Software Requirements Specification



Team CS-21

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Group CS-21

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1. Introduction

1.1 Domain description

Blood donation is a noble cause and a great help to the people in need. There are so many blood donors, blood donation campaigns, and blood donation campaign organizers all over Sri Lanka. Because of that, it is a tough job to keep track of all the data and to provide a more fruitful service for them by synchronizing the data.

Certain conditions apply to blood donation as well. Once donated, a donor can only donate blood again after 4 months. So, donors have to remember the last time when they donated blood to know when they can donate again. Blood donation campaign organizers have to use their money to advertise about the campaign. So reaching the appropriate audience entirely depends on the money invested even though the effectiveness of the advertisements cannot be guaranteed.

Likewise, the donor may or may not receive news about the campaigns in his/her area. The demand for blood is also not known by the campaign organizers and blood donors beforehand.

The National Blood Transfusion Service keeps records of these. But they are not synchronized and used to give a more fruitful service.

The National Blood Transfusion Service cannot inform the donors when there is a sudden demand for more blood.

1.2 Current system & Its limitations

The National Blood Transfusion Service has a system that keeps track of the data of blood donors, blood donation campaigns and blood donation campaign organizers separately. But there's very little synchronization between them. And there's no platform to connect the blood donors, blood donation campaigns and blood donation campaign organizers.

There are many campaigns held throughout Sri Lanka to donate blood. These blood donation campaigns are organized by both the government sector, the private sector, and individuals. They sacrifice their own time and money to organize campaigns. They register their campaign in the National Blood Transfusion Service and reserve a medical team in the area of the campaign. But sometimes their efforts become pointless being unable to collect the blood amount needed. One reason for that is after donating blood once, a donor is unable to donate for another 4 months. If multiple blood donation campaigns occur in the same area, it may lead to a futile effort. So if the blood donation campaign organizers can know about other campaigns in the area beforehand, he can arrange his campaign on a suitable day. Another limitation is that the donor has to remember the dates to know when he can donate blood again and Campaign organizers have no method to estimate the eligible blood donors in the area. Another reason is campaign organizers have to advertise their own campaigns and sometimes it may not reach the intended audience. The same happens with blood donors as they have no proper method to know about blood donation campaigns in their area unless they see it on a poster.

1.3 Objectives & Goals

- To provide a single platform for interaction between the National Blood Transfusion Service, Blood Donation Campaign Organizers, and Blood Donors.
- To decrease the illegal activities which happen around blood donation like demanding money for donating blood.
- To make the blood donation campaign organizing process faster, easier, smoother and better.
- To make the blood donation and collection process easier and better and more effective.
- In emergency situations which need donors to donate blood as soon as possible and need big amount of blood our goal is to convey that information to dedicated people as soon as possible and make that process easier.

1.4 Scope of the Project

In-Scope

- Building an interactive web application and mobile app.
- API based multi-tenant system.
- The system will be hosted on cloud servers.
- The system will be operated centrally.
- Provide security and confidentiality to information.

Out-Scope

- Establishing centers throughout the country.
- Establishing the feature of switching between different languages.
- Using machine learning to identify the rough estimate of the number of donors expected for a particular campaign in a specific area on a specific date.

1.5 Assumptions, Constraints & Limitations

Assumptions

- Campaign organizers, blood donors, visitors will have access to the internet.
- Users will enter valid and relevant information when creating a donation post and don't put fake posts.
- Editors will frequently monitor the content of blood donation posts and blood donation campaign posts and they will instantly change or delete unwanted or incorrect content.
- Blood donors will update their information like their phone numbers, residence addresses. etc.
- Blood donation campaign organizers will update their addresses, contact details, contact person, etc.
- All the users will act responsibly when using the system.
- Blood donors will update the last donation date after a donation (this will be used to calculate the next eligible date)

Constraints & Limitations

- Blood donors and campaign organizers may not have good knowledge of using new technologies or web sites and therefore the website should provide proper guidance to access the system.
- There may be users from certain rural areas that don't have good network coverage, therefore, the system should be able to work with low bandwidth as much as possible.
- Android users should have a google play store account to install the android app for android devices.
- Most of the users may not be using high-end devices and devices with good performance, therefore, the system should be developed to work with fewer resources as much as possible.
- All the users may not have good English literacy and therefore the system should include simple English terms until the system supports multiple languages.

- Because we don't have our own servers to host the system we will have to depend on a third-party service provider and therefore our system will highly depend on that service and there may be downtimes without any prior notice.
- Some people may demand money for donating blood therefore when publishing a blood donation post, there will be a specific structure of a post and editors should frequently review them.

