



GROUP 13 - BLOOD BOOK

Blood Bank Management System(BBMS)

Dhrumil Amish Shah (B00857606)

Dhrumil Rakesh Shah (B00870600)

Dhruviben Shah (B00867638)

Priya Arunkumar Savaliya (B00884335)

Viraj Jigar Shah (B00879448)

Overview

Blood donation is a virtuous act and is persistently required by many hospitals for several purposes. This makes it a generous act as it provides life-saving support to people in need. The demand for blood donation is high, and the shortage of blood donors has led to a crisis. In this interest, many NGOs conduct blood donation drives. The most important element of blood transfusion is the safe collection, testing, and distribution of blood to the needy.

Additionally, more densely populated and developing countries suffer from an acute shortage of safe, timely available blood. The reason behind this is that nearly four-fifths of high-income countries have a dedicated national blood policy. On the other hand, less than two-fifths of developing countries have similar policies in place. This daunting shortfall can be responsible for an inefficient blood collection system. The lockdowns due to COVID-19 have further led to blood shortages across the country. There is an urgent need to legislate into effect a comprehensive policy framework for efficient management of the blood banking system. To mitigate this gap, we will be developing and deploying an application that can be accessed by users and the blood banks to address these issues.

The Blood Book is kind of a Blood Bank Management System (BBMS). This application will be designed to manage information related to administrative and inventory management with a blood bank, and it will also connect blood donors and receivers. This application aims at maintaining all the information pertaining to blood donors, different blood groups available in each blood bank and helps them streamline the operations. The project aims to provide transparency in this field, make obtaining blood from a blood bank seamless and corruption-free, and optimize the blood bank management system.

In this project, we try to create a console-based application with most of the business logic written in JAVA. Additionally, the project also uses a relational database for storing the data that can be used for other analysis purposes. The application is implemented in local development environments and is deployed to TEST and PROD servers (Timberlea). The project is implemented in an incremental model in four sprints using scrum and other traditional agile methodologies. Priority is given to delivering the highest quality software by following various renowned principles of object-oriented programming such as SOLID principles, test-driven development, continuous integration/continuous deployment principles. As a result, the project will be easy to maintain going forward.

The application contains three prominent roles:

1. **Users (Blood Donors, Blood Receivers, Thalassemia Patients)** – Users will have the ability to donate blood and request blood from other users. They will buy blood from the blood banks, rate the blood banks, book vaccination slots, and view certificates. Also, they will be able to view all statistics and demographic analysis information and export data for their use. They are considered as **User Group A**.
2. **Blood Banks** – They will manage blood inventory, view ratings as given by users, organize blood camps, sell blood to users and manage blood requests. Blood banks will also be able to view statistics and demographic analysis information and export data. They are considered as **User Group B**.
3. **Admin** – Admin will have the ability to manage the vaccination inventory, give timeslots to users and generate certificates for blood donors and vaccinated users.

User Persona

Below in *Figure 1 User Group A Persona*, we have created a user persona for User Group A, i.e., Blood Donors, Blood Receivers, and Thalassemia Patients. The primary purpose of this user persona is to portray the target audience that will use our application, focusing on their Goals, Personality, and Motivation.

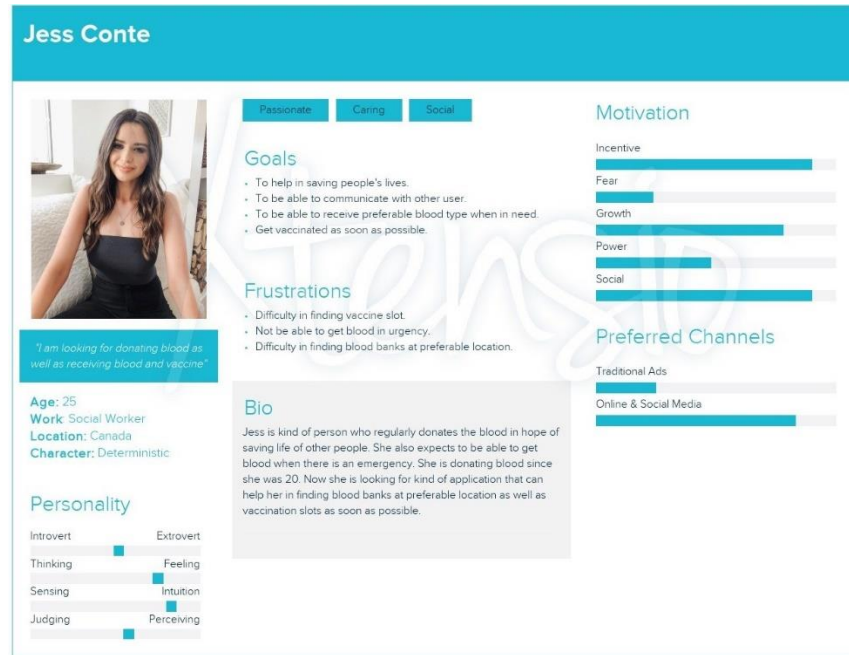


Figure 1 - User Group A Persona

Below in *Figure 2 User Group B Persona*, we have created a user persona for User Group B, i.e., the Blood Banks. The primary purpose of this user persona is to portray the target audience that will use our application, focusing on their Goals, Personality, and Motivation. Here we are considering the persona of the CEO of a famous Blood Bank.

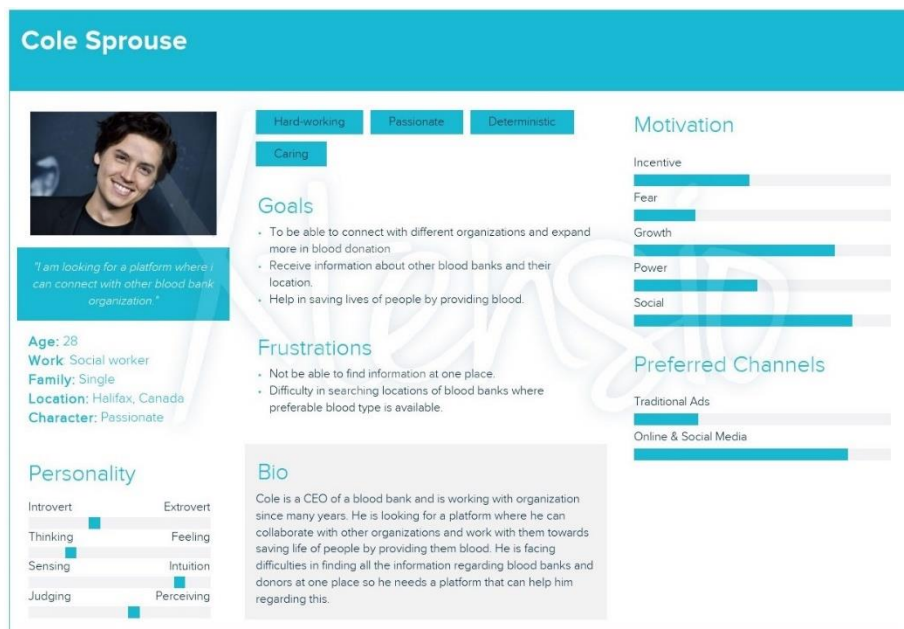
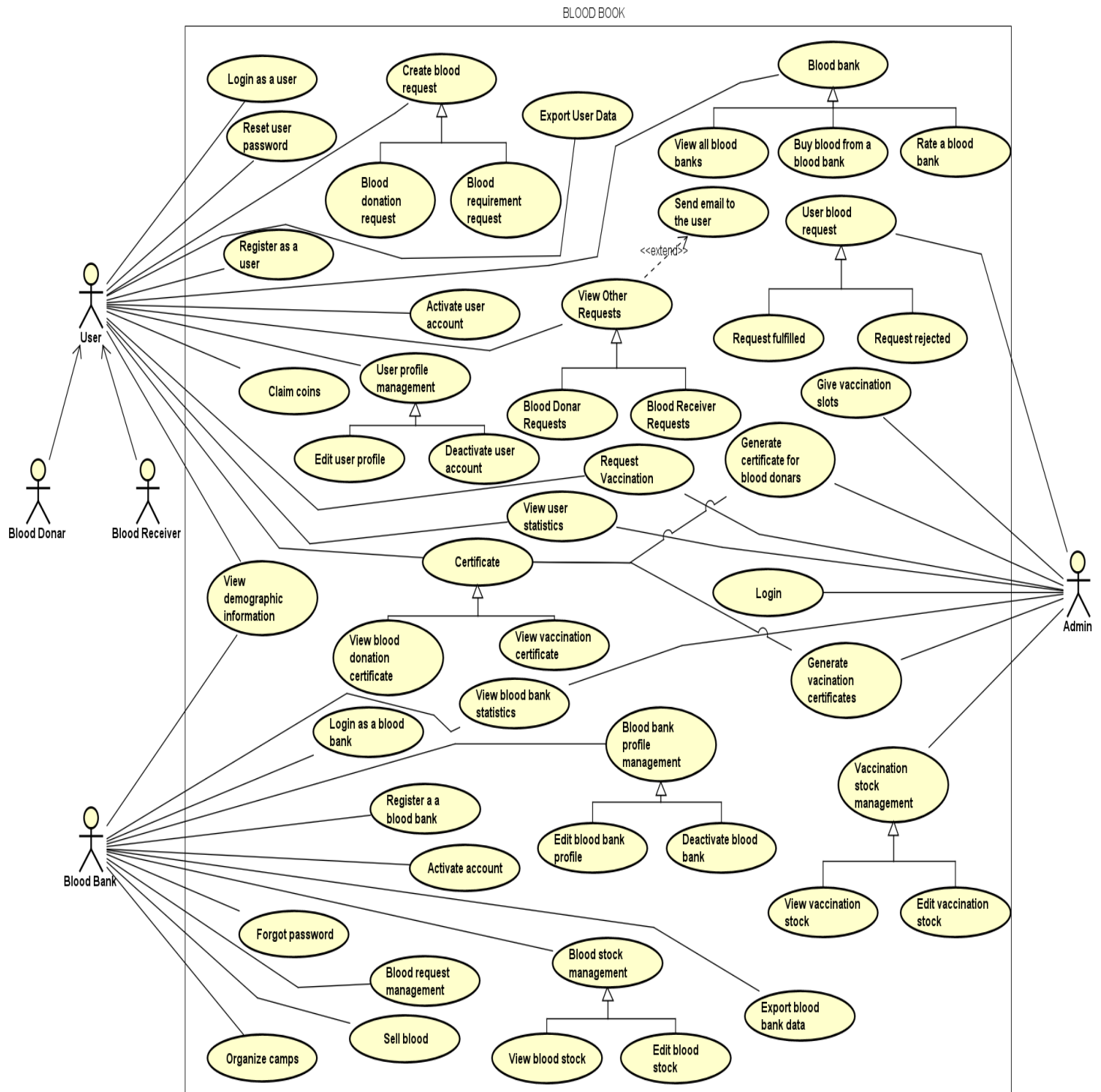


