

# **EXPOSYS DATA LABS INTERNSHIP**

**Role: Software Developer**

**Title: VColab Mail System**

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# ABSTRACT

VColab Mail system simulates the existing email system. Its purpose is to send and receive electronic mails. This project is developed using JAVA and few APIs of Java.

It securely transmits the mail between sender and receiver by encrypting the data and storing it safely. The cost of system design is too less when compared to conventional email services. mail program system is cost effective and doesn't compromise on security.

# INTRODUCTION

Email is a way to send and receive messages across the Internet. One can send a message to the other side of the world and get a reply in minutes. Email is referred as electronic mail. An email is a letter that is sent over a computer network instead of being sent through the post. Sending and receiving email is free and one can actually send an email to as many people as they like. Each person on email has a unique email address, which is how one can direct an email address to a specific person. All the emails are displayed in the inbox, which is like a virtual letter box. An email address always has an @ symbol. If a person uses a free web mail service their address will have that service's name after the @ symbol.

For example: myname@vcmail.com

A quick walkthrough of how to send an email:

1. New email is created
2. Recipient addresses are filled in
3. A subject line is entered
4. The content of the email is typed in
5. The email is sent.

This software encrypts the message on the sender's machine and then the recipient's machine uses the same encryption key to run a decryption procedure and make the email message readable. Encryption is a method to cypher data that a user sends and receives, as well as data that resides on endpoints and servers.

## **Email advantages**

1. Productivity tools: Email is usually packaged with an address book, instant messaging, and more for convenience and productivity.
2. Privacy: An email is delivered to one's own personal and private account with a password required to access and view emails.
3. Communication with multiple people: One can send an email to multiple people at once, giving options to include as few as or as many people as they want in a conversation.
4. Accessible anywhere at any time: One can access the mails from any computer or mobile device that has an Internet connection.

## **Email Features**

1. User Friendly: VColab Mail System is very easy to understand and to handle things. It uses easy flow of pages. Users can send and receive confidential mails without worrying about the security of the mail sent or received as it is highly encrypted and stored in the backend database. Fast transferring of mails helps users to communicate quickly. Modification of user profile made easy to maintain stability in user data.
2. Reply, Forward and Redirecting Mails: This system gives users the advantage to reply for a mail. It allows users to forward a particular mail to a different person existing in the system.
3. Retrieval of messages: This system automatically retrieves the mail received by the users once they enter to their mail homepage. There are no limits for the number of mails received or sent by a particular user existing in the mail system.
4. Important Notifications: It helps users by updating proper notifications for understanding and usage of the mail system very conveniently. It shows notifications for Successful Sign Up, Login, Mail Sent. It provides notification for unsuccessful Sign Up, Login and also if the mail is not sent to the user. This helps user to easily access and use the mail system.
5. Proper Arrangement of Mails: It automatically assigns date to the mail sent at the time of composing the mail. It properly arranges the data of the mail sent without getting any faults during the transmission of the mail from sender to receiver end.
6. Security: The security of this mail system is the main concept that helps it to be unique from all other mail system existing. The data stored in the system is highly secured using a strong encrypting algorithm. This feature help users to send confidential mails

without worrying about its security. This system also helps to avoid leakage of data to anyone except the user since each and every data is encrypted using the algorithm. The mail system is end-to-end encrypted i.e., the mail sent and received can only be viewed by the sender and the receiver.

