

ITC357-Assignment 2 Report

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Email web application

This is a simple web-based email system, using JavaServer Pages and Java Servlets and backed by a MySQL database.

It follows a Model-View-Controller pattern. Browser actions GET and POST are handled by controller Servlets, which pass data to JSP views, which handle how the page is displayed in the browser. Database actions are handled by Data Access Objects (DAO), which generally translate database data into instances of the model classes.

Database

Users have a unique username, which is also the primary key of the **users** table. Hashed and salted passwords are stored with their salt.

Messages have an automatically incremented id and use the text data type for the body of the message. As messages can be sent to multiple recipients, the recipients are stored in another table.

The **recipients** table has a row for each recipient of each message. It includes a boolean value **trash** which indicates if it should be displayed in the Inbox or Trash.

Build and Deploy

Pre-requisites

I tested using Tomcat 7 and MySQL 14.14 on Ubuntu:

```
$ /usr/share/tomcat7/bin/version.sh
Using CATALINA_BASE:   /usr/share/tomcat7
Using CATALINA_HOME:   /usr/share/tomcat7
Using CATALINA_TMPDIR: /usr/share/tomcat7/temp
Using JRE_HOME:        /usr
Using CLASSPATH:        /usr/share/tomcat7/bin/bootstrap.jar:/usr/share/tomcat7/bin/tomcat-
Server version: Apache Tomcat/7.0.52 (Ubuntu)
Server built:   Jul 24 2014 08:38:51
```

```
Server number: 7.0.52.0
OS Name:      Linux
OS Version:   3.13.0-34-generic
Architecture: amd64
JVM Version:  1.7.0_65-b32
JVM Vendor:   Oracle Corporation
```

```
$ mysql -V
mysql Ver 14.14 Distrib 5.5.38, for debian-linux-gnu (x86_64) using readline 6.3
```

The following libraries should be in the directory `WebContent/WEB-INF/lib`

```
catalina-ant.jar
jstl-1.2.jar
mysql.jar
tomcat-coyote.jar
tomcat-juli.jar
tomcat-util.jar
```

Database setup

The application uses MySQL as its database. To create the database and tables, run this command:

```
mysql -u root -p < database.sql
```

After the database is created, load the demo data with:

```
mysql -u root -p ST11429074email < demo.sql
```

This includes the users and data as seen in the screenshots [below](#). All users have their username as their password.

The application uses a properties file `WebContent/WEB-INF/db.properties`. Edit this file to select a database server. The user will need read and write access to the database. The default values are:

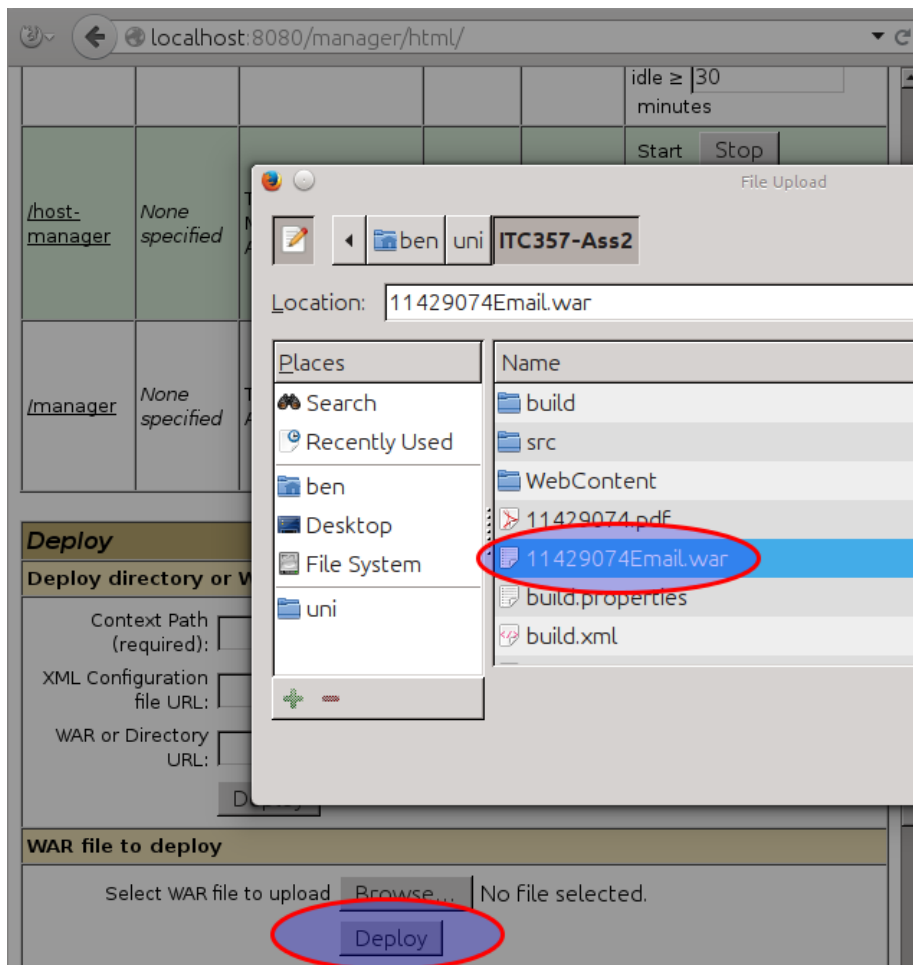
```
user=root
password=abc123
server=localhost
port=3306
database=ST11429074email
```

Deploy

I built and deployed using ant and Tomcat Manager:

`ant deploy`

You could also build `hotel.war` and deploy to Tomcat via the admin gui.
Create the war file with `ant war`, then deploy using the Tomcat Manager page.

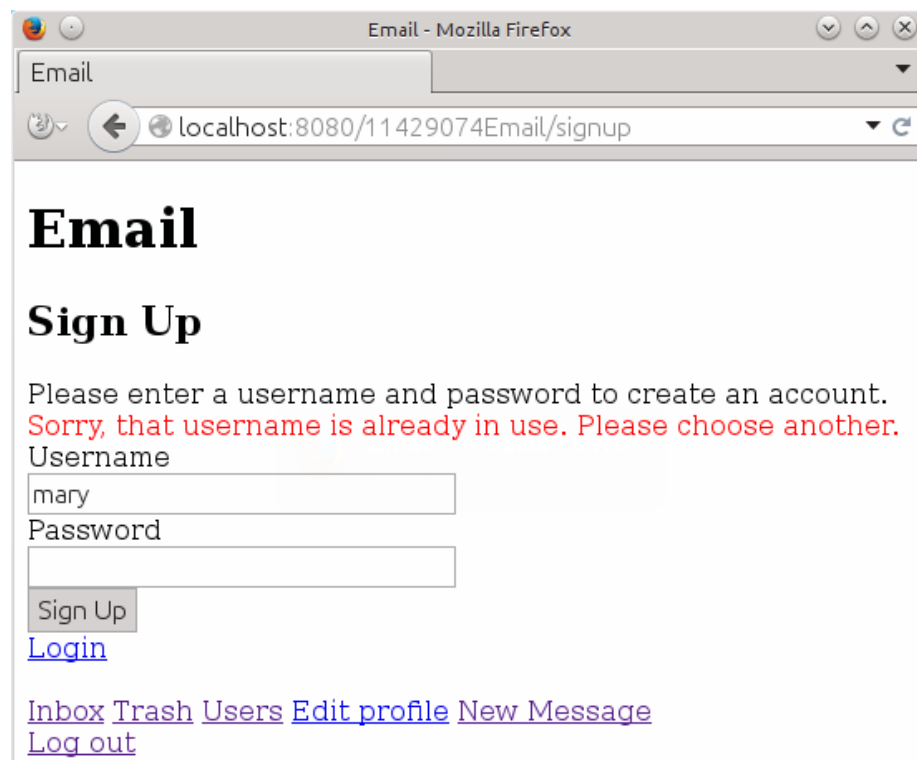


Run

Browse to the context path <http://localhost:8080/11429074Email/>:

Sign up

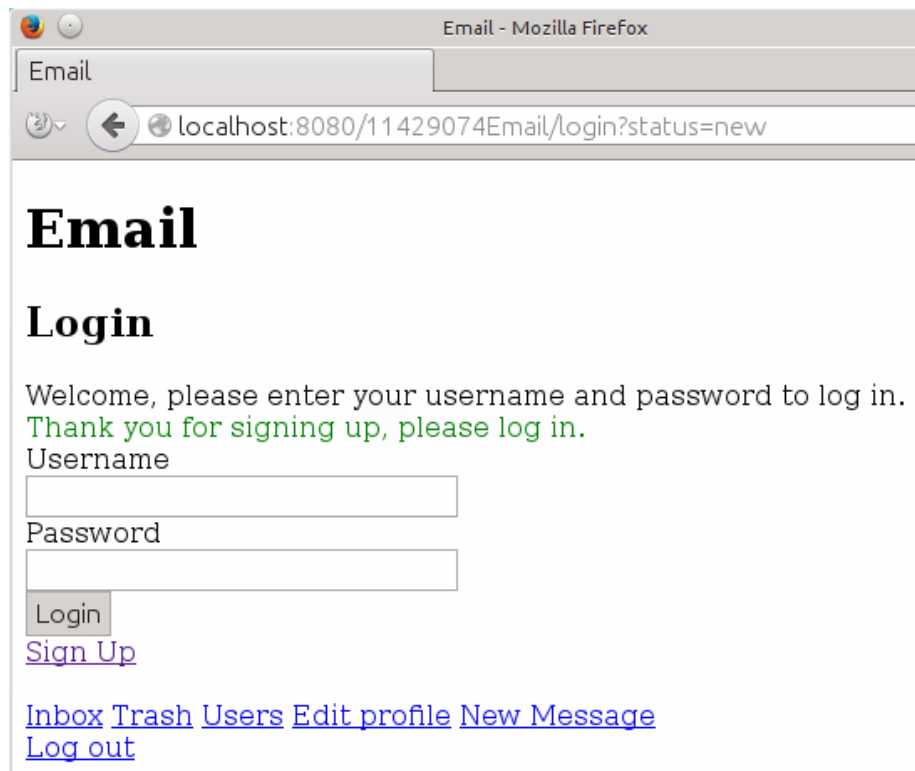
When signing up, the chosen username is checked against existing usernames to warn against duplicates.



