A

Mini Project Report

on

CUSTOMER RELATIONSHIP MANAGEMENT SYSTEM

Submitted in partial fulfillment of the requirements for the

degree

Second Year Engineering – Computer Science Engineering (Data Science)

by

SIDDESH SURVE	**24207004**
RUGVED SAPKAL	**24207011**
HARSH LAD	**24207002**
SAIYED SAMEER	**24207014**

Under the guidance of

Ms. POONAM PANGARKAR

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING (DATA SCIENCE)

A.P. SHAH INSTITUTE OF TECHNOLOGY

G.B. Road, Kasarvadavali, Thane (W)-400615

UNIVERSITY OF MUMBAI

Academic year: 2024-25

CERTIFICATE

This to certify that the Mini Project report on Customer Relationship Management system has been submitted by **Siddhesh Surve (**24207004**), Rugved Sapkal (**24207011**), Harsh Lad (**24207002**), and Saiyed Sameer(**24207014**)** who are bonafide students of A. P. Shah Institute of Technology, Thane as a partial fulfillment of the requirement for the degree in **Computer Science Engineering (Data Science)**, during the academic year **2024-2025** in the satisfactory manner as per the curriculum laid down by University of Mumbai.

Ms. Poonam Pangarkar
Guide

Ms. Anagha Aher
HOD, CSE(Data Science)

Dr. Uttam D. Kolekar
Principal

External Examiner:
1.

Internal Examiner:
1.

Place: A. P. Shah Institute of Technology, Thane
Date:

ACKNOWLEDGEMENT

This project would not have come to fruition without the invaluable help of our guide **Ms. Poonam Pangarkar**. Expressing gratitude towards our HoD, **Ms. Anagha Aher**, and the Department of Computer Science Engineering (Data Science) for providing us with the opportunity as well as the support required to pursue this project. We would also like to thank our project coordinator **Ms. Rajashri Chaudhari and Mr. Vaibhav Yavalkar** who gave us his/her valuable suggestions and ideas when we were in need of them. We would also like to thank our peers for their helpful suggestions.

TABLE OF CONTENTS

Chapter 1

Introduction

The **Customer Relationship Management (CRM)** system addresses a critical problem that many businesses face: the challenge of managing and optimizing interactions with a growing customer base. Without a structured approach, businesses struggle to track customer interactions, manage sales leads, and provide timely support, leading to decreased customer satisfaction and lost opportunities. CRM systems are designed to solve this problem by centralizing customer data, automating routine tasks, and enabling personalized engagement across multiple channels.

The aim of this report is to outline the development of a CRM system that enhances customer relationships by streamlining communication, automating sales processes, and providing actionable insights through data analysis. The scope of this project includes the design, implementation, and testing of a CRM platform capable of managing customer interactions, automating follow-ups, and supporting sales and support teams.

1.1 Purpose:

The purpose of this project is to develop a comprehensive **Customer Relationship Management (CRM)** system that enables businesses to efficiently manage customer interactions, automate sales and follow-up processes, and centralize customer data across multiple channels. By providing a structured platform, the CRM system will enhance customer satisfaction through personalized communication, timely support, and streamlined operations. Additionally, the system aims to improve sales performance by ensuring no leads are missed and automating repetitive tasks, allowing businesses to focus on building stronger, data-driven relationships with their customers.

1.2 Problem Statement:

In today's competitive market, businesses struggle to effectively manage and nurture customer relationships due to the growing complexity of interactions across multiple communication channels. Without an organized system in place, customer data is often scattered, leading to inefficient tracking of sales leads, poor follow-up management, and suboptimal customer support.

These challenges result in lost sales opportunities, decreased customer satisfaction, and difficulty in retaining clients. A comprehensive solution is needed to streamline customer interaction management, automate routine sales processes, and provide timely and personalized communication to improve overall business efficiency and customer satisfaction.

1.3 Objectives:

Enhance Customer Satisfaction: To improve customer satisfaction by efficiently managing customer interactions and providing timely responses to inquiries and support requests.

Automate Sales Processes: To automate sales and follow-up tasks, ensuring that leads are tracked systematically and that follow-ups are conducted promptly, thereby increasing conversion rates.

Streamline Communication: To integrate email communication within the CRM system, enabling seamless interactions between the business and its customers, and ensuring that all communication is tracked and easily accessible.

Data Management and Reporting: To develop a centralized database using MySQL for storing customer data, lead information, and interaction history, facilitating better data analysis and reporting to inform strategic decision-making.

1.4 Scope:

The scope of the Customer Relationship Management (CRM) system is extensive, focusing on three main areas: managing customer data, automating sales processes, and integrating email communication.

Customer Data Management involves the collection and organization of vital customer information, allowing businesses to access and update profiles easily, which supports personalized marketing efforts and fosters long-term relationships.

Sales Process Automation streamlines repetitive tasks such as follow-ups and lead tracking, enabling sales representatives to focus on high-value activities, thus increasing efficiency and conversion rates.

Email Integration facilitates seamless communication by allowing users to send and track emails within the CRM, ensuring that all interactions are logged and accessible for future reference.

The system also includes tools for **tracking customer interactions**, providing insights into customer behavior and preferences, and **generating reports** to analyze sales performance and marketing effectiveness, guiding informed decision-making.

Lastly, the CRM utilizes **MySQL for managing large datasets**, ensuring efficient storage and processing of customer information. This comprehensive scope empowers organizations to enhance customer relationships, streamline operations, and support business growth.

