

Development of a Centralized CRM Platform for Digital Customer Relationship Management

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Abstract: *The increasing adoption of digital technologies has transformed the way organizations interact with customers, making efficient relationship management a critical factor for business success. Modern customers expect personalized communication, faster responses, and seamless experiences across multiple channels, encouraging businesses to adopt intelligent software solutions that support these expectations. As competition continues to grow across industries, organizations must not only acquire new customers but also retain existing ones by understanding their preferences, purchasing behavior, and service requirements. This shift has increased the importance of data-driven decision-making, where businesses rely on accurate customer information to improve engagement, strengthen customer loyalty, and enhance overall business performance.*

Customer Relationship Management (CRM) systems have evolved from simple contact management tools into integrated platforms that assist organizations in managing sales, marketing, customer support, and strategic decision-making through centralized customer information. By consolidating customer interactions from multiple communication channels into a single platform, CRM systems enable businesses to automate routine processes, monitor customer activities, generate meaningful reports, and provide personalized services. Furthermore, modern CRM solutions support collaboration across departments, allowing sales, marketing, and customer service teams to access consistent and up-to-date information. This integrated approach not only improves operational efficiency but also helps organizations build stronger customer relationships, increase customer satisfaction, and achieve sustainable long-term growth in an increasingly competitive digital environment.

Keywords: Customer Relationship Management (CRM), Web-Based Application, Customer Data Management, Business Process Automation, Customer Engagement, Digital Transformation.

I. INTRODUCTION

Customer Relationship Management (CRM) software is a tool that businesses use to manage their interactions with current and potential customers. By centralizing customer data and communication history, CRM systems enable organizations to streamline business processes, improve customer service, and enhance customer satisfaction. These systems play a vital role in supporting sales, marketing, and customer support by providing a unified view of customer interactions across multiple channels, such as emails, phone calls, social media, and in-person communication.

With the rapid growth of digital technologies, customer expectations have evolved significantly. Businesses are now expected to provide faster responses, personalized services, and consistent communication across different platforms. Traditional methods of maintaining customer records are no longer sufficient to meet these demands, making CRM software an essential solution for improving operational efficiency and building long-term customer relationships. By automating routine tasks and providing real-time access to customer information, CRM systems help organizations make informed decisions and improve overall business performance.



The development of a CRM system typically involves a combination of front-end technologies for creating an interactive user interface and back-end technologies for managing and storing business data. In this research, Angular is used as the front-end framework to develop a responsive and user-friendly web application, while SQL is used as the database management system to securely store and manage customer information.

The primary objective of this research is to design and develop a web-based CRM system that simplifies customer data management, enhances communication, and supports efficient business operations. The proposed system aims to provide a centralized platform for managing customer information while improving productivity, customer engagement, and organizational decision-making.

II. LITERATURE REVIEW

1. Strategic Framework for Customer Relationship Management

According to Payne and Frow (2005), Customer Relationship Management (CRM) is more than just a software application; it is a comprehensive business strategy that integrates people, processes, and technology to build long-term customer relationships. Their research presents a strategic CRM framework consisting of customer acquisition, retention, value creation, multichannel integration, and performance assessment. The study emphasizes that organizations implementing CRM effectively can improve customer satisfaction, increase loyalty, and achieve sustainable business growth. This framework provides a strong foundation for developing CRM systems that support efficient customer management and business decision-making.

2. People, Process, and Technology in CRM

Chen and Popovich (2003) explain that the success of a CRM system depends on the effective integration of three key components: people, business processes, and technology. Their research highlights that CRM should not be viewed merely as a technological solution but as an organizational strategy that improves customer interactions through well-defined business processes and employee collaboration. The authors conclude that centralized customer information enables organizations to deliver personalized services, improve communication, and enhance operational efficiency. These findings support the development of modern web-based CRM applications that focus on improving both customer experience and internal business operations.

3. Modern CRM Technologies and Business Applications

Buttle and Maklan (2019) describe CRM as a customer-centric approach that combines information technology with relationship management to improve organizational performance. Their work discusses the evolution of CRM from simple contact management systems to intelligent platforms capable of supporting sales, marketing, customer service, and data analysis. The authors emphasize that modern CRM systems provide centralized customer data, automate routine business activities, and generate valuable insights that assist organizations in making informed decisions. These concepts are reflected in the proposed CRM system developed in this research using Angular for the front-end and SQL for secure and efficient database management.