The screenshot shows a web browser window titled "Email - Mozilla FireFox". The address bar displays "localhost:8080/11429074Email/signup". The page content includes a large heading "Email" followed by "Sign Up". Below this, a message states: "Please enter a username and password to create an account. Sorry, that username is already in use. Please choose another." There are two input fields: "Username" with the text "mary" and "Password" which is empty. A "Sign Up" button is located below the password field. At the bottom of the form area, there is a blue link for "Login". Below the form area, there is a horizontal list of blue links: "Inbox", "Trash", "Users", "Edit profile", and "New Message". At the very bottom, there is a blue link for "Log out".

After successfully signing up, the user is redirected to the login page and invited to log in.

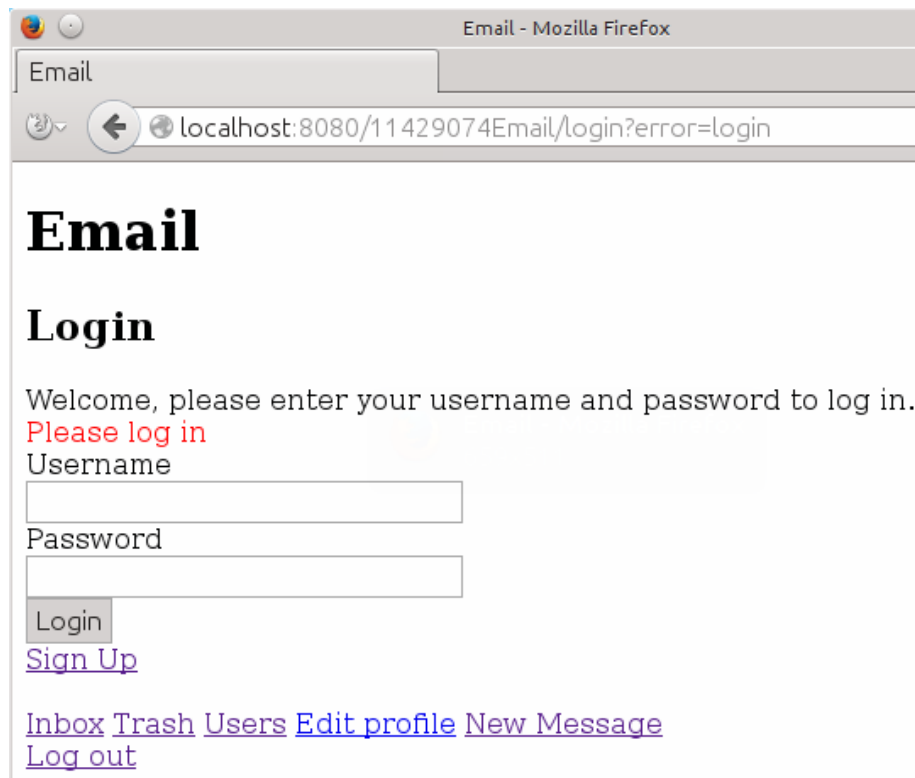
Passwords are hashed using password-based encryption. A [PBEKeySpec](#) is created with the chosen password and a salt which is generated using [SecureRandom](#). The hash is generated using [SecretKey](#) with the [PBKDF2WithHmacSHA1](#) algorithm. The hashed password and salt are stored with the username in the database.



The screenshot shows a Mozilla Firefox browser window titled "Email - Mozilla Firefox". The address bar displays "localhost:8080/11429074Email/login?status=new". The page content includes a large "Email" heading, a "Login" heading, and a welcome message: "Welcome, please enter your username and password to log in. Thank you for signing up, please log in." Below this are input fields for "Username" and "Password", a "Login" button, and a "Sign Up" link. At the bottom, there are several blue links: "Inbox", "Trash", "Users", "Edit profile", "New Message", and "Log out".

Log in

Pages that require a login to view are under the path **secure**. The filter **SessionFilter** is applied to that path to check if a user is logged in. When you attempt to browse to such a page without being logged in, you will be directed to the login page.



The screenshot shows a Mozilla Firefox browser window titled "Email - Mozilla Firefox". The address bar displays "localhost:8080/11429074Email/login?error=login". The page content includes a large "Email" heading, a "Login" heading, and a welcome message. A red error message "Please log in" is visible. Below the message are input fields for "Username" and "Password", a "Login" button, and a "Sign Up" link. At the bottom, there are links for "Inbox", "Trash", "Users", "Edit profile", "New Message", and "Log out".

Email

Email

Login

Welcome, please enter your username and password to log in.
Please log in

Username

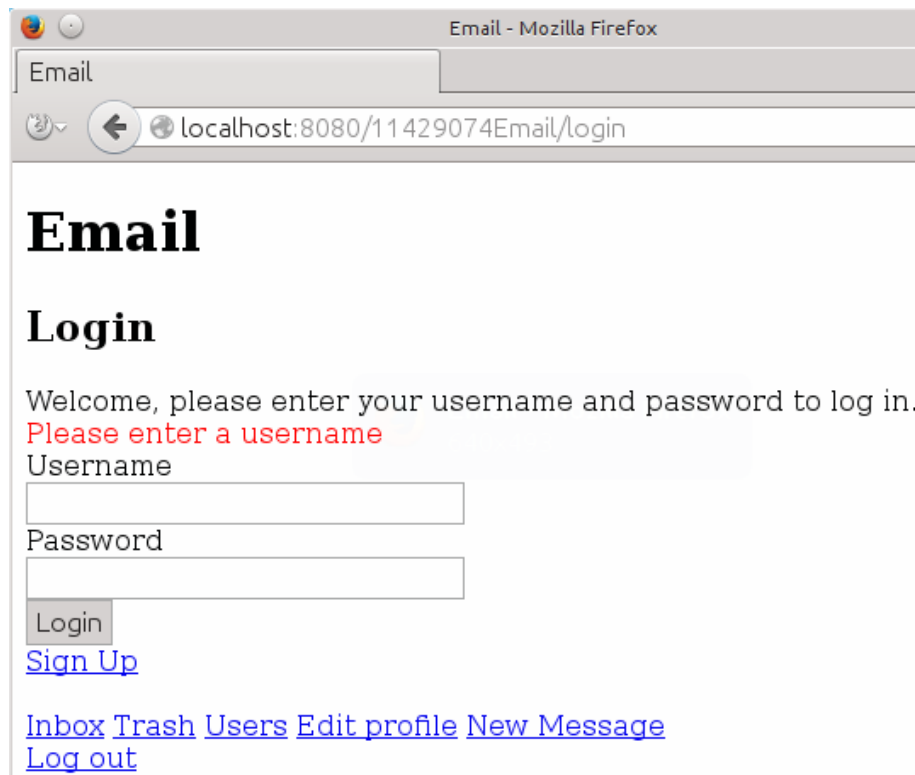
Password

Login

[Sign Up](#)

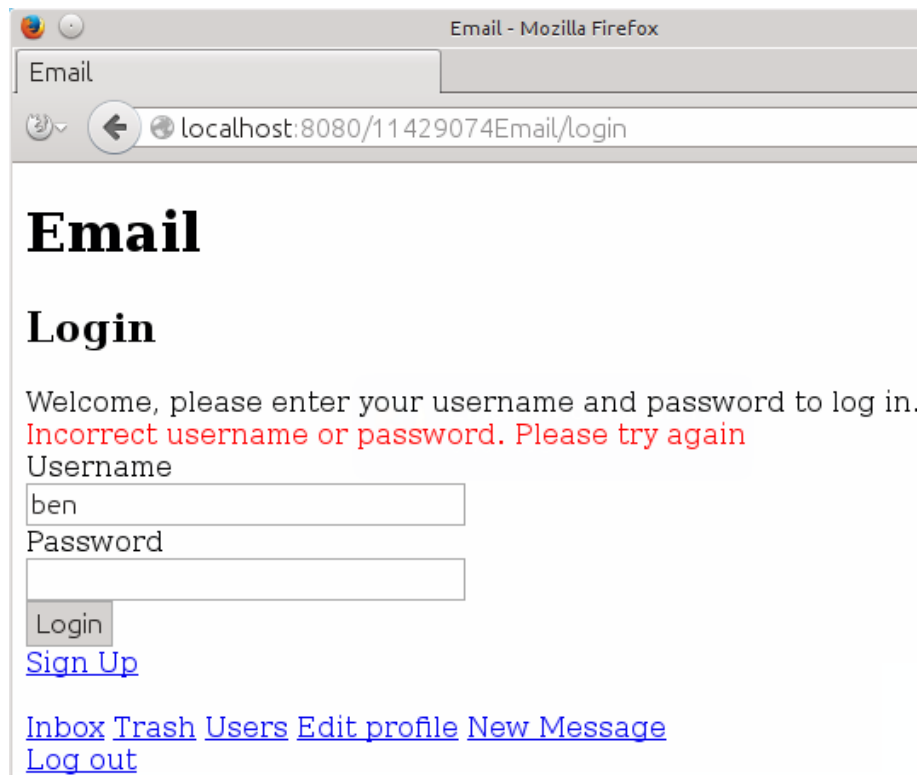
[Inbox](#) [Trash](#) [Users](#) [Edit profile](#) [New Message](#)
[Log out](#)

When the login button is clicked, the application checks that a username and password have been entered.



