Implementation of Contactly: A Smart Contact Management Solution

by

Mofakharul Islam
ID: CSE2103024141

Nadia Akter
ID: CSE2103024104

Sumaiya Akter
ID: CSE2103024111

Sabequn Nahar
ID: CSE2103024167

Mahedi Hasan Sagor
ID: CSE2103024101

Supervised by
Arifur Rahaman

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APPROVAL

The project titled "**Implementation of Contactly: A Smart Contact Management Solution**" submitted by Mofakharul Islam (CSE2103024141), Mahedi Hasan Sagor (CSE2103024101), Sumaiya Akter (CSE2103024111), Sabequn Nahar (CSE2103024167) and Nadia Akter (CSE2103024104) to the Department of Computer Science and Engineering, Sonargaon University (SU), has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of Bachelor of Science in Computer Science and Engineering and approved as to its style and contents.

Board of Examiners

Arifur Rahaman
Assistant Professor
Department of Computer Science and Engineering
Sonargaon University (SU)

Supervisor

(Examiner Name and Signature)
Department of Computer Science and Engineering
Sonargaon University (SU)

Examiner 1

(Examiner Name and Signature)
Department of Computer Science and Engineering
Sonargaon University (SU)

Examiner 2

(Examiner Name and Signature)
Department of Computer Science and Engineering
Sonargaon University (SU)

Examiner 3

DECLARATION

We, hereby, declare that the work presented in this report is the outcome of the investigation performed by us under the supervision of **Arifur Rahaman, Assistant Professor,** Department of Computer Science and Engineering, Sonargaon University, Dhaka, Bangladesh. We reaffirm that no part of this project has been or is being submitted elsewhere for the award of any degree or diploma.

Countersigned

(Arifur Rahaman)
Supervisor

Signature

Mofakharul Islam
ID: CSE2103024141

Nadia Akter
ID: CSE2103024104

Sumaiya Akter
ID: CSE2103024111

Sabequn Nahar
ID: CSE2103024167

Mahedi Hasan Sagor
ID: CSE2103024101

ABSTRACT

In today's digital era, managing and organizing contacts has become an important part of both personal and professional life. Relying on traditional methods such as paper notes or storing numbers only in mobile phones is often unsafe and difficult to maintain. To overcome these limitations, we have developed Contactly, a modern yet easy-to-use contact management application. Contactly allows users to securely store essential details including names, phone numbers, emails, and other relevant information in a single platform. The application is designed with a user-friendly interface, enabling users to quickly search, edit, and organize contacts without complications. It also offers useful features such as direct email sending, contact categorization, and data export to ensure flexibility and convenience. Unlike traditional methods, Contactly not only minimizes the risk of losing important information but also improves efficiency by saving time in daily tasks. This project presents the purpose, design, and features of Contactly, highlighting its benefits and discussing possible future improvements for wider use. Furthermore, the application was built using reliable technologies to ensure security, accuracy, and smooth performance. Contactly aims to provide an all-in-one solution for managing contacts that can be used by students, professionals, and organizations alike. With its simple approach and powerful features, Contactly demonstrates how modern applications can make daily life more organized and efficient.

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We are also thankful to all our teachers during our whole education, for exposing us to the beauty of learning.

Finally, our deepest gratitude and love to my parents for their support, encouragement, and endless love.

LIST OF ABBREVIATIONS

API	Application Programming Interface
CRUD	Create, Read, Update, Delete
DBMS	Database Management System
HTML	HyperText Markup Language
JPA	Java Persistence API
JVM	Java Virtual Machine
MYSQL	My Structured Query Language (Database)
OAuth2	Open Authorization 2.0
PDF	Portable Document Format
REST	Representational State Transfer
SMTP	Simple Mail Transfer Protocol (for sending emails)
SQL	Structured Query Language
UI	User Interface
UX	User Experience
XLSX	Microsoft Excel File Format (used for contact export)

TABLE OF CONTENTS

Title		Page No.
DECLARATION ..……		iii
ABSTRACT ……...…….		iv
ACKNOWLEDGEMENT …….…….....		v
LIST OF ABBREVIATION …….……...……...		vi
CHAPTER 1		1 – 3
INTRODUCTION TO CONTACTLY		
1.1	Background of this project …….....	1
1.2	Problem Statement …….…...…….....	1
1.3	Objectives ……..…….	2
1.4	Scope of the project …….…….....	2
1.5	Significance of the Project …….……	3
CHAPTER 2		4 – 6
SYSTEM ANALYSIS		
2.1	Overview …….….....	4
2.2	Existing Contact Management Systems…….……	4
2.3	Gap Analysis ……...	5
2.4	The Need for Contactly ……...	5
2.5	Summary …….	6
CHAPTER 3		7– 9
SYSTEM DESIGN		
3.1	Overview …….....	7
3.2	System Architecture …….……..	7
3.3	Workflow of Contactly …….…….….....	8
3.4	Database Design …….	8
3.5	Modules of Contactly …….	9
3.7	Summary …….	9
		10 – 13

CHAPTER 4

IMPLEMENTATION

4.1 Overview ……..……... 10

4.2 Development Environment …….…… 10

4.3 Security Implementation ……. 11

4.4 API Implementation …….……... 11

4.5 Email Integration ……. 11

4.6 Export Functionality ……..... 11

4.7 Summary ……. 12

CHAPTER 5 13 - 23

USER MANUAL

5.1 Overview ……. 13

5.2 System Requirments …… 13

5.3 Login And Register ……...….. 13

5.4 Dashboard Overview ...…… 16

5.5 Profile Page ……...……...……... 17

5.6 Managing Contacts …….. 17

5.7 Search ……...…….. 20

5.8 Exporting Contacts ……...……... 21

5.9 Email Feature ……...……... 22

5.9 TroubleShooting …….. 23

5.10 Summary ……...…….. 23

CHAPTER 6 24 – 26

SYSTEM TESTING AND EVALUATION

6.1 Overview ……..,..……. 24

6.2 Types of Testing Performed ……..……. 24

6.3 Test Environment …… 25

6.4 Sample Test Cases ……..... 25

6.5 Evaluation ……..... 25

6.6 Limitations Observed During Testing ……. 26

6.7 Summary ……...…….. 26

CHAPTER 7 27
CONCLUSION AND FUTURE WORKS
7.1 Conclusion ……... 27
7.2 Future Works ……... 27
REFERENCES ……...…….. 28

LIST OF TABLES

Table No.	Title	Page No.
Table 5.1	Troubleshooting for Contactly application	23
Table 6.1	Sample test cases for Contactly application	25

LIST OF FIGURES

Figure No.	Title	Page No.
Fig.3.1	Three-Tier System Architecture of Contactly	7
Fig.3.2	Database Design of Contactly	8
Fig.5.1	Registration from with name, email, password with image.	13
Fig.5.2	Name, email, password and phone Number required	14
Fig.5.3	Login with Wrong email or password	14
Fig.5.4	Verify Your Email to Activate Your Account	15
Fig.5.5	Email verified Successfully, Login now	15
Fig.5.6	Login with goggle	16
Fig.5.7	Dashboard Page	16
Fig.5.8	Profile page	17
Fig.5.9	Add contacts Page	17
Fig.5.10	Add contacts page form validation	18
Fig.5.11	Show saved contacts with pagination	18
Fig.5.12	Single contact information	19
Fig.5.13	Update contact page	19
Fig.5.14	Deleting a contact	20
Fig.5.15	Searching a contact	20
Fig.5.16	Exporting contacts to Excel	21
Fig.5.17	Export contact to Pdf format	21
Fig.5.18	Sending email through contactly application	22
Fig.5.19	Receiving sanded email from contactly	22

CHAPTER 1

INTRODUCTION TO CONTACTLY

1.1 Background of the Project

Contact management has been an essential part of personal and professional life for decades. In earlier times, people relied on paper-based address books to store names, phone numbers, and addresses. Although simple, this method was prone to data loss, physical damage, and was difficult to update when information changed. With the rapid growth of digital technology, mobile phones, email clients, and computers gradually replaced traditional paper records, providing users with faster, more reliable, and more convenient ways to store and retrieve contact information. These digital tools made searching, editing, and retrieving data much easier compared to manual record-keeping. However, most built-in contact managers on devices remain basic, often lacking advanced features such as detailed categorization, grouping, integration with calendars or email systems, and secure cloud-based backup, which are essential for professional and large-scale use.

As the number of personal and professional contacts continues to grow in today's interconnected world, these limitations have become more evident. Modern users require robust applications that can handle large amounts of information efficiently, support easy organization, and enable seamless communication between individuals or teams. A good contact management system should not only store data but also provide smart search, filtering, tagging, and synchronization across multiple devices, ensuring accessibility anywhere and anytime. Furthermore, secure backup and sharing options are now considered essential to prevent data loss and enable collaboration. This chapter therefore reviews existing solutions, highlights their shortcomings, and emphasizes the need for a comprehensive and feature-rich system like Contactly that fulfills these modern requirements and offers an improved user experience.