Figure 2 - User Group B Persona

Below *Figure 3 Use Case Diagram*, explains the overall features of the Blood Book application.



Authentication Module

This module focuses on new user account creation, login, resetting the account password, and activating the account. The application will start with a welcome screen, as shown in *Figure 4 Welcome Page*, where the user is asked to choose from a set of options. If a user enters a wrong choice, i.e., anything other than the above options, the user is prompted to enter a valid choice.

```
*****  
WELCOME TO BLOOD BOOK  
Blood Bank Management System  
*****  
  
1. Login as a user.  
2. Register a a user.  
3. Login as a blood bank.  
4. Register as a blood bank.  
5. Forgot password.  
6. Activate account.  
  
Select an option from above.  
>>> 1  
  
Redirecting you to the login page...
```

Figure 4 - Welcome Page

Login Page

If the User selects login as a user, the user is asked to enter the registered email address/contact number and password to login into the application. Once the user submits the details, the application will authenticate the user by retrieving the details from the database. If the entered credentials are not valid, then an error message is displayed, and the user is asked to login again.

```
*****  
                LOGIN AS A USER  
*****  
  
Enter your email address/contact number  
>>> johndoe@gmail.com  
  
Enter your password  
>>> *****  
  
Validating your credentials...  
Credentials validated...  
Redirecting you to the main page...|
```

Figure 5 - Login Page for User (User Group A)

```
=====
                LOGIN AS A BLOOD BANK
=====

Enter your email address/contact number
>>> bloodcross@gmail.com

Enter your password
>>> *****

Validating your credentials...
Credentials validated...
Redirecting you to the main page...|
```

Figure 6 - Login Page for Blood Bank (User Group B)

If the entered credentials are valid, then the user is logged in to the application, and their session is loaded with authenticated user data, as shown in *Figure 5 and Figure 6*.

Sign Up Page

Now, if the user selects to register, then the user is directed to the signup page according to their User Group (**A and B**), where the user is asked to provide relevant details to create a User Profile in our system and store the user's information in the database. Validations are performed for all the fields. Once the verification is done, we hit the database to check if the user's email address/contact number is registered. If the user is registered, then we show a "User already registered" message.

```
*****
***** REGISTER AS A USER *****
*****

Enter your name. (Can only be alphanumeric characters)
>>> John Doe
Enter your email address.
>>> johndoe@gmail.com
Enter your contact number.
>>> 416 555 0134
Enter your password. (Must be at least 8 characters with 1 upper case, 1 lower case, 1 special character and 1 number)
>>> *****
Enter your password again to confirm.
>>> *****
Enter your date of birth. (DD-MM-YYYY)
>>> 18-04-1998
Enter your gender. (M - Male|F - Female|O - Other)
>>> M
Enter your blood group. (A+ | A- | B+ | B- | AB+ | AB- | O+ | O-)
>>> AB+
Enter your address street.
>> 3907 Bellwood Acres Rd
Enter your city.
>>> Dorset
Enter your province.
>>> Ontario
Enter your zip code.
>>> P0A 1E0
Are you a Thalassemia Patient? (Y/N)
>>> Y
    How frequently you need blood? (Days)
    >>> 45
    When was the last you received blood? [(DD-MM-YYYY)]
    >>> 28-05-2021
SQ1. <Security Question 1>
>>> <Answer 1>
SQ1. <Security Question 2>
>>> <Answer 2>

Validating your details...
Details validated....
Redirecting you to the menu page...
```

Figure 7 - User Registration

```
*****
***** REGISTER AS A BLOOD BANK *****
*****
Enter name. (Can only be alphanumeric characters)
>>> Red Cross
Enter your email address.
>>> redcross@gmail.com
Enter your contact number.
>>> 416 444 0135
Enter your password. (Must be at least 8 characters with 1 upper case, 1 lower case, 1 special character and 1 number)
>>> *****
Enter your password again to confirm.
>>> *****
Enter your address street.
>> 3907 Claywood Acres Rd
Enter your city.
>>> Toronto
Enter your province.
>>> Ontario
Enter your zip code.
>>> P00 1E1
Enter your licence number. (12 characters and alphanumeric)
>>> 27CKLM902KKL
SQ1. <Security question 1>
>>> <Answer 1>
SQ2. <Security question 2>
>>> <Answer 2>

Validating your details...
Details validated....
Redirecting you to the menu page...
```

Figure 8 - Blood Bank Registration

If the User is not registered then, we store the user details in the database, load the user session and successfully register the user to our application, as shown in *Figure 7 and Figure 8*.

User Story for Blood Bank Registration

As a first time visitor on the system,
I want to register on the system,
so that I can browse different features of the system.

Acceptance criteria

Given registration form,
When the user fills the form and clicks submit button,
Then the user should be registered.

Forgot Password Page

Both group users (**A and B**) can reset their passwords by selecting the Forgot Password option. The user is asked to enter an email address, contact number, and any two security questions to reset the password. Validation is performed for all the fields to check for the correct format. Then, upon successfully matching the User entered inputs with the database records, the User is asked to enter a new password and confirm the entered password. Comparing both the entered password is done, and password constraints are set for user input. On successful verification, as shown in *Figure 9 Forgot Password Page*, the user password is reset and stored in the database as a hash value.

```
*****
| | | | FORGOT PASSWORD
*****

Enter your email address
johndoe@gmail.com
Enter your contact number
416 555 0134
SQ1. <Security question 1>
<Answer 1>
SQ1. <Security question 1>
<Answer 2>

Validating your identity...
Identity validated...

Enter your new password
>>> *****
Enter your password again to confirm
>>> *****

Updating your password...
Password updated...
Redirecting you to the menu page...|
```

Figure 9 - Forgot Password Page

As the application has two leading user groups, we have bifurcated their features accordingly.

User Group A Features

User Group A are the normal users of our application like Blood Donors, Blood Receivers, Thalassemia Patients.

Blood Donation Request

In this feature, the User can create a blood donation request, view past blood donation requests, request the admin to fulfill the active request, and claim coins for successful fulfillment of the blood donation. The User is presented with a menu of options to select from, as shown in *Figure 10 Blood Donor Request Page*. If a user enters a wrong choice, i.e., anything other than the above options, the User is prompted to enter a valid selection.

```
*****
|   |   |   |   |   BLOOD DONAR REQUESTS
*****
1. Create a new blood donation request.
2. View all previous blood donation requests.
3. Request blood donation fulfillment.
4. Claim coins for fulfilled requests.
```

Figure 10 - Blood Donor Requests Page

If the user selects "Create a new blood donation request" before presenting the user with a registration form, the application checks whether the User has any request that is active or in "request of fulfillment." If any such request is found, the User is prompted and not allowed to create any new blood donation requests. The User is also shown the requests that are not yet fulfilled, as shown in *Figure 11 New Blood Donation Request 1*.

```
*****
|   |   |   |   |   NEW BLOOD DONATION REQUEST
*****
Checking any active blood donation request...
Oops! A blood donation request already exists..
Please wait until the request is fulfilled.

Request ID - <request_id>
Request creation date - 25/05/2021 08:30 AM
Request current status - ACTIVE

Press "EXIT" to go back
>>> EXIT
```

Figure 11 - New Blood Donation Request 1

If no such unfulfilled requests exist, then the user is allowed to create a new donation request. The blood donation request form consists of a set of questions needed to be answered by the User. All the available details of the User are fetched from the database by the application. The answers to the questions asked are in YES/NO; validations are performed for the answers entered; if the user enters YES for any one of the questions, he/she is not allowed to create a blood donation request. Similarly, if the answers to all the questions are NO, a new request is successfully created. The details of the newly created request are displayed on the screen, and then the user can choose to exit, as shown in *Figure 12 New Blood Donation Request 2*.

```
*****
| | | NEW BLOOD DONATION REQUEST
*****
Checking any active blood donation request...
No requests found...
Create a new request...

Your general details will be fetched automatically.
=> Do you have any of the symptoms from cold, flu, sore throat, cold sore, stomach bug or any other infection?
=> Have you donated blood in the last 3 months?
=> Have you done any tattoo or body piercing within last 6 months?
=> Are you going through any medications (hormonal medications)?
=> Have you gone through any dialysis treatment?
=> BP?
=> Diabetes?
=> HIV?
Enter (YES/NO)
>>> NO

Creating a new blood donation request...
New request created successfully.

Request creation date - 25/05/2021 08:30 AM
Request current status - ACTIVE

Press "EXIT" to go back
>>> EXIT
```

Figure 12 - New Blood Donation Request 2

The User also has an option to view all the blood donation requests pertaining to that User. The requests could be in Active/Rejected/Fulfilled/Claimed state. The User can find detailed information for each request ever made, as shown in *Figure 13 View Blood Donation Requests*.

