

BloodForAll – Android Application For Blood Donors

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Abstract—Day to day there are many blood donations happening all over the world to save many lives. The main problem in blood donation is finding the blood donors within a short period of time during an emergency. Currently there is no proper solution exist for this problem. Although there are some blood donor applications in Android market already, none of them solves this problem completely. Many blood donors are not interested in using those applications due to the privacy issues. This application aims to provide a solution to all the problems in the existing blood donor applications. This paper discusses about the BloodForAll Application.

Keywords—blood donation; donor; Android; mobile devices

I. INTRODUCTION

A blood donation occurs when a person voluntarily has blood drawn and used for transfusions and/or made into biopharmaceutical medications by a process called fractionation (separation of whole-blood components). Donation may be of whole blood (WB), or of specific components directly. Blood banks often participate in the collection process as well as the procedures that follow it.

Today, in the developed world, most blood donors are unpaid volunteers who donate blood for a community supply. In poorer countries, established supplies are limited and donors usually give blood when family or friends need a transfusion (directed donation). Many donors donate as an act of charity, but in countries that allow paid donation some donors are paid, and in some cases there are incentives other than money such as paid time off from work. Donors can also have blood drawn for their own future use. Donating is relatively safe, but some donors have bruising where the needle is inserted or may feel faint.

The application which is described in this paper is a blood donor search and notification application, which is named as “Blood For All”.

When it comes to Google Play market, claiming that they provide the blood donor details [1][2][3]. After downloading many of those, it was found that many of those applications contain some sort of faults and the applications does not contain enough registered blood donors because many of the people seems to be not interested in displaying their personal details to public. It was also found that there is no single application in the market which is mainly focused on Sri Lankan blood donors. Therefore, I decided to build an

application to solve the above-mentioned problems and mainly to operate within Sri Lanka.

As the name “Blood For All” implies, this application is developed to provide the blood to everyone who are in need. Blood donors can register to this application. Whenever a blood donor request is received, the potential blood donors will be notified about the blood need. so that the blood donors can visit the hospital which is in need for the blood and donate the blood.

This paper explains the details of the design and implementation process of BloodForAll. Furthermore, possible future development is also discussed.

II. APPLICATION REVIEW

This is an Android based mobile application. This application will be used to register the blood donors by giving specific details. These details will be saved in a database. The hospitals will use this application to get the blood donors during an emergency by submitting a blood request to the application by giving the blood group details and the secret code of the hospital. This application will notify the blood donors about the need of the blood based on their location, and the blood group.

The mobile application will need to communicate with Global Positioning System (GPS) part of the blood donor’s phone in order to find out the blood donors near the hospital which is need for the blood. Notifications will be sent to the selected list of blood donors who are located near hospital. In addition to the notification, an email message will be also sent to their email address, as currently, many Android users receives the email messages instantly in their smart phones. The notification facility is achieved through the help of notification manager of the Android and Google Cloud Messaging (GCM) [4] of the Google. Internet connection is important for the proper function of this application, as every function in the application requires a internet connection. It will not be a problem, as the most of the Android users are always connected to internet to experience the real usage of the smart phones [5].

With this Android application, blood donors are allowed to register to this application by giving their name, blood group, date of birth, password and a email address. Blood donors are uniquely identified by the unique ID. These details can be updated whenever user wants. Changing the password and the procedure of getting the new password in an instance of the

forgotten password are facilitated by this application in order to provide the flexibility to users.

Hospitals which needs the blood can request the blood through this application. But in order to request the blood, the hospitals are supposed to join this system by contacting the admin of the system. After a proper manual authentication, the hospitals will be provided with a unique security code. Security code is essential to request the blood from this application, in order to avoid the anonymous requests from the users. Hospitals which have the security code can request the blood by giving the blood group details and the security code. After that this application will find out the nearest blood donors with specified blood group using the GPS and notify them about the blood donation request.

There are two types of users who will use this system. They are blood donors and the hospitals which request for the specific type of blood . Users who are willing to be blood donors will be requested to register to the system, in order to keep track of them. Whenever the blood donors need to update the information, they can login to this application and update the details. The people who request for the blood are not expected to register to this site rather they are expected to give the details about the blood group and the hospital details. In order to maintain the privacy of the blood donors, the blood donor details are not shared for the requestor rather a notification is sent to the blood donor when requested. The anonymous spam requests for blood donation are avoided by limiting the capability to request for blood for hospitals only.

As this is a mobile application, it is constrained by the resource (memory) allocation. Database server capacity is another constraint for this application because database is needed to be accessed multiple times in order to serve the requests from hospitals in an emergency.

In addition to that internet connection is another constraint for this application because to get the details about current location of the blood donors and to notify blood donors about the requests internet connection is essential. Not only that but also to register the users to applications and to get the request for the blood, internet connection is important. Altogether this application will not function without the internet connectivity.

