Independent University, Bangladesh

**An Undergraduate Internship /Project on
"Web Application on Employee Management System"**

By

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Spring, 2021

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Dissertation submitted in partial fulfillment for the degree of Bachelor of Science in

Computer Science

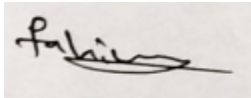**Department of Computer Science & Engineering**

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Attestation

I, Mohammed Fahim Shahriar, hereby certify that none of the work that has been done in this report is plagiarized or copied from anywhere. Any resources used are mentioned in the reference section of the report. No help was asked for during the completion of the report from a third party organization except the one that I have worked for in the last 3 months as an intern.

For any information, my internship supervisor, Mahtab Uddin Khan, at my company, Bengal Software Limited, can be contacted on 01816811482 .

Sincerely

Mohammed Fahim Shahriar

22th May, 2021

Acknowledgements

At first, I would like to thank Almighty ALLAH for giving me the endurance and the ability to work hard. It is my privilege that I had the opportunity to do an internship in Bengal Software. I would like to thank all the people on whom I carry out my internship.

I express my deep gratefulness to my supervisor Subrata Kumar Dey, Senior Lecturer, Department of Computer Science and Engineering, Independent University, Bangladesh; for his invaluable instructions, continuous guidance, constructive criticisms and thoughtful advice during pursuing this internship and preparation of this report.

I also express my deep gratefulness to Mahtab U Khan (CEO, Bengal Software), MD. Abid Hossain (Project Manager, Bengal Software), Fahim Ashab (Product Manager, Bengal Software). I also, express my deep gratefulness to all employees of Bengal Software for cooperating and helping me to complete this internship report.

Mohammed Fahim Shahriar
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Letter of Transmittal

22th May, 2021

Subrata Kumar Dey

Internship Supervisor & Senior Lecturer

Department of Computer Science and Engineering

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Independent University, Bangladesh

Subject: Internship report on 'Web application on employee management system' for Bengal Software Limited.

Dear Sir,

It is my pleasure to submit to you my internship report on 'Web application for on employee management system' for Bengal Software Limited. This report has been prepared based on my three month internship at Bengal Software Limited and the project that I had been working on during that time. The purpose of this report was to fulfill the requirements of the Bachelor degree of Computer Science and Engineering and also to gain an insight on how the organizations are dealing with the ongoing COVID-19 pandemic.

I tried to give my best effort to make this report successful. It has been an instructive and knowledgeable experience for me to work along with development team in Bengal Software Limited. I would be really happy if the report that I have created is able to serve its purpose. I am grateful to you for dedicating your valuable time, expertise, guidance and support. I have tried my best to complete the report appropriately as much as possible. I would be available to explain any kind of queries related with my report anytime.

Thank you.

Yours sincerely,

Mohammed Fahim Shahriar

ID: 1620216

Evaluation Committee

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Signature

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Supervisor

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Abstract

Employees are the backbone of any company therefore their management plays a major role in deciding the success of an organization. Employees Management Software makes it easy for the employer to keep track of all records. This software allows the administrator to edit employees, add new employees. Each employee in the database is associated with a position can be added and edited when need arises. Most of all, the admin can assign tasks to employees and assess their progress in order to keep track of employee performance. This system brings about an easy way of maintaining the details of employees working in any organization. It is simple to understand and can be used by anyone who is not even familiar with simple employees system. It is user friendly and just asks the user to follow step by step operations by giving easy to follow options. It is fast and can perform many operations for a company. The goal of this project is to design and develop an employee management system to fill existing gaps in the manual system.

This report is broadly categorized in 8th chapter. In first chapter there is an introduction about the project, background of the project, objectives, scope of the project and about the organization where I worked. Chapter two describes the literature review where I discussed about market analysis both in local and global market, about similar products and how my undergraduate studies helps me to do this project. Chapter three describes the project management and financing of the project where I describes work breakdown structure, time distribution show in critical map diagram, gantt chart, activity wise resource allocation and about the budget. Chapter four describes about methodology where I describes about waterfall methodology which I used here, I also describe why use waterfall methodology. Chapter five describes body projects, where I describe in details about work description, six element analysis, feasibility analysis, problem, effects and constraints analysis. I also give here rich picture, erd diagram, activity diagram, use case diagram, sequence diagram and class diagram. Functional, nonfunctional requirements, input, output and architecture of the project also describes in this section. Chapter 6 describes about survey results and analysis. Chapter seven describes project as engineering problem analysis which includes sustainability of the project, social and environmental effects of the project, addressing ethics and ethical issues. Chapter eight describes about the future work for this project and finally the conclusion. This software will save a lot of time and money for company

Keyword: Web application, EMS, Management system, HRM.

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Chapter 1: INTRODUCTION

1.1 Background

In this world of growing technologies everything has been computerized. With large number of work opportunities the Human workforce has increased. Thus there is a need of a system which can handle the data of such a large number of Employees. This project simplifies the task of maintaining records because of its user friendly nature. An employee management system is a platform where all work-related as well as important personal details of an employee is stored and managed in a secure way. By using this system, company can manage employee activities in an easier and quicker way. At past/previous time, all employees' record were kept manually. There was uncertainty and may lead to confusion to employee if records is not maintain properly. Then it was badly needed an automation system to make a system for manage all employees record. The company Bengal Software faced similar problems that's why they needed an automation system. They faced difficulties to keep recordings of employees so they needed an in house tool which will be applicable for company use only. In the age of software, real-time reporting and integration with other business systems, employee management system is very easy to use to all employee.

In this paper, a detailed discussion has given regarding development of an application on employee management system. The application is actually a suite of applications developed using PHP. The project contains two modules like Employee and Admin. It is simple to understand and can be used by anyone who is not even familiar with simple employee's system. It is user friendly and just asks the user to follow step by step operations by giving him few options. It is fast and can perform many operations of a company or organization.

1.2 Objectives

The main objective of this project is to develop a web-based in-house employee management system for Bengal software. The project objective is important because it define the purpose of the project.

Paperless: To make existing system paperless and save lots of bunching logs of files on the shelf which makes the later on access of the record not at all easy task and overhead to peoples.

Automatic: Making the existing system fully automatic which will save lots of human resources work. As the current system is all human resource work is needed to maintain and keep the record and details of every employee under and organization to keep track of every employee in staff working in an organization. Design of a web based employee management system to fulfill requirements such as project management, leave management. Well-designed database to store employee information. A user friendly front-end for the user to interact with the system.

1.3 Scopes of the work

The system includes online web form, database to store information and data, web portal and a secure network. The web application where admin and employee can do communicate and real-time reporting as well as integration, so this project does. Complete elimination of paperwork in leave management by enabling an employee apply for leave as well as check their leave status through the system. This will also enable the admin to accept/reject leave application through the system. Assign tasks and projects to employees. The admin will add an employee and set a password. The admin will then have the ability to add an employee's information to the database.

1.4 Expected Benefits

This system is expected to be user friendly and will offer easy access to data as well as service such as online leave management, task management. The employee is expected to have direct interaction with this system through a password protected user account therefore proposed system is web based to enable accessibility from any location as long as internet connectivity is available. This direct interaction with the system will enable employee self-service. Without an employee management system, it's a tedious job for the human resource department to keep track of each and every employee and even harder for a project manager to assign tasks to the project team.

1.5 Limitations of the work

For preparing this web app there was limitation of time. Due to time shortage for an internship program, the web app couldn't build proper plan way. On the other way, I didn't have much knowledge for core functionality as HTML, CSS, Bootstrap, PHP programming language etc. I had to learn these things as much as possible. During learning I had to work in parallel way for the project at a same flow.

1.6 The Organization

1.6.1 Overview of Bengal Software

An IT solutions company with the dedication and passion to provide quality IT services. Here at Bengal Software, the group of ICT professionals thrive to provide Web and Mobile App development services, e-commerce solutions, digital marketing services, UI & UX designing services among many other fabulous things to help grow a business digitally. Bengal Software is a one stop solution for all ICT needs.

1.6.2 Company Profile of Bengal Software

Bengal Software offer clients' quality services, policies and promising tactics by assuring clients the very best service in each category. Whole team is passionate, dynamic and focused when it's time to escalate a business in the digital world. Bengal Software holds technical expertise in the IT sectors which helps to build digital business in every aspect. They develop responsive and mobile friendly websites to strengthen the online presence of any company. As well as developing custom iPhone, Android, and Native apps to improve service delivery and drive growth for clients. Developing an ecommerce store, which delivers more revenue and works seamlessly with an entire business. Instantly improving sales process and make better decisions with CRM & Sales Integration services. Expert advice, strategies and campaigns to rank any website on top of search queries at the sector of search engine optimization. Bengal Software creates highly usable and intuitive designs for the B2B market improving the usability and usefulness of apps for optimal user experience for content designing. For digital advertising Bengal Software helps to reach millions of customer through on-line promotion for any business. Generally Economic value is

the measurement of the benefit derived from a good or service to a company. Economic value can also be the maximum price or amount of money that someone is willing to pay for a service. Bengal Software determines its own economic value by considering requirements of a client. The requirement and features of a project demanded by a client. Based on those, the economic value is settled down. Say for example, for a static and dynamic Web development Bengal Software charges 30,000 to 55,000 BDT, for e commerce site it charges 50,000 to 1, 50,000 BDT, for android app development 55,000 to 2, 50,000 BDT depending on clients demand.

1.6.3 Mission, Vision & Value

Amongst Bengal Software's missions providing B2B Web/App Solution to all SME, Becoming leading AR/VR Solution of for various kind SME, Becoming one of renowned business automation Solution Company, providing quality solution and supports to customers are mainly focused.

- Initial Vision: Providing low cost Web/App Solution to Startup and onboard many Partner as possible to create long term relation ensuring satisfactory services.
- Long Term Vision: Building some solution and try to sell them subscription based model to SME.
- Ultimate Vision: Providing data related solution and Automated SME Business Process.

Amongst values Teamwork functions for Bengal Software as assigning teams to tasks are successful because teamwork encourages communication and the flow of ideas. Employees work in teams because working with others allows each employee to bring their best to work. Trust amongst employees and customers is another value in here. Therefore, emphasize the value, integrity. The company is saturated with confidential information. Bengal Software do business with integrity to gain their customers respect and trust. Maintaining a quality behavior between customers – employee is one of the most important values in Bengal Software.

1.6.4 Products & Services

Bengal Software provides a bunch of quality products and Services. It provides Web/Mobile Based Application Development services. Bengal Software extracts large amount of data from website

by providing Data Scraping and Data Analysis service. It also provides Chat Assistant (Chat-bot) services for Business Pages Robotic Process Automation.

Chapter 2: Literature Review

2.1 Background

The literature review of the report is based on the ideas, theories and methodologies used to make the application. On this literature review, different aspects of the application such as the market analysis both for local and global markets, similarities and new functionalities included in this application will be thoroughly discussed. The report will also discuss relevant published journals, newspaper articles and research papers in this section.

The purpose of literature review is to identify need for additional research (justifying your research) Identify the relationship of works in context of its contribution to the topic and to other works. Place your own research within the context of existing literature making a case for why further study is needed. The main goal of this segment of the report is to show how the application is similar to global brands around the world and what new features has been added in the application to achieve the primary goals discussed above

2.2 Relationship with Undergraduate Studies

Throughout the undergraduate studies, from 'Hello World' to solving complex mathematical equations, were the basics of understanding how the real world applications work in general. To have the opportunity to do that and find the relevance of the project with some of the courses that are taught throughout the 4 year undergraduate course in IUB was simply exemplary. Since the project is a web based applications courses such as the CSE 203- Data Structure, CSE 211- Algorithm were the building blocks of understanding how a project data can be handled. From CSE 303 – Database Management help me to design the database. The tools learnt from courses such as CSE 309- Web Application and Internet and CSE 213- Object Oriented Programming helped me to build and code the entire project. From CSE -307 System Analysis and Design course I learnt how a project can be design, project lifecycle and most important how to draw diagram for projects. Finally courses like CSE 451- Software Engineering and CSE 452 – Software Marketing helped my how to handle a project from start to bottom. It should be said most of the courses that has been taught had some sort of contribution to my knowledge in the building part of the project.