Objectives of the Study

1. To design and develop a web-based Customer Relationship Management (CRM) system using Angular and SQL.
2. To centralize customer information and improve the management of customer records through a single integrated platform.
3. To enhance communication between businesses and customers by maintaining accurate customer interaction histories.
4. To simplify sales and customer management processes by reducing manual data handling and improving data accessibility.



5. To evaluate the effectiveness of the proposed CRM system in improving operational efficiency and customer relationship management.
6. To provide a secure and user-friendly CRM application that supports business decision-making through organized customer data.

Hypotheses**H₀ (Null Hypothesis):**

The proposed web-based CRM system does not significantly improve customer data management and business operations.

H₁ (Alternative Hypothesis):

The proposed web-based CRM system significantly improves customer data management and business operations.

III. RESEARCH METHODOLOGY

This research adopts a development-oriented methodology to design, implement, and evaluate a web-based Customer Relationship Management (CRM) system that improves the management of customer information and business operations. The study begins with an analysis of the challenges associated with traditional customer management practices and identifies the functional requirements needed for an efficient CRM solution. Based on these requirements, the system is designed and developed using the Agile software development methodology, which supports iterative planning, development, testing, and continuous improvement throughout the project lifecycle. The application is built using Angular as the front-end framework to provide a responsive and user-friendly interface, while SQL is employed as the database management system to securely store, organize, and retrieve customer data. HTML, CSS, and TypeScript are used to enhance the application's functionality, performance, and maintainability. The developed system includes essential CRM features such as user authentication, customer record management, sales and communication tracking, and centralized data management. Functional testing is conducted to verify the accuracy and reliability of each module, while usability testing ensures that the application is easy to use and meets the intended business requirements. The overall methodology focuses on developing a secure, scalable, and efficient CRM solution that simplifies customer management, enhances communication, improves operational efficiency, and supports better decision-making within organizations.

IV. SYSTEM ARCHITECTURE

The proposed Customer Relationship Management (CRM) system follows a three-tier architecture consisting of the presentation layer, application layer, and database layer. This architecture provides a structured and scalable approach for managing customer information, sales activities, and business operations while ensuring efficient communication between the user interface and the database.

The presentation layer is developed using the Angular framework, which provides a responsive and interactive web interface for users. This layer enables administrators and sales employees to perform various operations such as user authentication, customer management, lead generation, opportunity tracking, interaction management, and report generation. Angular's component-based architecture and data-binding capabilities ensure smooth navigation, real-time updates, and an enhanced user experience.

The application layer acts as the communication bridge between the user interface and the SQL database. It processes user requests, validates input data, applies business rules, and performs the required operations before interacting with the database. Whenever a user performs an action such as adding a customer, updating lead information, recording customer interactions, or requesting reports, the application layer handles the request and ensures that accurate information is exchanged between the front-end and the database.

The database layer is implemented using SQL, which securely stores and manages all business-related information. The database consists of interconnected tables such as Users, Customers, Leads, Opportunities, Interactions, and Sales



Employees. Through relational database management, the system maintains data consistency, minimizes redundancy, and enables quick retrieval of customer information. SQL queries are used to perform operations such as inserting, updating, deleting, and retrieving records while supporting report generation and business analytics.

The overall architecture enables seamless communication between all system components, ensuring secure data management, efficient processing of customer information, and reliable business operations. By integrating Angular with SQL, the proposed CRM system provides a scalable, maintainable, and user-friendly solution that improves customer relationship management, enhances operational efficiency, and supports informed decision-making.

Technologies Used

Angular - Developed the responsive front-end interface and implemented component-based architecture for dynamic user interactions.

Type script - Implemented application logic, services, and business functionality within the Angular framework.

SQL - Stored customer information, user accounts, sales data, interactions, and reports in a relational database.

HTML - Structured the web pages and application components.

CSS - Designed the application's layout, styling, and responsive interface.

Database Design

The CRM system uses a relational SQL database to securely store and manage customer information, user accounts, sales activities, and interaction records. The database is designed to minimize data redundancy while maintaining relationships between different modules for efficient data retrieval and management.