User Story for Blood Donation Request

As a donor,

I want to be able to request for blood donation,

so that donated blood can be used to help people who need it.

Acceptance criteria

Given no active request exists,

When donor select create a new request,

Then a new donation request should be created with time and status.

```

*****
| | | VIEW ALL BLOOD DONATION REQUESTS
*****
Request ID - <request_id>
Request creation date - 25/05/2021 08:30 AM
Request current status - ACTIVE
... more information ...

Request ID - <request_id>
Request creation date - 25/02/2021 07:30 PM
Request current status - REJECTED
... more information ...

Request ID - <request_id>
Request creation date - 17/05/2020 06:30 PM
Request current status - FULFILLED
... more information ...

Request ID - <request_id>
Request creation date - 12/05/2020 04:20 AM
Request current status - CLAIMED
... more information ...

Press "EXIT" to go back
>>> EXIT

```

Figure 13 - View Blood Donation Requests

Once the user has donated blood, he/she can request the admin to fulfill the donation request. On selecting the "Request for fulfillment" option, the request is sent to the Admin. After successful verification by the Admin, the request's status is updated to "Fulfilled," as shown in *Figure 14 Request for Fulfilment*.

User Story for Blood Donation Request

As a donor,
I want to fulfill my request for blood donation,
so that I can make new requests in the future and claim the coins.

Acceptance criteria

Given active request exists,
When the donor select request for fulfillment and the admin verifies the request,
Then request status should be changed by fulfillment, and the donor gets claim coins.

```
*****
| | | | REQUEST FOR FULFILLMENT
*****
If you have donated the blood, you can request for fulfillment.
You can claim coins once the request is fulfilled.

Request ID - <request_id>
Request creation date - 25/05/2021 08:30 AM
Request current status - ACTIVE
... more information ...

1. Request for fulfillment
2. Exit
>>> 1

Sending request...
Request sent.. You'll get a call for verification.
Thank you for donating blood <3

Press "EXIT" to go back
>>> EXIT
```

Figure 14 - Request for Fulfillment

After successful fulfillment of the request, the user gets an option to claim the coins for the successful blood donation, as shown in *Figure 15 Claim Coins Page*.

```
*****
| | | | CLAIM COINS
*****
Yey!! Your request was fulfilled.
You have received <coins>.

Keep donating <3
Press "EXIT" to go back
>>> EXIT
```

Figure 15 - Claim Coins Page

Blood Requirement Request

In this feature, the user can create a blood receiver request, view past blood receiver requests, request the admin to fulfill the active request, and claim coins to successfully fulfill the blood donation. The User is presented with a menu of options to select from, as shown in *Figure 16 Blood Reciever Request Page*. If a user enters a wrong choice, i.e., anything other than the above options, the User is prompted to enter a valid selection.

```

*****
| | | | BLOOD RECEIVER REQUESTS
| | | | *****
1. Create a new blood receive request.
2. View all previous blood receive requests.
3. Request blood receive fulfillment.
4. Claim coins for fulfilled requests.

```

Figure 16 - Blood Receiver Requests Page

If the user selects "Create a new blood receive request" before presenting the user with a registration form, the application checks whether the user has any request that is active or in "request of fulfillment." If any such request is found, the user is prompted and not allowed to create any new blood receiver requests. The User is also shown the requests that are not yet fulfilled, as shown in *Figure 17 New Blood Receiver Request 1*.

```

*****
| | | | NEW BLOOD RECEIVE REQUEST
| | | | *****
Checking any active blood receive request...
Oops! A blood receive request already exists.
Please wait until the request is fulfilled.

Request ID - <request_id>
Request creation date - 25/05/2021 08:30 AM
Request current status - ACTIVE

Press "EXIT" to go back
>>> EXIT

```

Figure 17 - New Blood Receiver Request 1

If no such unfulfilled requests exist, then the user is allowed to create a new receiver request. The blood receiver request form consists of a set of questions needed to be answered by the User. All the available details of the User are fetched from the database by the application. The details of the newly created request are displayed on the screen, and then the user can choose to exit, as shown in *Figure 18 New Blood Receiver Request 2*.

```

*****
| | | | NEW BLOOD RECEIVE REQUEST
| | | | *****
Checking any active blood receive request...
No requests found...
Create a new request...

Your general details will be fetched automatically.

Creating a new blood receive request...
New request created successfully.

Request creation date - 25/05/2021 08:30 AM
Request current status - ACTIVE

Press "EXIT" to go back
>>> EXIT

```

Figure 18 - New Blood Receiver Request 2

The User also has an option to view all the blood receiver requests pertaining to that user. The requests could be in Active/Rejected/Fulfilled/Claimed state. The User can find detailed information for each request ever made, as shown in *Figure 19 View Blood Receiver Requests*.

```
*****
| | | VIEW ALL BLOOD RECEIVE REQUESTS
*****
Request ID - <request_id>
Request creation date - 25/05/2021 08:30 AM
Request current status - ACTIVE
... more information ...

Request ID - <request_id>
Request creation date - 25/02/2021 07:30 PM
Request current status - REJECTED
... more information ...

Request ID - <request_id>
Request creation date - 17/05/2020 06:30 PM
Request current status - FULFILLED
... more information ...

Request ID - <request_id>
Request creation date - 12/05/2020 04:20 AM
Request current status - CLAIMED
... more information ...

Press "EXIT" to go back
>>> EXIT
```

Figure 19 - View Blood Receiver Requests

Once the user has requested blood, he/she can request the admin to fulfill the receiver request. On selecting the "Request for fulfillment" option, the request is sent to the Admin. After successful verification by the Admin, the request's status is updated to "Fulfilled," as shown in *Figure 203 Request for Fulfillment Page*.

```
*****
| | | REQUEST FOR FULFILLMENT
*****
If you have donated the blood, you can request for fulfillment.
You can claim coins once the request is fulfilled.

Request ID - <request_id>
Request creation date - 25/05/2021 08:30 AM
Request current status - ACTIVE
... more information ...

1. Request for fulfillment
2. Exit
>>> 1

Sending request...
Request sent.. You'll get a call for verification.

Press "EXIT" to go back
>>> EXIT
```

Figure 20 - Request For Fulfillment Page

After successful fulfillment of the request, the user gets an option to claim the coins for the successful blood receiver, as shown in *Figure 21 Claim Coins Page*.

```
*****
|         |         |         |         | CLAIM COINS
*****
Yey!! Your request was fulfilled.
You have received <coins> coins.

Happy receiving <3
Press "EXIT" to go back
>>> EXIT
```

Figure 21 - Claim Coins Page

User Story for Blood Receiver Request

As a recipient,
I want to be able to request for blood receiver,
so that I can find a blood donor and collect the blood.

Acceptance criteria

Given no active request exists,
When the recipient select create a new request,
Then a new request for the receiver should be created with time and status.

Statistics Page

The statistics page for User Group A will have a list of options that the users can select to view various statistics and analysis pertaining to the applications users. In no way do the presented data include users that are not registered in the application. The presented data will be filtered by age groups on selecting any of the options, as shown in *Figure 22 Statistics Page*. The analysis is done by the application in the backend after retrieving the data from the database. No additional data is required from the user to present the statistics.

```
*****
| | | | | STATISTICS
| | | | |
*****
1. How many active donars?
2. How many active receivers?
3. Average blood donar age?
4. Average blood receiver age?
5. Highest blood type donated?
6. Highest blood type requested?
7. Active user classification based on blood type?
8. How many blood donations in a year?
9. Classification based on donar status? (Active/Fulfilled)
10. Classification based on receiver status? (Active/Fulfilled)

Select an option from above
>>> 7

Select filter option age group wise statis
1. 18 - 25
2. 26 - 40
3. 41 - 60
4. 60 above
>>> 2

| ...
Statistics is displayed
| ...

Enter any other option to view other statistics. (Press "Exit" to go back)
>>> Exit|
```

Figure 22 - Statistics Page

All Blood Donor Requests

When a user needs a blood donor then, he/she can search all the requests of donors who are ready to donate blood. In this way, the User will find compatible blood donors in his/her area easily. Users can enter the blood group type and location for searching donors in a nearby area, as shown in *Figure 23 Active Blood Donor Requests*.


```

=====
All Active Requests Of Blood Donors
=====
Hello <User's name>!!

1. Find Compatible blood type donor
2. Notify the donor
3. Exit

Enter your input: 1
-----
Fill the requirement Form :-

Required Blood Group* : A+
Location : Halifax

Submit (YES/NO)? YES

Searching Active donor's request....

1. Name      : Annie Brar
   Age       : 35 years
   Blood Group: O+
   Email      : anniebrar@gmail.com
   Contact    : +1 458-236-6233
   Address    : 7071 Bayers Rd Unit 252,
               Halifax, NS B3L 2C2, Canada
   Rating star: 4/5

2. Name      : Light Yagami
   Age       : 28 years
   Blood Group: A-
   Email      : lightyagami@gmail.com
   Contact    : +1 758-636-6264
   Address    : 15 Commerce Ct, Elmsdale,
               NS B2S 3K5, Canada
   Rating star: 3/5

-----
Enter your input:

```

Figure 23 - Active Blood Donor Requests

User Story for All Blood Donor Requests

As a Blood recipient,

I want to search for compatible blood donor near my location,
so that I can find the required blood type.