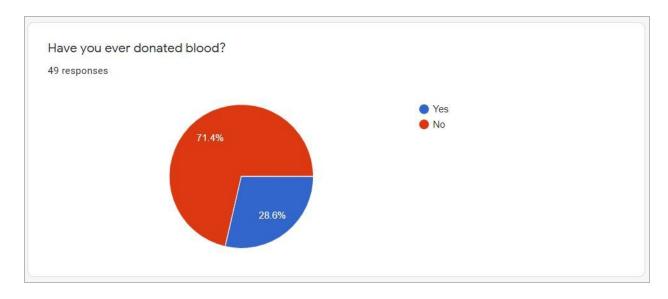
2. Feasibility Study

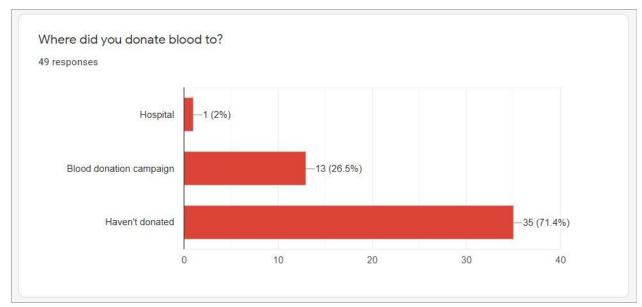
2.1 Operational feasibility

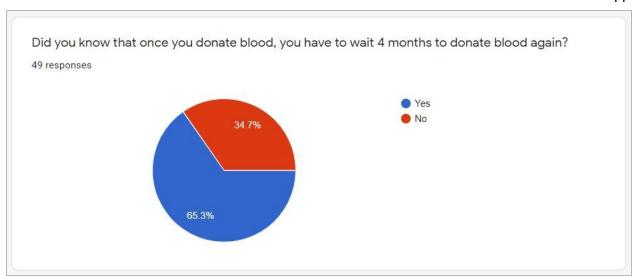
Here, we measure how well NobleRED solves the addressing problem and how well it satisfies the system requirements identified from users.

- By using this app, the work of the National Blood Transfusion Service, campaign organizers, and donors will get easier.
- The Donor will be able to see the upcoming campaigns.
- The Donor will get notified about upcoming campaigns in his area within a 4km radius.
- The Donor will be able to see a count down indicating the days he will be able to donate blood again.
- The Donor will be able to request blood for emergencies by creating a post.
- The campaign organizers will be able to organize their campaign from home after registering with the National Blood Transfusion Service for the first campaign.
- The campaign organizers are benefited from the information of previously held campaigns, and upcoming campaigns within a 4km radius from the area that they intend to do their campaign.
- The campaign organizers will be able to see the number of eligible donors within a 4km radius from the selected area of the campaign.
- The National Blood Transfusion Service is benefited with being able to manage information about the campaign details.
- National Blood Transfusion Service will be able to allocate medical teams to the campaigns according to availability.
- National Blood Transfusion Service will be able to view the map of blood donation campaigns.
- National Blood Transfusion Service will be able to send messages to Campaign Organizers, and Blood Donors.
- National Blood Transfusion Service will be able to filter Donors according to eligibility, blood type, area, and the required date.
- National Blood Transfusion Service will be able to create and review posts created by Donors and Campaign organizers and to delete, modify or notify users.

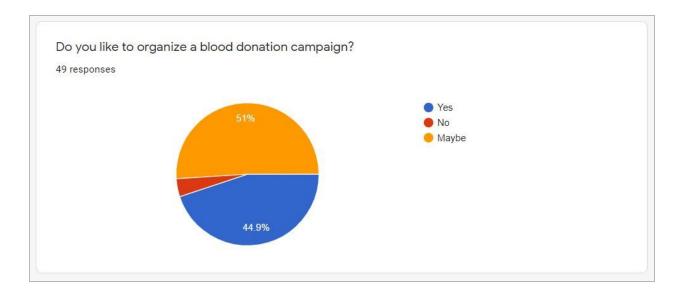
Here are some results obtained from a survey proving the operational feasibility of the system.

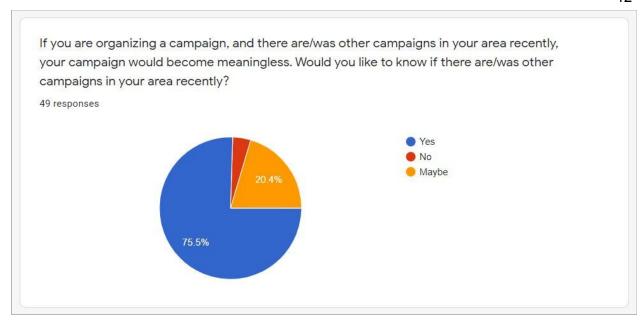




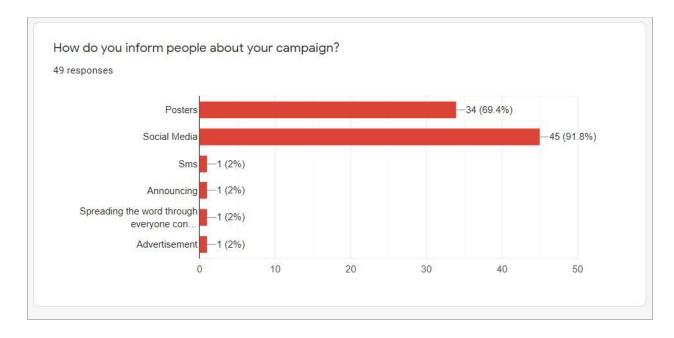


The above diagram shows that about 35% of people are not aware that they cannot donate blood again before 4 months after donation. NobleRED has a feature to calculate and display the next eligible date to donate blood and also provide a countdown.





The above diagrams show that about 75% of organizers would like to know about the past campaigns, so they can organize the campaign with prior understanding.



2.2 Technical feasibility

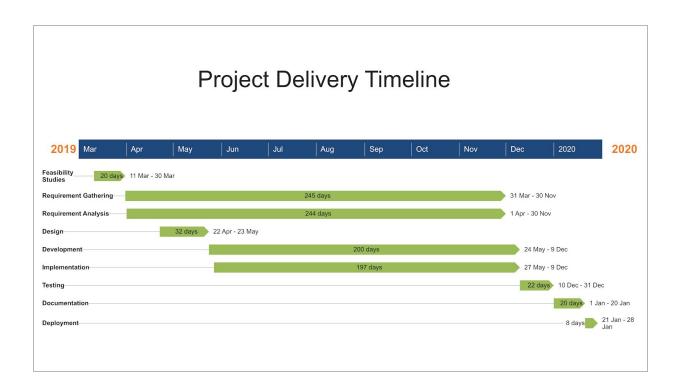
In technical feasibility, we check whether this solution is practical and reasonable. We have found out that the solution is very much practical. Because,

- We are intending to develop a web page and a mobile application as the solution.
- We are using vue.js for the front-end development and node.js for the back end development.
- For mobile development, we intend to use flutter as the mobile app development tool.
- And for database management, we use Firebase as our database management system.

