Advance System Analysis And Design

Project Report

Blood Bank System

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1. Introduction

1.1 Purpose

It is well said that Blood donation is the best gift. But there are not many good programs to aspire people to donate blood. Sufficient knowledge and inspiration for blood donation is lacking. Procedure and eligibility criteria for blood donation is unknown to many. With the purpose to create awareness and provide a single stop point to provide all information related to blood, we created a web based application which is a perfect information system for all blood donation related problems and queries. This site also plans to create awareness for blood donation with the goal to minimize casualties caused due to lack of required blood type on time.

What is Blood Bank System?

This is a web based application which intend to provide information for blood donation. This is a platform for all types of users like normal information seeker, blood donor, blood receiver, blood bank and hospitals. This contains information about all above users. Any information seeker can visit this website to gain all detailed information regarding blood like blood type and what can be the blood type of a child based on the blood type of their parents, geographical distribution of people depending on the blood type, advance search option and many more.

2. Requirements

2.1 Functional Requirement

- The website allows users to create account for this site. This also provides login option using their Gmail and Facebook account.
- Any information seeker should be able to see the blood donation related information.
- Any volunteer can log in and register as a blood donor.
- This site provides advance search option where any blood seeker can search for nearest blood bank. This blood bank search option includes zip code and perimeter of location.

- Any seeker should also be able to search for active blood donor depending on the blood group and zip code.
- Any seeker can connect with the admin to publish notification of blood requirement.
- This site contains general information like blood group and their antigen and antibody components.
- This site contains inspirational article like why should one donate blood.
- This site also contains eligibility criteria which not only contains information like age, weight/height but also contains other information like medications, vaccination, general health consideration, medical treatment, lifestyle and diseases. This page also conations information for immigrants and people who are travelling outside USA.

2.2 Non-Functional Requirement

- **Performance** – The web based application should have good database design for fast query processing and should be able to withstand high user load.
- **Availability** – This site is based on cloud application and hence assures of high availability.
- **Security** – This site does not store user's credential as a plain text. This cloud application does not allow admin to view password.
- **Support desktop browser** – This site is supported by almost all web browser like Google Chrome, Firefox, Internet Explorer and Safari (version 9 and above).
- **Support mobile browser** – This support mobile browsers like Google Chrome and Safari.

3. Intended audience and their functions

- **Information seeker/Viewer** – This user can go to site to view the general information. The user can also create their own account in this site and can also log in using Facebook or Gmail options to view more information. The user has access to search for a donor or blood bank. The user can also check for their eligibility for blood donation.
- **Blood receiver** – The blood receiver can perform all above action of a viewer. Also, this type of user can connect with an admin to publish notification for any blood demand.
- **Blood donor** – This type of user can perform all above actions. These donors can register themselves for blood donation by providing required details.

- **Blood bank** – The blood bank can connect with any donor in case for emergency. The blood bank can also update their details like the blood group and units of blood they hold. They can also publish notifications on upcoming blood donation events.
- **Hospitals** – They can search for donor. Hospitals can connect with donor or blood bank when they want blood. Hospitals can also publish notification regarding blood drive or in blood emergency.
- **Website Admin** – The admin manages the database of the website. The admin has the rights to publish notification when any user or blood receiver request for blood need notice.

4. Design

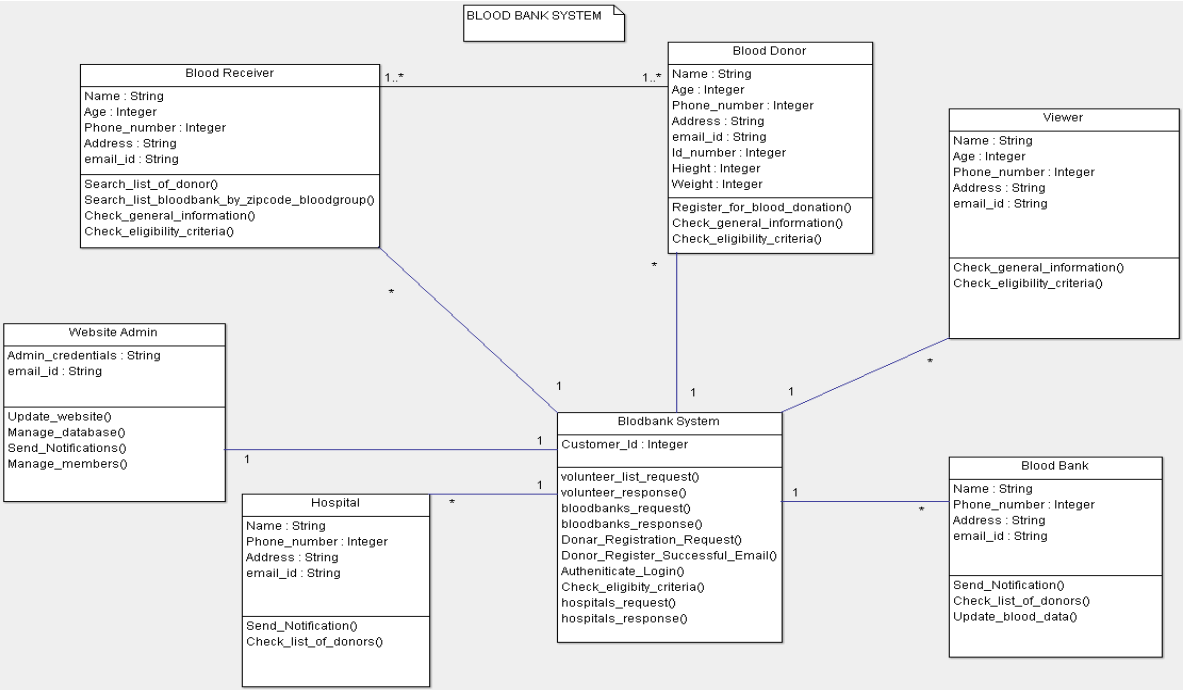
4.1 Use Case Diagram

The use case diagram has following actors:

a) **New User:** All our actors are initially our new user and they have to initially sign up to our website in order to gain access all the privileges of our website.
b) **Blood Receiver:** They can login with their credentials and then they can check eligibility criteria, check general information, search list of donors near him/her and also check list of Blood bank by zip code and blood group.
c) **Viewer:** Viewer are the users who can perform the function such as check eligibility criteria and checking general information.
d) **Blood Donor:** This actor first logs in the system to access few pages which require compulsory login. After login he has the privilege to perform actions such as check eligibility criteria for donation, checking general information, register for donation and also search blood bank near him/her so that they can directly donate blood to blood bank as well.
e) **Website Admin:** Special login credentials are available with website admin. They have to perform responsibilities such as manage database, manage website (manage users, update website and resolve website related issues) and also broadcast notification for urgent blood requirements and for blood drives.
f) **Blood Bank:** These actors have ability to perform certain actions such as update blood bank blood availability data for each group, they will update blood data on regular basis so that people can view the most recent data. They can send notification to people in case of any blood drive being organized or in case of urgent requirement of certain blood group.
g) **Hospitals:** Hospitals have the functionality like send notification and search list of donors.

Note: We have not given sending notification privileges to individual users like blood donor, blood receiver and viewer because this can cause chaos and several false notifications being sent by the users. Only authorized users such as blood bank and hospitals have this privilege. In case the individual user wants to broadcast emergency blood requirement notification then they will have to contact website admin and then admin will broadcast message on behalf of them. Contact details are mentioned on our website.

4.2 Class Diagram



In our blood bank system, we have seven classes i.e. Blood receiver, Blood donor, Viewer, Blood bank, Website Admin, Hospitals, and Blood bank system.

a) **Blood Receiver** has attributes such as name, age, phone number, address and email id. It has can perform functions such as search list of donors, search blood bank by zip code and blood group, check general information and check eligibility criteria.

b) **Blood Donor** has attributes such as name, age, phone number, address, id number (government id proof), height, weight and email id. He has methods such as register for blood donation, check general information and check eligibility criteria.

c) **Viewer** has attributes such as name, age, phone number, address and email id. It has functions such as check general information and check eligibility criteria for blood donation.