Acceptance criteria

Given Blood group and location

When the recipient clicks the search tab

Then a list of active donors will be displayed.

If Users find compatible donors and inform them, they can email them by selecting the notify option as shown in *Figure 24 Notify Donor*.

```

Enter your input: 2

Enter the donor number that you want to notify : 1

Email is sent successfully to Annie Brar for blood donation!

```

Figure 24 - Notify Donor

User Story for All Blood Donor Requests

As a Blood recipient,

I want to notify donors,

so that I can inform the donor and he can donate me blood.

Acceptance criteria

Given donor email address is selected

When the recipient click notify tab

Then the donor will get an email for donation.

All Blood Receiver Requests

User(**Donor**) wants to donate blood, then he/she can view all the received blood requests made by receivers. In this way, donors will find compatible blood receivers in his/her area easily. The donor can enter the location and search all the blood receiver's active requests to view all the requests as shown in *Figure 25 Active Requests of Blood Receivers*.

```
=====
                        All Active Requests Of Blood Receivers
=====
Hello <User's name>!!

1. Find Compatible blood type receiver
2. Notify the receiver
3. Exit

Enter your input: 1
-----
Your blood group is A+ .
Enter your current Location : Halifax

Submit (YES/NO)? YES

Searching Active receiver's request....

1. Name      : Annie Brar
   Age       : 35 years
   Blood Group: O+
   Email      : anniebrar@gmail.com
   Contact    : +1 458-236-6233
   Address    : 7071 Bayers Rd Unit 252,
               Halifax, NS B3L 2C2, Canada
   Rating star: 4/5

2. Name      : Light Yagami
   Age       : 28 years
   Blood Group: A-
   Email      : lightyagami@gmail.com
   Contact    : +1 758-636-6264
   Address    : 15 Commerce Ct, Elmsdale,
               NS B2S 3K5, Canada
   Rating star: 3/5

-----
Enter your input:
```

Figure 25 - Active Requests of Blood Receivers

If users find a compatible receiver and inform them, donors can email them by selecting the notify option as shown in *Figure 26 Notify Receiver*.

```
Enter your input: 2

Enter the receiver number that you want to notify : 2

Email is sent successfully to Light Yagami for receiving blood!
```

Figure 26 - Notify Receiver

User Story for Blood Receiver Request

As a Blood donor,
I want to search for blood recipient near my location,
so that I can find compatible blood type recipients.

Acceptance criteria

Given location
When the recipient clicks the search tab
Then the list of the active recipient will be displayed

User Story for Notify Receiver

As a Blood donor,
I want to notify the recipient,
so that I can inform the recipient and he can collect blood from me.

Acceptance criteria

Given recipient email id is selected
When donor click notify tab
Then the recipient will get an email or receive blood.

Export Data to File

The choice to export the data to a file appears for the users when they access three main other features like the "User statistics data," "Users blood donation requests," and "Users blood receive requests." The user needs to select the option to export the data to a file, as shown in Figures 27 and 28.

```
*****  
| | | Export Data to File  
*****  
  
1. User statistics data export  
2. User blood donation requests data export.  
3. User blood receive requests data export.  
... more ...  
n. Exit  
Enter your option  
>>> 1.
```

Figure 27 - Export Data Page 1

```
*****
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
*****
Export Data to File
*****
Option selected - User statistics data export

Enter valid file name -
>>> statistics.txt

Preparing...
Exporting data to file "statistics.txt"...
Data exported succesfully.

Enter "Exit" to go back
>>> Exit
```

Figure 28 - Export Data Page 2

Profile Management

In this feature, users can update their profile details. The user can also add other relevant details, which were not asked of the user at the time of registration. But before any change, users need to login into their account, as shown in *Figure 29 Login Page*. The application retrieves the data from the database, displays it to the user, and edits the fields. New information is captured and stored in the database. All the verifications are performed while editing the data.

```
===== LOGIN PAGE =====
```

```
EMAIL ID :- ABC@gmail.com
```

```
PASSWORD :- Xyz@dsmvl124
```

						SUBMIT (YES/NO)? : YES
--	--	--	--	--	--	------------------------

Figure 29 - Login Page

The user's contact number and email address will be non-editable fields to maintain the application's privacy. A user can create another account but with a different contact number and email ID. This feature could be achieved from the developer's side by making the contact number or email ID as a primary key or both as a composite key, so there could not be duplicated between them in the database, as shown in *Figure 30 Profile Management Page*.

```
===== PROFILE MANAGEMENT FOR USERS =====

Enter your name : abc
Enter your date of birth (DD/MM/YYYY): 01/01/2000
Enter your Blood group : O+
Enter your address : 4ZA STREET PARK, ONTARIO
Enter your city : TORONTO
Enter your province : ONTARIO
Enter your zip code : 4PS ZA3

submit (YES/NO)? : YES

validation your details...
Validated the details...
Redirecting you to the home page...
```

Figure 30 - Profile Management Page

User Story for Profile Management

As a user,
I want to edit my profile,
so that I can update my latest Information in my profile.

Acceptance criteria

Given profile management form
When the user clicks submit, and validation is done on the User's Information
Then the User's profile will be updated.

Vaccination

In this section, we can show the list of things regarding vaccination. First of all, users need to submit a form. The form has many fields from which we can authenticate them, and then we can validate them by the details entered, as shown in *Figure 31 Vaccination Form 1*. All the fields are validated before being stored in the database.

```
===== Vaccination Form =====  
  
FIRST NAME : ABC  
LAST NAME : XYZ  
EMAIL ID : ABC@SMF.com  
CONTACT NUMBER : 85647856  
AGE : 26  
LOCATION : Nova Scotia  
DO YOU HAVE ANY ALLERGIES? (YES/NO) : NO  
  
|_____|_____|_____|_____|_____|_____| SUBMIT? (YES/NO) : YES
```

Figure 31 - Vaccination Form 1

And if the validation is successfully completed for the entered details, users are eligible to take the Vaccine, as shown in *Figure 32 Validation*.

You are eligible to take vaccine

Figure 32 - Validation

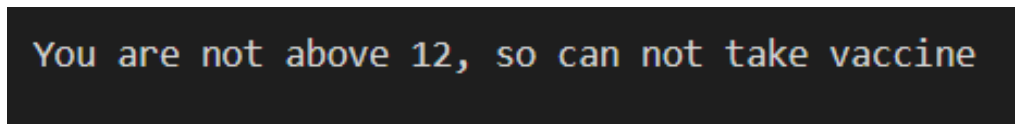
Otherwise, users can not take vaccines. There are two main fields. Based on these two fields, we can make decisions that users are eligible for vaccination or not, as shown in *Figure 33 Vaccination Form 2*.

- User is 12+ age or not
- The user has any allergies or any serious problems.

```
===== Vaccination Form =====  
  
FIRST NAME : ABC  
LAST NAME : XYZ  
EMAIL ID : ABC@SMF.com  
CONTACT NUMBER : 85647856  
AGE : 10  
LOCATION : Nova Scotia  
DO YOU HAVE ANY ALLERGIES? (YES/NO) : NO  
  
| | | | | | | | | |  
SUBMIT? (YES/NO) : YES
```

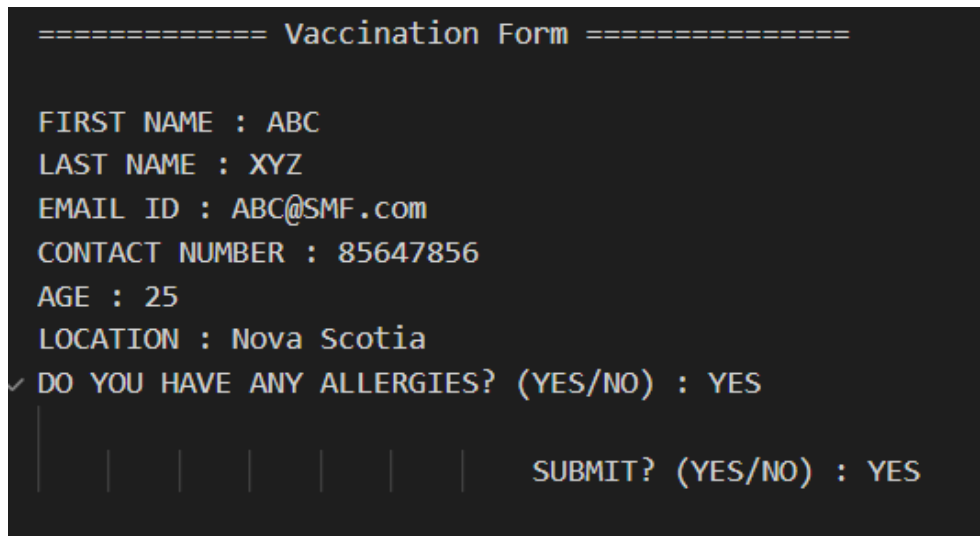
Figure 33 - Vaccination Form 2

If the user is below 12, then the user is not eligible to take the Vaccine, as shown in *Figure 34 Cannot take the Vaccine 1*.