The technologies we are using is available and emerging technologies in the world, therefore our solution is feasible.

2.3 Schedule feasibility

We are planning to finish the development of this project by the end of 2019. We are following an agile methodology for development, there may be new requirements occurred throughout the development of the project. But at this stage, considering the amount of work we have done and features implemented, it will be possible to finish the development of the project before the deadline.



2.4 Economic feasibility

We have considered some payments that we will have to make during the development and when implementing the solution.

- This web application will be hosted on the AWS free-tier server, which is provided by Amazon Web Servers free of charge for one year and this bares zero cost for the first year of operation.
- We should have a domain name for this web application and we will have to pay a small annual subscription for the domain. (\$12 per year)
- The development tools like the android studio and google firebase for the backend can be used free of charge for the project.
- Publishing an Android app requires a developer account which we will have to make a one-time payment for the account. (\$25 one-off payment)

And we can say this project is economically feasible. If we implement this solution in a real client environment the client will have to make those payments.

2.5 Legal feasibility

Because this solution is a learning project we will not use actual user data and we will only use sample data. And the National Blood Transfusion Service doesn't give donor details to a third party until they have the authorship of the system. Therefore at this stage, there will be no issue in legal aspects. But when we actually implement the system and store actual user data we will follow the standards and guidelines of data storing for donors and campaign organizers. Other than that this system will ensure the following aspects,

- Privacy of information The details of the users which will be visible to other users only be published with the permission of the users and will not be available to unregistered users.
- Handling user data Private and confidential within the system will be kept secret and will not be sold or used for advertising purposes.
- Handling posts When a user posting something in the system that will be according to a predefined format and also verified by modifiers of the system.
 Posts with advertising intentions or harmful content will not be posted.

3. Requirements

3.1 Stakeholders

We have identified the following as the stakeholders of this system.

- NBTS National Blood Transfusion Service
- Blood donors
- Blood donation campaign organizers
- General public

Here we categorized these stakeholders into 4 categories as following.

1. Registered users

These are the users who will mostly and mainly interact with the system. Blod donors and blood donation campaign organizers will fall into this category. They are the most benefited users of the system and they will have access to almost all the features of the system. Because of that, they will have to register with the system and maintain a profile.

2. Unregistered users

These users mainly are visitors to the system. They will be able to view public information posted in the system. But they will not be able to edit them or add a new item. Therefore they don't have a profile in the system. Also, their data will not be stored in the database of the system. The general public will fall into this category.

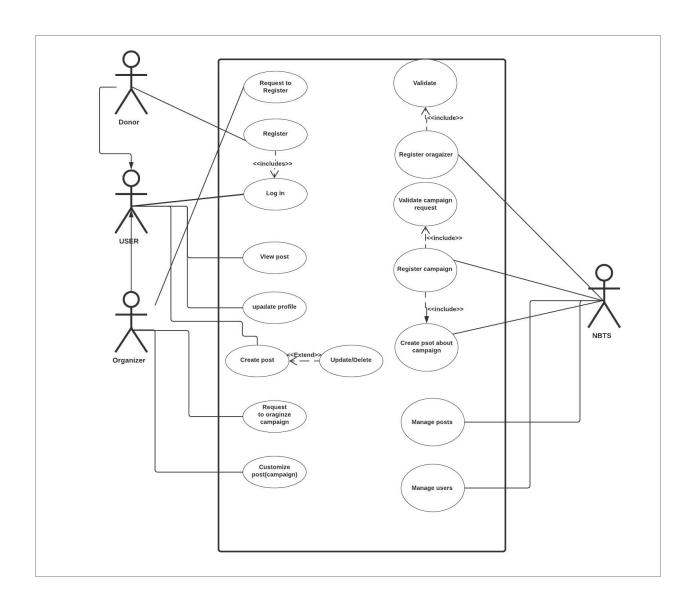
3. Editors

These types of users are able to edit the content like campaign posts and donation posts. But they don't have access to all the data in the system. They also have to have a profile in the system. Lower ranked individuals and developers of NobleRED will fall into this.

4. Administrators

The most powerful type of user of the system, and they have all the authority to do modifications to almost all the modules and control the system. They also can take immediate action on their own in the system. The administrator would be a very high ranking National Blood Transfusion Service official or a developer of NobleRED.

3.2 Use cases and Use Case diagrams



- Blood Donation Campaign Organizer Organizer
- Blood Donor Donor
- NBTS National Blood Transfusion Service
- User Visitor(General public)

Use Case Name	Login
Use Case Description	This is where users log in to the system
Participating Actors	Blood Donation Campaign OrganizerBlood Donor
Pre-Condition	User must visit the website and user must be already registered in the system
Basic Flow	 Go to NobleRED application Press Login Enter login credentials Submit

Use Case Name	Register - Blood Donor
Use Case Description	This is where Blood Donor can register to the system
Participating Actors	Unregistered Blood Donor
Pre-Condition	-
Basic Flow	 Go to NobleRED application Press Login Press Sign up Enter the required details Attach required documents(optional) Press-Register

Use Case Name	Register- Campaign Organizer
Use Case Description	This is where the Organizer can request the National Blood Transfusion Service to Register him/her/organization
Participating Actors	Unregistered Blood Donation Campaign Organizer
Pre-Condition	The Organizer must be registered in the National Blood Transfusion Service prior to registering in the system
Basic Flow	 Go to NobleRED application Press Login Press Signup Press Campaign Organizer Enter the required details Attach required documents(optional) Press-Register

Use Case Name	Verify Campaign Organizer
Use Case Description	This is where the National Blood Transfusion Service check the submitted organizer details and verify the organizer
Participating Actors	National Blood Transfusion Service
Pre-Condition	The organizer must have requested to register in the system and the organizer must be registered in the National Blood Transfusion Service prior to registering in the system
Basic Flow	See the registered organizers Verify the organizer

Use Case Name	Organize Campaign
Use Case Description	This is where the registered organizer can request to register a blood donation campaign.
Participating Actors	Blood Donation Campaign organizer
Pre-Condition	The organizer must be registered in the system
Basic Flow	 Log In as Campaign Organizer Click on the Organize Campaign button on the website. Fill out relevant details. Click on Confirm to make the request.

