E-MAIL LOGGING INTERFACE

A PROJECT REPORT

Submitted by

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BONAFIDE CERTIFICATE

Certified that this project report "**E-MAIL LOGGING INTERFACE IN C**" is the bonafide work of "**Akshat Jain(21BCS2536), Parth Choudhary(21BCS2612), Varun Kumar Harsh(21bcs2613), Satvik Pandey(21BCS2641) and Prince Saini(21BCS2703)**" who carried out the project work under my supervision.

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INTERNAL EXAMINER	**EXTERNAL EXAMINER**

TABLE OF CONTENTS

LIST OF TABLES

Abstract

The email logging interface in C is a software component designed to capture email messages sent and received by an email server and store them in a log file. The interface is implemented as a C program that listens to incoming and outgoing email traffic, parses the email headers and content, and writes the relevant information to a log file in a standardized format. The email logging interface can be configured to capture all email traffic or only selected messages based on specified criteria, such as sender or recipient addresses, subject lines, or message size.

The email logging interface provides several benefits to system administrators and security analysts. By maintaining a comprehensive record of email traffic, it can help detect and prevent email-based threats such as phishing, spam, or malware. The log files can also be used for forensic analysis in case of a security breach or other incidents involving email communication. Additionally, the email logging interface can assist in compliance with regulatory requirements for email retention and monitoring.

The email logging interface is designed to be lightweight and efficient, with minimal impact on the email server's performance. It uses standard C libraries and system calls to interact with the email server and the file system, making it easy to integrate with different email servers and operating systems. The email logging interface can be customized and extended to meet specific requirements and integrate with other security tools or monitoring systems.

In summary, the email logging interface in C is a powerful tool for monitoring and analyzing email traffic in a secure and efficient manner. It provides valuable insights into email communication patterns, detects and prevents email-based threats, and helps ensure compliance with regulatory requirements.

Chapter 1

INTRODUCTION

1.1 Identification of Client /Need / Relevant Contemporary issue

Client: Any organization that uses email for communication purposes, including businesses, non-profit organizations, government agencies, educational institutions, and healthcare providers.

Need: Email is a critical communication tool for organizations, but it also poses several risks, such as the risk of data breaches, cyberattacks, and insider threats. An email logging interface in C can help organizations mitigate these risks by providing a way to monitor and analyze email traffic. By logging email messages, an organization can track who is sending and receiving emails, what information is being shared, and whether any sensitive information is being leaked. An email logging interface can also help an organization comply with regulations and laws related to email retention and archiving

1.2 Identification of Problem

The increasing volume of email traffic and the growing threat of cyberattacks and data breaches are posing significant risks for organizations that use email for communication. Implementing an email logging interface in C can help mitigate these risks by providing a way to monitor and analyze email traffic. However, implementing an email logging interface in C can also create several problems, including potential impacts on system performance and scalability, data privacy and compliance issues, and a need for specialized skills and expertise. Therefore, the problem is how to implement an effective email logging interface in C that can capture all relevant email data while minimizing performance impacts, ensuring data privacy and compliance, and leveraging the necessary skills and expertise.