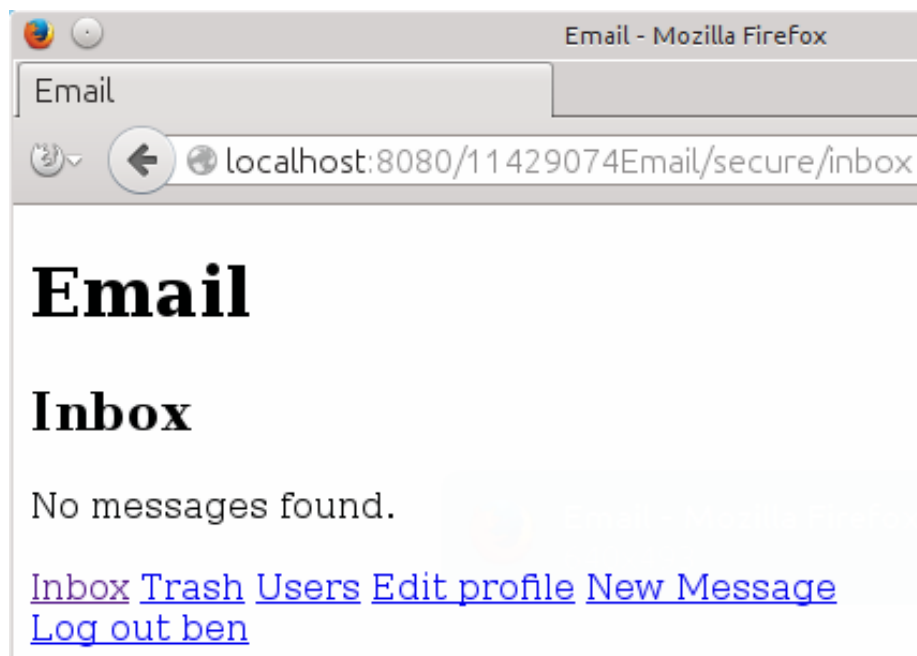
The screenshot shows a Mozilla Firefox browser window titled "Email - Mozilla Firefox". The address bar displays "localhost:8080/11429074Email/login". The page content includes a large heading "Email", a sub-heading "Login", and a welcome message: "Welcome, please enter your username and password to log in." Below this, there is a red error message: "Please enter a username". The form consists of two input fields labeled "Username" and "Password", followed by a "Login" button. At the bottom of the form, there are several blue links: "Sign Up", "Inbox", "Trash", "Users", "Edit profile", "New Message", and "Log out".

When a username and password is entered, the application checks the combination against the database.



The screenshot shows a web browser window titled "Email - Mozilla Firefox". The address bar displays "localhost:8080/11429074Email/login". The page content includes a large heading "Email", a sub-heading "Login", and a message: "Welcome, please enter your username and password to log in. Incorrect username or password. Please try again". Below this, there are input fields for "Username" (containing "ben") and "Password", a "Login" button, and a "Sign Up" link. At the bottom, there is a row of links: "Inbox", "Trash", "Users", "Edit profile", "New Message", and "Log out".

Logging in takes the user to their Inbox. There is a row of links at the bottom of every page for accessing all the functions of the application.



The screenshot shows a web browser window titled "Email - Mozilla Firefox". The address bar displays "localhost:8080/11429074Email/secure/inbox". The page content includes a large heading "Email", a sub-heading "Inbox", and a message: "No messages found.". Below this, there is a row of links: "Inbox", "Trash", "Users", "Edit profile", "New Message", and "Log out ben".

Your profile

Clicking *Edit Profile* takes the user to their profile page, which includes a form for updating their details.



Email

localhost:8080/11429074Email/secure/user?user=ben

Email

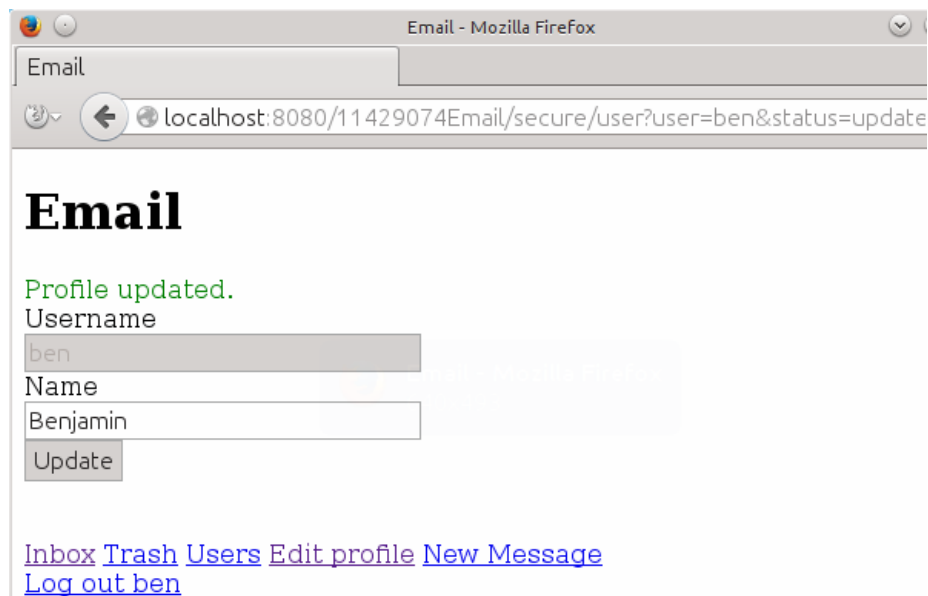
Username
ben

Name

Update

[Inbox](#) [Trash](#) [Users](#) [Edit profile](#) [New Message](#)
[Log out ben](#)

The user can enter their name and click *Update*.



Email

localhost:8080/11429074Email/secure/user?user=ben&status=update

Email

Profile updated.

Username
ben

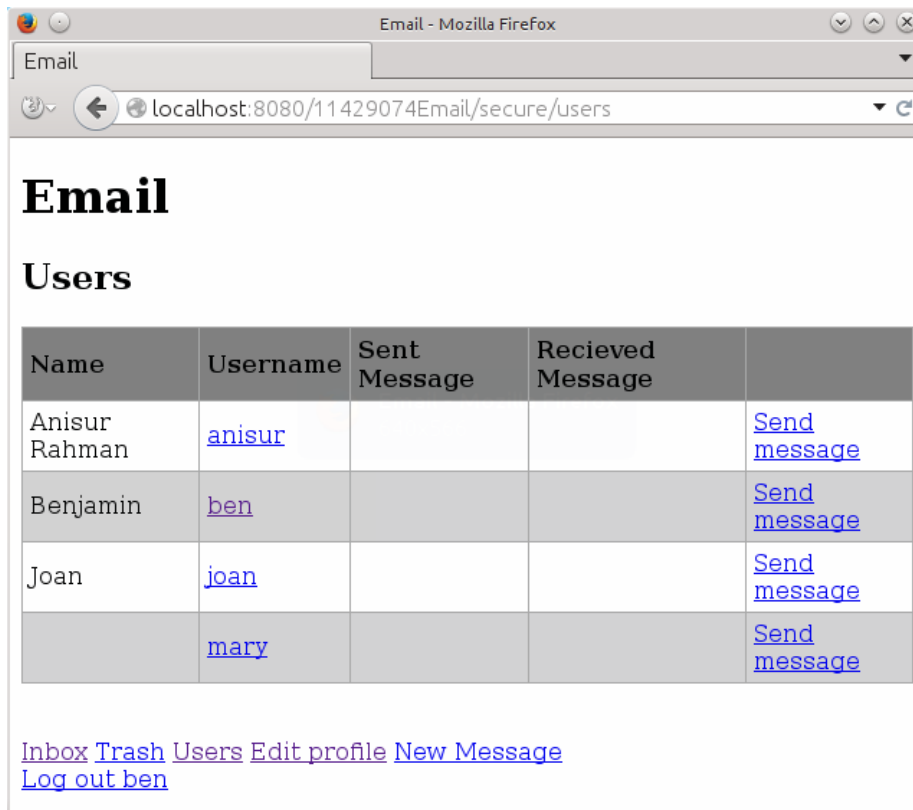
Name
Benjamin

Update

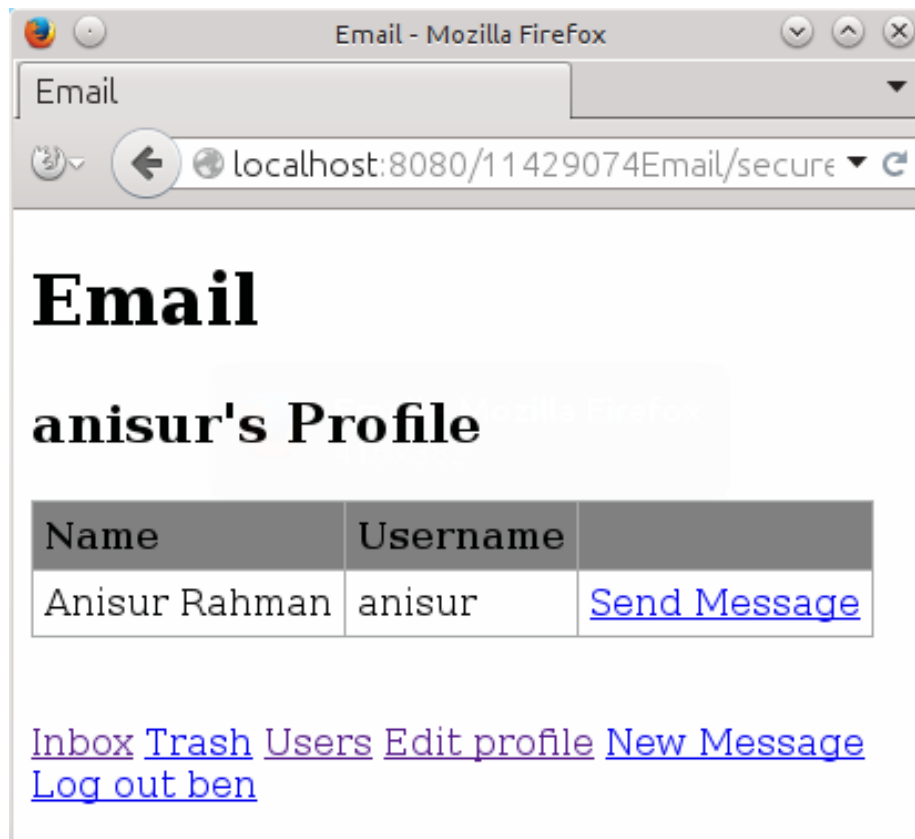
[Inbox](#) [Trash](#) [Users](#) [Edit profile](#) [New Message](#)
[Log out ben](#)

User list

Clicking the *Users* link takes the user to a list of all registered users. From here they can view another user's profile or send a message.