1.2 Problem Statement

Although mobile devices and traditional methods provide basic options for storing contacts, they lack advanced functionalities such as categorization, email integration, and exporting capabilities. Users often face challenges in managing a large number of contacts, ensuring data security, and retrieving information quickly. These limitations become even more evident in professional environments, where maintaining organized and reliable communication is critical. In addition, there is always a risk of data loss if contacts are not properly backed up or if devices are lost, stolen, or damaged. Paper-based records and spreadsheets are equally vulnerable, as they are either too fragile or too difficult to maintain efficiently.

Therefore, there is a clear need for a modern system that not only stores contact information but also ensures safety, efficiency, and flexibility. Such a system should provide users with advanced features like role-based access control, easy search and filtering, automated backups, and seamless integration with communication tools such as email. By combining simplicity with powerful features, a dedicated contact management

application can significantly reduce the challenges associated with traditional methods and offer a reliable solution for both personal and professional use.

1.3 Objectives

The main objective of this project is to design and develop a contact management application that simplifies and improves the way users store and manage their contact information. The system is intended to provide an efficient alternative to traditional methods while ensuring safety, reliability, and ease of use.

The specific objectives include:

- To provide a secure and reliable platform for storing contacts, reducing the risk of data loss.
- To design a simple and user-friendly interface for adding, editing, deleting, and searching contacts so that users of all backgrounds can use the application with ease.
- To implement advanced features such as contact categorization and email integration, making the system more versatile for both personal and professional use.
- To include options for exporting contact details in PDF and Excel formats, enabling users to back up and share their data conveniently.
- To ensure data security by implementing authentication and role-based access, giving users confidence that their information is well-protected.
- To integrate modern tools and frameworks that enhance performance, scalability, and maintainability of the application.

1.4 Scope of the project

The Contactly application focuses on providing users with an efficient way to manage contact information. It covers features such as:

- Adding, updating, and deleting contacts.
- Storing details like name, phone number, email address, and other information.
- Categorizing contacts for better organization.
- Searching and filtering contacts easily.
- Sending emails directly through the application.
- Exporting contacts to PDF and Excel files.
- Securing data with authentication and authorization features.

However, the current version is designed as a web-based system and does not include mobile app support or cloud synchronization. These areas can be considered for future development.

1.5 Significance of the Project

The Contactly project is significant because it provides a simple, effective, and modern solution to an everyday problem faced by almost everyone—managing contacts efficiently. It reduces the risk of losing important information and saves users valuable time by offering quick access to well-organized contact details. Unlike traditional methods such as mobile storage, paper records, or spreadsheets, Contactly ensures that data remains safe, structured, and easily retrievable.

The application can be used by students, professionals, and organizations alike, making it versatile and practical across different scenarios. For individuals, it simplifies personal contact management; for professionals, it ensures smooth communication; and for organizations, it provides a reliable system to maintain structured client or employee records.

Furthermore, its design and implementation serve as a valuable example of building a secure and user-friendly application using modern technologies such as Spring Boot, MySQL, and REST APIs. By integrating features like authentication, role-based access, email communication, and export options, the project also highlights the importance of combining simplicity with advanced functionality. Overall, Contactly demonstrates how technology can transform a simple task into an efficient and reliable process, contributing both to users' convenience and to the learning of modern software development practices.

CHAPTER 2

SYSTEM ANALYSIS

2.1 Overview

Contact management has been an essential part of personal and professional life for decades. In earlier times, people relied on paper-based address books to record names, phone numbers, and addresses. Although this method was simple and easy to use, it was prone to wear and tear, data loss, and was difficult to update when information changed. The rapid growth of digital technology brought a major transformation—mobile phones, email clients, and computers replaced traditional paper records, providing users with faster, more reliable, and convenient ways to store and retrieve contacts. Despite these improvements, the built-in tools on most devices often lack advanced functionality. They usually do not provide options for categorizing contacts, integrating with other services such as email or calendars, or offering secure cloud-based backups.

As the number of personal and professional contacts continues to grow in today's interconnected world, these limitations become more apparent. Modern users demand contact management solutions that can handle large volumes of information efficiently and intelligently. A robust contact management system should not only store data but also support advanced organization, seamless communication, and secure data sharing across multiple devices. This chapter explores existing solutions, analyzes their shortcomings, and emphasizes the need for a comprehensive, feature-rich system like Contactly that addresses these gaps and enhances the overall user experience.

2.2 Existing Contact Management Systems

Mobile Phone Contact Apps

- Most smartphones have built-in contact applications that allow storing basic details such as names, numbers, and emails.
- **Advantages:** Easy to use, comes pre-installed, integrated with phone calls and messaging.
- **Limitations:** Limited features, lack of advanced search, no export to PDF/Excel, and data loss risk if the device is damaged or lost.

Google Contacts

- A widely used online service integrated with Gmail, allowing users to store and sync contacts across devices.
- **Advantages:** Cloud backup, easy integration with Google services, cross-device accessibility.
- **Limitations:** Requires internet connection, limited customization, privacy concerns as data is stored on third-party servers

Microsoft Outlook Contacts

- Popular among professionals, Outlook offers robust contact management along with calendar and email integration.
- **Advantages:** Strong integration with Microsoft Office, suitable for corporate environments.
- **Limitations:** Complex interface for beginners, not user-friendly for non-professional users, subscription required for full features.

CRM (Customer Relationship Management) Tools

- Used by businesses to manage customer interactions, track communication, and analyze data.
- **Advantages:** Advanced features, suitable for large organizations.
- **Limitations:** Too complex and expensive for general users or small-scale needs.

2.3 Gap Analysis

From the review of existing systems, the following gaps are identified:

- **Complexity:** Professional tools like CRM systems are difficult for general users.
- **Limited Features:** Mobile phone contact apps lack advanced options like categorization, email integration, and exporting to multiple formats.
- **Data Security:** Many free applications store data on third-party servers, raising privacy concerns.
- **Flexibility:** Most systems are either too simple or too complex, leaving a gap for a balanced, user-friendly application.

2.4 The Need for Contactly

Contactly has been designed to address the gaps found in existing contact management solutions. Its key highlights include:

- **User-Friendly Interface:**
  - Clean, intuitive, and easy-to-use design suitable for all users, regardless of technical experience.
  - Simple navigation and smooth workflow for managing, adding, and updating contacts quickly.
- **Advanced Features:**
  - Contact categorization and grouping for better organization.
  - Powerful search functionality to find contacts instantly.
  - Built-in email integration for direct communication without leaving the system.
  - Export options in multiple formats, including **PDF** and **Excel**, for easy sharing and backup.
- **Data Security:**
  - Authentication mechanisms to ensure only authorized users can access the system.
  - Role-based access control to restrict sensitive operations to specific users.

2.5 Summary

The review shows that while there are many existing solutions for managing contacts, most of them are either too limited or too complex. Users need a system that balances simplicity with functionality. Contactly aims to provide this balance by offering a secure, reliable, and easy-to-use application that meets the needs of a wide range of users. This makes Contactly not just another contact manager, but a practical tool that solves real-world problems in contact organization and communication.

CHAPTER 3

SYSTEM DESIGN

3.1 Overview

The development of the Contactly application follows a structured design and methodology to ensure efficiency, reliability, and user-friendliness. The system design process involves analyzing requirements, creating the system architecture, designing the database, and defining the modules that together make up the application. The methodology follows a modular approach where each component of the system is developed, tested, and integrated systematically.

3.2 System Architecture

The architecture of Contactly is based on a three-tier model:

1. Presentation Layer (Frontend/UI):
    - Provides interaction between the user and the system
    - Simple and user-friendly for managing contacts.
2. Application Layer (Backend/Business Logic):
    - Developed using Spring Boot.
    - Handles all the business logic such as adding, updating, deleting and searching contacts.
3. Data Layer (Database):
    - Uses MySQL as the relational database.
    - Stores all contact details securely.
    - Ensures data integrity and supports complex queries.

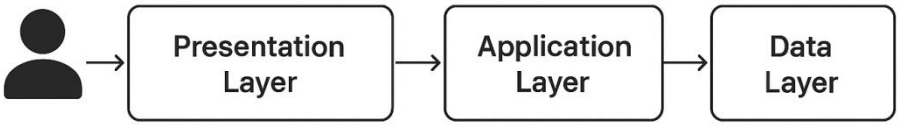


Fig-3.1: Three-Tier System Architecture of Contactly

3.3 Workflow of Contactly

The workflow of the application can be described as follows:

- The user logs into the system using Basic Authentication or JWT authentication.
- The user can add new contacts by providing details such as name, phone number, and email.
- The user can search, update, or delete existing contacts.
- Contacts can be categorized for better organization.
- The user can send emails directly through the application using SMTP integration.
- Contact data can be exported in PDF or Excel (XLSX) format.
- The system ensures data security and prevents unauthorized access through role-based access control (Admin/User).

