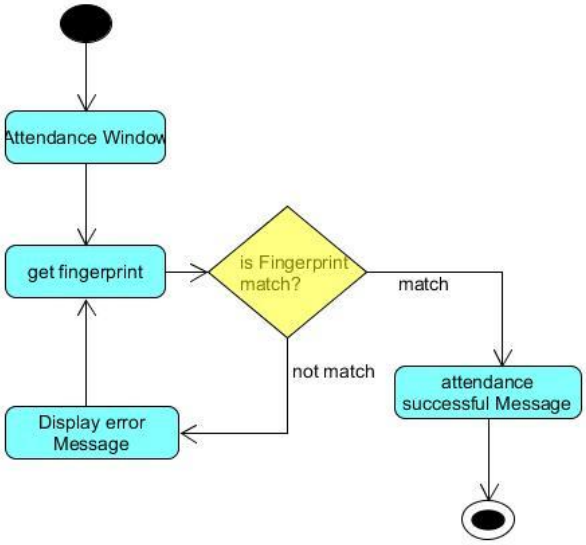


Figure 8 Activity Diagram for Attendance

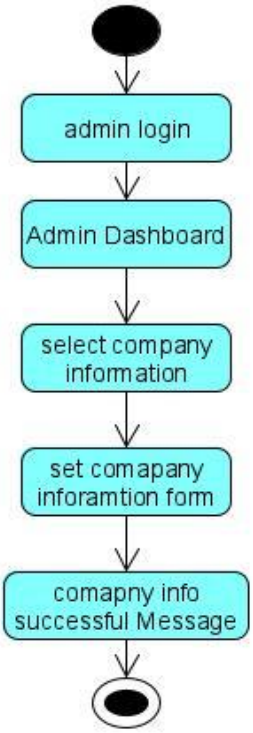


Figure 9 Activity Diagram for setting Company information

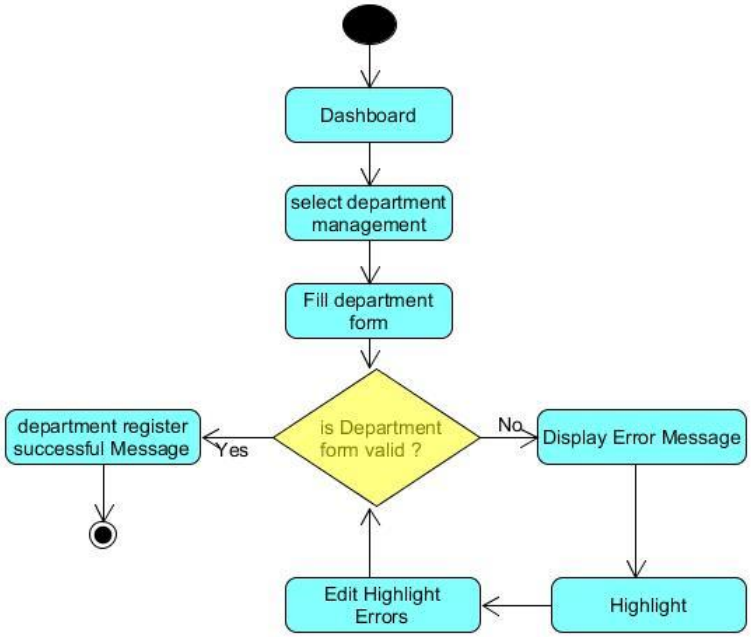


Figure 10 Activity Diagram for Department Registration

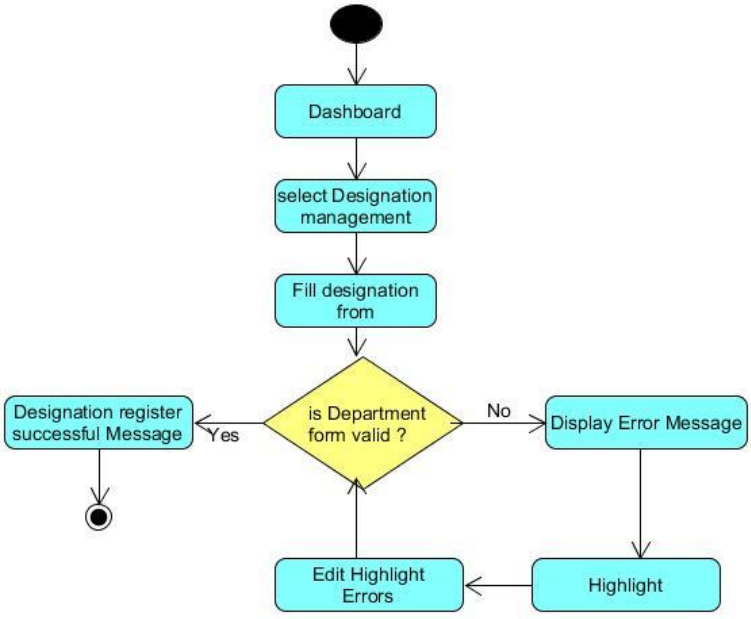


Figure 11 Activity Diagram for Designation Registration

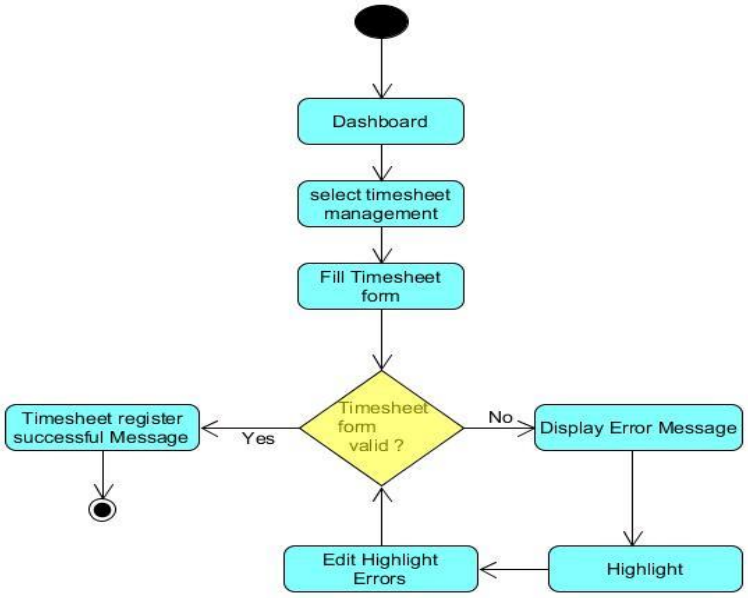


Figure 12 Activity Diagram for Time sheet Registration

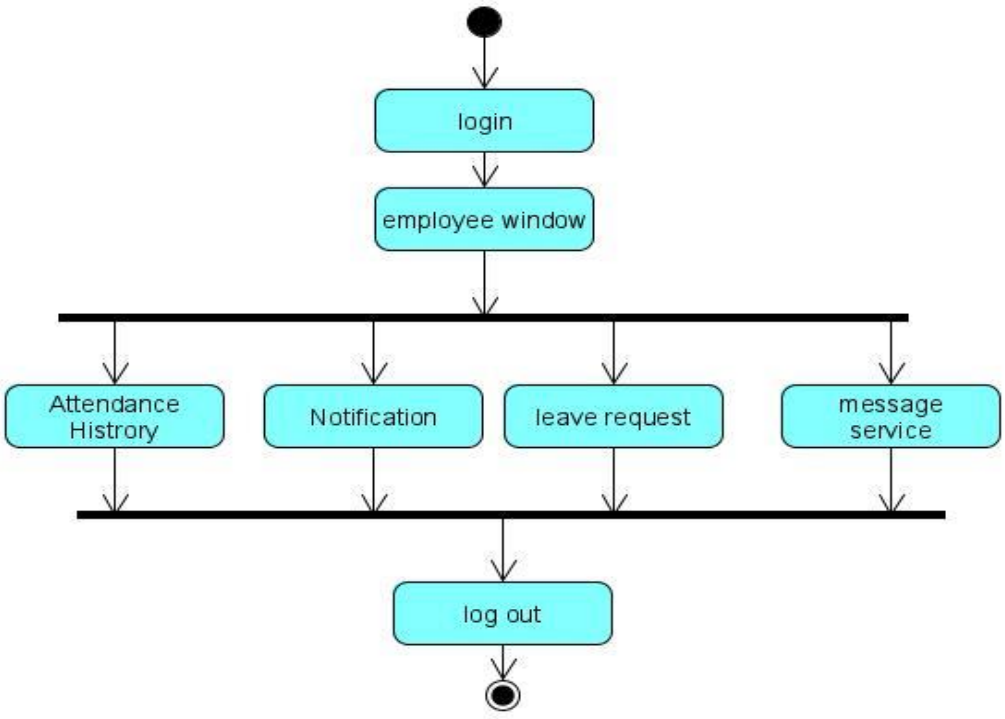


Figure 13 Activity Diagram for Employee

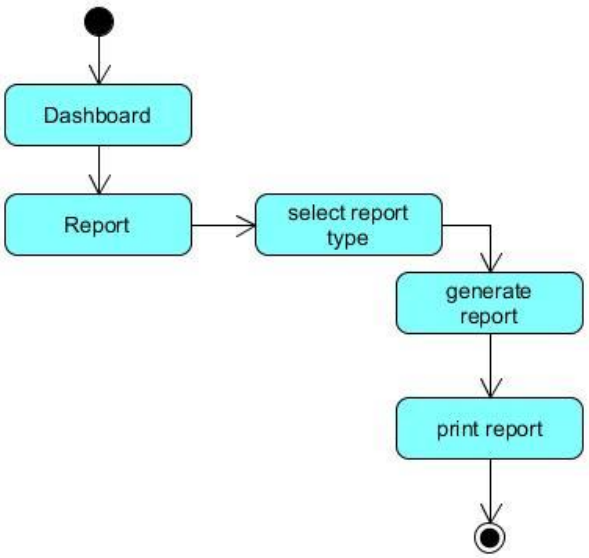


Figure 14 Activity Diagram for Report

3.3 Behavioral/Dynamic Modeling

Behavioral Modeling helps visualize, specify, construct and document the dynamic aspects of a system. Sequence diagrams is used to show the behavioral characteristics of system. So we use the sequence diagram to show the behavioral character of BFEMS.

