
# An Undergraduate Internship Report on CRM Prototype

By

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**Department of Computer Science & Engineering**

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# Attestation

I, Mahmuda Nizam, hereby attest that the work presented in this report is my original creation, and I have diligently and responsibly undertaken the tasks associated with its development.This project was undertaken as part of my role as an intern at Genex Infosys Limited, and it represents a comprehensive effort to illustrate everything I worked for in the three months of my internship.I further affirm that all the information, data, and content presented in this work are accurate to the best of my knowledge. Any external sources referenced have been duly cited with their links in accordance.This work will be submitted to my office and university for academic and professional credit, and it is not a reproduction or modification of any existing work.This work was completed under the supervision of Mr. Sajed Imtenanul Haque,lecturer of IUB as the internal supervisor, and Mr. Mahedi Hasan Hridoy of Genex Infosys Limited as the external supervisor.I take full responsibility for the content and quality of this work, and I am prepared to provide additional information or clarification upon request.

01/25/2024

Signature Date

Mahmuda Nizam

Name

# Acknowledgement

In the name of the Almighty, the Most Gracious and Most Merciful,
I extend my heartfelt gratitude and appreciation to all those who have been instrumental in the completion of this report. Their unwavering support and encouragement have been invaluable throughout this journey. First and foremost, I express my deepest gratitude to the Almighty for bestowing upon me the strength and wisdom to navigate through the challenges of academic and professional pursuits. I am profoundly thankful to my father for his relentless dedication and sacrifices in shouldering the financial burdens of my university education. His unwavering support has been the cornerstone of my academic endeavors. My heartfelt appreciation extends to my mother, whose constant encouragement and unwavering belief in my capabilities have been a source of inspiration and motivation.
I am indebted to my esteemed faculties and supervisors at Independent University,Bangladesh for their guidance and constructive feedback. Their expertise has been pivotal in shaping my academic and professional growth. Special thanks are due to my supervisors at my workplace, Mr. Mahedi Hasan Hridoy and Mr. Minhazul Taher, for their continuous guidance, support, and mentorship. Their insights and encouragement have significantly contributed to the successful completion of this endeavor. I am grateful to our Chief Technology Officer, Mr. Arifur Rahman, for his consistent encouragement, valuable advice, and mentorship. His leadership has been a guiding light, steering me towards excellence.
A warm acknowledgment goes to my colleagues at Genex Infosys, whose collaborative spirit have created a conducive work environment.
Last but not least, I extend my appreciation to my friends at the university who have shared this academic journey with me. Their companionship and shared experiences have enriched this chapter of my life.Each of them have played a unique and significant role in this endeavor, and for that, I am truly thankful.

With sincere gratitude,
Mahmuda Nizam


# Letter of Transmittal

24th January,2024
Mr. Sajed Imtenanul Haque
Lecturer
Department of Computer Science and Engineering
School of Engineering,Technology and Sciences
Independent University,Bangladesh

Subject: Internship Report on Customer Relationship Management Prototype,under Genex Infosys Limited

Dear sir, I would like to start by acknowledging that it is a great pleasure for me to submit my report on my internship at Genex Infosys Limited. I have detailed all my work experiences and lessons that I have learned as my first time in the corporate world.The report mainly highlights about the project that I was assigned to work on by my industry supervisors.
I have tried to provide an appropriate details of everything that I learned and worked on in this three months of internship at Genex.I hope the report will be according to your expectations.I would also like to express my heartfelt gratitude for giving me the opportunity to submit this report and complete my internship.

With sincere regards,
Mahmuda Nizam
2020259

01/25/2024

# Evaluation Committee

Supervision Panel

| | |
|---|---|
| ..... | ..... |
| Academic Supervisor | Industry Supervisor |

Panel Members

| | |
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| Panel Member 1 | Panel Member 2 |
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| Panel Member 3 | Panel Member 4 |

Office Use

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| ..... | ..... |
| Internship Coordinator | Head of the Department |

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Industry Coordinator of the Department

# Abstract

Genex Infosys Limited, a pioneering BPO, BPM, and IT solutions and services company in Bangladesh, stands as the first publicly listed entity in this sector within the country. Established in 2012 as an initiative by IPE Group, UK, the company has since expanded its operations to the APAC region.

This internship report centers on my engagement with Genex Infosys, where I will be collaborating with the experts in the Technology and Service Delivery Department to develop a Customer Relationship Management (CRM) solution for their clients. My primary focus will involve backend development, an integral part of this project.

In the initial month, my responsibilities encompassed creating a CRUD (Create, Read, Update, Delete) operation using raw PHP and BOOTSTRAP within the XAMPP server environment. The overarching goal of this internship is to deliver a high-quality CRM solution that aligns with the needs and expectations of Genex Infosys clients, thereby furthering the company's commitment to providing exceptional services.And as for the last month of my internship I was able to deliver the CRM Prototype I was asked to develop by my supervisors. This report provides details of the project that I worked on and delivered in my office.

***Keywords***— alpha, beta, gamma

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# Chapter 1

# Introduction

In an era marked by the rapid evolution of technologies that significantly contribute to business operations, various tools are employed to enhance efficiency and automate tasks. Among these tools is Customer Relationship Management (CRM) software, which helps aggregate customer information from diverse communication channels and touchpoints encompassing interactions between customers and the company. In acknowledgment of the dynamic nature of customer engagements spanning multiple channels and contact points, such as the company's website, phone interactions, live chat, direct mail, promotional materials, and social media platforms, compile and synthesize data. Genex Infosys has positioned itself as a developer of robust Customer Relationship Management (CRM) software. During my internship at Genex Infosys Limited, I was assigned the task of developing a CRM prototype tailored for use in the call centers of the company. This prototype serves as a foundational framework, aligning with the specific requirements and operational nuances of Genex Infosys Limited.The CRM prototype is further tailored to meet the specific needs of our clients.

## 1.1 Overview/Background of the Work

While developing the CRM prototype during my internship, I undertook the responsibility of the project's entire development process, including both the front-end and functionality. Recognizing that front-end development might have areas for improvement, I dedicated my best efforts to deliver a product that met the specified functionality requirements.Throughout the project, the functionality of the CRM prototype was meticulously determined in collaboration with my supervisor. Their guidance and input were invaluable in shaping the features and capabilities of the system. Bangladesh has emerged as a popular destination for outsourcing call center services, attracting businesses from various industries, including telecommunications, e-commerce, banking, and technology.Bangladesh has a large population with English language proficiency, which is a significant asset for call center operations.The government of Bangladesh has shown support for the growth of the IT and outsourcing industry, including call centers.Beyond call

centers, Bangladesh has seen expansion in the Business Process Outsourcing (BPO) and Information Technology Enabled Services (ITES) sectors. With government support and a focus on IT and outsourcing, Genex has become a key player in the industry.
Genex managed to become the largest Business Process Management and IT Services company in Bangladesh,and further expanded into its operations in the APAC region, managing over 170 million customer interactions a year. The customer relationship management software is used on a regular basis by their own agents in the call center.
CRM solutions capabilities include automation of Marketing,Sales,Contact Center,Geolocation technology, or location-based services.The CRM designed and developed helps in reducing to alleviate the laborious aspects of a contact center agent's role, automation within contact centers involves the use of pre-recorded audio for aiding customers in problem resolution and information dissemination. This automation not only supports agents in handling customer requests more efficiently but also serves to reduce call durations and streamline overall customer service processes.

## 1.2 Objectives

The primary objective behind the development of this CRM prototype was to gain a profound understanding of Customer Relationship Management (CRM) systems and their integral role in automating contact center solutions, a key offering of Genex Infosys. As a learner in the field, my aim was to delve into the intricacies of how CRMs function, their underlying mechanisms, and the practical applications they bring to the realm of customer interactions. Throughout the development process, my focus extended beyond the mere creation of a functioning prototype; it was an immersive educational journey to comprehend the dynamics of CRM software. Emphasizing a hands-on approach, I dedicated my efforts to implement the Model View Controller (MVC) architecture, a design pattern widely utilized in web development. This architectural approach not only enriched my understanding of software design principles but also allowed me to structure the CRM prototype in a modular and maintainable manner. While I acknowledge that my proficiency in PHP and JavaScript is an ongoing learning process, this project became a significant catalyst for expanding my programming skills. Despite the challenges and the recognition that there's more to explore in these languages, the successful development of the CRM prototype stands as a testament to my ability to grasp complex concepts and apply them in a practical context.

## 1.3 Scopes

The CRM prototype developed during the internship encompasses a comprehensive set of features and functionalities tailored to address the diverse needs of four distinct user roles: Admin, Agent, Team Lead, and Client. The primary objective of the system is to streamline and enhance customer interactions, ticket management, and reporting within the context of Genex Infosys Limited's contact center solutions.

Key Functionalities:

- User Management
- Ticket Management
- Customer Information Storage
- Dashboard and Reporting
- Charting and Visualization
- User Information Management

While the developed CRM prototype successfully addresses key functionalities, it is essential to acknowledge certain limitations. Notably, the prototype may require further refinement and scaling to meet the evolving needs and complexities of Genex Infosys Limited's contact center solutions.

# Chapter 2

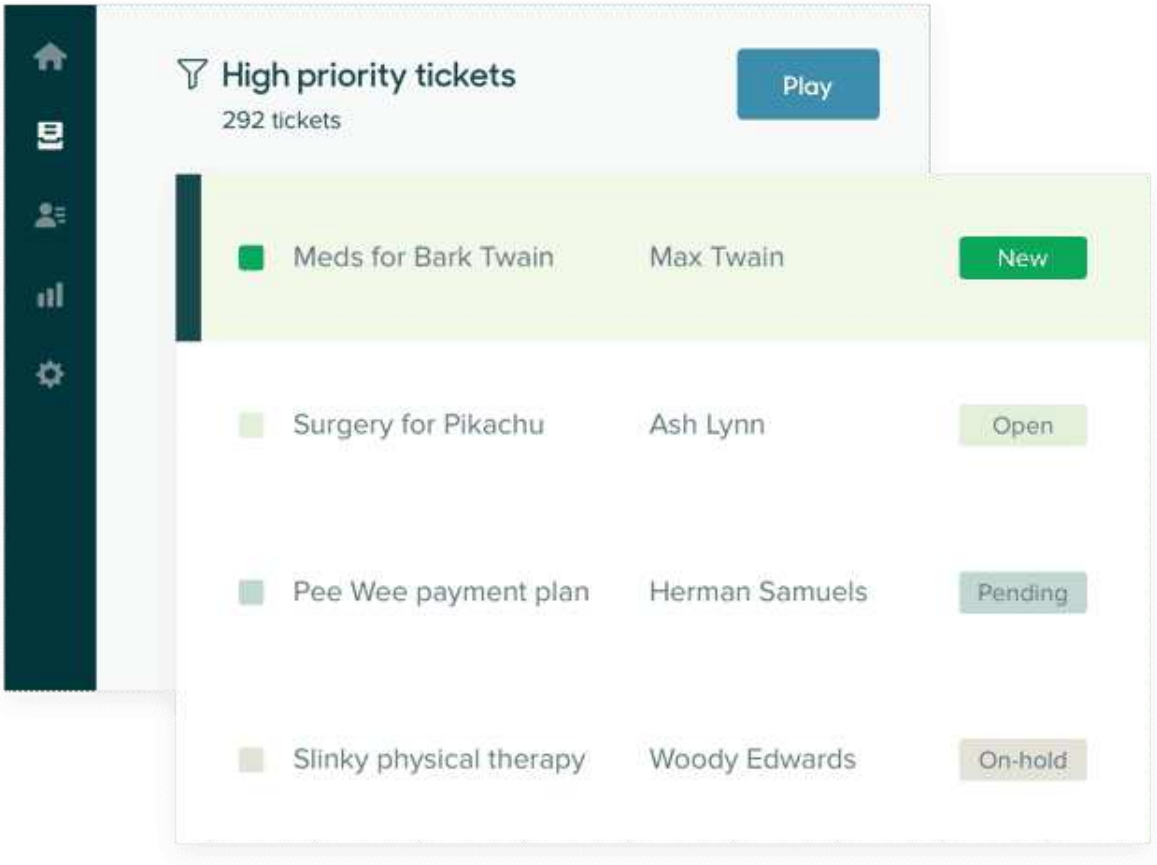
# Literature Review

## 2.1 Relationship with Undergraduate Studies

I correlated what I learned in my courses with the activities and work I did in my internship. Initially, I was assigned to do some hardware related courses by DELL to understand the products that were sold by my company and everything that I learned in that course was easier for me to understand because of my Computer Architecture and Microprocessor courses . The Web Applications and Internet course proved handy when designing a web-based CRUD application, utilizing my familiarity with PHP, XAMPP, and frontend work. Thanks to my Project Management course, I was already familiar with terms discussed in meetings with senior colleagues. Concepts from the Software Quality Assurance and Testing course aligned with documents I encountered. The Software Engineering course introduced me to various methodologies, aiding my understanding of those implemented by the company. Additionally, my knowledge from Object-Oriented Programming (OOP), Operating Systems, and Data Communication courses proved beneficial, especially when delving into MVC architecture and studying Linux, a crucial skill for software developers. The OSI model, covered in Data Communications and Networking, and insights from the Database Management course were also instrumental in developing applications during my internship.