The main database tables include:

- **Users:** Stores user login credentials, roles, and account information.
- **Customers:** Contains customer details such as customer code, company name, contact information, assigned sales employee, and budget.
- **Sales Employees:** Maintains employee details, including employee code, name, email, and department.
- **Leads:** Stores information about potential customers, including company details, lead status, priority, and assigned sales employee.
- **Interactions:** Records customer communications, including interaction type, date, item details, and comments.

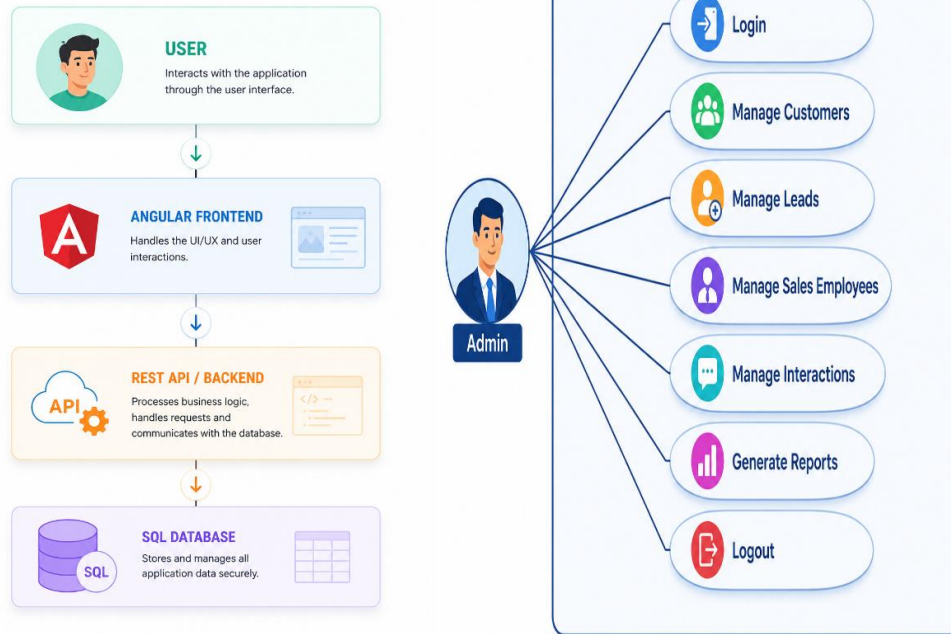
Database Relationships

The CRM database follows a relational model where:

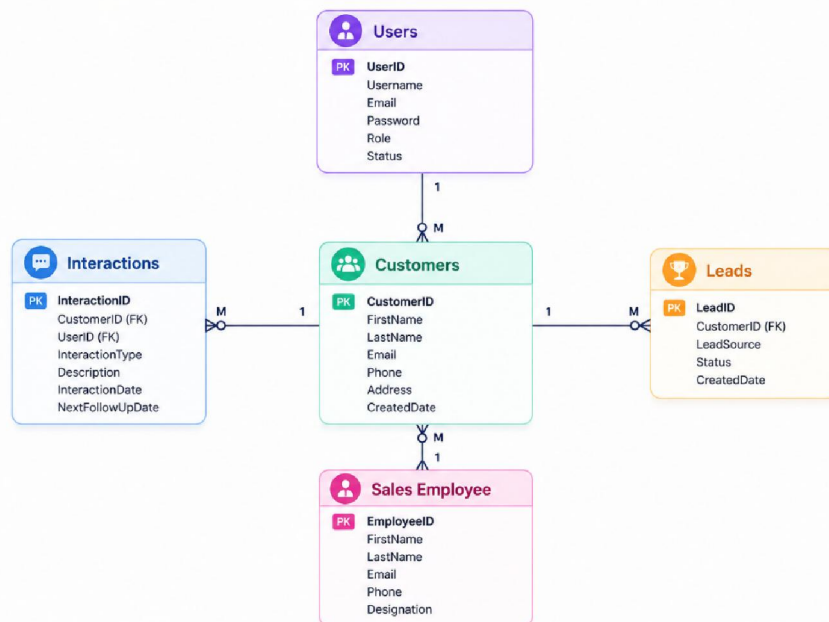
- One Sales Employee manages multiple Customers.
- One Customer can have multiple Interactions.
- One Customer may generate multiple Leads.
- User authentication controls system access based on assigned roles.
- SQL relationships maintain data integrity through primary and foreign keys.