3.3.1 Sequence diagram

Sequence Diagrams are interaction diagrams that illustrate the ordering of messages according to time. It also shows actors, objects (instances of classes) and the messages sent between them. You can use one or more sequence diagrams to pass a use case or to identify all the possibilities of a complex behavior. A sequence diagrams conveys the same kind of information it concentrates on the chronology of messages passing between the objects in place of their structure. Below are sequence diagrams for major functionalists provided by the proposed system

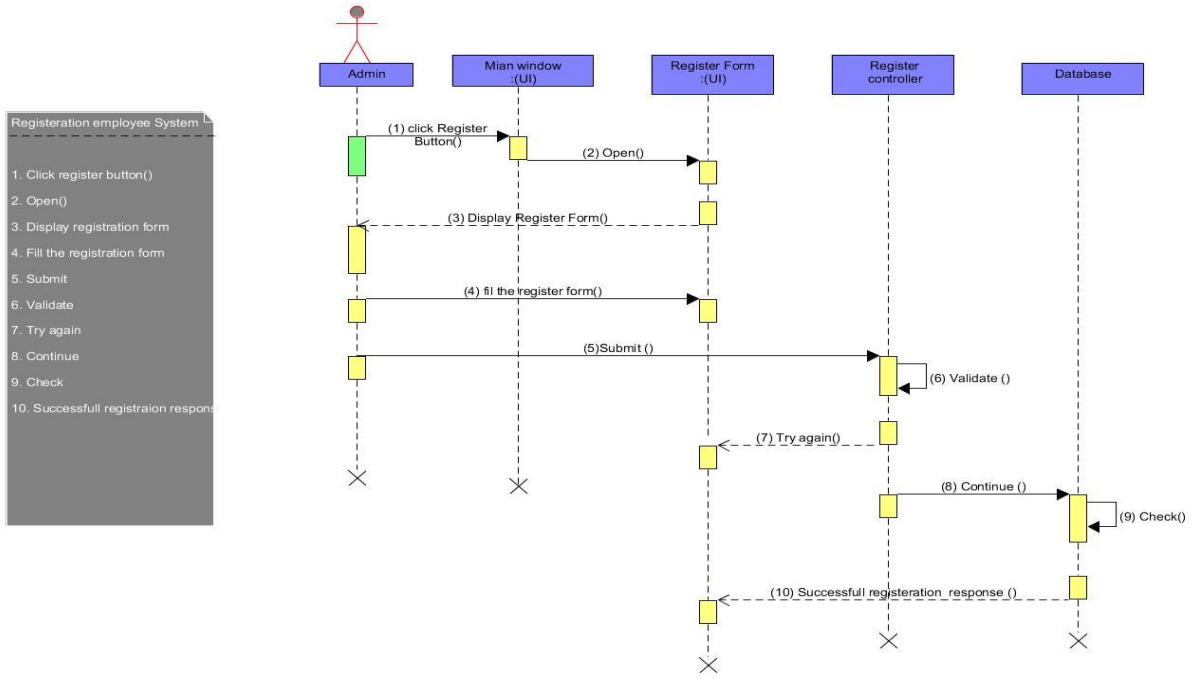


Figure 15 Sequential Diagram Registration

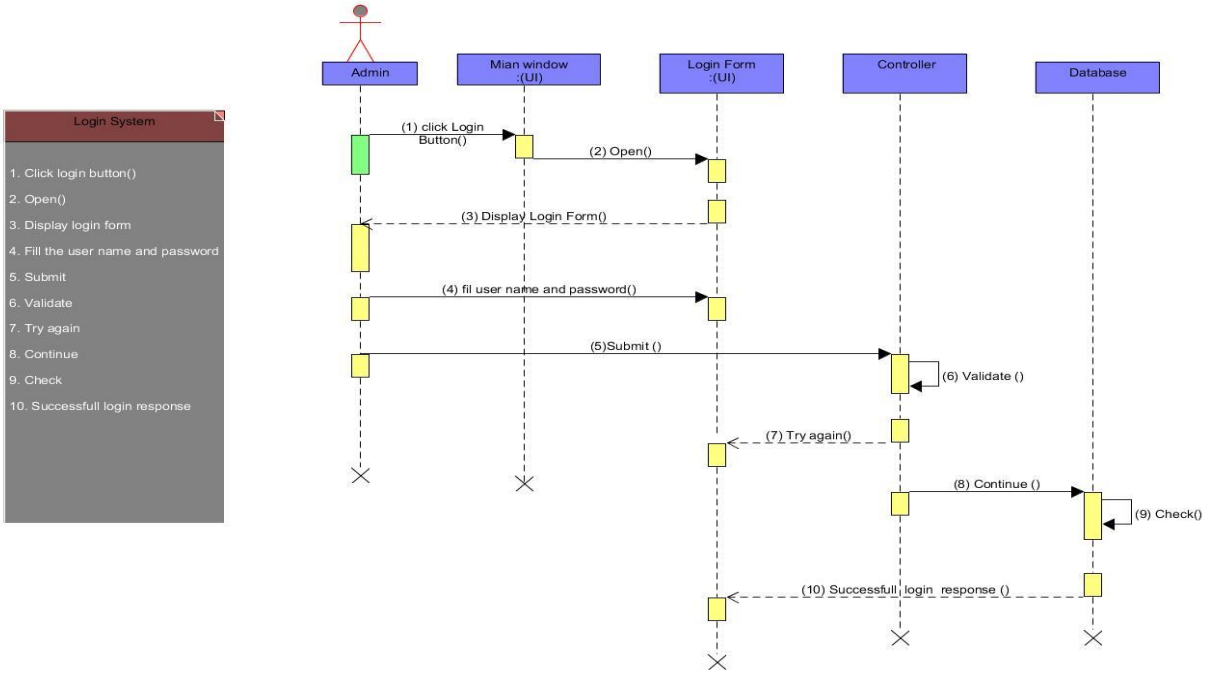


Figure 16 Sequential Diagram login

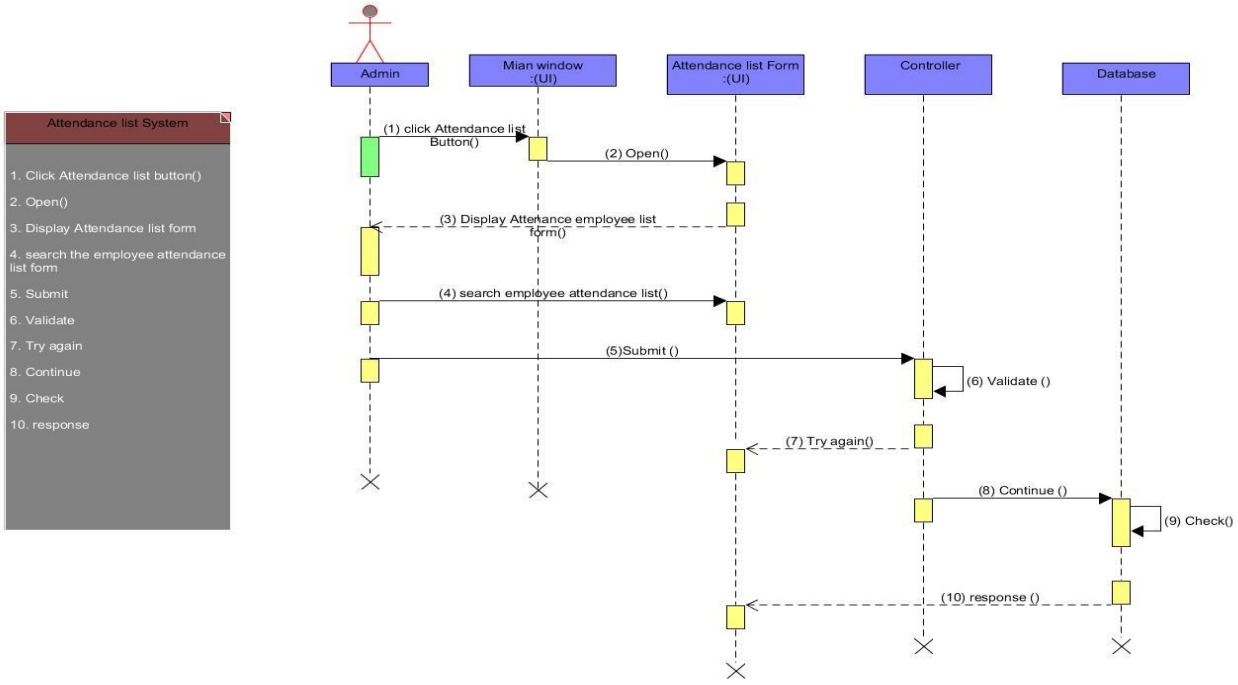


Figure 17 Sequential Diagram Attendance List

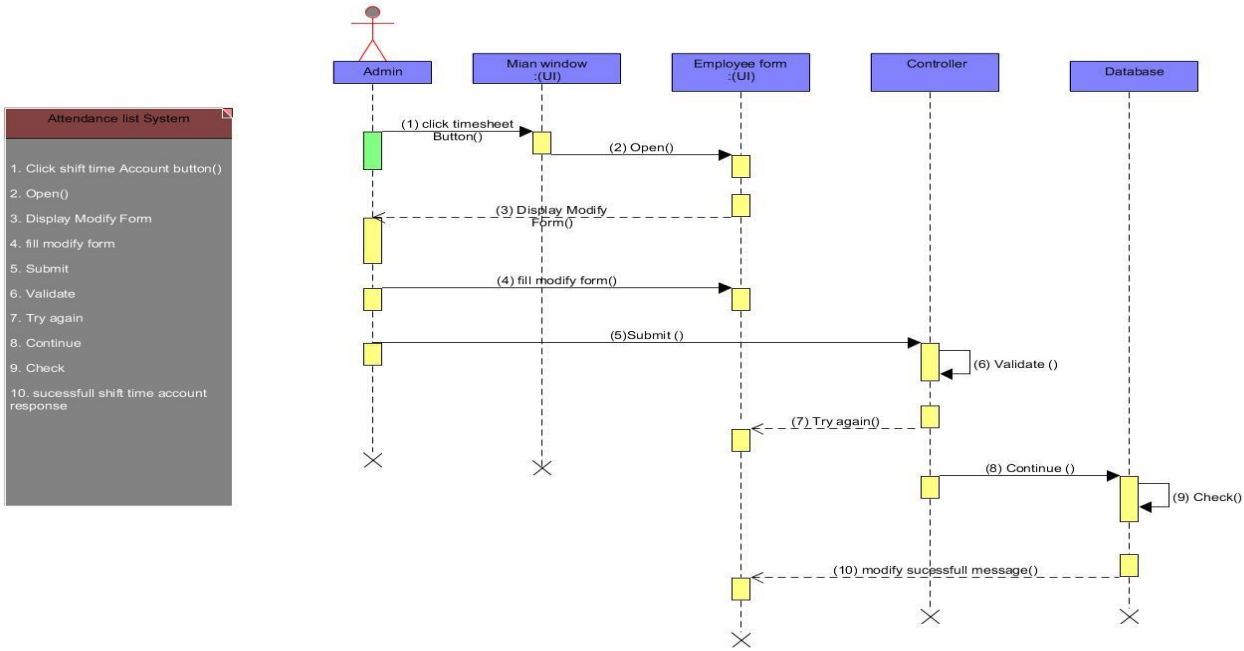


Figure 18 Sequential Diagram for the modify account

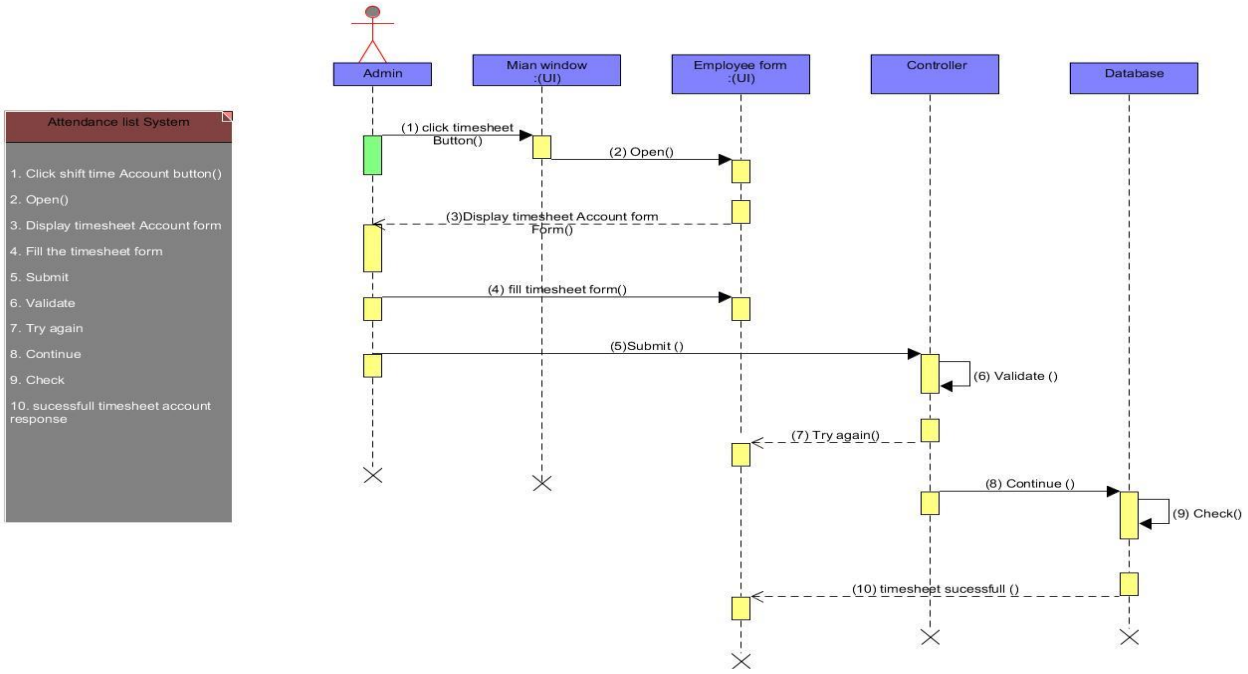


Figure 19 Sequential Diagram the timesheet

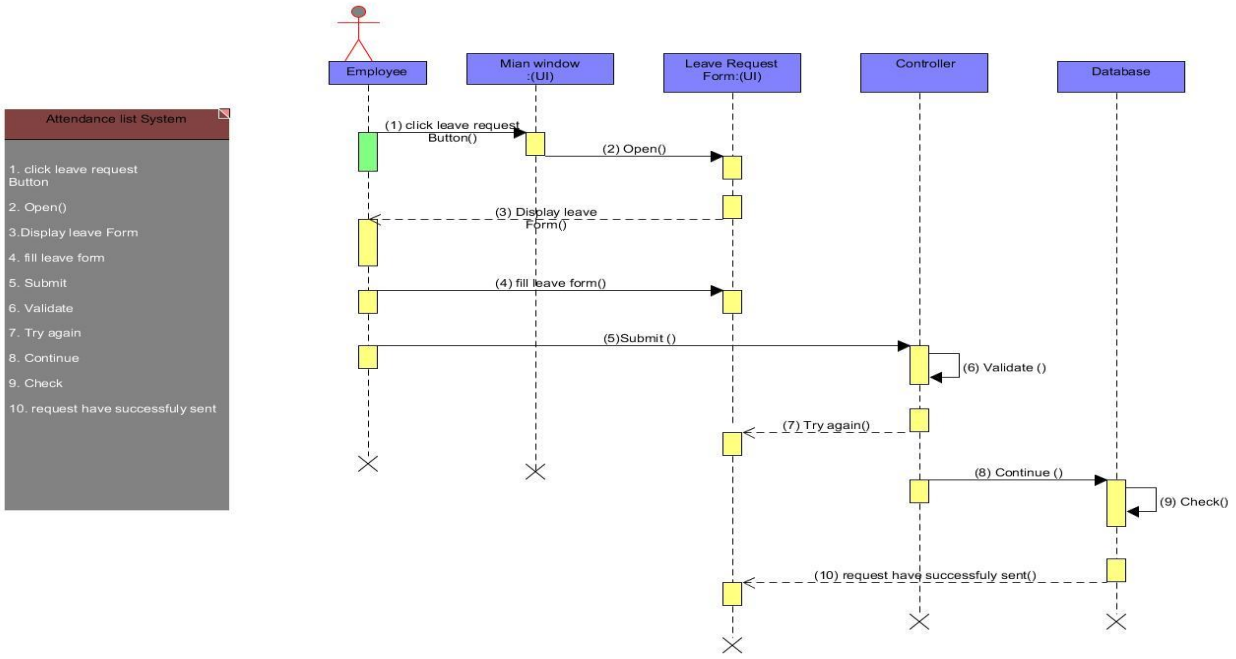


Figure 20 Sequential Diagram the Employee leave request

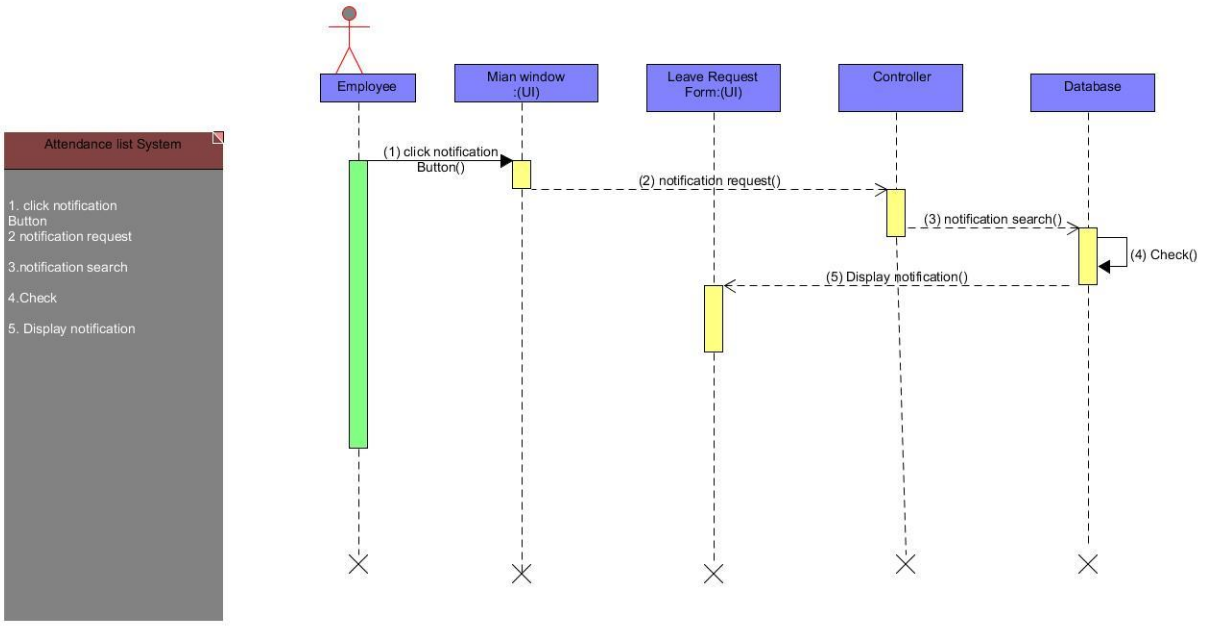


Figure 21 Sequential Diagram the Employee notification

3.3.2 State Diagram

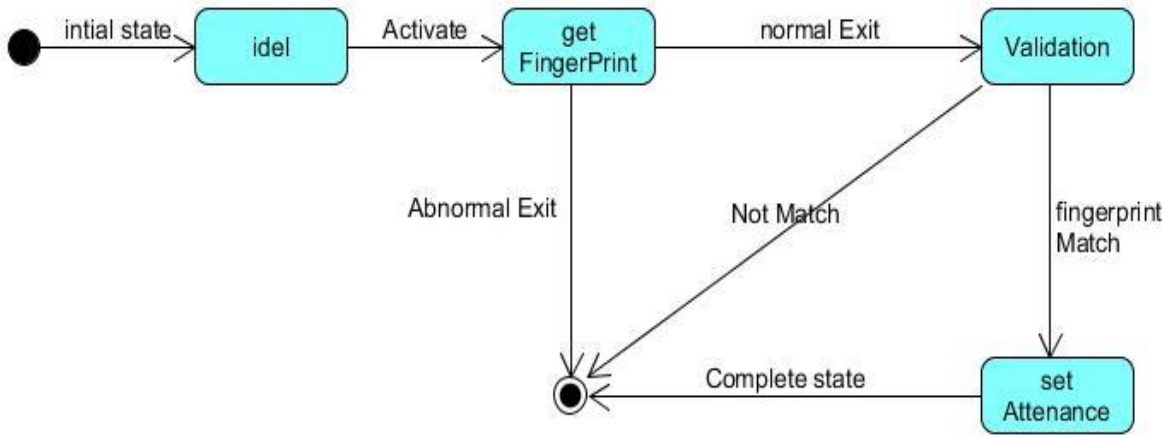


Figure 22 State Diagram for the Attendance

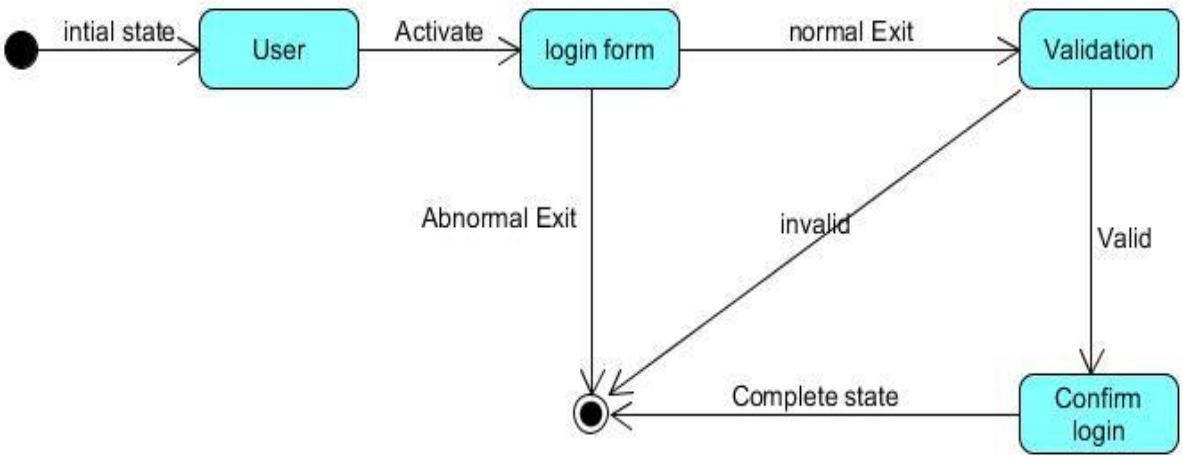


Figure 23 State Diagram for the login

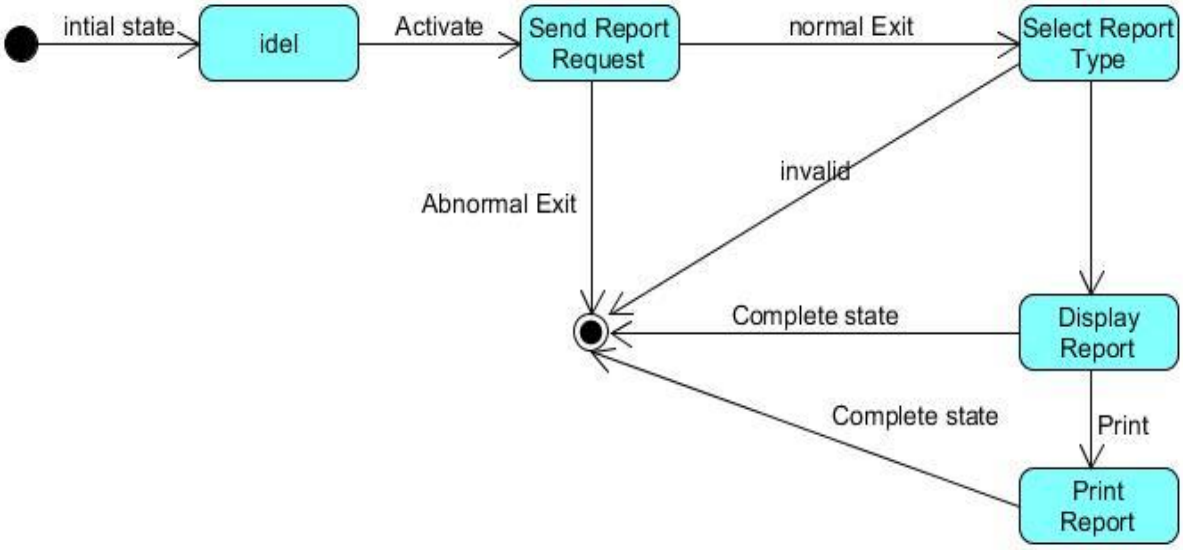


Figure 24 State Diagram for the Report

3.2.3 Class diagram

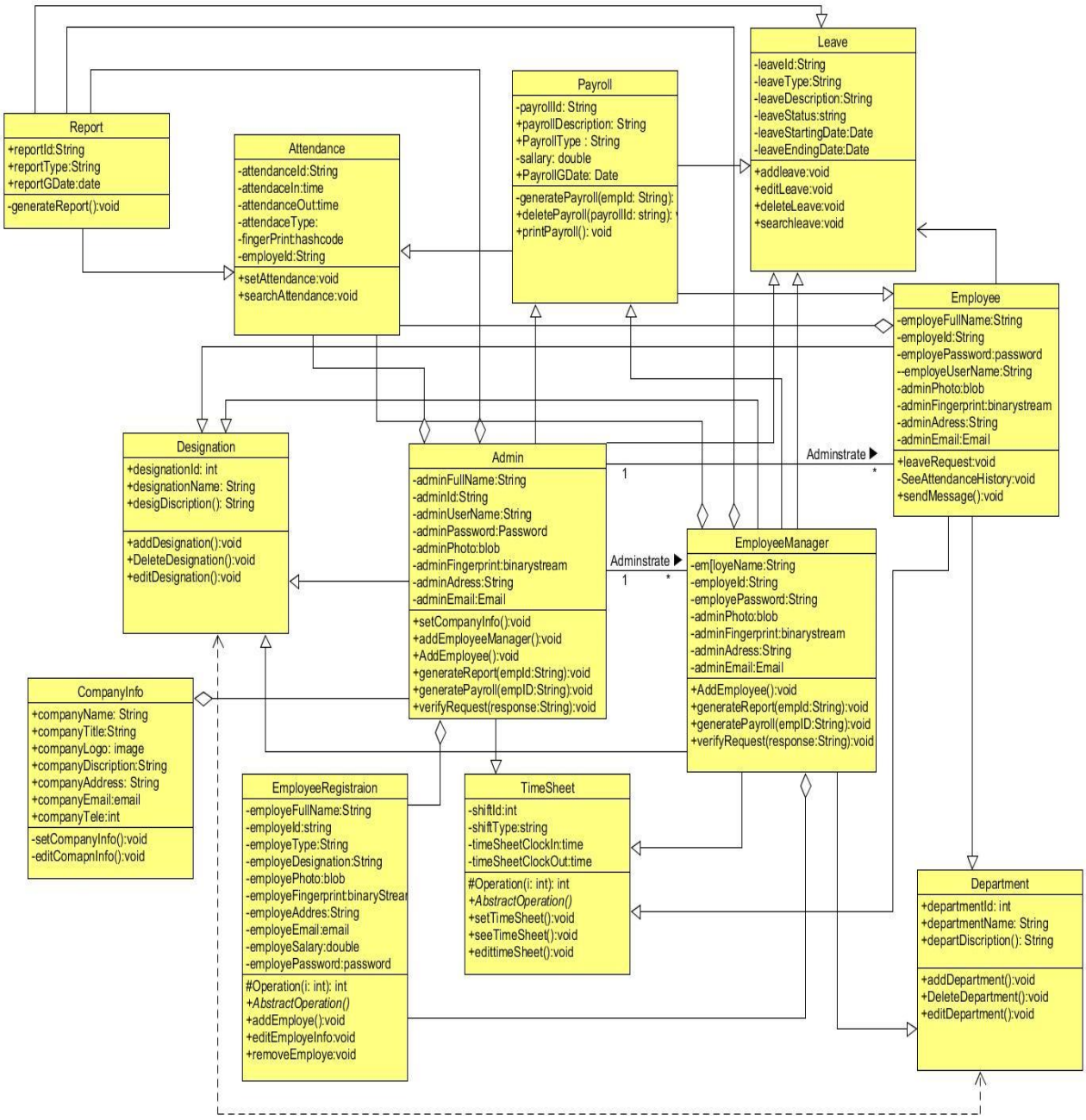


Figure 25 Class Diagram