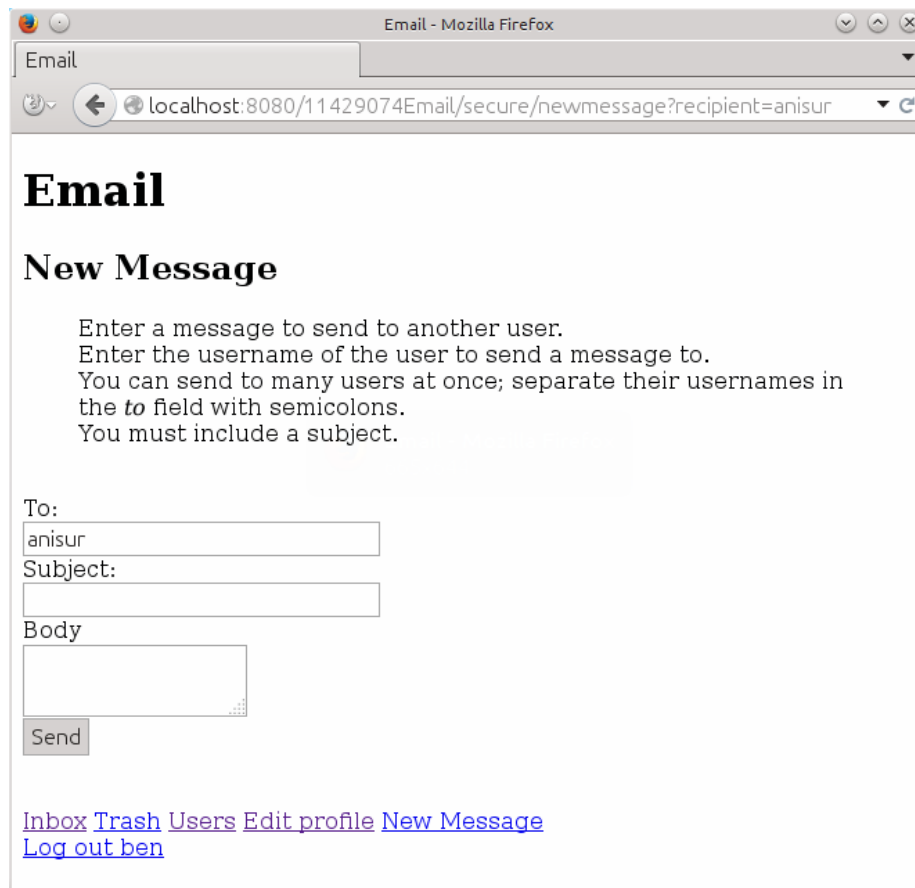


If the user clicks the username of another user, they can view that user's profile.



Sending messages

Clicking the *Send Message* link on the Profile or the User List directs the user to the New Message page with the *To* field pre-filled.



The screenshot shows a Mozilla Firefox browser window titled "Email - Mozilla Firefox". The address bar displays "localhost:8080/11429074Email/secure/newmessage?recipient=anisur". The page content includes a large heading "Email", a sub-heading "New Message", and instructional text: "Enter a message to send to another user. Enter the username of the user to send a message to. You can send to many users at once; separate their usernames in the *to* field with semicolons. You must include a subject." Below this, there are input fields for "To:" (containing "anisur"), "Subject:", and "Body". A "Send" button is positioned below the body field. At the bottom, there are several blue links: "Inbox", "Trash", "Users", "Edit profile", "New Message", and "Log out ben".

Email

New Message

Enter a message to send to another user.
Enter the username of the user to send a message to.
You can send to many users at once; separate their usernames in the *to* field with semicolons.
You must include a subject.

To:
anisur

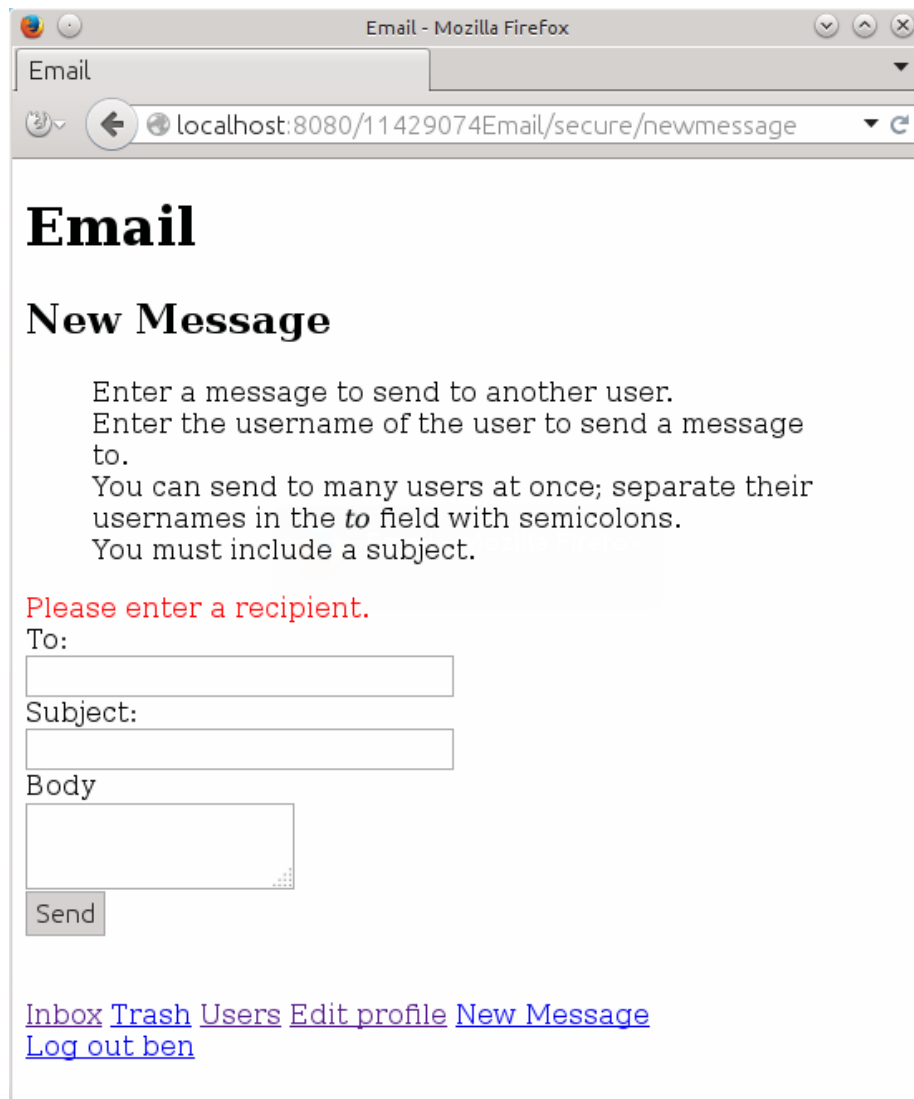
Subject:

Body

Send

[Inbox](#) [Trash](#) [Users](#) [Edit profile](#) [New Message](#)
[Log out ben](#)

When attempting to send a message, the application checks that a recipient and a subject have been entered.



Email

New Message

Enter a message to send to another user.
Enter the username of the user to send a message to.
You can send to many users at once; separate their usernames in the *to* field with semicolons.
You must include a subject.

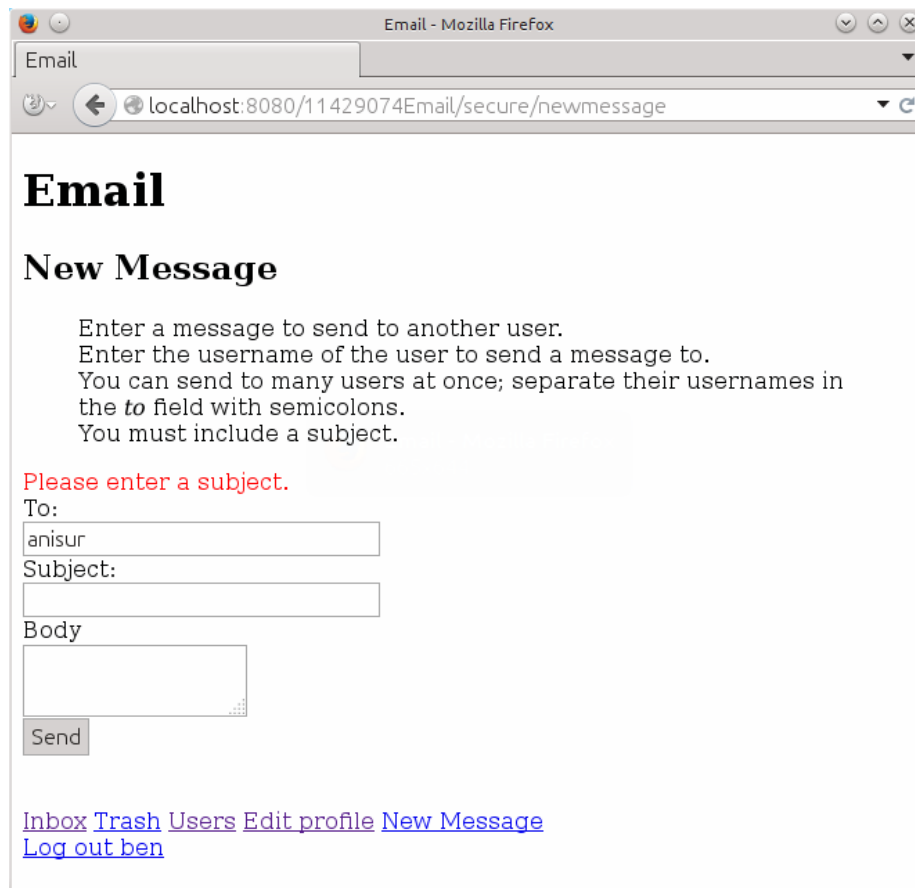
Please enter a recipient.