Chapter 2

Proposed System

The proposed Customer Relationship Management (CRM) system aims to provide businesses with a comprehensive platform to manage customer interactions, streamline sales processes, and improve overall efficiency. This system is designed to centralize customer data, automate key tasks such as lead tracking and follow-ups, and integrate communication channels, particularly email, for seamless interaction management.

2.1Features and Functionality

1. **Customer Data Management**: Centralized repository for storing customer information, including contact details, purchase history, and preferences. Easy access and updating of customer profiles to ensure data accuracy and relevance.

2. **Lead Tracking and Management**: Automated tracking of sales leads throughout the sales pipeline, from initial inquiry to conversion. Categorization and prioritization of leads based on interaction history and potential value.

3. **Sales and Follow-Up Automation**: Automation of routine sales tasks, including sending follow-up emails, scheduling appointments, and reminders for customer interactions. Tools for generating quotes and tracking sales performance.

4. **Email Integration**: Seamless integration with email platforms for direct communication with customers. Automated email campaigns to nurture leads and keep customers informed about promotions or new products.

Chapter 3

Project Outcomes:

1. **Improved Customer Satisfaction:** By efficiently managing customer interactions and providing timely responses, the CRM system is expected to enhance overall customer satisfaction, leading to stronger relationships and increased customer loyalty.

2. **Streamlined Business Processes:** The automation of sales tasks and integration of email communication will streamline business operations, allowing teams to work more efficiently and reducing the time spent on manual tasks.

3. **Effective Customer Relationship Management:** By centralizing customer data and tracking interactions, the CRM system will facilitate a more comprehensive understanding of customer needs and preferences, leading to more personalized and effective customer engagement strategies.

4. **Scalability for Future Growth:** The CRM system is designed to be scalable, allowing businesses to expand its functionalities and accommodate an increasing volume of customer data as they grow.

Chapter 4

Software Requirements:

The successful development and implementation of the Customer Relationship Management (CRM) system require a robust set of software tools that support the system's functionality and scalability. These software requirements ensure that the CRM system can manage customer data efficiently, automate sales processes, and facilitate seamless communication between the business and its customers.

Development Environment:

Visual Studio Code: A lightweight and powerful source code editor used for developing the CRM application, supporting various programming languages and extensions for enhanced functionality.

Database Management:

MySQL: An open-source relational database management system used to store customer data, lead information, and interaction history. MySQL provides robust data handling and querying capabilities, ensuring efficient data management.

Email Integration:

Email API (e.g., SendGrid or Mailgun): Services used for sending automated emails and managing email communications directly through the CRM system.

Chapter 5

Project Design

The design of the CRM System emphasizes a structured and efficient approach to managing customers, employees, and product data, as well as integrating WhatsApp and email API functionalities. The application is structured into three main components: the frontend (Java Swing), the backend (Java with JDBC), and the database (MySQL). This architecture ensures smooth interaction between users and the system, allowing for seamless CRUD operations and API integrations.

5.1 System Architecture

The CRM application follows a client-server architecture. The Java-based frontend communicates with the MySQL database via JDBC for data storage and retrieval. This architecture enhances the user experience by ensuring efficient handling of data and maintaining system scalability.

Components of the Architecture:

1. **Client (Frontend):** The frontend, developed using Java Swing, manages the user interface, allowing users to interact with the system. It consists of various sections such as login, dashboard, customer management, employee management, and product management. The user interface also includes API functionality to send messages via WhatsApp or email from the customer section.
2. **Backend (Logic & Database Access):** The backend is responsible for business logic, handling user inputs, processing CRUD operations, and interacting with the database using JDBC. It efficiently manages the data flow between the client and the database for customers, employees, and products. It also integrates API functionalities to interact with external services (WhatsApp and email).

3. **Database (MySQL):** The MySQL database acts as persistent storage, holding all relevant data for the system. It includes tables for customers, employees, and products, facilitating the storage and retrieval of information. The database supports all CRUD operations and is accessed via SQL queries executed by the Java application.

This architectural design ensures the CRM system is robust, maintainable, and scalable while providing a smooth and intuitive experience for users.

5.2. Database Design

The database is designed using the relational model and includes tables for managing customers, employees, and product details. The customer table also supports integration with external APIs like WhatsApp and email. Below are the key tables used in the system, with descriptions of their fields and relationships.

5.2.1 Key Entities and Their Relationships:

1. **Login Table:** Manages user authentication.
2. **Customer Table:** Stores information about customers.
3. **Employee Table:** Stores data on employees.
4. **Product Table:** Holds product-related information.

Customers Table:

Field	Type	Description
id	Int	Unique key
Customer_name	Varchar(45)	Specifies Customer Name
Cust_company	Varchar(45)	Specifies Customer Company
productid	Varchar(45)	Foreign key for relation
phone_no	Decimal(10,0)	Specifies customer phone no
email	Varchar(45)	Specifies Customer Email
role	Varchar(45)	Specifies Customer Role

Table 5.1: Customer Table

Employees Table:

Field	Type	Description
EmployeeID	Varchar(10)	Primary key
EmployeeName	Varchar(100)	Specifies employees name
EmployeeEmailAddress	Varchar(100)	Specifies employees email address
EmployeePhone	Varchar(15)	Specifies employee phone no

Table 5.2: Employee Table

Product Table:

Field	Type	Description
product_id	Int	Primary key
Product_name	Varchar(45)	Specifies product name
Prod_size	Varchar(45)	Specifies product size
Prod_version	Varchar(45)	Specifies Prod versions
Prod_type	Varchar(45)	Specifies product type
Batch_no	Varchar(45)	Specifies product's batch no
Prod_gen	Varchar(45)	Specifies product generation
company	Varchar(45)	Specifies company of product
Price_per_unit	Varchar(45)	Specifies price of product
Billing_id	Varchar(45)	Used for access management

Table 5.3: Product Table

5.3 Frontend Design

The user interface is designed for ease of use and is built using **Java Swing**. Key screens include:

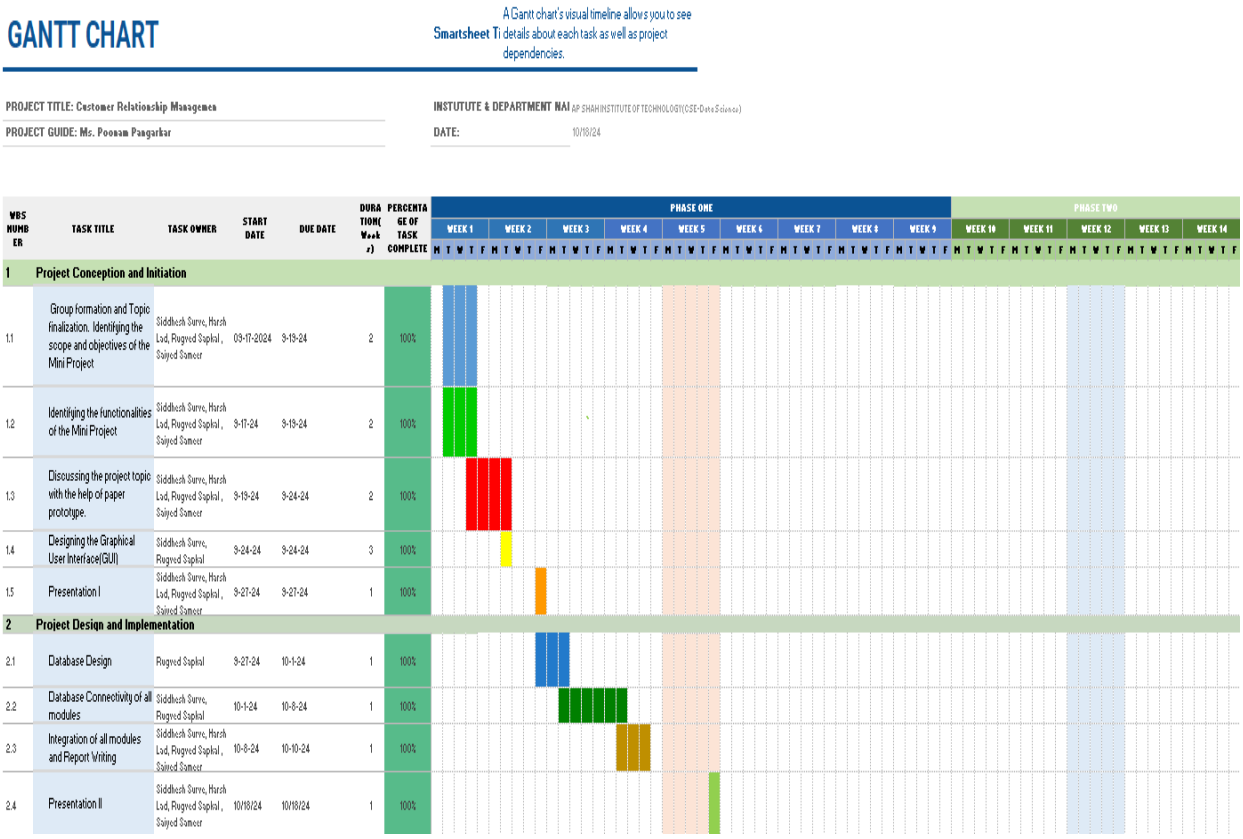
1. **Login Screen:** Simple login form with username and password fields. Upon successful login, the user is redirected to the dashboard.
2. **Dashboard:** Displays a summary of customers, employees, and products, with buttons for navigating to each section.
3. **Customer Section:** Displays customer data in a table. Options for adding new customers and sending WhatsApp or Email messages.
4. **Employee Section:** Displays employee data in a table, with an option to add new employees.
5. **Product Section:** Displays product data in a table, with an option to add new products.

5.4 Flow of Operations

1. **Login/Authentication**: Users are authenticated via the login screen. Their credentials are checked against the database.
2. **Customer Management**: Customers can be added or viewed, and communication is enabled via WhatsApp or Email APIs.
3. **Employee Management**: Employees can be added and their details viewed.
4. **Product Management**: Products can be added or viewed.
5. **Data Persistence**: All records are stored and retrieved from the MySQL database using JDBC.

Chapter 6

Project Scheduling



GANTT CHART

A Gantt chart's visual timeline allows you to see details about each task as well as project dependencies.