2.3 Market Analysis

Employee management system is very popular and useful nowadays because it is a very easy way to manage all employees and also time saving. Both globally and locally there are lots of employee management software. There are two types of software in market one is web application based and another is desktop app based. A few organizations make their own application and maximum organization buy application from others. A survey indicates that considering users of 100%, 75% organization uses employee management system while 25% organization don't use it [1]

Figure 2.1: Organizations using EMS
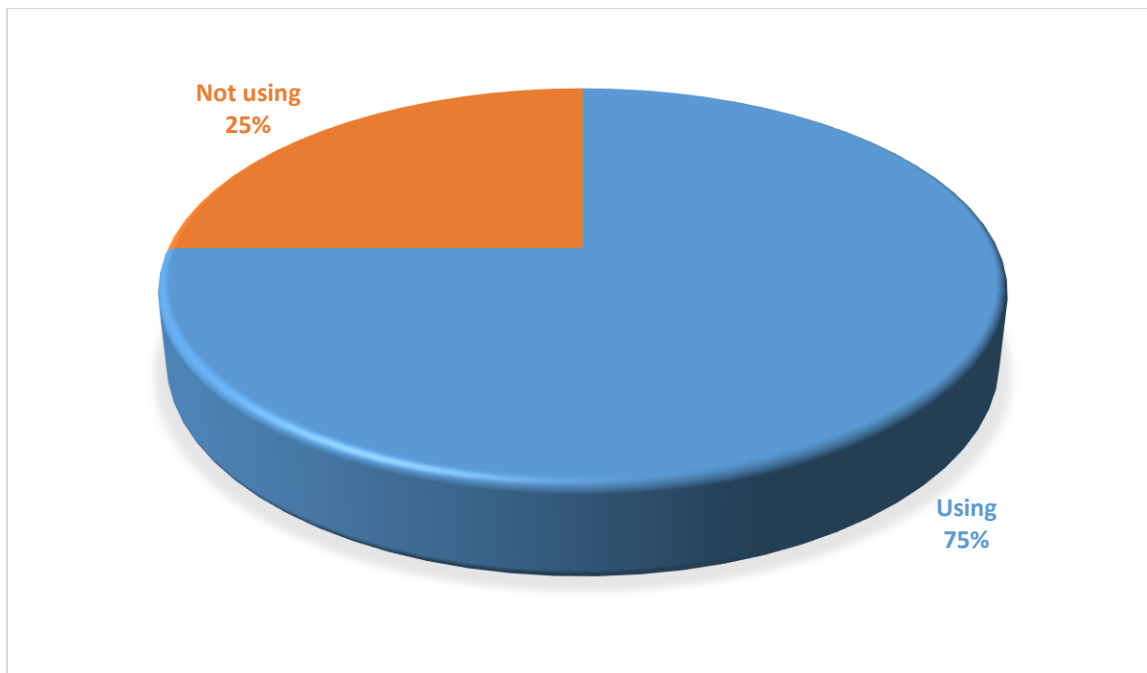
From this survey, it is clearly appeared that a most of the company uses employee management system now a days and it becomes an important essential software for a company.

2.3.1 Global Market

The first world country already using this application. Globally most of the country use this software because it is very easy to use, easy to maintain all employee and also time saving.

Orange HRM

Orange HRM is a powerhouse human resources tool developed by Orange HRM that any small or midsize business can benefit from using. With Orange HRM, you have options: You can download and install the system on your own hardware, or you can purchase a hosted solution. To get prices for the hosted solution, you have to contact them from their Request a Quote page. Orange HRM's features include:

- Company benefits,
- Employee self-service, training, budget, job and salary history
- HR functions like employees leave, performance and more.

The software installation is fairly straight-forward. With a self-extracting Windows installer or full-source installations for Windows, Mac, and Linux, you can get Orange HRM up and running on nearly every platform. If you don't have the hardware or the skills to set up Orange onsite, you can request a quote for a hosted instance of Orange HRM. You can also purchase support plans and customizations. [2]
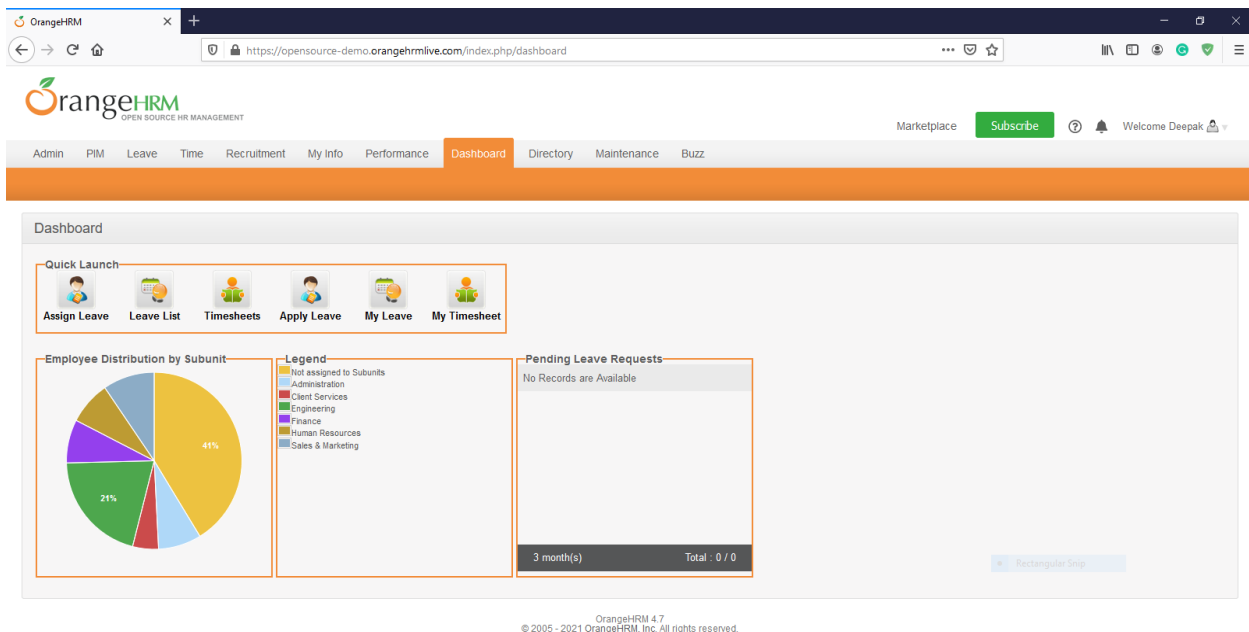
Figure 2.2: Snapshot of Orange HRM interface

Simple HRM

Simple HRM offers an open source version of its professional platform. This version offers time management, and it can be installed on either a WAMP (Windows Apache MySQL PHP) or LAMP (Linux Apache MySQL PHP) server. Once installed, Simple HRM offers every feature you need to solidify your HRM department:

- Employee information,
- Leave management,
- Travel management,
- Expense management,
- Benefit management
- Task reporting.

Simple HRM allows you to assign a CV to an employee and define eligibility for rehire. Each major module offers plenty of granular control, and the user interface is well laid out. [3]
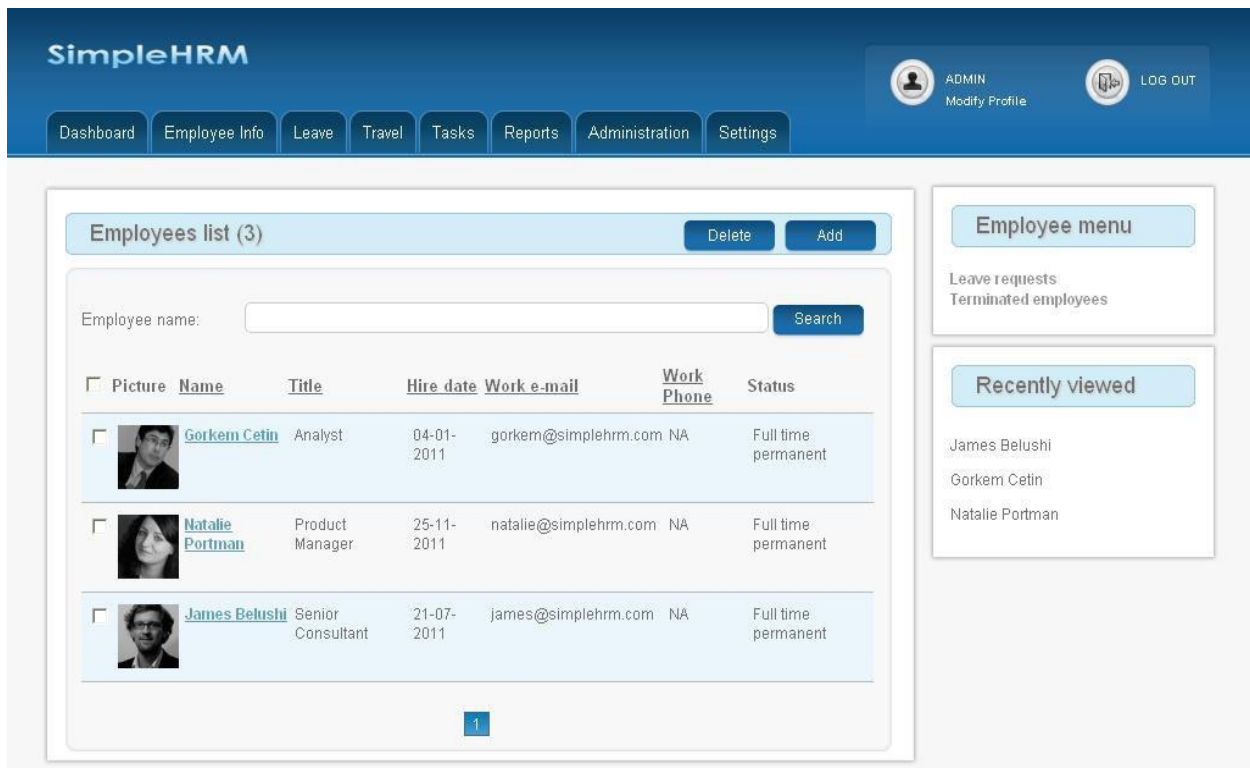
Figure 2.3: Snapshot of Simple HRM interface

Waypoint HRM

Waypoint HR is the HR software for any small or midsize company looking for a platform that nearly any user, of any experience level, can use. Waypoint HR can manage employee data, which include:

- Personal details

- Holiday/sickness/absence history

- Employment/contract/job/salary details

- Discipline and grievance records

- Performance appraisals

- Exit interviews and termination

- A five-step add employee wizard

- Export reports to PDF

- Multi-site facility layering

Waypoint HR also offers an active online support forum, a dedicated support website (which includes developer support), as well as an on-demand solution (for those that do not want to bother with the installation of Waypoint HR on a local machine). To get a quote for the on demand solution, visit this page, fill out the questionnaire, and wait to hear from Waypoint HR. [4]

Figure 2.4: Snapshot of Waypoint HR interface

2.3.2 Local market

Human Resource Management is the process of managing and monitoring the employees in an organization with a proper system. The worldwide HR management system incorporates several processes like recruitment, monitoring, storing data, payrolls, administration, and attendance data and so on. This worldwide system is applicable to Bangladesh too, so the practice of the HR Management System in Bangladesh is similar hereafter so many years of liberation war recently for several years, Bangladesh has seen an upward and positive trend to human resour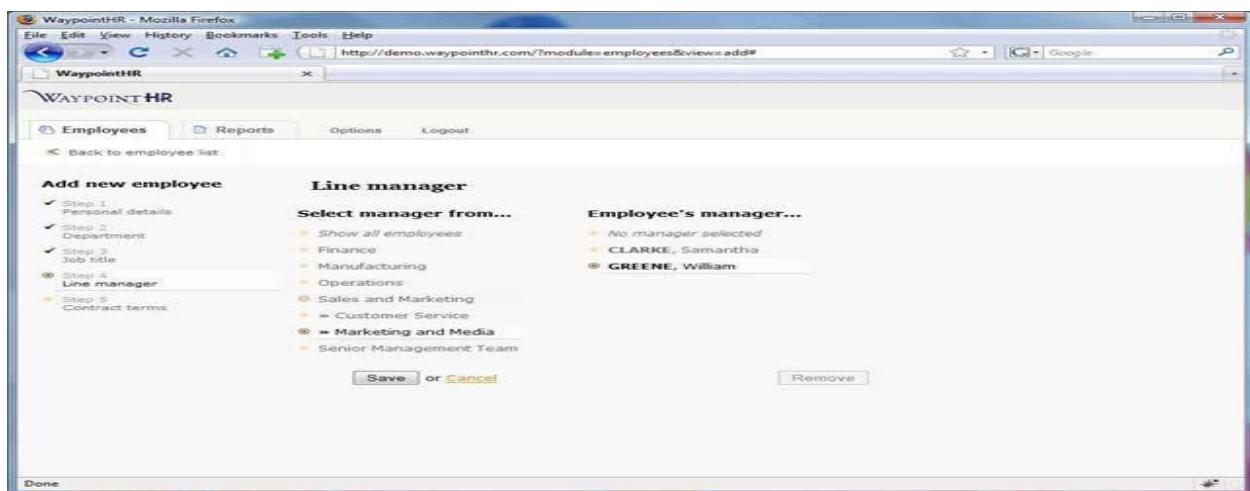ce management. The reasons behind that are the economic warm-up and better education. Most of the organization has established a separate department for human resource management. [5]

Lines Pay HRM

This Best HR and Payroll software service in BD is the professional platform for small-medium and enterprise businesses. Their focus is to serve a modern and updated payroll management system that is focused on user experience and simplifying complex workflows.