## 2.2 Related works

There are other well-known CRM that have incredible ticketing systems available as web applications.One of them is Zendesk,a software available on the market. Zendesk's ticketing system is at the core of its functionality. It allows businesses to efficiently manage customer inquiries, issues, and requests by converting them into tickets. These tickets can be assigned to specific agents or teams for resolution.Zendesk supports omnichannel customer service, enabling businesses to interact with customers seamlessly across multiple channels such as email, chat, phone, social media, and more. The platform consolidates all customer interactions into a unified view.Other key features include workflow and automations, chatbots,integrations and reporting.



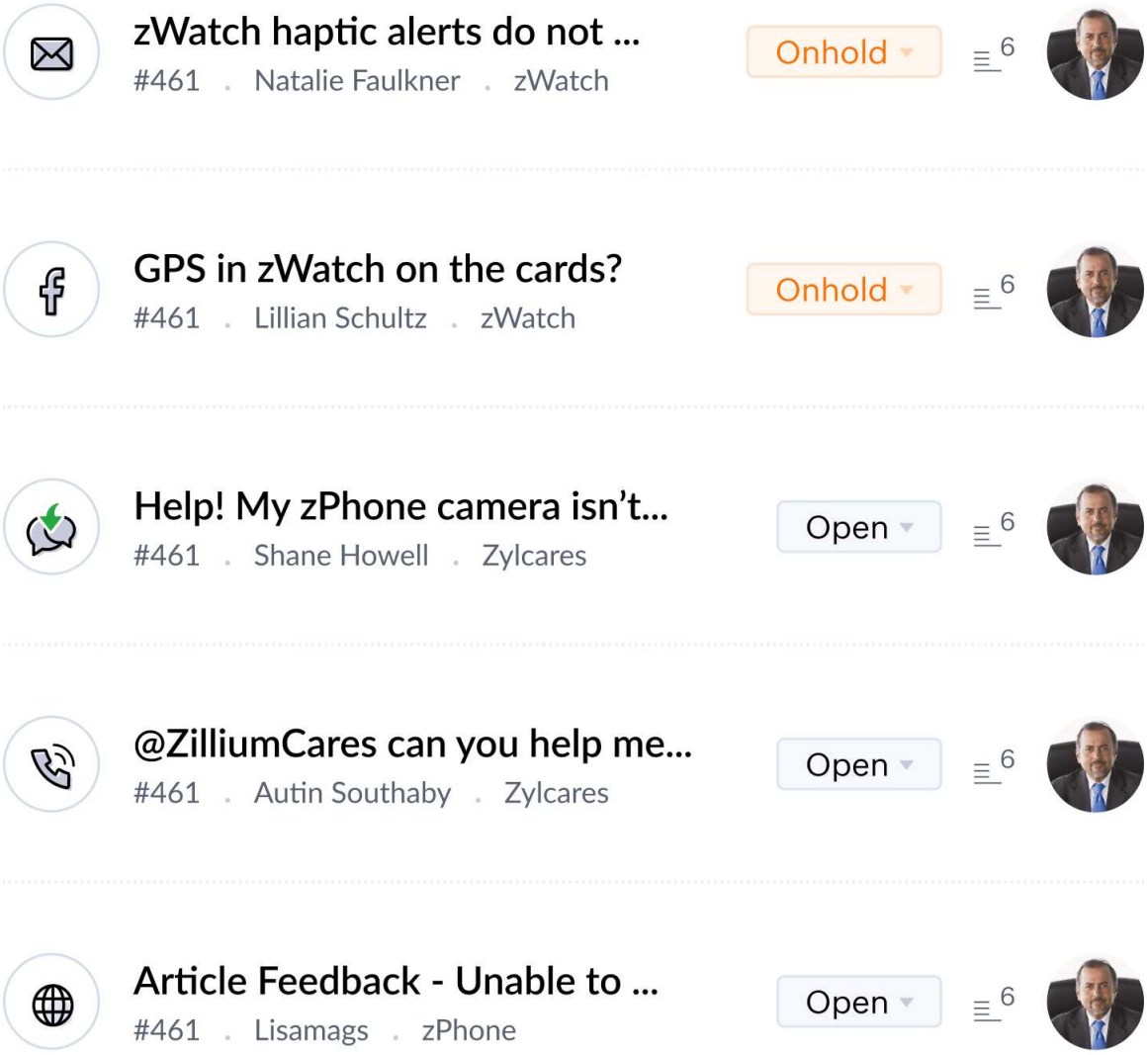

The pricing starts with 19 dollars per agent per month.I have listed some pros and cons of using Zendesk that I found in an article of Forbes magazine ( https://www.forbes.com/advisor/business/software/zend talk-review/ ). Pros:

- IVR call routing available
- Integrates with over 1,000 apps including JIRA and monday.com
- The interface is intuitive and easy to navigate
- Offers six free months of service for qualifying early-stage startups

Cons:

- Cost per agent is higher than its top competitor, Freshdesk
- Some users found it difficult to receive help from customer support
- Some reported call quality issues
- Zendesk does not offer international numbers

The second one I want to discuss is the support ticketing system by Zoho desk.The key features are omnichannel support,live chat,Zoho CRM integration and community forums.



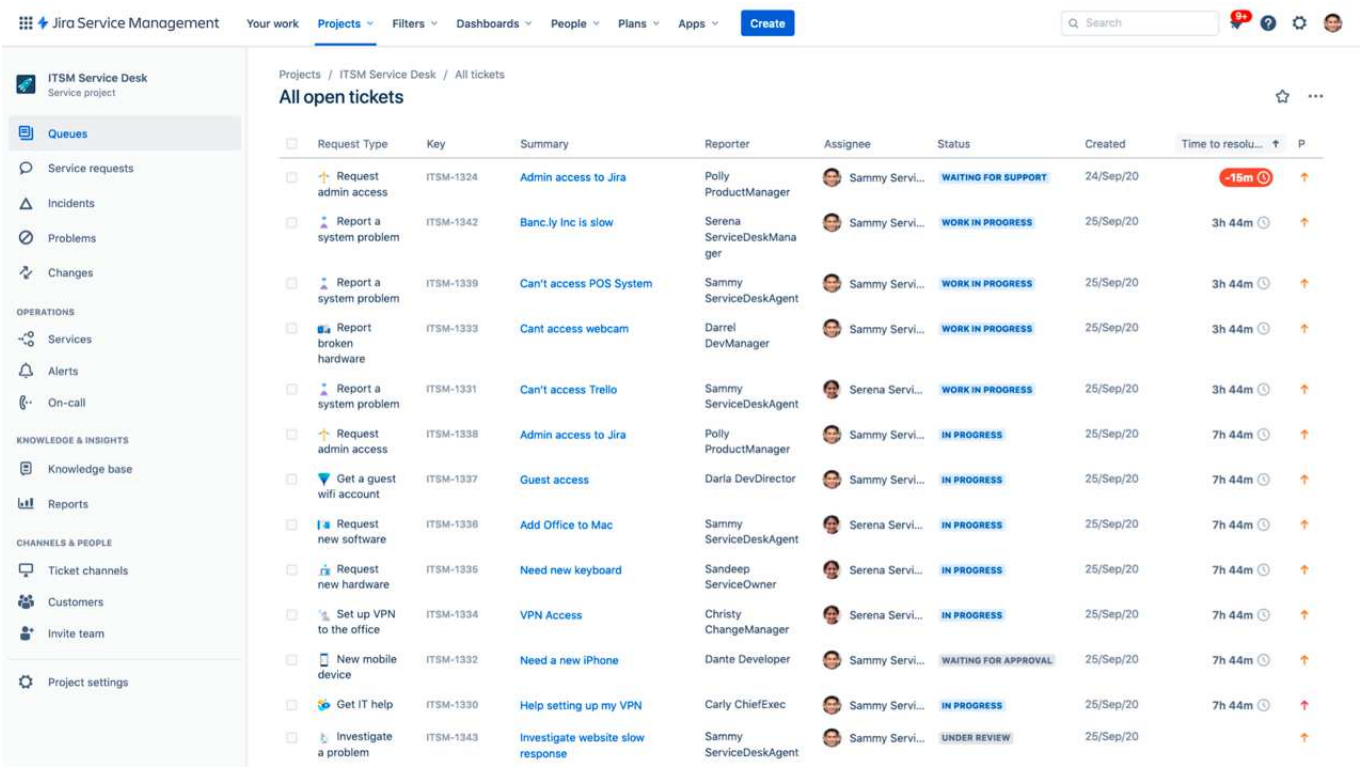

There are free plans available but there are paid plans with 7 dollars per month.I have listed some reviews of the software online that I found online (https://www.softwareadvice.com/remote-support/zoho-desk-profile/reviews/ ). Positive Reviews:

- "The software is pretty; the user interface is very attractive and impressive. It does seem well developed."

- "I have been using SaaS products from Zoho for more than 7 years and they keep getting better every time. I really enjoyed Zoho desk for the better overview on incoming information."
- "Cost and ease of getting set up. Support personnel always helpful."

Negative Reviews:

- "If you want to use your own domain email address, instead of some weird address that is not easy to remember then you're at a bit of a loss."
- "The software was difficult to navigate and ultimately setup. I found it confusing and not very intuitive or straight forward."
- "I say this because I am not a developer and I really struggle to do this." The third one I want to discuss is Jira Service Management, developed by Atlassian. The key features are shared inbox,incident alerts,asset and service management,integrations and reporting.There are free plans available and paid plans include 22.05 dollars per agent per month.




The pros and cons listed below were found in an online article of PC Mag ( https://www.pcmag.com/reviews/jira service-desk ). PROS:

- Free plan for up to three agents
- New integration options for messaging channel

- Low-code or no-code intelligent form creation

CONS:

- Customer access via social media channels requires third-party add-on
- Integration with various authentication services requires additional subscription

# Chapter 3

# Project Management & Financing

## 3.1 Work Breakdown Structure

A Work-Breakdown structure is a vital tool in the software development process that can help to organise and define the total scope of a project. The WBS is a hierarchical decomposition of a project into phases, deliverables, and work packages. The hierarchical structure helps break down the project into smaller,manageable components.With a detailed breakdown of tasks, it becomes easier to estimate the time, resources, and costs associated with each component. As the project progresses, the WBS serves as a reference point for tracking the completion of tasks and milestones. By breaking down the project into smaller components, potential risks and challenges can be identified more easily. A top-down approach was followed for creating a work breakdown structure for my project.

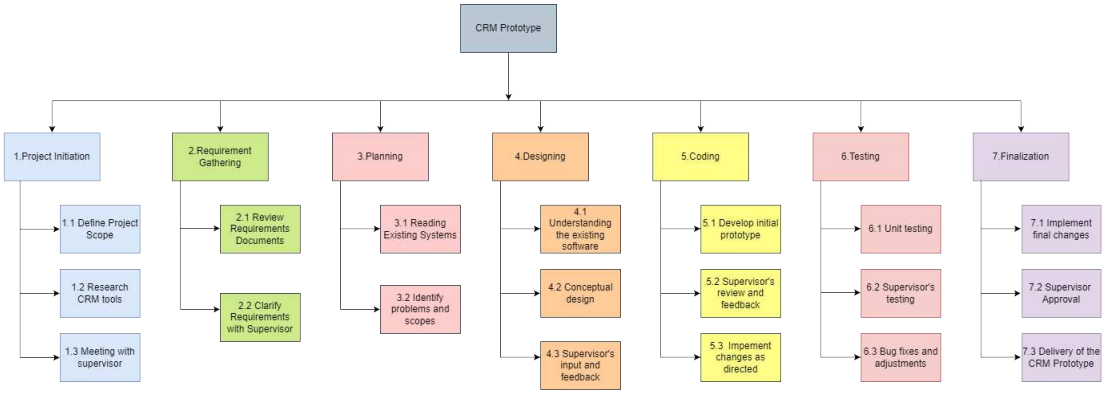



**Figure 3.1.1**

## 3.2 Process/Activity wise Time Distribution

For each phase of the WBS structure a specific time frame was allocated.The Table below has all the details.

| Task no. | Task | Duration in days | Dependency |
|---|---|---|---|
| 1 | Project Initiation | 3 | - |
| 2 | Requirements Gathering | 2 | 1 |
| 3 | Planning | 1 | 2 |
| 4 | Designing | 6 | 2,4 |
| 5 | Coding | 17 | 4 |
| 6 | Testing | 5 | 5 |
| 7 | Finalization | 2 | 6 |

**Table 3.2.1**

Total number of days taken to complete the project were 36 days and only the working days were counted as the total duration.Now to find the critical path I have done an activity-on-node network diagram below.In order to find the critical path slack time analysis was done.