Smartsheet Ti

PROJECT TITLE: Customer Relationship Management

PROJECT GUIDE: Ms. Poonam Pangarkar

INSTITUTE & DEPARTMENT NAI AP SHAH INSTITUTE OF TECHNOLOGY (CSE-Data Science)

DATE: 10/18/24

WBS NUMBER	TASK TITLE	TASK OWNER	START DATE	DUE DATE	DURATION (Week #)	PERCENTAGE OF TASK COMPLETE
1	**Project Conception and Initiation**					
1.1	Group formation and Topic finalization. Identifying the scope and objectives of the Mini Project	Siddhesh Surve, Harsh Lad, Rugved Sapkal, Saiyed Sameer	09-17-2024	9-19-24	2	100%
1.2	Identifying the functionalities of the Mini Project	Siddhesh Surve, Harsh Lad, Rugved Sapkal, Saiyed Sameer	9-17-24	9-19-24	2	100%
1.3	Discussing the project topic with the help of paper prototype.	Siddhesh Surve, Harsh Lad, Rugved Sapkal, Saiyed Sameer	9-19-24	9-24-24	2	100%
1.4	Designing the Graphical User Interface(GUI)	Siddhesh Surve, Rugved Sapkal	9-24-24	9-24-24	3	100%
1.5	Presentation I	Siddhesh Surve, Harsh Lad, Rugved Sapkal, Saiyed Sameer	9-27-24	9-27-24	1	100%
2	**Project Design and Implementation**					
2.1	Database Design	Rugved Sapkal	9-27-24	10-1-24	1	100%
2.2	Database Connectivity of all modules	Siddhesh Surve, Rugved Sapkal	10-1-24	10-8-24	1	100%
2.3	Integration of all modules and Report Writing	Siddhesh Surve, Harsh Lad, Rugved Sapkal, Saiyed Sameer	10-8-24	10-10-24	1	100%
2.4	Presentation II	Siddhesh Surve, Harsh Lad, Rugved Sapkal, Saiyed Sameer	10/18/24	10/18/24	1	100%

PHASE ONE: WEEK 1 | WEEK 2 | WEEK 3 | WEEK 4 | WEEK 5 | WEEK 6 | WEEK 7 | WEEK 8 | WEEK 9

PHASE TWO: WEEK 10 | WEEK 11 | WEEK 12 | WEEK 13 | WEEK 14

M T W T F M T W T F M T W T F M T W T F M T W T F M T W T F M T W T F M T W T F M T W T F M T W T F M T W T F M T W T F M T W T F M T W T F M T W T F M T W T F M T W T F

Figure 6.1: Gantt Chart

Chapter 7

Results

The CRM System effectively accomplishes its objective of managing customer, employee, and product data efficiently while integrating external communication APIs (WhatsApp and Email) for enhanced customer interaction. Below is a detailed summary of the results from development and testing:

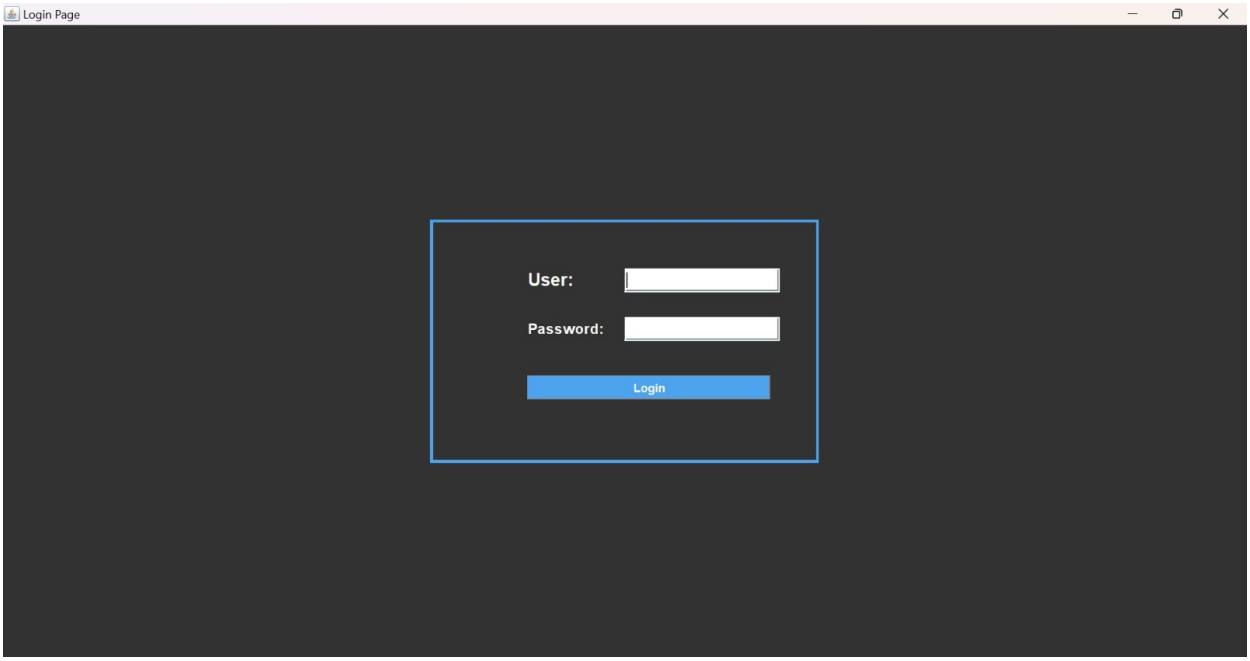


Fig 7.1: Login Page

1. **User Login**: The system provides secure login functionality. Upon successful login, users are directed to a dashboard where they can navigate to different sections (Customer, Employee, and Product) with pre-existing data displayed from the MySQL database.