3.4 Database Design

The database design of Contactly ensures efficient storage and retrieval of data. The main entities include:

- User: Stores user credentials and role information.
- Contact: Stores details such as name, phone number, email, and category.
- Role: Defines access levels (Admin, User).
- User_Role: Manages the relationship between users and roles.

ER Diagram (Conceptual)

- A User can have multiple Contacts.
- A User can have one or more Roles.
- A Contact belongs to exactly one User.

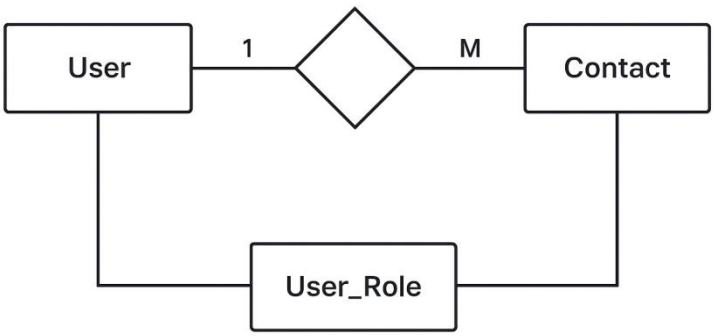


Fig-3.2: Database Design of Contactly

3.5 Modules of Contactly

The system is divided into several modules for better management, scalability, and ease of use. Each module is designed to handle a specific functionality, ensuring that the application remains organized and efficient. The major modules include:

1. Authentication Module
    - Provides secure login functionality using Basic Authentication and OAuth2 login options.
    - Ensures that only authorized users can access the system, thereby protecting sensitive contact information.
    - Implements role-based access control, allowing different levels of permissions for admins and regular users.
2. Contact Management Module
    - Serves as the core of the system, allowing users to add, edit, delete, and search contacts with ease.
    - Stores important details such as name, phone number, email, and category in a structured manner.
    - Includes search and filter functionalities to quickly locate specific contacts, even in large datasets.
3. Categorization Module
    - Enables grouping of contacts into categories for better organization and quick retrieval.
    - Allows users to manage both personal and professional contacts more efficiently by separating them into relevant groups.
4. Email Module
    - Integrates with SMTP to allow sending emails directly from the application.
    - Helps users communicate without leaving the platform, making the system more practical and time-saving.
    - Can be used to send updates, invitations, or other important information to selected contacts.
5. Export Module
    - Provides functionality to export contact lists in PDF and Excel formats.
    - Ensures users can back up their data or share it with others in professional, widely accepted formats.
    - Uses OpenPDF and Apache POI libraries for reliable and efficient export generation.

3.7 Summary

The design and methodology of Contactly ensure that the system is reliable, scalable, and easy to use. By combining a three-tier architecture, secure database design, modular development, and Agile methodology, Contactly achieves its goal of providing a modern and user-friendly contact management solution.

CHAPTER 4

IMPLEMENTATION

4.1 Overview

The implementation phase transforms the design of the Contactly system into a fully functional software application. This phase focuses on converting the planned architecture and design specifications into actual code and operational components. It begins with setting up the development environment and configuring the required tools, frameworks, and dependencies to ensure smooth development. The database is then created and connected to the application, enabling structured storage of contact information.

Next, the backend services are developed using Spring Boot, where the core functionalities such as contact management, categorization, and role-based access are implemented. Authentication mechanisms, including Basic Authentication and OAuth2, are integrated to ensure that only authorized users can access the system. Additionally, advanced features such as the email service and data export to PDF/Excel are implemented to enhance the system's practicality and usefulness.

Overall, this phase is crucial as it brings together all planned modules—Authentication, Contact Management, Categorization, Email, and Export—into a single cohesive application that is ready for testing and deployment.

4.2 Development Environment

- The project was developed using the following tools and technologies:
- Programming Language: Java
- Framework: Spring Boot (for backend and REST APIs)
- Database: MySQL
- Frontend: HTML, Tailwind CSS, Thymleaf Template Engine
- IDE: IntelliJ IDEA / Eclipse
- Build Tool: Maven
- Version Control: Git
- Security: Basic Authentication, and OAuth2
- Export Library: OpenPDF for PDF, Apache POI for Excel (XLSX)
- Email Service: JavaMail API (SMTP)
- API Testing Tool: Postman (for testing REST APIs)
- Containerization (Optional): Docker (for easy deployment and environment setup)
- Cloud Storage (Optional): Cloudinary (for storing and managing media files)

4.3 Security Implementation

To ensure secure access:

- Basic Authentication is used for simple login in early stages.
- OAuth2 Integration**:** Provides modern, secure authentication and allows future integration with third-party login providers (e.g., Google, GitHub).
- Role-Based Access Control (RBAC):
  - Admin: Can manage users and all contacts.
  - User: Can manage only their own contacts.

4.4 API Implementation

The Contactly backend is structured around RESTful APIs. Each feature is mapped to a specific endpoint:

- User APIs
  - /api/users/register – Register new users
  - /api/users/login – Authenticate users
  - /api/users/{id} – Get user details
- Contact APIs
  - /api/contacts – Create a new contact
  - /api/contacts/{id} – Retrieve, update, or delete a contact
  - /api/contacts/search?name= – Search contacts by name
  - /api/contacts/export/pdf – Export all contacts in PDF format
  - /api/contacts/export/excel – Export all contacts in Excel format

4.5 Email Integration

The system allows users to send emails directly to their saved contacts, making communication faster and more convenient. This feature is implemented using the SMTP protocol through the JavaMail API**,** which ensures reliable delivery of messages. Users can compose and send messages without leaving the application, saving time and reducing the need to switch between multiple platforms. In addition, the email module can be extended to support sending attachments, group emails, and notifications, making it not only useful for personal communication but also practical for professional and organizational purposes.

4.6 Export Functionality

Contactly supports exporting contact details in two formats:

- PDF Export: Using OpenPDF, generates neatly formatted documents of contacts.
- Excel Export: Using Apache POI, produces spreadsheets for data portability and analysis.

4.7 Summary

The implementation of Contactly demonstrates the successful integration of modern technologies into a practical and user-friendly application. By combining a structured database, secure authentication mechanisms, and efficient REST APIs, the system ensures both reliability and performance. In addition, advanced features such as email integration and data export to PDF/Excel enhance its usefulness, making it more than just a simple contact storage tool. Contactly thus proves to be a complete and reliable solution for personal, professional, and organizational contact management needs. It not only addresses the common challenges of data loss and disorganization but also showcases how modern frameworks and best practices can be applied to build scalable, secure, and efficient applications.

CHAPTER 5

USER MANUAL

5.1 Overview

The User Manual provides comprehensive guidance on how to use Contactly, a modern contact management application. This chapter is intended to help users—from beginners to advanced—understand the features of the system, navigate its interface efficiently, manage their contacts, use advanced search and export functionalities, and leverage email integration. Proper use of Contactly ensures better organization of contacts, secure handling of data, and improved productivity.

5.2 System Requirements

Hardware Requirements:

- PC or Laptop with at least 4 GB RAM for smooth performance.
- Minimum 500 MB of free disk space to store data and exports.
- Internet connection for cloud-based features and email services.

Software Requirements:

- Latest version of web browsers such as Chrome, Firefox, or Microsoft Edge.
- Operating system: Windows 10 or above, macOS 10.15 or above.
- PDF/Excel viewer installed to open exported contact files.

5.3 Login And Register

- To start using Contactly, open any browser and visit contaclty. First you will have to register on the app with username, email, password and Phone Number. You can also add a message and profile picture, but they are optional.

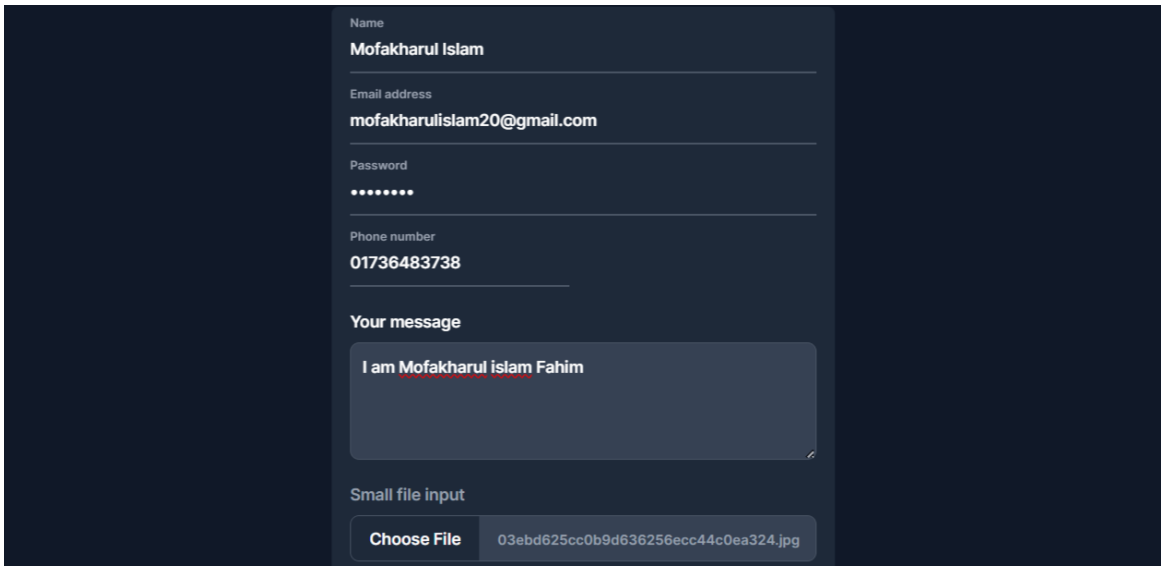


Fig-5.1: Registration from with name, email, password with image.