Chapter Four: System Design

4.1 Overview

This chapter will describe the system design of our project. In these system design parts, the document contains the decomposition of Bio-Metric Fingerprint Employee Management system into smaller subsystems that can be easily realized proposed system. It also includes architecture of the system, class diagram, collaboration diagram, and deployment diagram and database design. The purpose of designing is to show the direction how the web page is built and to obtain clear and enough information needed to drive the actual implementation of web page.

The system will contain three-tier application, a presentation tier for managing user interface, web server which contains all the business and logic for the system and database tier. The web server is maintained using Apache HTTP server, MYSQL server is used as a back-end database, and Java Script, CSS, and java is used as back-end. Java for standardized report generation and Code development will be done via java.

4.2 System Design

4.2.1 System Decomposition

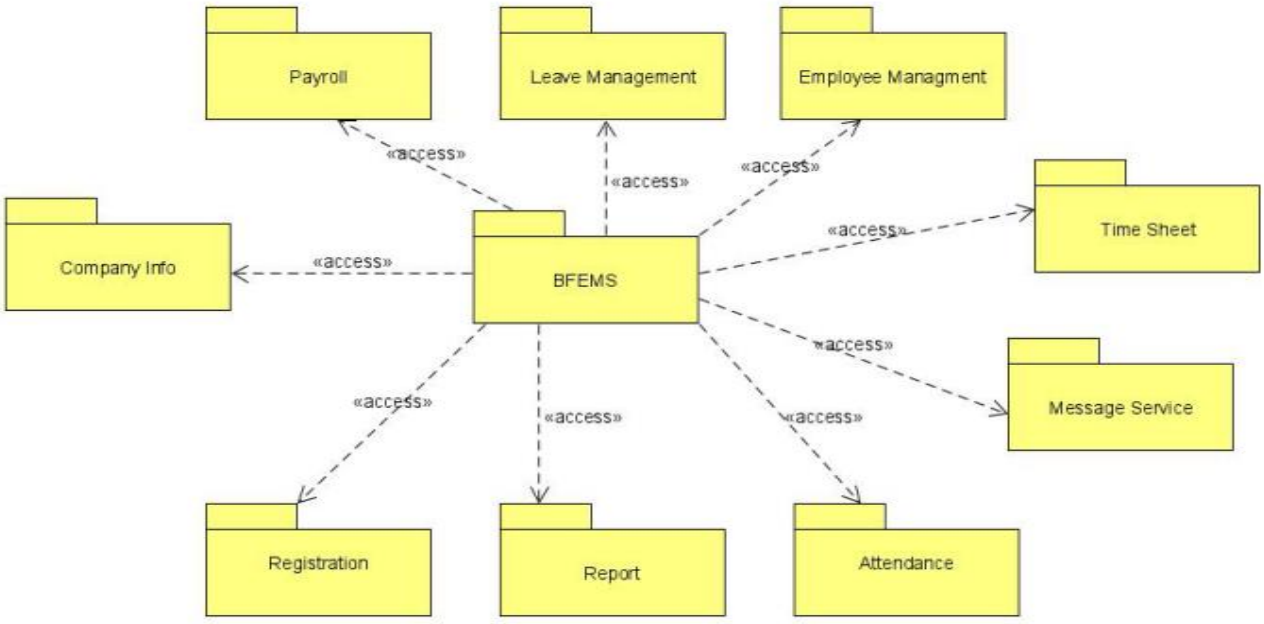


Figure 26 Package Diagram

Our system is decomposed into smaller packages to build the system.

Packages

1. **Company Info:** it is the package granted for the admin to manage the company information. Like company name, Email, address, log, phone number, FAQ, and company description.

2. **Report:** This package provides a way to generate different reports, and provides a way for different types of reporting hierarchy.

3. **Registration:** provides a registration for employees.