They used to offer some updated services like:

- Their software can run independently on any platform
- All the information about the employee data records smoothly in one central palace.
- Many business companies maintain several sections to management HRM data, but they provide an all-in-one solution. It saves time.

Including the above points, their software provides other common services like salary report, loan report, deduction, allowance and other things in an easier way. [6]
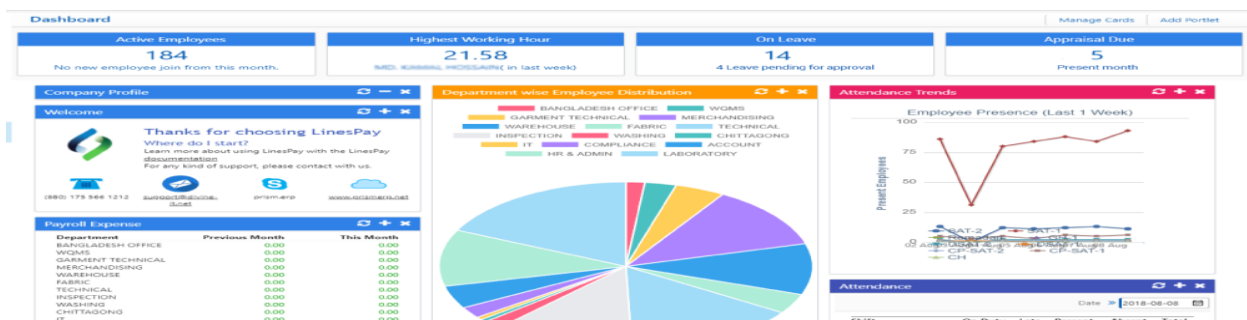

Figure 2.5: Snapshot of Lines Pay HR interface

Jibika HRM

Jibika HRM is developed by jibika plexus which is one of the best HR and Payroll management software services in Bangladesh. They provide a smart management solution for the HR and Payroll software field. Jibika Plexus has some amazing features that are very helpful for the management of a company. They are given below:

- No need to print record documents because jibika is available on your mobile, PC, Laptop and Desktop. It's play a crucial role in reducing the use of paper up to 75%

- It offers a reliable and flexible face detection attendance system.

- It has a multi-layer for leave, evaluation, confirmation and so on.

- Through email and popup alerts, jibika plexus sends notification about pending works

- It offers unlimited adding facilities. Even the end person can add or modify the report.

- Administrators can centrally control all the necessary calculating without the help of a software maker company. [7]

Roopokar HRM

Roopokar is another good HR and Payroll software in Bangladesh. They have developed some good features for HR and Payroll services. Their services are Employee portal, announcement section, leave schedule handling, office shift handling, holiday module, corporate scorebook, all report charts, security and so on. Except that they have some additional features that are pretty good. They are:

- To make it more accessible and user-friendly, they have input the Bangla language in their software. This is a big comfort in a country like Bangladesh.

- They have considered different levels of users. Their app is so easy to use that even an illiterate person will be able to use it.

- They have offline and online working facilities.

- After the handover, to the company, this software doesn't take more time to implement.

- It has the fastest data connection and data backup system. So you never feel upset if you lose some data from the store. [8]

2.4 Related Journal Analysis

- **"International Research Journal of Engineering and Technology (IRJET)"**
  E-ISSN: 23950056 P-ISSN: 2395-0072 volume: 06 issue: 05 | MAY 2019
  WWW.IRJET.NET

In this article the writer explains what employee management software is and how important it is nowadays. Writer also give a brief description about how to design this software, which features should be implement, what problem may occurs and how an employee management software can be run in an organization.

- **"Challenges of Implementing an Employee Management System for Improving Workplace Management Effectiveness"**
  Prety Diawati, Vip Paramarta, Djoko Pitoyo, Tomy Fitrio, Sri Wiyati Mahrani Published: 20/12/2019

In this article there is a brief discussion about major challenges in managing employees if there is not employee management software. Some major problems are lack of alignment, managing poor performance leadership and management commitment. Here also discuss about how to improve workplace management by using ems software and optimized streamlined administrative tasks and workload.

- **"Human resource management systems and firm performance"**
  Karen L. Ferguson, Thomas G. Reio Jr Journal of Management Development ISSN: 0262-1711 Published: 25/05/2010

In this journal author did a study to test a model where human resource inputs (motivation, employee skill) and human resource processes/practices (training and development; profit sharing) are hypothesized to contribute uniquely and positively to organizational outputs, job performance and firm performance.

Chapter 3: Project Management and Financing

To start a project, every company has to create a timeframe through which every aspect of the project has to be determined, planned and execute according to this plan or schedule. This works as a guideline for the company to track the progress of the project and to make sure the smaller goals and deadlines have been met. A guideline with diagrams is shown in the next figures mainly through the Work Breakdown Structure, Gantt chart and Database design.

3.1 Work Breakdown Structure (WBS)

A work-breakdown structure in project management and systems engineering, is a deliverable oriented breakdown of a project into smaller components. Our works were divided into categories and each categories have a sub category as shown below in the diagram. Starting from the beginning of the project to the deployment segment. Having this Diagram gives the operators a basic idea of how the project is going to be and what comes after which. So they do not lose track in work.
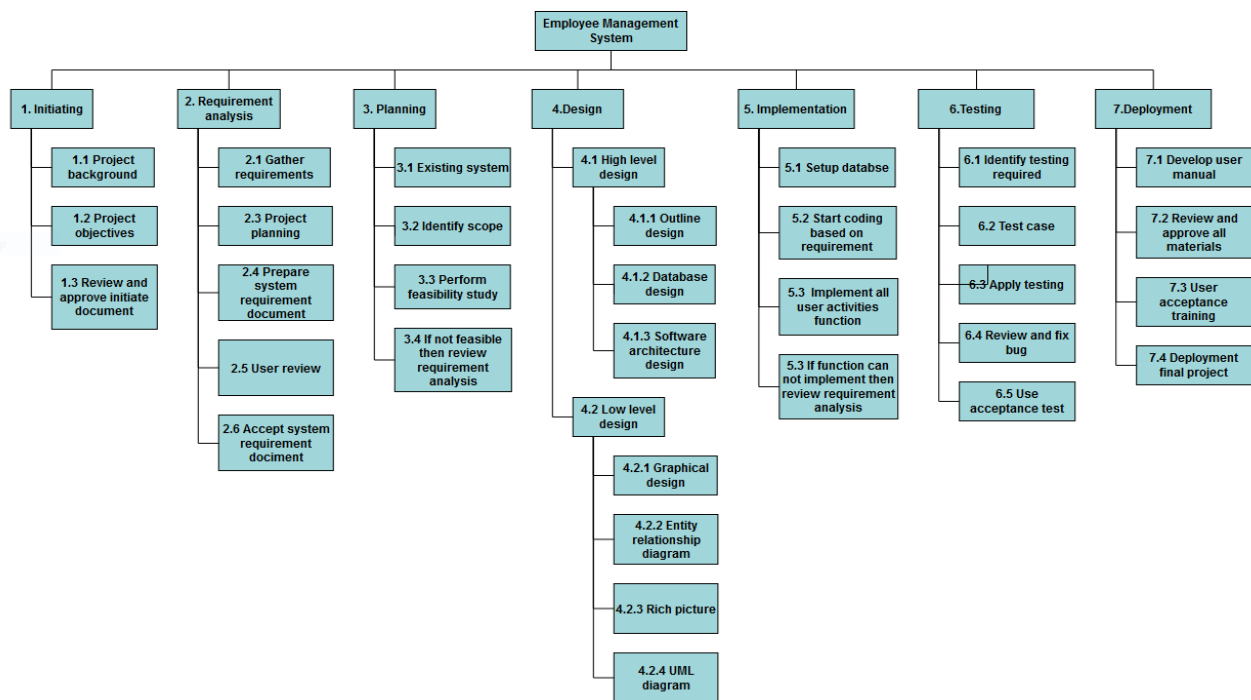
Figure 3.1 Work Breakdown Structure

3.2 Process/Activity wise Time Distribution

The time distribution defines the estimated time required to end the project successfully, the timeline designed below in a critical path method. The critical path is the longest sequence of activities in a project plan which must be completed on time for the project to complete on due date. An activity on the critical path cannot be started until its predecessor activity is complete; if it is delayed for a day, the entire project will be delayed for a day unless the activity following the delayed activity is completed a day earlier.
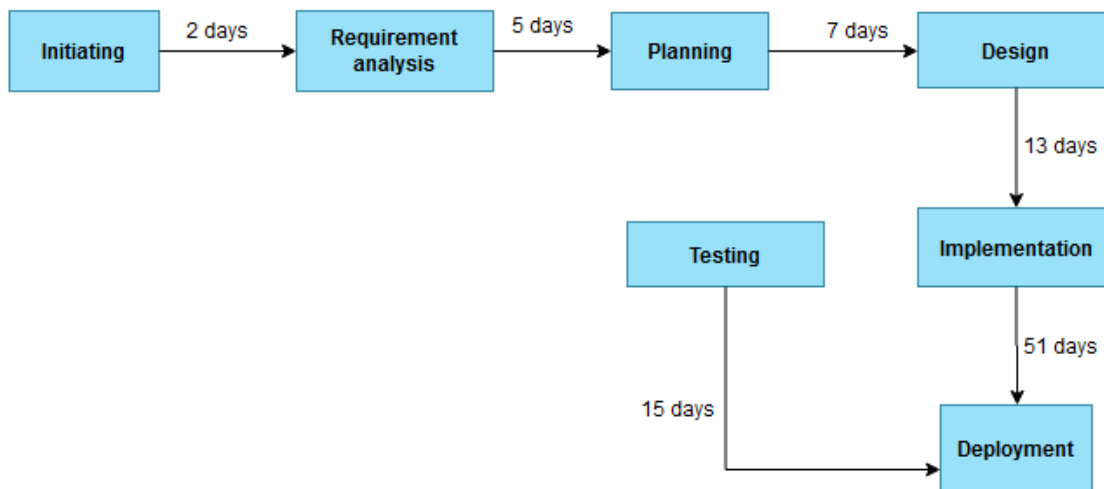
Figure: 3.2 Critical Path

3.3 Gantt Chart

We have used the Gantt chart developed by Henry Gantt to display the timeline. Gantt charts are commonly used for tracking project schedules, and they are especially useful in project management. To put it simply, they illustrate and allow us to know what needs to be done, and when it needs to be done. Gantt charts are also able to show us additional information regarding the different tasks or sections of a project, such as how far have tasks progresses, how a group of tasks might depend or other groups of tasks, how important several tasks are, and resources are being used within a project.

Task	14-Feb-21	16-Feb-21	17-Feb-21	23-Feb-21	24-Feb-21	02-Mar-21	03-Mar-21	15-Mar-21	17-Mar-21	08-Apr-21	22-Apr-21	05-May-21
Initializing												
Requirement Analysis												
Planing												
Design												
Implementation												
Testing												
Deployment												
Legend												
	Complete											
	Needs To Be Complete											
	On Track											
	Beyond The Schedule											

Figure: 3.3 Gant Chart

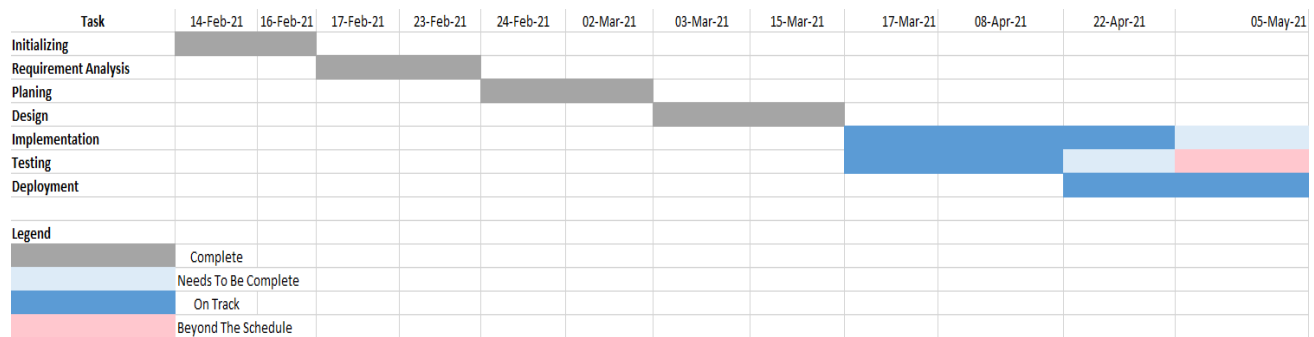## 3.4 Resource Allocation

For this project, the developers are considered as the primary resource followed by the computers used in the office, the servers (VPS) required for the deployment of the project. Every employee of the company is considered a resource, hence everyone has assigned a particular assignment with certain deadlines, all of which collaborated to the entire production of the project. Following are the details of every step of the project

Initializing: This is the first period of the project, where the idea of the project was presented by the CEO of the company. Since this was an in-house product, no delay was made and the paperwork for the project was started.