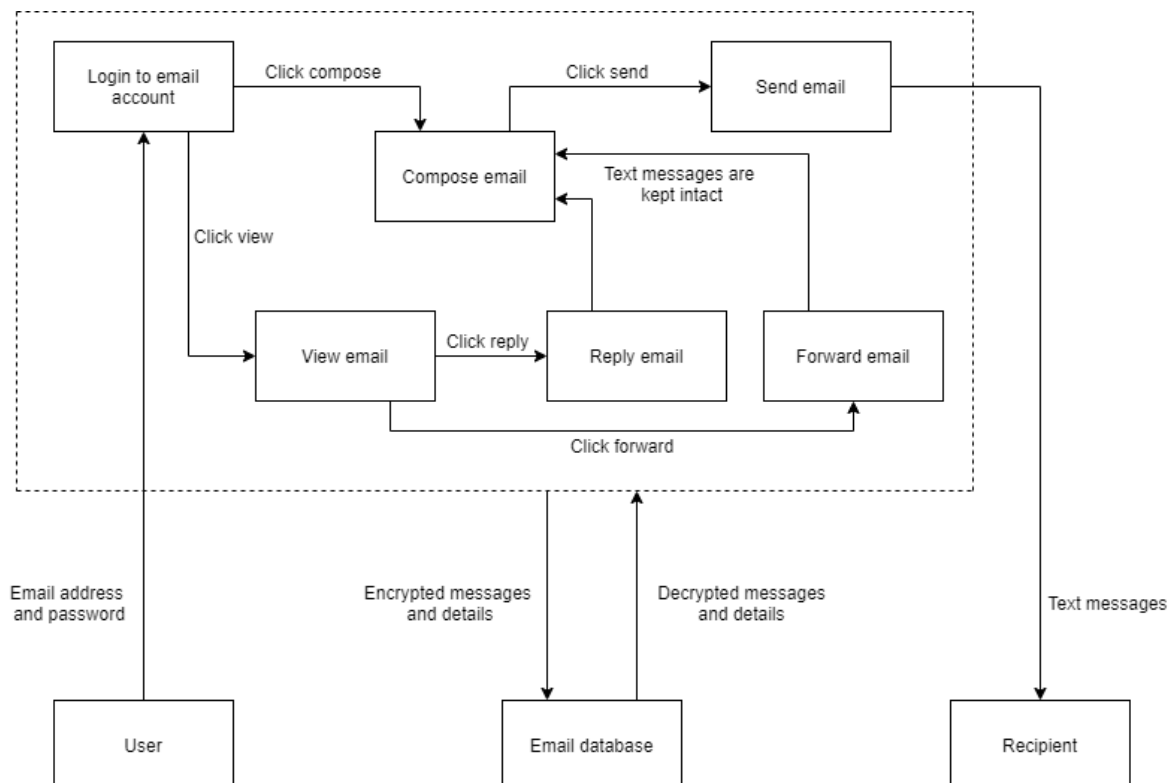
# METHODOLOGY

## Existing System

The existing system has two mail servers one at sender side and another at recipient side. The sender's device is connected to the backend MYSQL Database, which stores the data in an encrypted form. The recipient server processes the received mails, decrypt the stored data, sorts them and sends to receiver device. Mailing services like Yahoo, Gmail and Hotmail uses HTTP 80 port for communication which is not suitable for sharing confidential messages as messages can be hacked easily. To overcome this issue, VColab Mail helps to send and receive confidential mails without getting leaked.

## Proposed System

The proposed system uses Java coding to send the mails. It securely transmits the mail between sender and receiver by encrypting the data and storing it safely. The cost of system design is too less when compared to conventional email services. Over all, email program system is cost effective and doesn't compromise on security.



# **SYSTEM REQUIREMENTS**

## **Software Requirements**

Software: Java SDK 2, Net-Beans 8.1

Operating System: Windows XP or higher / Linux

## **Hardware Requirements**

No of Systems: 2 – Client & Server (Minimum)

Processor: Pentium 4 or equivalent or higher

Network: Standard Wired/Wireless network with either Ad-hoc or infrastructure mode

RAM: 512 MB minimum

Hard Disk: 40 GB minimum

# IMPLEMENTATION

This software uses a highly secured encryption and decryption algorithm. This is the major feature that highlights the software when compared to other mail system. This ensures end-to-end encryption so that users can easily send confidential mails without worrying about the security of the mail sent.

The encryption algorithm works in a very unique way, it first splits the given information into a specific range. The range is divided into four parts, one for capital alphabet, second for small alphabet, third for numbers and finally the fourth for special characters. Once the information is changed into the divided range, it is then converted into binary numbers and stored in the back-end database. No third person except the sender and the receiver can view the content of the mail sent.

The decryption algorithm works in a opposite way when compared to encryption, it first converts the binary number into the decimal format. Once the decimal form is obtained, the decimal value is checked for its respective range. The range is divided into four parts, one for capital alphabet, second for small alphabet, third for numbers and finally the fourth for special characters. According to the range, the encrypted information is decrypted and displayed to the user.

For A-Z,

$A=65*2=130$                        $Z=90*2=180$     range: (130-180)

For a-z,

$a=97*3=291$                        $z=122*3=366$     range: (291,366)

For 0-9,

$0=48*5=240$                        $9=57*5=285$     range: (240,285)

-----



Text → Range → Hexadecimal → Binary

Binary → Hexadecimal → Range → Text

(space)=32\*4=128    /=47\*4=188    range: (128,188)

: =58\*4=232    @=64\*4=256    range: (232,256)

[=91\*4=364    ‘=96\*4=384    range: (364,384)

{=123\*4=492    ~=126\*4=504    range: (492,504)

0=48\*6=288    9=57\*6=342    range: (288,342)

A=65\*8=520    Z=90\*8=720    range: (520,720)

a=97\*8=776    z=122\*8=976    range: (776,976)