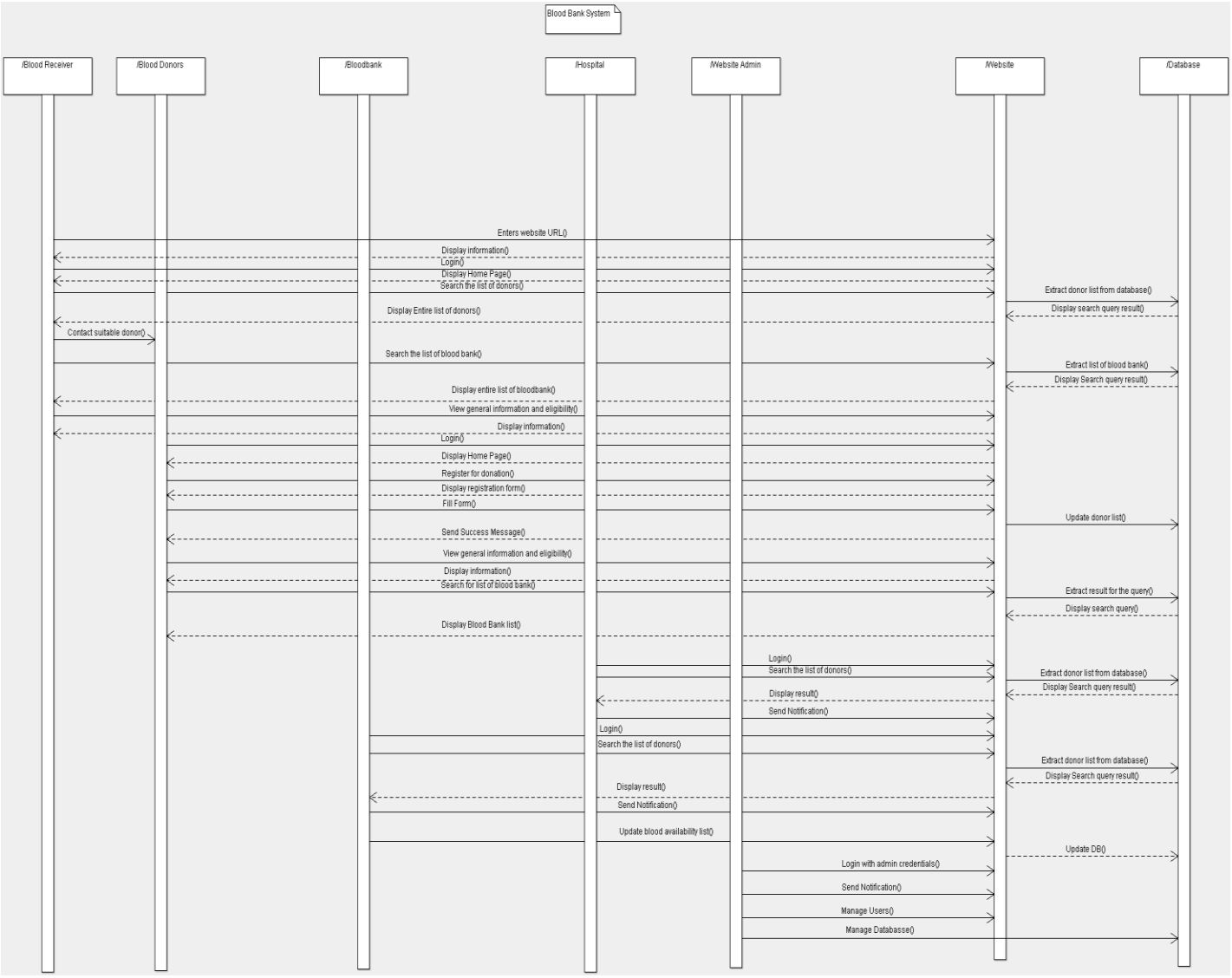
d) **Website Admin** has attributes like admin credentials and email id. It can perform function such as send notification, update website, manage database and manage members.

e) **Blood Bank** has attributes like name of blood bank, phone number of blood bank, address of blood bank and email id of blood bank. It can broadcast notifications, update blood availability data at their blood bank and check list of donors.

f) **Hospital** has attributes such as name of hospital, phone number of hospital, address and email id of hospital. It can also send notification and check list of donors.

g) **Blood bank system** has attribute like customer id and methods like volunteer list request, volunteer list response, donor registration & request, donor registration success email, check eligibility criteria, authenticate login, hospitals request, hospitals response, blood banks request and blood banks response. These request and response of user, blood bank and hospital can be any request like giving them access to website, searching list of donors or any other request.

4.3 Sequence Diagram

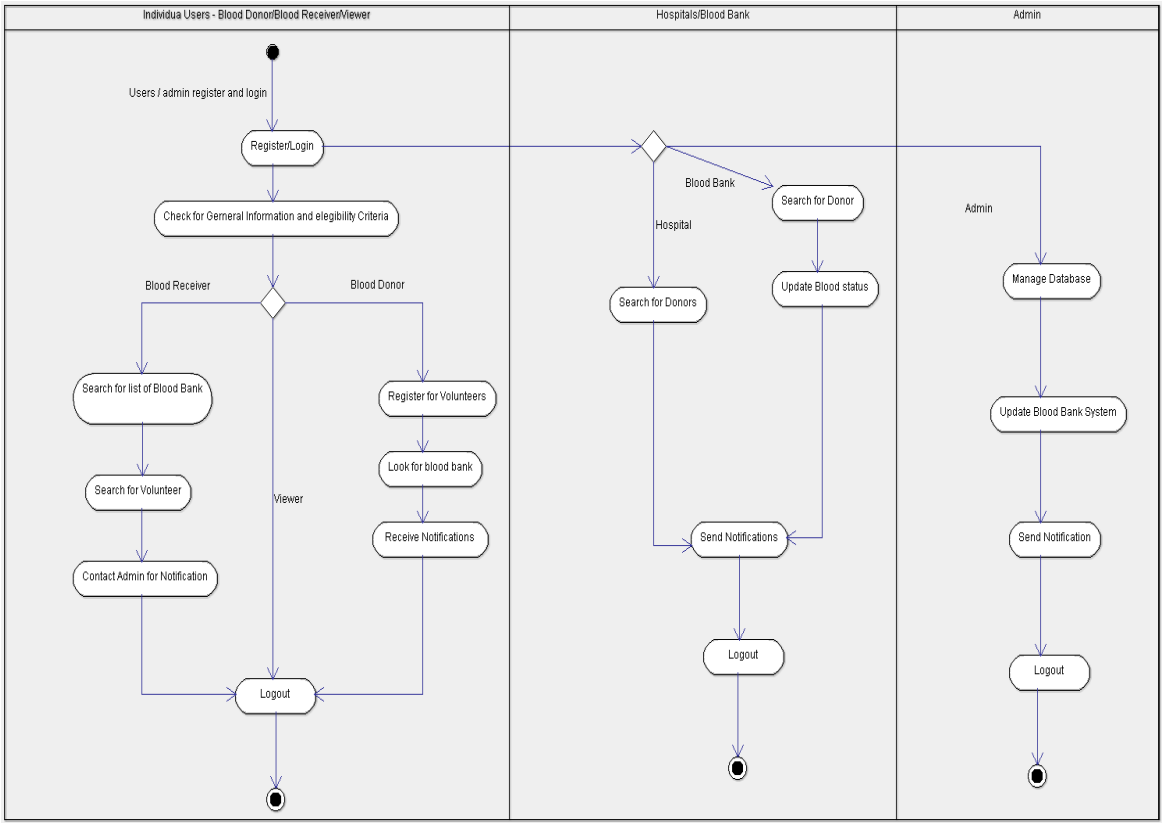


The sequence diagram shows both internal as well as external flow of task and actions. We have seven classifying roles for our system and action – return mechanism between them.