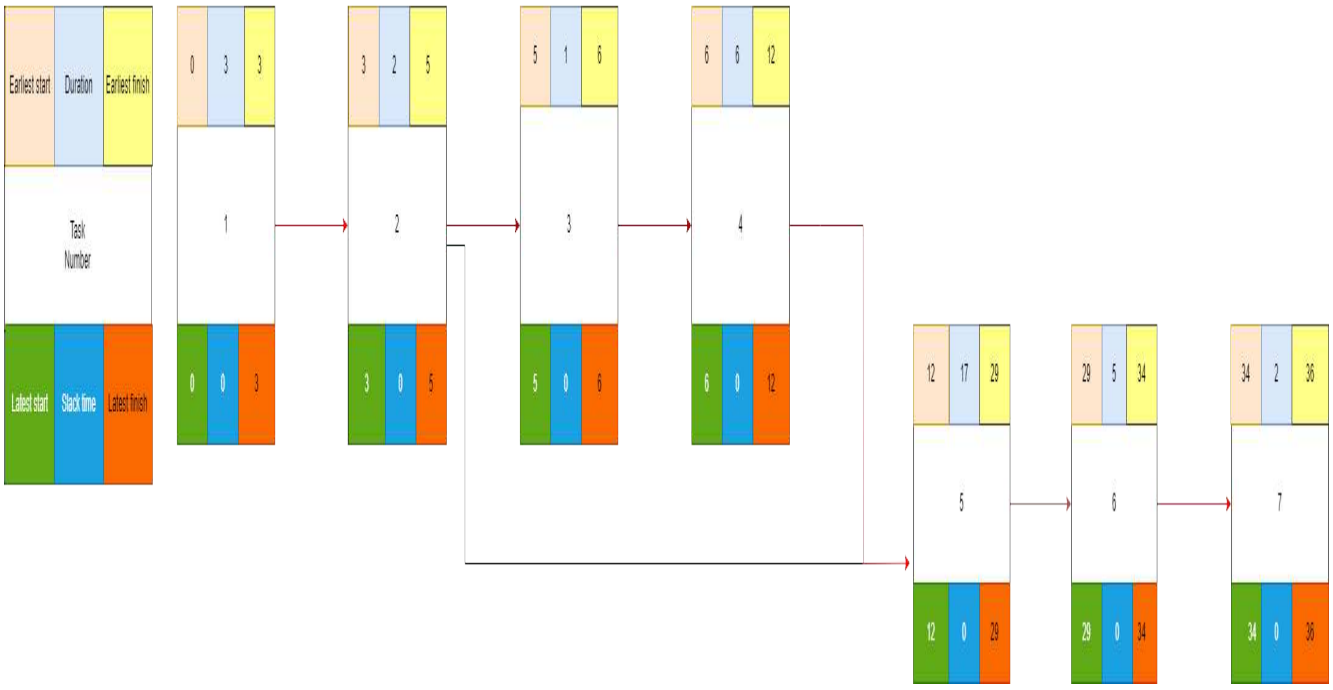



**Figure 3.2.1**

The critical path remains sequential starting from task 1 to task 7 as shown in the diagram indicated by the red arrows. The table below sums up everything shown in the activity diagram which includes earliest start and finish ,latest start and slack time as well.

## 3.3 Gantt Chart

| Task no. | Earliest start | Earliest finish | Latest start | Latest Finish | Slack |
|---|---|---|---|---|---|
| 1 | 0 | 3 | 0 | 3 | 0 |
| 2 | 3 | 5 | 3 | 5 | 0 |
| 3 | 5 | 6 | 5 | 6 | 0 |
| 4 | 6 | 12 | 6 | 12 | 0 |
| 5 | 12 | 29 | 12 | 29 | 0 |
| 6 | 29 | 34 | 29 | 34 | 0 |
| 7 | 34 | 36 | 34 | 36 | 0 |

**Table 3.3.1**

To enhance the visual representation of the sequential progression of tasks and the attainment of milestones, I have provided a refined Gantt chart below.

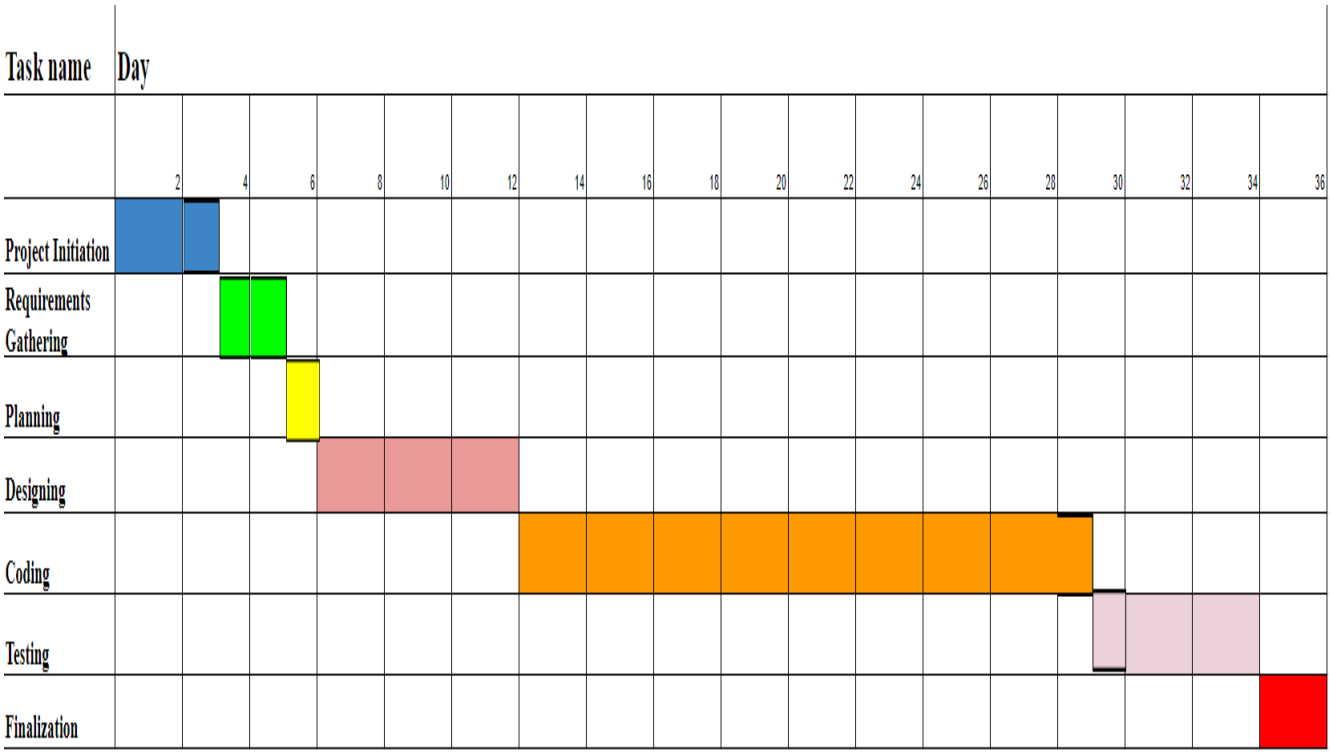



**Figure 3.3.1**

## 3.4 Process/Activity wise Resource Allocation

Below is a table that shows in detail about the resources that were allocated according to the activities. The resources mainly used for development purposes were my laptop, softwares like

XAMPP, and Visual Studio Code.

| Activity | Resource |
|---|---|
| Project Initiation | The main resource involved in this activity was actually the information that I found online through Google and YouTube to understand CRM and exactly how it works. |
| Requirements Gathering | After gaining some knowledge about how CRM works and what it is mainly used for.My supervisor helped me understand Genex's existing system further.After which he also handed me a requirements document. |
| Planning | My supervisor helped me with the planning of the software by detailing what I should do first and which users and features I should start working on first. |
| Designing | In order to design the prototype I took a little bit inspiration from the existing software and used Bootstrap for frontend purposes. |
| Coding | I started writing business logics immediately after I was done with the frontend.I used php,MYSQL and Java Script for development purposes. |
| Testing | I tested each and every other business logic after I was done writing them and ensured I got rid of all the bugs as well.Most of the data I used for testing purposes were all dummy data. |
| Finalization | Throughout the phases of development, design, and testing, I maintained a collaborative approach by regularly presenting my work to my supervisor for feedback. I diligently incorporated the suggested changes to align with the project requirements. Prior to the finalization and presentation of the software, a comprehensive quality assurance process was undertaken to ensure flawless functionality and the absence of any bugs. |

**Table 3.4.1**

## 3.5 Estimated Costing

As a software product, it will inherently entail an initial purchase price. Additionally, being a web application used continuously, ongoing expenses for its maintenance and operation are also anticipated. The estimated costs for these aspects are provided below.

| Item | Cost |
|---|---|
| Development | 70000 |
| Server cost per year | 60000 |
| Maintenance cost per year | 50000 |

**Table 3.5.1**

# Chapter 4

# Methodology

There are various methodologies for software development, with Genex Infosys adopting the Agile methodology for project management. Agile is a method that breaks down projects into stages, promoting ongoing collaboration and improvement. At Genex Infosys, teams engage in a cycle of planning, executing, and evaluating throughout the project's life.


In my observations, senior team members engage in regular meetings with different clients. One notably significant meeting involves notifying the company's Chief Technology Officer (CTO) on a weekly basis. In this meeting, the team discusses the work accomplished in the previous week and outlines the tasks employees are preparing to complete in the current week. During a specific meeting, one of my seniors explicitly mentioned the adoption of the Agile methodology, which influences the frequency of client meetings. Clients, understanding the Agile approach, might also prefer and benefit from weekly meetings to stay updated on project progress. It's worth noting that the initial meeting or discussions about meeting frequencies occur before the project commences and are typically decided by the steering committee. This committee is responsible for overseeing and making strategic decisions related to project management.This structure ensures effective communication and alignment with Agile principles, allowing for transparency, adaptability, and continuous improvement in the software development and project management processes at Genex Infosys.

# Chapter 5

# Body of the Project

## 5.1 Work Description

I was assigned to develop this prototype to understand and expand my knowledge about the systems used in business.Along with that I also got some idea about the operations of the contact center of Genex Infosys Limited. Additionally,as I progressed with my work, my proficiency and expertise in PHP and JavaScript continued to advance, further enhancing my knowledge and skills in these programming languages. The front-end technologies used for developing this software was mainly bootstrap,for backend PHP,MYSQL and Java script were used and along with that software like XAMPP and Visual Studio code were used. The main feature in the prototype is the ticketing system. Other features are also there in the main CRM that Genex already developed but due to time constraints I was unable to develop all the functionalities.

## 5.2 Requirement Analysis

### Rich Picture

As I was developing a prototype of an existing system the requirements analysis was not done in depth and I was only given a few documents to look at and start my work.Whenever I got confused about anything I took help from the internet and my supervisor. Since I was not asked to fulfil the requirements given to me specifically I developed a CRM prototype in general keeping in mind how the contact center at Genex works. The following rich picture succinctly illustrates the operational dynamics of the system, providing a concise overview of its actual functioning.

