

SECURE MAIL

ABSTRACT

Secure Mail system is to simulate the existing email system. Its purpose is to send and receive electronic mails (e-mails). This project is developed using JAVA and few APIs of Java.

Existing System

The existing system has two mail server's 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, Secure mail helps to send and receives 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's 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.

Software Requirements

- Software: Java SDK 2, Net-Beans 6.0.
- 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

INTRODUCTION

Email is a way to send and receive messages across the Internet. It's similar to traditional mail, but it also has some key differences.

Email is the modern way to send letters – you can send a message to the other side of the world and get a reply in minutes! Email is short for 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 generally free, and you can actually send an email to as many people as you like. Each person on email has a unique email address, which is how you direct an email address to a specific person. You can even send emails to yourself. This sounds kind of silly, but people do this to send themselves reminders. All your emails come into your Inbox, which is like your virtual letter box. You can have multiple email addresses if you like. You don't have to limit yourself to just one! An email address always has an @ symbol (pronounced at). If a person uses a free web mail service their address will have that service's name after the @ symbol.

For example: **myname@smail.com.**

A quick walkthrough of how to send an email:

- First, a new email is created
- Then, recipient addresses are filled in
- Next, a subject line is entered
- Then the content of the email is typed in

And 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. To get a better idea of what email is all about, take a look at the infographic below and consider how you might benefit from its use.

Email advantages

- Productivity tools: Email is usually packaged with an address book, instant messaging, and more for convenience and productivity.
- Privacy: Your email is delivered to your own personal and private account with a password required to access and view emails.
- Communication with multiple people: You can send an email to multiple people at once, giving you the option to include as few as or as many people as you want in a conversation.
- Accessible anywhere at any time: You don't have to be at home to get your mail. You can access it from any computer or mobile device that has an Internet connection.

FEATURES

- **User Friendly:**

Secure 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/received as it is highly encrypted and stored in the backend database. Fast transferring of mails helps user to communicate quickly. Modification of user profile made easy just by clicks to maintain stability in user data.

- **Reply, Forward and Redirecting Mails:**

Secure Mail system gives user the advantage to reply for a mail. It also allows users to forward a particular mail to a different person existing in the system.

- **Retrieval of messages:**

Secure Mail system automatically retrieves the mail received by the user once he enters to his Mail Home Page. There are no limits for the number of mails received or sent by a particular user existing our Mail system.

- **Important Notifications:**

Secure Mail system 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 also 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 our mail system.

- **Proper Arrangement of Mails:**

Secure Mail system automatically assign date to the mail sent at the time of composing the mail. It also properly arranges the data of the mail sent without getting any faults during the transmission of the mail from the sender to the receiver end.

- **Security:**

Secure Mail system's security 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 helps user 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, that is the mail sent and received can only be viewed by the sender and the receiver.

CONTENT

FRONT-END

HOME PAGE:



This is the first page that is displayed to the user when the user open the software. This page 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. This welcomes the user to our secure mail system. 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:

SIGN UP


First Name:

Last Name:

Password:

Confirm Password:

Phone Number:

Captcha Code:  **Enter Code:**

This is the Sign up page that is displayed to the user to create a new account. This page is used to retrieve data of the user to create a new account, it retrieves data like Firstname, Lastname 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. Namely:

