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# 1. Introduction

The integration of Customer Relationship Management (CRM) technology within small and medium-sized enterprises (SMEs) is a multifaceted endeavor, influenced by a myriad of factors including relative advantage, cost-effectiveness, top management support, IT knowledge, government backing, and competitive pressure. This complexity is underscored by the scholarly work of Ramaseshan (2008), who provides a foundational understanding of these influencing factors.

1.1 The Impact of CRM on SMEs: A Double-Edged Sword

The potential benefits of CRM for SMEs, such as enhanced performance and a competitive edge, are well-documented by researchers like Mohamad (2014) and Kim-Soon (2012). However, the implementation journey is fraught with challenges, notably the complexity of data integration and the demands of e-CRM. Lawson-Body (2006) and Qian (2012) offer a cautionary perspective, highlighting these hurdles that can stymie the effective adoption of CRM technologies. Yet, these challenges are not insurmountable. Solutions such as data web integration and the outsourcing of CRM services present viable paths forward, potentially reducing both costs and implementation risks.

## 1.2 The High Cost and Complexity Dilemma

The financial and operational burdens of CRM implementation cannot be overstated. Both Reichold (2004) and Mishra (2009) emphasize the significant investment and intricate nature of deploying CRM systems, with Reichold (2004) particularly noting the challenges in measuring outcomes. This brings us to the problem statement of the project: the development of a simplified, yet effective CRM system tailored for SMEs. This initiative is born out of a recognition of the need for less complexity and more affordability in CRM solutions, aiming to democratize access to technology that can empower SMEs to thrive in competitive markets.

## 1.3 Toward a Simplified CRM Solution for SMEs

This project endeavors to bridge the gap identified in current CRM offerings, focusing on the development of a streamlined CRM platform that addresses the core needs of SMEs without the burden of unnecessary features or prohibitive costs. By concentrating on user-friendly design, essential functionalities, and scalable architecture, the proposed CRM system aims to alleviate the challenges highlighted by previous research.

In conclusion, the successful implementation of CRM in SMEs requires a nuanced understanding of both the potential benefits and inherent challenges. By drawing insights from existing literature and focusing on simplification and cost-effectiveness, this project seeks to offer a practical solution that supports SMEs in harnessing the power of CRM for sustained growth and competitiveness. Through this endeavour, it is aimed to contribute to the ongoing dialogue on technology adoption in SMEs, offering a path forward that reconciles the demands of modern business with the realities of limited resources.

# 2. Project Evaluation (Methods)

## 2.1 Simplicity

The cornerstone of the evaluation process is simplicity. This encompasses not only the ease of use but also the ease of implementation and maintenance. To evaluate simplicity, it is going to:

* User Testing: Conduct testing sessions with SME owners and employees to assess their ability to navigate and utilize the CRM without prior training. This real-world feedback is invaluable for identifying complexity that needs to be simplified.(I am working in a company and will ask them for feedback QUESTION : is this allowed?)
* Feature Review: Analyze each feature for its direct benefit to SME operations, ensuring that each component of the CRM adds value without adding unnecessary complexity.

## 2.2 Automation

Automation stands as a key benefit of an effective CRM system, aiming to reduce manual tasks and streamline business processes. The evaluation of automation will focus on:

* Efficiency Gains: Measure the time saved on tasks that the CRM automates, comparing the before and after scenarios for SMEs. This quantifies the direct impact of automation on operational efficiency.
* Error Reduction: Assess how automation contributes to reducing errors in data entry and management, a common challenge for SMEs. Fewer errors translate to higher data quality and reliability.

## 2.3 UX/UI Design

The user experience (UX) and user interface (UI) design are critical for ensuring that the CRM is not only functional but also intuitive and engaging. To evaluate UX/UI, it will focus on:

* User Satisfaction Surveys: Gather feedback on the aesthetics, navigation, and overall user satisfaction with the CRM system. This helps in understanding how users perceive the system and what improvements are necessary. (use the same indivuduals from the user testing part)
* Heuristic Evaluation: conduct a heuristic evaluation of the CRM, identifying usability issues and areas for enhancement based on established UX principles.