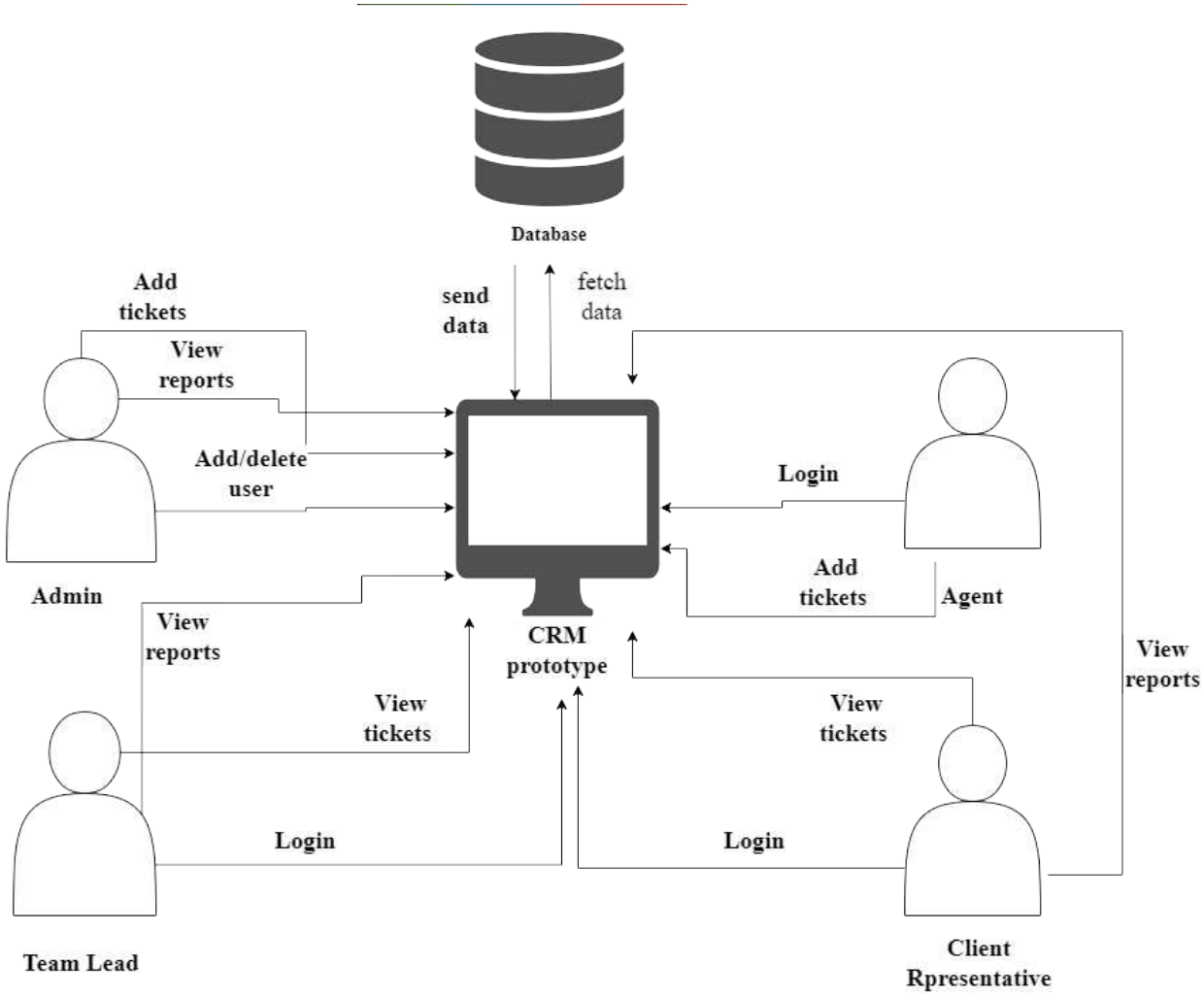



**Figure 5.2.1**

## Functional and Non-Functional Requirements

### Functional Requirements:

- The system enables the user to login and logout successfully.Along with that a forgot password feature is included.
- The admin is able to add the other three users which are agents,team-lead and client representative.
- The system is able perform a check during the ticket creation process to verify if customer information already exists in the database. If the customer information exists, the system will not duplicate the entry. If the information does not exist, the system will add the customer information to the database.
- The ticket's status can be changed by both the admin and the agent.
- The system will provide a functionality to download ticket information, allowing users to retrieve a comprehensive dataset of tickets in a downloadable format, such as an Excel

file.Users are able to input a start and end date to narrow down the selection of tickets for download as a filtering method.

- The system will generate and display charts on individual users' dashboards, providing visual representations for the analysis of key performance metrics and relevant data specific to each user role.
- The system will have the capability to accurately fetch relevant data from the database based on user-specific parameters. This data will be dynamically displayed in the user's dashboard, providing real-time and accurate information tailored to the user's role.

**Non-functional Requirements:**

- The system is able to login within 3 to 5 seconds.
- The system can generate and deliver the downloadable ticket information within 10 seconds.
- The system is able to pull relevant information from the database to be presented in the graphical illustrations in the dashboards of each user.
- The system sends an email and a token is generated and sent to the user's email for authentication for the forgot password feature.
- The system is able to differentiate between users and accordingly gives users access to perform tasks for example except for admin no one can delete the customer,and tickets can be only deleted by agents or admins.

## 5.3 System Analysis

### 5.3.1 Six Element Analysis

| Process | System Roles | | | | | |
|---|---|---|---|---|---|---|
| | **Human** | **Non-Computing Hardware** | **Computing Hardware** | **Software** | **Database** | **Communication and Network** |
| **Login** | User enters login credentials into the login page | N/A | Laptop | Web Browser | XAMPP | Internet |
| **Add/Delete Ticket** | Admin and agent can add and delta tickets | N/A | Laptop | Web Browser | XAMPP | Internet |
| **Create new user** | Admin can create user profiles for agents,team leads and client representatives | N/A | Laptop | Web Browser | XAMPP | Internet |
| **Download tickets information** | Every user can download ticket information but the information will be filtered according to the specific user.Only admin can get access to all the tickets information. | N/A | Laptop | Web Browser | XAMPP | Internet |
| **Password Reset** | Users can reset password and an email will be sent to | N/A | Laptop | Web Browser | XAMPP | Internet |

| | | | | | | |
|---|---|---|---|---|---|---|
| | them with a token number | | | | | |
| **Update Profile** | Users are allowed to update their information in their profiles | N/A | Laptop | Web Browser | XAMPP | Internet |
| **View Customer Informatio n** | Every user can view customer information | N/A | Laptop | Web Browser | XAMPP | Internet |
| **Add/Delete Customer** | Only agent and admin can add customer and admin can only delete a customer | N/A | Laptop | Web Browser | XAMPP | Internet |

**Table 5.3.1**

### 5.3.2 Feasibility Analysis

A feasibility study assesses the viability of a project or system. It involves a purposeful and reasoned examination of a prospective business or venture to identify its strengths, weaknesses, potential opportunities, and threats. The study also analyzes the resources needed for execution and evaluates the overall likelihood of success. The judgment of feasibility centers on two key criteria: the necessary expenses and anticipated value.I have conducted a feasibility analysis for my system though it is done during the requirements stage because this is a prototype of an already existing system.

| Feasibility Factors | Analysis |
|---|---|
| **Operational** | The user interfaces have been developed keeping in mind the end user's perspective and they are made responsive enough. Other than that the main feature is the ticketing system which works well and matches accurately to the existing system.Currently the web app is running on XAMPP but the existing system is running on a live server.A reliable internet connection is important to establish a connection with the database. The features are a lot less in this prototype compared to the existing system but the performance is fine for the main features it has. |
| **Technical** | Technical Wise the system could have been developed in a more efficient way using the MVC architecture.The use of pretty URL in php,background processing pages, are missing.The existing system makes all the requests to the index page from where it gets routed to different pages, something my prototype does not have. Functions could have been a little bit more efficient and less functions could have been used overall if an Object Oriented approach were used. |
| **Schedule** | Since it was my very first time developing a system like that and I had a very limited knowledge about CRM the time taken looks reasonable enough.However,in real world situations 36 days for a simple prototype with such less features would be too much time consumed in development. |
| **Economic** | The economic feasibility analysis is quite out of reach for my understanding of this system as it is a prototype.Hoever, if I consider the existing system the financial gains should match or surpass the expenditures. The assessment involves appraising the total system costs, encompassing both software and hardware expenses, pertinent to the specific application class under consideration. After scrutinizing the entire application system, we determined that conducting a comprehensive system investigation is feasible. Additionally, ongoing maintenance support is provided by the development team, suggesting the potential inclusion of maintenance costs. |

**Table 5.3.2**

### 5.3.3 Problem Solution Analysis

In software development, problem analysis refers to the process of thoroughly examining and understanding a perceived issue or challenge in order to define its nature, identify its root causes, and pave the way for effective solutions. The purpose of problem analysis in software development is to provide a systematic and structured approach to addressing issues that may hinder the successful development, deployment, or functioning of a software system. The problem I initially faced was with how I will design my project and trying to understand the end user's perspective was another problem. I was unable to understand the tasks that each user could perform along with the ticketing system feature. This was a problem that I was able to solve using information from the internet and in addition to that my supervisor also actively guided me with the designing process. When I started coding I ran into several technical issues.I was unable to pass parameter values from Java Script to php script so I had to ditch the entire modal idea and design more pages and use form submission in order to view information fetched from the database using a unique ID. The main problem was that I tried to make the system way too complicated by writing too many functions,however,as I proceeded with the development I was able to efficiently write functions and I was also able to reduce the number of functions and optimize it by using the same functions for different purposes.By the end I was able to understand how I could have actually done more from the beginning to make the system more

efficient and use less functions too. Due to time constraints I was not able to make further changes.

### 5.3.4 Effect and Constraints Analysis

Project constraints refer to the elements that impose limitations on your development process. These constraints can take tangible forms, such as the financial resources allocated in a project budget or the necessary hardware for coding. Alternatively, they can manifest as intangible factors, encompassing aspects like time restrictions, customer contentment, or unforeseen market fluctuations, which have the potential to impede or decelerate the progress of a project development.The constraints, as I read in an article published by https://www.mobindustry.net/blog/what-are-constraints-in-a-software-development-project/ , are mainly time,scope and cost.The two main constraints for me were time and scope. Time was a huge constraint because when developing the system I ran into several issues,caught bugs that I could not identify earlier which eventually lead to wasting more time trying to figure out the problem.And I was not able to move on into working into some other module until I was able to solve the problem I got caught up with at first place. Another constraint was obviously the scope being able to add all the features and functionalities accurately was a challenge.Sometimes one functionality would run smoothly but at the same time ruin the other functionality completely.In order to determine the best functionality it took me a number of days and more time was consumed in order to make all the features run smoothly together. And I used to only work on this project during my office hours which were eight hours specifically. At times I was not productive enough to finish working on easy features, however, I managed to pick up the pace and was able to show them the prototype I developed.

## 5.4 System Design

#### UML Diagrams

The system design has been kept simple,however,if one is not familiar with the MVC architecture it might be hard to understand how the system is operating.On the other hand the way I developed the system might not seem efficient enough for senior developers.Below I have illustrated some basic activities that the end users can perform.Among them as shown in the diagram the admin has access to perform a number of activities which other users like team lead,agent and client cannot perform.The include relationships describe how the forgot password feature has been added to these two specific pages which is why the reset password activity is described as something included in the update profile and login activity.


**Figure 5.4.1**

In the seconds use case diagram I have further demonstrated how some other important activities, which can be counted as one of the main activities of the CRM Prototype, are performed by which specific user.As shown below the admin and agent have access to perform more activities than the team lead and client representative.The diagram below shows extend relationship, and it specifically means an optional functionality which depends on the user if they want to use that option or not.Every time a customer is viewed the admin is also shown an option to delete

the customer.It depends on the admin if they want to use this option or not.

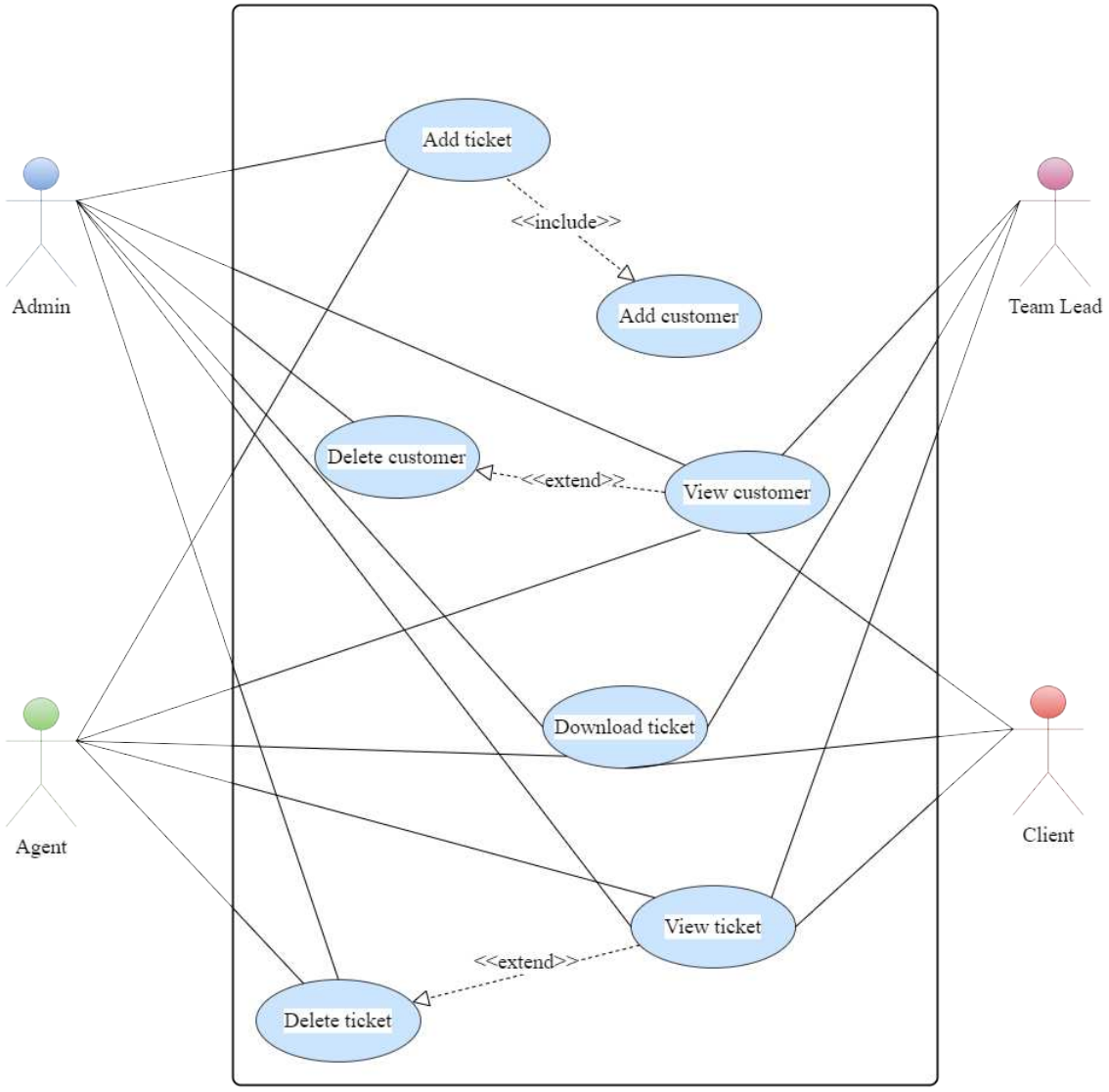



**Figure 5.4.2**

## Architecture

Looking at the architecture that I tried to implement was a very common architecture which is the MVC architecture. The Model-View-Controller (MVC) architecture is a design pattern used in software development to organize and structure code in a way that separates concerns and enhances maintainability. The model component helps to retrieve the data from the database and also performs the operations of the application.The view is the user interface and the end user uses this interface to perform activities and request data.The view also displays all the data to the user that they want to see.The controller acts like the interface between the model and the view so that the model and view cannot directly interact with one another.The components of view sends a request to the controller which in turn forwards the request to the model which fetches the data from the database and sends it back to the controller.The controller sends the

requested data to the view component for the end user to view it on their screen.

