Yarmouk University

Faculty of Information Technology and Computer Sciences

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Project Title

A Drop Equals Life Application

Project Team

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Contents

Abstract:

The need for blood is important for various treatments in medical field. For every second someone needs blood to save their life. The task of the blood bank is to receive blood from different donors, to monitor the database of blood types and to send blood required when needed in an emergency hospital. The problem is not the lack of enough donors but finding a willing donor in the right time. We want to build a network of people who can help each other during an emergency. This application updates the donor information in the right time. Many blood donors are attracted by the Android app. Since almost everyone has a mobile phone, it ensures instant tracking and communication with the site. In this application we use Google map technology that will be used to track the path to the hospital. The user will get on the way to the desired location without asking about it manually, so time can be saved.

We have implemented this project to facilitate the process of finding the blood type needed by the patient.

A Drop Equals Life Applications an application that solves a frequent problem, which is to find the blood type needed by the patient and will help the hospital to find the blood type needed by the patient in the shortest possible time.

1. Introduction:

Despite all the advances in medicine and technology, alternative medical methods have not been found in blood, blood components or blood derived products yet. Blood can only be supplied by live donors. Blood transfer was responsible for saving millions of lives each year around the world. After the quantity and quality of blood available for blood transfer remains a major concern worldwide, especially in

developing countries. There are also hospitals where there is no blood bank and cannot reach donors easily because there are no donors with the same blood type and because there are eight different blood types: O +, O-, A +, A-, B +, B -, AB + and AB-. Each blood type has unique properties.

Blood type	You can give to	You can receive from
A+	A+, AB+	A+, A-, O+, O-
A-	A-, A+, AB-, AB+	A-, O-
B+	B+, AB+	B+, B-, O+, O-
B-	B-, B+, AB-, AB+	B-, O-
O+	O+, A+, B+, AB+	O+, O-
O-	All Blood Types	O-
AB+	AB+	All Blood Types
AB-	AB-, AB+	AB-, A-, B-, O-

Figure 1: Blood types matches

Blood donation occurs when a person withdraws blood and uses blood transfer. There's no end to the benefits of donating blood for those who need it such that you'll get a mini-medical, reduces your risk of heart disease and cholesterol and you are removing 225- 250mg of iron from your body, reducing your risk of health complications [1].

Today in the developed world, most blood donors are volunteers who donate blood for community supplies. Supplies are limited to many people because there are no specific bloods available and blood donors usually give blood when family or friends need blood transfer (targeted donation).

In Jordan, donating blood is a prominent tradition among Jordanian population. According to Ministry of Health statistics, only 3.3% of Jordanians (6.5 million people) donate blood, which places Jordan on list of nations considered "developed" [2].

Blood donors are always welcome. By choosing to donate blood, you are playing an important role in protecting your health and that of the people. In fact, chances are you or one of your family members will need blood or a blood product at some point in your lives.

Computers and mobile phones are very important in storing data safely and easily in a short period of time. Therefore, A Drop Equals Life Application aims to provide different blood types, thus facilitating the acquisition of blood types required for the patient, and in order to maintain the recruitment of blood continuously, blood banks must carry out a campaign to encourage people to become registered volunteers. Also, they must facilitate the process of donating blood with the help of new technology in order to increase donor readiness and accessibility.

2. Literature review and Background:

2.1 Literature review:

In this section, we will talk about some related applications that contain the same concept as part of them, and we will show some of these applications:

- The application of Blood Donor Finder provides the opportunity to find blood donors by geographical location. It gives a chance to life to the person who needs it most. The young Lebanese Wissam Attia has succeeded in employing technology in the medical field, where he succeeded in creating this application to facilitate the process of donating blood [3].

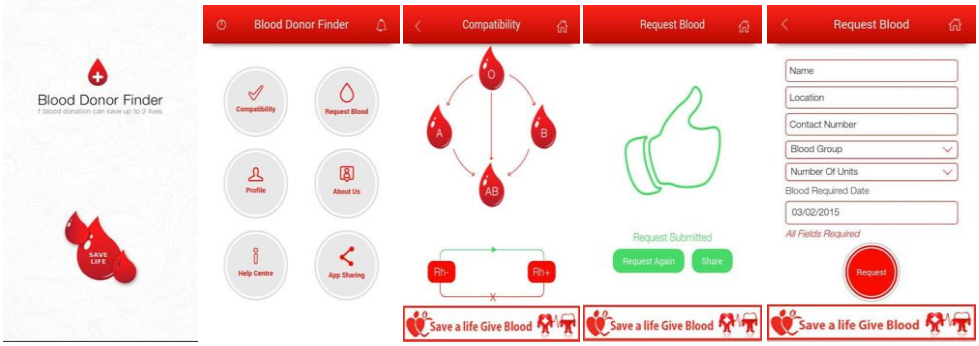

Figure 2: Interface for Blood Donor Finder

- Revive is a blood donor finder android application which will helps users to find nearby donors and for donors to find blood requests. This application works to create a bond between blood giver and receiver. It will make the blood search much easier for who are seeking it. This works both for the giver and receiver. The searcher can request blood through this application and eligible giver is issued a notification through the application [4].