## 2.4 Documentation

Comprehensive and understandable documentation is essential for empowering users to make the most of the CRM system. The evaluation will include:

* Accessibility and Clarity: Ensure that documentation is easily accessible and written in clear. This makes it easier for SMEs without IT expertise to utilize the system effectively.
* Usefulness: Evaluate the documentation's effectiveness in helping users solve common problems and perform tasks. This involves testing the documentation in real-world scenarios to ensure it addresses user needs. (use the same individuals from the user testing part)

By employing these evaluation methods, it is aimed to develop a CRM system that is not only tailored to the unique needs of SMEs but also stands out for its simplicity, automation capabilities, user-friendly design, and comprehensive documentation. This approach ensures that the final product is not just a tool but a solution that SMEs can rely on for their customer relationship management needs, fostering growth and efficiency in their operations.

# 3. Project Progress

## 3.1 Containerization Efforts:

Docker Implementation: We've containerized both the front-end and back-end parts of the project using Docker. This step ensures the CRM system is scalable, making it easier to manage, update, and deploy without disrupting the user experience.

## 3.2 Technology Stack:

* Back-End Development: We're building the back end with Go (Golang), chosen for its efficiency and scalability. Golang's performance is ideal for handling the data processing and business logic for the CRM.

Initially It was planed to use Aerospike a noSql database, but after talking with my supervisor I realised the challenges I would face by using it so I decided to use a SQL database

* Front-End Communication: The front end is developed using React Native, facilitating a responsive and intuitive user interface. We've implemented Cross-Origin Resource Sharing (CORS) to enable secure communication between the front-end and back-end containers. This setup ensures that the CRM's user interface is not only appealing but also seamlessly interacts with the back end for a smooth user experience.

# 4. Literature Review

Here It is explained the research conducted around this ideia in order to decide the structure, logic and technology used for this project.

## 4.1 Technology used

### 4.1.1 Advantages of Using Golang for CRM Development:

1. Optimized Performance and Scalability:

Golang is known for its excellent performance thanks to its compiled nature, which can lead to faster execution times compared to interpreted languages Ueda (2017), Lion (2022).This is crucial for CRM systems that need to handle large volumes of data and user requests efficiently. Additionally, Go's built-in support for concurrent programming allows for easy scalability, making it suitable for building high-performance CRM systems that can grow with your business. (F. S. Shoumik *et al.* 2017)

1. Code Simplicity and Maintenance Efficiency::

Go's syntax is clean and concise, which makes the codebase easier to read and maintain. This is beneficial for long-term CRM projects involving multiple developers, as it facilitates understanding and working with the code Abhinav *et al.* (2020).

1. Extensive and Robust Standard Library:

Go comes with a comprehensive standard library that offers a wide range of functionalities, including HTTP server and client packages, JSON encoding and decoding, and more. This can accelerate the development process of CRM features such as API integrations, data processing, and communication interfaces (Bodner 2024).

1. High compatibility with Docker:   
   Golang is a suitable language for creating Docker containers, as it is used to provision system programming to the container (Biradar, 2018). The language's concurrency models, including message passing, can help in creating reliable and efficient multi-threaded software (Tu, 2019).

### 4.1.2 The Role of React in Enhancing User Interfaces

React, a modern web development framework, is highly regarded for its ability to create dynamic user interfaces for single-page applications (Rawat, 2020). Its smart diffing algorithm and use of reusable components make it a powerful tool for UI/UX design. Additionally, its flexibility and rich library of features allow for a wide range of customization (Rawat, 2020).