The assumption for this product is the users who use this application will have phone which supports Android platform and the phone will also have facility of GPS. This application is fully dependant on the internet connection of the users.

So the core requirements of the application are:

- Blood donors should be able to register to the system.
- Public should be able to request the specific type of blood through hospitals.
- Notifications should be send to the selected list of blood donors.

The non-functional requirements satisfied by this application are usability, availability and performance. Usability is achieved by the good Graphical User Interface (GUI) based on the user comments. Availability and

performance are achieved by proper testing and the hosting of the database in a trusted server.

III. SYSTEM DESIGN

1) Use Case

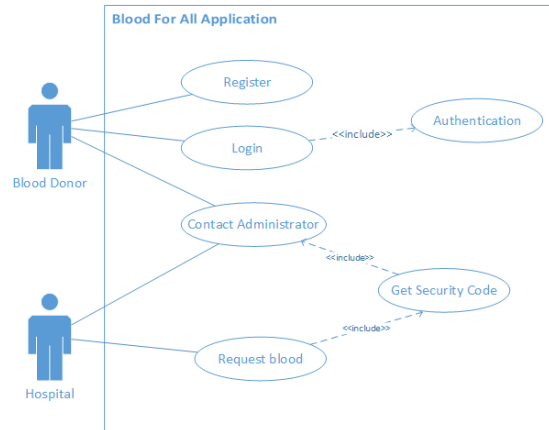


Fig. 1. Use Case Diagram

In the Fig. 1 use case that the main functional requirements of the Android application are depicted. The use cases are

- Registration and Login of blood donor details
- Request for a specific blood group
- Notification of blood emergency requests to blood donors

In addition to that contact administrator is also a functionality which is needed for various purpose. Following are some purposes of the contact administrator functionality:

- A hospital to join the application
- To make complains
- To suggest improvements

2) Architecture Design

Fig. 2 is an illustration of the architecture of the application. Users and hospitals access the application server through the internet. Web server does the necessary task according the requests. If the user registration request is received the details of the user will be saved. If the blood donor request is received, web server will first locate the users with the specified blood group and after that it will locate the nearest users based on their current GPS and given address. For that location finder of the Android application is used. After that notification will be sent to the selected users using the notification manager facility of Android.

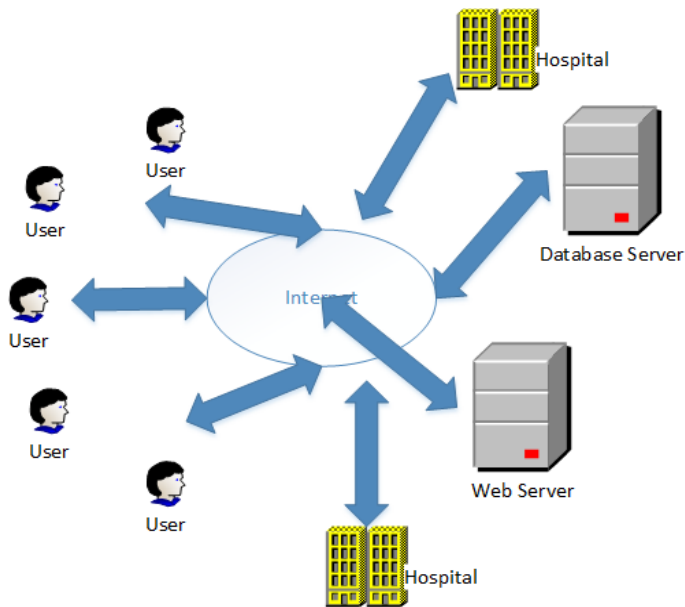


Fig. 2. High level architecture diagram.

Model-View-Controller (MVC) architecture (Fig. 3) is used for the design of the application architecture, since it can be easily handled in Android. MVC supports flexibility by separation of responsibilities [6]. Fig. 3 describes the overview of the MVC architecture of the application.

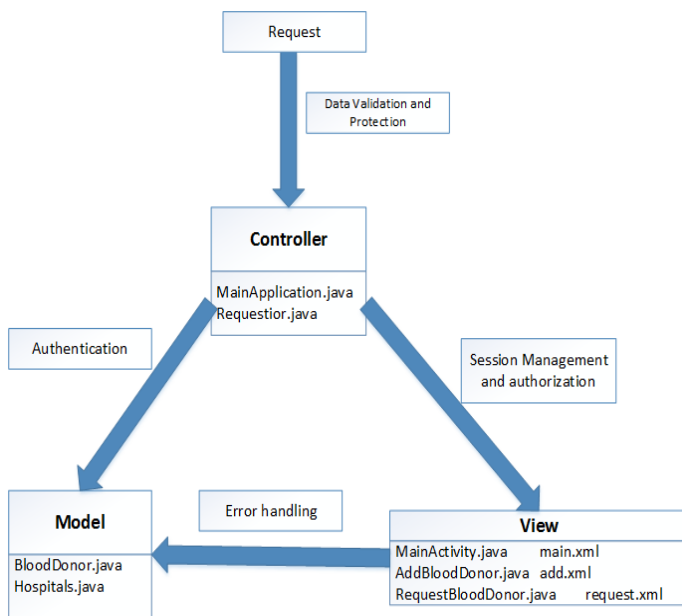


Fig. 3. MVC architecture diagram.