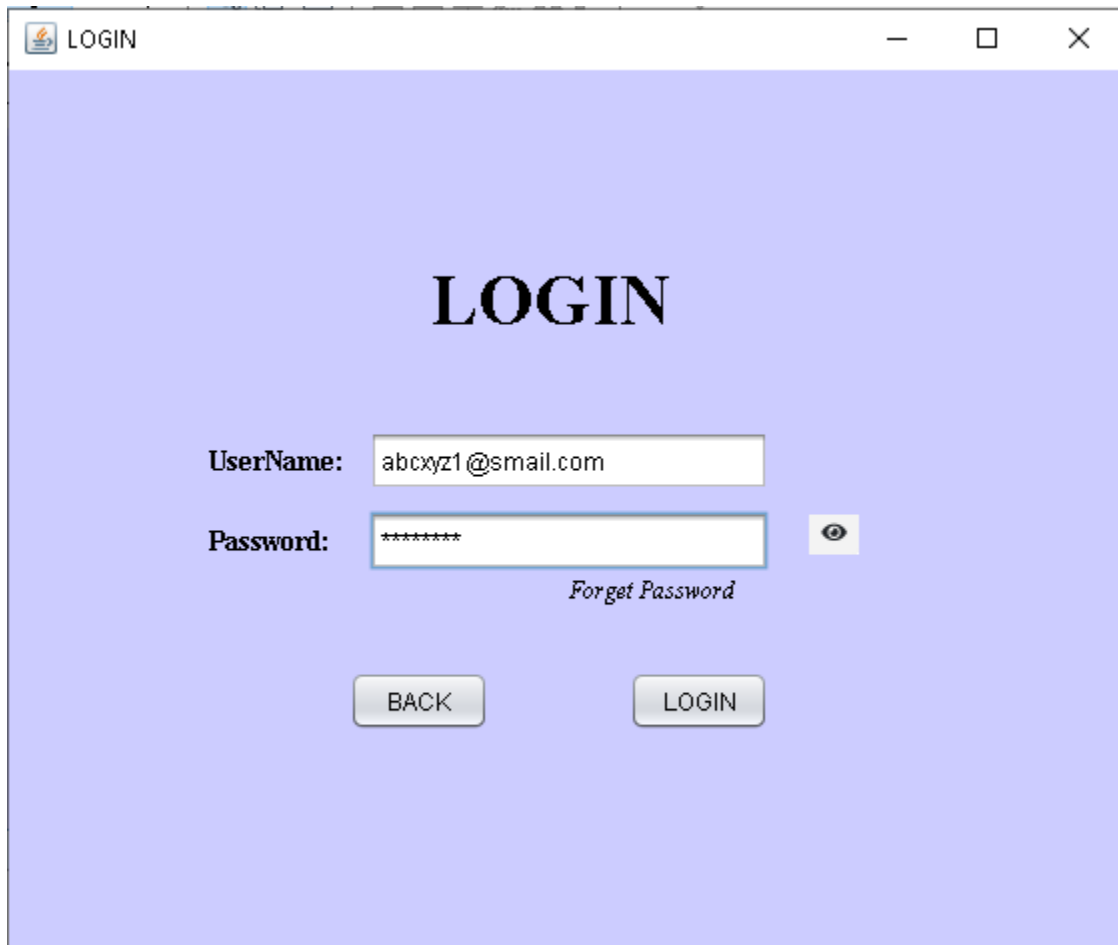
1. SUBMIT:

This option helps user to submit the data and if all the data satisfies 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:



The screenshot shows a web browser window with the title "LOGIN". The page has a light blue background. In the center, the word "LOGIN" is displayed in a large, bold, black serif font. Below this, there are two input fields. The first is labeled "UserName:" and contains the text "abcxyz1@smail.com". The second is labeled "Password:" and contains seven asterisks "*****". To the right of the password field is a small icon of an eye, indicating a toggle for password visibility. Below the password field is a link that says "Forgot Password". At the bottom of the form, there are two buttons: "BACK" on the left and "LOGIN" on the right, both with a light blue gradient and rounded corners.

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 4 Options. Namely:

1. PASSWORD VIEW/HIDE:

This option helps user to view the entered characters in the password field. This option is made available to check if the user has entered the right password to access his account by the user. The password hide options helps user to hide the viewed password so that no second person can view the entered password.