The combination of React and Golang offers several benefits. Golang, a statically typed, compiled language, is known for its efficiency and performance (Donovan, 2015). When used with React, a JavaScript library for building user interfaces, Golang can enhance the performance of web applications by providing a fast and reliable backend (Levesque, 1997). This combination is particularly useful for applications that require real-time updates and high levels of interactivity, such as those in the field of biological pathways (Schmidt, 2004). Additionally, Golang's support for concurrent programming can be leveraged to handle multiple requests efficiently, further enhancing the user experience (McIlraith, 2002).

## 4.2 Synergizing CRM and ITSM: An Essential Strategy for Tech-Savvy Enterprises

In companies that really care about IT (information technology), CRM (Customer Relationship Management) and ITSM (IT Service Management) go hand in hand. Think of CRM as the way companies keep their customers happy and coming back, while ITSM is all about making sure the company's technology runs smoothly. According to Farzin (2014), for CRM to work well, it's super important to have the right tech tools and systems in place. Sen (2011) believes that the company's CRM plans need to fit perfectly with its technology setup to succeed. Gneiser (2010) adds that for a CRM to really offer value, the teams that handle marketing, money, and technology must work closely together.

Here's an easier way to look at it: Imagine a company wants to use a new app to keep track of customer orders better. If the company's technology isn't set up to support this app guaranteeing that the customer has a smoot experience, or if the marketing and finance teams aren't on board, the app won't do much good. This shows why CRM and ITSM are like two peas in a pod for IT-focused companies. Getting the technology right and making sure it supports the company's plans for keeping customers happy are crucial steps for good customer relationship management.

### 4.2.1Integrating ITIL and COBIT 5 for IT Service Management Excellence

ITIL (Information Technology Infrastructure Library) and COBIT 5 are foundational frameworks that guide companies in managing and enhancing their IT services. These frameworks, while distinct in their approaches, synergize to form a comprehensive strategy for IT Service Management (ITSM) and governance, driving efficiency, reliability, and continuous improvement in IT operations.

ITIL: The Roadmap to Structured IT Service Management

ITIL serves as a crucial guidebook for ITSM, offering a structured methodology for organizing, planning, delivering, and maintaining IT services. Highlighted by Yao (2010), ITIL's role is instrumental in ensuring IT services are aligned with business needs, fostering a systematic approach to service management. Kabachinski (2011) and McNaughton (2010) further emphasize ITIL's focus on continuous monitoring and improvement of IT services, advocating for a proactive stance on enhancing service quality.

### 4.2.2Enhancing ITIL with Six Sigma

Chan (2009) introduces an innovative approach by recommending the integration of Six Sigma with ITIL. Six Sigma, a methodology aimed at improving processes and reducing errors, complements ITIL's framework by enabling precise measurement and enhancement of IT service performance. This combination not only augments ITIL's capabilities but also elevates the quality and efficiency of IT services, making it a potent strategy for businesses striving for excellence in ITSM.

COBIT 5: Elevating IT Governance and Risk Management

COBIT 5 extends beyond ITSM to encompass broader aspects of IT governance and risk management. As elucidated by experts like Arthananda (2022) and Tsai (2015), COBIT 5 plays a pivotal role in improving internal controls, setting IT objectives, enhancing information quality, and ultimately, boosting the overall value IT delivers to the business. Astuti (2017) and Haes (2013) delve into COBIT 5's utility in risk identification and evaluation, underscoring its importance in managing potential issues that could impact IT services and governance at an enterprise level.

### 4.2.3Synergy between ITIL and COBIT 5

By leveraging ITIL's structured approach to service management and COBIT 5's comprehensive governance and risk management framework, businesses can achieve a holistic ITSM strategy. This integration ensures not only the efficient delivery and management of IT services but also aligns IT operations with business objectives, enhances risk management, and promotes continuous improvement and operational excellence.