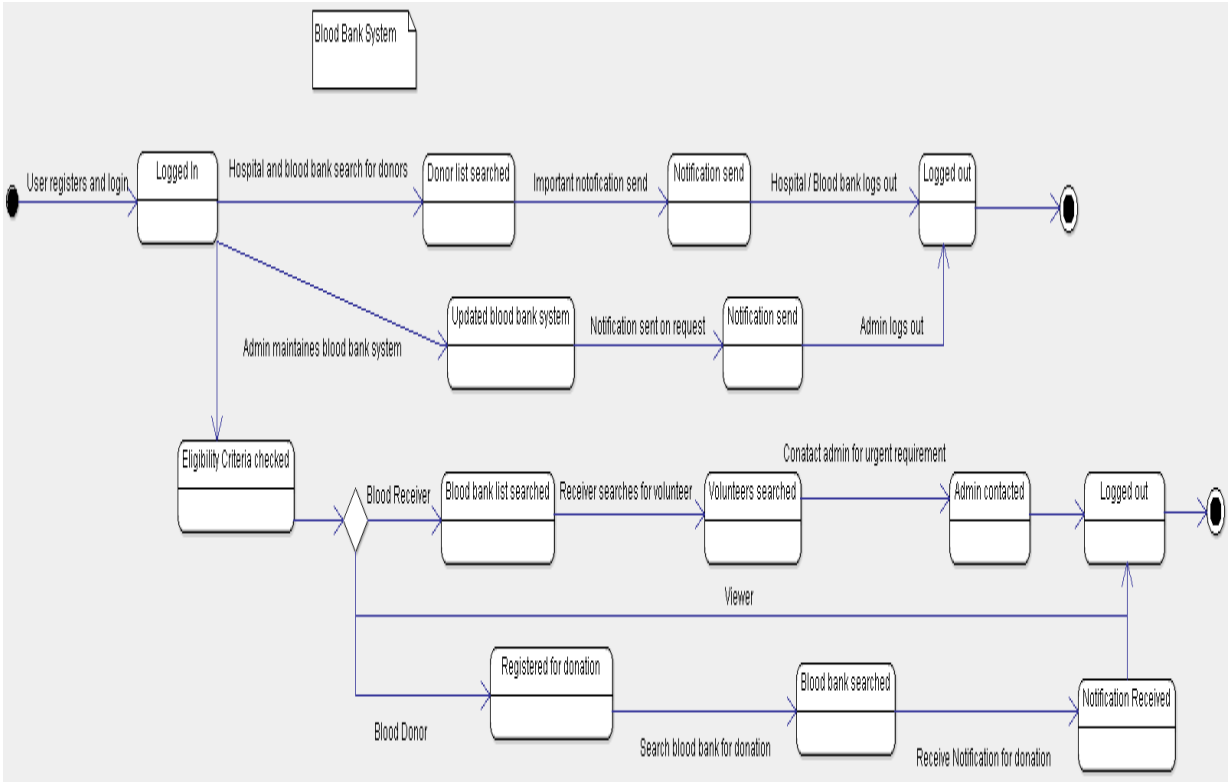
Below are the actions performed in this system:
Blood donor enters website URL then a response is sent by website where entire information about website web page is displayed. Blood donor then logins with his/her credentials and in response to which he/she is redirected to home page. He/she then searches for list of donors by zip code or blood group, website then calls database with extract information based on the request passed and displays list of users. Blood receiver can also search for the list of blood banks which is again extracted from database and displayed. He/she can also make requests like check eligibility criteria and general information. Blood Donor logs into the system and clicks on register for donation tab, he/she gets the form which he/she fills and submits. In return success message is displayed on webpage screen and an email is sent. He/she can also make request like search blood bank near him/her, eligibility criteria for donation, and general information. Hospital will login, search for the list of donors which is extracted from database and displayed to the hospital on webpage. Hospitals can also broadcast notifications. Blood bank logs into the system, searches for the list of donors which is fetched from database depending upon search inputs and then output is displayed. They can broadcast a notification in case of emergency of blood donation camps. Blood bank calls the website to update blood availability status which is then updated in database. Website Admin can manage website, users and database. Admin can also broadcast notifications.

4.4 Activity Diagram

The below activity diagram shows different type of actors like individual actors such as Blood donor/Blood Receiver/Viewer, Hospital/Blood Bank, and Admin. It shows parallel dynamic flow for all the actors. It shows complete flow from one activity to another activity.



4.5 State Chart Diagram



The above state chart diagram shows how complete operation is performed in our blood bank system. Firstly, login operation is performed. Hospital and blood bank can search for donor list followed by sending notification in case of urgent scenarios. While admin can update blood bank system and then log out. For blood receiver's and donor's proper eligibility criteria will be checked first. After which receiver checks for blood banks near him or volunteers near him and will contact admin if he is unable to find the blood required, so that admin can broadcast this message to all the people of that required blood group. Blood donor will register for blood donation, will get notification in case if somebody requires blood group of his blood group type and can check for blood banks near him and then logout of the website.

5. Development

5.1 Database development

We have used cloud based database engine called Caspio to develop our data base design. We have implemented two tables called Blood Donor and Blood bank databases.

	Name	DataType	Unique	Label
▶	Sl_No	Number	☐	Sl# No#
	Blood_Bank_Name	Text (255)	☐	Blood Bank Name
	Street	Text (255)	☐	Street
	City	Text (255)	☐	City
	State	Text (255)	☐	State
	ZIP	Number	☐	ZIP
	Phone	Text (255)	☐	Phone
	Latitude	Number	☐	Latitude
✕	Longitude	Number	☐	Longitude

Table 1: Blood bank database design

Name	DataType	Unique	Label
first_name	Text (255)		
last_name	Text (255)		
email_address	Text (255)		
age	Number		
blood_group	Text (255)		
height_in_centimeter	Number		
weight_kilograms	Number		
Contact_number	Number		
Zipcode	Number		
Address	Text (255)		
Idcard_type	Text (64000)		
Idcard_number	Text (255)		
city	Text (255)		
State	Text (255)		
lat	Number		
lon	Number		

Table 2: Blood donor database design

The data retrieval and modification were done using java script on Caspio as mentioned below.

```
<script type="text/javascript" src="https://c0abi798.caspio.com/scripts/embed.js">
    </script>
    <script type="text/javascript">
    try{
    f_cbload(true, "c0abi798.caspio.com", "7f3f5000e16be36041f44d28ac3d");
    }
    catch(v_e)
    {
    ;
    }
    </script>
    <div class="cxkg">
    <a
    href="https://c0abi798.caspio.com/dp.asp?AppKey=7f3f5000e16be36041f
    44d28ac3d">
    Click here</a>
    to load this Caspio
```

```
<a href="http://www.caspio.com" target="_blank" title="Cloud Database">Cloud Database</a>
</div>
<div id="cb7f3f5000e16be36041f44d28ac3d">
<a href="https://www.caspio.com" target="_blank">
Cloud Database
</a>
 by Caspio
</div>
```

The above is a sample java script code for retrieving list of volunteers near the seekers.

We have created a script to convert address into latitude and longitude values. Based on these respective latitude and longitude values, we can calculate the distance between the seeker and the volunteer or seeker and blood bank.

5.2 Application development

We have developed the application as per design in a cloud based environment, Wix. Here are the steps to develop the web site.

5.2.1 Login

To make the website such that only members can use the major features, we need login or signup pages. Wix provides the privacy features. To add this feature, we have to follow these steps:

- Go to your editorial page.
- Click on pages menu.
- Click on the 3 dots next to the page name you want to secure.
- Click on permission and choose members only option.

5.2.2 To create new pages on the website.

- Go to pages menu and click on +Add Page.

5.2.3 To add content to the page.

- Click on + sign.
- Choose text field.
- Add your text.

5.2.4 To add images.

- Click on + sign.
- Choose image option.
- Upload your image.
- Add it to the page.

5.2.5 To add Slideshow

- Click on + sign.
- Choose Interactive option.
- Upload your images.
- Add them to the pages.

Here are the screenshots of our website.