- If you forget to put your username, email, password or phone Number, it will send an error and won't register your account.

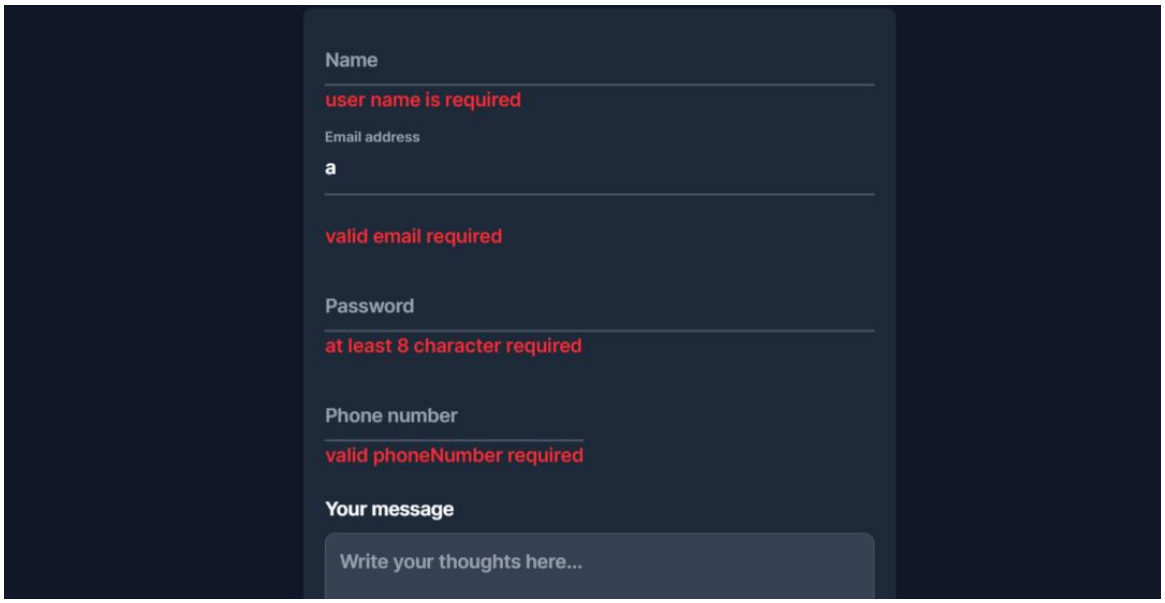


Fig-5.2: Name, email, password and phone Number required

- Click the Login button below the registration page to Navigate into the Login page. It will ask your user email and password to login to the application. Now if you put wrong email address and password. It will not login and will show a message "Invalid email or password".

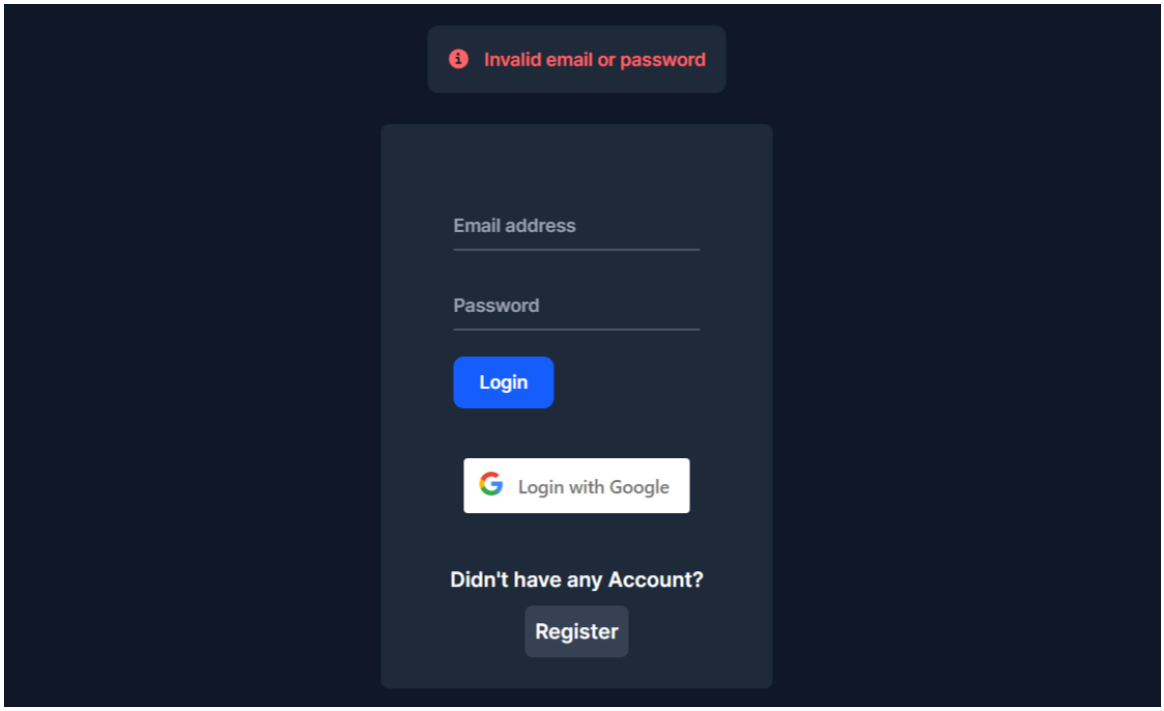


Fig-5.3: Login with Wrong email or password

- After registering an account in the Contactly application, a verification link will be sent to your email address. You must open your email and click the link to verify your account. If you attempt to access your account without completing this verification, the system will prompt you to verify your email first by clicking the link sent to you.

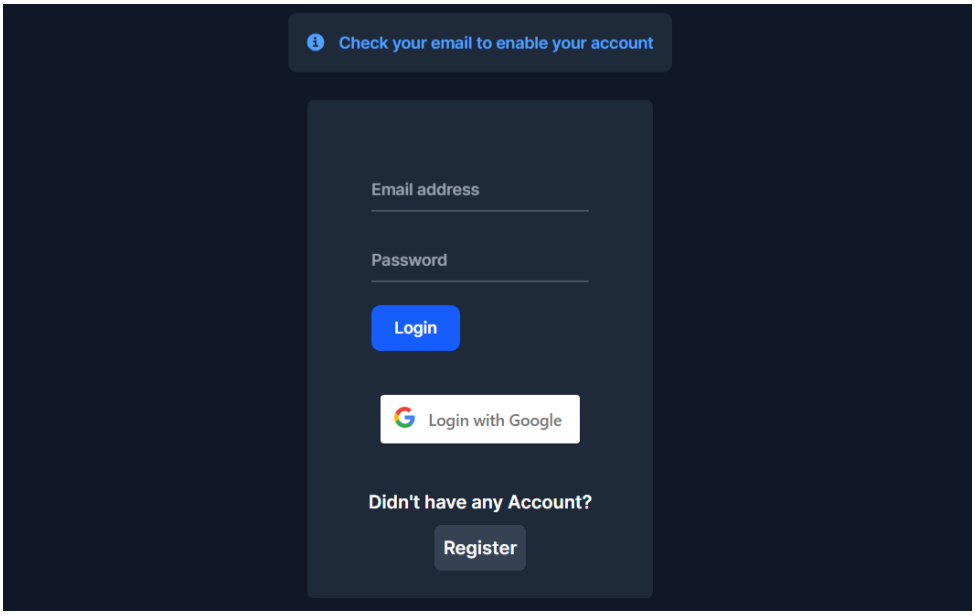


Fig-5.4: Verify Your Email to Activate Your Account

- After you click the verification link sent to your email, the system will confirm that your account has been successfully verified. Once verified, you will see a message informing you that your account is active. You can then proceed to log in and it will navigate you to the dashboard page.