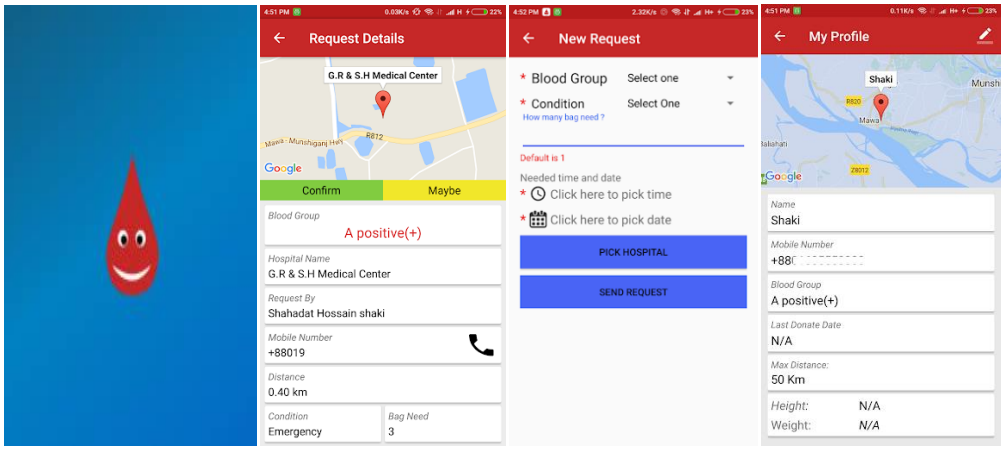

Figure 3: Interface for Revive

- Friends2Support is an android mobile application that enables Blood donor registration upon OTP verifications. This refers to

One Time Pass code that verifies a user email address or mobile number during registration by the submission of a one-time pass code. Once the OTP is entered, it is verified, and the user gets registered. Blood donor's login, edit, delete profile, change password, Location based voluntary blood donors search, you can call donor directly, Send SMS and WhatsApp donors details [5].

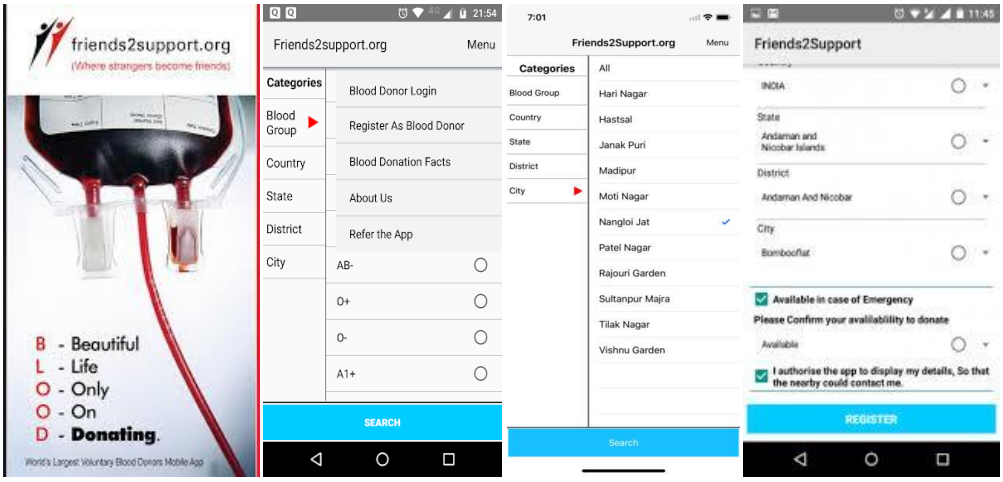

Figure 4: Interface for Friends2Support

2.2 Background:

The system has the potential to cover every place is near and reach much more people. The development of the mobile application for all types of smart phone devices will provide more opportunities for easier usage of the system and faster finding of necessary information concerning the blood donation process and needs. In the long term, the project would contribute to positive change of the attitude of the society towards voluntary blood donation. It will educate, inform and make a step towards overcoming the shortage of blood.