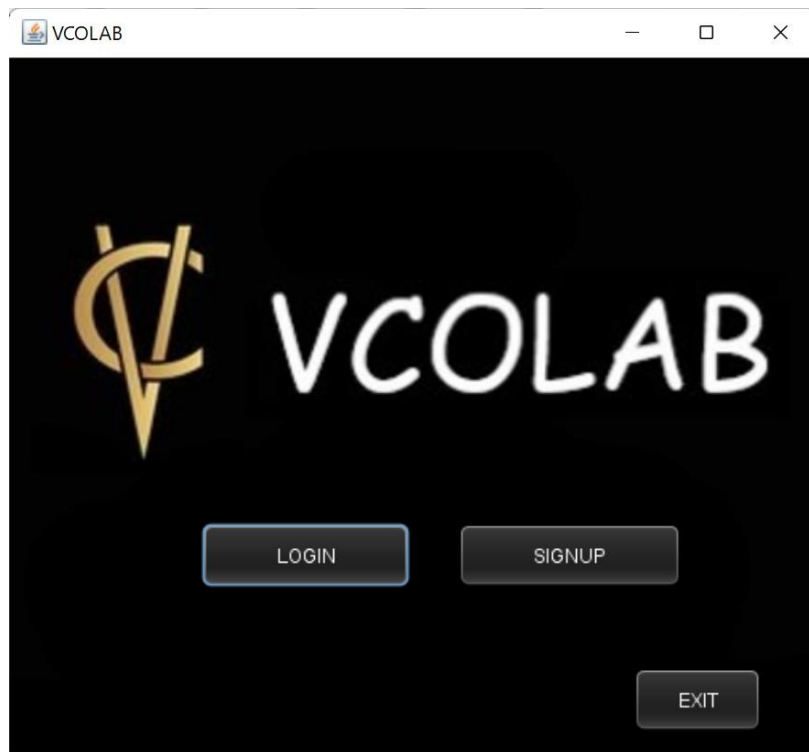
# RESULTS

## Front End

### Starting page



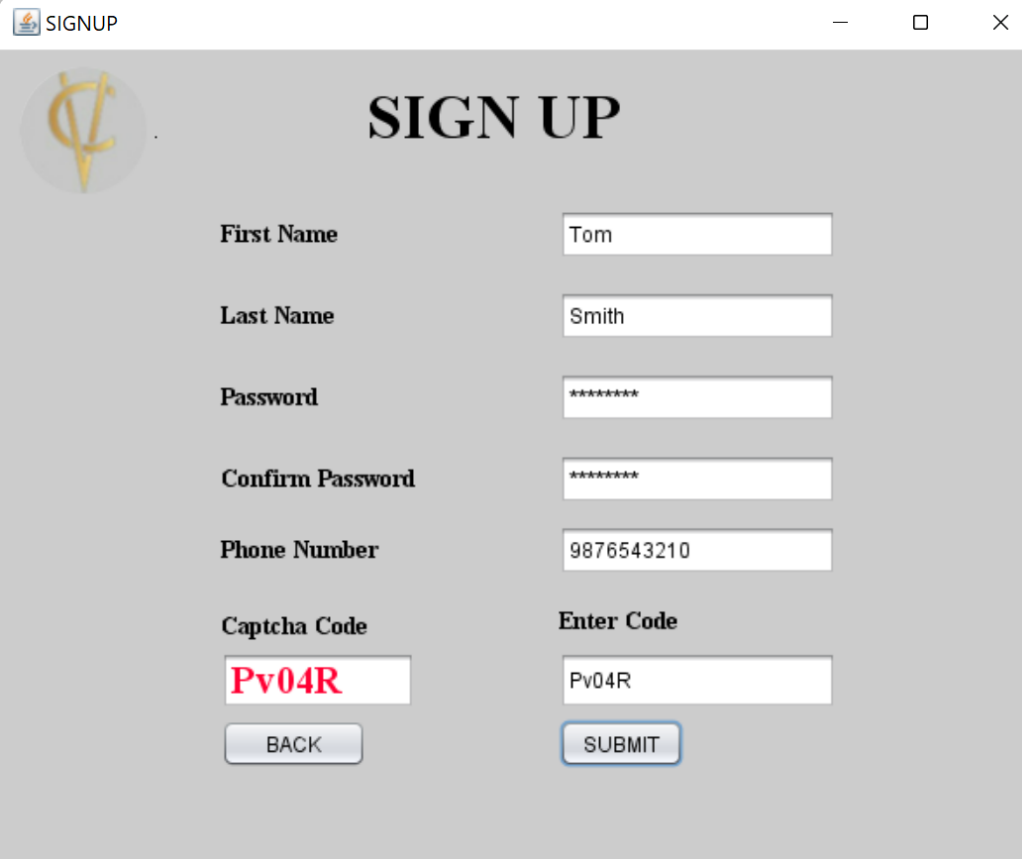
### Home page



This page is displayed to the users when they open the software. It has 3 options, namely:

1. **LOGIN:** This option helps user to log in to their existing account. Only after a successful sign up is done for the account, this option will be useful for the user.
2. **SIGN UP:** This option helps user to create a new account. It will redirect to the Sign-Up page for entering the details and creating a new account.
3. **EXIT:** This option helps user to exit the software. Once done with work and to save the progress of the work done, this option helps user to easily end the software without any other problems faced.