SYSTEM ARCHITECTURE



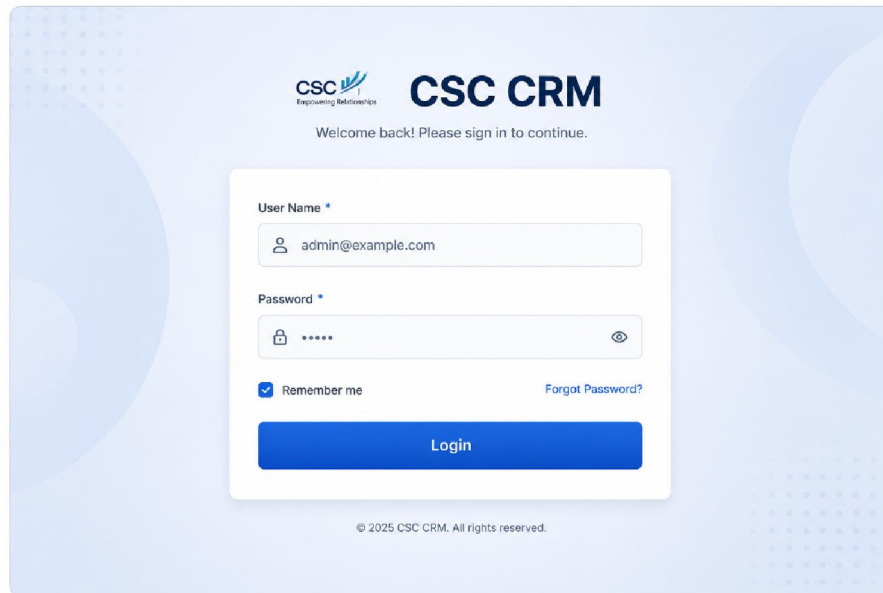
CRM SYSTEM - ER DIAGRAM



V. WORKING SOFTWARE

5.1 Login Screen

The Login Screen serves as the entry point to the CRM application, ensuring that only authorized users can access the system. The application supports two user roles: **Administrator** and **Sales Employee**. Users are required to enter a valid email address and password for authentication. Upon successful login, the system verifies the credentials and redirects the user to the dashboard based on their assigned role. This authentication mechanism helps protect sensitive customer information and ensures secure access to the CRM system.

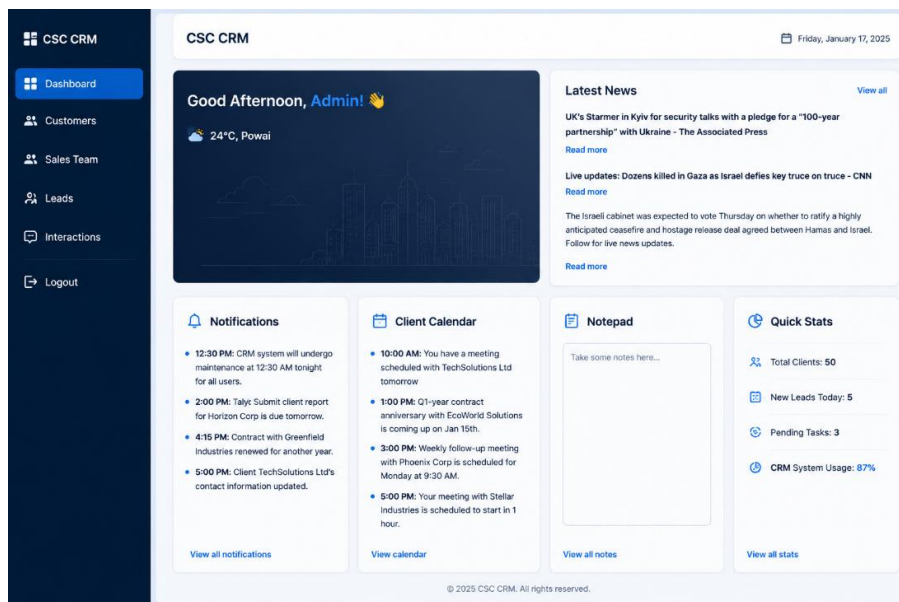


The screenshot shows the login interface for CSC CRM. At the top, the CSC logo and 'CSC CRM' text are displayed, along with the tagline 'Empowering Relationships'. Below this, a welcome message reads 'Welcome back! Please sign in to continue.' The login form contains fields for 'User Name' (with a dropdown icon) and 'Password' (with a toggle icon). The 'User Name' field is pre-filled with 'admin@example.com'. Below the password field, there is a 'Remember me' checkbox (checked) and a 'Forgot Password?' link. A blue 'Login' button is positioned at the bottom of the form. At the very bottom of the screen, a copyright notice states '© 2025 CSC CRM. All rights reserved.'