Currently, the problem has been addressed by a few organizations such as World Health Organization who are trying to do it. However,

these efforts are rare and limited and not only affect the global picture. No organizations offer a similar system or provide a real solution to the same problem.

3. Contribution and Objective:

A Drop Equals Life Application is an application designed to find blood donors, encourage users to donate blood and highlight the importance and need of more voluntary blood donors. The proposed system is used by the hospital to notify their blood needs for live donors. When a blood request is determined in the system, if the blood cannot be supplied from the blood bank of the hospital, the system sends a request for live donors from the same area by applying the mobile phone installed in the donor's smart phones and interpreting the response from donors. If there is any positive response from the living donors, the order will be delivered to the hospital as soon as possible. Therefore, the infrastructure is designed as flexibly as possible, in order to ensure easy exchange of data between the donor and the hospital, each with a different infrastructure.

The objectives of proposed system are as follows:

1. To bridge the gap between blood donors and hospital, through this system.
2. To facilitate the search process for blood donors and make it easier than before.
3. To provide fast, easily accessible, safest, most reliable and most cost-effective system for patients and donors.
4. Some blood types are rare so the system can find the required donors with the required blood type easily from the huge database by using search android app.

5. To provide dynamic database that is storing donors Information and can communicate with them easily.

4. System Analysis:

4.1 System User:

- Admin, who manages the system.
- Blood donors and hospitals, who are affiliated with the system.

4.2 Functional Requirement:

4.2.1 Functional Requirement for Hospital:

- The system should provide for each hospital its own account and own location.
- The system should allow hospital to sign in.
- The system should allow hospital to reset their password in forgot case.
- The system should allow hospital to change their name, password and phone number.
- The system should provide to the hospital the possibility to request a specific blood type.
- The system should provide to the hospital the possibility to select a specific radius.
- The system should provide to the hospital the ability to see the available blood donors.
- The system should allow hospital to send requests to blood donors.
- The system should show to the hospital the history of successful donations including the name of the blood

donor, phone number, blood type, date of donation and they can call blood donors.

- The system should allow hospital to track blood donor's status (accepted/declined/cancelled/arrived) and call blood donors.
- The system should allow hospital to logout.

4.2.2 Functional Requirement for Donors:

- The system should allow blood donors to create an account by their email, name, password, phone number, blood type, age, gender, profile picture, last date of donation and diseases (diabetes, heart, asthma, cancer).
- The system should allow blood donors to sign in by enter their email and password.
- The system should allow blood donors to reset their password in forgot case.
- The system should ask for location permission when it's not granted.
- The system provides to blood donors a switch (On/Off) to change their availability.
- The system prevents blood donor to turn switch on if he has a disease or his age less than 18 or more than 65.
- The system should allow blood donors to accept or decline the request from hospital.
- The system should send notification to the blood donors when they receive a request and press on it to open the app.

- The system should send notification to the blood donor who close the app when he is available, not in request and he can press on it for more information.
- The system should give the ability to blood donors to close the app when they are in request.
- The system should allow blood donors to cancel request.
- The system should allow blood donors to change their name, password, phone number, profile picture.
- The system should send notification to the blood donor when he arrived and press to it to open the app.
- The system should show to the blood donors the history of donations including the name of the hospital, phone number, date of donation and blood donor can call hospital.
- The system should allow blood donors to logout.

4.3 Non-Functional Requirement:

- The system should be secure.
- The system clear.
- The system should be easy to manage.
- The system should be available 24 hours.
- Usability.
- Reliability.
- Performance.

4.4 Use Case Diagram:

When A Drop Equals Life Application is opened by blood donor, he can either sign up or sign in. When he became signed in, he can accept or decline or cancel blood request from hospitals, update his profile (name, passwords, phone number, profile picture and diseases), view

their successful donations, view hospital info (name, phone number, date of donation) and logout.

Each hospital has already an account and specific location. When hospital is signed in into A Drop Equals Life Application, it can make a blood request for specific blood type and radius, update profile (name, password and phone number), view blood request information (name of blood donor, phone number, status), view blood donor’s successful donations(name of blood donor, phone number, date of donation) and logout.

Administrator can manage hospital and blood donor's accounts(add/delete/edit).