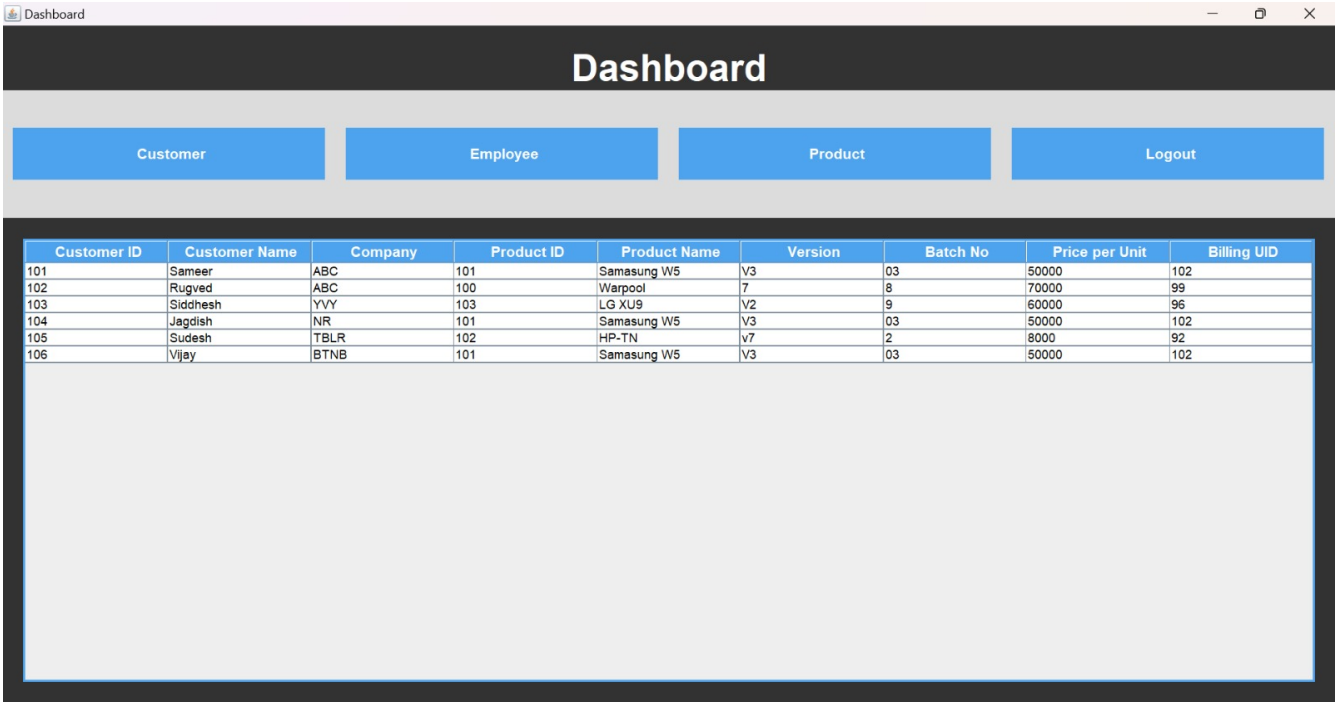


Fig 7.2: Dashboard

1. **Data Persistence**: All customer, employee, and product data is stored securely in a MySQL database, ensuring that the information is always up-to-date and accessible between sessions.