Requirement Analysis: During the first few weeks the CEO and the developers discussed the entire requirements for the completion of the project. For example, Computer specifications, software/tech to be used to build the application, features and developers required.

Planning: In this section of the development process, the developers and the CEO engaged in hours of discussion of how this project should be built from top to bottom, the approaches to be taken, creating smaller goals and setting deadlines for them.

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Design: In this phase few graphic designers were worked for designing the web pages of the application as well as the management team started working on the high level and low level diagrams for the project in order the get the bigger picture on sight.

Implementation: At this stage, the designs for the web pages were complete and the developers started working on writing the code for the front end and backend of the application, while the management team kept regulating whether all the deadlines were maintained.

Testing: Testing started as soon as a feature was added to the site. Hence simultaneously the testing was being carried out by the developers. At the end of the implementation phase unit testing for the application started.

Deployment: After the testing was truly completed, the team realized that it was behind schedule. For deployment, a VPS (Virtual Private Server) and a domain was bought to deploy the application on a live server.

3.5 Estimated Costing

Table 3.1: Cost Estimation table

Requirements	Amount (BDT)
Salary(3 months)	60,000
Computer (2)	100,000
Printer (1)	7,500
Server (1 year)	5000
Internet Bill (3 months)	3600
Subtotal	**176,100**

Chapter 4: Methodology

Successful projects are managed well. To manage a project efficiently, the manager or development team must choose the software development methodology that will work best for the project at hand. All methodologies have different strengths and weaknesses and exist for different reasons. For this project the Bengal development team has used waterfall methodology. Other methodologies includes:

- Agile
- Prototyping
- Iterative and Incremental Development
- Spiral Development
- Rapid Application Development
- Extreme Programming

4.1 Waterfall Methodology

The study mainly focuses on the development of employee management system. To develop the web application we followed Waterfall Methodology. The waterfall model is a sequential design process, often used in software development processes. It takes the fundamental process activities of specification, development, validation, and evolution and represents them as separate process phases such as requirements specification, software design, implementation, testing, and so on. [9]
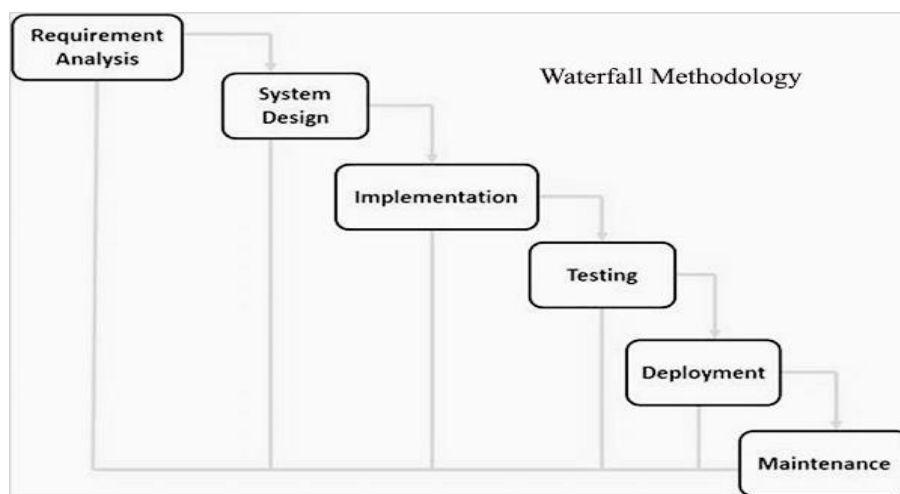

Fig 4.1: Waterfall Methodology Model

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4.2 Why Waterfall for this project?

We choose waterfall methodology for this project because when the project timeline is fixed and cannot be moved, Waterfall will offer a more predictable outcome. It is very simple to understand and use. In a waterfall model, each phase must be completed fully before the next phase can begin. Also waterfall methodology works well for smaller projects where requirements are very well understood, clearly defined stages, well understood milestones and easy to arrange tasks. That's why I use waterfall methodology for this project.

4.3 Waterfall Implementation

At first entire project requirement analyses carefully with the help of CEO. After completing requirement analysis fully then we go for system design. In system design at first we design the UI/UX of the software and design the database. Then we start implementation part where basically we start our coding part. Beside this coding execution we did also testing. Every day after execute each part of software whole team test the functions. Finally when full project is ready with all of requirements we did a final test. After testing we launch the software for our use. And beside this we maintain this software.

Chapter 5: Body of the Project

5.1 Work Description

As a main member of the development for the project, I had contributed to both the front end and the backend of the application. The front end built with the HTML 5, CSS 3, and BOOTSTRAP 4, JQuery framework of JavaScript language and for the backend using the PHP. Every day a target of the tasks to be completed throughout the day would have been appointed to me, and at the end of the work day those targets needed to be fulfilled and explained properly.

5.2 Client Requirement Analysis

5.2.1 Introduction

From the initiation of any project, it is very important to know who the client is for the application, its users, admins and the management operating the entire system. Since the application is only for in-house uses and suggested by the CEO, the client for the application was the CEO and all of my office colleague. Keeping that in mind, I had to think of ways to make the application as user friendly as possible and also how should the application be in a responsive state. Here all the shareholders, the CEO of the company and other developers engaged in meetings and carried out several methods to achieve a complete understanding of the application that was required to build. The methods include:

- Surveys & Questionnaires
- Group Interviews
- Developing a prototype
- Document Analysis

5.2.2 Survey & Questionnaire

Surveys are useful in describing the characteristics of a large population. No other research method can provide this broad capability, which ensures a more accurate sample to gather targeted results in which to draw conclusions and make important decisions [10]. In this case, the survey was conducted between my office employee and I also conduct with some others office employee to

truly understand the demand, functionalities and feasibility of the application to be built. The questionnaires are attached to Appendix- A.

5.2.3 Group Interviews

As an in-house product, the client interviews conducted were limited to the head of the company and the development team. To get a greater sense and to get the bigger picture of the application the interview question were conducted in two different methods.

- **Close ended questions**: These are question types that ask respondents to choose from a distinct set of pre-defined responses, such as "yes/no" or among set multiple choice questions. In a typical scenario, closed-ended questions are used to gather quantitative data from respondents.

- **Open ended questions**: These are question types that allow respondents to answer in open text format so that they can answer based on their complete knowledge, feeling, and understanding. It means that the response to this question is not limited to a set of options. In a typical scenario, open-ended questions are used to gather qualitative data from respondents.

5.2.4 Conclusion from research and Analysis

From the surveys and interviews conducted, it is quite clear that the demand for employee management system is really necessary. The according to the survey it is seen that the system will be very helpful for admin and employee. On the other hand, from the interviews that company can easily manage employee by this project. Down below are detailed descriptions for the system. All the roles and their work summary is listed down:

Admin:
- View all employee data.
- Has full support and conduct any CRUD operation.
- Register a new employee.

- Assign new task to employee

- Edit employee details.

Employee:

- View own information.

- Can change self-data.

- Smooth communication with admin through system.

- Apply leave.

5.3 System Analysis

5.3.1 Six Element Analysis

Table: 5.1 six element analysis table

Process	Human	Hardware (Computing)	Software	Database	Network
Login/ Register	Enter email & password	Keyboard, mouse, computer	Web browser	Stores register data and retrieves login data	Internet
Delete employee	Select employee	Keyboard, mouse, computer	Web browser	Delete employee from database	Internet
Update employee	Select employee and enter details	Keyboard, mouse, computer	Web browser	Update details	Internet

| Assign task | Enter task details | Keyboard, mouse, computer | Web browser | Stores task details | Internet |
| Apply Leave | Enter leave details | Keyboard, mouse, computer | Web browser | Store leave details | Internet |

5.3.2 Feasibility Analysis

Preliminary investigation examine project feasibility, the likelihood the system will be useful to the organization. The main objective of the feasibility study is to test the Technical, Operational and Economical feasibility for adding new modules and debugging old running system. All system is feasible if they are unlimited resources and infinite time. There are aspects in the feasibility study portion of the preliminary investigation:

- Technical Feasibility
- Operational Feasibility
- Economical Feasibility

Technical Feasibility

The technical issue usually raised during the feasibility stage of the investigation includes the following:

- Does the necessary technology exist to do what is suggested?
- Do the proposed equipment's have the technical capacity to hold the data required to use the new system?
- Can the system be upgraded if developed?
- Are there technical guarantees of accuracy, reliability, ease of access and data security?

Earlier no system existed to cater to the needs of 'Secure Infrastructure

Implementation System'. The current system developed is technically feasible. It is a web based user interface. Thus it provides an easy access to the users. The database's purpose is to create, establish and maintain a workflow among various entities in order to facilitate all concerned users in their various capacities or roles. Permission to the users would be granted based on the roles specified. Therefore, it provides the technical guarantee of accuracy, reliability and security. The work for the project is done with the current equipment and existing software technology. Necessary bandwidth exists for providing a fast feedback to the users irrespective of the number of users using the system.

Operational Feasibility

Proposed projects are beneficial only if they can be turned out into information system. That will meet the organization's operating requirements. Operational feasibility aspects of the project are to be taken as an important part of the project implementation. Some of the important issues raised are to test the operational feasibility of a project includes the following: -

- Is there sufficient support for the management from the users?
- Will the system be used and work properly if it is being developed and implemented?
- Will there be any resistance from the user that will undermine the possible application benefits?

This system is targeted to be in accordance with the above-mentioned issues. Beforehand, the management issues and user requirements have been taken into consideration. So there is no question of resistance from the users that can undermine the possible application benefits. The well-planned design would ensure the optimal utilization of the computer resources and would help in the improvement of performance status.

Economical Feasibility

A system can be developed technically and that will be used if installed must still be a good investment for the organization. In the economical feasibility, the development cost in creating the system is evaluated against the ultimate benefit derived from the new systems. Financial benefits

must equal or exceed the costs. The system is economically feasible. It does not require any addition hardware or software. There is nominal expenditure and economical feasibility for certain.

5.3.3 Effects and Constraints Analysis

A constraint is a restriction on the degree of freedom a company can have in providing a solution. Constraints are effectively global requirements, such as limited development resources or a decision by senior management that restricts the way the development team develop a system. Constraints can be economic, political, technical, or environmental and pertain to project resources, schedule, target environment, or to the system itself. Some of the constraints and its effects are described below:

Constraint 1: Budget

Effect: This constraint has critical effect on how many employees for the project are hired and for how long the project can continue to be developed before reaching a conclusion to deadline.

Constraint 2: Time

Effect: Both the budget and time constraint are interrelated to each other. Time strictly depends of the budget of the company for the particular project. If the time increase automatically budget increase with time.

Constraint 3: Scope

Effect: Scope defines whether the requirements set for the project are met. During the development phase the developer's needs to keep a close eye on the requirements of the project, if a deadline is too near the scope of the project can be stretched and delivered on a later date. This restricts the development team and has to undergo regular discussions, reviews and meetings to make sure the quality is up to the mark.

5.3.4 Proposed System

The proposed system is designed to eliminate all the drawbacks of the existing manual system. The system shall be responsible for maintaining information about employees, thus their personal profile. The system shall incorporate leave management all the way from application to

acceptance/rejection of leave requests as well as all employee projects with close monitoring of the projects from creation to completion.