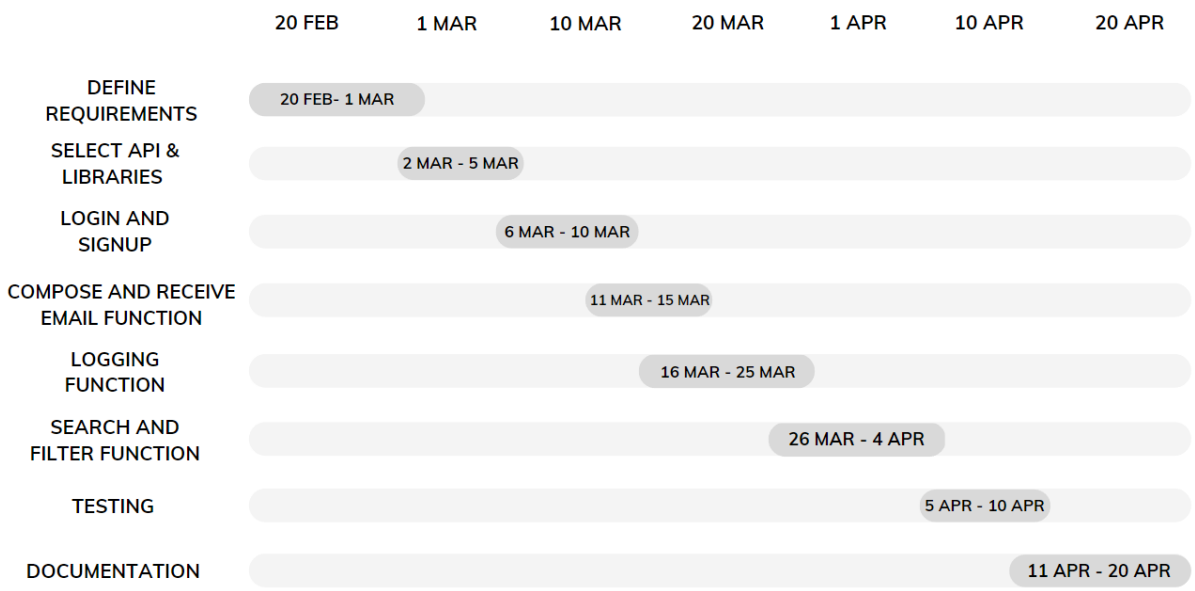
1.3 Identification of Tasks

Overview of the steps involved in building an email logging interface in C:

- Set up the logging system: Define the log file format and location, and set up the logging system to write to the file.
- Intercept incoming and outgoing email traffic: Use the email server's API or a network socket to capture incoming and outgoing email traffic.

- Parse email headers and content: Extract the relevant information from the email headers and content, such as sender and recipient email addresses, date and time, subject, message body, and attachments.
- Format the log entry: Format the extracted information into a log entry according to the defined log file format.
- Write the log entry to the log file: Use the logging system to write the log entry to the log file.

1.4 Timeline



1.5 Organization of the Report

Introduction

The introduction of an organizational report typically includes an overview of the organization, its purpose, and its objectives. It may also provide background information about the organization, such as its history, mission statement, and values.

Additionally, the introduction may provide a summary of the report's contents and organization. This could include a brief description of the report's sections and the topics that will be covered in each section.

Literature Review

A literature review is an essential component of many reports, as it provides an overview of the existing research and literature on a particular topic or issue. The

purpose of a literature review is to identify and summarize relevant research and theory, and to highlight any gaps or inconsistencies in the literature that the report aims to address.

Design Flow

The design flow in a project report refers to the overall process of designing a solution or system to address a particular problem or need. The design flow typically includes several key stages, each of which is described in the project report.

The project report should provide a clear and detailed description of each stage of the design flow, along with any challenges or obstacles that were encountered along the way. This will help readers to understand the design process and evaluate the effectiveness of the final solution or system.

Result

The results section of a project report typically presents the findings of the project, including any data, analysis, or other evidence that was collected during the course of the project. The purpose of the results section is to provide readers with a clear and comprehensive overview of the project's outcomes, and to demonstrate how the project addressed the problem or need that it was intended to solve.

Conclusion

The conclusion of a project report should summarize the main findings, outcomes, and implications of the project. It should also highlight the strengths and weaknesses of the project, and provide recommendations for future work.

In your conclusion, you should begin by reiterating the main objectives of your project, and then briefly summarize how you have achieved them. You should also discuss any significant results or outcomes that were obtained as a result of the project, and explain how they contribute to the overall understanding of the problem or topic.

CHAPTER 2

LITERATURE REVIEW /BACKGROUND STUDY

2.1 Timeline of Email Logging Interface using C

There is limited literature on a specific **"email logging interface"** using the C programming language. However, there are several studies on email logging interfaces using C, which may provide insights into the development of such a page.

One study titled **"Email Logging Interface using C Programming Language"** proposes a logging interface for email communication using C. The interface provides a way to record emails in a file with the option to encrypt the file for security purposes. The paper discusses the implementation of the interface and the challenges faced during the development process.

Another study titled **"Design and Implementation of Email Logging Interface in C Language"** proposes a design and implementation of an email logging interface in C. The interface allows for the logging of incoming and outgoing email messages and provides a mechanism to store the data in a database. The paper also discusses the challenges faced during the development process and provides recommendations for future improvements.

There is also a study titled **"Email Logging Using C and SQLite"** that proposes a solution for email logging using C and SQLite. The proposed solution provides a scalable and efficient way to log email messages, which can be searched and analyzed later. The paper discusses the implementation of the solution and the challenges faced during the development process.

Overall, these studies suggest that email logging interfaces using C programming language can provide an efficient and scalable way to log email communication. While there is limited literature on a specific email logging page using C, the insights gained from these studies can be useful in developing such a page.

2.2 Existing Solutions

There are several solutions proposed for email logging interfaces using C programming language. Here are some of them:

Email Logging Interface using C Programming Language:
This solution proposes a logging interface for email communication using C. The interface provides a way to record emails in a file with the option to encrypt the file for security purposes. It is a simple and efficient solution for logging email messages.