2. FORGET PASSWORD:

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

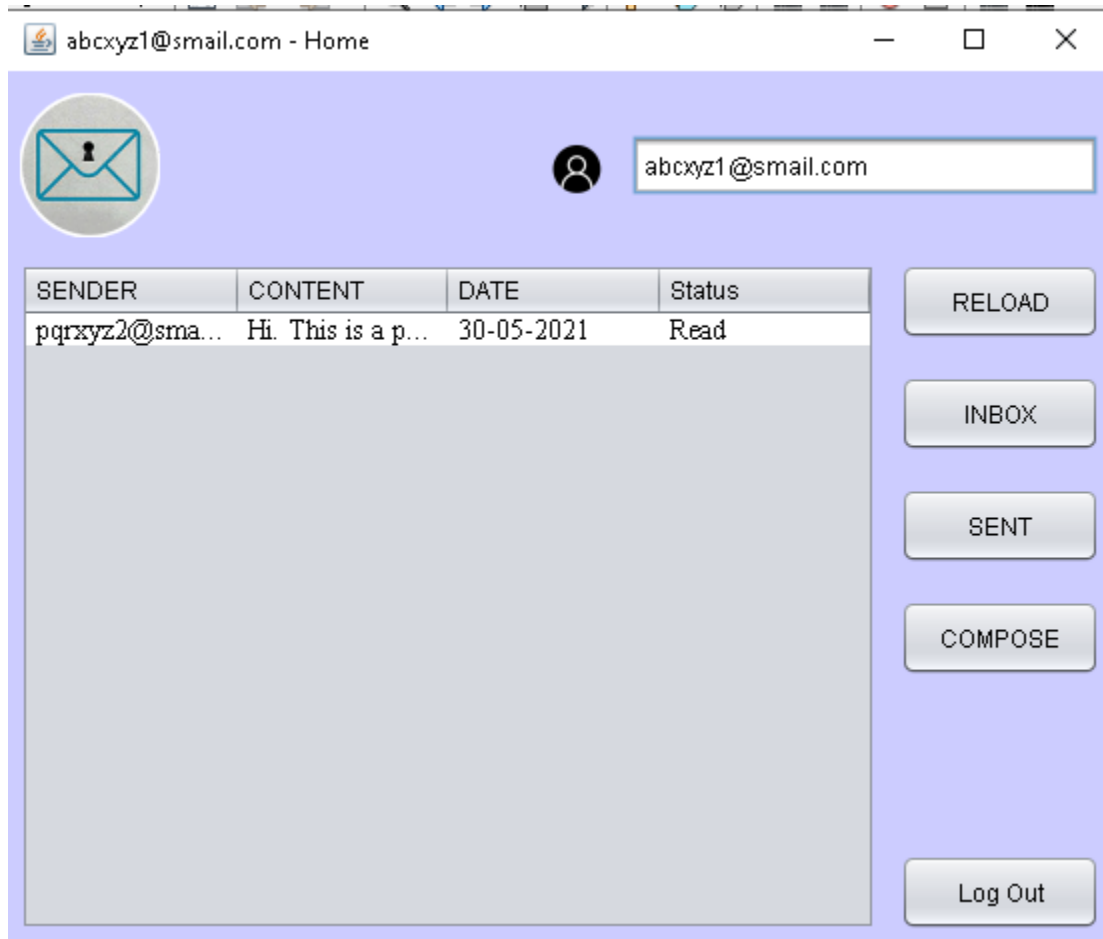
3. LOGIN:

This option helps user to access his EMAIL account. By entering the correct details related with user's account, this option allows user to enter into his account.

4. 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.

HOME PAGE EMAIL:



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. Namely:

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 by SMAIL 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.