    - Members can be administrator, staff, customers and all other individuals involved in the cinema.
    - New members can be created. Members will be provided access to system based on credentials provided at the time of registering.
    - Existing member scan delete their account.

    Process of creating account for members

    The information required to fill-in:

    - Full Name
    - Phone number
    - Password
    - Email address(optional)
    - User Type (Dropdown list)
    - Employee Photo
    - Employee Address
    - Employee Background

- Employee Designation (Combo box)
- Employee Fingerprint (Binary Stream)

4. **Attendance:** this package is for managing the attendance of employees with different shift, time sheet, clock in and clock out. This attendance is linked with the options that is used to fill the attendance.
    - By fingerprint

5. **Payroll:** the payroll package is used for generating payroll information of the employees from the attendance that was taken by the system.

6. **Leave Management:** this package used between the employees and the upper management for the situations of leave request and request approval.
    - Leave Request
    - Leave type
    - Leave Approval or denial
    - Leave request range (number of days).
7. **Employee Management:** is package is used for overall controlling the employee information and other system operations like updating, deleting, modifying.

8. **Time Sheet:** is essential package for the attendance and payroll. It specifies the shifts, time for entry and time for exile.

9. **Message Service:** a message service is used for communicating with upper and lower staffs. About their feedbacks and other messages.

4.3 Architecture of the system

Systems architecture is the conceptual model that defines the structure, behavior, and more views of a system.[1] An architecture description is a formal description and representation of a system, organized in a way that supports reasoning about the structures and behaviors of the system.

A system architecture can consist of system components and the sub-systems developed, that will work together to implement the overall system. There have been efforts to formalize languages to describe system architecture, collectively these are called architecture description languages (ADLs).[2][1]

4.3.1 Architecture style and pattern

A 3-tier architecture is a type of software architecture which is composed of three "tiers" or "layers" of logical computing. They are often used in applications as a specific type of client-server system. 3-tier architectures provide many benefits for production and development environments by modularizing the user interface, business logic, and data storage layers. Doing so gives greater flexibility to development teams by allowing them to update a specific part of an application independently of the other parts. This added flexibility can improve overall time-to-market and decrease development cycle times by giving development teams the ability to replace or upgrade independent tiers without affecting the other parts of the system.