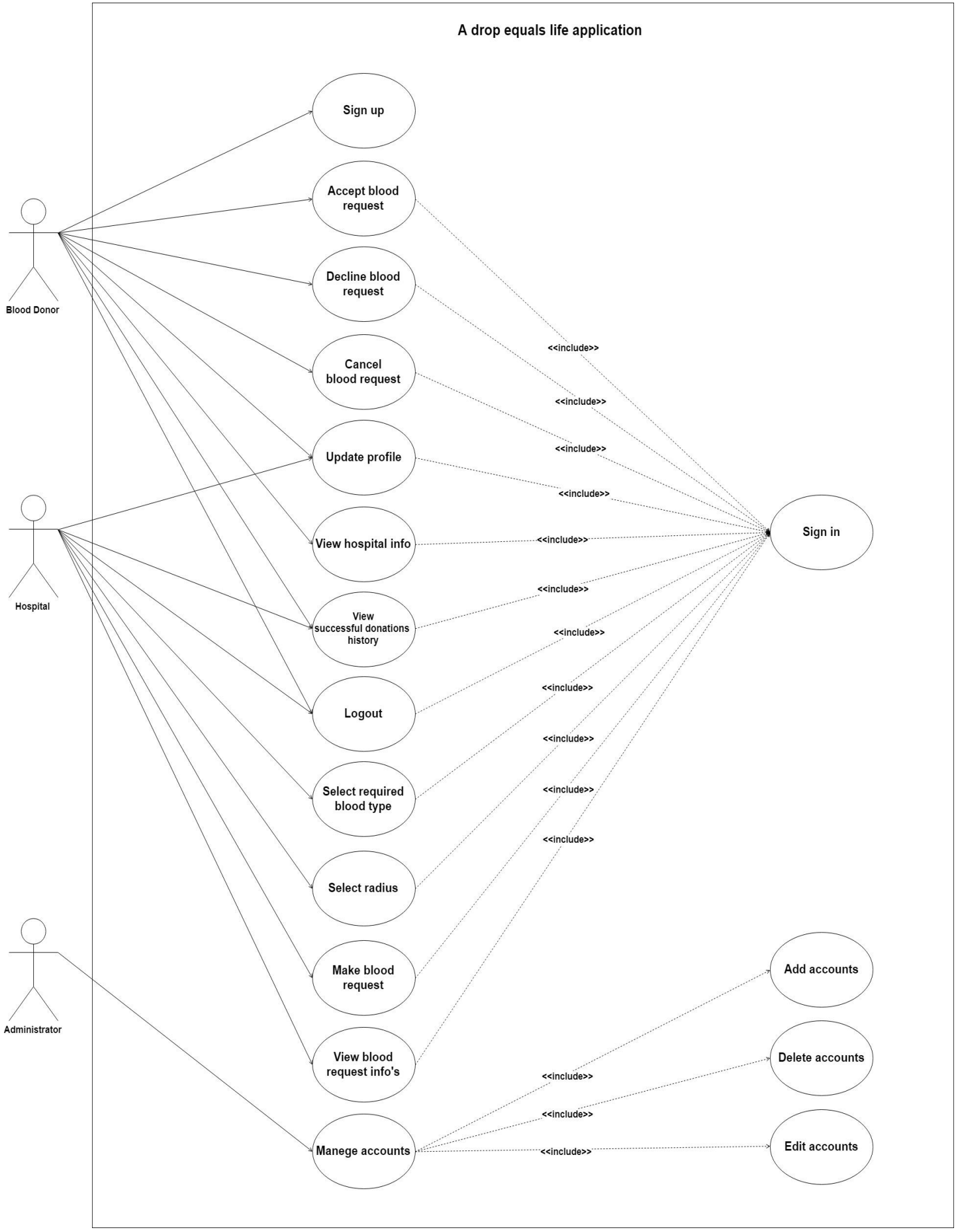

Figure 5: Use Case Diagram of A Drop Equals Life Application

4.4 Data Flow Diagram:

4.4.1 Data Flow Diagram level 0:

A Drop Equals Life Application give hospitals the ability to select required blood type, radius to show the available blood donors, send requests to them and know about blood donor decisions.

It also provides to the blood donors the ability to accept or decline the requests.

Administrator can manage blood donors and hospitals accounts and get a report of both from application.