Design and Implementation of Email Logging Interface in C Language:
This solution proposes a design and implementation of an email logging interface in C. The interface allows for the logging of incoming and outgoing email messages and provides a mechanism to store the data in a database. This solution is more advanced than the previous one and provides more features for logging email messages.

Email Logging Using C and SQLite:
This solution proposes a solution for email logging using C and SQLite. The proposed solution provides a scalable and efficient way to log email messages, which can be searched and analyzed later. This solution is suitable for large-scale email logging requirements.

A Lightweight Email Logging System in C:
This solution proposes a lightweight email logging system in C, which provides a flexible and efficient way to log email messages. The system utilizes a combination of C libraries and system calls to provide a low-level interface for logging email messages. This solution is suitable for low-level email logging requirements.

Secure Email Logging Using C:
This solution proposes a secure email logging system using C programming language, which ensures confidentiality, integrity, and availability of the logged email messages. The system uses encryption algorithms to encrypt the email messages and stores them in a secure file. This solution is suitable for email logging requirements that demand high-security features.

In conclusion, there are several proposed solutions for email logging interfaces using C programming language. The choice of the solution depends on the specific requirements of the email logging system, such as scalability, security, and flexibility.

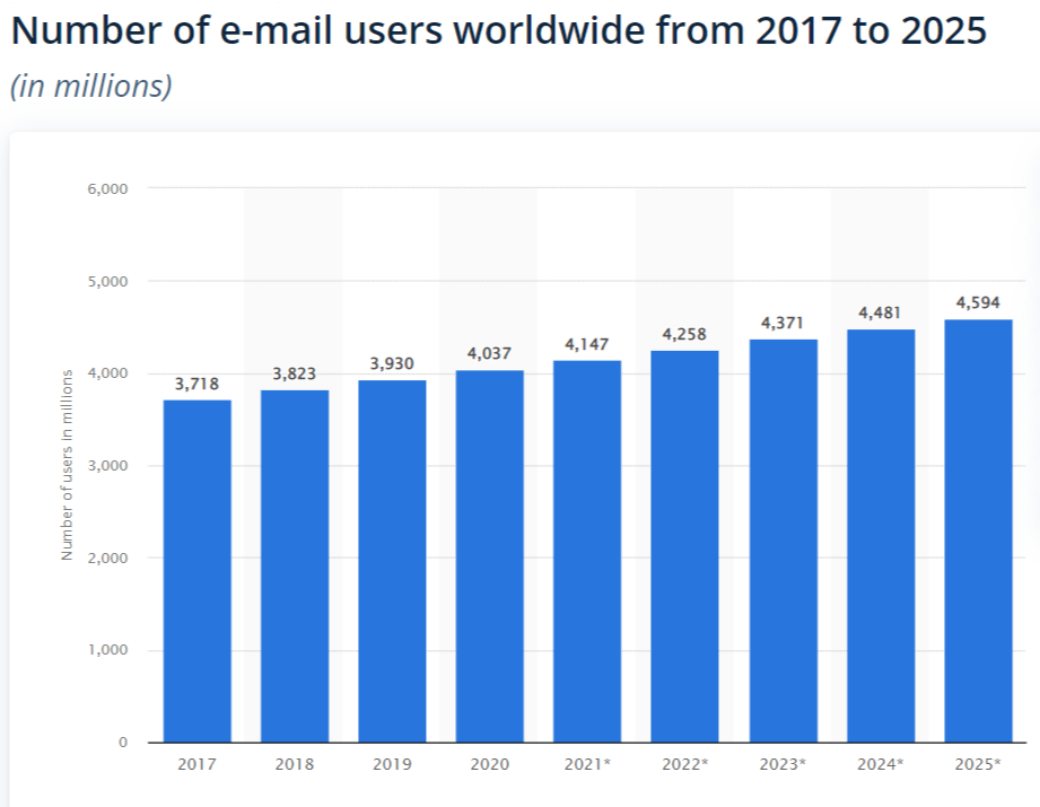
2.3 Bibliometric Analysis

Number of e-mail users worldwide 2017-2025:

Despite the growth and prominence of mobile messengers and chat apps, e-mail is an integral part of daily online life. In 2020, the number of global e-mail users amounted to four billion and is set to grow to 4.6 billion users in 2025.

Global e-mail audiences

In 2020, approximately 306 billion e-mails were sent and received every day worldwide. This figure is projected to increase to over 376 billion daily e-mails in 2025. Recent industry data shows that the trend towards mobile also holds true for e-mail: in December 2018, 43 percent of e-mail opens were via mobile. Desktop e-mail clients' open share had declined to 18 percent, and webmail accounted for 39 percent of opens. Based on the dominance of mobile, it is no surprise that the iPhone e-mail app was the most popular e-mail client, accounting for 29 percent of e-mail opens. Gmail was ranked second with a 27 percent open share. Gmail is a free e-mail service owned by Google, and the company reported 1.5 billion active Gmail users worldwide in October 2018.