Use Case Name	View Posts
Use Case Description	This is where the users can view posts
Participating Actors	Blood Donation Campaign OrganizerBlood Donor
Pre-Condition	-
Basic Flow	 Go to the website. Scroll to see posts.

Use Case Name	Validate Organize Campaign Request
Use Case Description	This is where the administrators (National Blood Transfusion Service) view and accept the request made by a campaign organizer.
Participating Actors	National Blood Transfusion ServiceAdministrator
Pre-Condition	There should be one or more campaign requests made by campaign organizers to validate.
Basic Flow	 Click on the Campaign Requests button on Admin Panel. National Blood Transfusion Service/ Administrator can check the availability of the medical teams and assign teams to campaigns. If there are no medical teams to allocate to a campaign or any other problem, the campaign requests will not be accepted. Campaign organizers will be notified whether the process is successful. If the campaign request is accepted, the new campaign will be added to the map and the campaign list. Nearby donors also will be notified.

Use Case Name	Update Profile
Use Case Description	This is where the users can update their profile
Participating Actors	 Registered Blood Donation Campaign Organizer Registered Blood Donor
Pre-Condition	The user must be registered in the system and the user must be logged in.
Basic Flow	Click on my profile View and manage profile details

Use Case Name	Customize Post - Campaign Organizer
Use Case Description	This is where the organizer can customize the post created by the National Blood Transfusion Service about the requested campaign
Participating Actors	Registered Blood Donation Campaign Organizer
Pre-Condition	The organizer must be logged in to the system and must have requested to Organize Campaign
Basic Flow	 Log In Select Manage Post Select the post you need to customize Select Edit Edit and Submit

Use Case Name	Customize Post - Blood Donor
Use Case Description	This is where the organizer can customize his posts
Participating Actors	Registered Blood Donor
Pre-Condition	The donor must be logged in to the system and must have made a post
Basic Flow	 Log In Select Manage Post Select the post you need to customize Select Edit Edit and Submit

Use Case Name	Create Post - Blood Donor
Use Case Description	This is where the registered blood donor can create a post about urgent blood requests.
Participating Actors	Blood Donor
Pre-Condition	The donor must be logged in as a blood donor
Basic Flow	 Log In Select Create Post Fill the form and submit

Use Case Name	Create Posts about Campaigns
Use Case Description	This is where the National Blood Transfusion Service or campaign organizers add posts about blood donation campaigns on the website.
Participating Actors	 National Blood Transfusion Service Administrator Editor Campaign organizer
Pre-Condition	Campaign posts can only be added by an administrator, editor or a campaign organizer and they should be signed in to the system.
Basic Flow	 Click on the Create Campaign Post button. Fill the relevant details. Upload a picture (optional) Click the Post button.

Use Case Name	Manage Posts
Use Case Description	This is where an administrator or an editor will update or remove a post, added by a user. New posts by administrators and editors will also be added from this module.
Participating Actors	National Blood Transfusion ServiceAdministratorEditor
Pre-Condition	There should be at least one post to update or remove.
Basic Flow	 Select the posts tab. Select a post. Click on Update to update the post. Click on Remove and Confirm it to remove. Click Add to add a new post.

Use Case Name	Manage Users
Use Case Description	This is where system administrators will add new users, update user information or remove a user from the system when some situation occurs.
Participating Actors	National Blood Transfusion ServiceAdministratorEditor
Pre-Condition	There should be at least one user registered in the system to be updated or removed.
Basic Flow	 Go to the Users tab in the Admin panel Select a user Click Update and change the data to update Click Remove and click Ok on the confirmation message to remove a user. To add a new user click on the Add button and enter the relevant details and click Ok.

3.3 Functional Requirements

- The Donors, campaign organizers and visiting users will be able to see all the upcoming campaigns.
- The Donors will get notified about upcoming campaigns in his area within a 4km radius.
- The Donors will be able to see a count down indicating the days he will be able to donate blood again.
- The Donors will be able to request blood for emergencies by creating a post.
- The campaign organizers will be able to organize their campaign from home after registering with the National Blood Transfusion Service for the first campaign.
- The campaign organizers are benefited from the information of previously held campaigns, and upcoming campaigns within a 4km radius from the area that they intend to do their campaign.
- Organizers are able to know about the campaigns organized in the area within 4 months forward and the 4 months backward from their organized date for their campaign.
- The campaign organizers will be able to see the number of eligible donors within a 4km radius from the selected area of the campaign.
- The National Blood Transfusion Service is benefited with being able to manage information about the campaign details.
- National Blood Transfusion Service will be able to allocate medical teams to the campaigns according to availability.
- National Blood Transfusion Service will be able to view the map of blood donation campaigns.
- National Blood Transfusion Service will be able to send mobile and email notifications to Campaign Organizers, and Blood Donors.
- National Blood Transfusion Service will be able to filter Donors according to eligibility, blood type, area, and the required date.
- National Blood Transfusion Service will be able to create and review posts created by Donors and Campaign organizers and to delete, modify or notify users.
- Administrators and NBTS will be able to generate reports.