### Sign Up page



The screenshot shows a 'SIGN UP' window with the following fields and values:

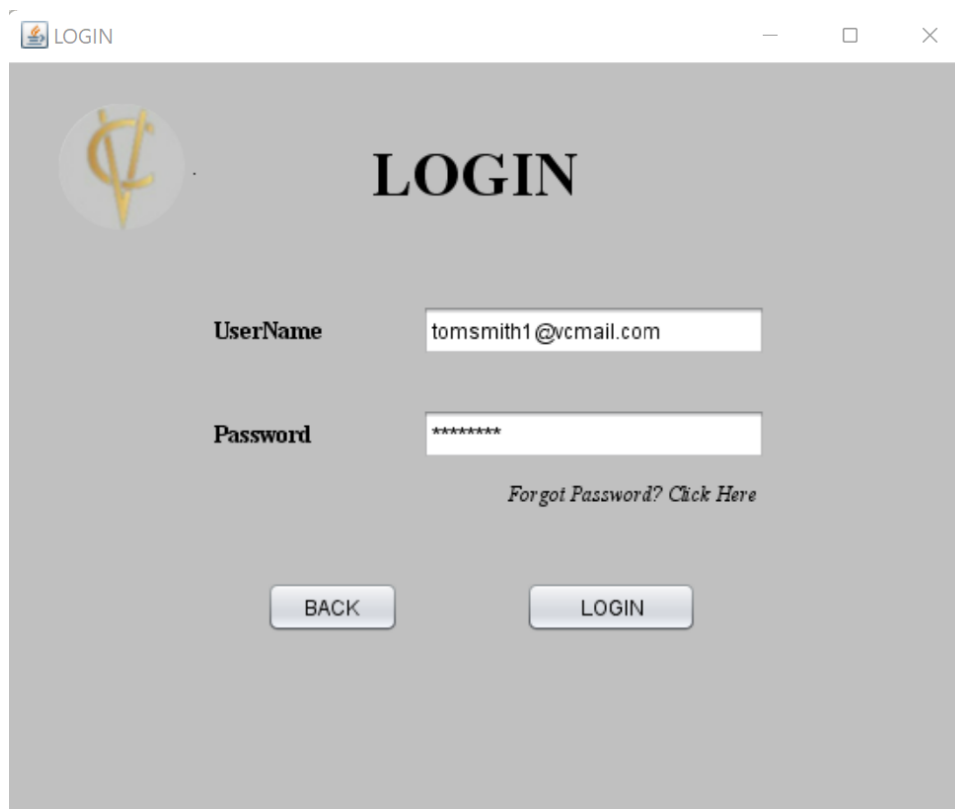
Field	Value
First Name	Tom
Last Name	Smith
Password	*****
Confirm Password	*****
Phone Number	9876543210
Captcha Code	Pv04R
Enter Code	Pv04R

Buttons: BACK, SUBMIT

This page is used to retrieve the data of the user to create a new account, it retrieves data like first name, last name which is combined to form the username of the user, password and confirm password to secure the user's account, phone number to verify the user's account and finally the captcha code to avoid robots entering into our systems. It has 2 options:

1. **SUBMIT:** This option helps user to submit the data and if all the credentials satisfy the condition, the user's account is created successfully. And the user is directed to the Login Page on a successful sign up or the user remains in the same page if incorrect details are entered.
2. **BACK:** This option helps user to move back to the HOME PAGE. This option is useful when the user enters the Sign-Up Page and wants to redirect to the previous page.

### Login page



This is the Login page that is displayed to the user for accessing the user's account. This page is used to retrieve data of the user to verify and allow access to the user's account, it retrieves data like username of the user, password of the user's account. When the entered details are matched with the back-end details, a successful login to the user's account takes place. It has 3 options:

1. **FORGOT PASSWORD:** This option helps user to retrieve the user account's password. When this option is selected, the user is redirected to a new FORGOT PASSOWORD PAGE to enable easy way for retrieving password.

2. **LOGIN:** This option helps user to access his VCMail account. By entering the correct details related with user's account, this option allows user to enter into his account.
3. **BACK:** This option helps user to move back to the HOME PAGE. This option is useful when the user enters the LOGIN Page and wants to redirect to the previous page.

### User profile page

This is the USER PROFILE page that is displayed to the user when the user wants to view or modify the data stored in his account. This option is proved useful to maintain proper data in the system. No fields present in this page can be modified by the user. It has 2 options:

1. **EDIT PROFILE:** When this option is selected by the user, the user is redirected to a new page that allows user to modify the details attached with the user's account. This option proves useful to avoid incorrect or fake data existing in the system.
2. **BACK:** This option helps user to move back to the HOME PAGE EMAIL. This option is useful when the user enters the PROFILE PAGE and wants to redirect to the previous page.