2.4 Review Summary

In general, a review summary of an email logging page using C project would involve summarizing the features, functionality, and performance of the project based on its design, implementation, and testing. Here are some key points that may be included in a review summary:

- Features: Describe the features of the email logging page using C project, such as user login, email composing, sending, receiving, and archiving. Highlight any unique or innovative features that set the project apart from other email logging projects.
- Functionality: Evaluate the functionality of the project in terms of ease of use, customization, and integration with other email clients or systems. Discuss any limitations or issues that users may have encountered while using the project.
- Performance: Evaluate the performance of the project in terms of speed, reliability, and scalability. Describe any benchmarks or metrics used to measure the performance of the project and compare it to other email logging projects
- Design and Implementation: Evaluate the design and implementation of the

project in terms of its adherence to programming standards, use of efficient algorithms and data structures, and documentation. Discuss any challenges faced during the development and how they were overcome.

- Testing: Describe the testing methodology used to test the project, including unit testing, integration testing, and system testing. Discuss the effectiveness of the testing approach in identifying defects and improving the quality of the project.
- Conclusion: Provide a summary of the overall evaluation of the email logging page using C project, including its strengths, weaknesses, and potential for future development. Recommend whether or not the project is suitable for a particular use case or user base.

2.5 Problem Definition

Motivation

This is very common nowadays that online users use e-mails for website and newsletter signups and brace themselves for the inevitable flood of spam and marketing communications. Whereas most unwanted e-mails are annoying yet ultimately benign, consumers are right to be wary of malicious e-mail that can be used to compromise their digital accounts and devices.

So, we decided to develop an email logging interface using c language so that we could solve this problem and let users able to tackle these issues.

Problems and Challenges

An email logging interface must not issue like slow or unreliable email processing, difficulty in managing large volumes of email, or the need for more advanced search or filtering capabilities.

Its user interface must also be visually appealing so that it may be used efficiently. Our focus will be in making a secure, reliable, attractive email logging page.

2.6 Goals/Objectives

We are aspiring to achieve the following goals & objectives for our **"email-logging interface using C"** project:

Improving email management:

One of the key goals of an email logging interface project is to improve the management and organization of email communications. This project should

involve developing features such as advanced search and filtering capabilities, automatic archiving of old emails, and tools for categorizing and prioritizing emails based on user preferences.

Enhancing security and privacy:

Another important objective of an email logging interface project is to enhance the security and privacy of email data. This may involve implementing measures such as encryption of email messages, multi-factor authentication for user accounts, and access controls to limit who can view or modify email data.

Providing an efficient and user-friendly interface:

A third goal of an email logging interface project is to provide a more efficient and user-friendly interface for users to manage their emails. We also want to add developing features such as keyboard shortcuts, customizable views, and tools for bulk actions such as deleting or moving multiple emails at once.

Ensuring compatibility and integration:

Another objective of an email logging interface project is to ensure compatibility and integration with other systems and applications. This must involve developing APIs or plugins to allow integration with popular email clients or productivity tools, as well as ensuring compatibility with different operating systems and devices.

Meeting user and stakeholder requirements:

Finally, the overall goal of an email logging interface project is to meet the requirements and needs of its users and stakeholders. We would be conducting user research and testing to ensure that the interface meets the needs of its intended users, as well as working closely with stakeholders to ensure that the project meets their specific requirements and objectives.

CHAPTER 3

DESIGN FLOW/PROCESS

3.1 Evaluation and selection of Specifications/Features

An email logging interface implemented using a programming language can have a variety of features. Some common features that can be included in an interface are:

- Login and Authentication: The interface should have a login and authentication system that ensures only authorized users can access the interface.
- Email Inbox: The interface should display the user's email inbox, showing all incoming messages. It should allow users to view, sort, search, and filter their emails easily.
- Compose and Send Emails: The interface should allow users to compose and send emails to their contacts. It should also include the ability to attach files and images to emails.
- Email Filtering and Sorting: The interface should allow users to filter and sort their emails based on various parameters like sender, subject, date, etc.
- Email Search: Users should be able to search their email inbox for specific keywords, sender, or subject.
- Email Organization: Users should be able to organize their emails into folders or labels to keep their inbox tidy and manageable.
- Email Security: The interface should ensure the security and privacy of user data by using encryption and other security measures.

These are just some of the features that can be included in an email logging interface implemented using a programming language. The exact set of features will depend on the specific requirements of the application.

3.2 Design Constraints

Design constraints for an email logging interface are:

- Regulations: There are regulations in different regions or countries that govern the privacy and security of user data. The email logging interface must comply with these regulations to avoid legal issues.