In this model the application is divided into 3 separate components called model, view and controller. They are interconnected. Controller controls overall application. View get the support from model and controller in order to output to the user. Model is used to save the temporary data of the application.

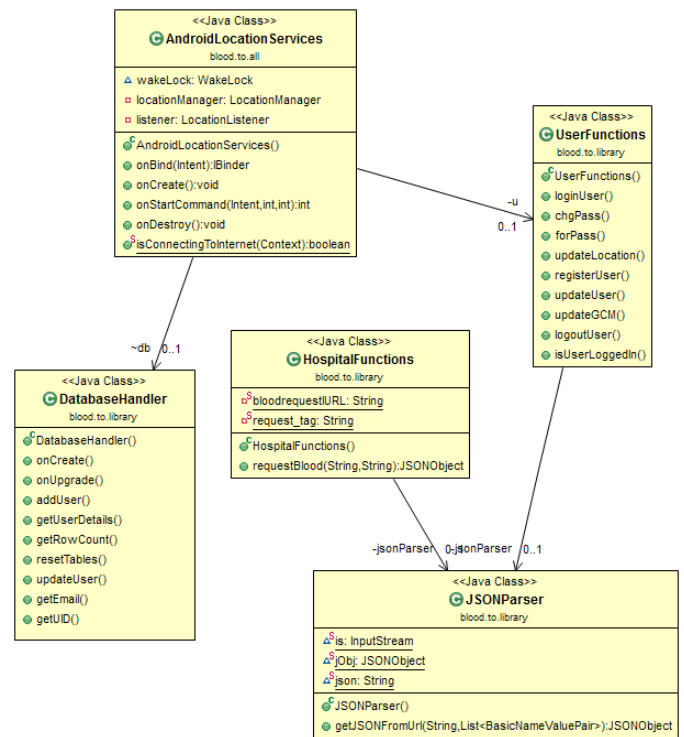


Fig. 4. High level class diagram.

3) User Interface Design

Screen shots of the user interface design are depicted in Fig. 5, Fig. 6, Fig. 7 and Fig. 8. They are designed carefully, in order to build an application with the improved usability. Screen shots of the user interface design are follow. They are designed carefully, in order to build an application with the improved usability.



Fig. 5. Splash Screen.

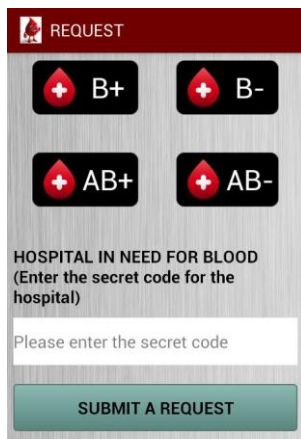


Fig. 6. Blood request screen.



Fig. 7. Eligibility requirement screen.

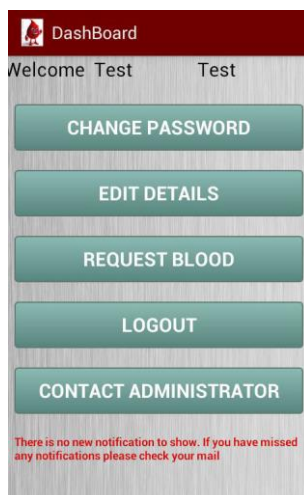


Fig. 8. Blood donor user panel window.

IV. SYSTEM EVALUATION & OUTCOMES

Unit testing on this app is done using the JUnit [7] testing mechanism and the integration testing is done using the

Robotium library [8]. Robotium library is also used for testing the user scenario and possible sequential flows of user clicks. Performance of the mobile application is tested using Trace View, which revealed the CPU time needed for each operation.

V. CONCLUSION & FURTHER IMPROVEMENTS

Detailed description of the project development and tastings are given in this paper.

Since there is a problem in the message receiving mechanism using GCM, it is expected to use some other similar mechanisms to make the application more usable in near future. Currently the hospitals are expected to enter the security code for requesting the blood. But there is possibility of finding out the security code using the brute force attack. Therefore, in the future it is planned to design a separate interface for hospitals and to allow the hospitals to login through it. It will be more secure than the current security code mechanism.

In near future it is also planned to publish this application in Google play market. Since this is a blood donor search and notification application based on Sri Lanka, I have planned to visit some of the most popular hospitals in Sri Lanka and to introduce my application to them. So that I can get a good market for this application because this application is purely based on social service without profitability purpose.

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