tomsmith1@vcmail.com - PROFILE

**PROFILE**

**Username** tomsmith1@vcmail.com

**First name** Tom

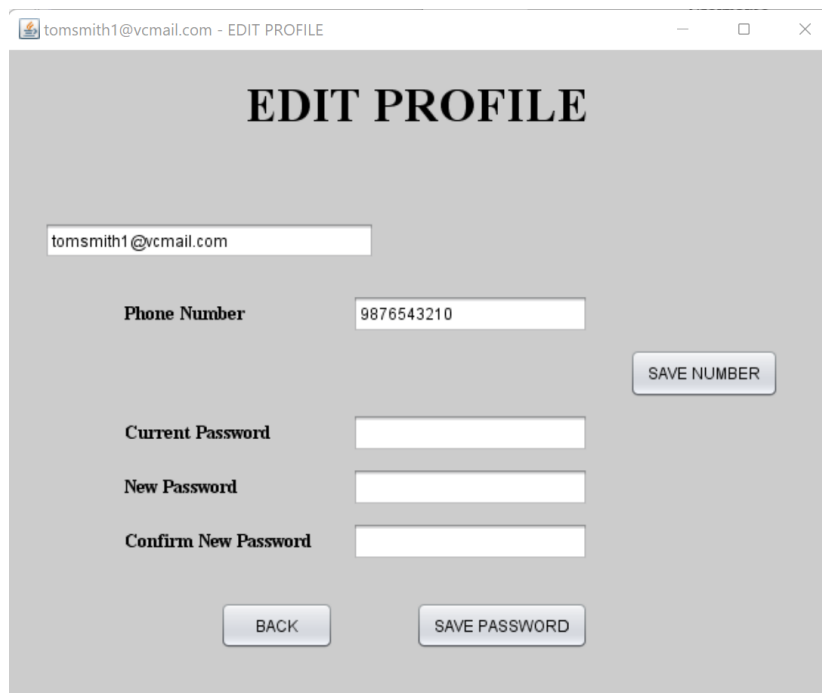
**Last name** Smith

**Phone Number** 9876543210

BACK EDIT PROFILE

## Edit profile page

This is the MODIFY PROFILE page that is displayed to the user when the user wants to modify the data stored in his account. This option is proved useful to maintain proper data in the system. All fields present in this page can be modified by the user. It has 3 options, namely:

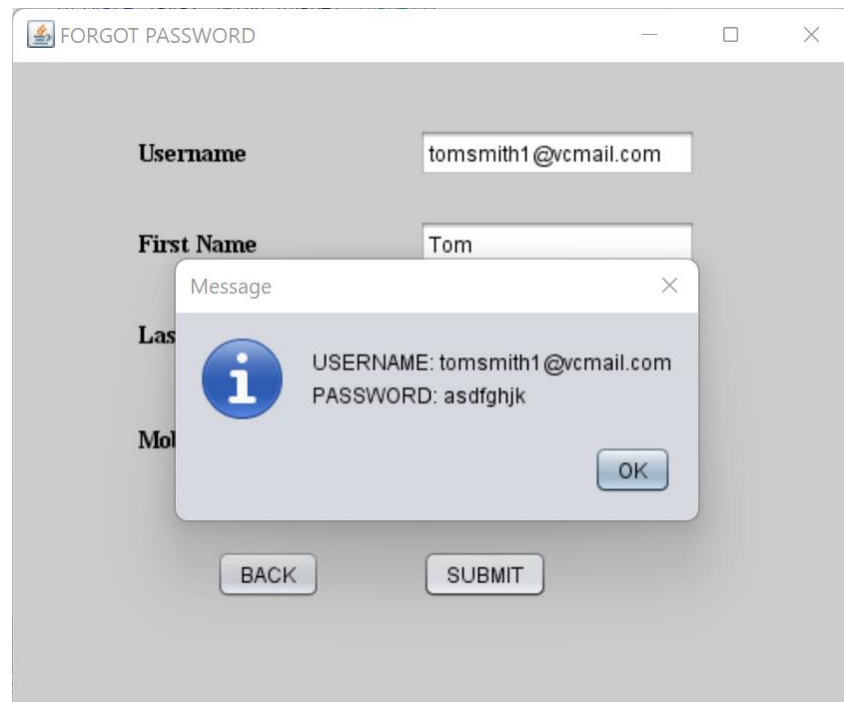


The screenshot shows a web browser window titled 'tomsmith1@vcmail.com - EDIT PROFILE'. The main heading is 'EDIT PROFILE'. Below the heading, there is a text input field containing 'tomsmith1@vcmail.com'. Underneath, there are three sections: 'Phone Number' with a text input field containing '9876543210' and a 'SAVE NUMBER' button; 'Current Password' with a text input field; 'New Password' with a text input field; and 'Confirm New Password' with a text input field. At the bottom, there are two buttons: 'BACK' and 'SAVE PASSWORD'.

1. **SAVE NUMBER:** When this option is selected by the user, the user is requested to enter the new mobile number that the user wants to interchange with the already existing mobile number. This is an important data that is used to verify the content of the user data stored in the system. The mobile number must undergo several conditions for successful updating.
2. **SAVE PASSWORD:** This option is used to maintain security of the user's account. When this option is selected by the user, the user is requested to enter the password details such as the old existing password, this field is retrieved to verify the originality of the current logged in user. It also accepts the new password that the user wants to update with the already existing password. The password must undergo several conditions for successful updating.
3. **BACK:** This option helps user to move back to the HOME PAGE EMAIL. This option is useful when the user enters the MODIFY PROFILE PAGE and wants to redirect to the previous page.