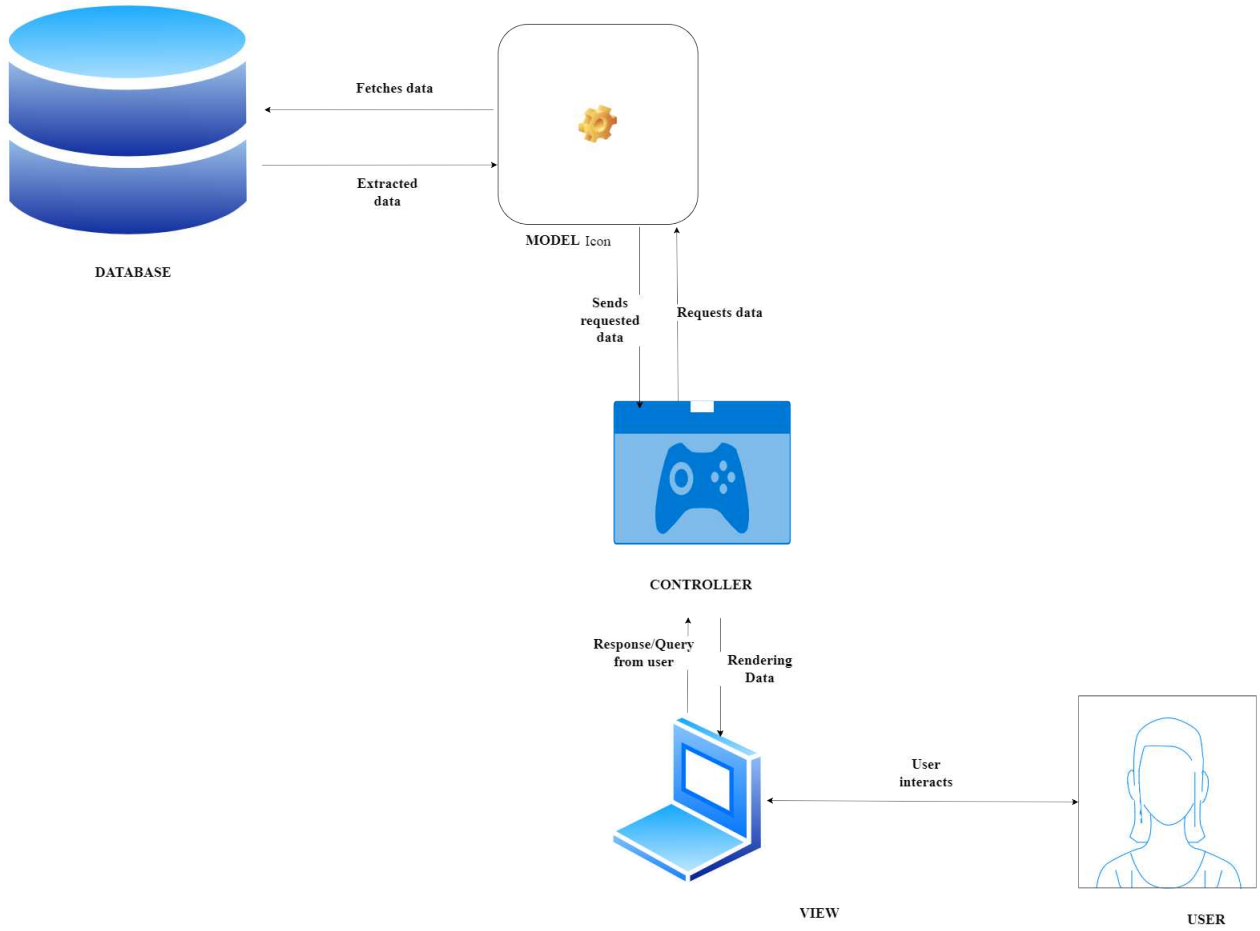



**Figure 5.4.3**

The components of view sends a request to the controller which in turn forwards the request to the model which fetches the data from the database and sends it back to the controller.The controller sends the requested data to the view component for the end user to view it on their screen.There are multiple advantages to using this architecture.

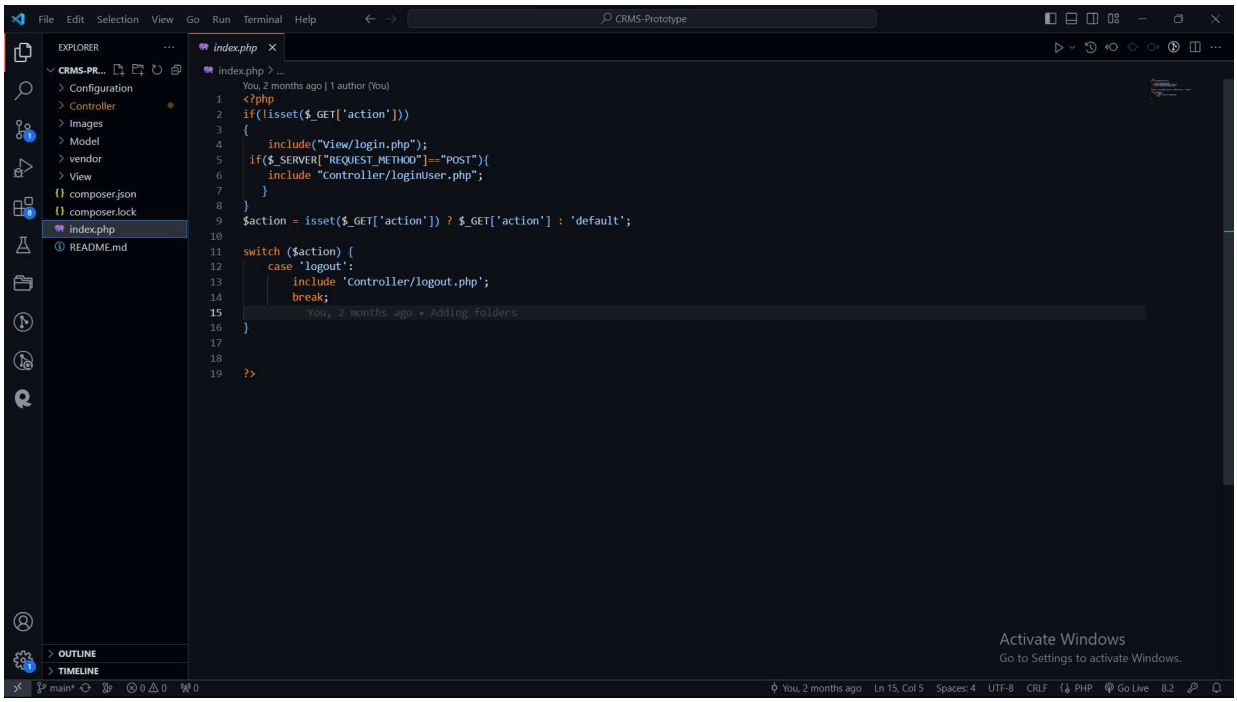
**Advantages of MVC:**

- Code maintenance is simplified, facilitating easy extensions.
- Each component of the MVC model can undergo separate testing.
- Simultaneous development of MVC components is feasible.
- Complexity is reduced by partitioning an application into three units: Model, View, and Controller.
- Support for Test Driven Development (TDD) is provided.
- Well-suited for web applications managed by extensive teams of designers and developers.

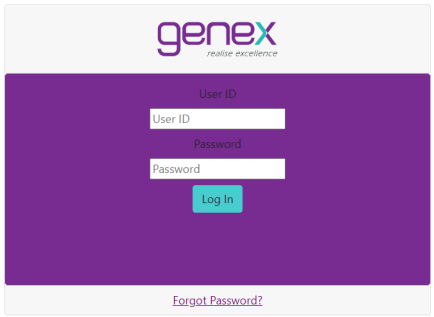
- This architecture enables the independent testing of components since all classes and objects operate autonomously.
- Friendly to Search Engine Optimization (SEO).

## 5.5 Implementation

For implementing all the functionalities and modules along with the MVC architecture I divided all the files accordingly.The model folder contains files that have functions which performs all the operations within the system.The controller folders also have different types of files meant for interacting with the model files that they need to interact with.Moreover, the controller files calls the appropriate function of the model files by simply including them.

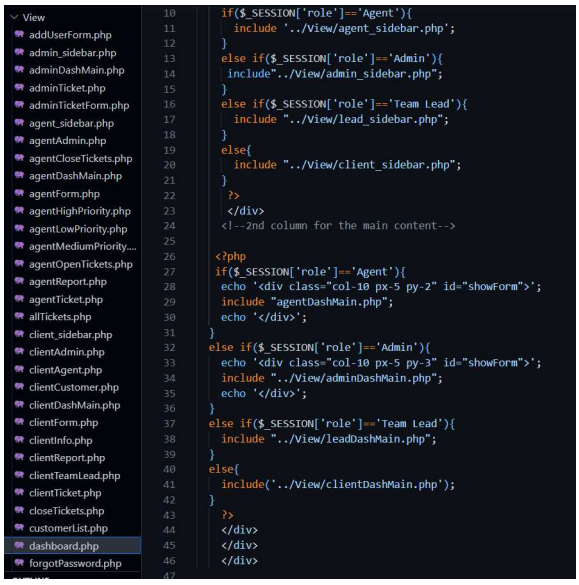



The controller files are most of the time included within the files inside the view folder.The files inside the view folder are the user interfaces that the user interacts with. The login page is included in the index.php,and if the user decides to sign out they will be automatically redirected to the login page again after the session has been unset in the logout controller.