5.2 Dashboard

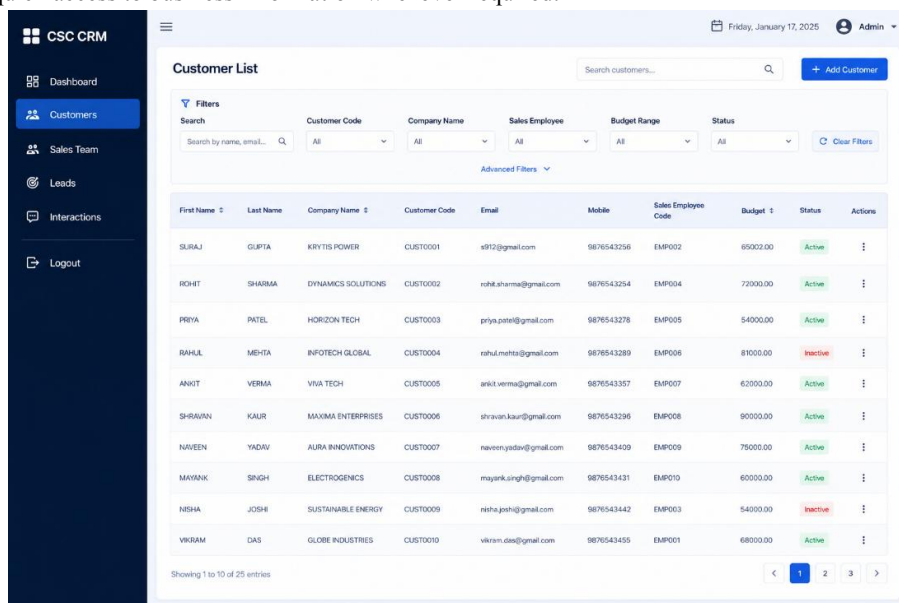
The Dashboard provides a centralized overview of all important business activities immediately after user login. It displays key components such as the **Task Tracker**, **Client Calendar**, **Latest News**, **Notifications**, **Notepad**, and **Quick Statistics**. These features help users monitor pending tasks, schedule client meetings, receive important updates, and track overall CRM performance. The dashboard improves productivity by presenting all essential information in a single interface, enabling users to perform their daily activities more efficiently.