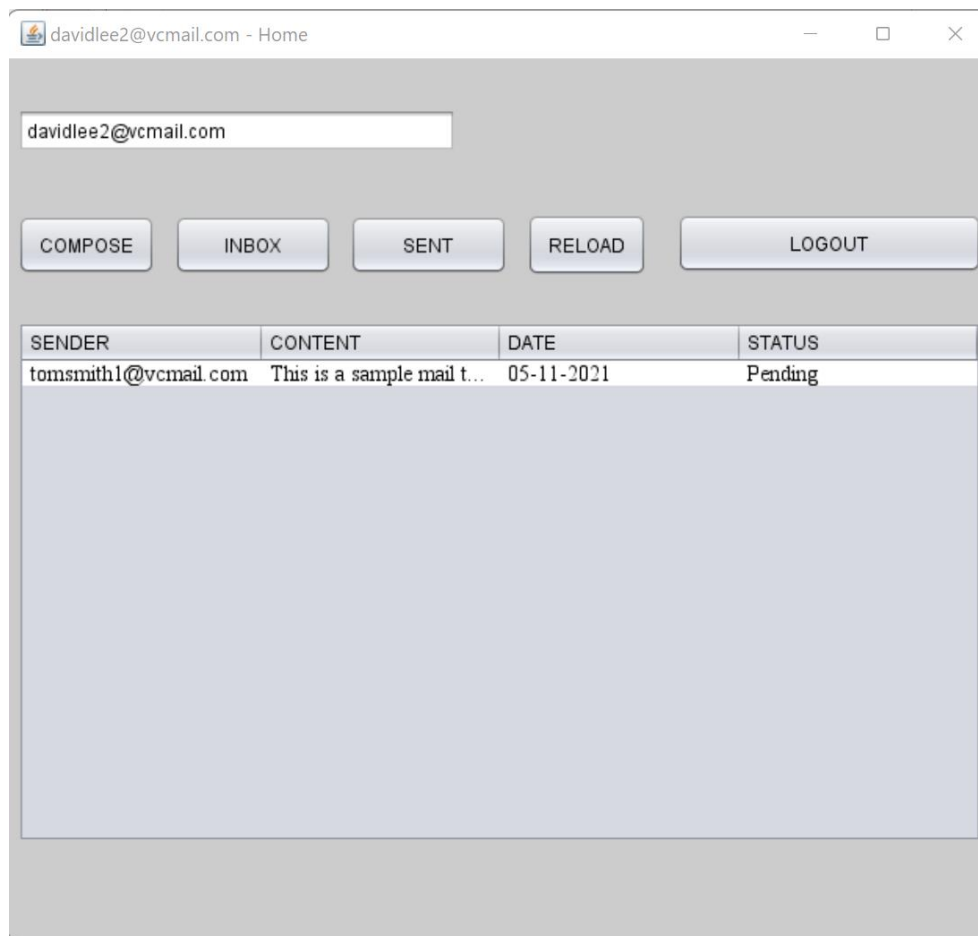
## Forgot password page

This is the FORGOT PASSWORD page that is displayed to the user when the user wants to retrieve his password attached with the user's account. This page requires user to enter few information attached with the user's profile. If the information entered by the user is same as the information stored in the system, the password of the user's account is displayed to the user. It has 2 Options, namely:



1. **SUBMIT:** When this option is selected by the user, information entered by the user are checked with the data already existing in the system. If the data entered matches the data present in the system, the user account's password is displayed using a message box.
2. **BACK:** This option helps user to move back to the LOGIN PAGE. This option is useful when the user enters the FORGET PASSWORD PAGE and wants to redirect to the previous page.

## Home page mail



This is the Home Page Email that is displayed to the user after successful login. The mails received and sent and displayed to the user with the help of a table. The Mails are automatically arranged in chronological order. It has 7 options:

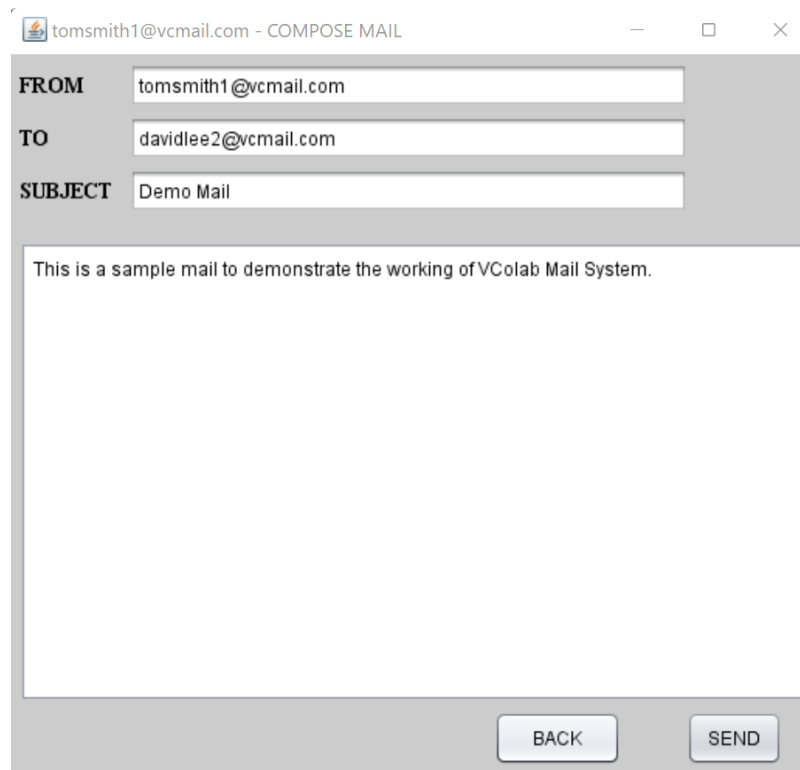
1. **USER PROFILE:** This option helps user to view his Profile. This option is made available to user for convenient view and modification in user information. This is a key advantage for the user as well as for the system to maintain clean data.
2. **INBOX TABLE:** Inbox scans the user's incoming mails for information. It gathers email messages related to the same overall topic to an organized bundle with a title describing the bundle's content. Clicking on a specific mail helps the user to view an expanded form of the particular mail. This table is also used for viewing a brief content of the mail sent by the user.
3. **RELOAD:** This option helps user to refresh the user's inbox and load new mails that the user has received. This option doesn't have any limitations for the number of new