The main features to be added include:

- Admin control
- Leave management
- Task management
- Employee profile

5.4 System Designs

5.4.1 Rich Picture

A rich picture is a drawing of a situation that illustrates the main elements and relationships that need to be considered in trying to intervene in order to create some improvement. It consists of pictures, text, symbols and icons, which are all used to illustrate graphically the situation. [11]

In the following rich picture show the activities of admin, employee. Admin and employee both have to login first before use the system. Admin have all power of create new employee, delete and update an employee, assign new task to employee. Employee can view their task and reply also/Employee can also apply for leave. All these information is saved in database. After saving information in database all information pass to users.
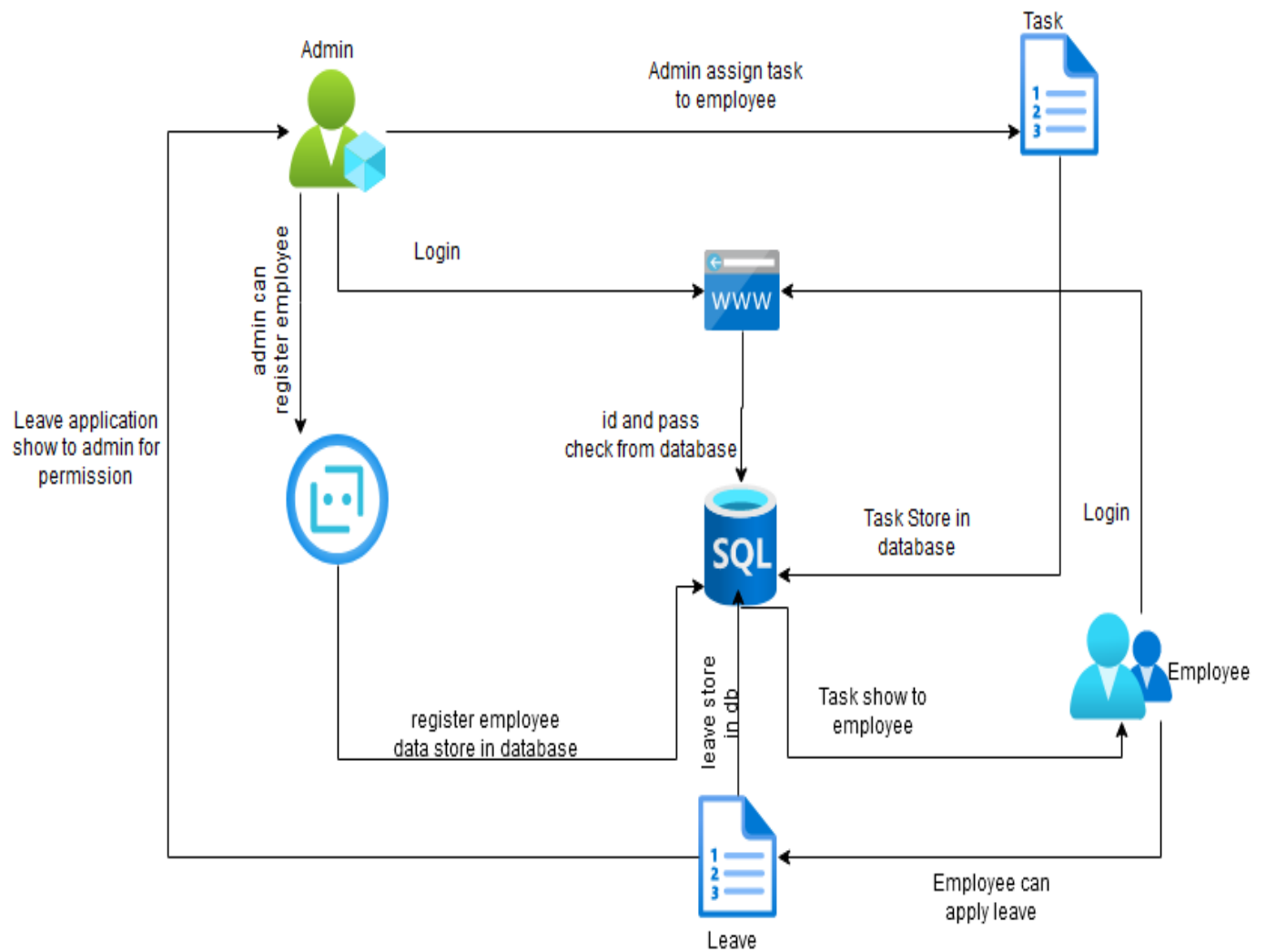
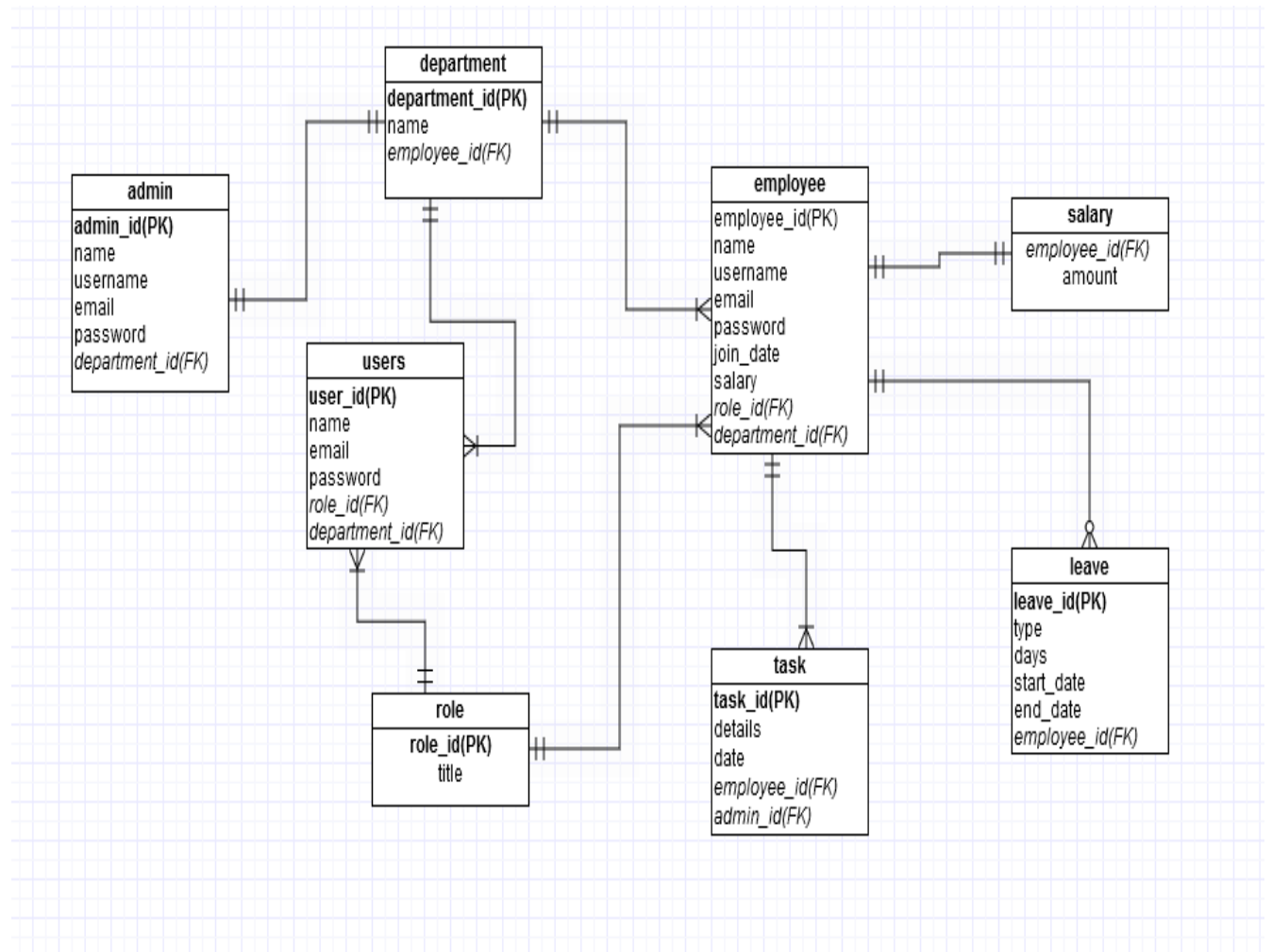Figure5.1: Rich Picture

5.4.2 Entity Relationship Diagram

Figure 5.2: ERD diagram

5.4.3 UML Diagrams

A UML diagram is a diagram based on the UML (Unified Modeling Language) with the purpose of visually representing a system along with its main actors, roles, actions, artifacts or classes, in order to better understand, alter, maintain, or document information about the system.[12]

UML specification is used to specify the requirements of any system. In this paper, we will focus on 4 diagrams which is activity diagram, use-case diagram, sequence diagram and class diagram for specifying the requirements of Employee management System.
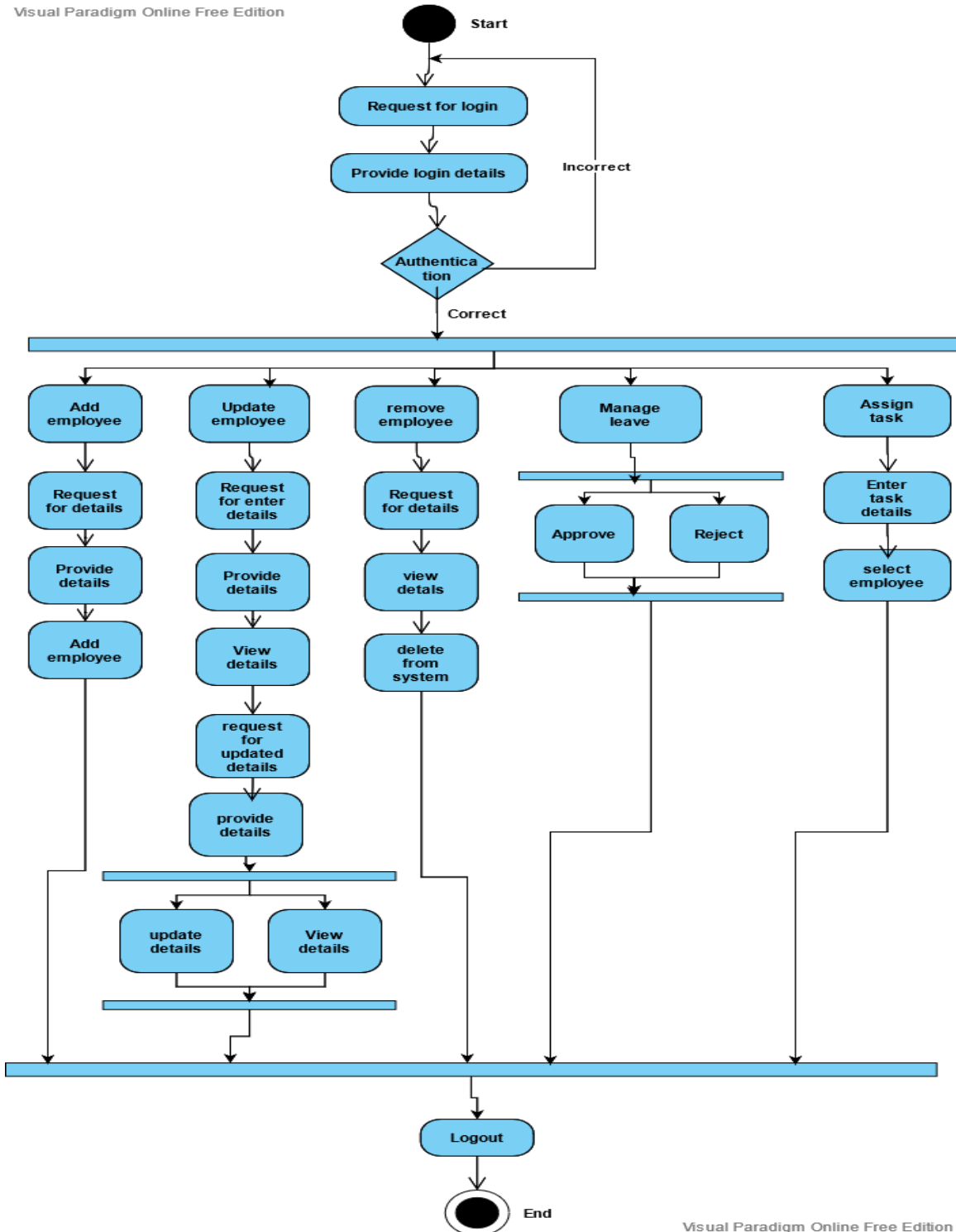
Activity diagram for admin