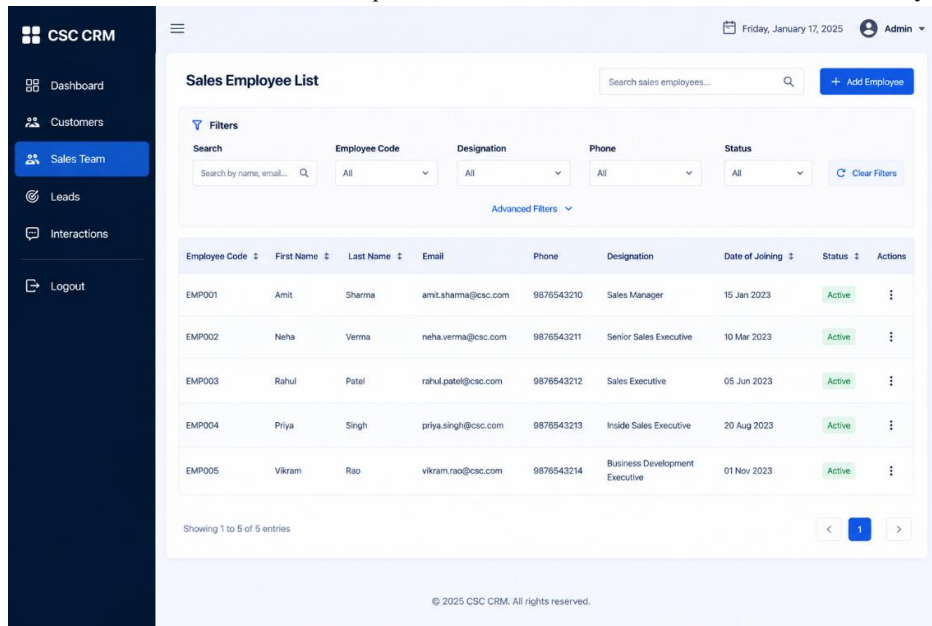
5.3 Customer Management

The Customer Management module allows users to maintain a centralized database of customer information. It displays important customer details, including **Company Name, Customer Code, First Name, Last Name, Email Address, Mobile Number, Assigned Sales Employee, and Budget**. Users can add new customers, edit existing records, search customer information, and manage customer profiles efficiently. This module simplifies customer record management and provides quick access to business information whenever required.



5.4 Sales Employee Management

The Sales Employee module is designed to manage employee information within the organization. It displays details such as **Employee Code, First Name, Last Name, Email Address, and Role**. Administrators can use this module to organize employee records, assign responsibilities, and manage role-based access within the CRM system. Maintaining employee information in a centralized location improves team coordination and administrative efficiency.



The screenshot shows the 'Sales Employee List' interface in the CSC CRM system. It includes a sidebar with navigation options: Dashboard, Customers, Sales Team (selected), Leads, Interactions, and Logout. The main content area features a search bar, filters, and a table of employee records.

Employee Code	First Name	Last Name	Email	Phone	Designation	Date of Joining	Status	Actions
EMP001	Amit	Sharma	amit.sharma@csc.com	9876543210	Sales Manager	15 Jan 2023	Active	
EMP002	Neha	Verma	neha.verma@csc.com	9876543211	Senior Sales Executive	10 Mar 2023	Active	
EMP003	Rahul	Patel	rahul.patel@csc.com	9876543212	Sales Executive	05 Jun 2023	Active	
EMP004	Priya	Singh	priya.singh@csc.com	9876543213	Inside Sales Executive	20 Aug 2023	Active	
EMP005	Vikram	Rao	vikram.rao@csc.com	9876543214	Business Development Executive	01 Nov 2023	Active	

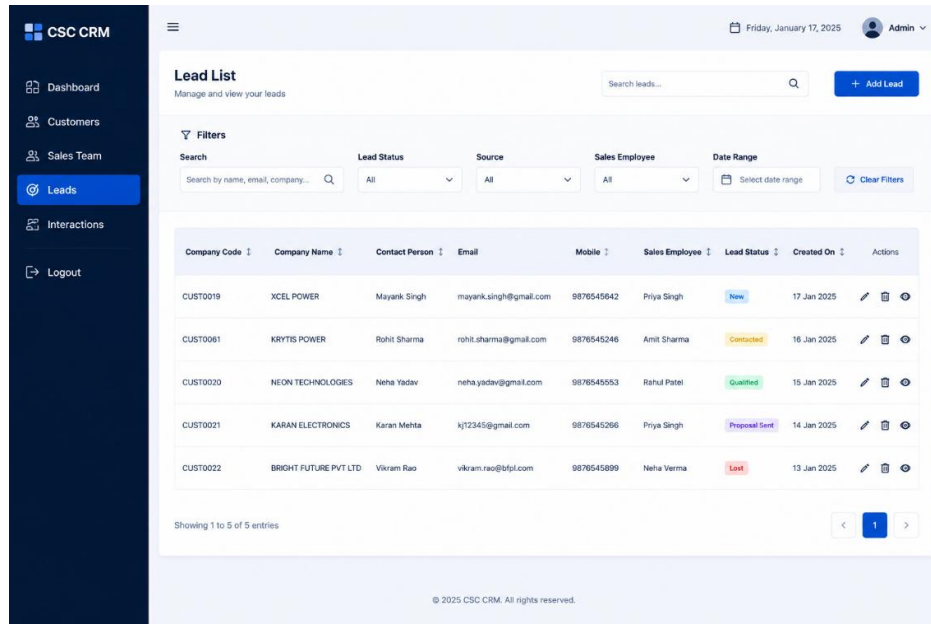
Showing 1 to 5 of 5 entries

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5.5 Lead Management

The Lead Management module helps organizations manage potential customers throughout the sales process. It displays lead information such as **Company Code, Company Name, Email Address, Mobile Number, and Assigned Sales Employee**. Users can create new leads, update lead information, delete unnecessary records, and record customer interactions using dedicated action buttons. This module enables businesses to monitor sales opportunities effectively and improve lead conversion rates through organized sales tracking.