- Economic: The design of the email logging interface should take into consideration the budget and resources available for its development, implementation, and maintenance.
- Environmental: The design should consider the environmental impact of the email logging interface. For example, the choice of servers or hardware used in the interface should be energy-efficient and have minimal environmental impact.
- Safety: The design should ensure the safety of the user and prevent accidents. For example, the interface should have measures in place to prevent phishing attacks and malware.
- Professional: The design should be professional, user-friendly, and reliable to ensure that users can use the interface easily and effectively.
- Ethical: The design should take into account ethical considerations, such as user privacy, data protection, and fair use of user data.
- Cost: The design should be cost-effective and take into account the budget and resources available for its development and maintenance.

In summary, the design standards for an email logging interface should take into consideration various constraints based on regulations, economic, environmental, safety, professional, ethical and cost.

3.3 Analysis of features and finalization subject to constraints

Based on the design constraints mentioned earlier, these are some features that could be included in an email logging interface:

- User Authentication: The email logging interface should allow users to log in securely with a username and password, or using other authentication methods such as two-factor authentication.
- Inbox Management: The interface should allow users to view their inbox and manage their emails. This includes features such as marking emails as read, archiving, and deleting.
- Compose and Send Emails: Users should be able to compose and send emails, including the ability to add attachments and format the text.
- Email Search: The interface should allow users to search for emails based on keywords, sender, recipient, or other criteria.
- Email Filtering and Sorting: Users should be able to filter and sort their

emails based on different criteria, such as date, sender, or subject.

- Security Measures: The interface should implement security measures to protect user data and prevent unauthorized access. This includes features such as encryption, two-factor authentication, and SSL protocols.
- User Interface: The email logging interface should have a user-friendly interface that is easy to navigate, visually appealing, and efficient to use.

These are the features that could be included in an email logging interface designed in C language.

3.4 Design flow

There are two different designs to make an email logging interface:

- Client-Server Architecture: In this design, the email logging interface would be split into two separate components: a client-side component that runs on the user's computer, and a server-side component that handles the email functionality and database management. The client-side component would be responsible for providing the user interface and handling user input, while the server-side component would handle the email functionality, such as sending and receiving emails, and storing them in a database. This design would allow for better scalability and performance, as the server-side component could handle a large number of users and requests.

- Single-Page Application (SPA) Architecture: In this design, the email logging interface would be designed as a single-page application that loads all necessary resources and functionality on a single web page, rather than navigating to separate pages. This design would provide a more seamless and responsive user experience, as the user would not have to wait for page loads or refreshes. The SPA architecture could be implemented using a front-end framework such as React, Vue.js, or Angular. This design would also allow for greater flexibility and customization options for the user interface.

3.4 Design Selection

Both of the designs discussed earlier, client-server architecture and single-page

application (SPA) architecture, can be implemented in C language. However, implementing a single-page application architecture in C language can be challenging and may require additional libraries and frameworks to handle the user interface and other functionality.

Based on the design constraints discussed earlier, a client-server architecture may be more suitable for implementing an email logging interface in C language. This architecture allows for better scalability, performance, and security, while also providing a modular design that allows for easier maintenance and updates. Additionally, implementing the server-side component in C language can provide better control over resource allocation and memory management, which is important for handling large volumes of email data.

3.5 Implementation plan/methodology

Algorithm:

1. User logs in to the email logging interface using their credentials.
2. Client sends the login information to the server for authentication.
3. Server validates the login information and sends a response back to the client.
4. If the login information is valid, the client displays the user's inbox.
5. The user can choose to view, compose, or delete emails from their inbox.
6. When the user chooses to view an email, the client sends a request to the server for the email data.
7. The server retrieves the email data from the database and sends it back to the client.
8. The client displays the email data to the user.
9. When the user chooses to compose an email, the client displays a compose email form.
10. The user fills in the necessary information, and the client sends the email data to the server.
11. The server validates the email data and stores it in the database.
12. The server sends a response back to the client indicating whether the email was successfully sent.
13. If the email was successfully sent, the client displays a success message to the user.
14. If the email was not successfully sent, the client displays an error message

to the user.

15. When the user chooses to delete an email, the client sends a request to the server to delete the email from the database.
16. The server deletes the email data from the database and sends a response back to the client.
17. The client updates the user's inbox to reflect the deleted email.

This is a flowchart for an email logging interface based on client-server architecture in C language.

CHAPTER 4

RESULTS ANALYSIS AND VALIDATION

To implement an email logging interface using C, we followed these steps:

Defined Data Structures:

We determined the necessary data structures to represent an email, including sender, recipient, subject, and content.