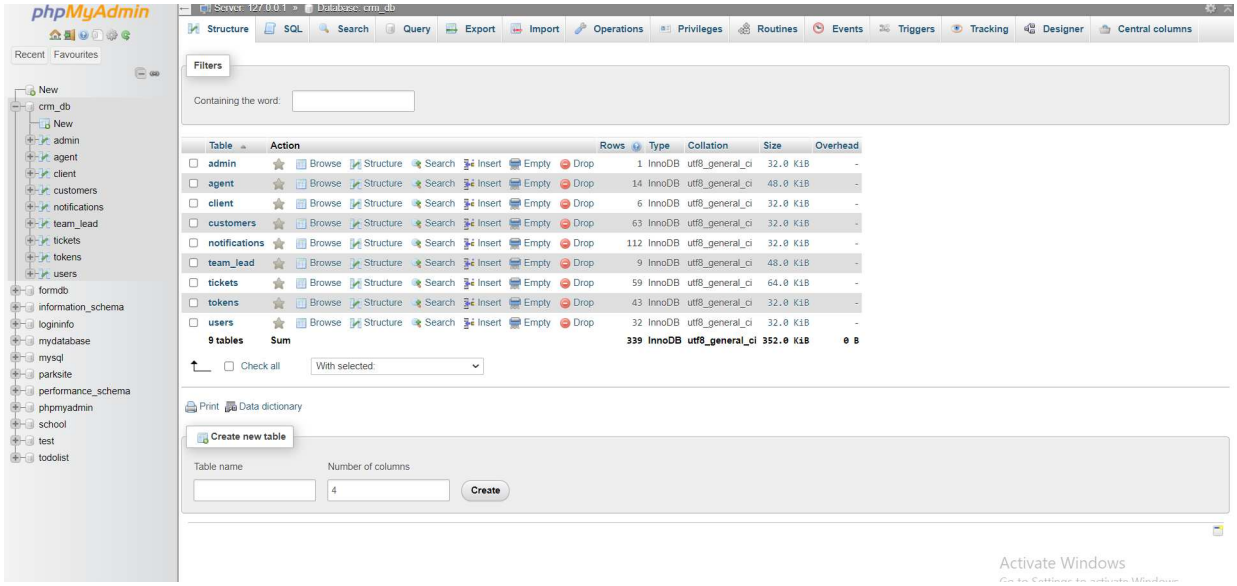


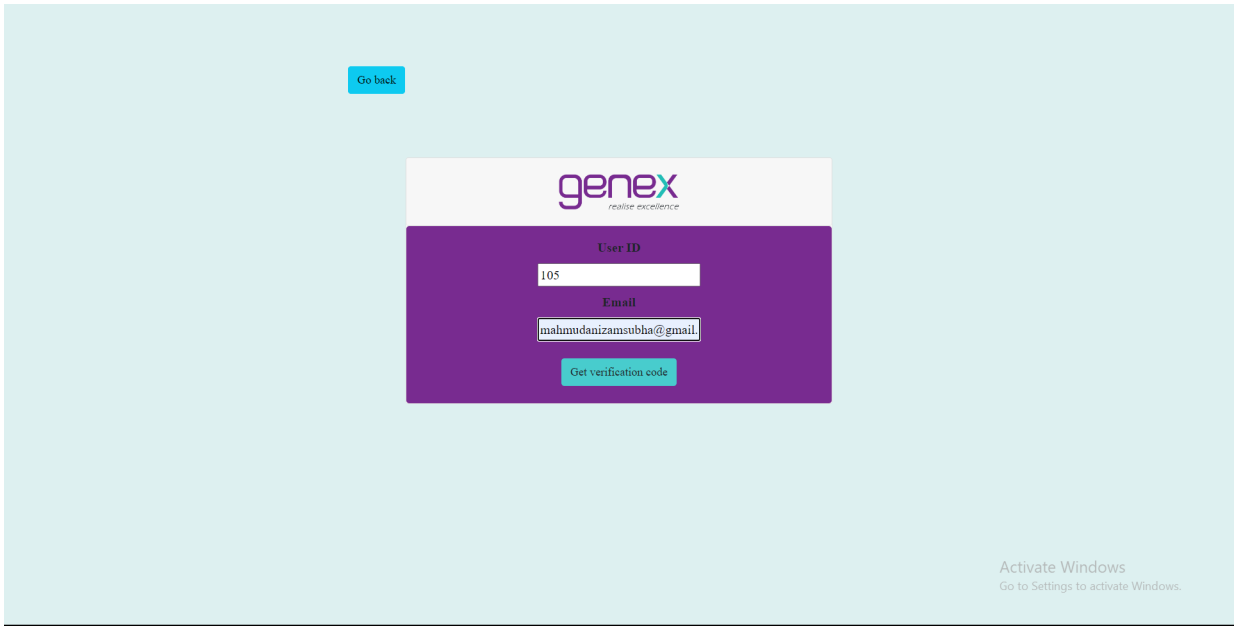



The controller folder could have been more organized if I had divided the files according to the users,something the existing system already had it done,however, I managed to efficiently handle all the files and navigate through everything with ease.If someone were to read my codes some of the files will actually confuse them wondering which file is meant for which user.I tried to name the file in a meaningful way but arranging them into different user folders could have been more helpful.




The dashboard.php file has some basic html css and with the help of if else conditions and session information the system can differentiate which user is active and display their specific dashboard to them accordingly.The dashboard shown below in the picture si the dashboard of the admin.


phpMyAdmin
Recent Favourites
New
crm_db
New
admin
agent
client
customers
notifications
team_lead
tickets
tokens
users
formdb
information_schema
logininfo
mydatabase
mysql
parksite
performance_schema
phpmyadmin
school
test
todolist
Server: 127.0.0.1 » Database: crm_db
Structure SQL Search Query Export Import Operations Privileges Routines Events Triggers Tracking Designer Central columns
Filters
Containing the word:
Table Action Rows Type Collation Size Overhead
admin Browse Structure Search Insert Empty Drop 1 InnoDB utf8_general_ci 32.0 KiB -
agent Browse Structure Search Insert Empty Drop 14 InnoDB utf8_general_ci 48.0 KiB -
client Browse Structure Search Insert Empty Drop 6 InnoDB utf8_general_ci 32.0 KiB -
customers Browse Structure Search Insert Empty Drop 63 InnoDB utf8_general_ci 32.0 KiB -
notifications Browse Structure Search Insert Empty Drop 112 InnoDB utf8_general_ci 32.0 KiB -
team_lead Browse Structure Search Insert Empty Drop 9 InnoDB utf8_general_ci 48.0 KiB -
tickets Browse Structure Search Insert Empty Drop 59 InnoDB utf8_general_ci 64.0 KiB -
tokens Browse Structure Search Insert Empty Drop 43 InnoDB utf8_general_ci 32.0 KiB -
users Browse Structure Search Insert Empty Drop 32 InnoDB utf8_general_ci 32.0 KiB -
9 tables Sum 339 InnoDB utf8_general_ci 352.0 KiB 0 B
Check all With selected:
Print Data dictionary
Create new table
Table name Number of columns
4
Create
Activate Windows


Go back
genex
realise excellence
User ID
105
Email
mahmudanizamsubha@gmail.
Get verification code
Activate Windows
Go to Settings to activate Windows.

## Password Reset Verification Code

From: <subhanizam15@gmail.com>
To: <mahmudanizamsubha@gmail.com>

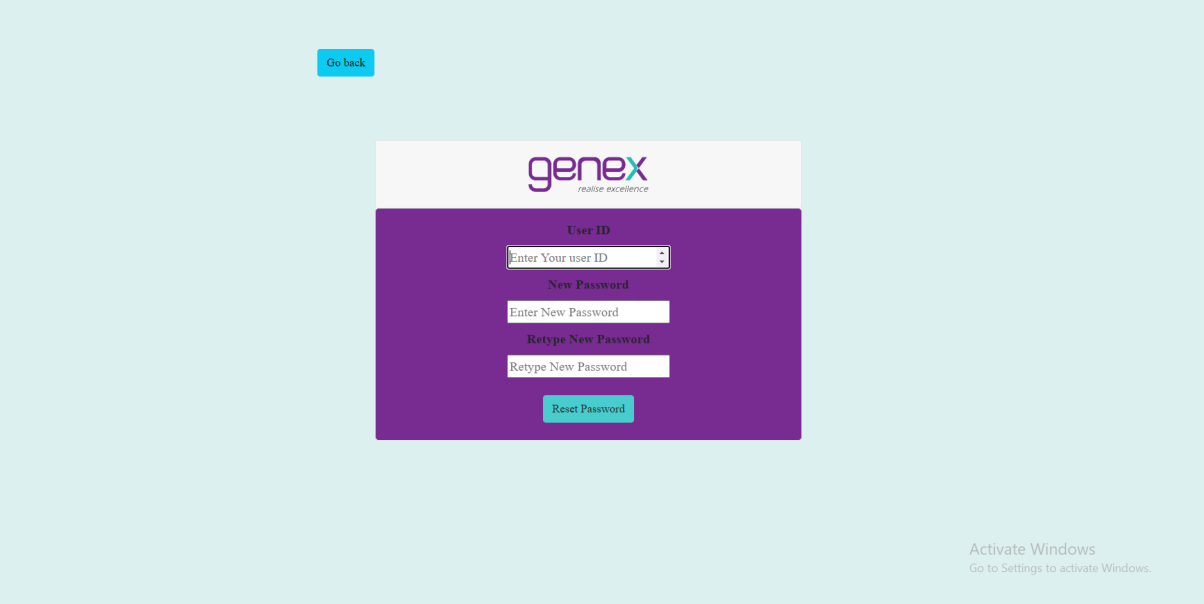
Show Headers

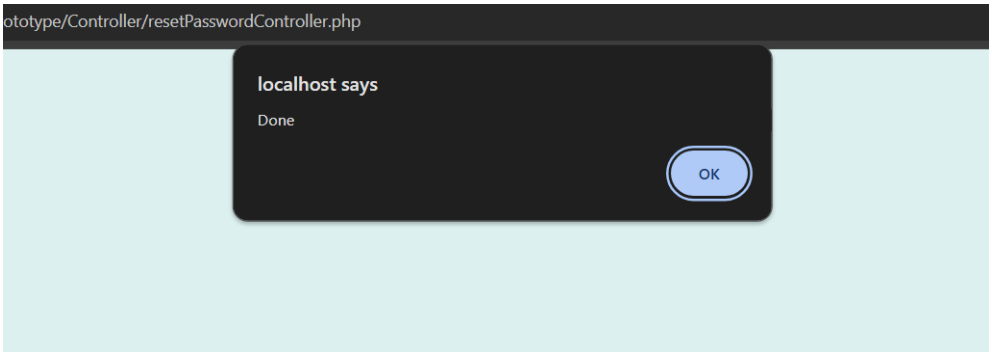
HTML | HTML Source | Text | Raw | Spam Analysis | HTML Check | Tech Info

Your verification code is: 35

Activate
Go to Setti

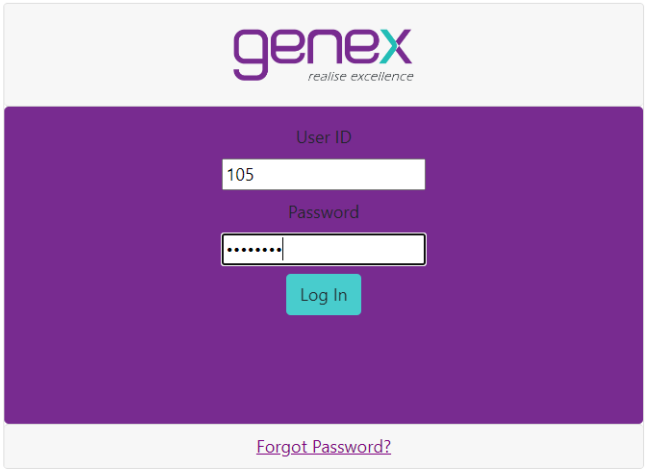

| | | | | | | |
|---|---|---|---|---|---|---|
| 0 | mahmudanizamsubha@gmail.com | 35 | 2024-01-24 15:20:24 | 1 | 2024-01-24 15:19:45 | 2024-01-24 15:20:24 |