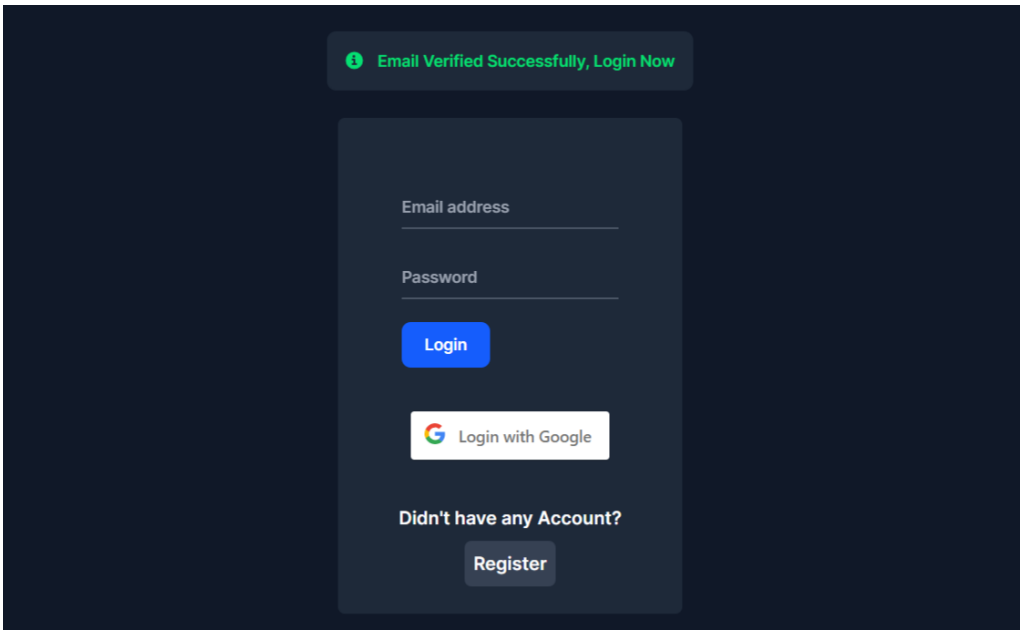


Fig-5.5: Email Verified Successfully, Login now

- If you want to avoid the Lengthy process, you can also just login with your goggle account. It's fast, no registration and email verification. Click the Login with goggle button, it will ask you to select your goggle account.

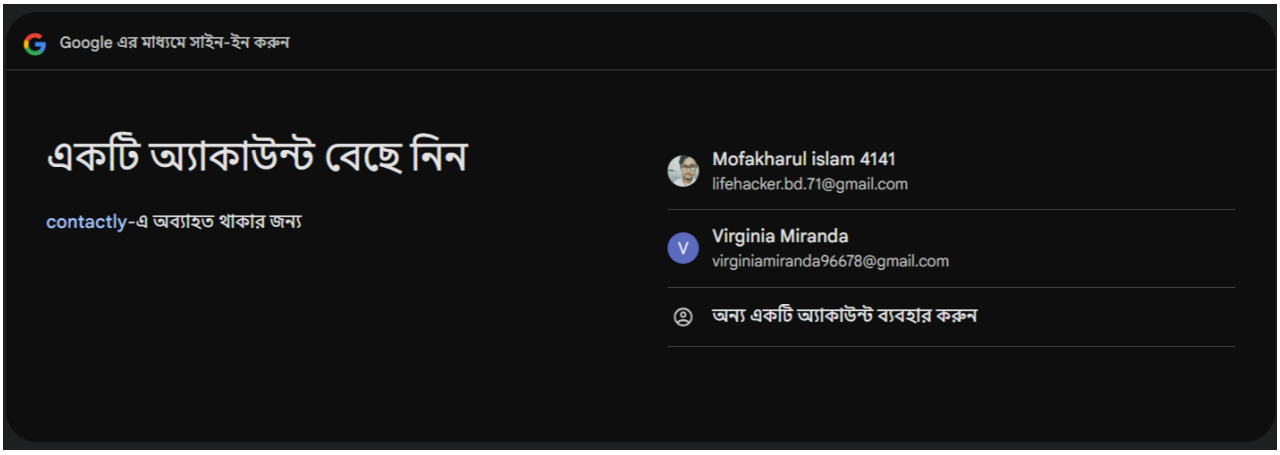


Fig-5.6: Login with goggle

5.4 Dashboard Overview

The **dashboard** is the central hub of Contactly. It provides users with a clear overview of their contacts and essential actions:

- **Total Contacts**: Displays total Number of saved contacts you have, click on this section will display all your saved Contacts.
- **Add Contacts**: You have a add contacts button , you can click that button and it will navigate you to add contacts form.
- **Logout:** Easily Logout from this account by clicking this displayed button.
- **Sidebar:** You have a sidebar where you can visit user profile, total contacts, add contacts, favorite contacts and logout.

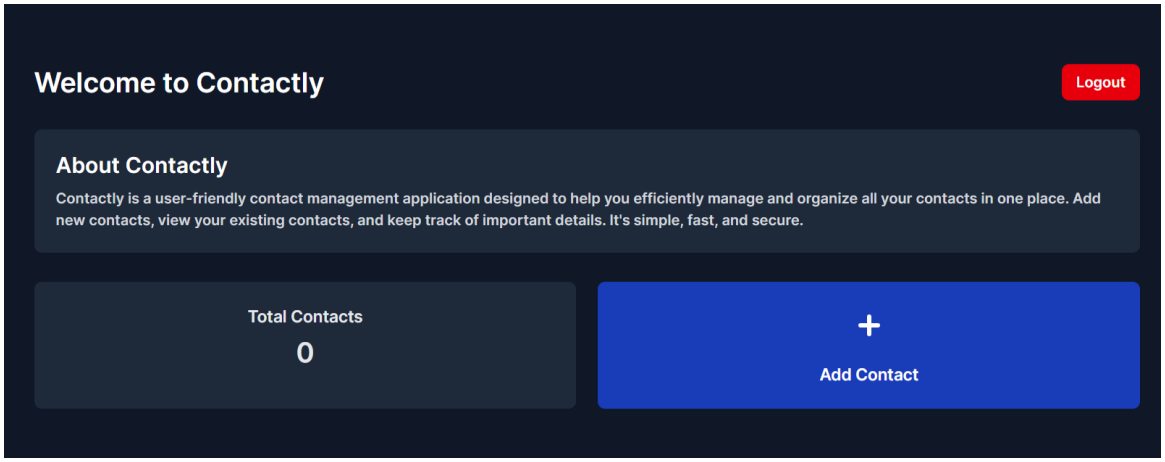


Fig-5.7: Dashboard Page

5.5 Profile Page

Profile page shows User Information, user name, email, image, phone Number and about.

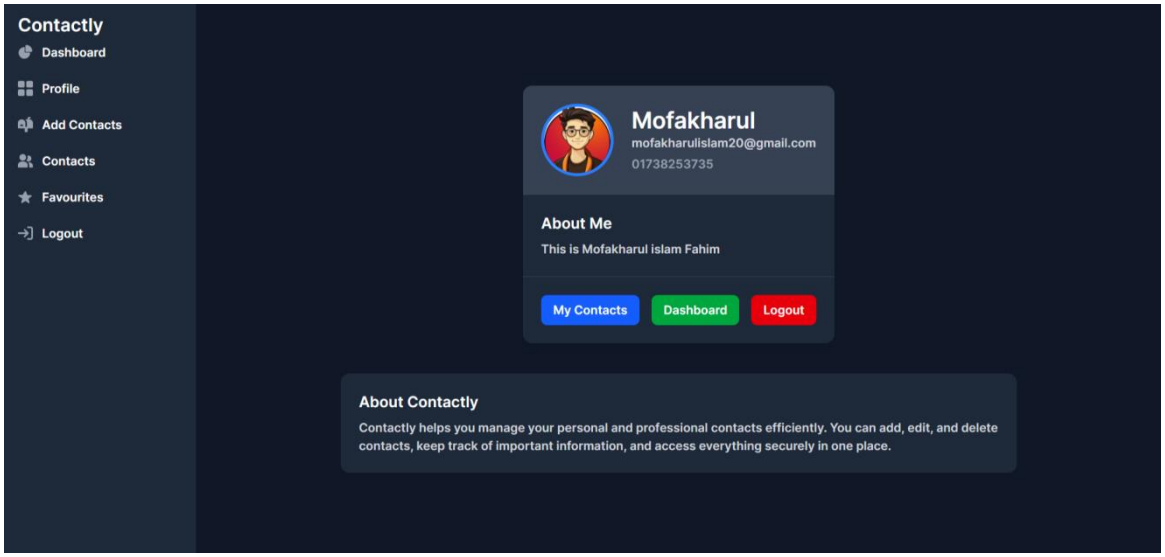


Fig-5.8: Profile Page

5.6 Managing Contacts

Adding a Contact

1. Click the **Add Contact** button.
2. Fill out all required fields: Name, Email, Phone Number, Address, description(optional) and image(optional).
3. Click **Submit** to store the contact.
4. A confirmation message will appear to indicate successful addition.