- **Presentation Tier-** The presentation tier is the front end layer in the 3-tier system and consists of the user interface. This user interface is often a graphical one accessible through a web browser or web-based application and which displays content and information useful to an end user. This tier is often built on web technologies such as HTML5, JavaScript, CSS, or through other popular web development frameworks, and communicates with others layers through API calls.
- **Application Tier-** The application tier contains the functional business logic which drives an application's core capabilities. It's often written in Java, .NET, C#, Python, C++, etc.
- **Data Tier-** The data tier comprises of the database/data storage system and data access layer. Examples of such systems are MySQL, Oracle, PostgreSQL, Microsoft SQL Server, MongoDB, etc. Data is accessed by the application layer via API calls.

Figure 27 3-tier Architecture

4.3.2 Component Diagram

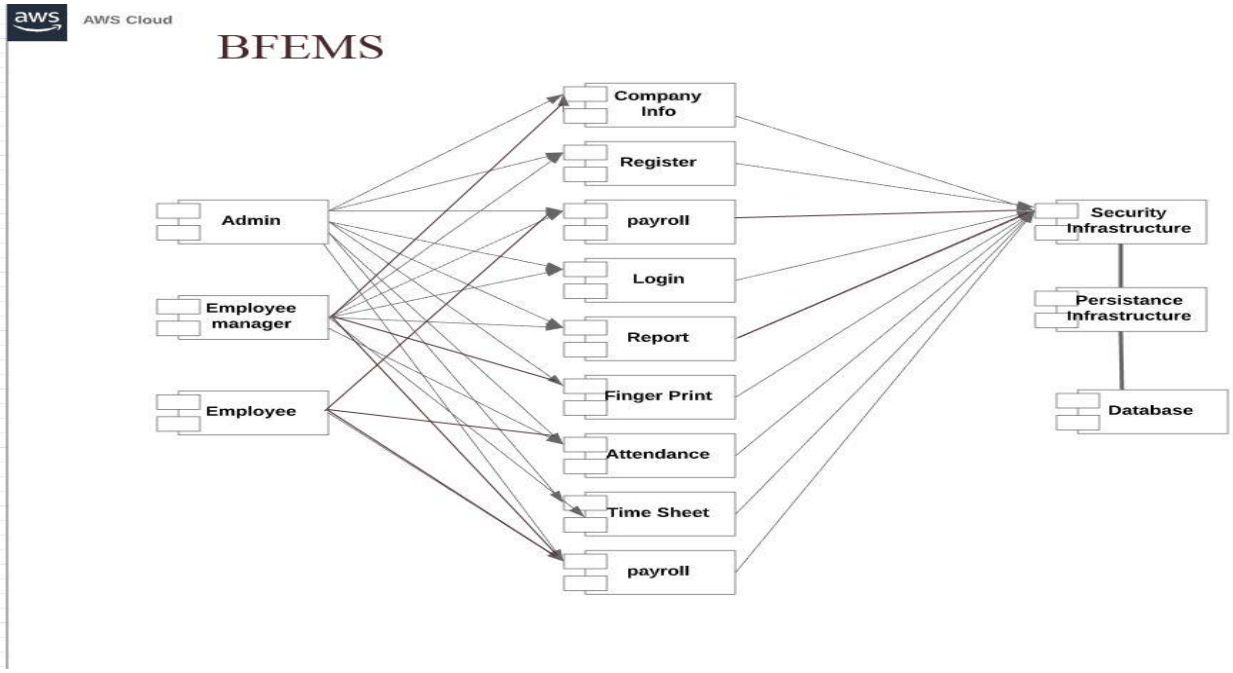


Figure 28 Component Diagram of BFEMS

4.3.3 Deployment Diagram

Deployment diagram shows the configuration of run-time processing elements and the software components, processing and objects that live on them. Software component instances represents run-time manifestations of code units.