To:

Subject:

Body

[Inbox](#) [Trash](#) [Users](#) [Edit profile](#) [New Message](#)
[Log out ben](#)



The screenshot shows a Mozilla Firefox browser window titled "Email - Mozilla Firefox". The address bar displays "localhost:8080/11429074Email/secure/newmessage". The page content includes a large heading "Email", a sub-heading "New Message", and instructional text: "Enter a message to send to another user. Enter the username of the user to send a message to. You can send to many users at once; separate their usernames in the *to* field with semicolons. You must include a subject." A red error message "Please enter a subject." is visible above the "Subject:" field. The "To:" field contains the text "anisur". The "Body" field is empty. A "Send" button is located below the body field. At the bottom of the page, there are several blue links: "Inbox", "Trash", "Users", "Edit profile", "New Message", and "Log out ben".

Email

New Message

Enter a message to send to another user.
Enter the username of the user to send a message to.
You can send to many users at once; separate their usernames in the *to* field with semicolons.
You must include a subject.

Please enter a subject.

To:
anisur

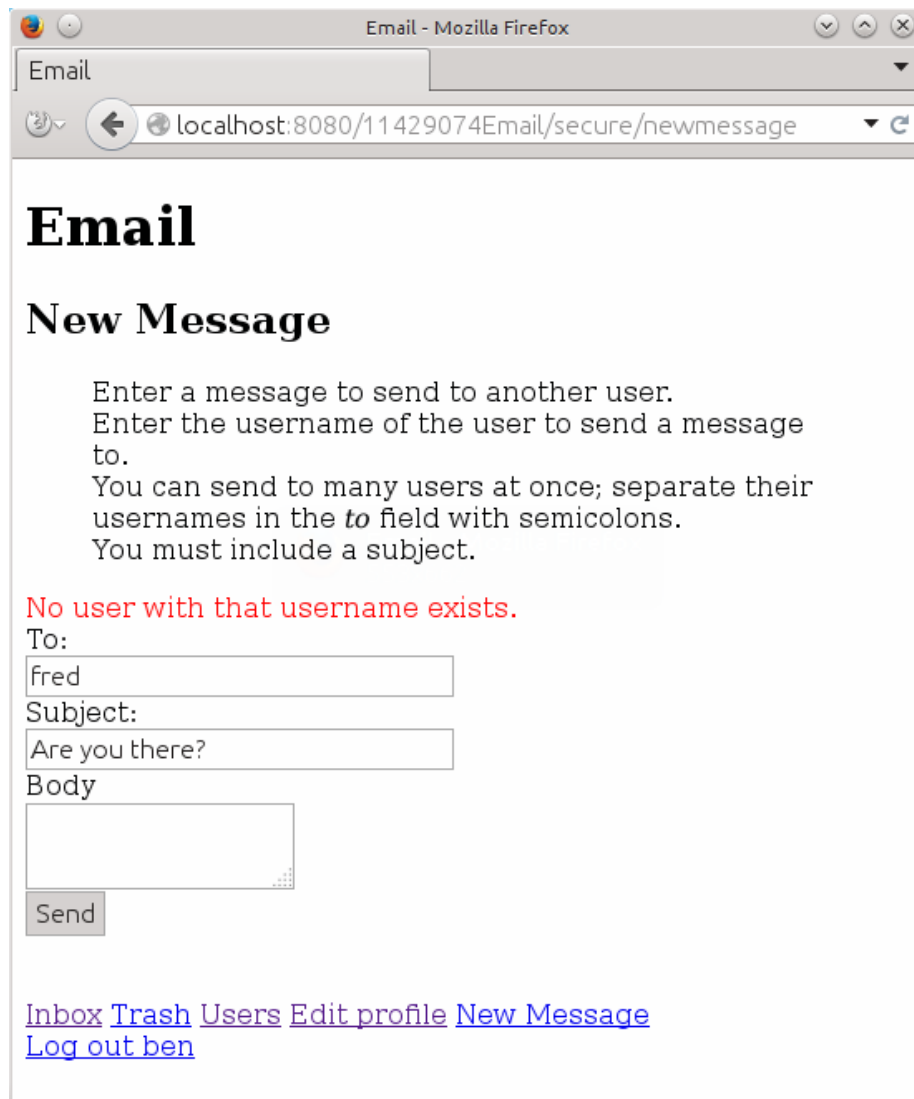
Subject:

Body

Send

[Inbox](#) [Trash](#) [Users](#) [Edit profile](#) [New Message](#)
[Log out ben](#)

The application will also warn the user if the recipient doesn't exist.



The screenshot shows a Mozilla Firefox browser window titled "Email - Mozilla Firefox". The address bar displays "localhost:8080/11429074Email/secure/newmessage". The page content includes a large heading "Email", a sub-heading "New Message", and instructional text: "Enter a message to send to another user. Enter the username of the user to send a message to. You can send to many users at once; separate their usernames in the *to* field with semicolons. You must include a subject." A red error message states "No user with that username exists." Below this, the "To:" field contains "fred", the "Subject:" field contains "Are you there?", and the "Body" field is empty. A "Send" button is located below the body field. At the bottom, there are links for "Inbox", "Trash", "Users", "Edit profile", "New Message", and "Log out ben".

Email

New Message

Enter a message to send to another user.
Enter the username of the user to send a message to.
You can send to many users at once; separate their usernames in the *to* field with semicolons.
You must include a subject.

No user with that username exists.

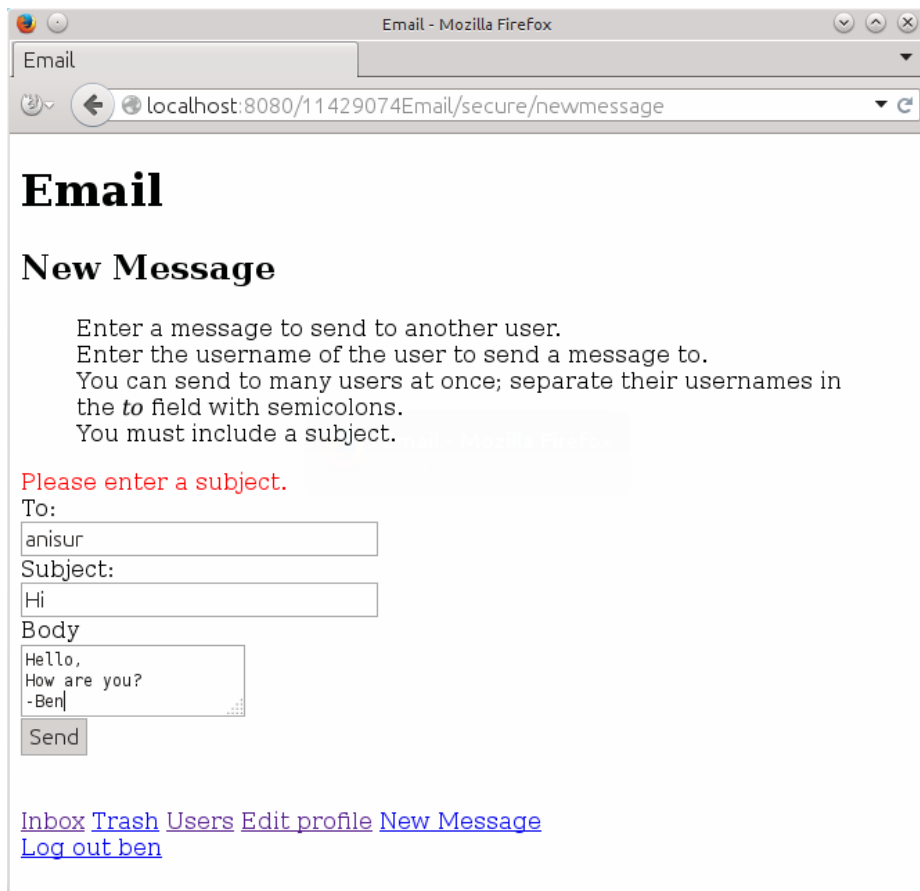
To:

Subject:

Body

[Inbox](#) [Trash](#) [Users](#) [Edit profile](#) [New Message](#)
[Log out ben](#)

After a message is sent, the user is redirected to the Inbox.



The screenshot shows a Mozilla Firefox browser window titled 'Email - Mozilla FireFox'. The address bar displays 'localhost:8080/11429074Email/secure/newmessage'. The page content includes a large 'Email' heading, followed by a 'New Message' section. Instructions state: 'Enter a message to send to another user. Enter the username of the user to send a message to. You can send to many users at once; separate their usernames in the *to* field with semicolons. You must include a subject.' A red error message 'Please enter a subject.' is visible. The form fields are: 'To:' with 'anisur', 'Subject:' with 'Hi', and 'Body' with 'Hello, How are you? -Ben'. A 'Send' button is at the bottom. Navigation links at the bottom include 'Inbox', 'Trash', 'Users', 'Edit profile', 'New Message', and 'Log out ben'.

Email

localhost:8080/11429074Email/secure/newmessage

Email

New Message

Enter a message to send to another user.
Enter the username of the user to send a message to.
You can send to many users at once; separate their usernames in the *to* field with semicolons.
You must include a subject.