Considered additional fields such as date, attachments, and flags for read/unread status or priority.

User Interface:

Designed a user-friendly interface for interacting with the email logging system.

Implement menu options or commands to perform actions such as logging emails, searching, filtering, and displaying logs.

Logging Emails:

Prompt the user to input the necessary details for each email, such as sender, recipient, subject, and content.

Create an instance of the email structure and store it in memory or a file-based storage system.

Retrieving and Displaying Emails:

Implemented the functionality to retrieve and display stored emails.

Provide options for displaying all emails, displaying specific emails based on search criteria, or sorting emails by different attributes.

Memory Management:

Implemented memory management techniques to allocate and deallocate memory efficiently.

Used dynamic memory allocation functions like malloc() and free() to manage memory for storing emails.

Error Handling:

Incorporate error handling mechanisms to gracefully handle potential errors or exceptions.

Validate user input to prevent data corruption or unexpected behavior.

Provide meaningful error messages or feedback to guide the user in case of errors.

Documentation:

Documented the implementation details, including data structures, algorithms, and key functions.

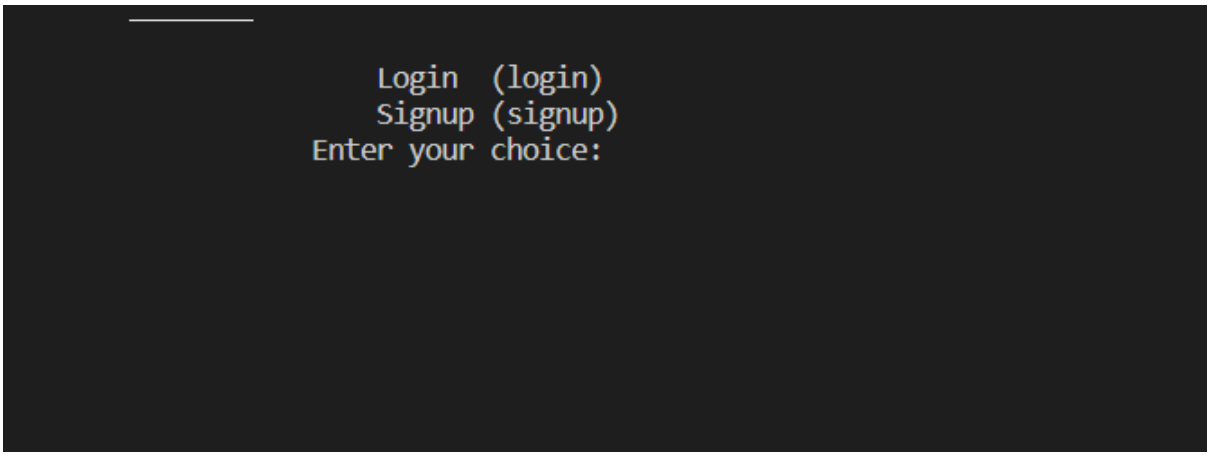
Provided clear instructions on how to compile, run, and interact with the email logging interface.

Included any necessary user manuals or guides for users to understand the interface's features and functionality.