3.4 Non-Functional Requirements

Simple and easy to use interfaces

The system is easy to operate for any person without a doubt because of the very simplified user interfaces and the fonts

Portability

This system has a web service that can be used in any device and the mobile app can be easily used on mobiles, tabs. So this system gives easy access to the blood donating cause.

Security

This system requires sensitive data like blood type from the donors. So the security is very high regarding those details and no one can access those details apart from the National Blood Transfusion Service or the owner of the account.

Robustness

The Firebase database accessing uses very little bandwidth and works even in a 2G network. It also stores information offline when there's a connection drop hence making the system very robust.

Performance

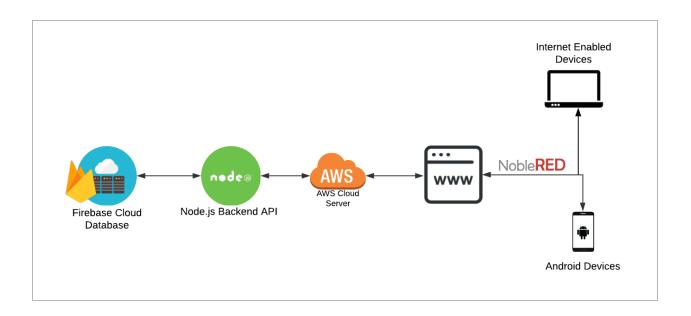
Because of the Vue.js single page application architecture and two way data binding, data displayed on the webpage will be updated instantly without refreshing the webpage. The firebase database also updates data instantly when there is a change. Hence the system will perform well and work faster.

Accuracy and reliability

Editors and the administrators will be frequently monitoring the system. Also the filtration and the rating system of users ensures whether the users are genuine and reliable. These factors results in more quality information with proper reliability.

4. Proposed System's Architecture

4.1 High-Level System Architecture



The above diagram illustrates the high-level architecture of the NobleRED. The system is hosted on an AWS Cloud server. The system uses Firebase Cloud Database to store data. The system uses Node.js backend API to communicate with the Firebase database. Any internet available device can access the NobleRED website through the internet. Android devices can access the system by downloading the Android mobile app.

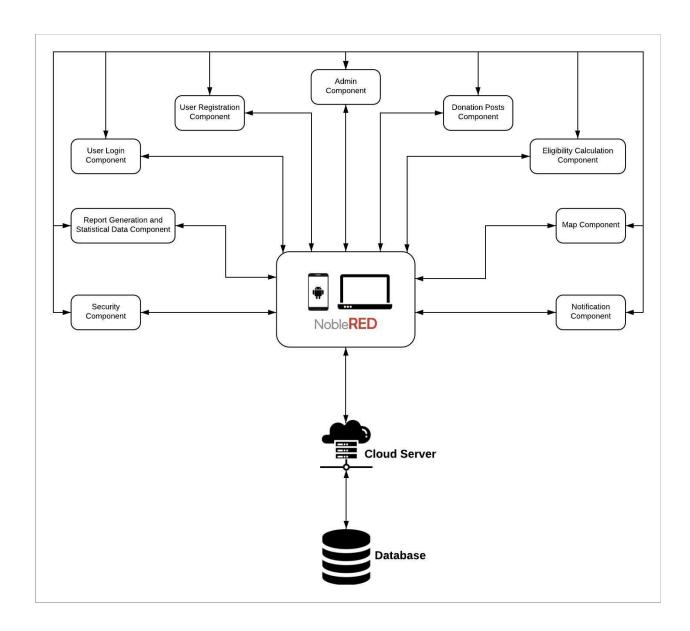
4.2 Components and their responsibilities

Component	Responsibilities
User Registration Component	 Get relevant details through a form to register a new blood donor. Get relevant details through a form to request to register as a new blood donation campaign organizer. Give account access details to new donors after the registration. Give account access details and the next necessary steps to be done to new campaign organizers after the acceptance of the registration request.
User Login Component	 Giving access to the system to the users after providing correct credentials. Block access and provide an error message when the wrong credentials are entered. Provide the password recovery mechanism. Save the timestamp of every login to the system in the database.
Admin Component	 Managing all the users. Managing blood donation campaign posts. Managing blood donors' posts. Managing notifications. Managing the map view. Managing the appearance of some website components like a carousel, header images etc, Assigning and managing medical teams to blood donation campaigns.
Campaign Posts Component	 Get the required information to make a new blood donation campaign request. Update the database with that information after the request is accepted by an admin or National Blood Transfusion Service. Automatically generate the new campaign post and publish it on the website.

Donation Posts Component	 Get the required information to create a new blood donation post. Update the database with that information after the details are reviewed by an editor. Automatically generate new blood donation posts and publish them on the website.
Eligibility Calculation Component	 The next blood donation eligible date of all donors will be calculated and displayed. There will be a countdown to the next eligible date displayed in the donor's profile.
Map Component	 All the blood donation campaigns will be displayed on a map. There will be different colors of markers according to time differences and a circle will indicate a 4km radius. When a new campaign is created the system will add a marker to the map and add relevant details about that campaign.
Notification Component	 Text and an email notification will be sent to the donors when a new campaign post is created in the nearby area of them. When a new blood donation post is created all the donors with the required blood type mentioned in the new post will be notified via text and email notifications. National Blood Transfusion Service can send special announcements to blood donors and campaign organizers through text and email notifications.
Security Component	 Establish the security of users' data by using modern encryption mechanisms. Monitor unauthorized activities on the website. Block the unauthorized entries to the system. Generate security reports every week. Manage user roles and their responsibilities.