You are not above 12, so can not take vaccine

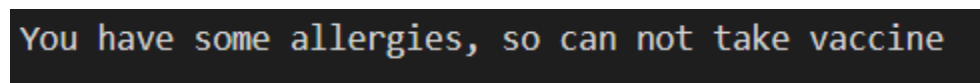
Figure 34 - Cannot take the Vaccine 1



```
=====  
===== Vaccination Form =====  
  
FIRST NAME : ABC  
LAST NAME : XYZ  
EMAIL ID : ABC@SMF.com  
CONTACT NUMBER : 85647856  
AGE : 25  
LOCATION : Nova Scotia  
✓ DO YOU HAVE ANY ALLERGIES? (YES/NO) : YES  
  
| | | | | | | SUBMIT? (YES/NO) : YES
```

Figure 35 - Vaccination Form 3

And if the user has any allergies or some serious issue, then not eligible to take the Vaccine as shown in *Figure 36 Cannot take the Vaccine 2*.



You have some allergies, so can not take vaccine

Figure 36 - Cannot take the Vaccine 2

We are planning to take care of the number of vaccines. After successful login, they can select provinces of their choice. And register for a vaccine. After that, the admin approves the request and gives them a slot for vaccination. The user can get the Vaccine as per his/her age. Because there are some government guidelines that users between 12 and 18 can only take the Pfizer BionTech vaccine, as shown in *Figure 37 Eligible to take the Vaccine*.

```
===== Vaccination Page =====

You are eligible to take Pfizer-BionTech vaccine.
But Vaccine is not available for the given date.
So, you need to wait for some time.

We can get back to you once the vaccine is available.
```

Figure 37 - Eligible to take the Vaccine

So, according to that, we can give a vaccine slot. If the Vaccine is not available, then users are not able to book their slot. This slot process is taken care of by Admin. After taking the Vaccine, users can see the vaccination certificate in their portal after login into this website.

User Story for Vaccination

As a user,
I want to find a suitable vaccine slot and spot,
so that I can take the Vaccine at a suitable time and place.

Acceptance criteria

Given minimum age and do not have an allergy
When the admin validate the details and give a time slot
Then eligible to take the Vaccine.

Generate and Store Certificate

This feature generates certificates for blood donors and vaccinated donors and also stores them in the database. The user is also able to export the certificate. The processing is done in the backend, retrieving the data, processing it, and formatting. Users can also select the option to view all the certificates received by that particular user, as shown in the *Figure 38 Certificates Page*.

```
*****  
|         |         |         |         | CERTIFICATES  
|         |         |         |         |*****  
  
1. Generate latest blood donation/vaccination certificate.  
2. View all certificates.  
3. Download a certificate.  
4. Exit  
  
Select an option from above  
>>> 1
```

Figure 38 - Certificates Page

Blood Bank Rating and Analysis - To User Group B From User Group A

Ratings and reviews of blood banks will be divided into two parts:

- According to location
- According to Age group

In this feature, User Group A will rate the blood banks according to their preference and review their experience with them, as shown in *Figure 39 Rating and Analysis 1*.

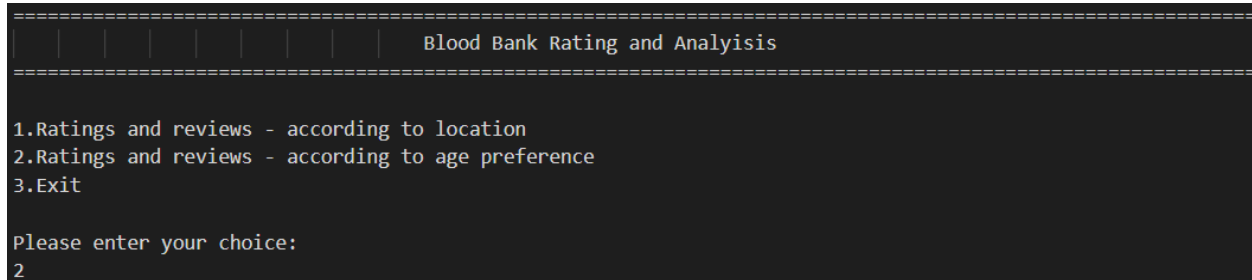


Figure 39 - Rating and Analysis 1

Users will see ratings and reviews of different blood banks by adding their choice, as shown in *Figure 40 Rating and Analysis 2*.

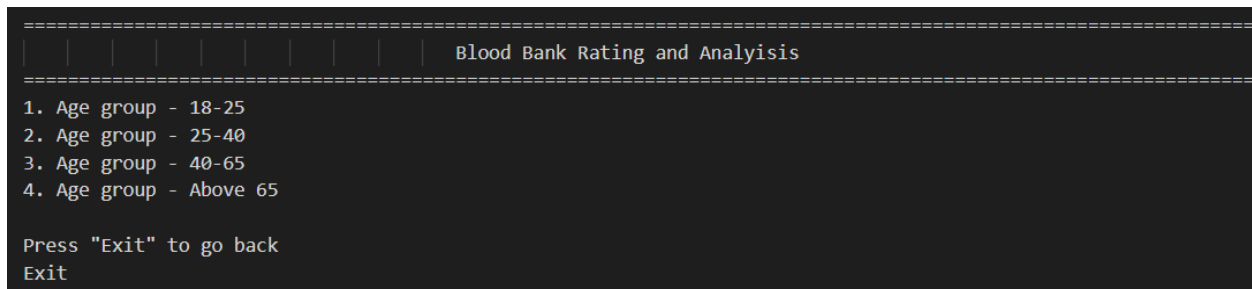


Figure 40 - Rating and Analysis 2

User Group B Features

User Group B are the users of our application like the various Blood Banks.

Sell Blood - Sell(User Group B) - Buy(User Group A)

In this feature, Users can buy blood bags for themselves or for others. They can request blood from the blood banks. Users can find blood banks by the stock availability, blood type, and quantity by city location provided by them. From the list of blood banks, they can request blood bag quantity to that blood bank. They can fill in information about the request to the bank such as quantity, Message for Bank (Related to urgency), Number of claim points they want to use. After submitting these details, the user's request for blood bags will be sent to a respected bank, as shown in *Figure 41 Buy Request for Blood*.

```

=====
                        Buy Request For Blood
=====
Hello <User's name>!!

Please Enter : Required Blood type*   : A-
              Quantity of blood bag* : 3 Units")
              Location : Halifax
              (from where you want to pick up the blood bags)

Search (YES/NO) ? : YES
Searching Blood Banks near You.....
-----
1. Candian Blood Services          | 2. Woodlawn Blood Collection
   Stock   : A-(50 Units) | O- (25 Units) |   Stock   : A-(40 Units) | O- (30 Units)
   Address : 7071 Bayers Rd Unit 252, |   Address : 92 Main St, Dartmouth,
              Halifax, NS B3L 2C2, Canada |   NS B2X 1R5, Canada
   Contact : +1 888-236-6283          |   Contact : +1 888-236-6283
-----
Please enter index of blood bank to whom you want to request for blood or EXIT : 2
Fill out a form of blood request :
-----
Quantity* : 3 Units
Number of claim coins you want to use : 10 coins   (1 coin = 0.5 CAD)
Emergency(1: High | 2: Medium | 3:Low ) : 1

Submit (YES/NO)? : YES
Your request is sent successfully!
Congrats!! You will get 5 CAD discount in Total amount.

Please enter index of blood bank to whom you want to request for blood or EXIT : EXIT

```

Figure 41 - Buy Request for Blood

User Story for Search Blood Request

As a Blood recipient,
I want to search blood bank near my location,
so that I can buy blood bags from the blood bank

Acceptance criteria

Given Blood group, location, quantity
When the recipient clicks the search tab
Then the list of all blood bank near the location will be displayed

User Story for Buy Blood Request

As a Blood recipient,
I want to buy bags from the blood bank,
so that I can give it to the person in need.

Acceptance criteria

Given quantity, claim coins to be used, emergency type
When the recipient clicks the request buy tab
Then the request will be sent to the respected blood bank

Camp Organization

Blood banks can add the details of blood donation camps that they are going to organize. That's how the users of this application or donors will know about the future blood donation drives. Blood bank will fill Information for the camp organization form, which will have information such as camp organizer name, Date, Time, Venue, City, Contact. The blood bank can announce the blood donation drive by filling in this camp information as shown in *Figure 42 Host Blood Donation Camp*.

```

=====
Host Blood Donation Camp
=====
Hello <Blood Bank's name>!!
Please fill the for Bblood drive :

1. Organizer* : Candian Blood Services
   Date*      : 24 June 2021
   Time*      : 10:00 AM
   Venue*     : 7071 Bayers Rd Unit 252, Halifax,
               NS B3L 2C2, Canada
   City       : halifax
   Contact    : +1 888-236-6283

               Submit (YES/NO) ? : YES

Blood donation camp hosted successfully!
You can do the arrangement :)