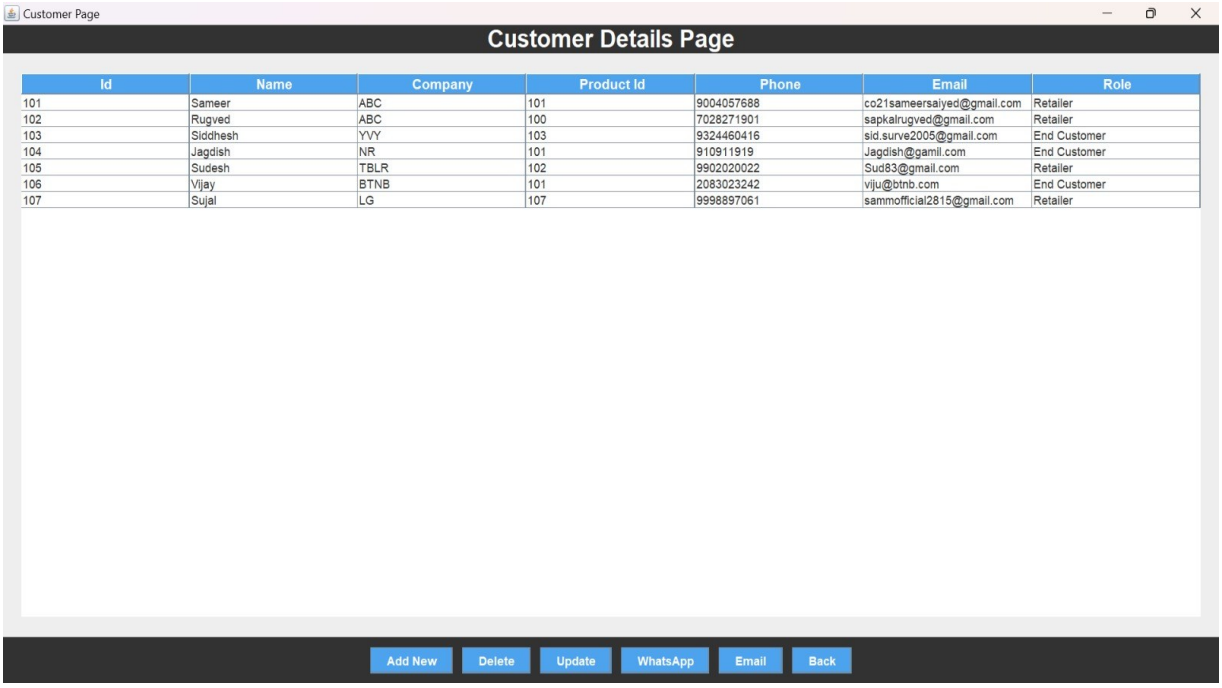


Fig 7.3: Customer Details Page

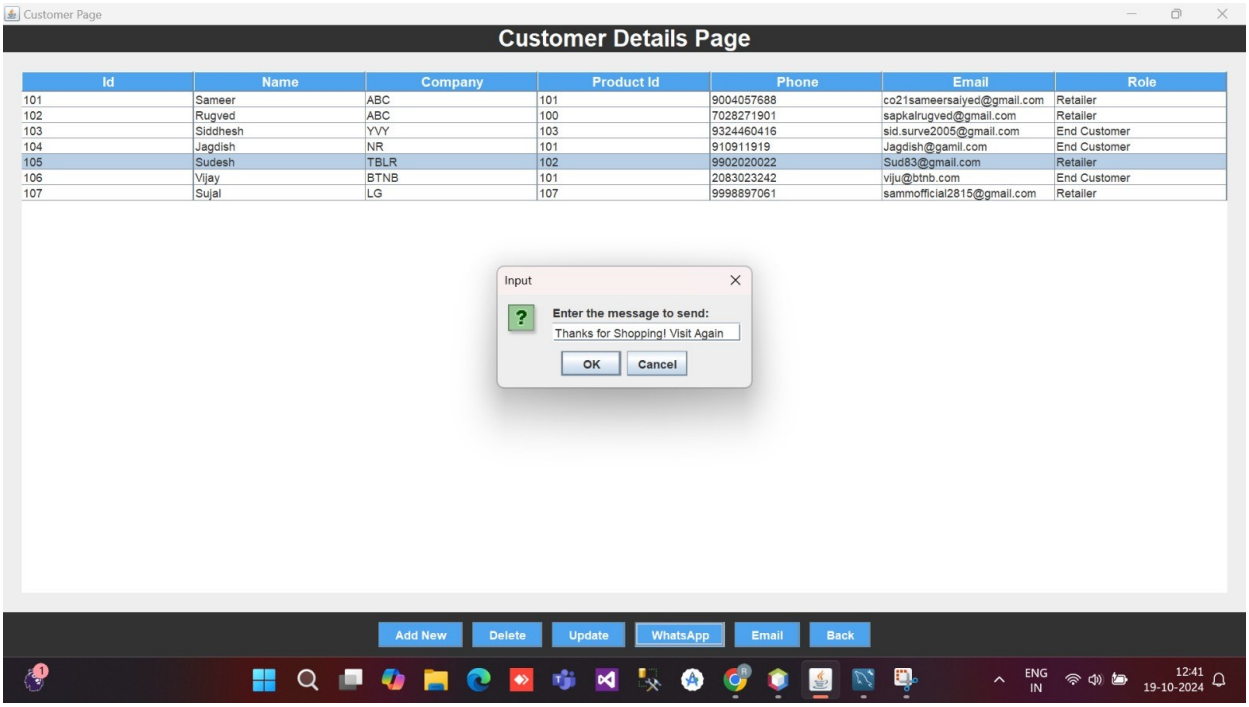


Fig 7.4: WhatsApp message prompt

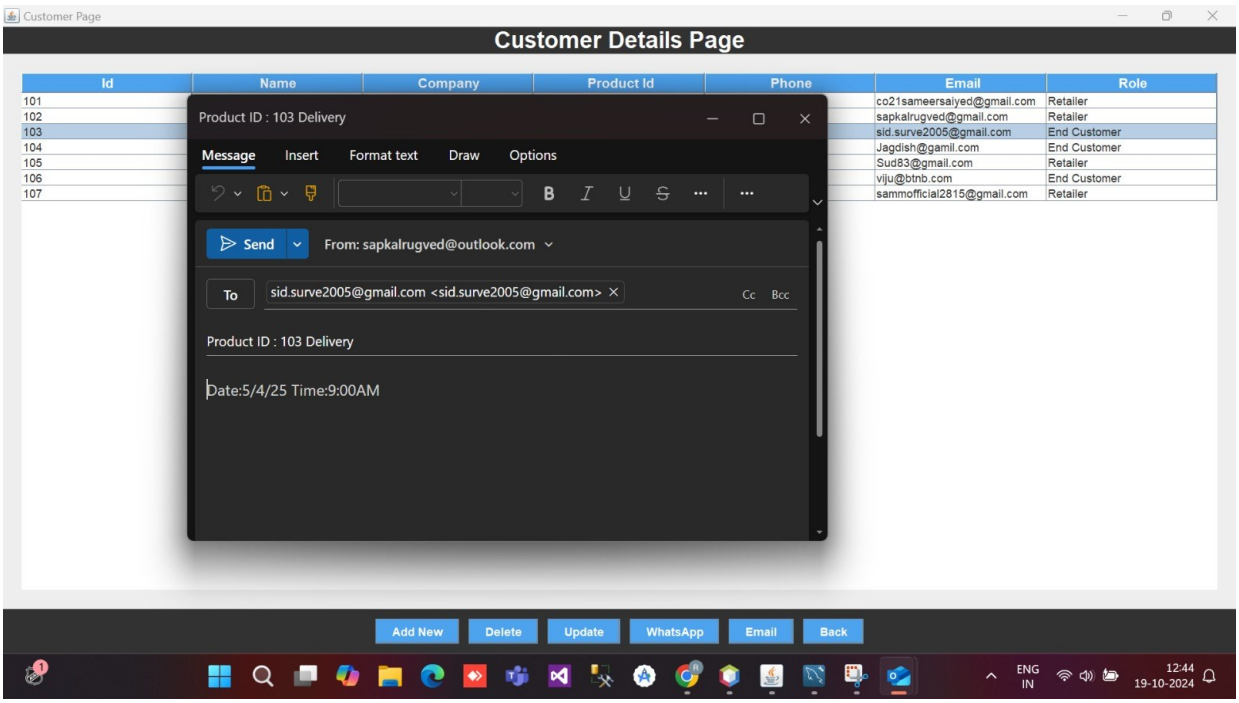


Fig 7.5: Email Prompt

2. **Customer Section with API Integration**: Users can view customer data in a table format, which includes email addresses and phone numbers. Clicking an entry provides