CSC CRM

Friday, January 17, 2025 Admin

Lead List

Manage and view your leads

Search leads... [+ Add Lead](#)

Filters

Search: Search by name, email, company... Lead Status: All Source: All Sales Employee: All Date Range: Select date range [Clear Filters](#)

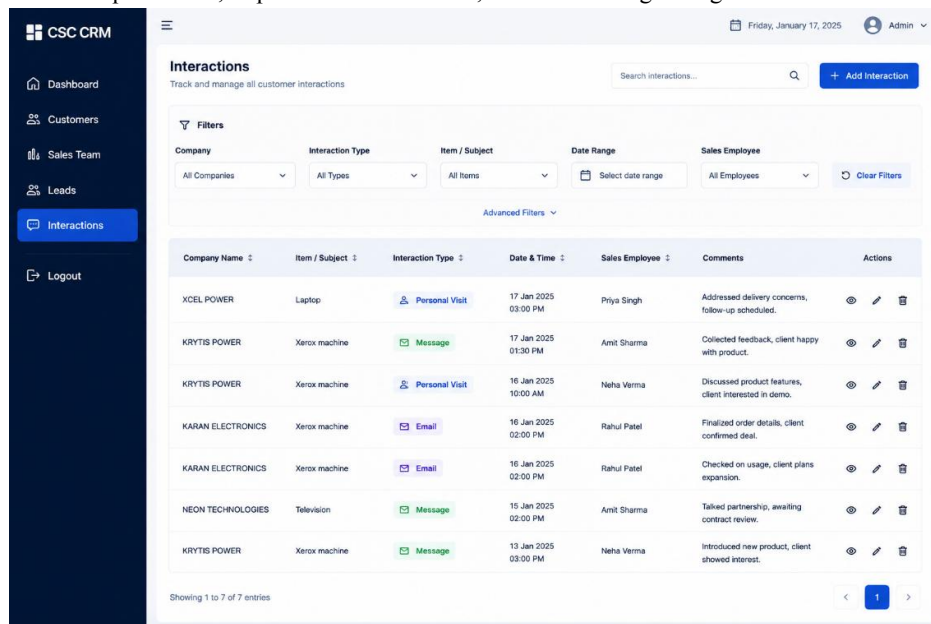
Company Code	Company Name	Contact Person	Email	Mobile	Sales Employee	Lead Status	Created On	Actions
CUST0019	XCEL POWER	Mayank Singh	mayank.singh@gmail.com	9876545642	Priya Singh	New	17 Jan 2025	Edit Delete View
CUST0061	KRYTIS POWER	Rohit Sharma	rohit.sharma@gmail.com	9876545246	Amit Sharma	Contacted	16 Jan 2025	Edit Delete View
CUST0020	NEON TECHNOLOGIES	Neha Yadav	neha.yadav@gmail.com	9876545553	Rahul Patel	Qualified	15 Jan 2025	Edit Delete View
CUST0021	KARAN ELECTRONICS	Karan Mehta	kj2345@gmail.com	9876545266	Priya Singh	Proposal Sent	14 Jan 2025	Edit Delete View
CUST0022	BRIGHT FUTURE PVT LTD	Vikram Rao	vikram.rao@bftl.com	9876545899	Neha Verma	Lost	13 Jan 2025	Edit Delete View

Showing 1 to 5 of 5 entries

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5.6 Interaction Management

The Interaction Management module maintains a complete history of communications between the organization and its customers. It records details such as **Company Name, Product Name, Interaction Type, Date, and Comments** for every customer interaction. Users can view previous meetings, emails, phone calls, and follow-up activities while adding new interaction records whenever required. Maintaining a comprehensive interaction history helps employees understand customer requirements, improve communication, and build stronger long-term customer relationships.