```

Figure 42 - Host Blood Donation Camp

Now users and donors can view blood donation camp announcements near their location(city) when searching for camps. If the camp date and time are suitable for users and wish to donate, they can select "Attending." General information entry will be done in the blood bank camp list, and users will be eligible to attend the camp. So that the blood bank organizer can track the attending numbers, as shown in *Figure 43 Attending Blood Donation Camp*.

```

=====
Attending Blood Donation Camp
=====
Hello <User's name>!!

1. View all Blood Donation announcements
2. Exit
Enter a number to proceed : 1

Searching Blood donation Camps.....

1. Organizer : Candian Blood Services      | 2. Organizer : Woodlawn Blood Collection
   Date      : 24 June 2021                 |   Date      : 25 June 2021
   Time      : 10:00 AM                     |   Time      : 4:00 AM
   Venue     : 7071 Bayers Rd Unit 252, Halifax, |   Venue     : 92 Main St, Dartmouth,
               NS B3L 2C2, Canada             |   NS B2X 1R5, Canada
   City      : halifax                       |   City      : halifax
   Contact   : +1 888-236-6283                |   Contact   : +1 888-236-6283

(Please enter 0 if You don't want to attend any of listed camp or else index number of camp which you want to attend.)
Enter Your input : 2

Your interest is recorded successfully!
You are doing Generous work! :)

Enter a number to proceed :

```

Figure 43 - Attending Blood Donation Camp

This option is for users who don't wish to attend any donation camps listed, as shown in *Figure 44 Blood Donation Drive*.

```
(Please enter 0 if You don't want to attend any of listed camp or else index number of camp which you want to attend.)  
Enter Your input : 0  
  
Stay tuned for future blood donation drives.
```

Figure 44 - Blood Donation Drive

User Story for Blood Donation Drive

As a Blood Bank,
I want to host a blood donation camp,
so that we can maintain the bloodstock by collecting the different blood types.

Acceptance criteria

Given blood bank logged in,
When the blood bank enters Information and clicks submit button,
Then the info will be visible to normal users.

As a Blood Donor,
I want to register for attending the blood donation camp,
so that I can donate blood in a blood drive.

Acceptance criteria

Given User logged in,
When User selecting "Attending" in any camp announcement,
Then the user will be eligible to attend the camp.

Blood Request Management

Blood Banks can manage all the received requests made by users. It will be viewed based on the first receive first display.

Blood banks can perform the following actions:

1. **Accept:** Blood banks can accept the request based on Emergency(priority) provided by users. After accepting a request, the remaining stock of that particular type will be displayed in *Figure 45 Manage Requests of Blood*.

```

=====
Manage Requests Of Blood
=====
Hello <Blood Bank's name>!!

Fetching All requests of blood bags.....

1. Name      : Annie Brar      | 2. Name      : Ray Light
   Quantity   : 3 Units        |   Quantity   : 1 Units
   Required Blood type: A-    |   Required Blood type: O-
   Status      : Requested     |   Status      : Requested
   Emergency   : 1             |   Emergency   : 1

-----

Action : Type A to accept any request
        Type R to reject any request
        Type F to fulfill the accept request
        Type E to exit

Type Your Action : A
Enter the request number from list : 1

You have Accepted Annie Brar's request for 3 units of A- blood.
available stock now : A-(37 Units)
                   O-(30 Units)

Type Your Action :

```

Figure 45 - Manage Requests of Blood

2. **Reject:** Blood banks can reject the request If stock is not available at that time, as shown in *Figure 46 Reject*.

```

Type Your Action : R
Enter the request number : 2
Type YES to reject the request : YES

You have REJECTED Ray Light's request for 1 units of O- Blood.

Type Your Action :

```

Figure 46 - Reject

Users can collect their requested blood type bags at the blood banks by getting a discount offered while requesting claim coins. After receiving the blood bags and payment, Blood Bank can change the status of the requested User's status from Accept to Fulfill, as shown in *Figure 47 Accepted Requests*.

```

Type Your Action : F

Displaying all the accepted requests.....

1. Name      : Annie Brar
   Quantity   : 3 Units
   Required Blood type: A-
   Status      : Requested
   Emergency   : 1

Enter the request number that you want to fulfill : 1

Accepted status updated to Fulfill successfully.

```

Figure 47 - Accepted Requests

As a Blood bank,
I want to search all buy requests,
so that I can manage the requests.

Given blood bank logged in,
When the bank click the search tab,
Then a list of buyer requests will be displayed.

Acceptance criteria
Given buy request selected
When blood bank click accept or reject tab
Then buyer requests should be accepted or rejected.

This feature enables the Blood Bank to check up on its stock/inventory. They can choose any option out of the three in the menu presented in *Figure 48 Blood Inventory Management Menu*.



Page | 29

```
*****  
|         |         |         |         |         | Blood Stock Management  
|         |         |         |         |         | View All Stock  
*****  
  
Name: Red Cross  
  
Blood Group      Units Available(Bags)   Threshold    Unit Price  
A+                2000                      700          750  
A-                2050                      1200         950  
B+                2430                      500          900  
B-                3440                      500          650  
AB+               1300                      300          1050  
AB-               5203                      1500         850  
O+                 923                       700        1250  
O-              1338                      700        1000  
  
Enter "Exit" to go back.  
>>> Exit  
  
Redirecting you to the back page.
```

Figure 49 - Blood Bank Stock

The Blood Bank can also update various things in the inventory by selecting the appropriate option, as shown in *Figure 50 Manage Stock*. Basically, Blood Bank can manage its stock. Processing from the backend side is to retrieve the data and then check for the threshold value for that stock. Notification is sent if the threshold is triggered. Blood Bank also has the feature to update the threshold value for any particular stock.

```
*****  
Blood Stock Management  
Manage Stock  
*****  
What you want to update?  
1. Units  
2. Threshold  
3. Unit Price  
4. Exit  
Enter your option  
>>> 1  
  
==== Update Units ====  
1. Increment the stock  
2. Decrement the stock  
3. Overwrite the stock  
Enter your option  
>>> 1  
  
Enter your increment string (Example: A+ 100).  
>>> B+ 100  
Stock incremented by 100. New stock of B+ is 2430  
  
What you want to update?  
1. Units  
2. Threshold  
3. Unit Price  
4. Exit  
Enter your option  
>>> 2  
  
==== Threshold ====  
Enter your threshold string (Example: A+ 200).  
>>> B+ 40  
Threshold incremented by 40. New threshold of B+ is 500  
  
What you want to update?  
1. Units  
2. Threshold  
3. Unit Price  
4. Exit  
Enter your option  
>>> 4  
  
Redirecting you to the back page.
```

Figure 50 - Manage Stock

Statistics Page

The statistics feature covers the following things for the Blood Bank. These options provide valuable insights to the Blood Banks, as shown in *Figure 51 Blood Bank Statistics*.

- Total blood bags (blood units) available based on blood types.
- Yearly camps organized by blood banks.

- How many users attended a camp.
- How frequently camps are organized by a blood bank
 - Every 6 months
 - Every 12 months

Filter: Classification based on blood type (A+, A-, B+, B-, O+, O-, AB+, AB-)

```

*****
| | | | | STATISTICS
| | | | | *****
1. Total blood bags (blood units) available based on blood types.
2. Yearly camps organized by blood banks.How many users attended a camp.
3. How frequently camps are organized by a blood bank
   Every 6 months
   Every 12 months

Select an option from above
>>> 2.

Select filter classification based on blood type ( A+, A-, B+, B-, O+, O-, AB+, AB-)
>>> A+

| | | | | ...
Statistics is displayed
| | | | | ...

Enter any other option to view other statistics. (Enter "Exit" to go back)
>>> Exit

```

Figure 51 - Blood Bank Statistics

Export Data to File

To access this feature, the Blood bank first needs to retrieve their inventory, after which they can select the option to export the retrieved data to a file. Similarly, the Blood bank can retrieve and export the camp's organized data to a file. The choice to export the data to a file appears for the users when they access three main other features like the "Blood Stock/Inventory data," "Blood camps organized data export with a list of users," and "Received rating data exports." The user needs to select the option to export the data to a file, as shown in Figures 52 and 53.

```

*****
| | | | | Export Data to File
*****
1. Blood stock/inventory data export.
2. Blood camps organized data export with list of users.
3. Received ratings data export.
... more ...
n. Exit
Enter your option
>>> 1.

```

Figure 52 - Export Data Page 1

```

*****
| | | | | Export Data to File
*****
Option selected - Blood stock/inventory data export

Enter valid file name -
>>> current_stock.txt

Preparing...
Exporting data to file "current_stock.txt"...
Data exported succesfully.

Enter "Exit" to go back
>>> Exit|

```

Figure 53 - Export Data Page 2

Profile Management

In this feature, Blood banks can update their Information the same as the user, as shown in the above feature. Before any step, Blood banks need to log into their account before making changes in their profile step, as shown in *Figure 54 Login Page*.

```

===== LOGIN PAGE =====

EMAIL ID :- ABC@gmail.com
PASSWORD :- Xyz@dsmv124

| | | | | SUBMIT (YES/NO)? : YES
|

```

Figure 54 - Login Page

But in this section, we have some different fields because registration pages for users and registration pages for blood banks are different. So in the *Figure 55 Profile Management Page*, we have shared the profile management page of the Blood bank. Blood banks are also not able to edit their email ID as well as contact details.

```

===== PROFILE MANAGEMENT FOR BLOOD BANKS =====

Enter your name : Red cross
Enter your address : 4ZA Spring garden, Nova scotia
Enter your city : HALIFAX
Enter your province : Nova Scotia
Enter your zip code : 4PS AS4
Enter your Licence number : P00 1E1

submit (YES/NO)? : YES

validation your details...
Validated the details...
Redirecting you to the home page...

```

Figure 55 - Profile Management Page

After submitting all the details, all the information will be passed through the validation process.