Please enter a subject.

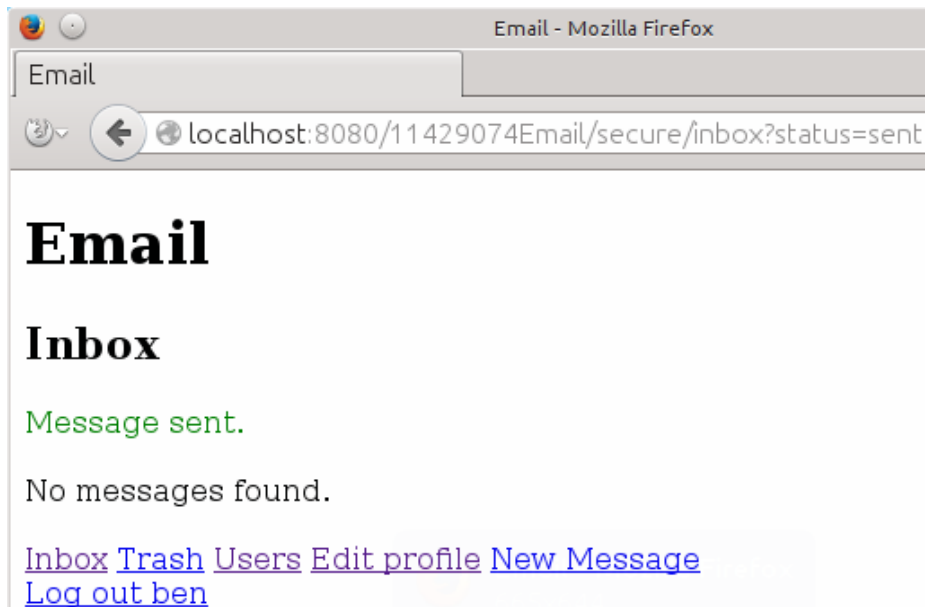
To:
anisur

Subject:
Hi

Body
Hello,
How are you?
-Ben

Send

[Inbox](#) [Trash](#) [Users](#) [Edit profile](#) [New Message](#)
[Log out ben](#)



The screenshot shows the same Mozilla Firefox browser window, now displaying the 'Inbox' page. The address bar shows 'localhost:8080/11429074Email/secure/inbox?status=sent'. The page content includes the 'Email' heading, followed by an 'Inbox' section. A green message 'Message sent.' is displayed, followed by 'No messages found.' The same navigation links are present at the bottom.

Email

localhost:8080/11429074Email/secure/inbox?status=sent

Email

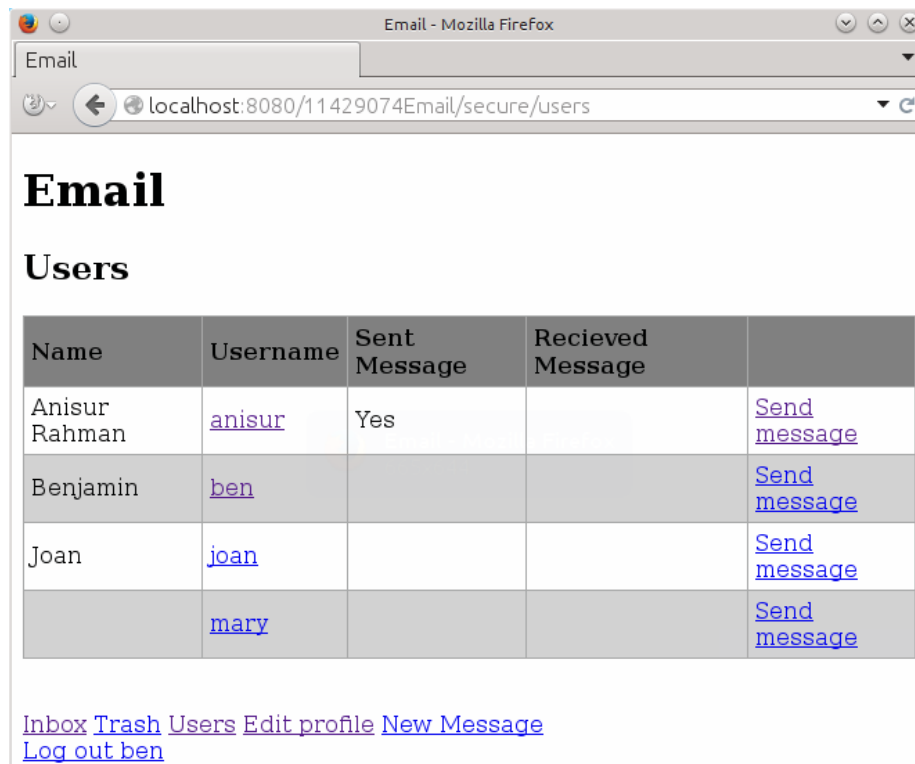
Inbox

Message sent.

No messages found.

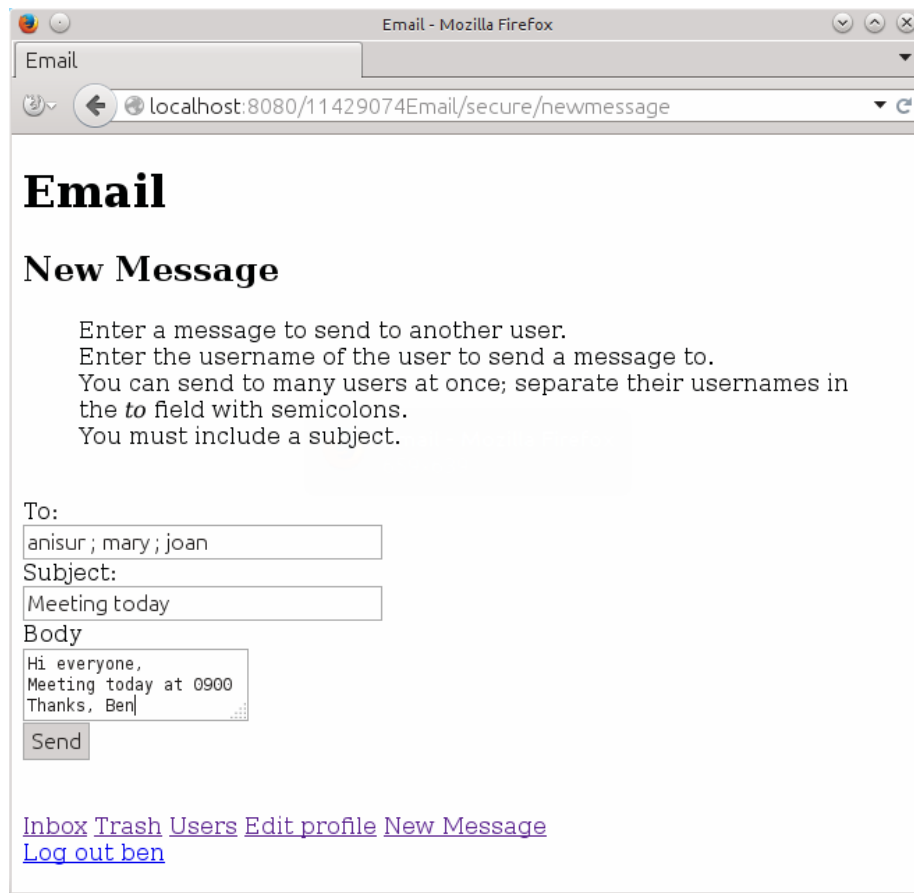
[Inbox](#) [Trash](#) [Users](#) [Edit profile](#) [New Message](#)
[Log out ben](#)

The User List is updated to show that a message has been sent to that user.



Multiple recipients

Messages can be sent to multiple recipients by specifying many usernames separated with semicolons.



The screenshot shows a Mozilla Firefox browser window titled "Email - Mozilla Firefox". The address bar displays "localhost:8080/11429074Email/secure/newmessage". The page content includes a large heading "Email", a sub-heading "New Message", and instructional text: "Enter a message to send to another user. Enter the username of the user to send a message to. You can send to many users at once; separate their usernames in the *to* field with semicolons. You must include a subject." Below this, there are input fields for "To:" (containing "anisur ; mary ; joan"), "Subject:" (containing "Meeting today"), and "Body" (containing "Hi everyone, Meeting today at 0900 Thanks, Ben"). A "Send" button is located below the body field. At the bottom, there are links: "Inbox", "Trash", "Users", "Edit profile", "New Message", and "Log out ben".

Email

localhost:8080/11429074Email/secure/newmessage

Email

New Message

Enter a message to send to another user.
Enter the username of the user to send a message to.
You can send to many users at once; separate their usernames in the *to* field with semicolons.
You must include a subject.