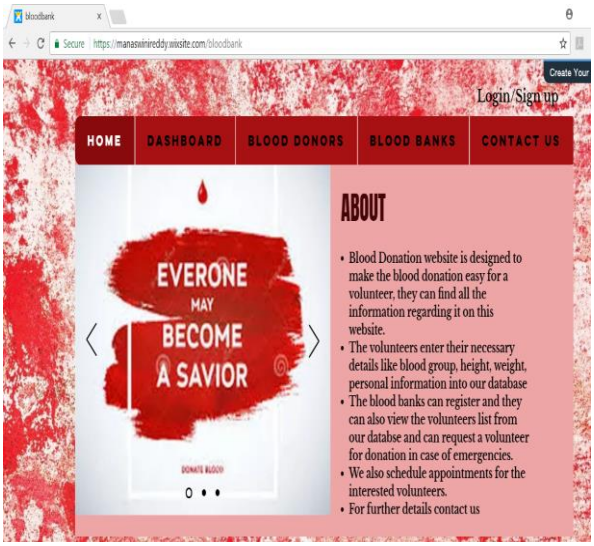


Figure 1: Home Page

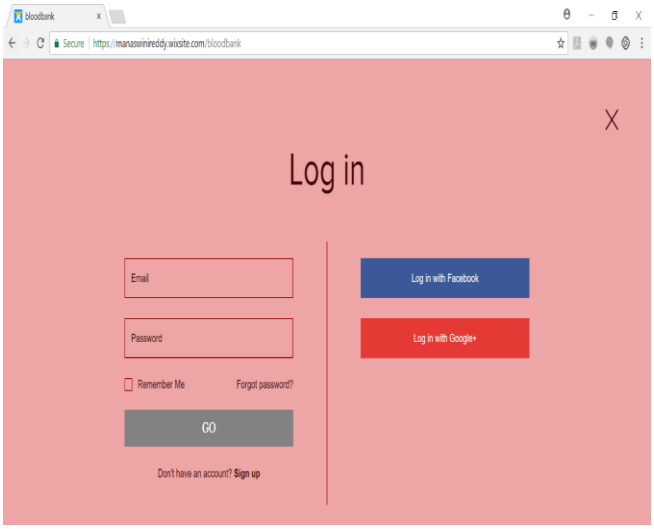


Figure 2: Login/Signup Page

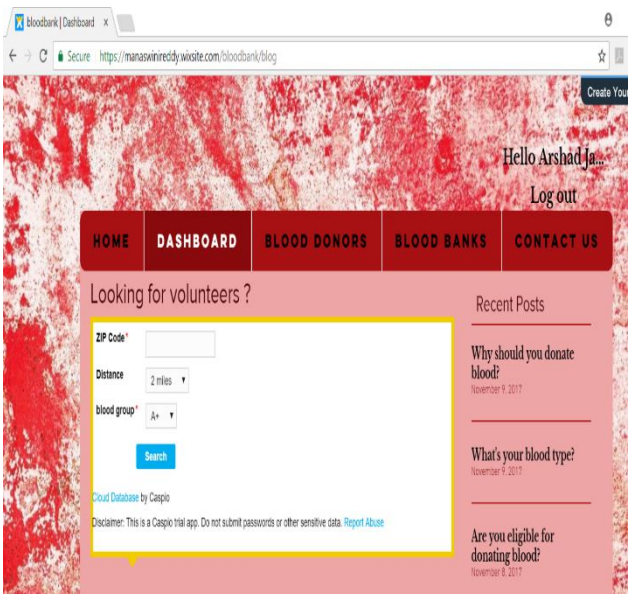


Figure 3: Dashboard

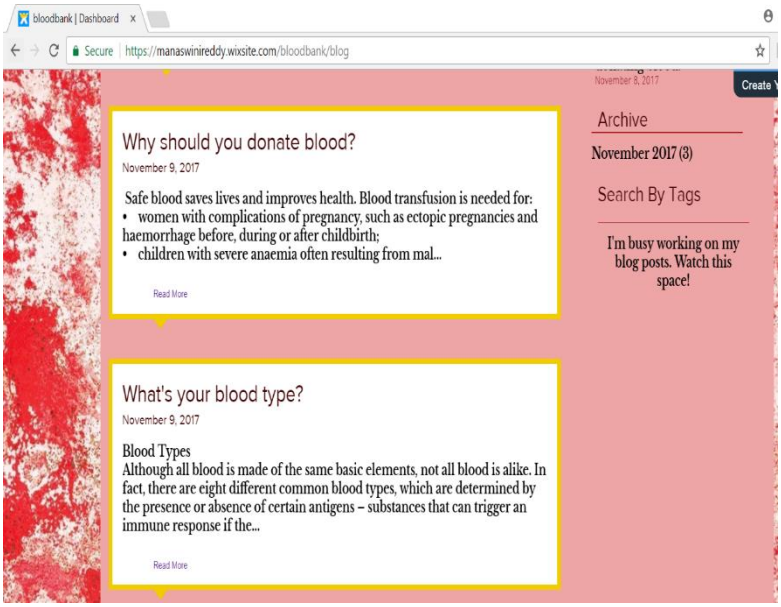


Figure 3: Dashboard

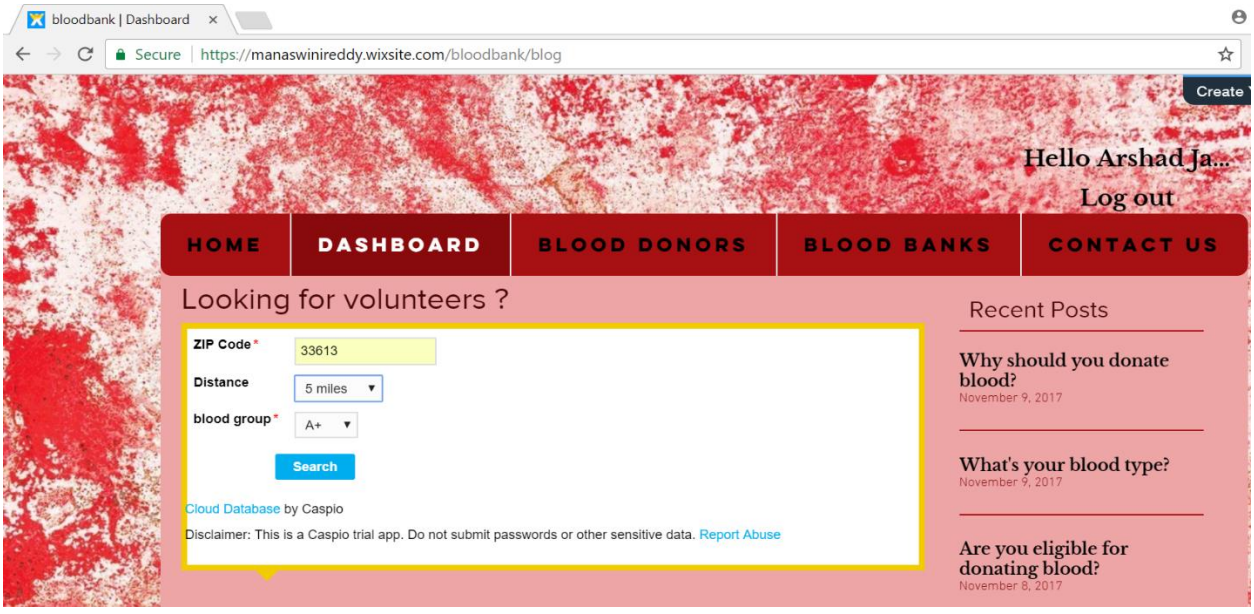


Figure 5: Input for searching volunteers

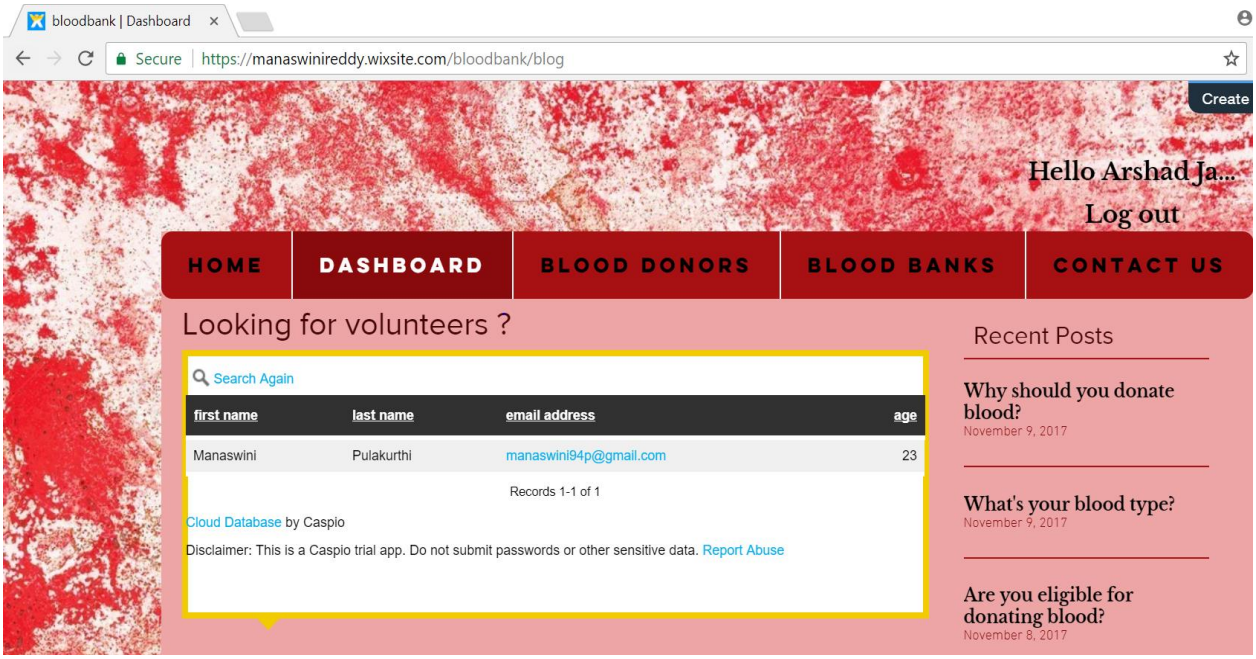


Figure 6: Output for searching volunteers

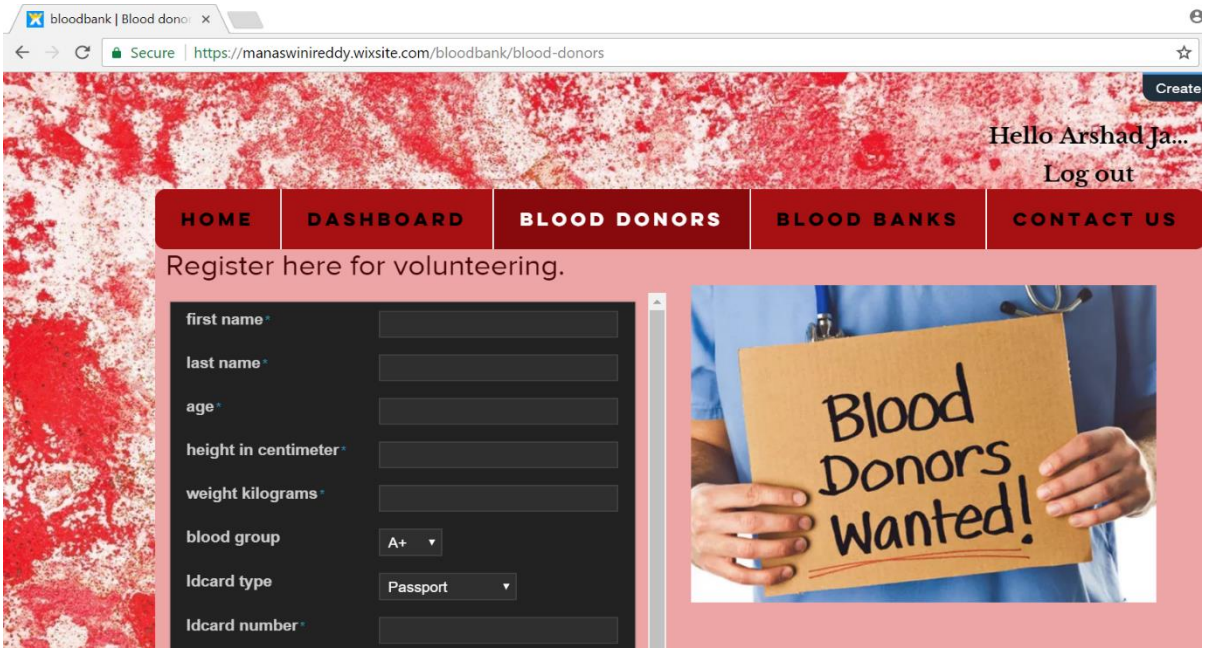


Figure 7: Blood donor registration Form