User Story for Blood Bank Profile Management

As a Blood bank,
I **want** to edit my details,
so that I can update the latest information about us.

Acceptance criteria

Given submit profile management form
When blood bank user submit the form
Then the profile will be updated.

Demographic Information - Group A and B

This section shows the details of the number of blood donors, total number of blood banks, frequency of blood donation by user kind of thing in that particular demographic location as shown in *Figure 56 Demographic Information*.

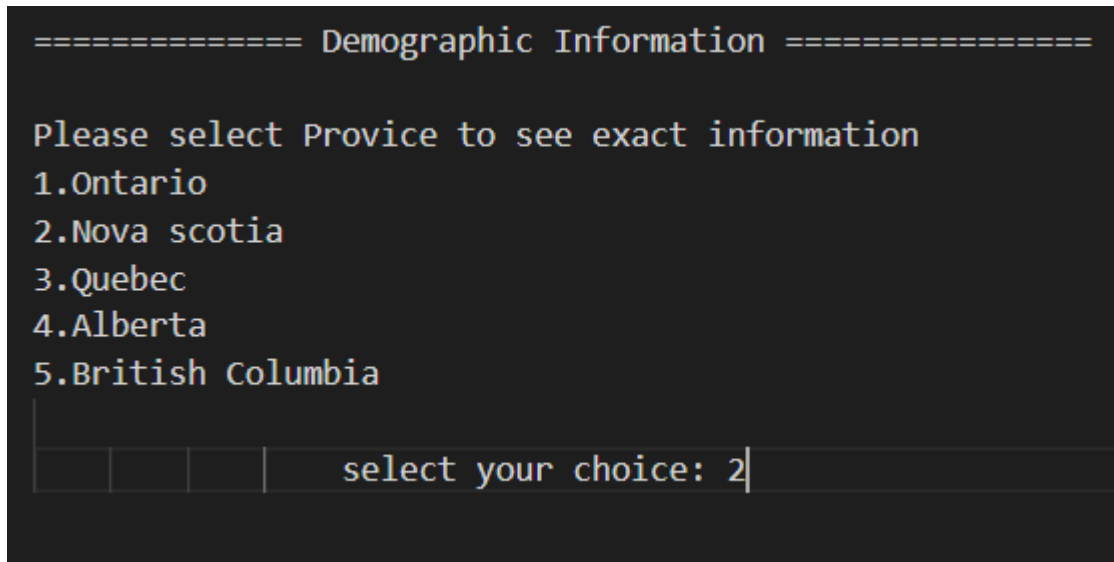


Figure 56 - Demographic Information

Users have to select a particular region, and according to data, we can show the exact number of things we mentioned above, as shown in *Figure 57 Data*.

From this feature, we can know that:

- Where the number of blood donors number is high.
- Which location has more number of blood requests?
- How many blood banks are there in that particular region?
- What is the exact number of frequency of blood donors?

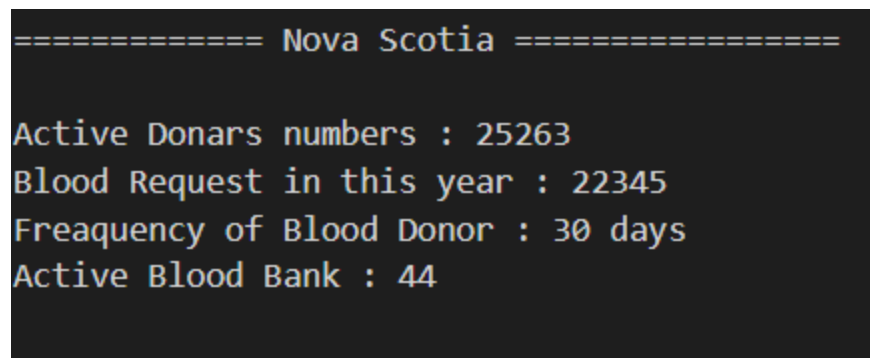


Figure 57 - Data

User Story for Demographic Information

As a user,
I want to see the number of active users,
so that I know the exact details.

Acceptance criteria
Given choose location

When the user clicks the submit button
Then the list of the active recipient will be displayed

As a user,
I want to see the number of blood request in a particular province,
so that I know the details related to blood required in that particular region.

Acceptance criteria

Given choose location
When the user clicks the submit button
Then the number of blood request will be displayed

As a Blood bank,
I want to see the number of blood bank available in a particular province,
so that I know the details related to blood banks in that particular region.

Acceptance criteria

Given choose location
When the user clicks the submit button
Then the number of blood bank will be displayed

Admin Management

Admin will have different access and features, as shown in *Figure 58 Admin Menu Page* that he/she can select from. Admin does not have a signup page; their credentials are directly generated for them.

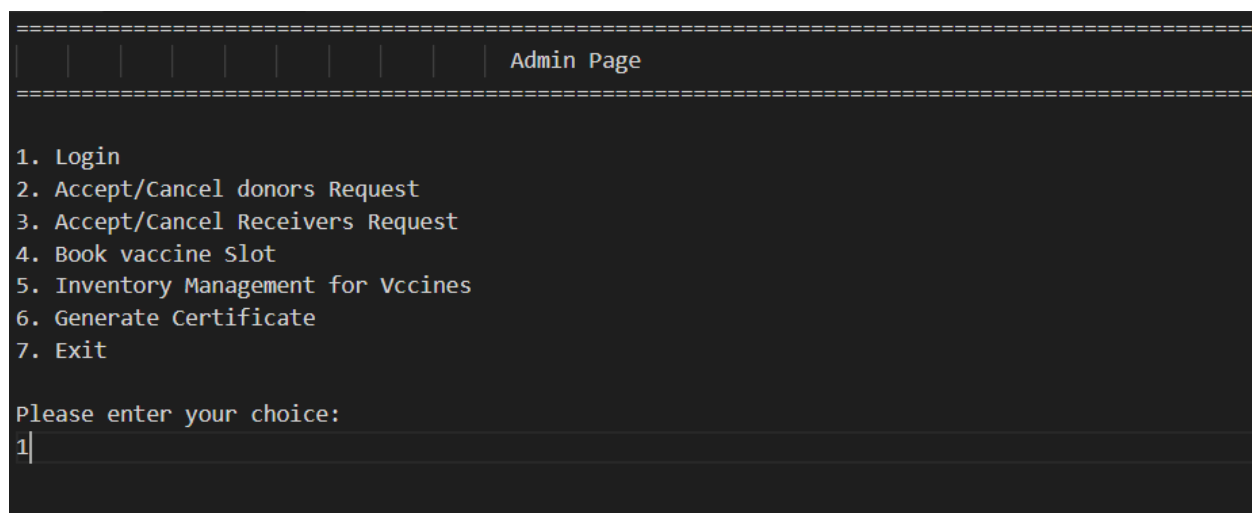


Figure 58 - Admin Menu Page

Login Module

The login page will have a two-step process. By entering the email and password, the admin will be able to access the application as shown in *Figure 59 Admin Login Page*. There can be multiple admins.

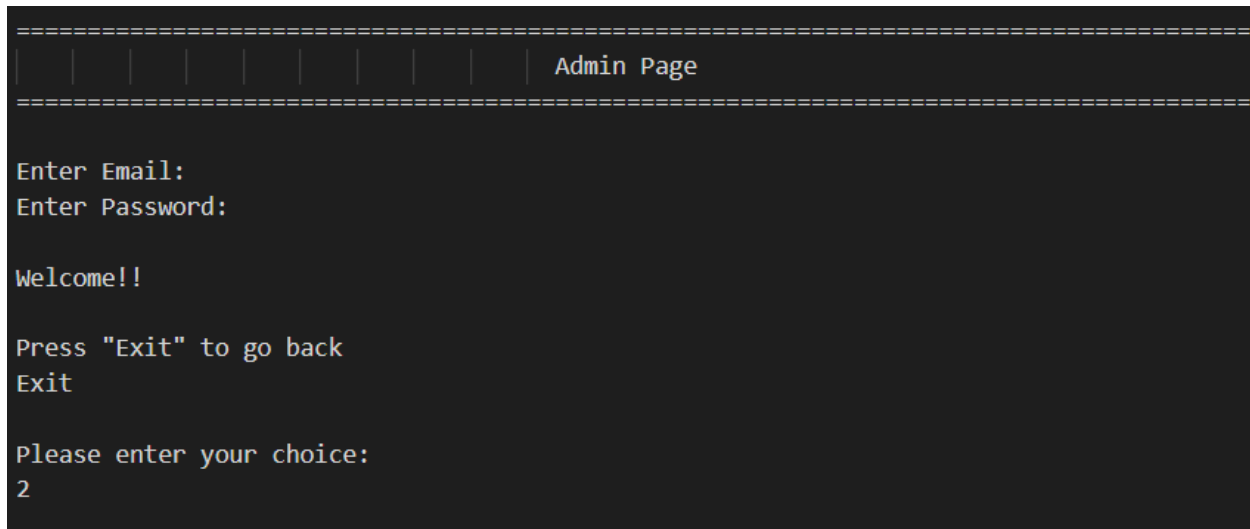


Figure 59 - Admin Login Page

Donor's Request / Receiver's Request

Admin will fulfill or cancel the active request of blood donation made by the donor according to the details given by the donor. If the request has been accepted and the donor's blood donation process is done by the donor, it will redirect them to the blood donation certificate page. Admin can also accept or reject requests of users according to their profile and requirement as shown in *Figure 60 Donor Request*.