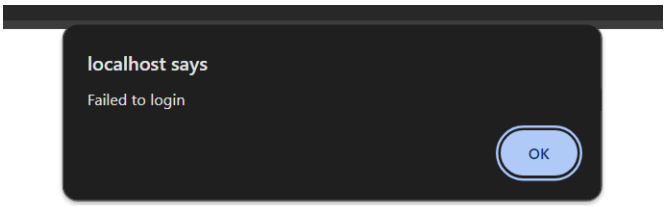


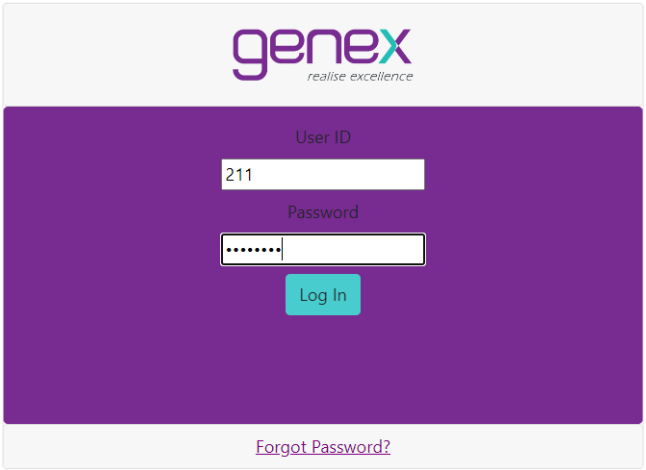



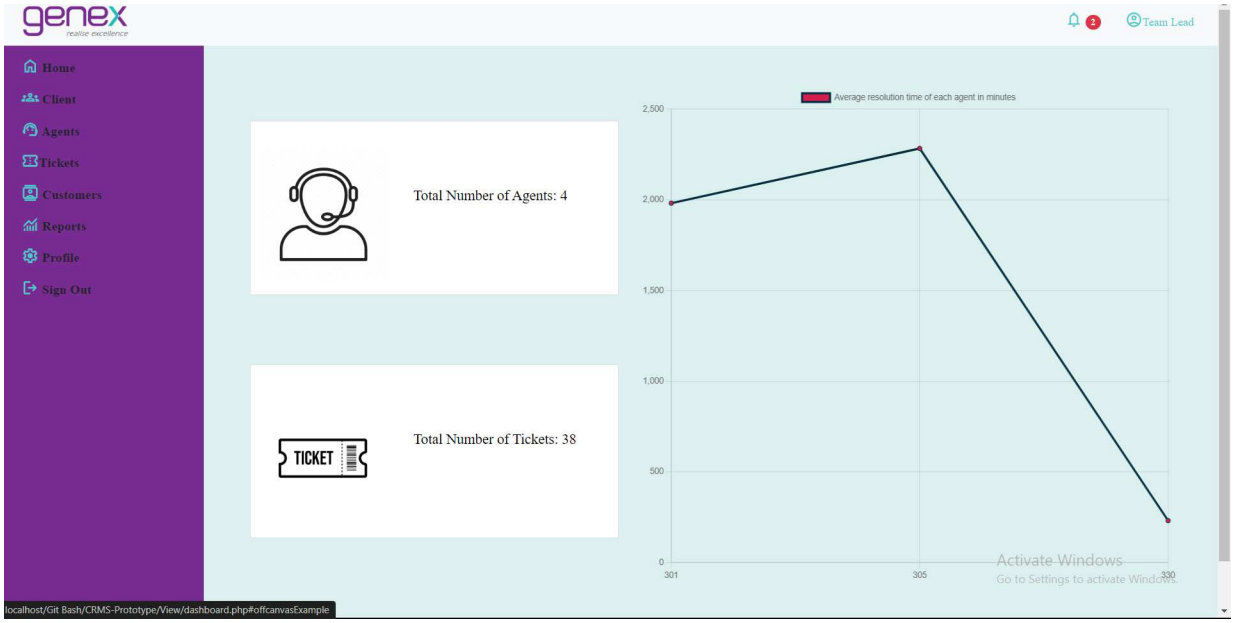

## 5.6 Testing

Throughout the development of each module, I diligently conducted simultaneous testing to ensure the reliability and functionality of the system. Despite these rigorous testing efforts, challenges emerged, and certain issues persisted. There were instances where the database experienced occasional malfunctions, and not all functionalities seamlessly integrated with one another. This prompted a meticulous troubleshooting process and iterative refinements to address these issues and enhance the overall system robustness. Continuous testing and refinement cycles were integral to mitigating challenges and ensuring a more cohesive and dependable application.I believe I was able to get all the operations to run smoothly.My supervisor also tested the functionalities,and if some problem arises in the future it can be fixed again. For testing the system I have provided some images below that can demonstrate the testing scenarios well. The images below depicts how the system can verify the users and according to their id and password the appropriate dashboard is loaded.


genex
realise excellence
User ID
105
Password
Log In
Forgot Password?

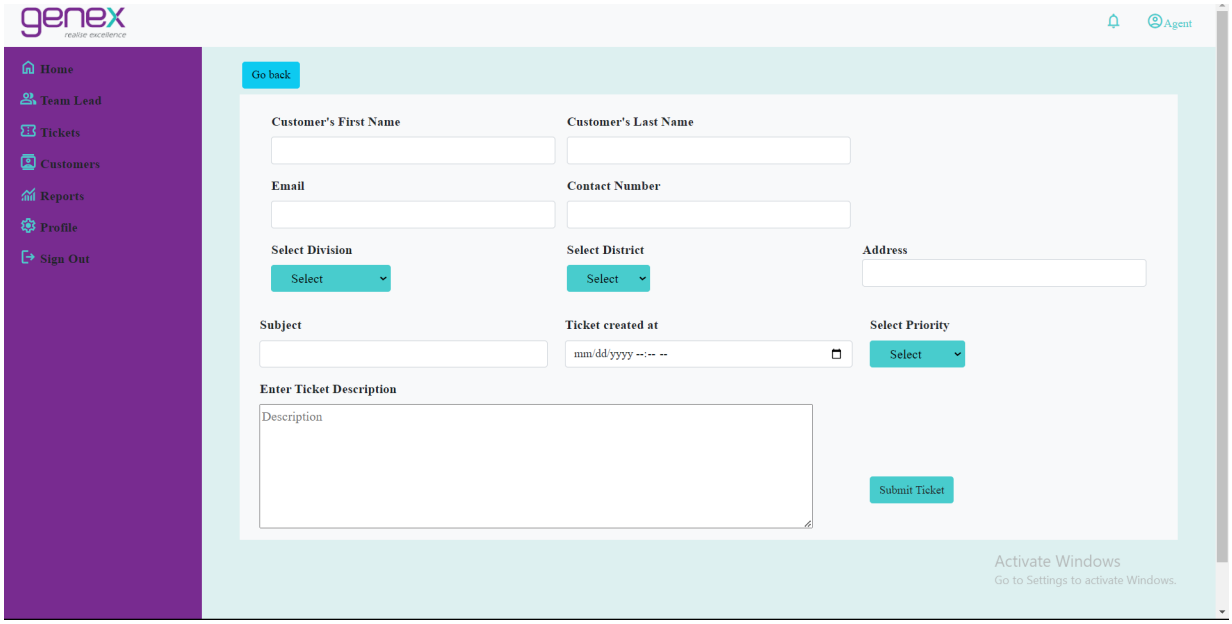

localhost says
Failed to login
OK

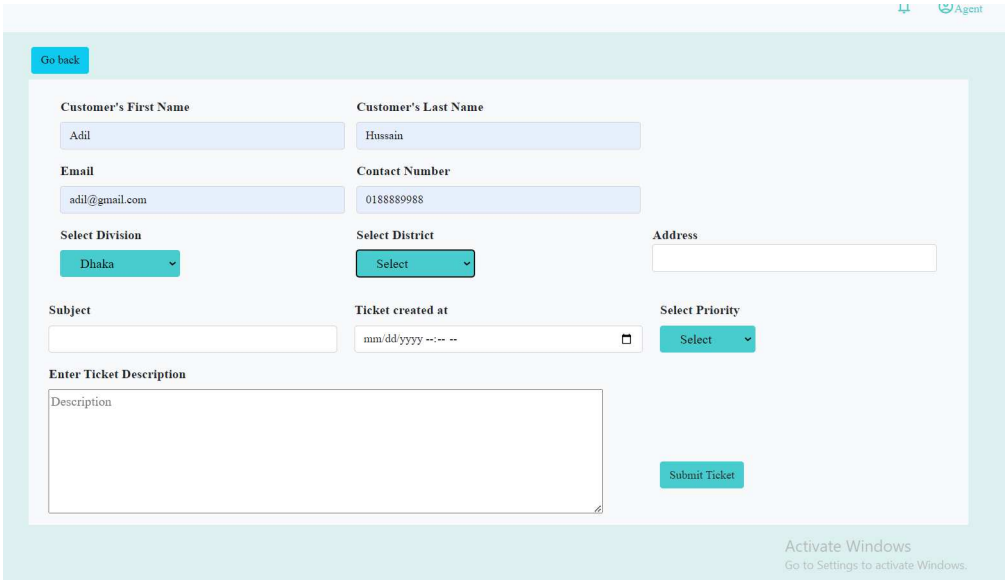

genex
realise excellence
User ID
211
Password
Log In
Forgot Password?

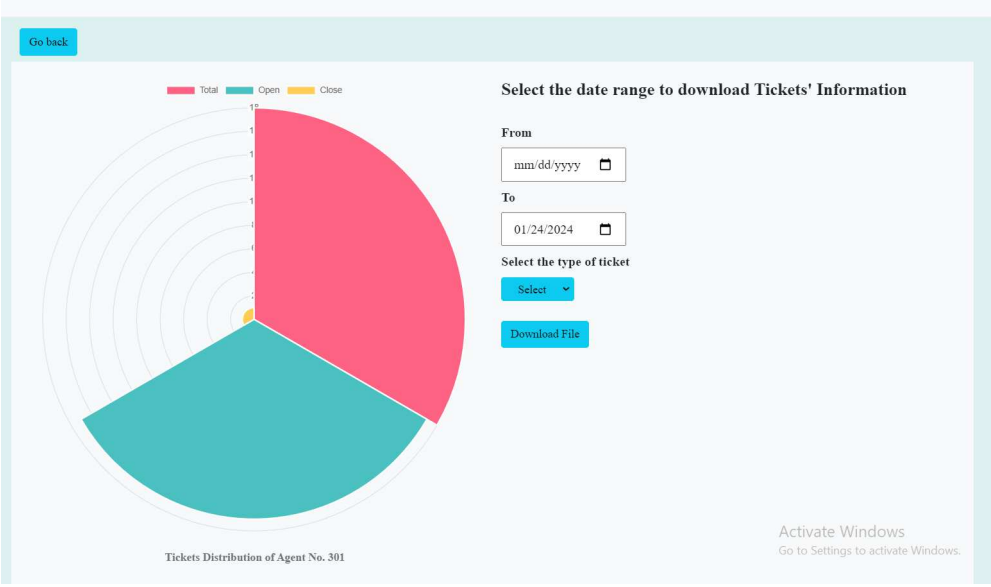


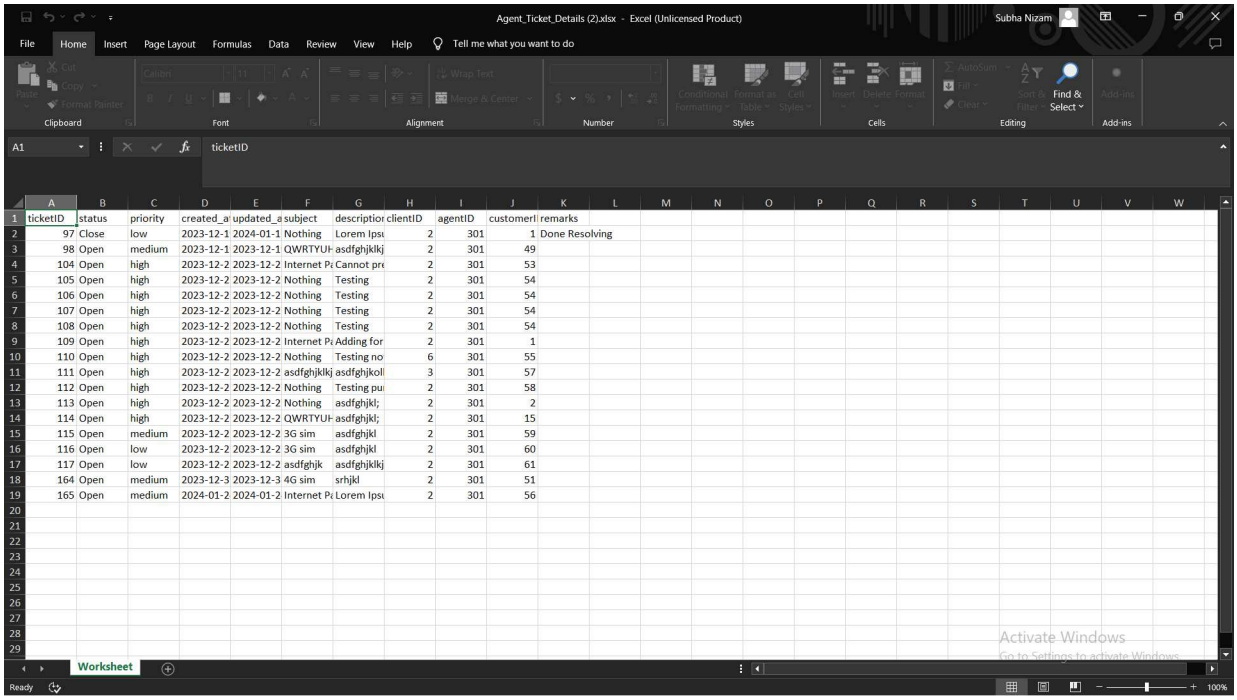

Team Lead's Dashboard is loaded based on the credentials logged in by the user.The reset password functionality works well too as shown above in the images in the implementation section.

The way I tested the downloading tickets information functionality has been illustrated in the pictures below.