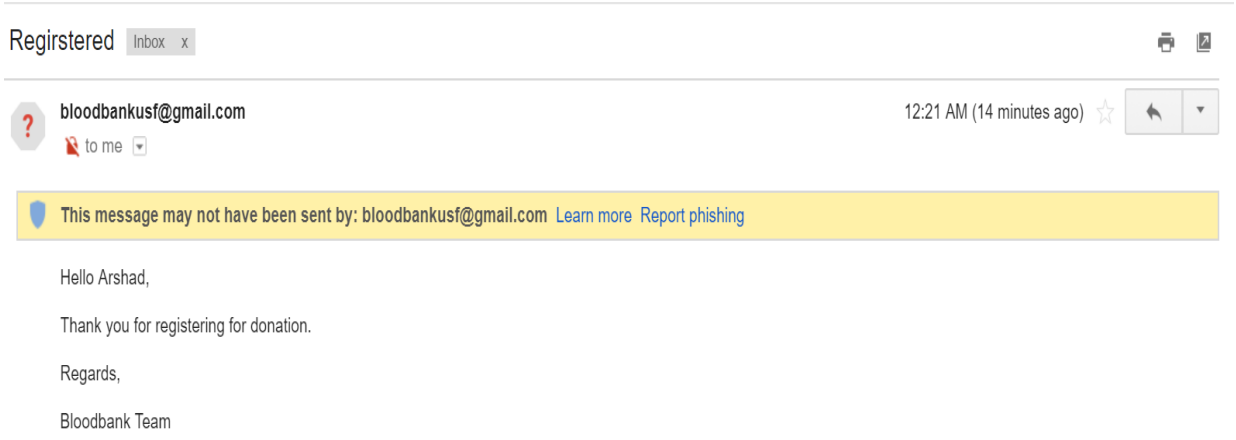


Figure 8: Email after registration

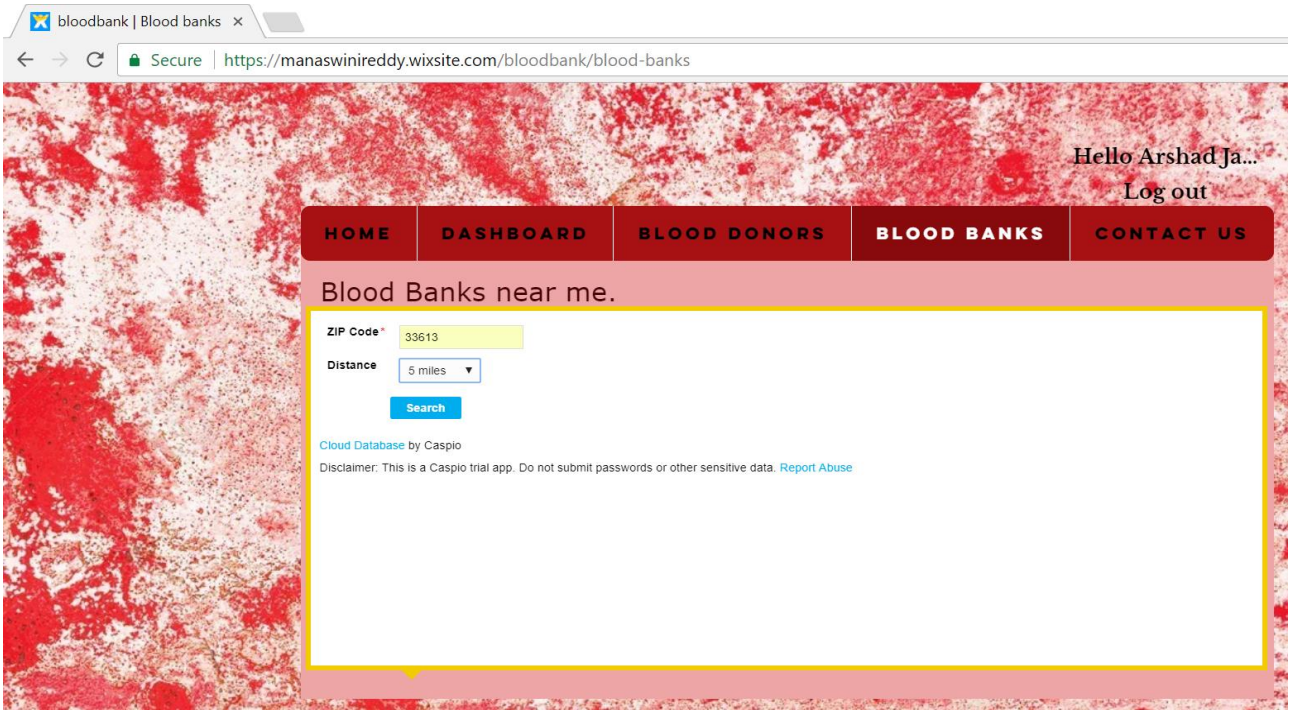


Figure 9: Input for searching blood banks

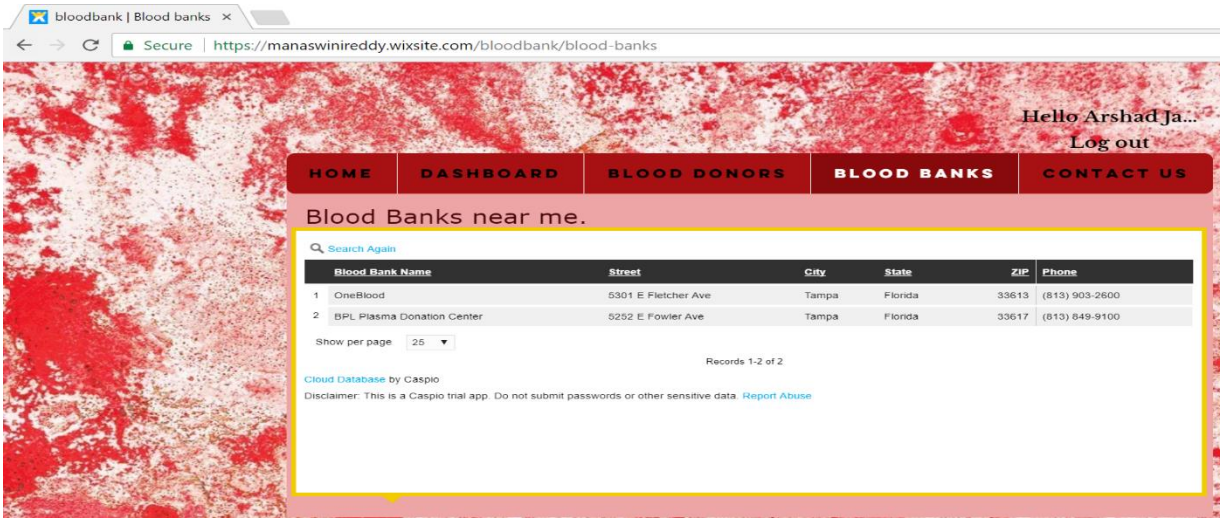


Figure 10: Blood banks near me

6. Testing

Testing scope

The following modules are in scope of our testing:

- Login/ Signup page functional testing.
- Dashboard functional testing.
- Blood donor functional testing.
- Blood bank functional testing.
- Performance testing.