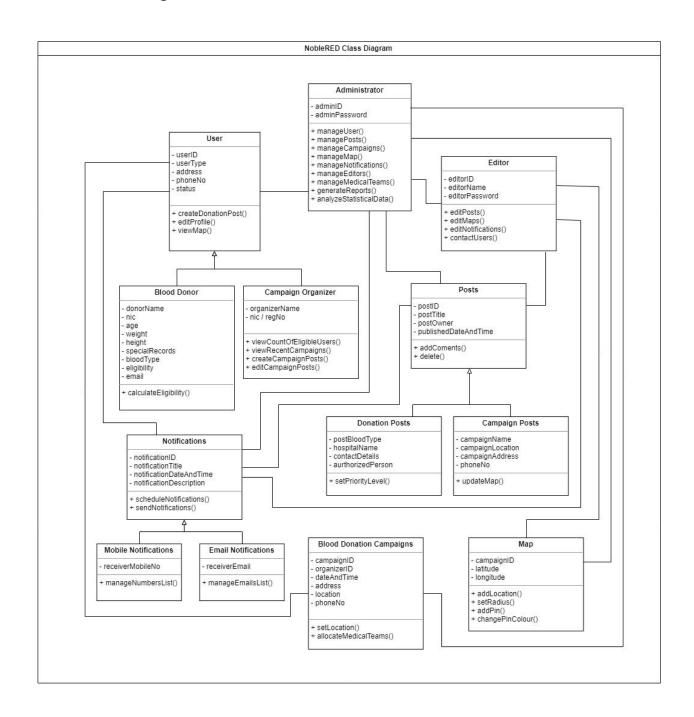
Report Generation and Statistical Data Component	 Generate daily reports about new registrations. Generate weekly reports about the system like resource usage, website traffic, etc. Generate monthly reports like if any attacks and safety measures taken, monthly website traffic, number of total posts, user feedback, etc.
Database Component	 Storing all the user data, campaign data, notification data and all the other system data in the database. Give access to administrators to manage those data. Control access to the data. Provide security to the data and information stored inside. Provide real-time connection and continuous flow of data up and down.