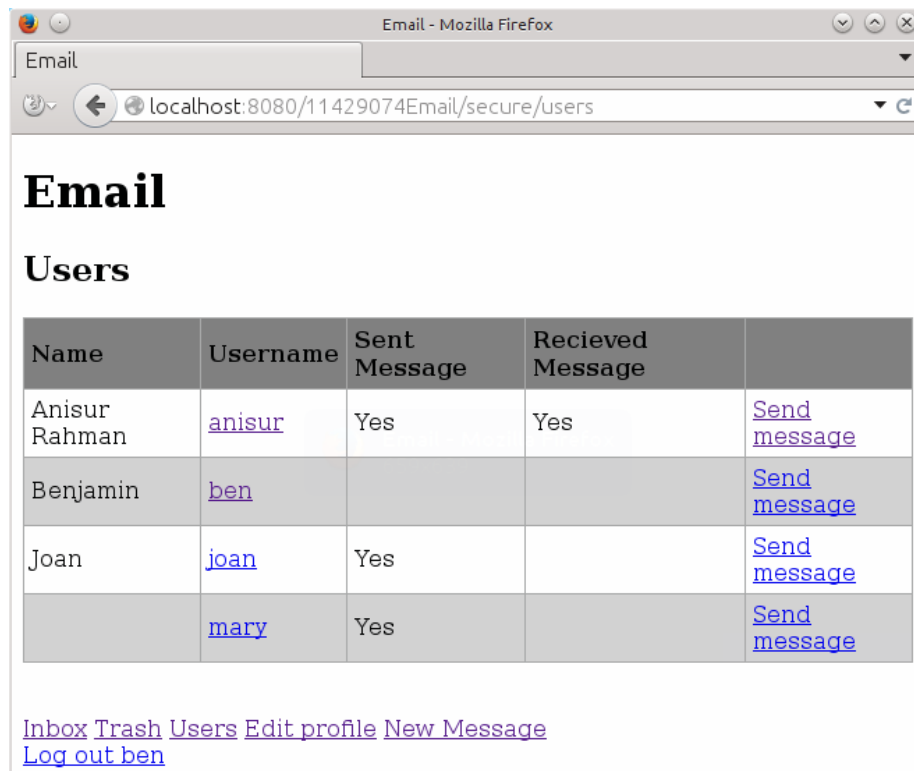
To:
anisur ; mary ; joan

Subject:
Meeting today

Body
Hi everyone,
Meeting today at 0900
Thanks, Ben

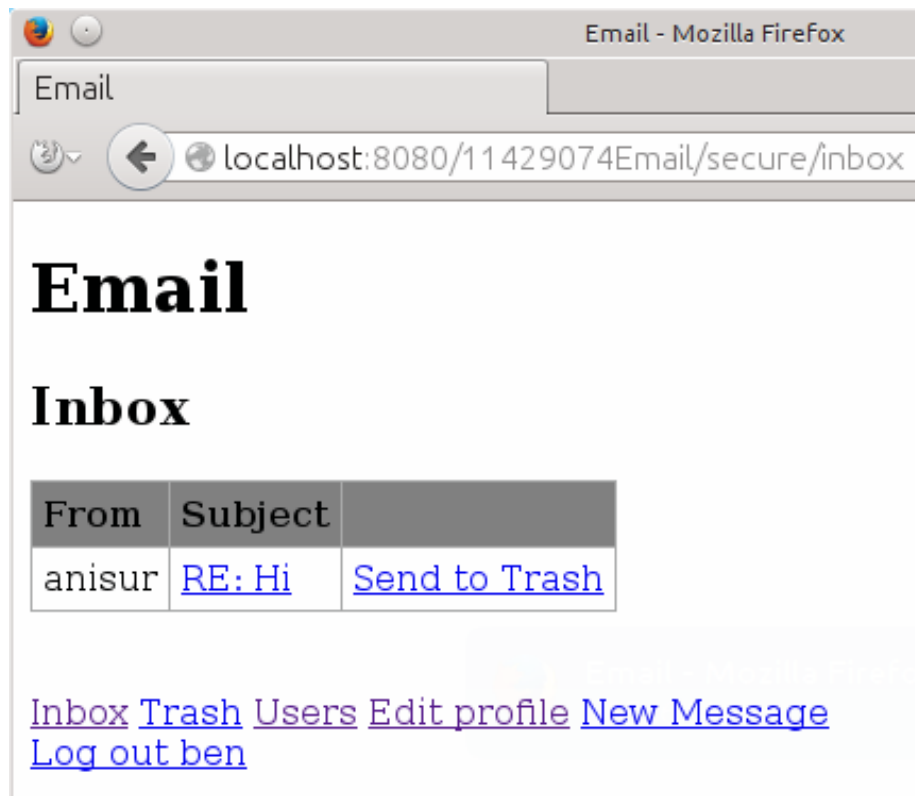
Send

[Inbox](#) [Trash](#) [Users](#) [Edit profile](#) [New Message](#)
[Log out ben](#)

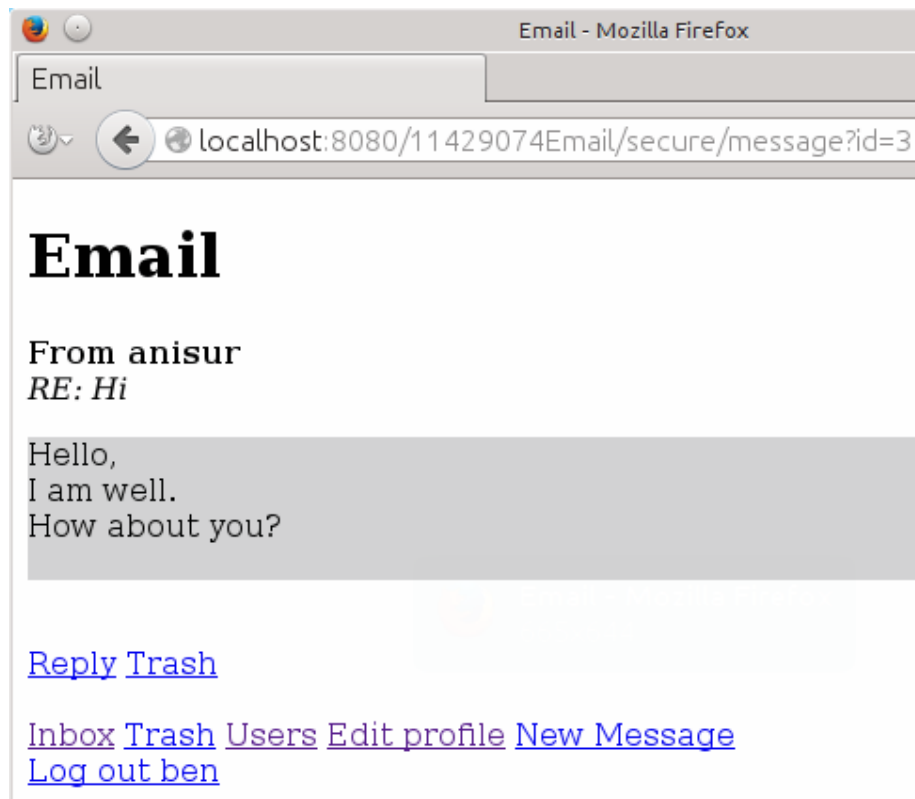


Receiving messages

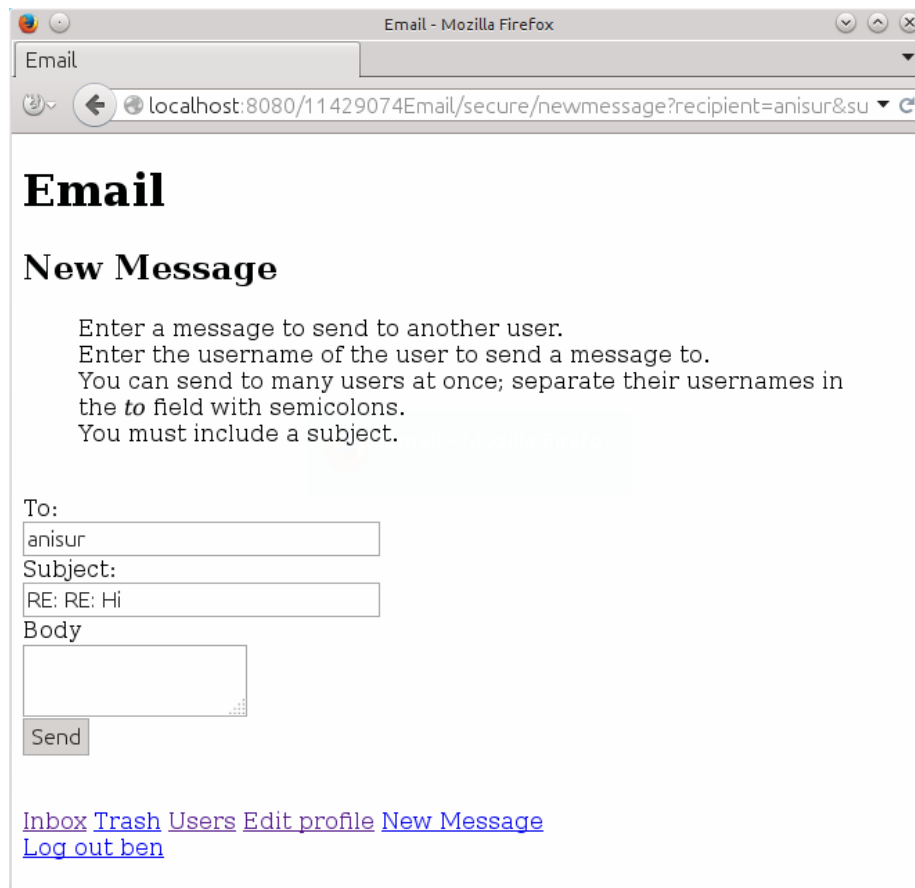
Received messages appear in the Inbox.



The user can click the subject to view the message.



The user can click *Reply* to reply to the message. The *To* and *Subject* fields are pre-filled.



The screenshot shows a Mozilla Firefox browser window titled "Email - Mozilla Firefox". The address bar displays "localhost:8080/11429074Email/secure/newmessage?recipient=anisur&su". The page content includes a large heading "Email", a sub-heading "New Message", and instructional text: "Enter a message to send to another user. Enter the username of the user to send a message to. You can send to many users at once; separate their usernames in the *to* field with semicolons. You must include a subject." Below this is a form with fields for "To:" (containing "anisur"), "Subject:" (containing "RE: RE: Hi"), and "Body". A "Send" button is located below the body field. At the bottom of the page, there are several blue links: "Inbox", "Trash", "Users", "Edit profile", "New Message", and "Log out ben".

Email

New Message

Enter a message to send to another user.
Enter the username of the user to send a message to.
You can send to many users at once; separate their usernames in the *to* field with semicolons.
You must include a subject.