CSC CRM

Friday, January 17, 2025 Admin

Interactions

Track and manage all customer interactions

Search interactions... [+ Add Interaction](#)

Filters

Company: All Companies Interaction Type: All Types Item / Subject: All Items Date Range: Select date range Sales Employee: All Employees [Clear Filters](#)

Advanced Filters

Company Name	Item / Subject	Interaction Type	Date & Time	Sales Employee	Comments	Actions
XCEL POWER	Laptop	Personal Visit	17 Jan 2025 03:00 PM	Priya Singh	Addressed delivery concerns, follow-up scheduled.	Edit Delete View
KRYTIS POWER	Xerox machine	Message	17 Jan 2025 01:30 PM	Amit Sharma	Collected feedback, client happy with product.	Edit Delete View
KRYTIS POWER	Xerox machine	Personal Visit	16 Jan 2025 10:00 AM	Neha Verma	Discussed product features, client interested in demo.	Edit Delete View
KARAN ELECTRONICS	Xerox machine	Email	16 Jan 2025 02:00 PM	Rahul Patel	Finalized order details, client confirmed deal.	Edit Delete View
KARAN ELECTRONICS	Xerox machine	Email	16 Jan 2025 02:00 PM	Rahul Patel	Checked on usage, client plans expansion.	Edit Delete View
NEON TECHNOLOGIES	Television	Message	15 Jan 2025 02:00 PM	Amit Sharma	Talked partnership, awaiting contract review.	Edit Delete View
KRYTIS POWER	Xerox machine	Message	13 Jan 2025 03:00 PM	Neha Verma	Introduced new product, client showed interest.	Edit Delete View

Showing 1 to 7 of 7 entries



Challenges:

- Ensuring secure user authentication and role-based access control.
- Designing an efficient and well-structured SQL database.
- Developing a responsive and user-friendly interface using Angular.
- Maintaining accurate and consistent customer data across all CRM modules.

Suggestions:

- Implement AI-powered customer insights to provide personalized recommendations and improve decision-making.
- Integrate cloud-based storage to enhance data accessibility, scalability, and backup capabilities.
- Develop a mobile application to allow users to access the CRM system anytime and from any location.
- Enhance data security by implementing multi-factor authentication and advanced encryption techniques.

VI. CONCLUSION

This research successfully presents the design and development of a web-based Customer Relationship Management (CRM) system using Angular and SQL. The proposed system provides a centralized platform for managing customer information, sales employees, leads, and customer interactions, thereby improving the efficiency of business operations. By integrating modern web technologies with a structured database, the application simplifies customer data management, enhances communication, and supports better decision-making. The implementation of essential modules such as user authentication, dashboard, customer management, lead tracking, and interaction management demonstrates the practical benefits of CRM software in streamlining organizational processes. The system offers a responsive and user-friendly interface while ensuring secure and reliable data management.

Overall, the developed CRM system meets the objectives of the study by improving customer relationship management, reducing manual effort, and increasing operational productivity. It provides a scalable foundation that can be further enhanced with advanced features such as artificial intelligence, cloud integration, mobile accessibility, and predictive analytics, making it a valuable solution for organizations seeking to strengthen customer relationships and achieve sustainable business growth.

REFERENCES

1. Buttle, F., & Maklan, S. (2019). *Customer Relationship Management: Concepts and Technologies* (4th ed.). Routledge.
2. Chen, I. J., & Popovich, K. (2003). Understanding customer relationship management (CRM): People, process and technology. *Business Process Management Journal*, 9(5), 672–688.
3. Payne, A., & Frow, P. (2005). A strategic framework for customer relationship management. *Journal of Marketing*, 69(4), 167–176.
4. Kotler, P., & Keller, K. L. (2016). *Marketing Management* (15th ed.). Pearson Education.
5. Laudon, K. C., & Laudon, J. P. (2020). *Management Information Systems: Managing the Digital Firm* (16th ed.). Pearson.
6. Sommerville, I. (2016). *Software Engineering* (10th ed.). Pearson.
7. Elmasri, R., & Navathe, S. B. (2017). *Fundamentals of Database Systems* (7th ed.). Pearson.
8. Silberschatz, A., Korth, H. F., & Sudarshan, S. (2019). *Database System Concepts* (7th ed.). McGraw-Hill Education.
9. Freeman, A. (2023). *Pro Angular* (17th ed.). Apress.
10. Date, C. J. (2019). *Database Design and Relational Theory: Normal Forms and All That Jazz* (2nd ed.). O'Reilly Media.