4.3 Component interactions

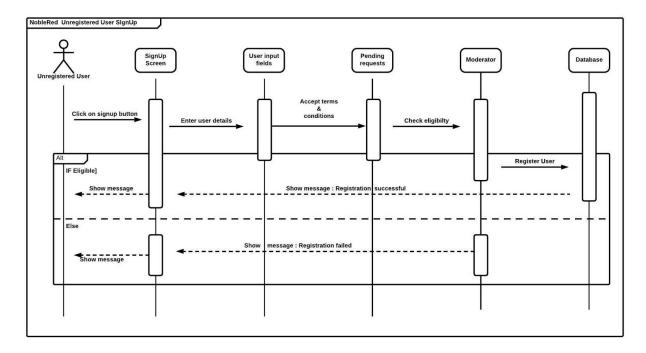


5. System's Design

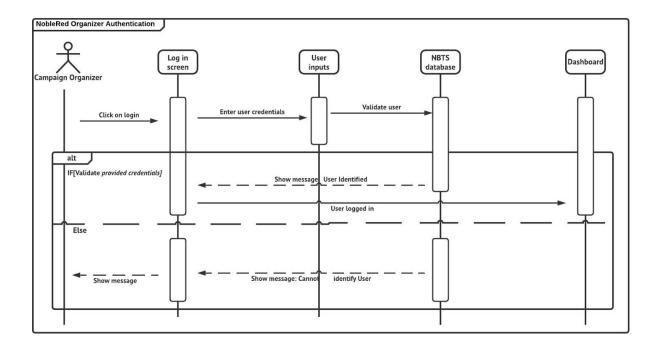
5.1 Class diagrams



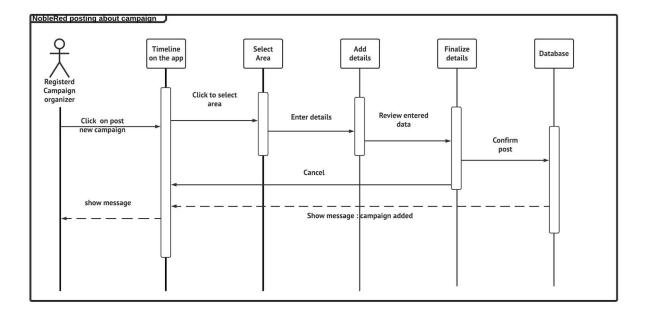
5.2 Sequence diagrams



Sequence diagram for the user signup process

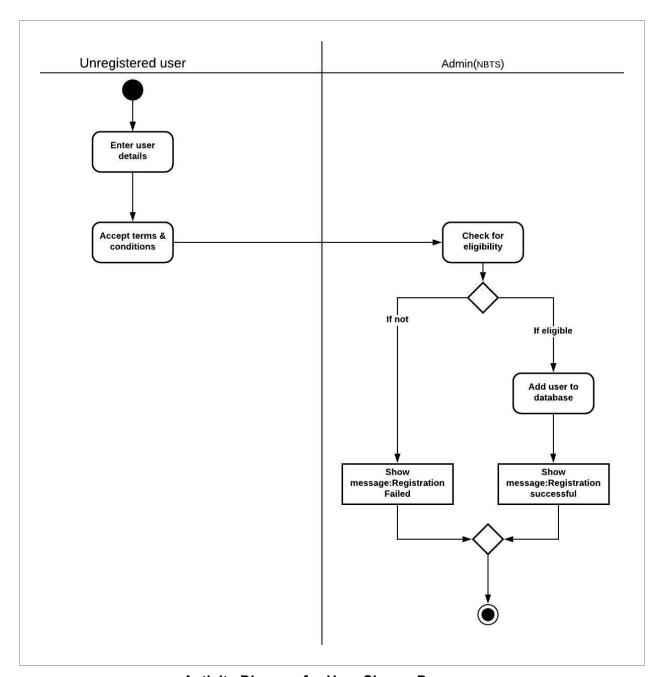


Sequence diagram for the organizer authentication process

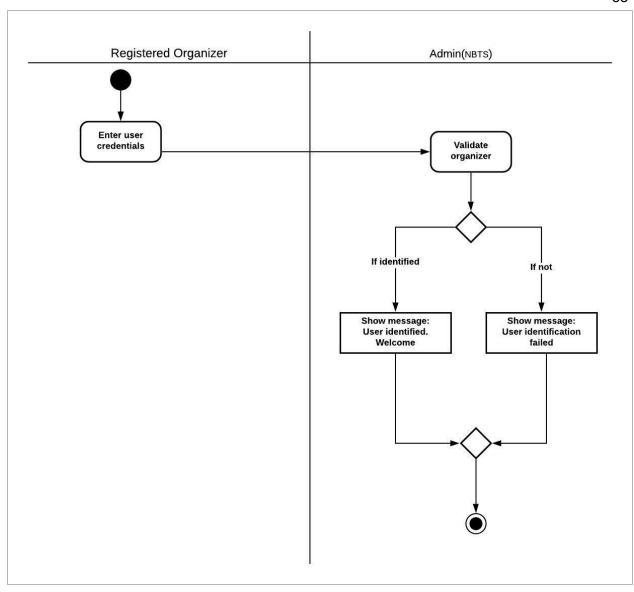


Sequence diagram for posting about campaigns process

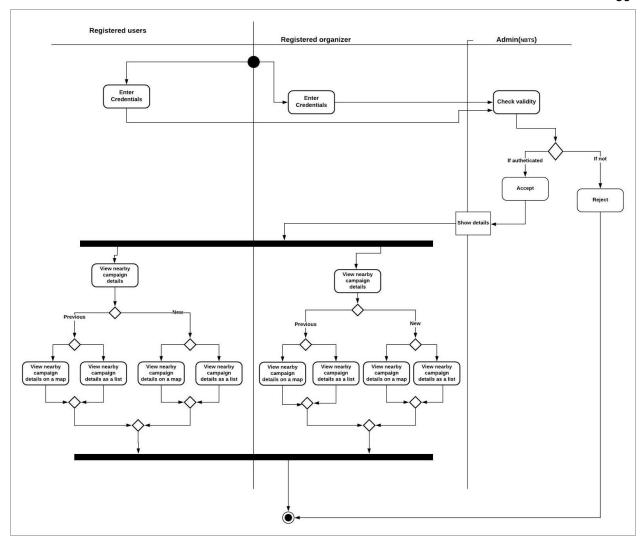
5.3 Activity diagrams



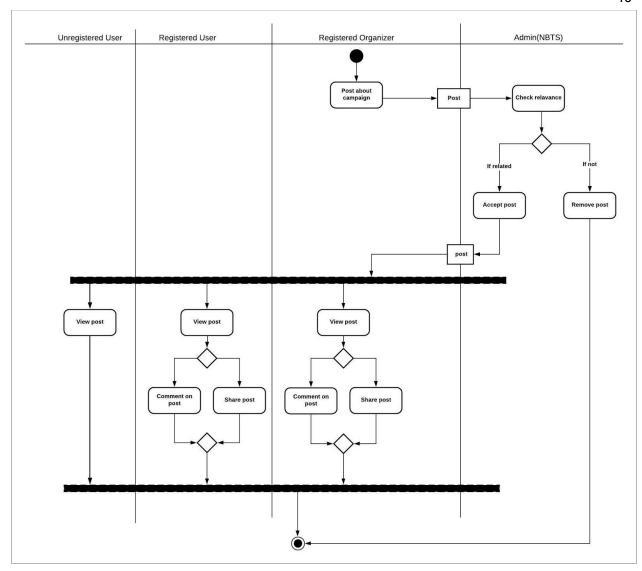
Activity Diagram for User Signup Process