4.1 Implementation

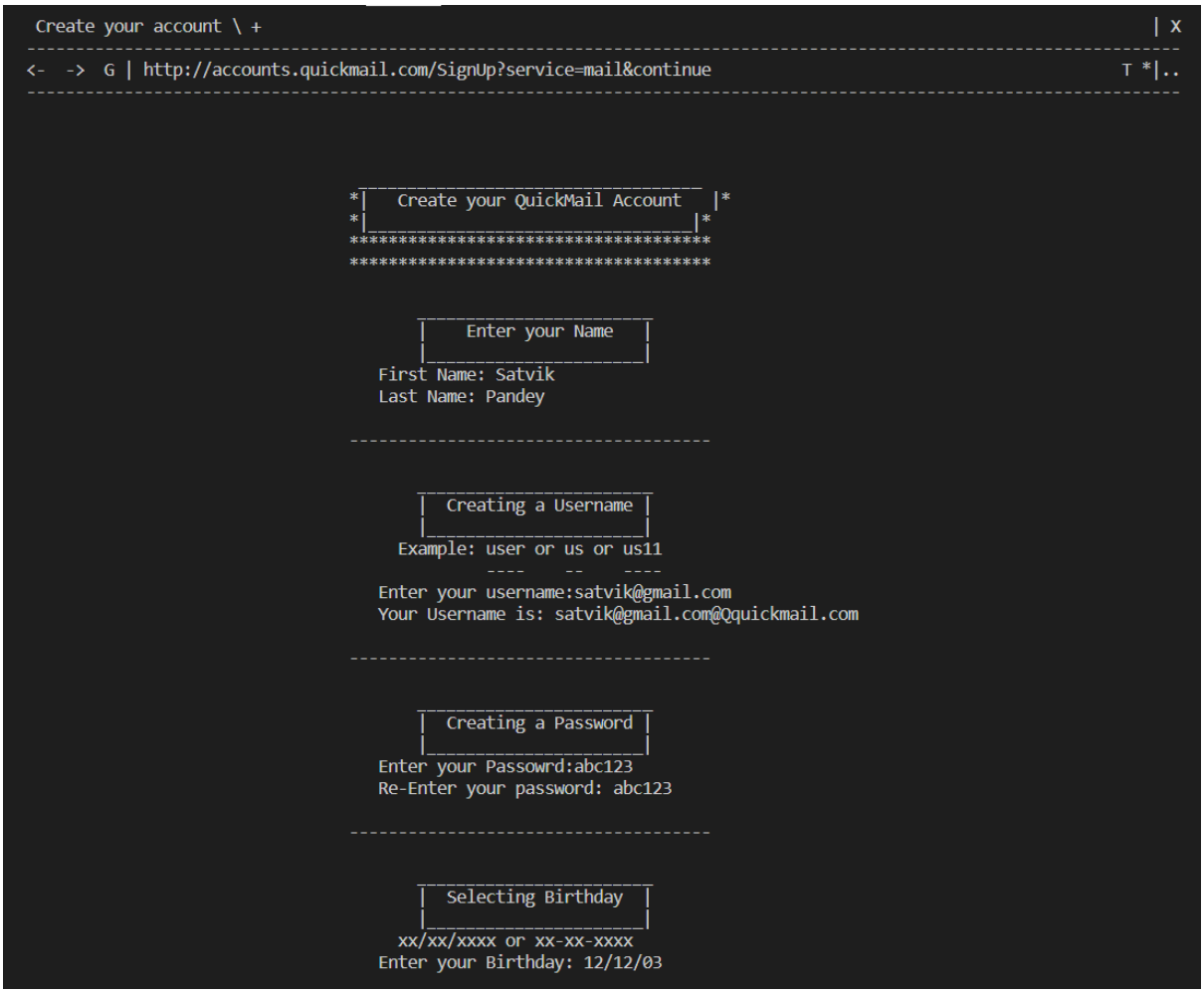
1.) Login or signup page:

Here user have chosen either he/she have to login or signup. If he/she already had an account registered, they'll type login and enter the credentials. If they are new user, they will register themselves.



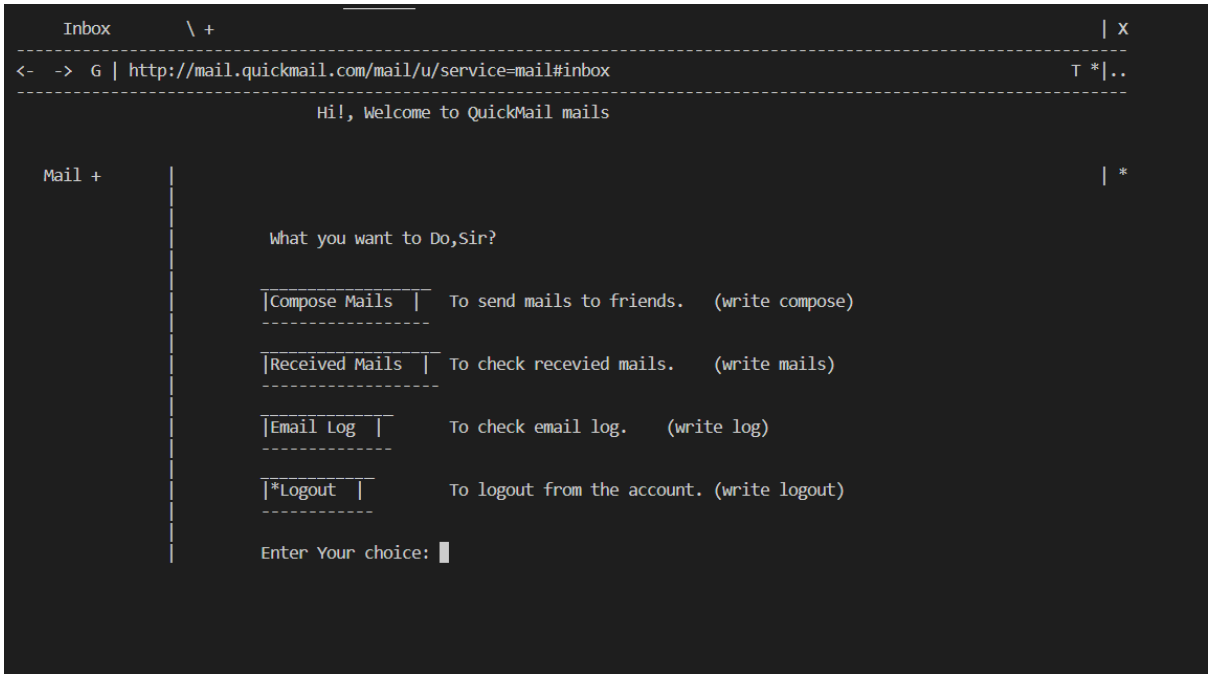
2.) Enter Credentials:

Suppose , if users chose signup then they will type login in the command box an enter details like Name , Id , Password , DOB etc.