Figure 5.3: Activity diagram for admin
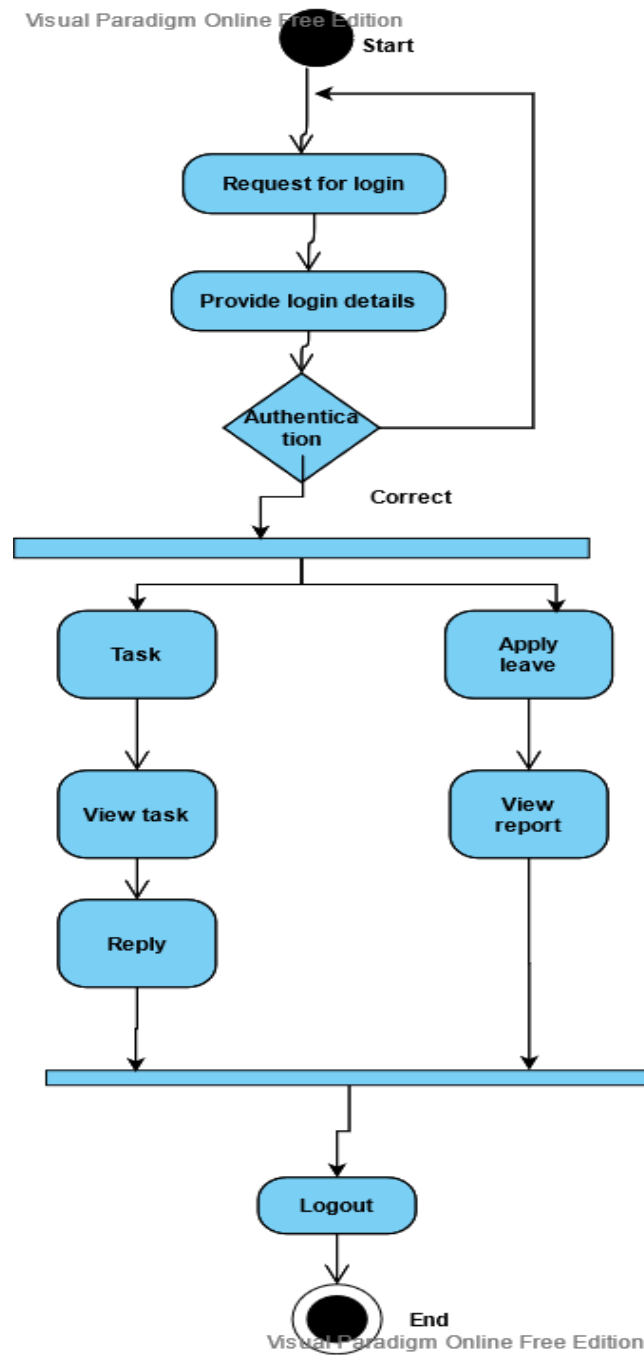
Activity diagram for employee:

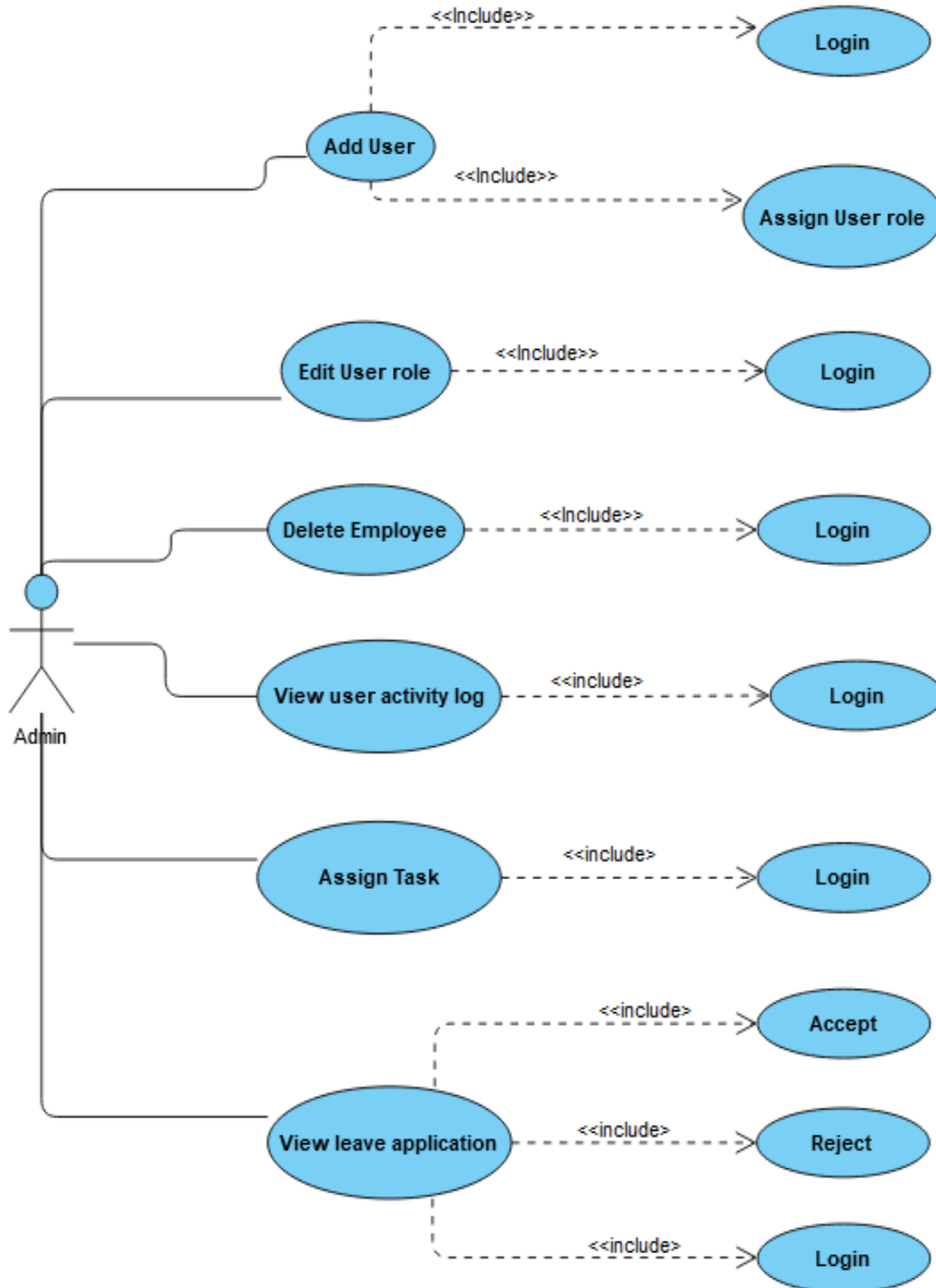Figure 5.4: Employee activity diagram

Use case diagram for admin:

Figure 5.5: Use case diagram for admin
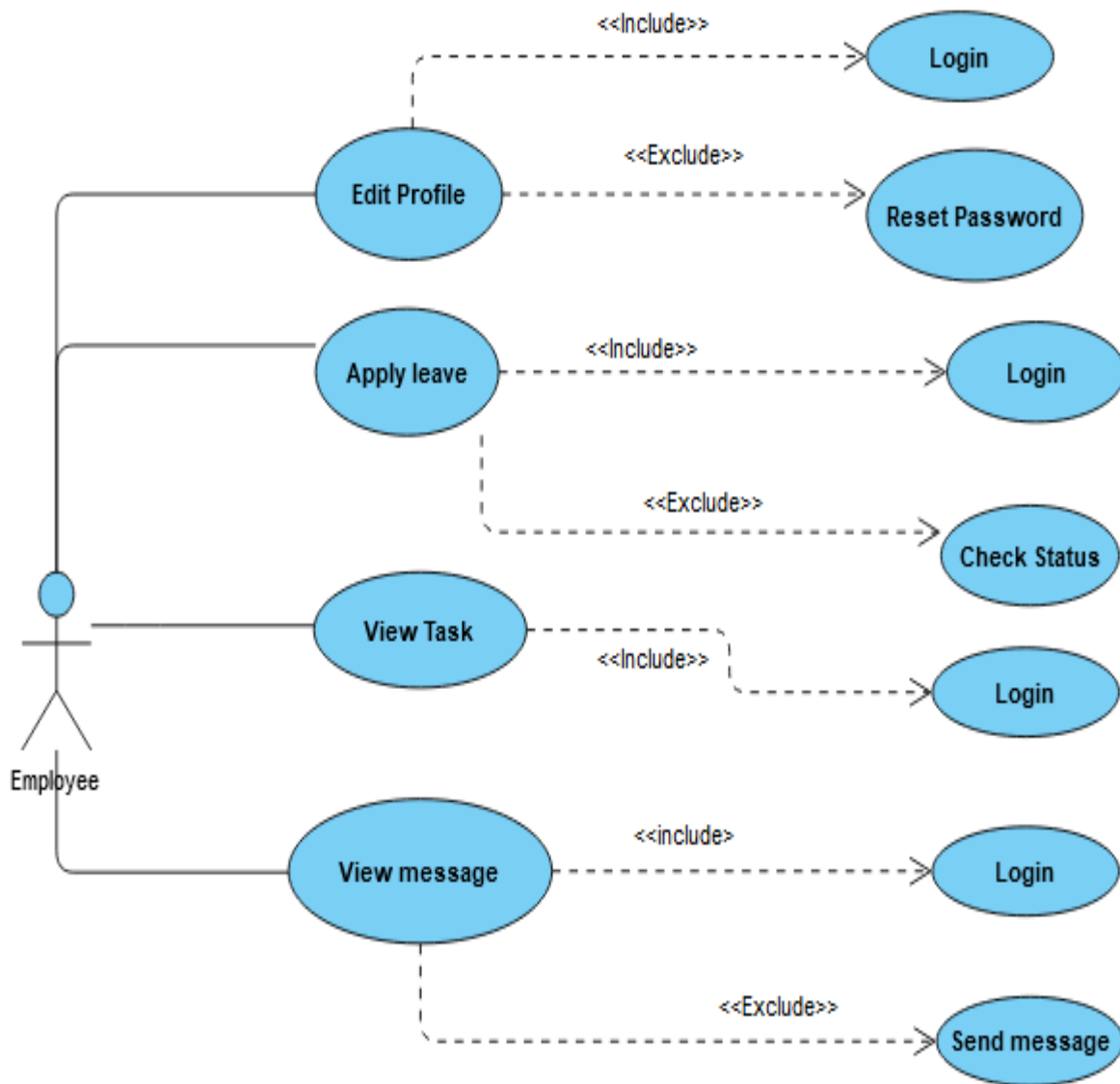
Use case diagram for employee:

Figure 5.6: Use case diagram for employee

Sequence diagram for add new employee:

1. The user logs in by providing correct username and password.

2. If username and password are not found on the database access into the system is denied.

3. If the credentials are identical to the ones found on the database, access is granted.

4. User enters the details of the new employee.

5. The user input is written to the database.
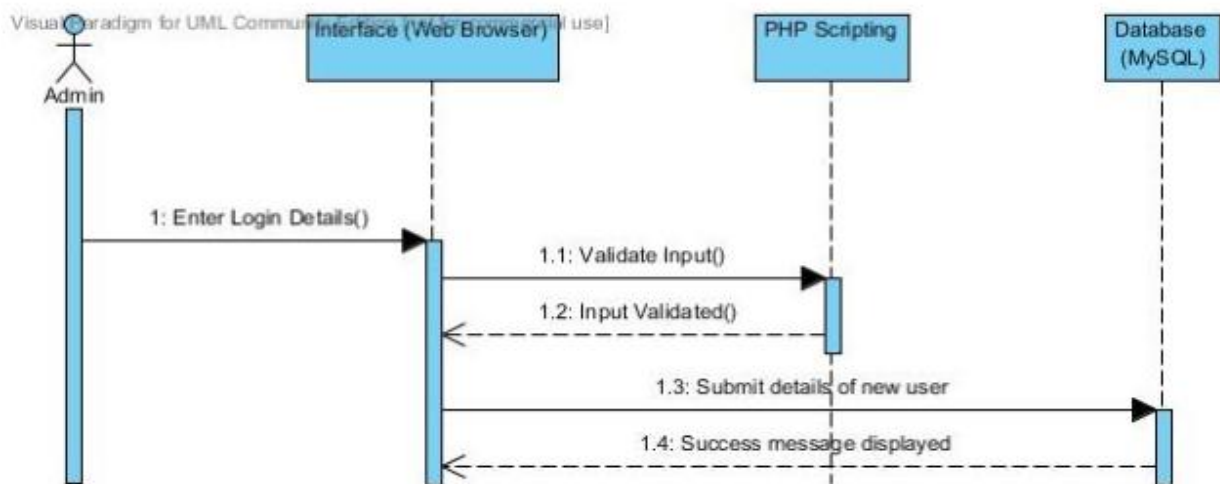
Figure 5.7: Sequence diagram for add new employee

Sequence diagram for create projects

1. The user logs in by providing correct username and password.

2. If username and password are not found on the database access into the system is denied

3. If the credentials are identical to the ones found on the database, access is granted.

4. The admin creates a project and assigns members.

5. The user input is written to the database.
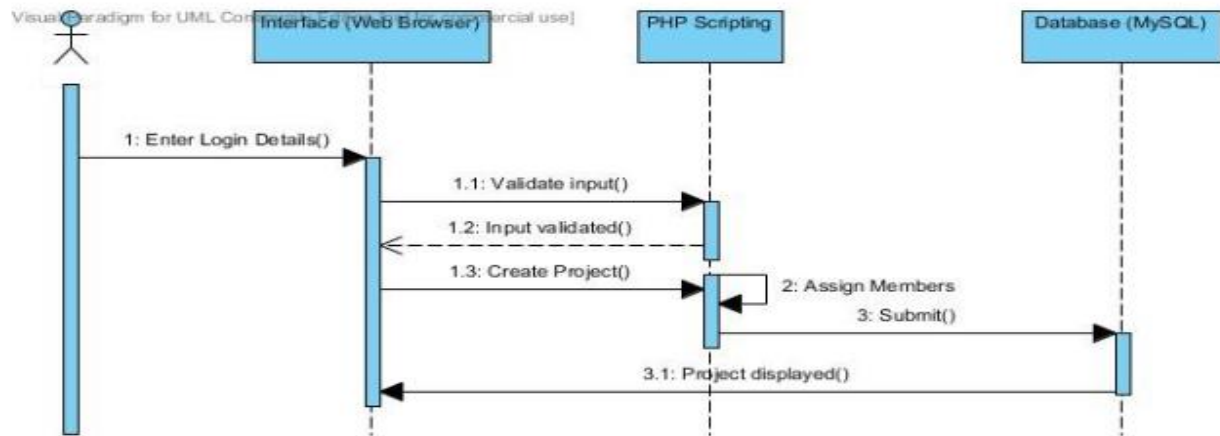
Figure 5.8: Sequence diagram for create project.