- Compatibility testing.

6.1 Functional and unit testing

6.1.1 Login/ Signup testing

We have done the following test scenarios on this page.

- Mandatory value testing
- Password validation testing
- Email Id validation testing

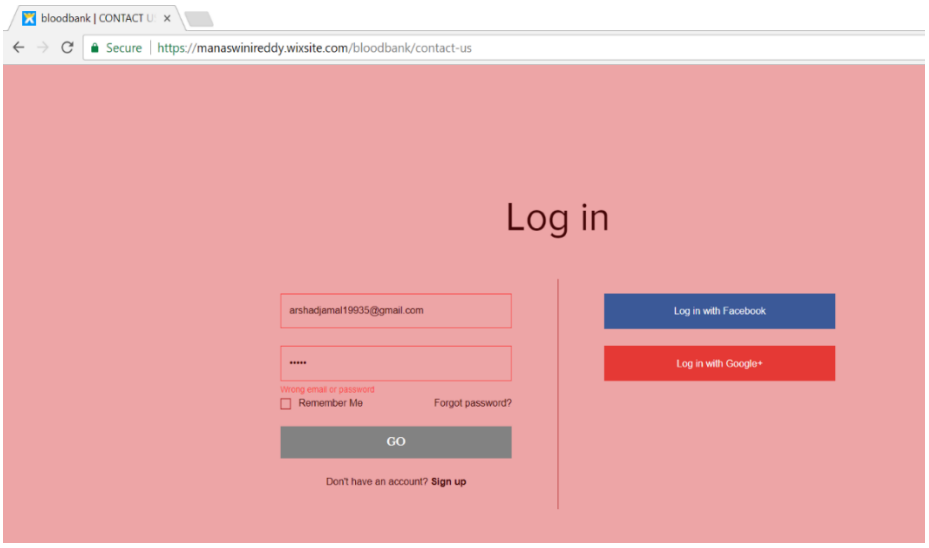


Figure 12: Login page invalid credentials

6.1.2 Dashboard page functional testing

We have tested this page with the following test scenarios

- GUI testing
- Mandatory value testing
- Invalid value testing
- Datatype testing