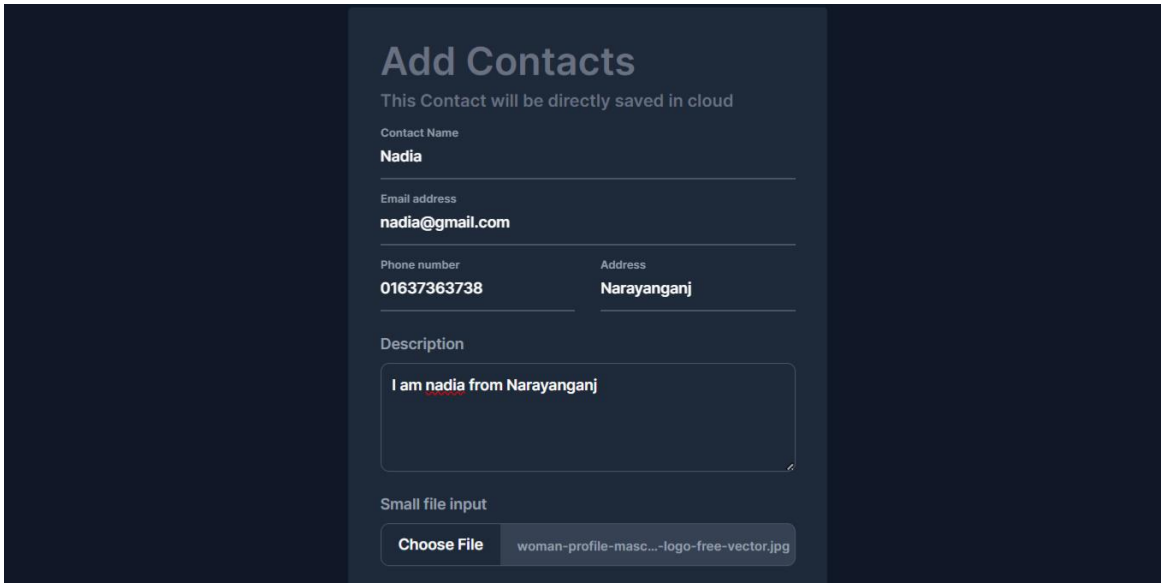


Fig-5.9: Add Contacts Page

5. If you will try to submit without giving contact name, email, phone number and address, it will give you validation message.

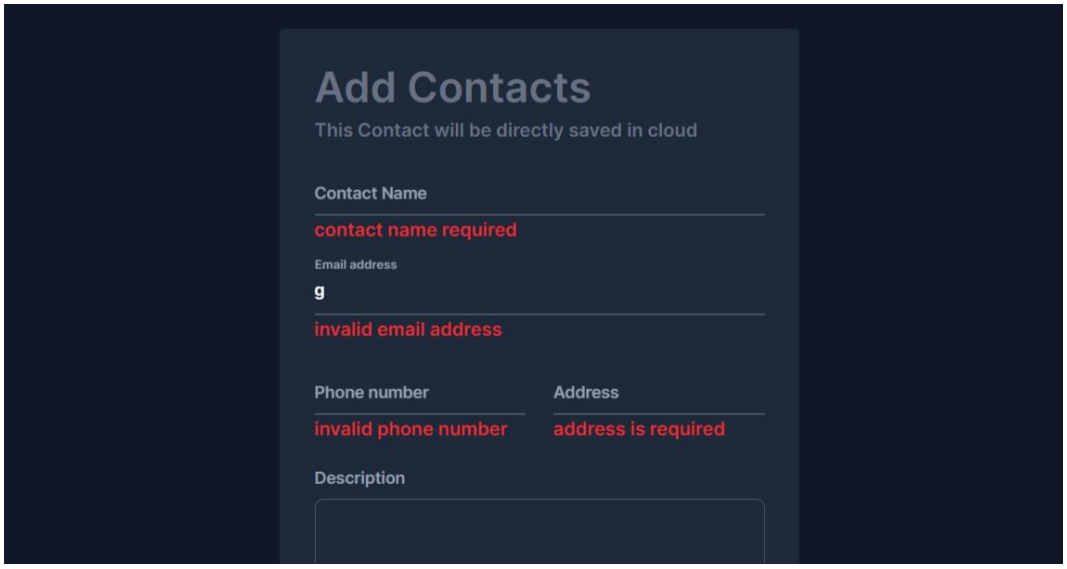


Fig-5.10: Add contacts page form validation

Visit Contacts

1. Click Contacts button and it will show you all saved contacts with pagination.

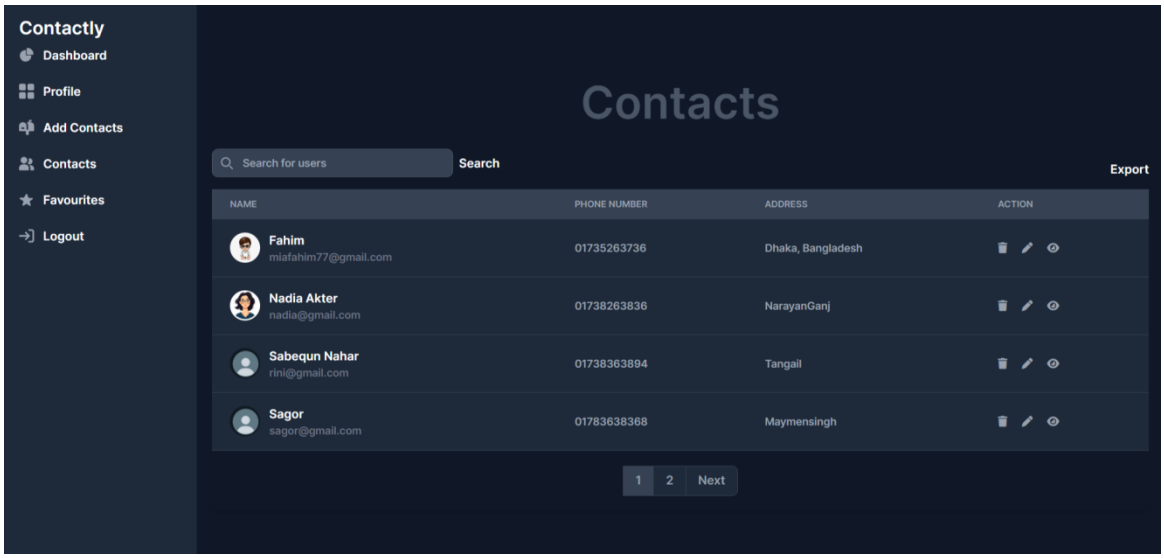


Fig-5.11: show saved Contacts with Pagination

2. Click the eye button from contact informations and it will open a page with contact information, along with edit, delete, send email and export to pdf features.

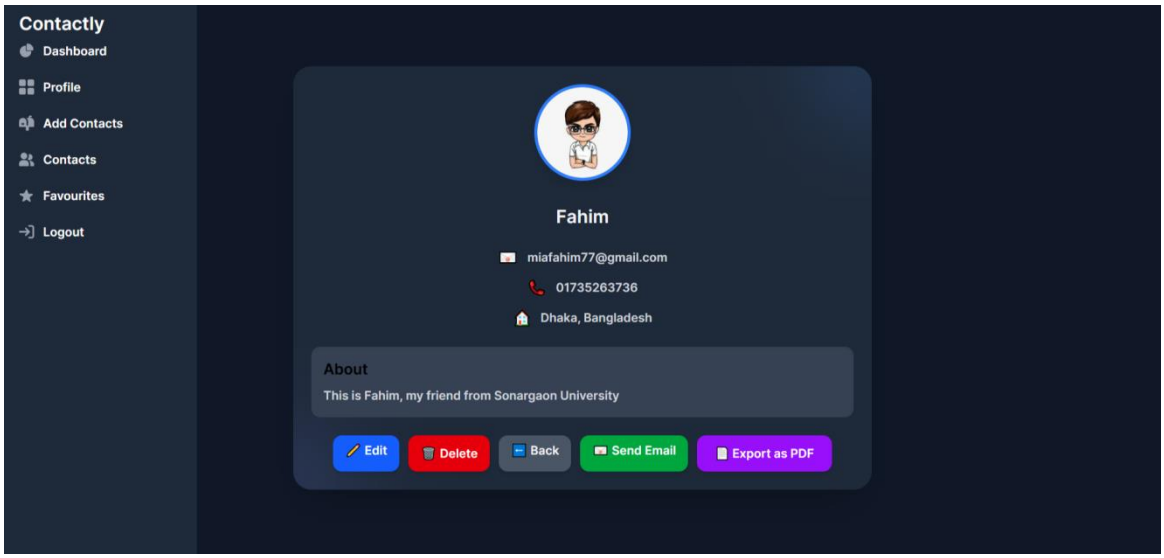


Fig-5.12: Single Contact information

Editing a Contact

1. Locate the contact in the list.
2. Click the **Eye** button next to the contact or click the Edit button in single contact show page.
3. It will give you a form filled with Contacts Information, you can then edit any information from the form and then click submit.