Sequence diagram for employee leaves application

1. The user logs in by providing correct username and password.

2. If the username and password are not found in the database access into the system is denied.

3. If the credentials are identical to the ones found on the database, access is granted.

4. User requests for leave form.

5. User enters leave details.

6. Details are written to the database.

7. A message confirming details have been submitted is displayed to the user.

Figure 5.9: Sequence diagram for employee leave application

Class Diagram:

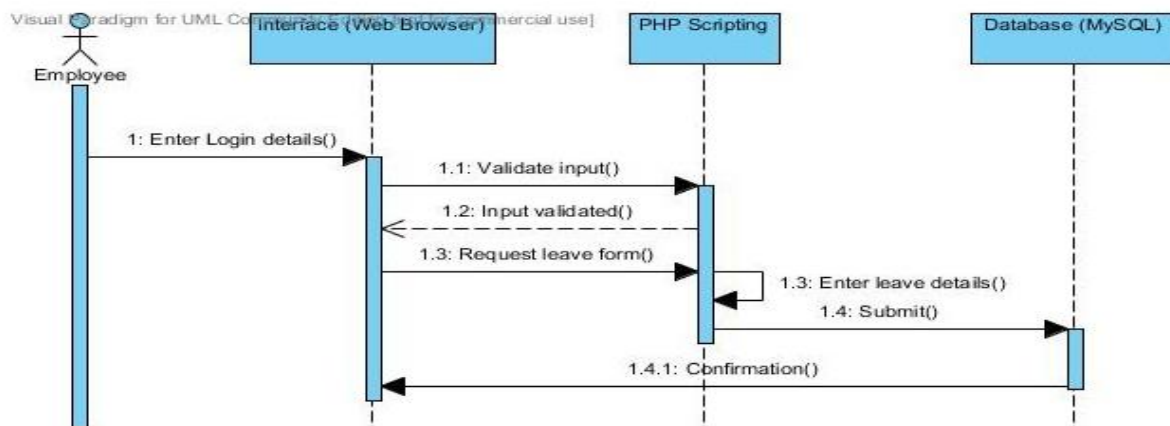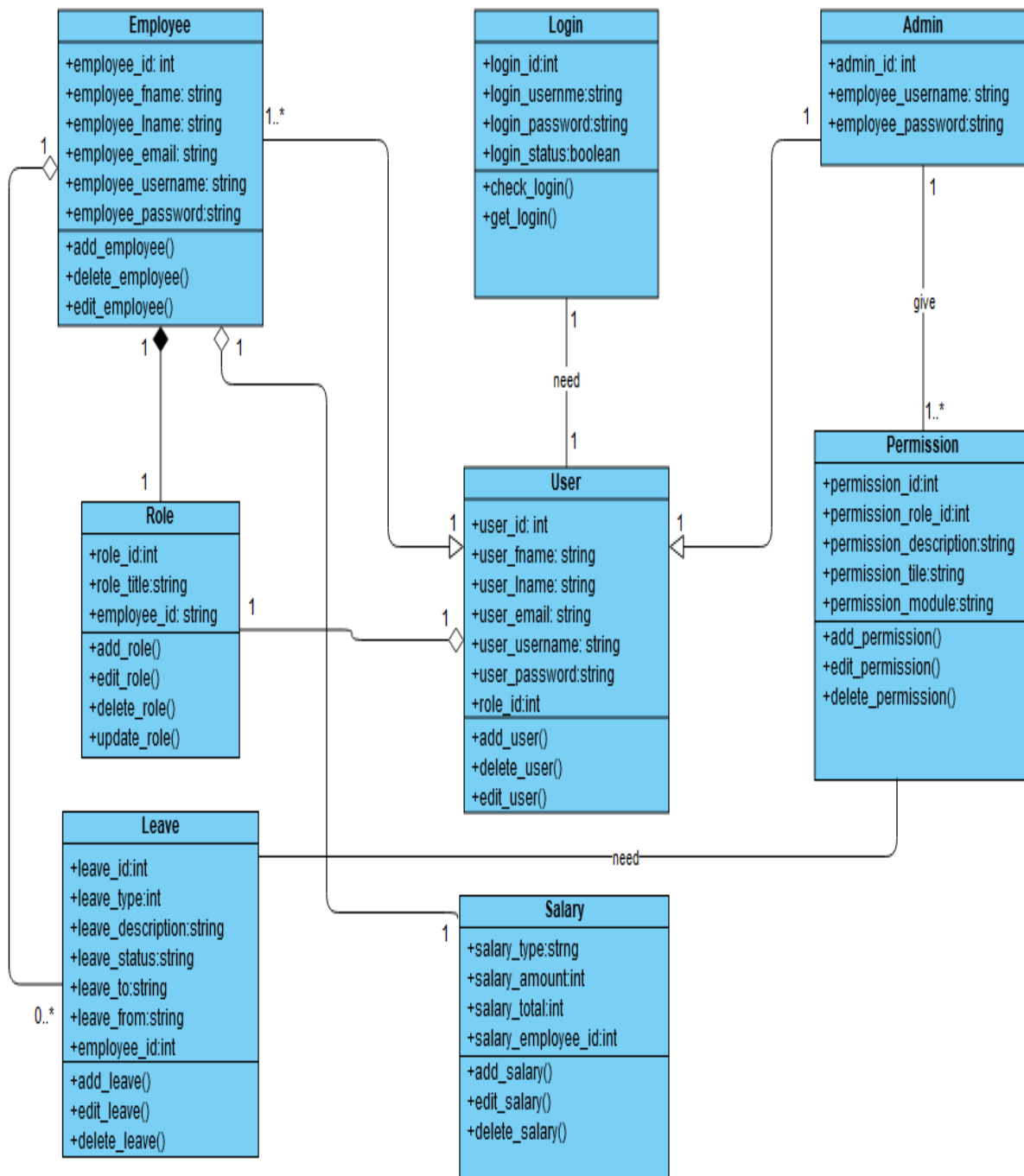Figure 5.10: Class diagram

5.4.4 Interface Design

Consistent- The website should have a similar look and feel on every page. Every page should have the same header/logo, heading style, fonts etc.

Efficient and easy to maintain- This refers to the fact that there is need to separate content from layout, so that you can easily change your page design without editing every page on the site.

Layout-The layout of each page should have a good contrast between the text and background area. This helps considerably with visibility as it will be difficult to read the text if it is almost the same color as the background. Monitor size should also be taken into consideration.

Easy to navigate and use- Users should not have a hard time trying to navigate the site. Navigation links should be consistent and clearly labelled. All navigation links should also be working properly and should point to the intended page/site.

Browser compatible- When designing the site consider different browser environments. Extensive testing should be done on each page in all the major browsers and the design changed appropriately to cater for all.

Visually appealing- The use of color, text, fonts and graphics should be carefully considered and used to ensure that the site is visually appealing to its visitors.

5.4.5 Functional and Non Functional Requirements

Functional requirements

The functional requirement is that it essentially specifies something a system should do**.** The Functional Requirements are the operations and activities that a system must be able to perform.

Authentication

- Login- The user can login to the system with his/her username and password.
- Logout- The user can log out from the system.
- Login failure- If the user does not exist in the database or the user has not yet being authorized by the admin.

Authorization

- User role check- After logging in, the user role will be checked from the database and the user interface will be displayed according to their role.

Process Data

- Display- User with defined roles can display the content of the database. Being more specific, employee can only view his/her personal information. Admin can not only see his/her personal information but also employee's information.
- Edit- Admin can edit all information related to all employees' including their user role type.

Leave/Approval Application

- Leave application- The user can be able to fill in leave application form in the appropriate fields.
- Leave approval- The admin can be able to approve leave applications based on the reasons stated, length of leave.
- Leave days accrued- The user shall be able to check the number of leave days accrued.

Non Functional requirements

- Non-functional requirements are often called "quality attributes" of a system. A non-functional requirement is a requirement that specifies criteria that can be used to judge the operation of a system. Here, according to this website Non Functional Requirements are discussed below.

Performance requirements

There is no restriction on the number of the users to be added to the database.

Hardware requirements

EMS should be able to work on a computer with the following minimum hardware specifications:

OS: Windows XP/Vista/7/8/10

CPU: Pentium III (700MHz) and above

Memory: 512 MB and above

Capacity: 4GB of hard drive

Others: Network interface card, mouse, keyboard, and monitor.

Software requirements

Since EMS application is a web-based application, internet connection must be established.
The EMS software personal database model will support MySQL environment as DBMS.

5.4.6 Prototype

Before a full application can be developed, a prototype of the application is developed. The prototype goes under rigorous testing, design tests and UI checked by the client. The data and information obtained from the surveys and interviews were used to develop the prototype. On approval from the client, using this prototypes software developers can then begin to actually work on the whole application. Since a waterfall methodology was being followed, any design or UI changes can be adjusted accordingly.

5.5 Product Features

Login/registration: Like any other web application that contains user systems, login and registration is the most common features of any application. Admin can register a new employee and both admin and employee can login with correct password.

Update information: Admin can change employee's information. Can update their role and department also.

Assign Task: Admin can assign task to a specific employee. Both can chat on that assign task. Automatically task date will be crated from database and show to employee.

Leave: Admin can assign medical leave, casual leave, earning leave to employee. Employee can apply leave from appropriate fields. Admin can accept or reject that leave.

5.5.1 Input

The following table shows the process and the fields required for the inputs of the corresponding process.

5.2: Input table with their fields

Process	Fields type
Login	Email- string Password- string
Registration	Name - string Email - string Password - string Salary - integer Joining date - string Department – string
Edit profile	Name - string Email - string Password - string Salary - integer Department – string
Assign task	Name- String Task details- string Date - string

Assign leave	Name- string
	Number of leave- string
	Time - string
Apply leave	Name- string
	Number of leave- string
	Time - string

5.5.2 Output

The output of the process listed below

5.3: Output table with their fields

Process	**Output**
Login	On success- Redirect to user dashboard.
	On failure- Show error message at top "Please enter correct id or password" at top.
Registration	On success- Show success message "Registration successfully done" at top.
	On failure- Show error message "Registration not done" at top and under the fields input.
Edit profile	On success- Show success message "Updated data successfully" at top.
	On failure- Show error message "Data not updated "at top.
Assign task	On success- Show success message "Assigned task successfully" at top.
	On failure - Show error message "Task not assigned" at top.
Assign leave	On success- Show success message "Assigned leave successfully" at top.

	On failure - Show error message "Leave no assigned, try again" at top.
Apply leave	On success- Show success message "Applied leave successfully" at top. On failure - Show error message "Leave no applied, try again" at top.

5.5.3 Architecture

For development this application we use LAMP (Linux, Apache, MySQL and PHP) technology. We use LAMP because this is open source, flexible, cheap, efficient and easily managed. Here is

Linux: For maintain Server.

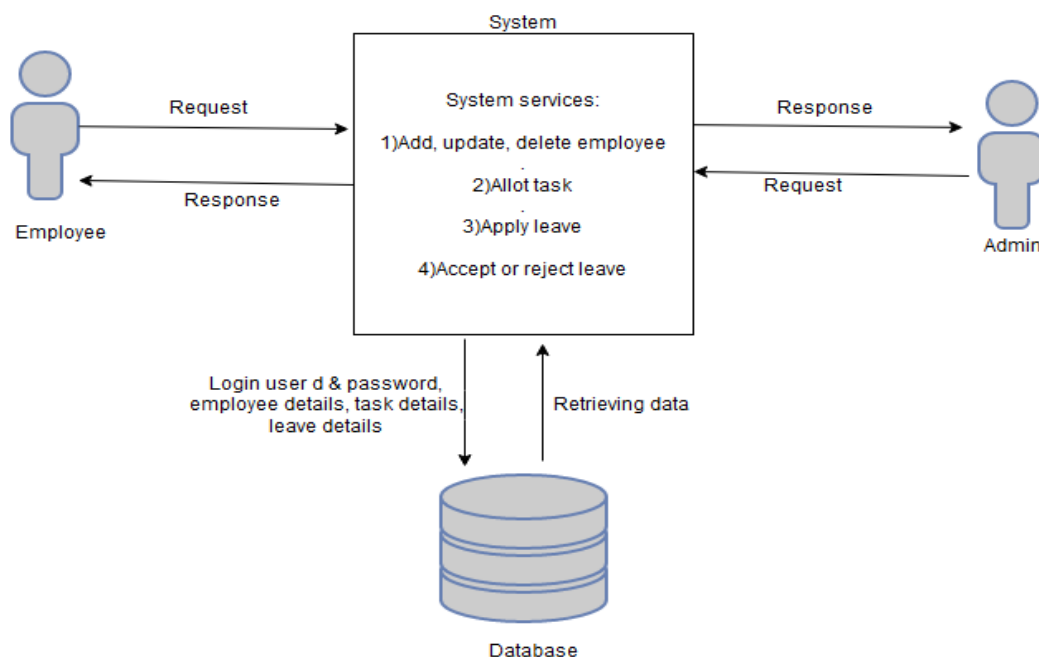**Apache**: Free available web server. It allows MySQL and PHP to run on server.