## 4.2 Ticketing system:

The ticketing system plays a key role in managing IT services, making it easier for clients to get help and for support teams to solve problems. Gohil (2019) mentions that it's a vital tool for providing quick and efficient solutions in IT service management. This is especially true when we talk about ITIL, a set of practices for IT service management that aims to align IT services with the needs of businesses. Tawar (2013) points out that in the world of ITIL, a ticketing system is not just helpful; it's essential for managing IT services and making them better.

Suggested by the supervisor of this project it was analysed a series of documents talking a bout good practices and the logic behind a ticketing system(ask how to reference this part):

The accompanying conformance profile, TMF621B, details the criteria for evaluating the implementation of the Trouble Ticket API, ensuring that telecom service providers adhere to the specified standards. This document underscores the necessity for rigorous testing and validation processes, ensuring that the API's implementation meets the industry's operational and technical requirements.

Similarly, TMF724, the Incident Management API REST Specification, extends the concept to a broader scope of incident management, focusing on the entire lifecycle of incidents that affect IT services. This specification advocates for a comprehensive management strategy, from incident identification and logging through resolution and closure, facilitating a streamlined response to minimize impact on business operations.

In analyzing these documents, it's evident that the TM Forum has developed a robust set of standards and practices designed to improve the management of services and incidents in the telecommunications sector. These specifications not only promote operational efficiency but also ensure that customer issues are addressed promptly and effectively, contributing to overall service quality and customer satisfaction.

By standardizing the processes for trouble ticket and incident management, the TM Forum facilitates a unified approach to service management across the telecommunications industry. This standardization is crucial for achieving interoperability among diverse systems and platforms, enabling service providers to deliver consistent and high-quality services to customers.

Furthermore, the detailed conformance profiles play a critical role in ensuring that implementations of these APIs meet the high standards set by the TM Forum.

Considering the strategic importance of these standards, the decision was made to base this project's ticketing component on the recommended API. This choice underscores the project's commitment to leveraging best practices in ticketing system implementation, ensuring that the ITSM component within the CRM is not only effective but also compliant with industry-leading standards. Through this approach, the project aims to enhance the efficiency of service management and incident resolution, ultimately contributing to improved service quality and customer satisfaction.

5. Project Management

5.1 Project Breakdown and Estimative Timeline

### 5.1.1. Backend Development (170h)

Database (40h): Design and setup database schema, focusing on users, sessions, and essential CRM entities (e.g., contacts, opportunities).

Users & Sessions (30h): Implement authentication, user management, and session handling.

Routes (30h): Define and implement API routes for CRUD operations on main entities.

Implementation of Features (50): Develop core CRM functionalities such as lead tracking, customer management, and interaction logs.

### 5.1.2. Frontend Development (110h)

Prototyping (40 h): Use tools like Figma to design UI prototypes for key pages.

Common Design Elements (20 h): Develop a common header and reusable UI components.

Page Development (50 h): Implement the frontend for specified pages based on the prototypes and backend APIs.

### 5.1.3. Integration and Testing (20 h)

Integrate frontend with backend services.

Conduct thorough testing (unit, integration, and user acceptance tests).

### 5.1.4. Reporting (60 h)

Documentation (10 h): Document the architecture, features, and user guide.

Final Testing and Fixes (5 h): Address any remaining issues.

Report Writing (45 h + time dedicated for notes and references while developing front and backend): Compile project reports, results, and learnings.

## 5.2 Gantt Chart Creation

A graph with different colored squares

Description automatically generated

## 5.3 Agile Practices to Follow

Sprint Planning:

11/02/2024 – sprint n 1

16/02/2024 -sprint n 2

24/02/2024 -sprint n 3

01/03/2024 - sprint n 3

15/03/2024 -sprint n 4

3/04/2024 -sprint n 5

15/04/2024 -sprint n 6

30/04/2024 - sprint n 7

01/04/2024 – final sprint

Sprint Reviews and Retrospectives: At the end of each sprint, review work completed and discuss lessons learned to improve the next sprint with the supervisor (send email if necessary).