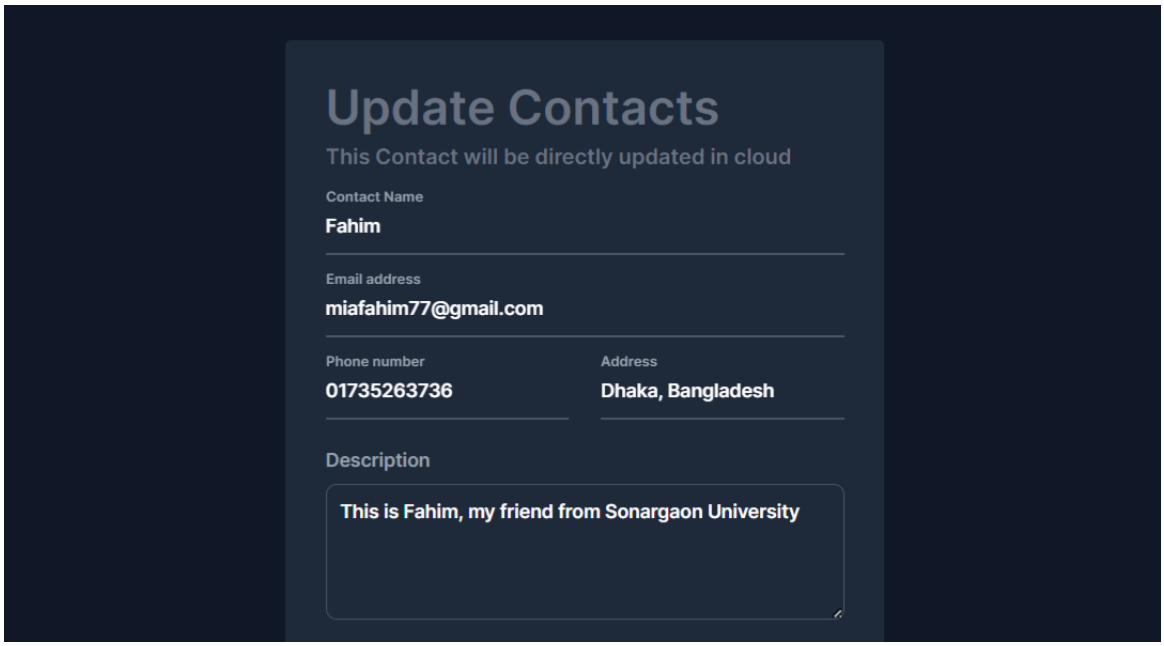


Fig-5.13: Update Contact Page

Deleting a Contact

1. Select the contact you want to remove.
2. Click the **Dustbin** button or delete button from single contact page.
3. Confirm deletion in the pop-up dialog.
4. The contact is permanently removed from your list, and the action is logged for audit purposes.

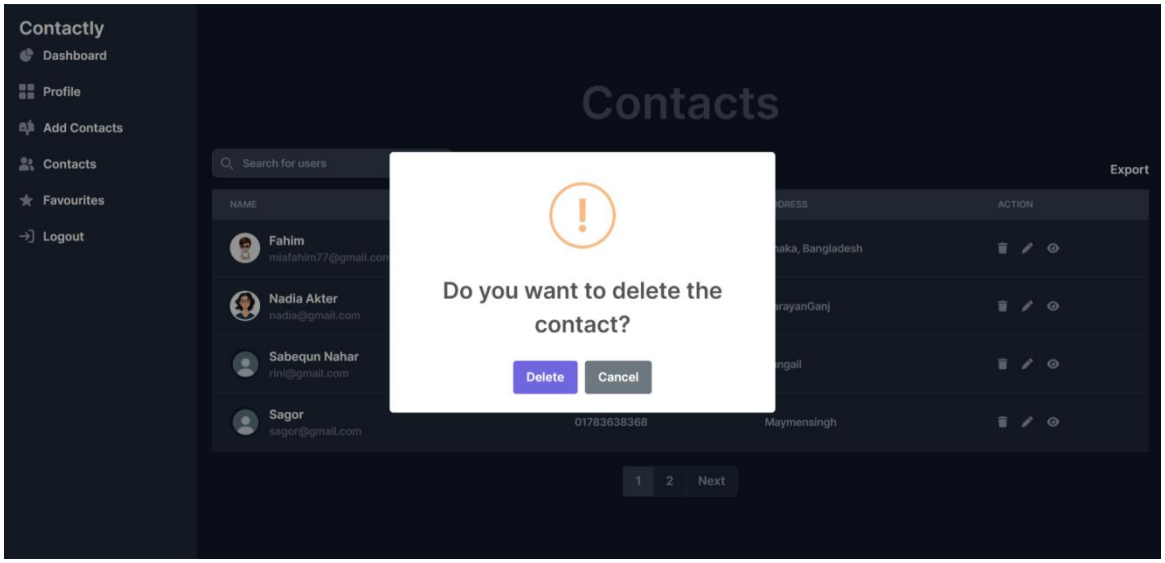


Fig-5.14: Deleting a Contact

5.6 Search

Use the **Search Bar** at the top of the dashboard to locate contacts by entering keywords such as name, phone number, or email.

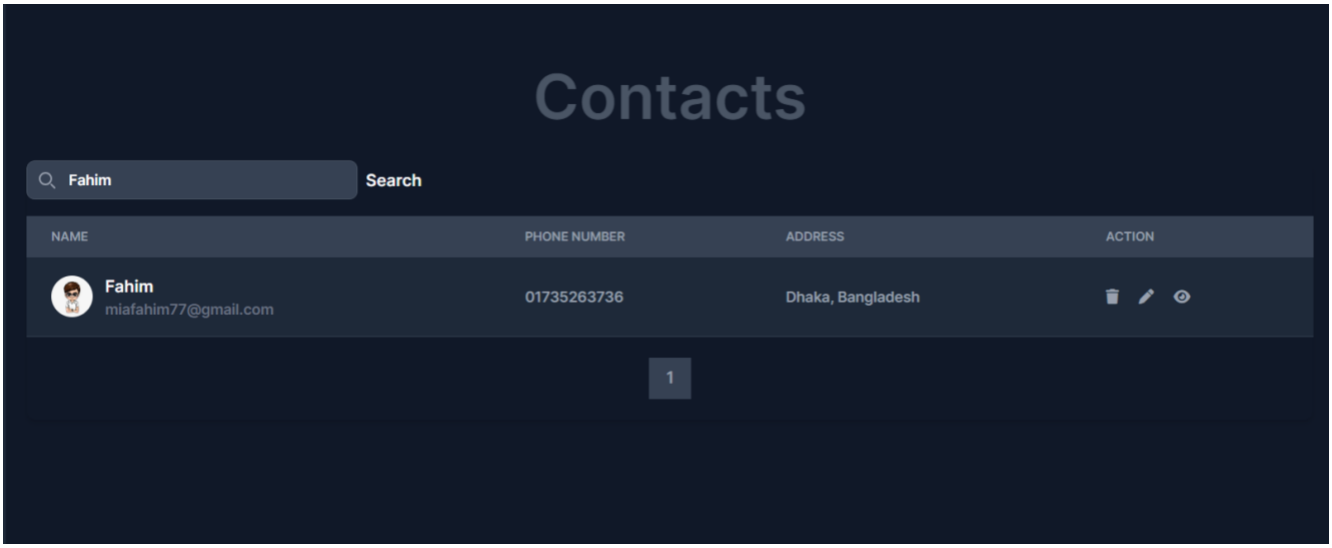


Fig-5.15: Searching a Contact

5.7 Exporting Contacts

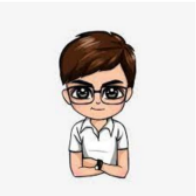
1. Click the Export button to download contacts, it will save contacts in excel format and will be automatically downloaded in your device.

	A	B	C	D	E	F
1	Name	Email	Phone Number	Address	Description	
2	Fahim	miafahim77@gmail.c	01735263736	Dhaka, Bangladesh	This is Fahim, my friend from Sonargaon University	
3	Nadia Akter	nadia@gmail.com	01738263836	NarayanGanj	My friend Nadia from NarayanGanj	
4	Sabequn Nahar	rini@gmail.com	01738363894	Tangail	I am from tangail	
5	Sagor	sagor@gmail.com	01783638368	Maymensingh	hello sagor	
6						
7						
8						
9						
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11						
12						
13						
14						
15						

Fig-5.16: Export Contacts to Excel

2. View single contact information and click export to pdf and it will automatically download pdf file containing your contacts information in pdf format.
3. Contactly ensures data is exported securely without loss of information.

Contact Details



Name	Fahim
Email	miafahim77@gmail.com
Phone	01735263736
Address	Dhaka, Bangladesh
Description	This is Fahim, my friend from Sonargaon University

Fig-5.17: Export Contact to Pdf format

5.8 Email Feature

- Select one contacts from the list.
- Click **Send Email**.
- Enter the **Subject** and **Message Body**.
- Click **Send**, and the system logs the email for reference.
- This feature helps users communicate directly with contacts without leaving the application.