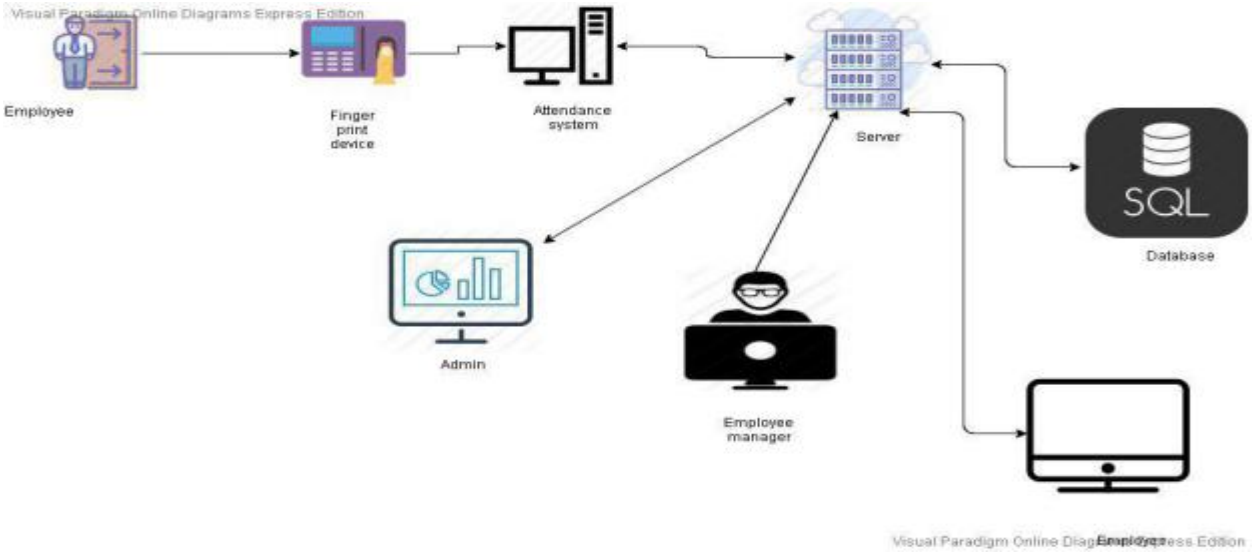


Figure 29 Deployment Diagram

4.4 Database design

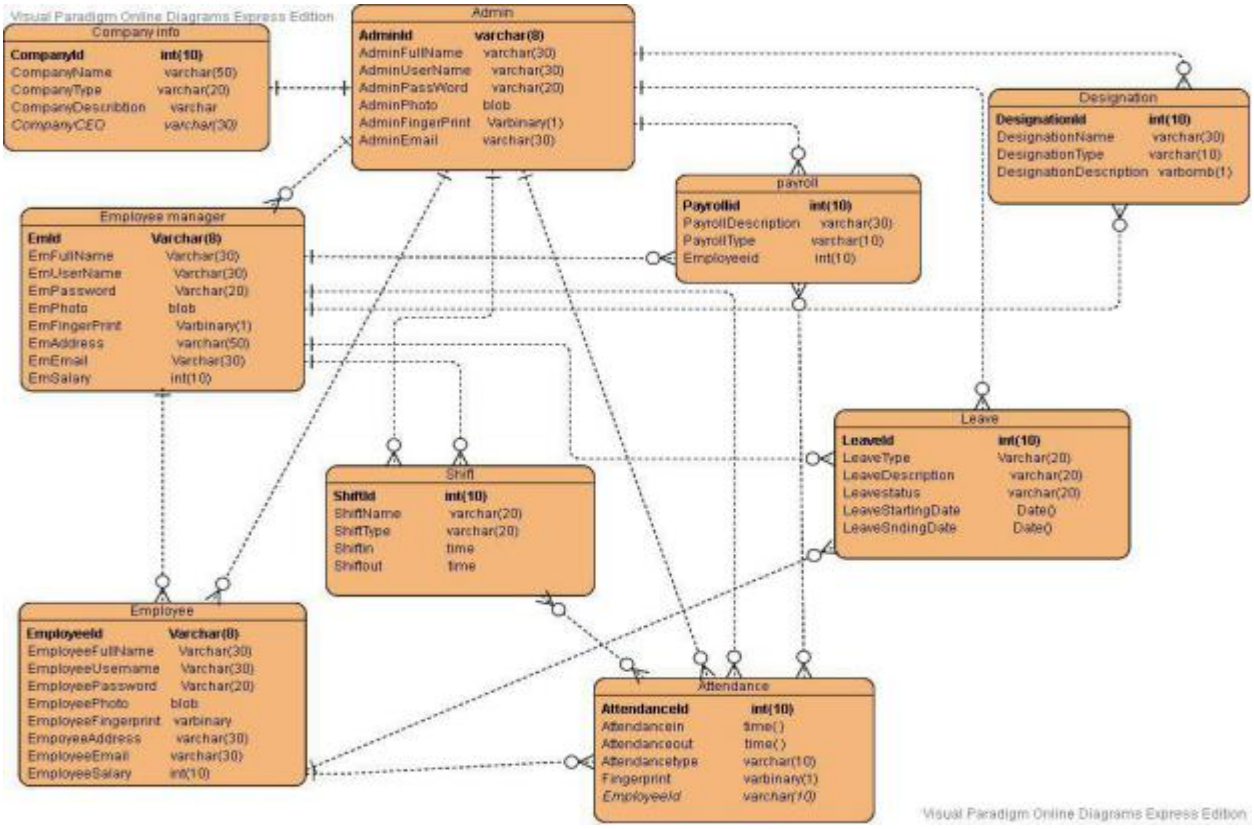


Figure 30 ER Diagram for the BFEMS

4.5 User Interface Design

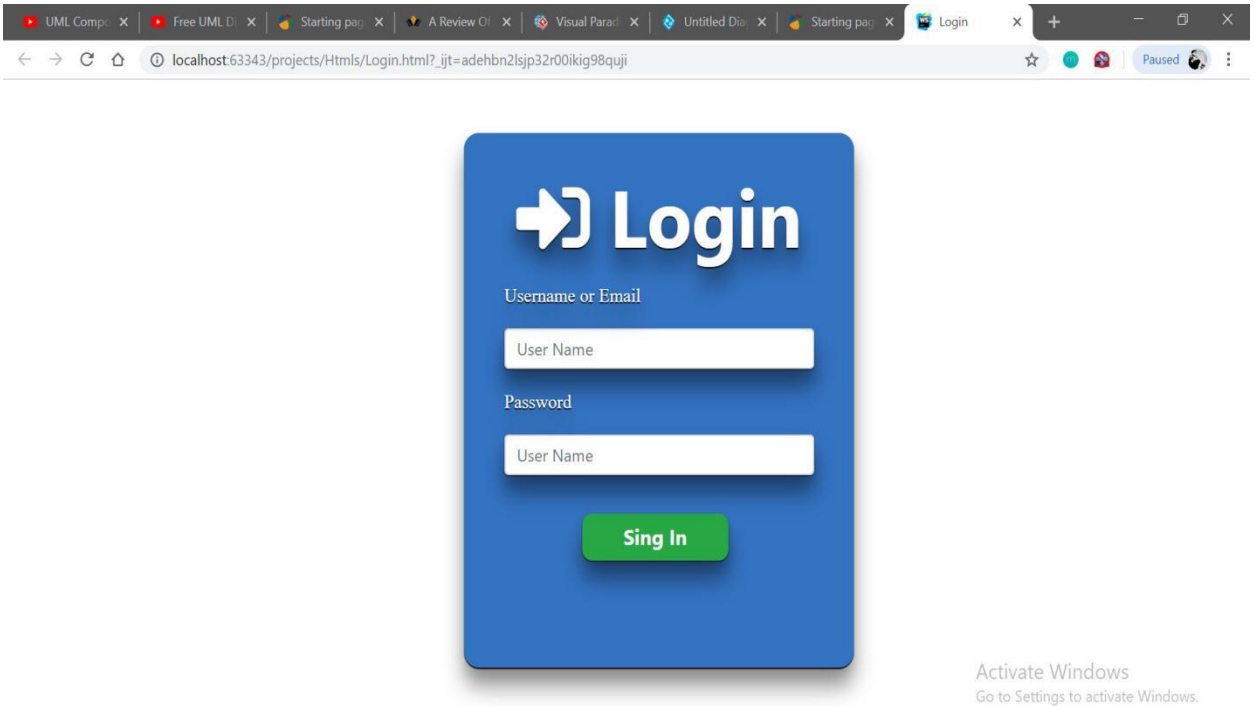


Figure 31 UI for Login

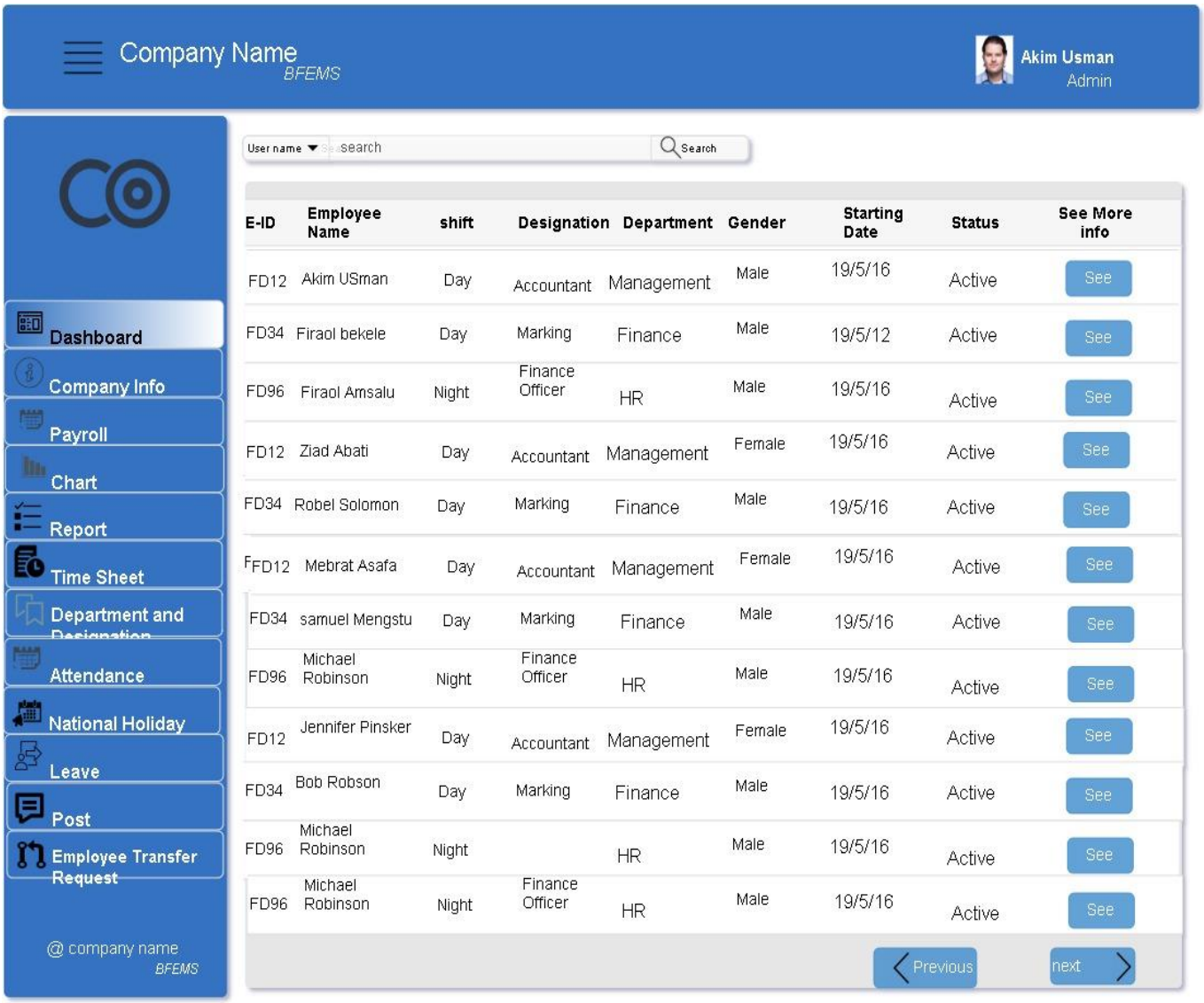


Figure 32 UI for Dashboard