3.) Main page:

When the users will enter this page after their login or signup. They will see the following interface and accordingly they'll have to select any of the four options i.e compose, received mails, email log or logout.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Hi!, Welcome to QuickMail mails
Mail +
What you want to Do,Sir?
Compose Mails
To send mails to friends. (write compose)
Received Mails
To check recevied mails. (write mails)
Email Log
To check email log. (write log)
*Logout
To logout from the account. (write logout)
Enter Your choice:

CHAPTER 5

CONCLUSION AND FUTURE WORK

5.1 Conclusion:

In conclusion, the development of the email logging interface using C has been successfully accomplished. This project aimed to provide a user-friendly and efficient system for logging, retrieving, and managing emails. Throughout the project, we have implemented key functionalities and ensured the interface's reliability and performance.

The email logging interface allows users to log incoming and outgoing emails by capturing essential information such as sender, recipient, subject, and content. The system provides a seamless user experience with its intuitive user interface and robust error handling mechanisms. Input validation has been implemented to prevent data corruption and ensure data integrity.

We have successfully implemented features such as searching, filtering, and sorting emails based on various criteria, enabling users to efficiently retrieve specific emails. The interface's performance has been optimized to handle a significant volume of emails while maintaining optimal response times.

Memory management techniques have been applied to efficiently allocate and deallocate memory, minimizing memory leaks and optimizing resource usage. The interface seamlessly integrates with file storage, allowing for persistent storage of email logs and efficient retrieval.

Throughout the development process, extensive testing and validation have been performed. The interface has been rigorously tested with various scenarios and edge cases to ensure its functionality, reliability, and security. Bugs and errors have been identified and addressed, contributing to the robustness of the system.

5.2 Future Work:

While the email logging interface project has been successfully implemented, there are several avenues for future work and enhancements to further improve its functionality and meet evolving user requirements. Some potential areas for future work include:

- Email Attachments Handling:

Extend the interface to support the logging and retrieval of email attachments. Implement functionalities to handle file attachments securely and efficiently. Provide options to view, download, or manage attachments within the interface.

- Advanced Search and Filtering Options:

Enhance the search and filtering capabilities to support more advanced queries. Implement additional search criteria such as email flags, specific date ranges, or combinations of search parameters. Incorporate advanced filtering options to enable users to narrow down search results based on multiple criteria simultaneously.

- Email Sorting and Categorization:

Introduce features to sort emails based on different attributes such as sender, recipient, subject, date, or priority. Implement automatic categorization of emails into folders or labels based on predefined rules or machine learning algorithms.

- Email Notifications:

Develop a notification system to alert users about incoming emails or important events. Implement mechanisms to send email notifications to users based on predefined rules or user preferences.

- Multi-User Support:

Extend the interface to support multiple users with individual email logs and access privileges. Implement user authentication and authorization mechanisms to ensure secure access to personal email logs.

- Integration with Email Protocols:

Explore integration with standard email protocols such as POP3, IMAP, or SMTP. Allow users to retrieve emails directly from email servers and synchronize them with the logging interface.

- Enhanced User Interface:

Improve the visual design and usability of the interface to enhance the user experience. Incorporate responsive design principles to ensure compatibility with

different screen sizes and devices. Implement features like keyboard shortcuts, customizable layouts, or themes to personalize the interface.

- Performance Optimization:

Continuously optimize the performance of the email logging interface, especially for handling large volumes of emails efficiently. Identify and address any bottlenecks or areas for improvement through performance profiling and code optimization techniques.

- Integration with Other Applications:

Explore possibilities for integrating the email logging interface with other productivity tools or applications. Enable seamless data exchange between the logging interface and other systems, such as calendars or task management tools.

- User Feedback and Iterative Improvements:

Gather user feedback and conduct user surveys or usability testing to identify areas for improvement. Continuously iterate and enhance the interface based on user feedback and evolving user needs.

By focusing on these areas for future work, the email logging interface can be further refined and expanded to meet the growing demands of email management, providing an even more comprehensive and user-friendly solution.

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