options to send either a WhatsApp message or an email, integrating external APIs for seamless communication.

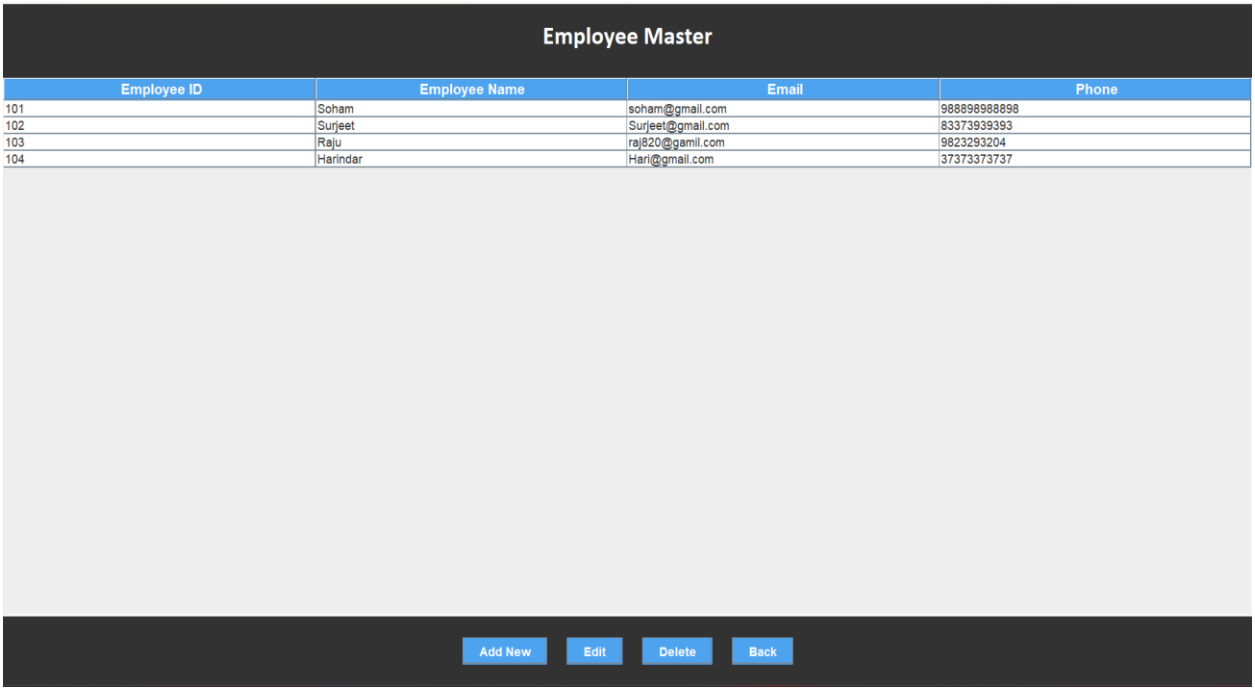


Fig 7.5: Product Details Page

3. **Employee Management**: Admins can add, modify, and view employee records. This feature ensures that all employee data (like name, contact, and position) is managed effectively in the MySQL database.