Figure 5.11: System architecture

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Front-End technology: HTML5, CSS3, Bootstrap4, JavaScript.

HTML5: Hypertext Markup Language (HTML) is the set of markup symbols or codes inserted into a file intended for display on the Internet. The markup tells web browsers how to display a web page's words and images.HTML5 is the latest version of HTML. [13]

CSS3: Cascading Style Sheets (CSS) is a language that is used to illustrate the look, style, and format of a document written in any markup language. In simple words, it is used to style and organize the layout of Web pages. CSS3 is the latest version of an earlier CSS version, CSS2. [14]

BOTSTRAP4: Bootstrap 4 is the newest version of Bootstrap, which is the most popular HTML, CSS, and JavaScript framework for developing responsive, mobile-first websites. [15]

JavaScript: JavaScript is a dynamic computer programming language. It is lightweight and most commonly used as a part of web pages, whose implementations allow client-side script to interact with the user and make dynamic pages. It is an interpreted programming language with object-oriented capabilities [16]

Back-End technology: PHP

PHP: PHP (Hypertext Preprocessor) is an open source server side scripting language, it is platform independent, meaning it can work on all major operating systems. PHP supports many types of databases including MySQL and is supported by a large community of users and developers. PHP is an excellent choice for developing web based systems because it's an open source technology and has a large community of users and developers, this makes PHP a language that is easy to learn and understand, furthermore coding solutions and bugs are resolved quickly. The fact that PHP is platform independent gives the developer the freedom to develop an application without worrying about the operating system on a user's machine. PHP has the ability to integrate with most web technologies thus it can be used as middleware. [17]

Database: MySQL

MySQL: MySQL stands for My Structured Query Language. It is the world's most popular open source relational DBMS. MySQL is available for free under the GNU General Public License for open source benefits/reasons related to development. Initially MySQL was free and some versions of it are still free though if you desire to use MySQL for commercial purposes you will need to purchase a license. It is non-proprietary, easily extensible and platform independent. Its downside is that it lacks a graphical user interface; therefore you need to know how the database works to make the most efficient use of it. [18]

5.6 Testing

5.6.1 Introduction

Software testing is a process, to evaluate the functionality of a software application with an intent to find whether the developed software met the specified requirements or not and to identify the defects to ensure that the product is defect-free in order to produce a quality product. The main purpose is of identifying any errors, gaps or missing requirement versus the actual requirement.

The testing phase for this application started right in between the implementation phase. The Bengal team worked to make sure every time a functionality was implemented it was tested thoroughly, following a testing pattern called test driven development or TDD. A testing strategy was followed described in the next chapter.

5.6.2 Testing Strategy

The main objective of software testing is to design the tests in such a way that it systematically finds different types of errors without taking much time and effort so that less time is required for the development of the software. The steps used are detailed below:

- Before testing starts, the requirements gathered are understood and made a list in a quantifiable manner.
- The objectives of the testing are identified and developed. This step was mainly used to identify test cases.

- The user groups of the application are identified and their functionalities.
- Before testing, effective formal reviews are used as a filter.
- Conduction of formal technical reviews to evaluate the nature, quality or ability of the test strategy and test cases.
- For this software only the Black Box testing was implemented.
- Test report generated

5.6.3 Testing Analysis

5.4 Test Table

Test case	Test Purpose	Pre-condition	Test steps	Expected outcome	Actual result	Status	Remark
Login	Check username and Password	1)Users must have stable internet connection 2)User must enter credentials	1) Enter credentials in the field provided 2)Enter the login button	Grant access to the users dashboard	User successfully logs into the system upon submission of correct login credentials.	Pass	None
Registration	To ensure that a new user is added to the system successfully	1)Users must have stable internet connection 2)User must enter credentials	1) Enter credentials in the field provided 2)Enter the register button	1) Show success message "registration done successfully"	Message shown "Registration done successfully"	pass	None

				2) Failure message shown "registrati on not done" and indicate under the input			
Edit personal details	To ensure that once different details are provided on the edit Personal details form and submitted, these details are altered in the database to reflect the recent changes	1)Users must have stable internet connection 2) users must be login 3) users must enter new credentials	1) Enter new credentials in the field provided 2)Enter the update button	1) New user should be successful ly added to the system and show success message "Data updated successful ly" 2) Failure message shown "data not updated" and indicate	Message shown "Updated data successfully"	pass	None

				under the input			
Assign leave	To test all leave assign to each employee	1)users must have stable internet connection

2) admin must be login

3) admin need to enter credentials | 1) Enter credentials in the field provided

2)Enter the assign leave button | 1) Show success message "Assigned leave successfully"

2) Failure message shown "Leave not assigned" | Show success message "Assigned leave successfully" | pass | None |
| Apply leave | To test if all employees can Successfully apply for leave. | 1)users must have stable internet connection

2) users must be login

3) users need to enter credentials | 1) Enter credentials in the field provided

2)Enter the apply leave button | 1) Show success message "Applied for leave successfully"

2) Failure message shown "Leave not applied" | Show success message "Applied leave successfully" | Pass | None |

Chapter 6: Results and Analysis

6.1 Overview

At the beginning stages of the requirement collection, we follow some steps to gather required requirement for the project. At first interview of the CEO, and office employee were taken to make understand the system we are trying to build. Once all the interview had been conducted and a general idea of the project was developed, the second part was the survey, where my office employee participated. This made clear the functionalities that should be involved in a system like this. Another interview session occurred where the system interface, what tech is going to be used, and the data that was needed was determined. Finally came the prototype with all the gatherings that had been found though the interviews and surveys. Because of the COVID-19 situation we have to take all interview and surveys within our office employees.

6.2 Results from Survey and Interviews

From the interview, initially it was quite clear what we wanted to create for our in house uses. From the surveys the functionalities of the application was being identified. Simple questions such as what the employee really wants and how to make the application more user friendly was answered through this survey. From the surveys we found that our employees are very much interested to use employee management system.

6.3 Testing Result

Not all the functionalities of the application is added, they are being added as the requirements are fulfilled. Hence there are more chances of more test cases in the future for this application. Any problem that arises during the test are immediately resolved by the developers. If the testing phase is completed 100%, a beta version of the system will be released for office use. From the test table, it can be observed that all the test cases were passed. The failure and success outcomes of each functionalities have also been mentioned. After the completion of the testing process, the team will make sure to prepare user manuals, documentation for the test cases, documentation for the defects in order to explain the complicated tasks in plain English for the non-technical personnel as well

for the future developers who might join the development team. A test summary will also be generated to show how the testing were done and the difficulties faced.

6.4 Conclusion

Now at Bangladesh everything become digitalized. No organization don't want to keep employee records in paper because it is a big hassle and not secure also. Everyone wants to work smartly and want to use employee management system. Because by using ems they can easily track and manage all employee activities. Especially every it farm uses ems. Though Bengal Software is renowned it farm we take decision to make an employee management for our in house uses.

Chapter 7: Project as Engineering Problem Analysis

7.1 Sustainability of the Work

After the system is developed the sustainably would be upright as we thought, due to pandemic situation we need to do office from our home, so we can use this system to manage our employee. Because it is hard to manage all employee, and assign task everyone when we doing office from home. By this system we can easily manage our employee and assign task. If any employee need leave they can apply through this system and system can also keep track of every activity.

7.2 Social and Environmental Effects and Analysis

Though the employee management system is only uses for in-house but it may be have some social effects. By this system every activities of employee keep in record. Employee's performance will be record in system. CEO can easily get to know what employee do what works and what is their performance in office. He can easily find out the best employee based on record and it will definitely motivate other employee to work hard. When everyone work hard company will get more revenue and ultimately if company get more profit employee will get more salary and it will improve their social status. All data can be keep safe in database. So employee have not worry about data loses because database will have a backup.

As for environment, while using this system we don't have to use lots of paper like before. So it is great save of paper. As we know that every year 17 billion cubic feet of trees destroyed and 60% of this are uses for making paper. So using this system has a positive impact in environment.

7.3 Addressing Ethics and Ethical Issues

The system will be fully secured for all users. No personal information will be leaked from the database. We will try to give maximum level of security. Every users password will encrypted so that admin cannot know the password. Only users can change their password and access to their dashboard.

Chapter 8: Lesson Learned

8.2 Problem Faced During This Period

Problem analysis is the process of understanding and defining the problem to be solved. Problem solving identifies solutions that conform to the needs and constrains of the problem. Much of what is done in designing and building information systems is to solve problems, even though the objective of the system may be seen as improving existing systems or taking advantage of market opportunities.

Getting employee information: The biggest challenge faced was getting hold of employee information for system. The project was initially aimed at implementing an employee management system for Bengal Software but that proved to be a challenge because employee information is very critical. This led to the implementation of a generic system thereby drawing a few assumptions were possible meaning that requirements kept on changing as different views were put into consideration.

Testing: Even though the development team has great abilities with development phase, but there were no dedicated testing team, hence the testing had to be done by the development team as a result due to lack of experience no proper testing process was defined.

Server: After the development of the project, there was a huge confusion if the team had to go with a shared hosting server or a dedicated hosting server. Both the server would have worked, but with shared hosting there is a scalability issue.

8.2 Solution of those problems

Getting employee information: For getting employee information, we keep every employee information into a new excel sheet and organize them according to our database. Then we give input from excel to our database.

Test: For testing an experienced SQA professional was hired during the development phase of the project. His expertise led to the development of a testing process which is defined in the next chapter

Host: For server issue, shared and dedicated both server have worked but due to scalability issue we choose to host on a dedicated server.

Chapter 9: Future Work and Conclusion

9.1 Future Work

The work doesn't stop here. For the future we will add more feature in this application like

- **Integration of payroll**

   In order for the system to be more comprehensive, we will add an integration of the system to a payroll system that will enable employees view and download their pay slips on demand.

- **Employee Performance**

   The designed system provides the admin with the ability to assign tasks to employee. In future, we will add a performance functionality to base on employee ability to finish their work.

- **Attendance**

   We will add employee attendance functionalities to keep attendance.

- **Information archiving**

   A system holding all the employee information should have some form of archiving system so that retired, suspended or fired employees are archived rather than been completely deleted from the system.

9.2 Conclusion

During the internship, I worked on a web application which is employee management system for Bengal Software. This helps me to get knowledge how an office manage all employees. This employee management system design for saving money, time and also work well for the team. For improving effectiveness of workplace management an employee management system is implemented.

It has been a great opportunity for me to work in Bengal Software as a web application developer. The internship program here was 3 months, the guidance here has been my first step to the world of information technology. My experience here was full of knowledge about the development process and also the job market. I have learned how to handle different requirement for the software and the best approach to developing it. This program gave me a clear idea about professional life as a web developer, what I must face and how to handle those situations. During internship, I tried to cover my weakness about web development and tried to become a better web developer.

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Appendix A (Survey Questionnaire)

Q1.How old are you?

Answer: _____

Q2.What is your gender?

Answer: (a) Male (b) Female (c) Others

Q3.What is your designation?

Answer: _____

Q4.How do you monitor your work?

Answer: _____

Q5.How many people are employed in this organization?

Answer: _____

Q5. Does management can clearly communicate with all employees?

Answer: (a) Yes (b) No

Q6.What kind of problem you face with the manual paper based system?

Answer: _____

Q7. Do you think that employee management software will be helpful for organization?

Answer: (a) Yes (b) No

Q8. Do you think the employee management software can maintain all employee in the organization?

Answer: (a) Yes (b) No

Q9. Is an employee management software is safe for keep all employees data?

Answer: (a) Yes (b) No

Q10. Please give an overall opinion about employee management system?

Answer: _____

Appendix B (UI Images)

Login Page

Admin Dashboard

Assign task page for admin

Apply leave page for employee