Figure 33 UI for Employee Registration

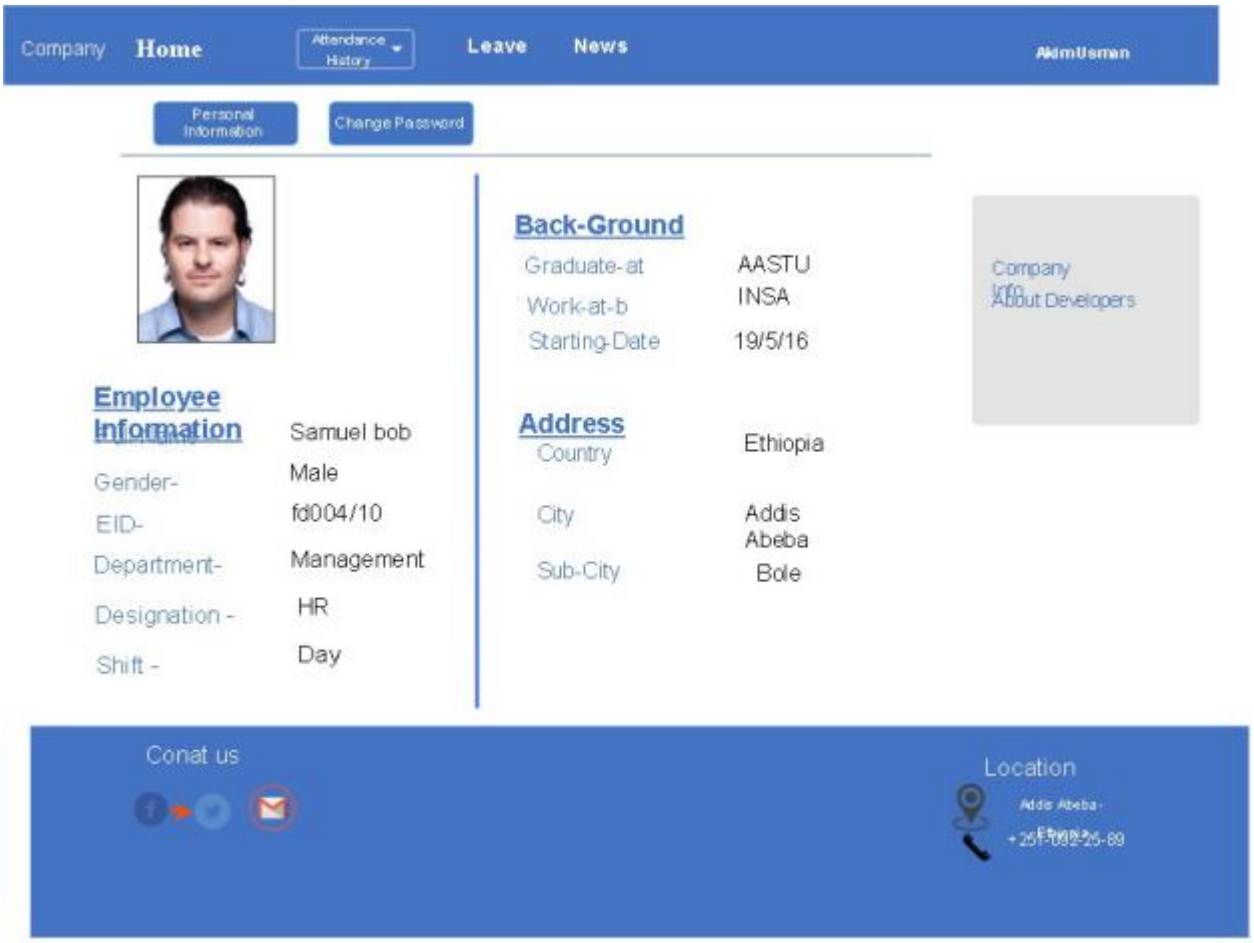
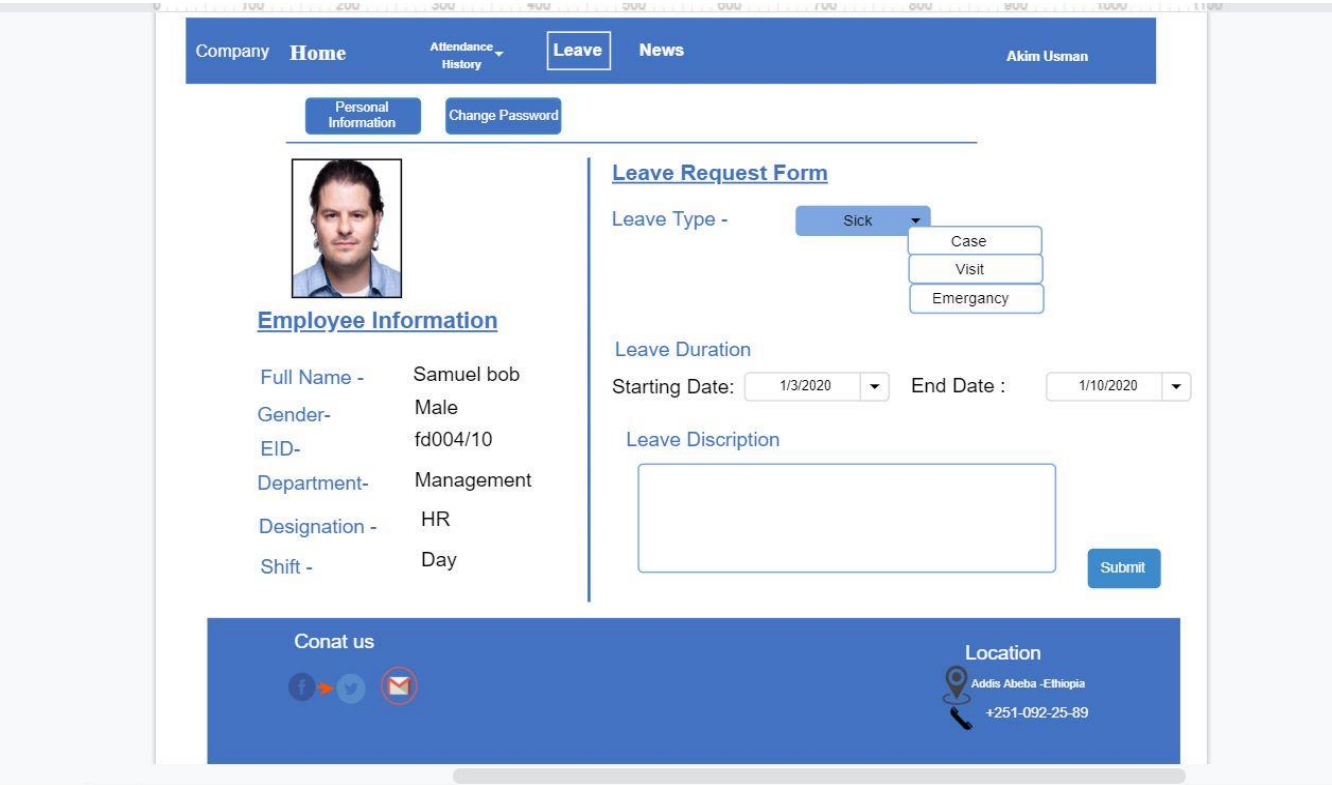


Figure 34 UI for Employee



*Fig*ure 35 UI for leave request

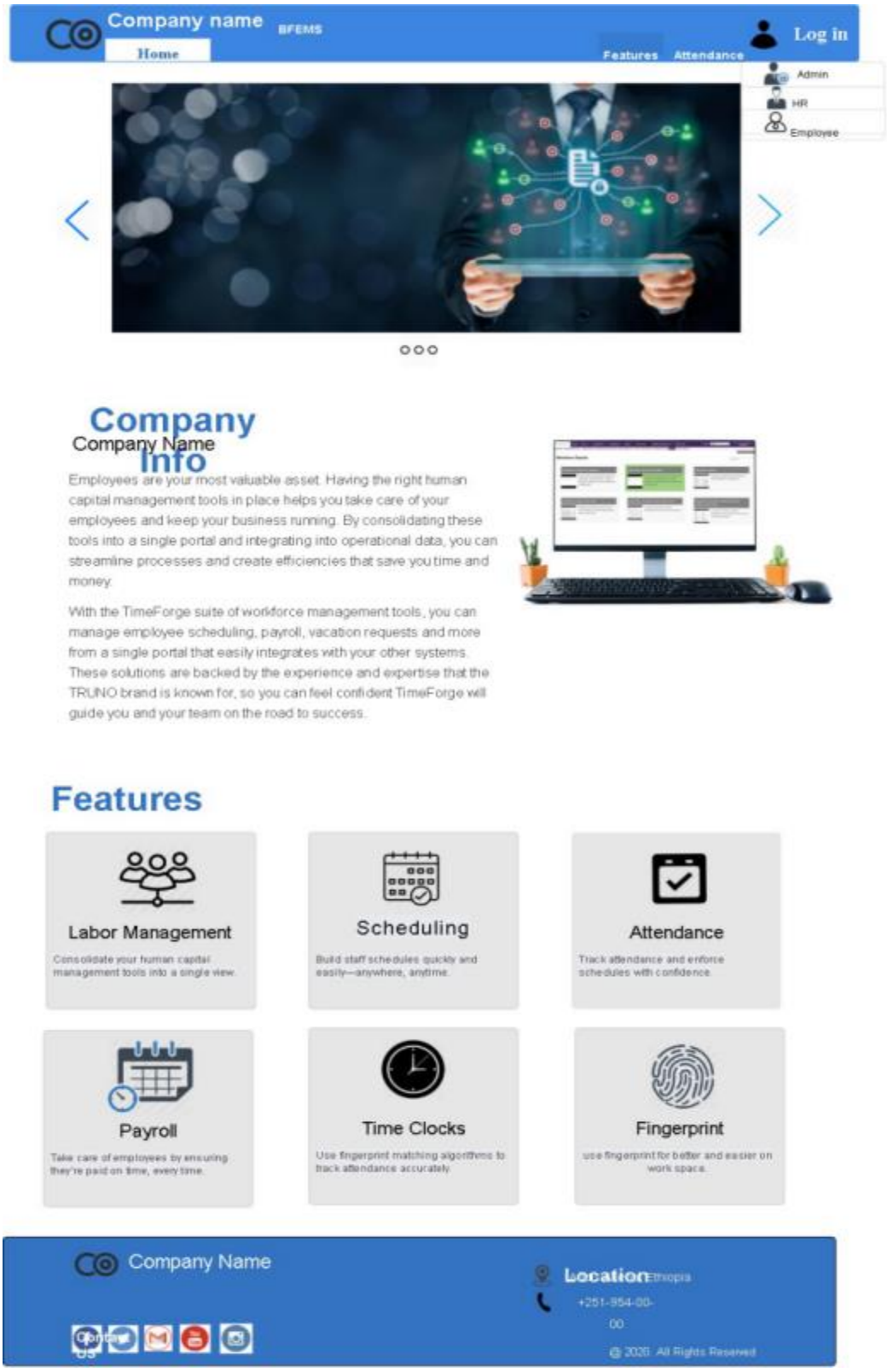


Figure 36 UI for Ground page

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Appendix