Activity Diagram for Registered Organizer

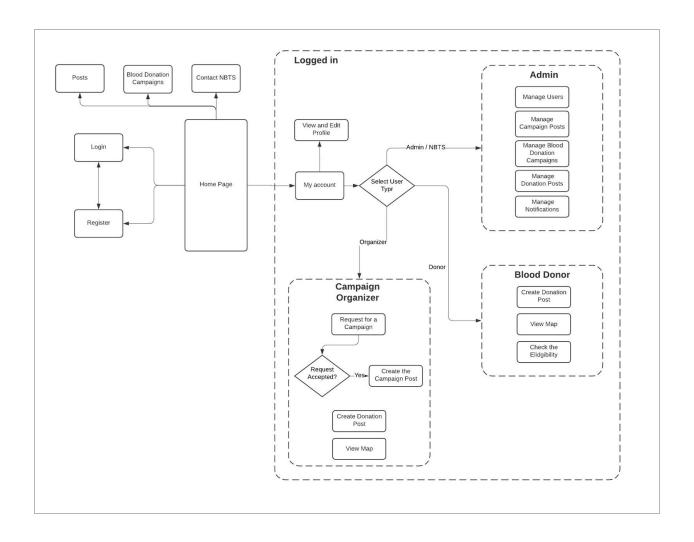


Activity Diagram for the Logged in Users Accessing Campaign Map Process



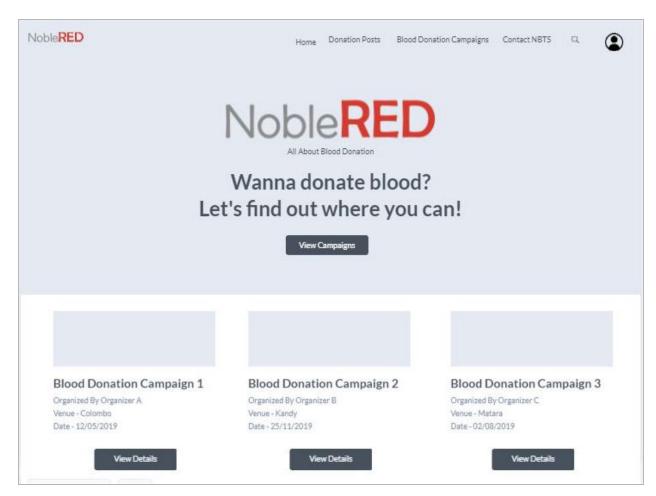
Activity Diagram for the Campaign Posts Creation and Viewing Process

5.4 User Interface Flow Diagram

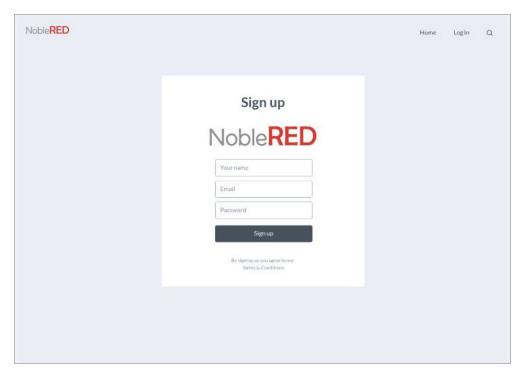


6. User Interface Mockups

6.1 Web Interface Mockups



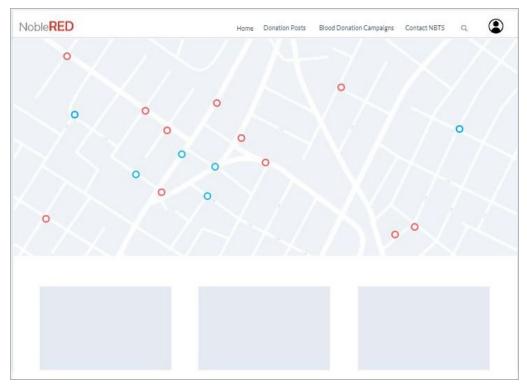
Home Page Interface



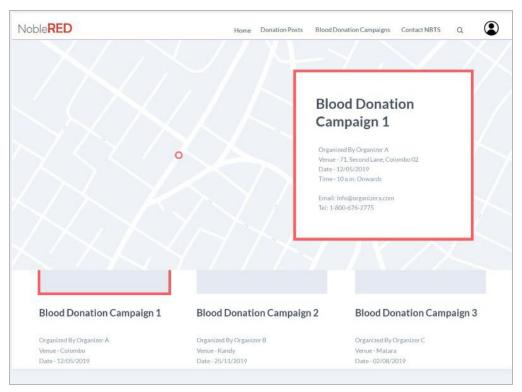
Sign Up Screen Interface



Log In Screen Interface



Campaigns Map View Interface

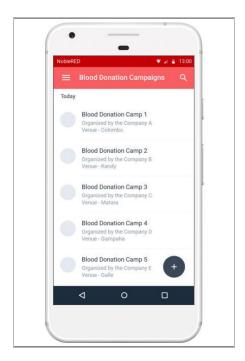


Campaigns Details View Interface

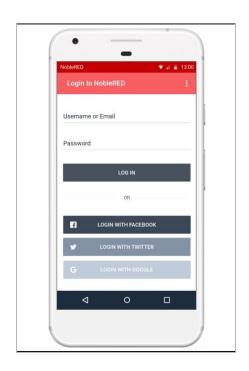
6.2 Mobile Interface Mockups



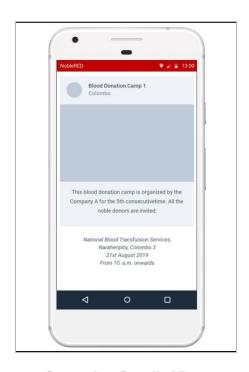
Welcome Screen



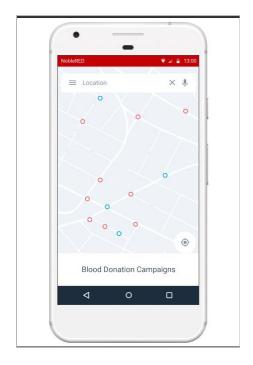
Campaign List



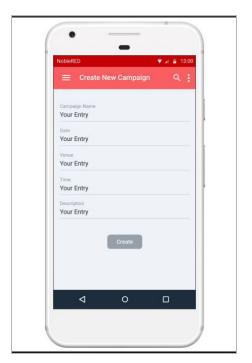
Sign Up and Log In Screen



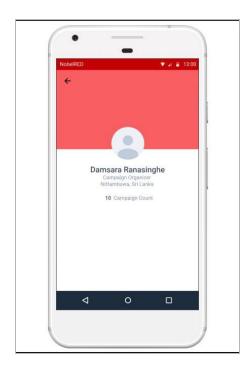
Campaign Details View



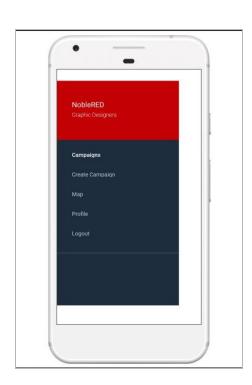
Map View



Create Post Screen



Profile View



Side Menu