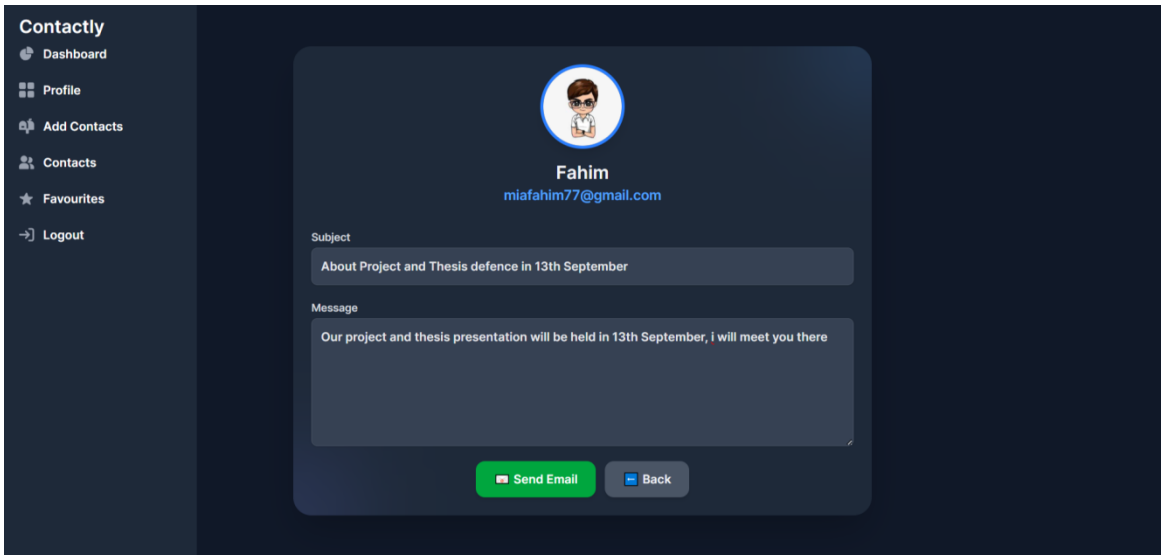


Fig-5.18: Sending email through contactly application

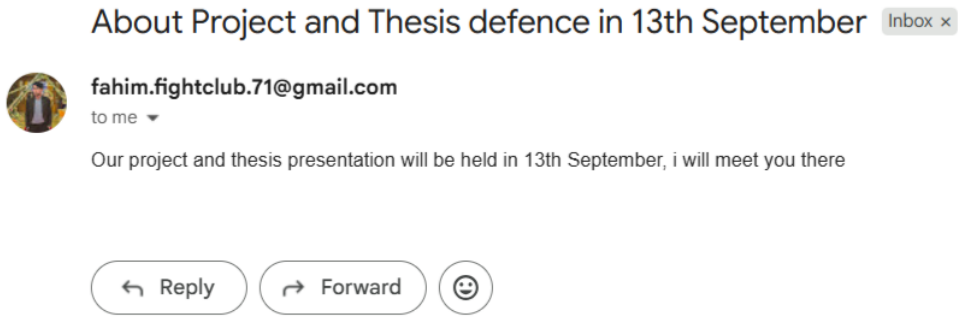


Fig-5.19: Receiving sanded email from contactly

5.9 Troubleshooting

Cannot login	Ensure correct username and password, check internet connection, and contact admin if the issue persists.
Export Fails	Verify file format, check storage space, and retry. Ensure the system has access to the save location.
Emails not sending	Confirm correct email addresses, check internet connection, and verify SMTP settings.
Email verification not received	Check the email inbox (including spam/junk folders) for the verification email. Ensure your email address is entered correctly and resend the verification link if needed.

Table 5.1: Troubleshooting for Contactly application

5.10 Summary

The User Manual provides detailed instructions for using Contactly efficiently and securely. By following this guide, users can fully leverage the system's features, including contact management, search, export, and email functionalities. Proper use of Contactly improves productivity, ensures data security, and enhances communication management.

CHAPTER 6

SYSTEM TESTING AND EVALUATION

6.1 Overview

Testing is a critical stage in the software development lifecycle to ensure that the application is functional, reliable, and meets user expectations. The Contactly application underwent various levels of testing, including unit testing, integration testing, system testing, and user acceptance testing (UAT)**,** to verify both individual components and the overall system. This chapter presents the testing approach, key test cases**,** results**,** and an overall evaluation of the system's performance, demonstrating that Contactly operates correctly and efficiently while fulfilling the intended requirements.

6.2 Types of Testing Performed

- **Unit Testing**
    - Focused on testing individual components such as user authentication, contact CRUD operations, and export functions.
    - Implemented using JUnit and Mockito.
    - Example: Testing if the /api/contacts endpoint correctly saves a new contact in the database.
- **Integration Testing**
    - Ensured that components work together as expected.
    - Example: Verifying the connection between the REST APIs and the MySQL database.
    - Checked if contact data is stored and retrieved consistently across modules.
- **System Testing**
    - The complete system was tested as a whole.
    - Verified workflows such as user login → adding a contact → exporting → sending an email.
    - Ensured that the user interface, backend, and database work seamlessly together.
- **Security Testing**
    - Tested authentication and role-based access control.
    - Checked for unauthorized access attempts.
    - Example: A normal user should not be able to view or edit admin-level data.

- **User Acceptance Testing (UAT)**
    - Conducted with real users to verify usability and ease of navigation.
    - Users confirmed that the system is **easy to use**, with clear buttons, forms, and messages.

6.3 Test Environment

- **Hardware:** Intel Core i5, 8 GB RAM, 256 GB SSD
- **Software:** Windows 10, IntelliJ IDEA, MySQL Workbench
- **Tools:** JUnit, Postman (for API testing), Mockito

6.4 Sample Test Cases

Test Case ID	Description	Input	Expected Output	Result
TC-01	User Login	Valid Credentails	Successful Login	Pass
TC-02	User Login	Invalid credentials	Error message	Pass
TC-03	Add Contact	Name, phone, email	Contact saved	Pass
TC-04	Delete Contact	Contact ID	Contact removed	Pass
TC-05	Export Contact	Click export button	PDF generated	Pass
TC-06	Email Sending	Compose + send	Email delivered	Pass

Table 6.1: Sample Test Cases for Contactly Application

6.5 Evaluation

- Functionality: All core features (authentication, contact management, email, export) worked as expected.
- Reliability: The system performed consistently under normal workloads.
- Usability: Test users found the interface intuitive and easy to navigate.
- Performance: Response times were acceptable, with no noticeable delays during typical operations.
- Security: Role-based access worked correctly, preventing unauthorized operations.

6.6 Limitations Observed During Testing

- Performance decreases slightly when handling thousands of contact records in export.
- Email sending depends on an active internet connection and SMTP server availability.
- No dedicated testing was performed for mobile responsiveness, though Tailwind CSS provides some support.

6.7 Summary

The testing and evaluation phase confirmed that Contactly is a robust and user-friendly contact management system. While minor limitations were identified, none of them critically affect system usage. The results validate the application’s readiness for real-world deployment

CHAPTER 7

CONCLUSION AND FUTURE WORKS

7.1 Conclusion

The Contactly application achieves its main goal of delivering a secure, efficient, and user-friendly contact management system. It allows users to easily store, search, update, and delete contacts, ensuring smooth contact management. Beyond these basics, it offers direct email communication with saved contacts and supports exporting data in PDF and Excel formats, making it useful for both personal and professional purposes. On the technical side, Contactly uses a modern frontend built with HTML, Tailwind CSS, and Thymeleaf, combined with a powerful Java Spring Boot backend and MySQL database. The application follows best practices for usability, scalability, and security, including role-based access control and JWT-based authentication to protect user data. Its simple and clean interface ensures a smooth experience for both administrators and regular users. The modular design makes it easy to maintain and expand with future features. Overall, Contactly is a reliable and versatile contact management solution that balances functionality, security, and ease of use.

7.2 Future Works

While the current version of Contactly is functional and reliable, there is significant potential for future improvement and expansion. Some of the planned enhancements include:

- **Mobile Application:** Developing a dedicated Android and iOS app for on-the-go access.
- **Advanced Email Features:** Adding support for attachments, scheduling, and bulk emailing.
- **Additional Export Formats:** Supporting CSV, JSON, and cloud-based synchronization (Google Drive, Dropbox).
- **Enhanced Security:** Integration of OAuth2 and multi-factor authentication (MFA) for stronger protection.
- **Cloud Deployment:** Hosting the application on platforms like AWS, Azure, or Google Cloud for better availability and scalability.
- **AI-Powered Features:** Smart suggestions, duplicate contact detection, and analytics to improve user experience.
- **Customizable User Interface:** Allowing users to personalize themes, layouts, and dashboard widgets for a tailored experience.
- **Integration with Third-Party Services:** Connecting with CRM systems, calendars, and social media platforms to streamline workflow and increase productivity.*

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