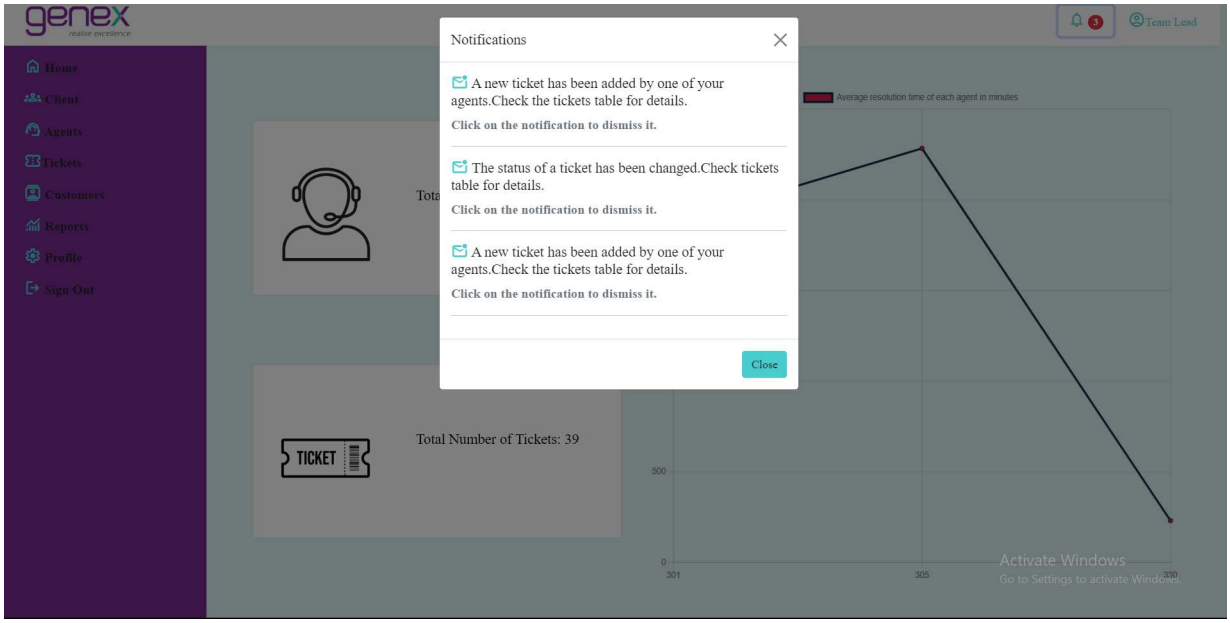


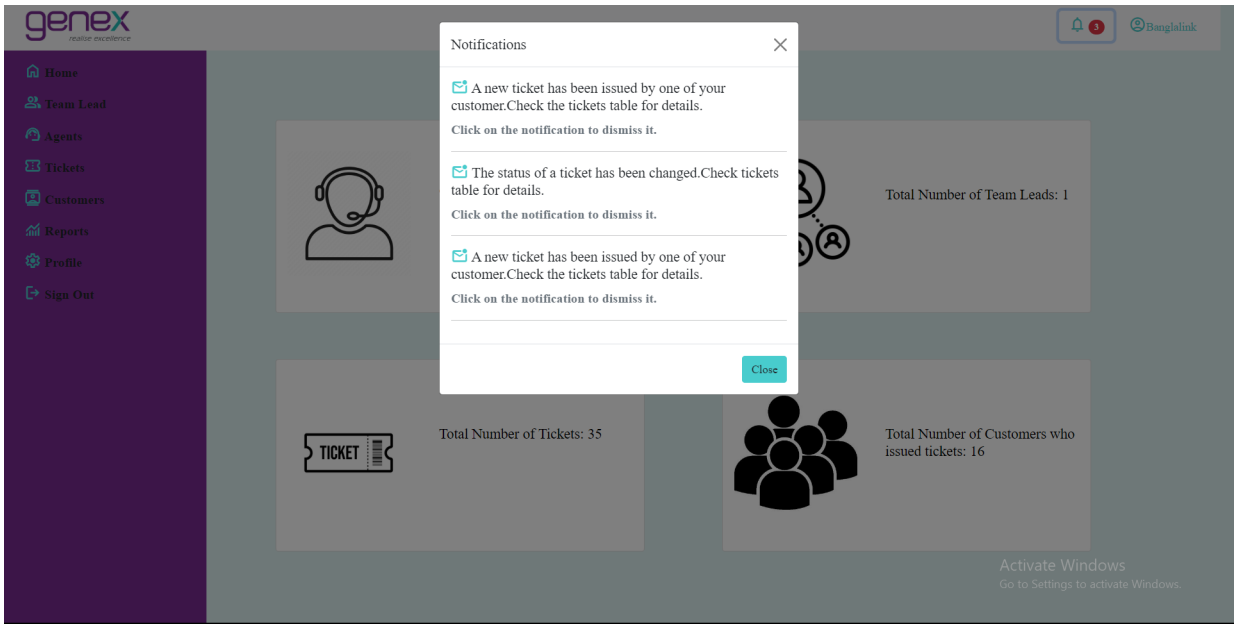

Agent
Go back
Customer's First Name
Adil
Customer's Last Name
Hussain
Email
adil@gmail.com
Contact Number
0188889988
Select Division
Dhaka
Select District
Select
Address
Subject
Ticket created at
mm/dd/yyyy --:-- --
Select Priority
Select
Enter Ticket Description
Description
Submit Ticket
Activate Windows
Go to Settings to activate Windows.


Go back
Total
Open
Close
Tickets Distribution of Agent No. 301
Select the date range to download Tickets' Information
From
mm/dd/yyyy
To
01/24/2024
Select the type of ticket
Select
Download File
Activate Windows
Go to Settings to activate Windows.




In order to test the tickets functionality I added a new ticket as shown above in the pictures and immediately my admin got a notification of a new ticket being added,similarly the team lead of thai agent will get notified too and so will the client.I have attached images to show the notifications sent to each of the user after the agent adds a new ticket.




I have tried to illustrate a few tests that helped me with understanding if the modules are working properly,however,other than this I have run a huge number of tests on this system to ensure it works smoothly and according to how my supervisor wanted it.

# Chapter 6

# Results & Analysis

In developing this CRM prototype, while the project itself wasn't exceedingly complex, I successfully achieved the targeted outcomes. The cornerstone of the prototype lies in its efficient ticketing system, a functionality executed with precision to yield the desired results. Guided by my supervisor's thorough support and direction, I not only met the outlined requirements but also incorporated additional features as per his specific instructions.

The ticketing module stands out as a central component, seamlessly functioning to meet its objectives. Beyond this, the customer management functionality was seamlessly integrated. Notably, only the admin possesses the authority to delete customer records, and the addition of new customer information aligns seamlessly with the process of opening a new ticket. In addition to the technical accomplishments, meeting project deadlines was a notable achievement. Despite facing some challenges and debugging phases, I successfully completed the entire project on time. The optimization journey during this period was marked by a transition to more efficient and streamlined coding practices. This evolution in coding proficiency led to the elimination of unnecessary files and functions, contributing to a leaner and more optimized system. As I presented the finalized system to my supervisor, the culmination of consistent coding efforts and independent system development became evident. The ability to write more efficient code and implement logical solutions was a testament to the learning curve throughout the project. This experience not only enriched my technical skills but also underscored the importance of iterative development, problem-solving, and efficient coding practices in delivering a robust and well-optimized software solution.

# Chapter 7

# Project as Engineering Problem Analysis

## 7.1 Sustainability of the Project/Work

I envision the sustainability of this CRM prototype, acknowledging the potential challenges posed by the aging language used in its development and the evolving industry standards. While the current implementation might not adhere to the latest coding practices, particularly in the context of the swiftly changing technological landscape, I recognize the importance of enhancing sustainability. The decision to employ object-oriented PHP for development would have been an optimal choice for future-proofing the system. However, as per my supervisor's guidance, the focus was on implementing the MVC architecture rather than OOP. Although the system operates seamlessly now, uncertainties loom regarding its ability to smoothly accommodate additional features and changes. While the system may not meet all industry standards, I perceive it as a foundational model for potential future developments. The incorporation of MVC architecture, despite being a deviation from OOP, lays a solid groundwork. This choice enhances the system's maintainability and provides a structural framework that can be adapted and extended in the future. Considering the more advanced functionalities in the existing Genex system, this prototype serves as a stepping stone for a less complicated model. The lessons learned from its development can be applied to future projects, emphasizing the importance of adopting modern coding practices for sustained relevance and adaptability in the dynamic technological environment. In essence, I view this prototype as a starting point, acknowledging the potential for further refinements and enhancements to meet the evolving industry standards and ensure long-term sustainability.

## 7.2 Social and Environmental Effects and Analysis

**Social Effects:**The CRM prototype significantly enhances user accessibility with its user-friendly interface and intuitive design.The system plays a pivotal role in enhancing customer relationships. By providing tools for efficient customer service, satisfaction, and engagement, the

CRM prototype contributes to a positive social impact. **Environmental Effects:**The CRM prototype promotes environmentally friendly practices by significantly reducing paper usage. Through digitized processes, it minimizes the organization's reliance on paper, contributing to resource efficiency and a reduction in environmental impact.By supporting remote access and telecommuting, the CRM prototype reduces the need for extensive commuting, resulting in a decreased carbon footprint. This aligns with environmental consciousness, contributing to a more sustainable operational model.The CRM prototype's impact on cost reduction is notable, with savings on paper costs, decreased travel expenses, and optimized resource utilization. This not only enhances operational efficiency but also aligns with responsible financial practices.

## 7.3 Addressing Ethics and Ethical Issues

From an ethical standpoint, the project's foundation seems stable as it primarily involves the management of company information. However, the existing build lacks robust security measures. The username and password authentication merely entail a basic cross-check with the database, posing a potential risk to sensitive company information. This raises ethical concerns as the current setup could jeopardize the confidentiality of valuable data. To rectify this issue, future iterations must prioritize the implementation of secure credential mechanisms. The emphasis should be on enhancing authentication protocols to ensure a more formidable defense against unauthorized access. Additionally, considering off-site storage for critical information would serve as an effective deterrent against potential intruders seeking access to the company's sensitive data. This approach aligns with ethical standards by prioritizing data protection and security.

# Chapter 8

# Lesson Learned

## 8.1 Problems Faced During this Period

Throughout the course of three months, I've discovered that becoming proficient in coding doesn't require an extensive amount of time. Regardless of the knowledge or programming skills I acquire, I've come to accept that I'll always resort to searching for solutions on Google. Over this period, I maintained a consistent coding practice, a habit that was lacking during my entire university experience. Concurrently, I undertook courses alongside my internship, recognizing familiar terms at my office due to my completion of related coursework. This process enlightened me about my shortcomings, emphasizing the need for continuous improvement and learning. Importantly, I realized that I can solve a myriad of problems and debug my code without relying on AI tools like ChatGPT.

## 8.2 Solution of those Problems

However, amidst the lessons learned, I encountered challenges. An initial hurdle was time management. While I dedicated effort to timely deliverables at the office, this discipline faltered in my university responsibilities. Striking a balance between work life and student commitments proved challenging, impacting my focus in post-work classes. This experience underscored the inadequacy of my skill set in preparing me for corporate life. There exists an additional facet to the corporate world, demanding familiarity with diverse terms and an understanding of the entire business process—knowledge not imparted during my university education. Processes like acquiring projects were unfamiliar to me, making it challenging to grasp these complexities. To add to the difficulty, I battled with imposter syndrome, feeling keenly aware of technical terms and tools that were beyond my understanding. Despite these challenges, I successfully completed both my internship and two coursework modules. This accomplishment has provided me with a fresh perspective on the corporate world. I now understand precisely what I need to learn and how to enhance my skill set before venturing into another job. The experience has highlighted the importance of efficiently juggling work and other responsibilities, reinforcing the principle of continuous learning. While acknowledging my current deficiency in time management, I am

committed to improvement and recognize the need to develop this skill further.

# Chapter 9

# Future Work & Conclusion

## 9.1 Future Works

This initial project serves as a foundational model upon which future iterations will be developed. It represents a fundamental concept of the web application's capabilities. In upcoming versions, significant enhancements are anticipated. Firstly, a more robust implementation of the MVC (Model-View-Controller) architecture is paramount. This will not only contribute to a more organized and scalable codebase but also enable the incorporation of a multitude of additional features. Security is a top priority for future iterations. The existing version lacks robust security measures, relying on a basic cross-referencing of credentials against the database. This vulnerability must be addressed to prevent unauthorized access. Future implementations should employ advanced security measures to safeguard sensitive company data. Beautification and user interface (UI) enhancements are imperative. While the current focus has been on functionality, aesthetics play a crucial role in user experience. Future versions should undergo significant UI improvements to create a visually appealing and user-friendly interface. Lastly, scalability should be a key consideration. The system's capacity to accommodate more users needs to be expanded. This involves not only optimizing performance but also designing the architecture to seamlessly handle an increased user load.

## 9.2 Conclusion

In conclusion, this internship has proven to be a highly fruitful experience, providing valuable insights into the dynamics of corporate life. The guidance and advice from my supervisors have been instrumental, offering a wealth of knowledge that will undoubtedly shape my future endeavors. Through this internship, I have not only gained practical skills but also honed my time management abilities. The lessons learned here will undoubtedly serve as a solid foundation for my future professional journey.


# An Undergraduate Internship Report on CRM Protype

By

**Mahmuda Nizam**

Student ID: **2020259**

**Autumn, 2023**

**The student modified the internship final report as per the recommendation made by his or her academic supervisor and/or panel members during final viva, and the department can use this version for achieving. The turn it in score was 11%.**

**Signature of the Supervisor**

## Name of the Supervisor

**Supervisor's Designation**

Department of Computer Science & Engineering

School of Engineering, Technology & Sciences

Independent University, Bangladesh