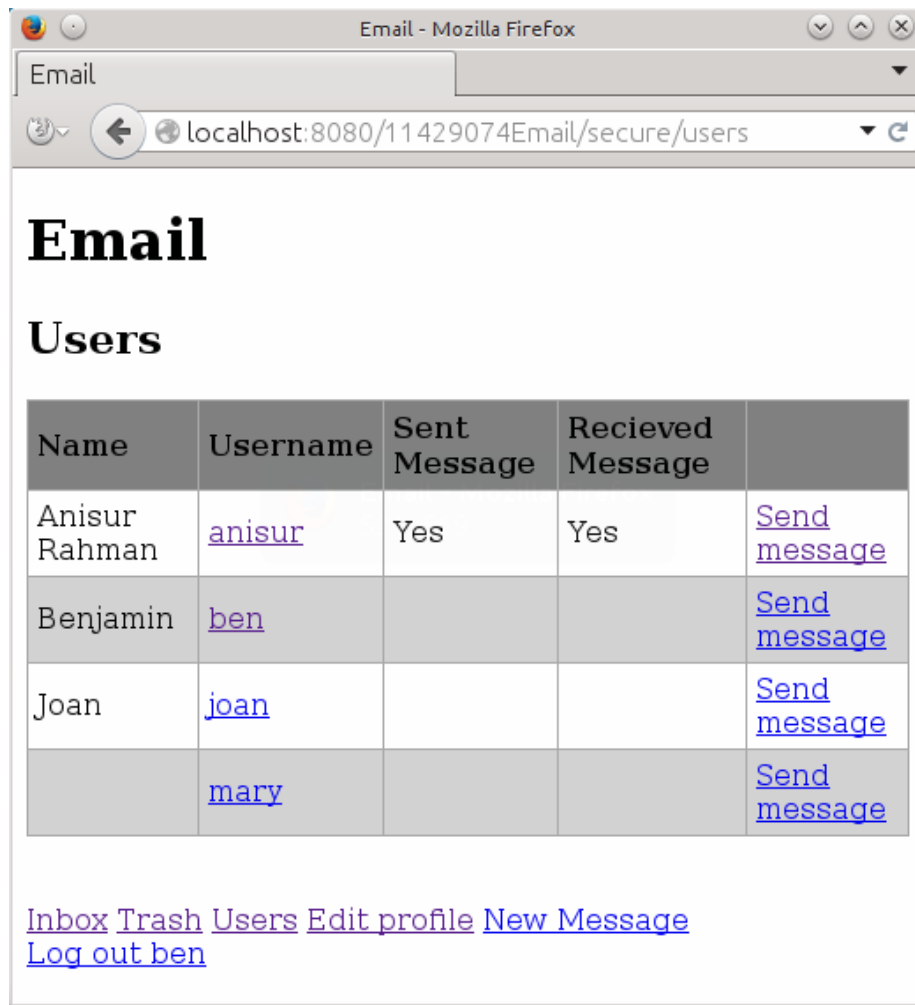
To:

Subject:

Body

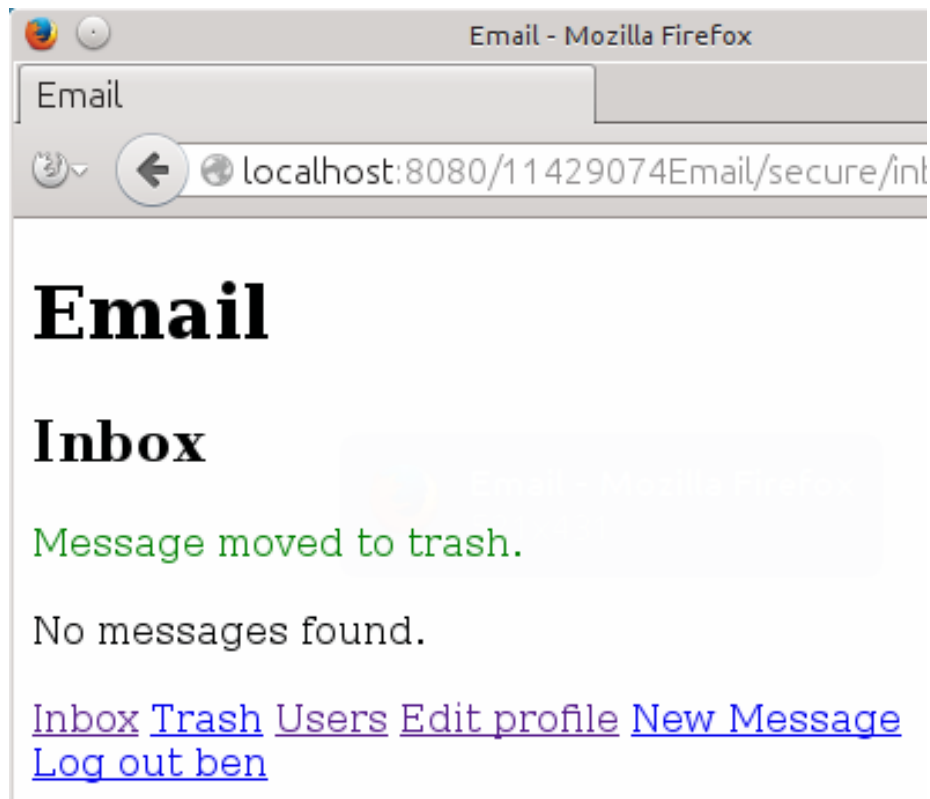
[Inbox](#) [Trash](#) [Users](#) [Edit profile](#) [New Message](#)
[Log out ben](#)

The User List is updated to show that a message has been received from that user.

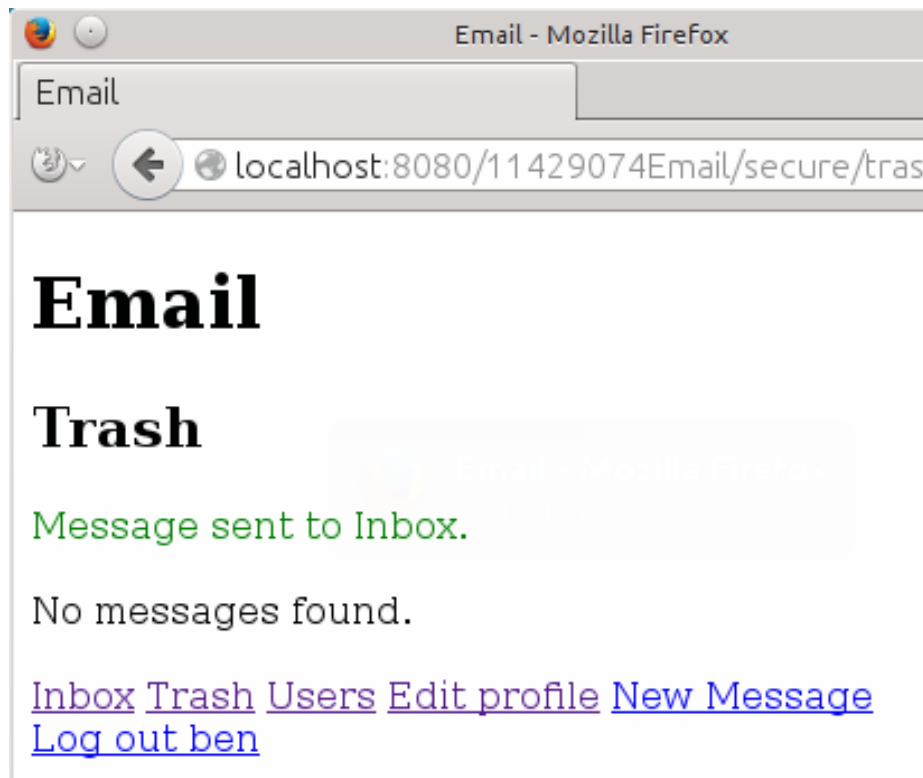


Trash

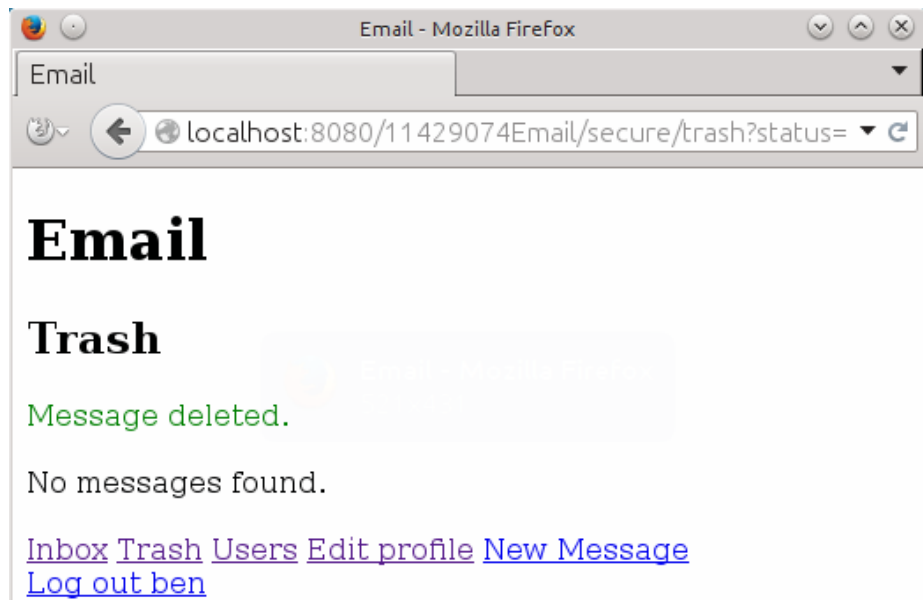
From the Message or Inbox, the user can send messages to the Trash. This sets the `trash` column in the `recipients` table to true.



Messages in the Trash can be moved back to the Inbox.



Messages can be deleted from Trash. Deleting a message deletes the row for that message for the current user from the `recipients` table. If there are no recipients for a message, that message is deleted from the `messages` table.



Logout

Clicking *Logout* invalidates the user's session and redirects the user to the login page.