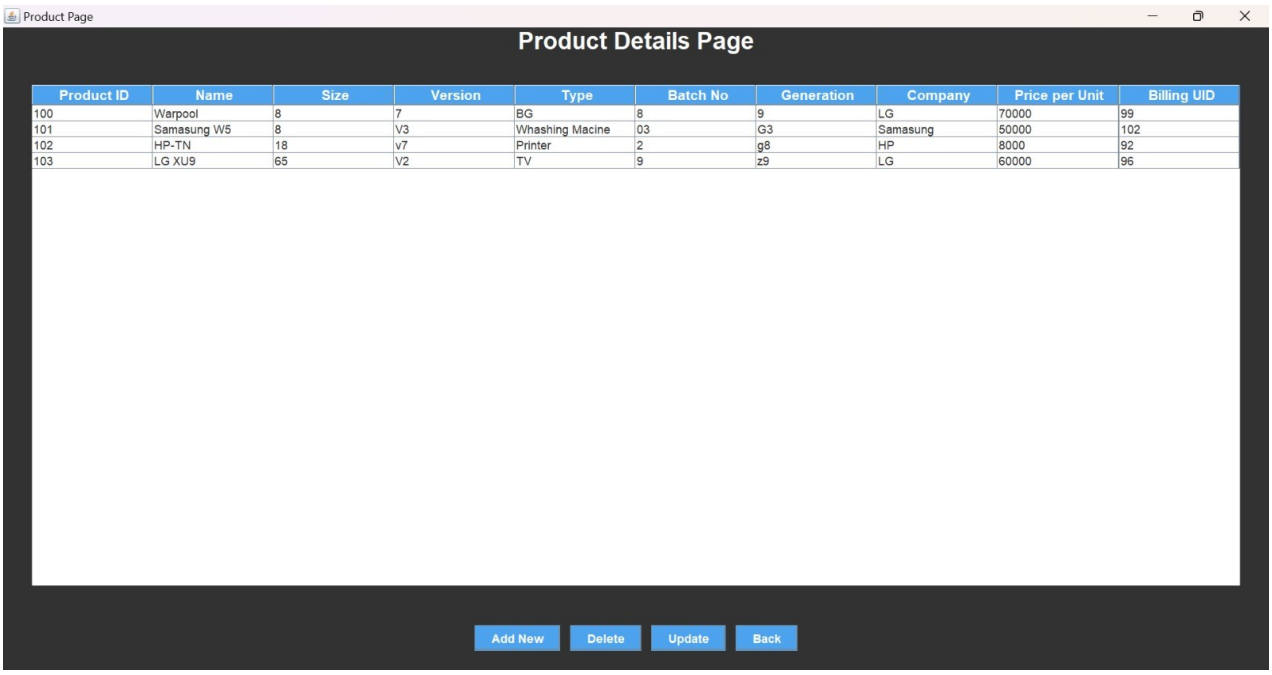


Fig 7.6: Product Details Page

4. **Product Management**: Admins can add, modify, and view product information. The system allows for streamlined product management, with the ability to track inventory and details efficiently.

7.1 Performance and Responsiveness

1. **Data Handling**: The system efficiently handles data storage and retrieval through optimized MySQL queries. Whether managing customer communications or handling employee and product data, the CRM system responds promptly, even with a substantial volume of entries.

2. **User Interface**: Built using JavaFX/Swing, the interface is intuitive, allowing users to switch between sections (Customer, Employee, Product) with ease. The inclusion of API features, such as sending messages, is integrated smoothly into the user experience.

7.2 Testing Results

1. **Functional Testing**: The CRM system was tested across various scenarios, ensuring that key functionalities performed without errors. This included:
    - User login and navigation to the dashboard.
    - Customer section API integrations (WhatsApp, Email).
    - Employee and product data management.
    - Database interaction (add, view, modify records). All test cases passed successfully.

2. **Performance Testing**: The system maintained stable performance when tested with large datasets, including numerous customer, employee, and product records.

7.3 Challenges and Resolutions

1. **API Integration**: Integrating WhatsApp and Email APIs required careful handling of customer data (phone numbers, emails). Challenges in establishing connections with the APIs were resolved through proper configuration and testing.
2. **Database Management**: Ensuring data integrity and avoiding duplicate entries were key challenges, especially when adding new customers, employees, or products. These were addressed through validation checks and the use of unique keys in the database schema.

7.4 Achievements

The CRM System successfully met the following goals:

- Implemented key CRM functionalities such as customer management, employee records, and product tracking.
- Integrated communication APIs to allow direct customer interaction through WhatsApp and email.
- Developed a robust backend using MySQL, ensuring data persistence and integrity.
- Provided an intuitive Java-based frontend for easy navigation and data management.

Chapter 8

Conclusion

The system's core functionalities—user login, customer management with API integration, employee and product data management—were implemented successfully. It provides a clear separation between the frontend (built using JavaFX/Swing) and the backend, ensuring efficient data handling and persistence.

Through rigorous testing, the CRM system has proven reliable in various real-world scenarios, including managing customer communications and employee/product data. The architecture and database design lay a strong foundation for potential enhancements.

8.1 Challenges and Learning Outcomes

During development, challenges such as API integration and maintaining database integrity were overcome. Working with external APIs for customer communication provided valuable insights into handling third-party services, while the use of MySQL and JDBC deepened understanding of Java-database interactions.

8.2 Future Work

There are numerous possibilities for expanding the system's functionality in the future:

- **Advanced Customer Analytics**: Providing reports on customer interaction trends, enabling businesses to analyze customer behavior.
- **Employee and Product Reports**: Allowing managers to generate detailed reports on employee performance or product inventory.
- **Multi-channel Communication**: Extending communication channels beyond WhatsApp and Email to include SMS, social media, etc.
- **Mobile Version**: Developing a mobile version of the system for enhanced accessibility

8.3 Final Thoughts

The development of this CRM System has been a valuable learning experience, combining skills in Java programming, database management, and API integration. The system's solid foundation offers opportunities for further development and optimization, promising to enhance its functionality and usability for business needs.

References

[1] Swing Documentation URL: https://docs.oracle.com/javase/tutorial/uiswing//

[2] Oracle “ java Swing Packages” URL: https://docs.oracle.com/javase/8/docs/api/index.html?javax/swing/package-summary.html

[3] GeeksforGeeks “Swing Scrollpane Layout” URL: https://www.geeksforgeeks.org/java-swing-scrollpanelayout-class/?ref=asr3

[4] Stackoverflow “Jpanel “ URL: https://stackoverflow.com/questions/5328405/jpanel-padding-in-java

[5] Stack Overflow. "Various Java and MySQL Development Queries." URL: https://stackoverflow.com/

[6] JavaTpoint. "JDBC MySQL Tutorial."

URL:https://www.javatpoint.com/java-mysql-tutorial