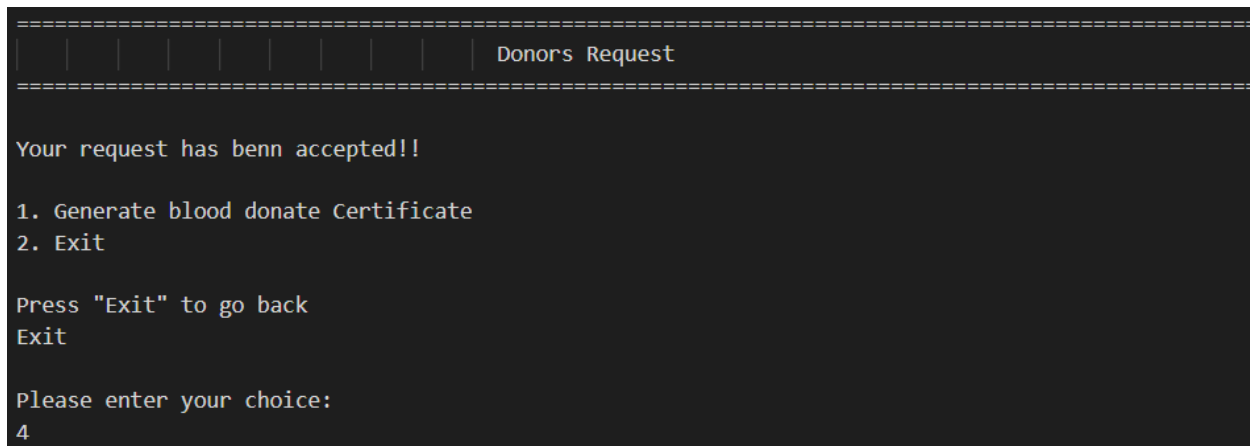


Figure 60 - Donor Request

Vaccine Slot

For the vaccination process, the User will fill up the validation form for getting the Vaccine; after that, the admin will check it and provide the date and time for the Vaccine. When a user gets a vaccine, the vaccination certificate will be generated for them, as shown in *Figure 61 Vaccine Slot*.

```
=====
| | | | | | | | | | Vaccine Slot
=====

Thank you for booking vaccine...
Please be at the location on given date and time!

Date:
Time:

Press "Exit" to go back
Exit

Please enter your choice:
5
```

Figure 61 - Vaccine Slot

Inventory Management

This module will show the list of available vaccines. When one user gets the Vaccine, that particular Vaccine will be decreased from the inventory. Same as when new vaccines will come, stocks will be updated by the admin as shown in *Figure 62 Inventory Management*.

```
=====
| | | | | | | | | | Inventory Management for vaccines
=====

Available stock!!

Pfizer: 20
Moderna: 30
Astrazeneca: 25

Press "Exit" to go back
Exit

Please enter your choice:
6
```

Figure 62 - Inventory Management

Certificate Generation

Users can get a certificate of their blood donation and vaccine completion whenever they like as shown in *Figure 63 Certificate Creation*.

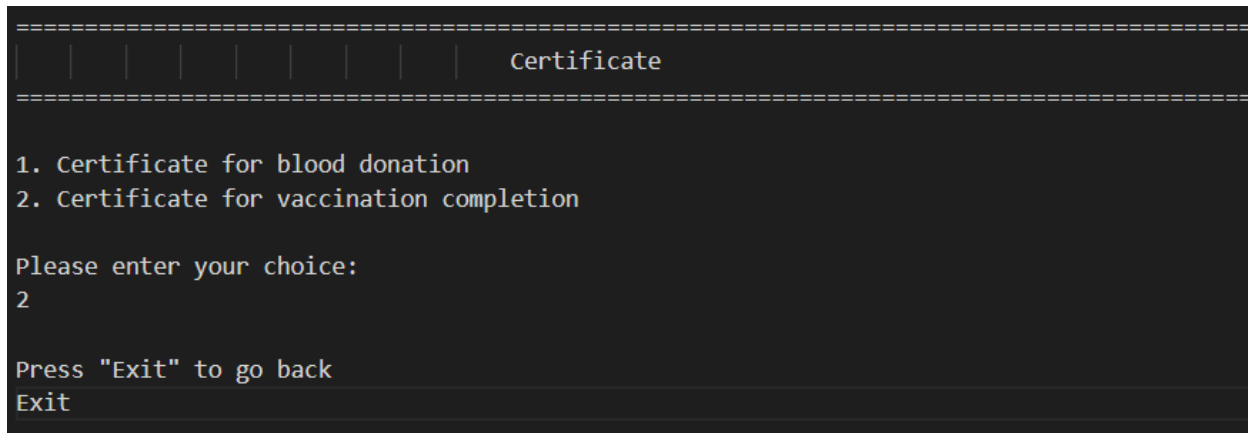


Figure 63 - Certificate Creation

Non-Functional Requirements

Below are the non-functional requirements of the Blood Book application:

- **Security** - To ensure the application's security, we will hash the credentials of the users of the system. This will make sure that the credentials won't be compromised in an incident of a data breach.
- **Availability** – The application will be available 24/7 to request blood at any time and buy blood from a blood bank.
- **Data Integrity** – The database design will support ACID principles and follow normalization to ensure that the data is consistently stored and maintained. This ensures that the user data and blood bank are stored without any anomalies, is scalable and robust. We will be executing queries in batch to reduce network calls, which will be further optimized to reduce multiple transactions and fail cases.
- **Extensibility** – We will be designing the application by following Object-Oriented Design Principles, various design patterns, and SOLID design principles. This ensures that we will be able to add multiple modules using an incremental approach.
- **Usability and Accessibility** – The application will let the user reach any component in the system within 3 navigations.
- **Portability** – This is a console-based JAVA application; it will be easily portable and compatible with all operating systems, thus reaching more users.

Tools/Framework Used To Develop The Project

- **Database:** MySQL, JDBC Adapter
- **Programming Language:** JAVA
- **IDE:** IntelliJ
- **VCS:** Git
- **UI:** Console based application
- **Task Management Tool:** JIRA (SCRUM)
- **Testing Tool:** JUnit
- **Deployment Platform:** Heroku

Project Schedule

We will be using agile methodologies to implement this project. The tentative project completion timeline is 4 sprints, as shown in *Figure 64 Project Schedule*. At the end of each sprint, we will have a retrospect meeting and planning of the next sprint.

Also, we will have a scrum meeting every day and weekly meetings with the TAs to track the work progress. Below is the tentative project schedule that we will follow:

Project Schedule

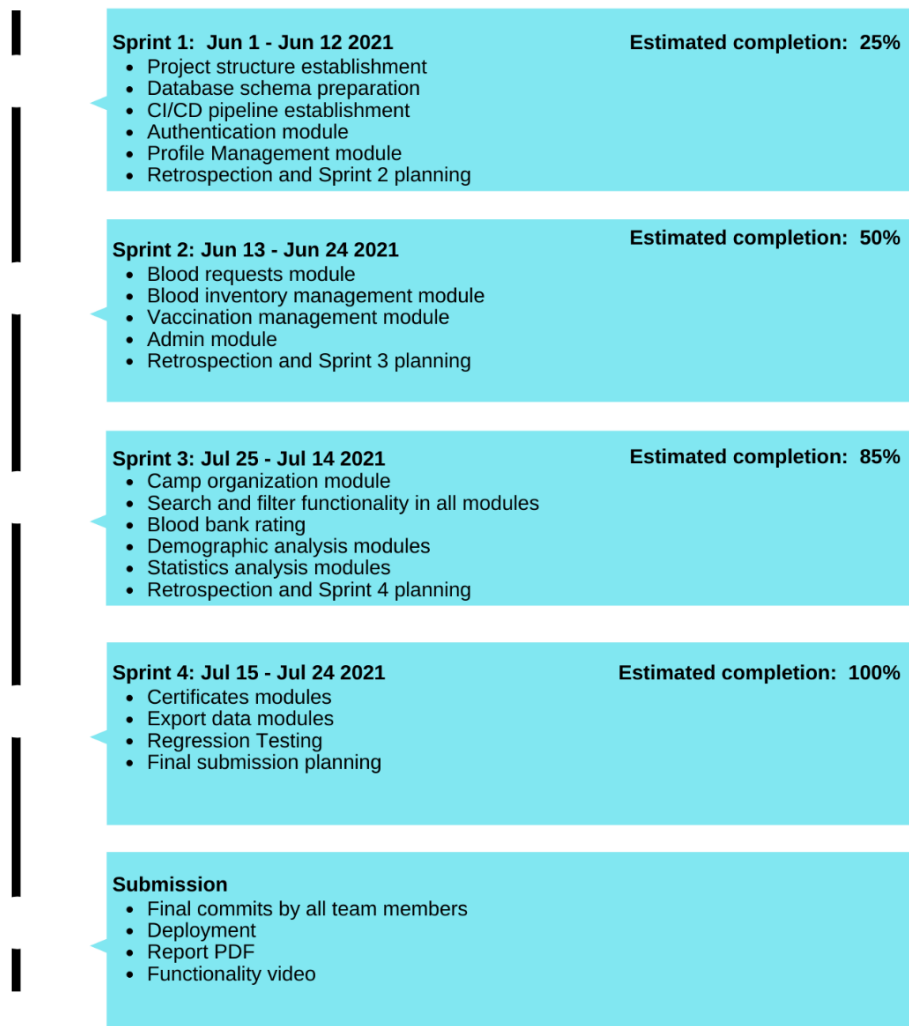


Figure 64 - Project Schedule