mails received. This option is quicker to work when compared to other existing mail systems.

4. **INBOX:** Inbox is a repository in an email application that accepts incoming messages. This option helps user to easily move on through the mails received by just scrolling over the table in which the mails are displayed.
5. **SENT:** This option helps user to view through the mails sent by the user. When user sends an email message, it flows through a series of steps to reach its destination and the mail is displayed to the receiver's inbox page.
6. **COMPOSE:** This option helps user to generate a new mail. By clicking in this option, user is redirected to a new **COMPOSE PAGE**. The system helps users to connect different user using this **COMPOSE** option.
7. **LOG OUT:** Logging out informs the software that the current user wishes to end the login session. Log out is also known as log off, sign off or sign out. This also helps the system to save modifications made by the user in the user account.

### Compose mail page



tomsmith1@vcmail.com - COMPOSE MAIL

**FROM** tomsmith1@vcmail.com

**TO** davidlee2@vcmail.com

**SUBJECT** Demo Mail

This is a sample mail to demonstrate the working of VColab Mail System.

BACK SEND

This is the Compose Frame page that is displayed to the user for generating a new mail. The structure of this frame is described as:

From: Sender's name and email

To: Recipient's name and email address.

Date: Sent date of the mail, this is automatically generated by the software.

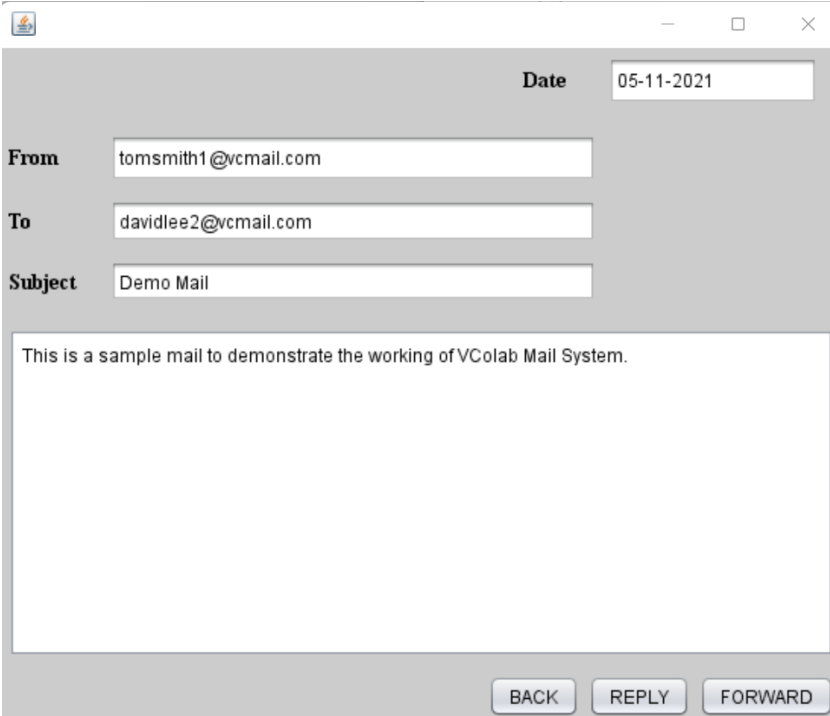
Subject: Whatever text the sender entered in the Subject heading before sending.

Body: This is the main content that the user wants to send to the receiver.

It has 2 options:

1. **SEND:** This option helps user to upload the data into the back-end. Once this option is selected, within a fraction of second, the data feed in this frame is automatically encrypted and sent to the receiver. This option also validates the data entered into the 'To' field, thus verifying the receiver exists in our mail system.
2. **BACK:** This option helps user to move back to the HOME PAGE EMAIL. This option is useful when the user enters the COMPOSE PAGE and wants to redirect to the previous page.