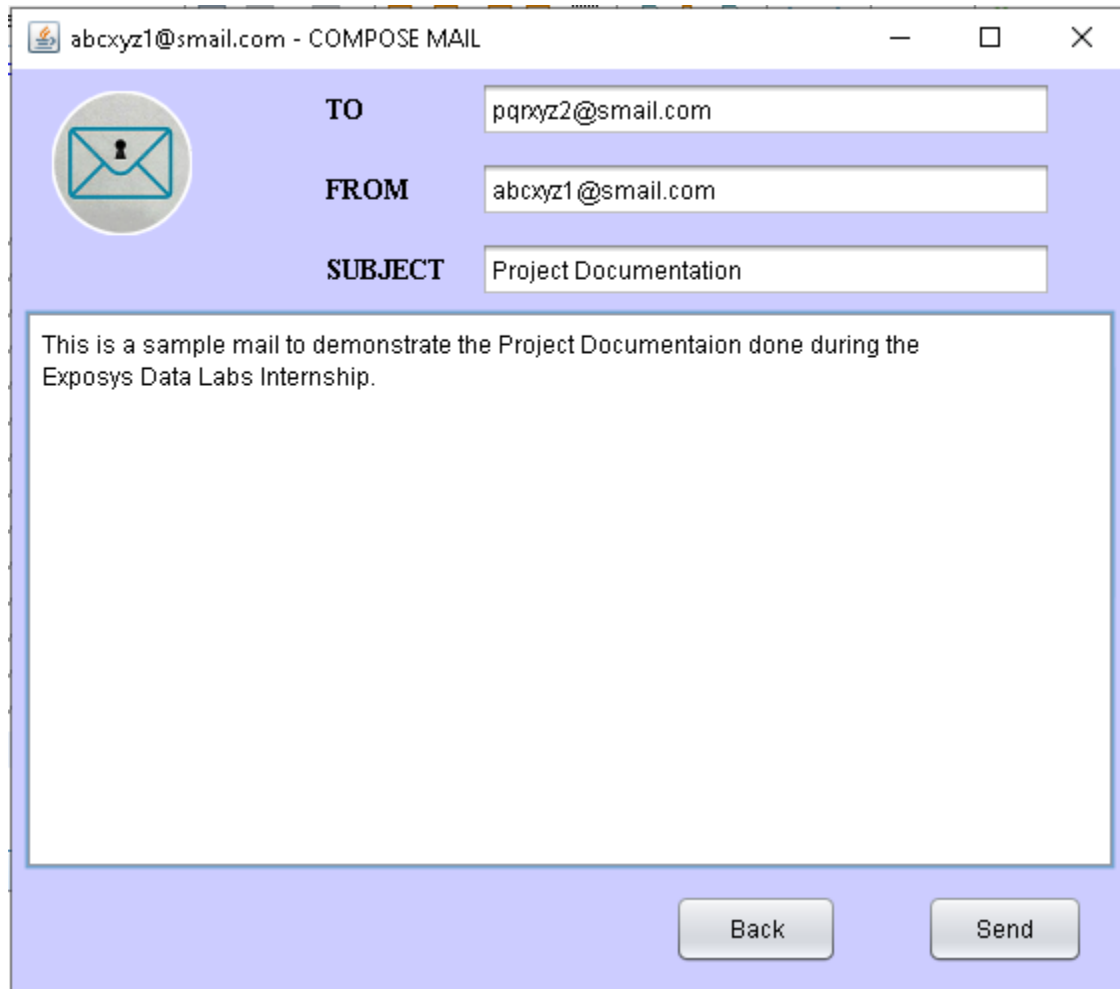
6. COMPOSE:

This option helps user to generate a new mail. By clicking in this option, user is redirected to a new COMPOSE PAGE. SMAIL 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 FRAME PAGE:



abcxyz1@smail.com - COMPOSE MAIL



TO pqrxyz2@smail.com

FROM abcxyz1@smail.com

SUBJECT Project Documentation

This is a sample mail to demonstrate the Project Documentaion done during the Exposys Data Labs Internship.

Back Send

This is the Compose Frame page that is displayed to the user for genrating 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. Namely:

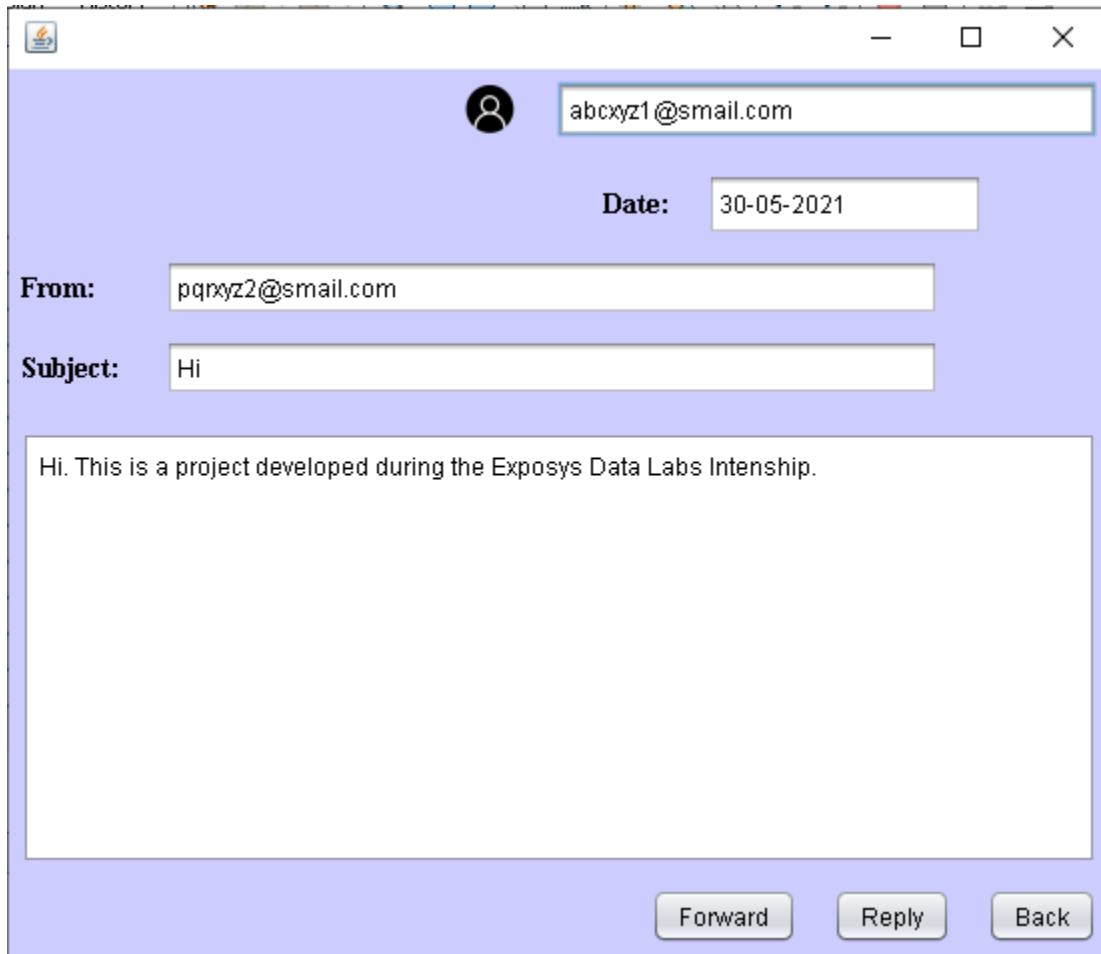
1. SEND:

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 shows a web application window titled "EXPAND MAIL PAGE". The interface has a light blue header bar. On the left, there is a circular profile icon. To its right, a text input field contains the email address "abcxyz1@smail.com". Below this, a "Date:" label is followed by a text input field containing "30-05-2021". Further down, a "From:" label is followed by a text input field containing "pqxyz2@smail.com". Below that, a "Subject:" label is followed by a text input field containing "Hi". The main body of the page is a large white rectangular area containing the text "Hi. This is a project developed during the Exposys Data Labs Intenship." At the bottom right of the page, there are three buttons: "Forward", "Reply", and "Back".

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. Namely:

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.

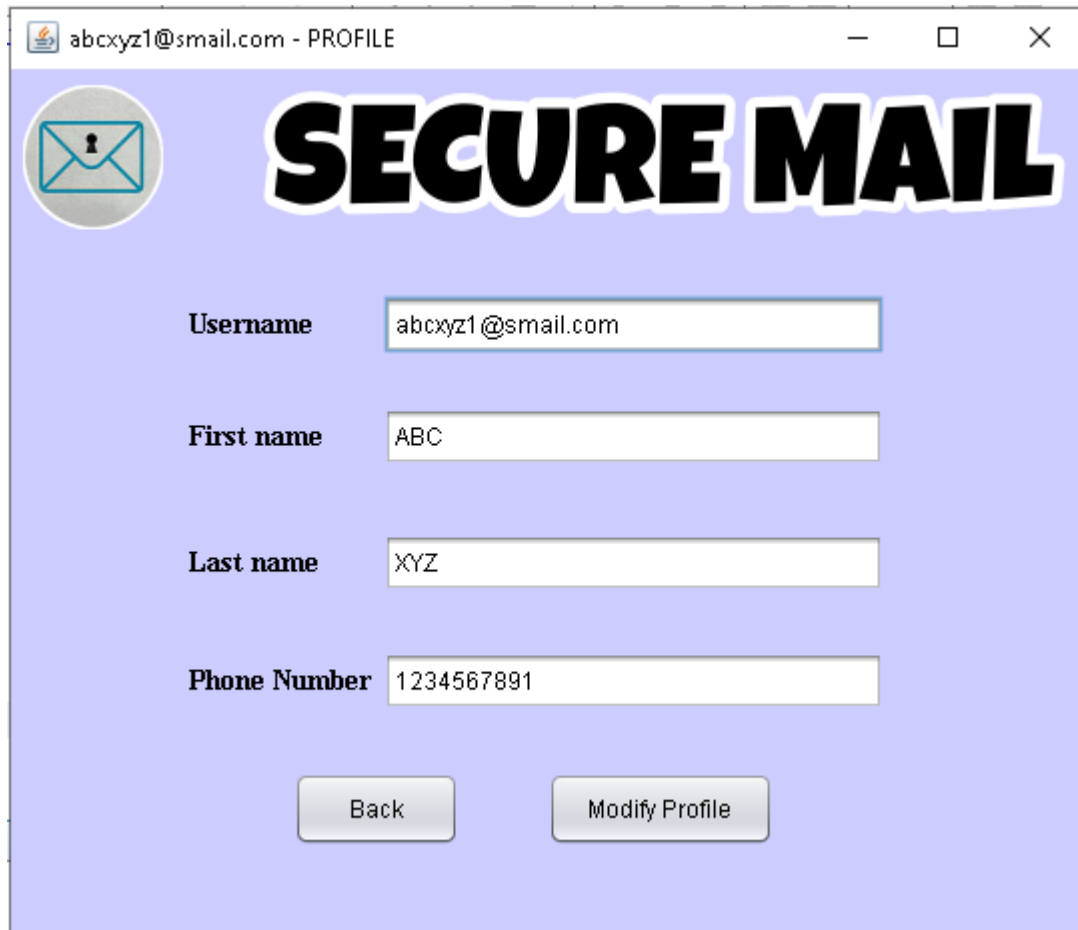
2. REPLY:

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.

USER PROFILE:



abcxyz1@smail.com - PROFILE

 **SECURE MAIL**

Username: abcxyz1@smail.com

First name: ABC

Last name: XYZ

Phone Number: 1234567891

Back Modify Profile

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. That is this page is just useful for the display of information and not to modify data. It has 2 Options. Namely:

1. MODIFY 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.

MODIFY PROFILE:

The screenshot shows a web browser window titled 'abcxyz1@smail.com - MODIFY PROFILE'. The page has a light blue background and is divided into two main sections by a dashed horizontal line. At the top, there is a user profile icon and a text box containing the email 'abcxyz1@smail.com'. Below this, the first section contains the label 'Phone Number:' followed by a text box with the number '1234567891' and a 'Save Number' button. The second section contains three password fields: 'Current Password' with masked text '*****', 'New Password' with masked text '*****', and 'Confirm New Password' with masked text '*****'. At the bottom of the page, there are two buttons: 'Back' and 'Save Password'.

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:

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.

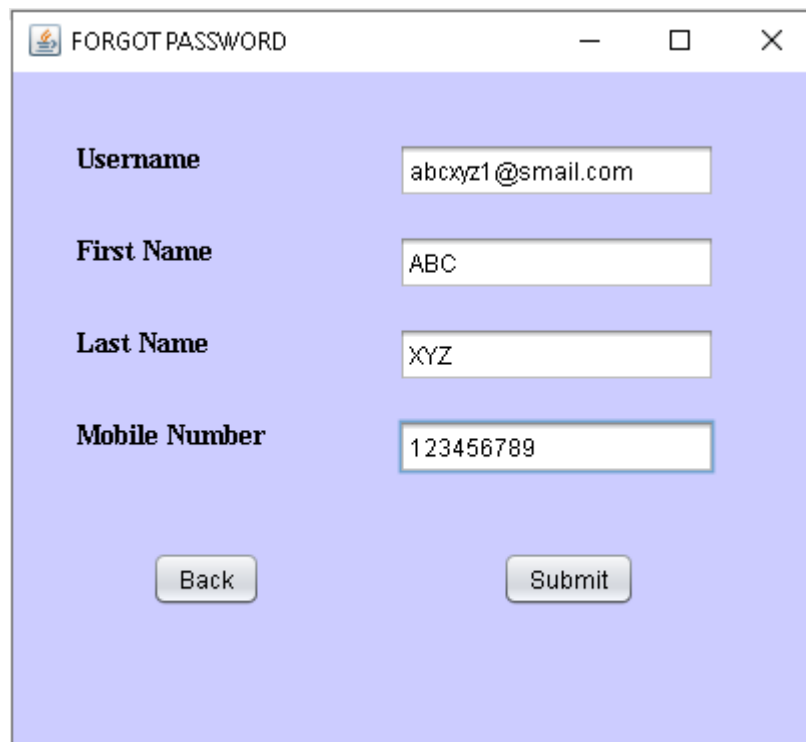
2. SAVE PASSWORD:

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:

A screenshot of a web application window titled "FORGOT PASSWORD". The window has a light blue background and a white border. It contains four input fields with labels to their left: "Username" with the value "abcxyz1@smail.com", "First Name" with the value "ABC", "Last Name" with the value "XYZ", and "Mobile Number" with the value "123456789". At the bottom of the form, there are two buttons: "Back" and "Submit". The window also has standard window controls (minimize, maximize, close) in the top right corner.

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.

BACK-END

ACCOUNT:

```
mysql> desc account;
```

Field	Type	Null	Key	Default	Extra
id	int(11)	NO	PRI	NULL	auto_increment
fname	longtext	YES		NULL	
lname	longtext	YES		NULL	
username	longtext	YES		NULL	
password	longtext	YES		NULL	
phonenum	longtext	YES		NULL	

```
6 rows in set (0.14 sec)
```

[illegible]

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 table 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 the 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:

1. id:

This attribute is used to store the unique ID of each particular user. This is automatically incremented by the back-end since the `auto_increment` function is established with the ID attribute.

2. fname:

This attribute is used to store the first name of the user. This data is collected by the user in the time of Sign-Up. This data cannot be modified after once given during Sign-Up. Data in this field is stored in an Encrypted format.

3. lname:

This attribute is used to store the last name of the user. This data is collected by the user in the time of Sign-Up. This data cannot be modified after once given during Sign-Up. Data in this field is stored in an Encrypted format.

4. username:

This attribute is used to store the username of the user. This data is automatically generated by the SMAIL software in the time of Sign-Up. Data in this field is generated by adding the data present in the fname, lname and id, which is followed by '@smail.com'. This data cannot be modified after a successful Sign-Up. Data in this field is stored in an Encrypted format.

5. password:

This attribute is used to store the password of the user's account. This data is collected by the user in the time of Sign-Up. This is the main data which allows access to the user's account during LOGIN. This data can be modified only in the user's profile page after a successful access with the user's account. Data in this field is stored in an Encrypted format.

6. phonenum:

This attribute is used to store the phone number of the user. This data is collected by the user in the time of Sign-Up. This data can be modified only in the user's profile page after a successful access with the user's account. Data in this field is stored in an Encrypted format.

EMAIL:

```
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(11)	NO	PRI	NULL	auto_increment
subject	longtext	YES		NULL	
status	longtext	YES		NULL	

```
7 rows in set (0.01 sec)
```

[illegible]

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 to 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 SMAIL 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.

ENCRYPTION AND DECRYPTION

A = $65*2=130$ - z= $90*2=180$ ----(130,180)

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

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

ENTER->RANGE->HEXA->BINARY

BINARY->HEXA->RANGE->ENTER

(space) = $32*4=128$ /= $47*4=188$ (128-188)

: = $58*4=232$ @ = $64*4=256$ (232-256)

0-48*6=288 9=57*6=342 (288-342)

[= $91*4=364$ ' = $96*4=384$ (364-384)

{ = $123*4=492$ ~ = $126*4=504$ (492-504)

A = $65*8=520$ Z = $90*8=720$ (520-720)

a = $97*8=776$ z = $122*8=976$ (776-976)

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 are divided into four part, One for Capital alphabets, 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 are divided into four part, One for Capital alphabets, 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.

CONCLUSION

Email is still one of the most effective forms of marketing. If you use it correctly, you can target prospective customers with relevant information, at precisely the right time - gaining brand loyalists for life. 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's important to thoughtfully compose each part of your message, a well-constructed email sign-off (the last line of your email and your signature) is essential to leaving the reader with a positive impression. Writing clear, professional emails can help position you positively in your career with your colleagues, people in your network or potential employers. To help make sure you achieve this goal, thus, this software helps mainly in communicating confidential mails from the sender to the receiver. Hence, building this software as the most secure mail system existing known as SMAIL SOFTWARE.