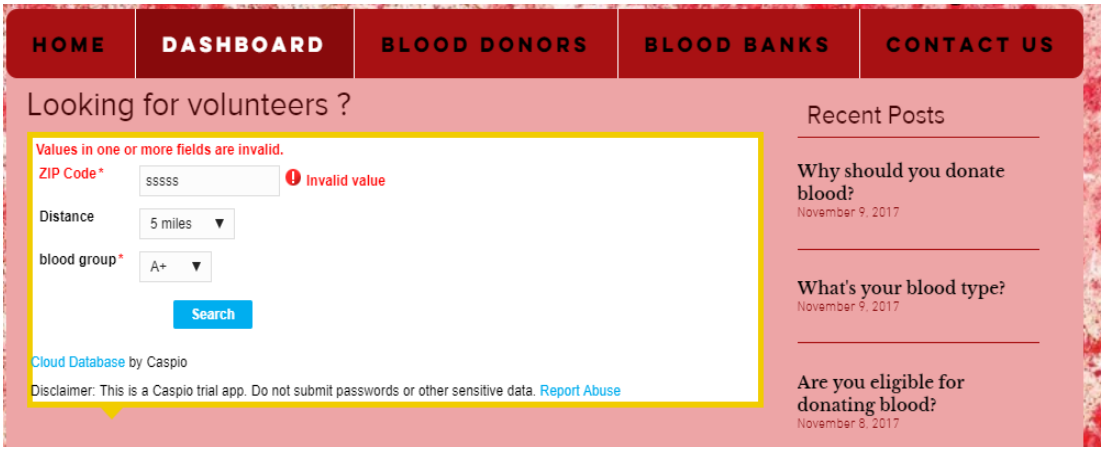


Figure 13: Datatype validation testing for dashboard page

6.1.3 Blood donor registration functional testing

We have done the following test scenarios for the registration frame

- Mandatory value testing

- Datatype testing
- Data length testing
- Invalid data validation testing

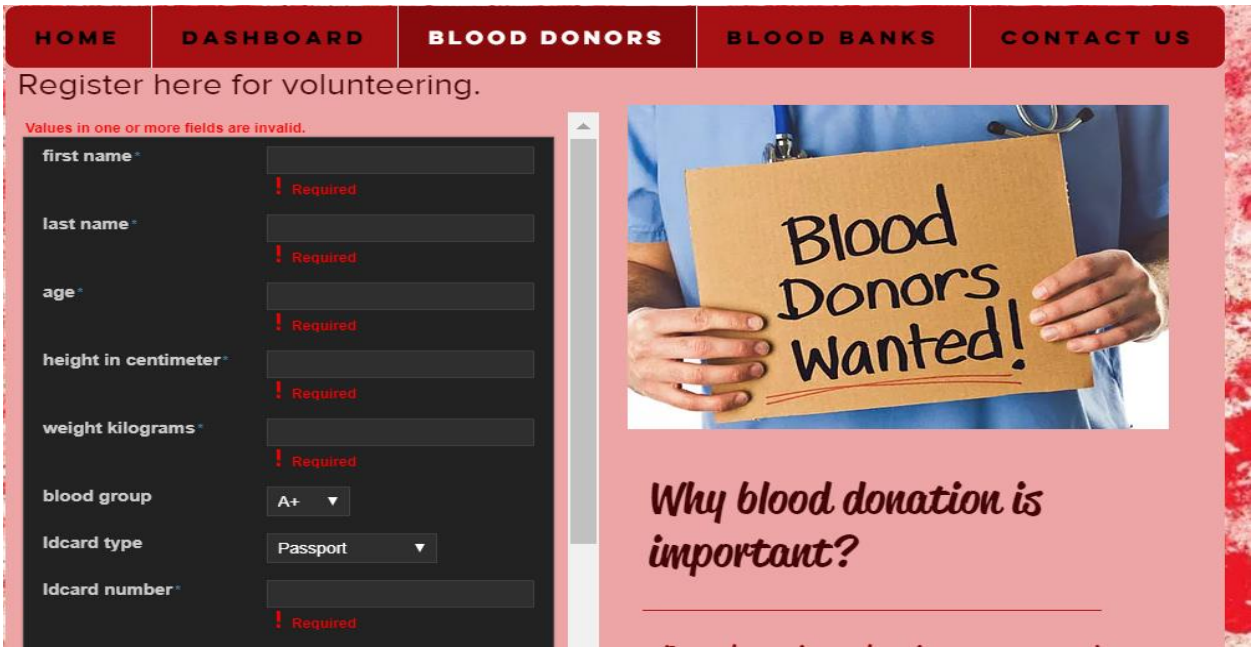


Figure 14: Mandatory value testing on blood donor form

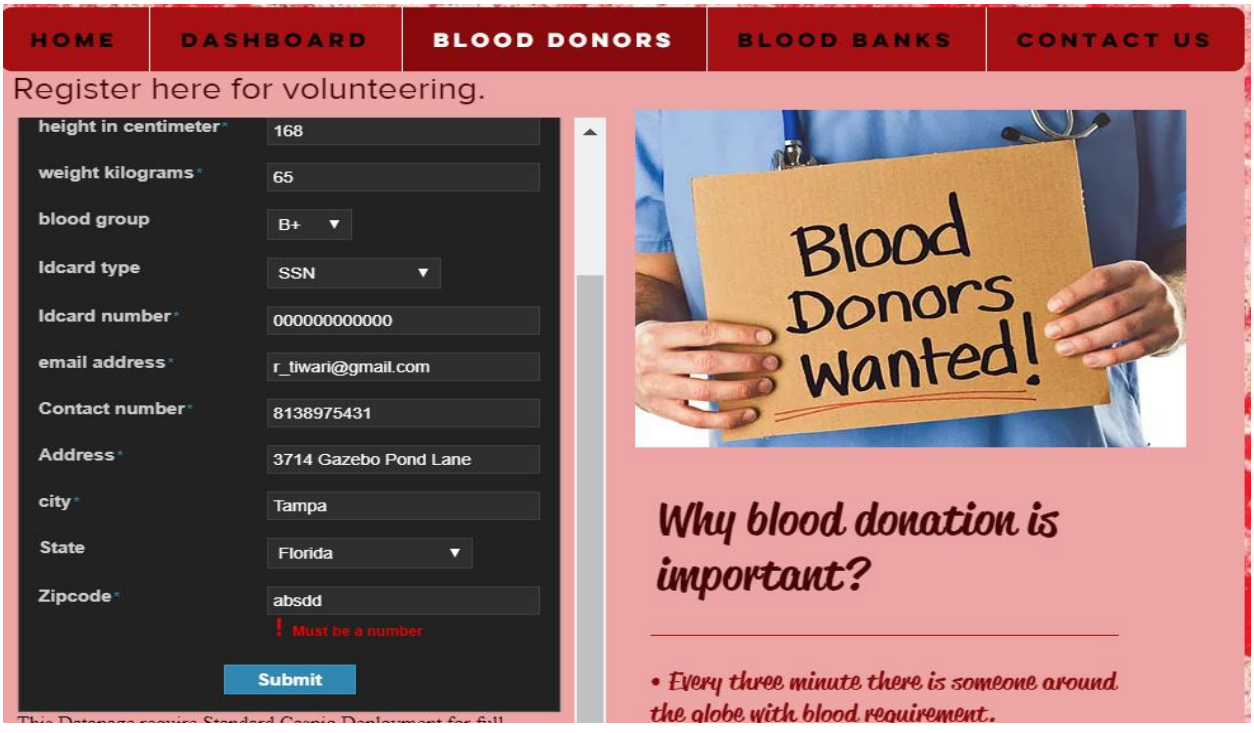


Figure 15: Invalid data testing in blood donor page

6.1.4 Blood bank functional testing

We have done the following test scenarios for the registration frame

- Mandatory value testing
- Datatype testing
- Data length testing
- Invalid data validation testing
- GUI testing

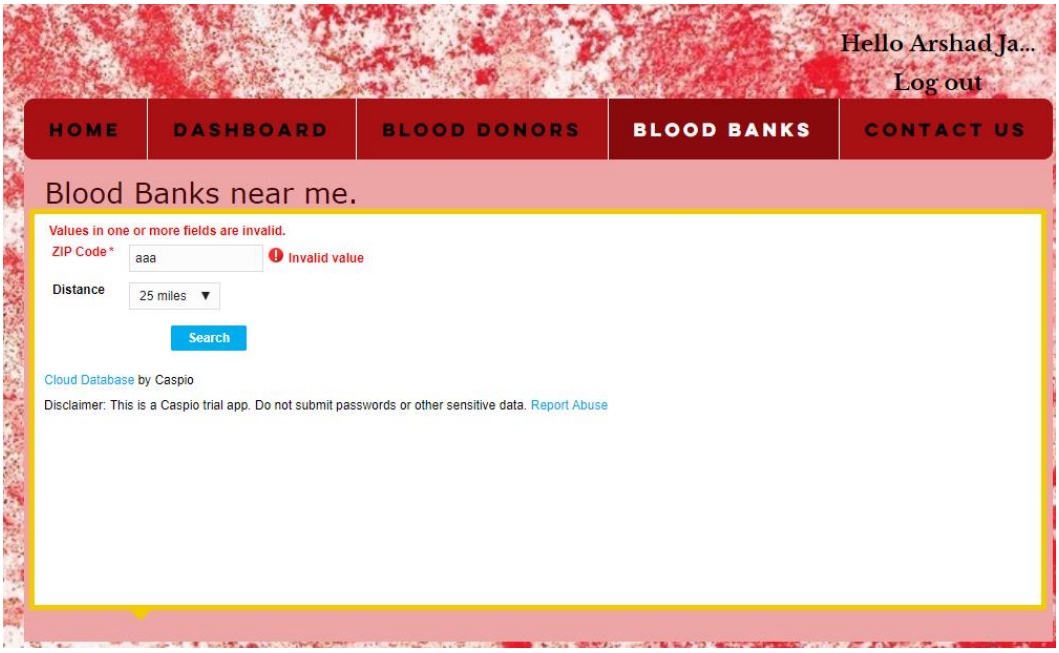


Figure 16: Invalid data testing for blood banks page

6.2 System integration testing

We have tested all the modules put together. We checked if we were able to go from one module to another without any problems. Also, we have checked if we start the entire testing process from different modules, of there were any problems arising. Our website has stood its ground for system integration testing.

6.3 Performance testing

We have performed load, spike, stress, soak, internet testing to measure the concurrency, throughput and response time. The response time has met the performance requirement. All the performance testing that we have done on our system, the system was able to withstand all kinds of stress according to the performance requirement.

6.4 Compatibility testing

We have run our website on different browser such as

- Google chrome
- Internet explorer

- Mozilla Firefox
- Safari
- Opera
- Microsoft edge

It was compatible on all the above-mentioned browsers.

7. Deployment and Maintenance

Deployment was done after testing and rectifying all the bugs in our system. Since we have developed cloud based application, we have deployed in cloud itself.