# 6. Roadmap for Implementation and Future Developments

The next steps in the development of this CRM project are pivotal in establishing a robust platform that meets the needs of both administrators and users while integrating an efficient ticketing system. The following outlines the key phases and features planned for implementation:

## 6.1 Finalizing the Database Choice

Decision on SQL Database: A critical decision awaits regarding the selection between MySQL and PostgreSQL. This choice will be influenced by factors such as performance requirements, scalability, and compatibility with the project's technology stack.

## 6.2 Developing the User System

Basic User System Implementation: The initial phase involves setting up a user system that allows for account creation. Administrators without a registered company in the CRM will be able to register through the admin portal. Following this, administrators can add "normal" users to their organization, who will then access the CRM through the user portal.

## 6.3 Integrating the Ticketing API

Ticketing System Development: A basic ticketing API will be utilized to enable users to open tickets and track their status. This functionality extends to the admin portal, where tickets can be viewed, their status updated, and comments added for further clarification and tracking.

## 6.4 Enhancing Ticket Management

**Label Creation for Tickets**:

To facilitate future analytics and statistics, labels will be introduced for ticket categorization. This will aid in the development of graphical representations of ticket data, enhancing insights into support operations.

SLA Configuration:

Service Level Agreements (SLAs) for tickets will be configurable within the admin settings, ensuring that response and resolution times meet predefined criteria, thereby improving service quality.

## 6.5 Automating Processes

User and Admin Automations: The system will incorporate automations for both users and administrators. For example, automations can manage inventory by deducting stock when a new user is onboarded and automatically ordering more from providers when stock levels are critically low, or close a ticket when the user don’t give feedback for a certain amount of time.

## 6.6 Future Feature Development

Continuous Feature Implementation: Depending on the project timeline and resource availability, additional features will be considered for implementation. These enhancements will be aimed at improving user experience, expanding functionality, and ensuring the CRM system remains competitive and responsive to user needs.

# Reference list

# Bibliography

A ‘Bibliography’ is a list of all sources you have used in preparing your dissertation, whether you have referred to them in the paper or not.

Check whether your School requires you to include a reference list or a bibliography (in some cases they may want to see both, if so, put them on separate pages).

Make sure your list is given in Alphabetical order of the Author’s surnames, or the Name of the company or institution providing the website if no author is given.

For more information, visit the tutorial on succeed@solent: <https://learn.solent.ac.uk/succeed/referencing>

# Appendix A – Draft Literature Survey

1500-word draft literature survey with its on self-contained reference list of quality/peer-reviewed sources. This is to get feedback only and is not be graded and so is not in the word count

Reference list  
  
Remember to add a self-contained reference list within Appendix A linking to your citation (Author Date) in your literature survey

# Appendix B: Title

Plus, a separate appendix items containing any supporting evidence linked to your reporting.

An appendix is for anything you feel is useful for your reader to see, but which isn’t essential for understanding your dissertation. It is optional.

|  |  |
| --- | --- |
| Column heading 1 | Column heading 2 |
| Write table text here. | Write table text here. |

Note: An appendix normally includes research related material that does not fit easily or suitably in the body of the report. Start each appendix on a new page

Notice that the sequence of your appendices is given using letters ‘Appendix A’, ‘Appendix B’, etc.

Also, the numbering of the pages in your appendix is done at the bottom of the page as ‘A-1, A-2’/ ‘B-1, B-2’ etc.

To get this separate numbering, you need to insert a continuous break at the heading of the appendix, this will start the numbering again. Then click into the footer and uncheck the box which says ‘same as previous’. You should then be able to change the letter next to the number (e.g. ‘A-1’ changed to ‘B-1’)to match the letter of your Appendix.

In-text citation (link) to an Appendix should look like this: (Appendix A)

Use a footnote reference system Foo Bar1