### Expand mail page



The screenshot displays a web-based email interface. At the top right, there is a 'Date' field showing '05-11-2021'. Below this, the 'From' field contains 'tomsmith1@vcmail.com', the 'To' field contains 'davidlee2@vcmail.com', and the 'Subject' field contains 'Demo Mail'. The main content area is a large text box with the message: 'This is a sample mail to demonstrate the working of VColab Mail System.' At the bottom of the interface, there are three buttons: 'BACK', 'REPLY', and 'FORWARD'.

This is the Expand Mail page that is displayed to the user when the user wants to expand a particular mail. By clicking on a mail that is shown to the user in the INBOX table, the

expanded form of the mail is displayed to the user with the help of this page. This page is also used to view the expanded form of the mails sent by the user. It has 3 options:

1. **FORWARD:** This option helps user to send the received mail to any other user existing in the mail system. This option generates an advantage for user to rewrite the same content multiple times without taking any effort. This option is also available when the user expands a mail sent by the user itself.
2. **REPLY:** This option helps user to mail back a response regarding the received mail to the receiver. The software automatically feeds the 'To' field as the receiver's email address. And the subject content starts with 'Reply for:' followed by the subject of the received mail. This option is not available when the user expands a mail sent by the user itself since the user can't reply to his own generated mail.
3. **BACK:** This option helps user to move back to the HOME PAGE EMAIL. This option is useful when the user enters the EXPAND MAIL PAGE and wants to redirect to the previous page.

## Back-end

### Account table

```
mysql> desc account;
+-----+-----+-----+-----+-----+-----+
| Field | Type  | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| id     | int   | NO   | PRI | NULL    | auto_increment |
| fname  | longtext | YES |     | NULL    |               |
| lname  | longtext | YES |     | NULL    |               |
| username | longtext | YES |     | NULL    |               |
| password | longtext | YES |     | NULL    |               |
| phonenumber | longtext | YES |     | NULL    |               |
+-----+-----+-----+-----+-----+-----+
6 rows in set (0.04 sec)
```

This is the ACCOUNT table that is used to store the details of the user existing in our mail system. This is one of the powerful tables that is used in every corner of the Mail system to maintain and update user data. This table also helps in transferring a mail from one person another person referring the sender and the receiver's mail address. LONGTEXT datatype is used in this table since the data of the user is stored in an encrypted format and the length of the encrypted data cannot be fixed. It is 6 attributes, namely:

- [illegible]

## Email table

```
mysql> desc email;
```

Field	Type	Null	Key	Default	Extra
sender	longtext	YES		NULL	
receiver	longtext	YES		NULL	
content	longtext	YES		NULL	
date	longtext	YES		NULL	
id	int	NO	PRI	NULL	auto_increment
subject	longtext	YES		NULL	
status	longtext	YES		NULL	

7 rows in set (0.00 sec)

This is the EMAIL table that is used to store the details of the mails sent across the mail system. This table mainly helps in transferring a mail from one person another person referring the sender and the receiver's mail address along with the data regarding the content of the mail. LONGTEXT datatype is used in this table since the data of the mails is stored in an encrypted format and the length of the encrypted data cannot be fixed. It is 7 attributes, namely:

1. sender: This attribute is used to store the username of the sender. It helps in differentiating between the sender and the receiver. This data cannot be modified after once given during Compose Mail. Data in this field is stored in an encrypted format.
2. receiver: This attribute is used to store the username of the receiver. It helps in differentiating between the sender and the receiver. This data cannot be modified after once given during Compose Mail. Data in this field is stored in an encrypted format.
3. content: This attribute is used to store the content of the mail uploaded in the system. This is the most important field as it stores the whole major information that is sent by the sender. This data cannot be modified after once given during Compose Mail. Data in this field is stored in an encrypted format.
4. date: This attribute is used to store the date when the mail is sent. It is automatically generated by the software to categories mails as recent or older ones. This data cannot be modified after once given during Compose Mail. Data in this field is stored in an encrypted format.
5. id: This attribute is used to store the unique ID of each particular mail sent using this software. This is automatically incremented by the back-end since the auto\_increment function is established with the ID attribute.

6. **subject:** This attribute is used to store the subject of the mail uploaded in the system. This is the second most important field as it stores the brief information that is sent by the sender in that particular mail. This data cannot be modified after once given during Compose Mail. Data in this field is stored in an encrypted format.
7. **status:** This attribute is used to store the current status of the mail. This is very helpful for the user to categories read and unread mails. This data cannot be modified after once given during Compose Mail. Data in this field is stored in an encrypted format.

[illegible]

## **CONCLUSION**

Email is still one of the most effective forms of marketing. One can target prospective customers with relevant information if it used correctly, at precisely the right time. It identifies the sender and their intentions it provides the recipient with the sender's contact information. Email is one of a few primary forms of communication during the job search and in the workplace. While it is important to thoughtfully compose each part of a message, a well-constructed email sign-off (the last line of an email and signature) is essential to leave the reader with a positive impression. Writing clear, professional emails can help position one positively in their career, build a good network of people and potential employers. This software helps mainly in communicating confidential mails from the sender to the receiver.