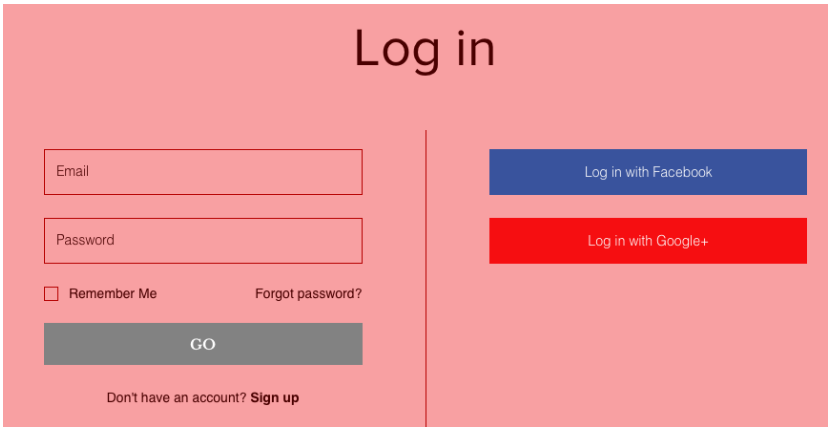
7.1 Deployment

7.1.1 User documentation

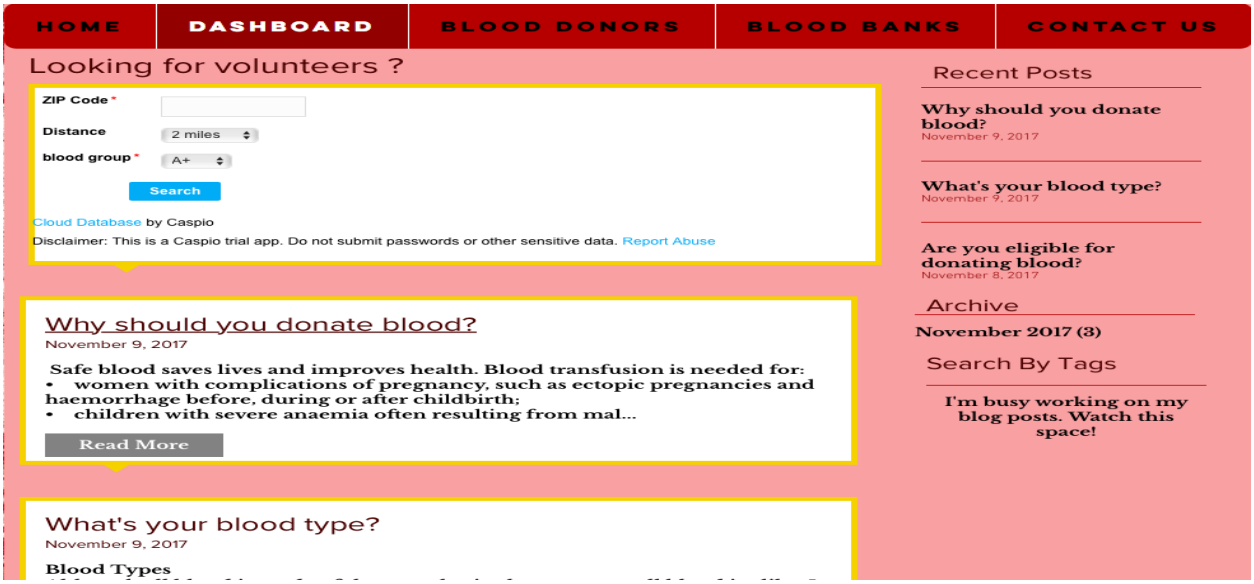
There are 2 types of user documentation covering the aspect of both type of user i.e. admin and members.

7.1.1.1 Written documentation: Below is the navigation and instructions for using this site.

Once you open the page, user can go to login page. Here user can find option to sign up for the account. If the user has already created their account, they can log in using their credentials. The user can also see option for logging in using Facebook or Google account.

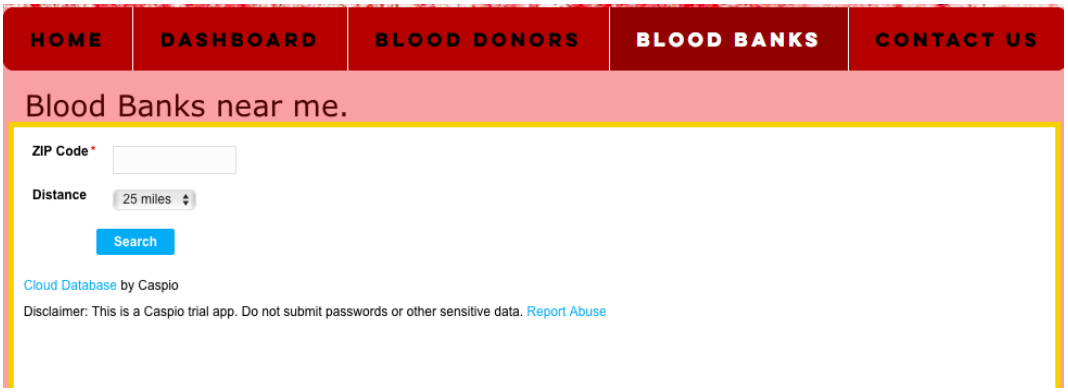


On login, user will be in Home tab which contains some basic article. The user can then click on Dashboard tab. Here the user can find options to search for a donor. The page also contains some latest article like why should one donate blood and what is your blood type. The tab also provides information regarding eligibility criteria for donation blood.



The user can then go to blood donor sections. Here the user can register for donating blood by providing some required details.

In the Blood bank tab, user can use the advance search option to search for the blood bank. They can search blood by providing values for zip code and setting the radius of their search.



In the next Contact us section, the user can get the details of admin and can request them for publishing any blood request.

7.1.1.2 Audio-visual documentation:

A video is created to coach different users on how to use the application. Below is the YouTube link for the online tutorial:

https://youtu.be/LtGG45_9hVw

7.2 Maintenance

- Continuously updating website with the enhancement which are required with time.
- 24/7 site monitoring via some tool as well as manually.
- Putting server up and running again if there is any server down reported or observed.
- Server cache cleaning on regular basis.
- Backing up of website on regular basis.
- Create backup of database on regular intervals.
- Traffic stats analysis, increasing memory on the basis on traffic analysis.
- Continuously keep on working to adopt newer and better methods for security of website.
- Check various aspects of our website through analytics tool.
- Update blood donation general information and eligibility criteria as they need continuous amendment with time.
- Manage users and notifications.
- Help users who want to opt out of receiving notifications.
- Feedback system to incorporate new demands of the user and also resolve issues faced by them.

8. Future Enhancements

- Allow blood banks to enter and update their stats and records into our web site which will then be maintained in our database.
- Cover more states for blood bank data (Only Florida is covered in current system which was implemented), we will go broader and take details of other states as well and then put the data about blood banks of other states also.
- Different access levels for blood bank, hospital and individual users. We will give slightly different privileges for our different types of user, for example: based on access given to the individual user like Blood Donor, Blood Receiver and viewer, he/she cannot see the tab for update their stats for different blood type and quantity availability. This will tab will only be seen to Blood banks based on privileges given to them.
- Include real time chat and messaging facility for interaction between donor and receiver. With this facility we aim to connect users directly.

9. Learning for the team

- Learned all the 7 cycles of system development i.e. Identifying problem and analysis, requirement gathering, design, implementation, deployment, maintenance, and testing.
- Learned to work as a Team.
- Learned to identify real world problem and solution which involves all the users.
- Learned to coordinate amongst the team member and to divide task equally in our short scrum meetings.
- Gained lot of knowledge about blood donation.
- Learned methods to test our application thoroughly in various ways.
- Explored and achieved good database design.
- Learned to develop a software or system from scratch.
- Learned to resolve various project issues as a team.

10. Recommendations/Conclusion

- Blood Bank System is a required and must system to integrate blood banks, hospitals, blood receivers and blood donors.
- Blood Bank System needs to be marketed well and awareness about this system has to be made so that most of the people are familiar with the blood bank system, this will get more user and donors to serve the purpose.
- Admin Dashboard needs to be improved so as to visualize better.
- Blood Bank System can really be helpful in developing countries like India where getting rare blood sometimes becomes a very tedious task and sometimes causes loss of life due to unavailability.
- This system also provides a huge benefit of providing knowledge and educating users about blood donation camps information, general information about blood donation and eligibility criteria for blood donations.
- This system is huge plus as it encourages users to help others and donate blood.

This system solves purpose of all i.e. donor can easily donate, receiver can easily get blood, viewer can see important information and get knowledge, and hospital and blood bank can get blood in case of emergency and also broadcast notification for the blood drives. In short, its one place for all blood donation and requirement related issues.