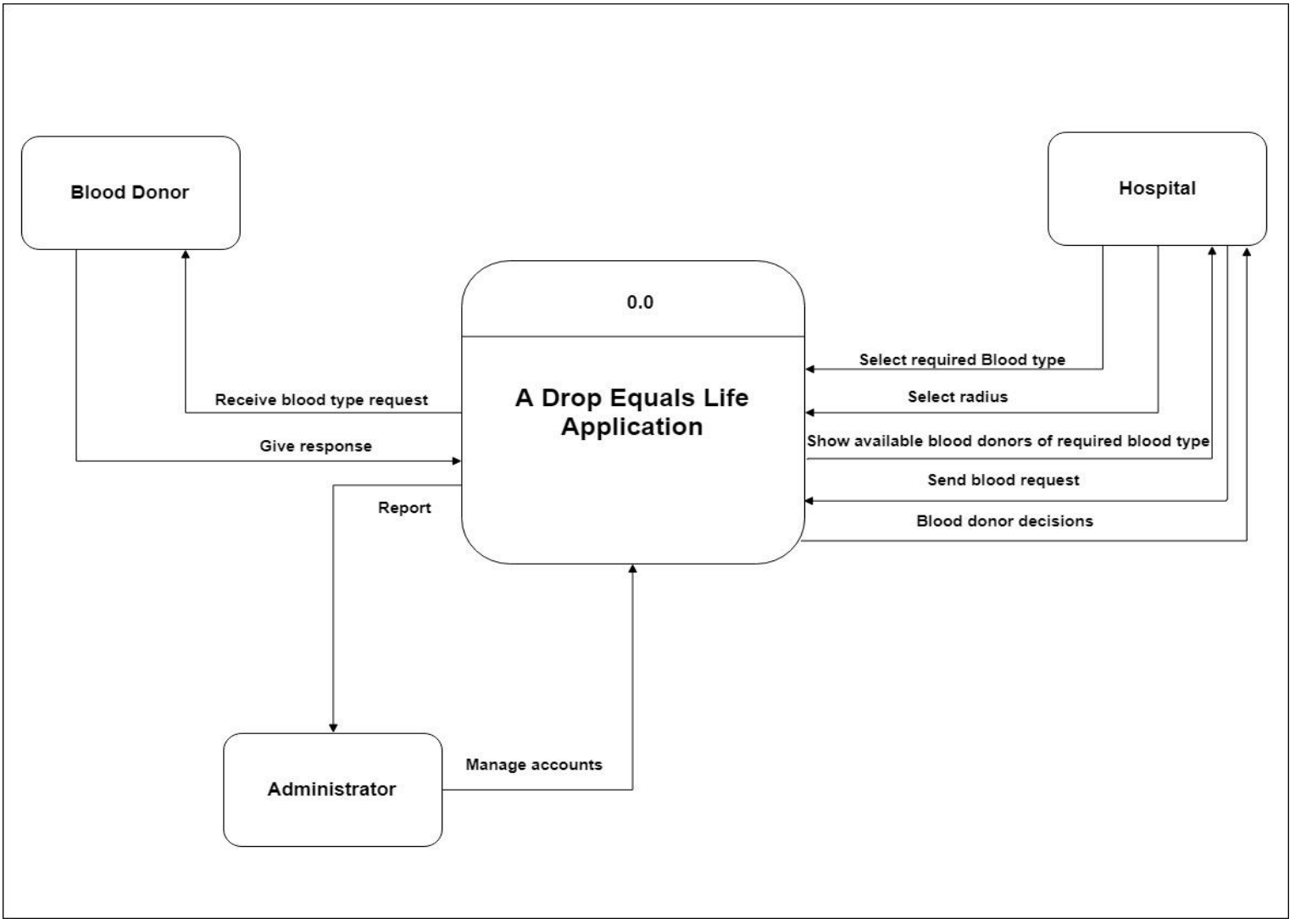

Figure 6: Data Flow Diagram level 0 of A Drop Equals Life Application

4.4.2 Data Flow Diagram level 1

A Drop Equals Life Application provide to the blood donors to create their own accounts, view their successful donations, update their profile information(name, passwords, phone number, profile picture and diseases), where application will request from them to enter their information such that email, name, password, phone number, blood type, age, gender, profile picture, last date of donation and diseases (diabetes, heart, asthma, cancer). Where this information will be stored into database.

A Drop Equals Life Application provide ready created accounts to the hospitals and own location, they can update their profile (name, password and phone number), ability to request and search for blood type by selecting required blood type and radius. Where hospital will get the information of available blood donors from the database and send requests to them.

When hospital send request, available blood donor will be notified about the request. Where blood donor can accept or decline the request, cancel the request, view hospital information (name, phone number, date of donation), blood donor decision and arrival and cancelation will be updated in his status, all that done using database where each step is stored in it.

Administrator can manage hospitals and blood donor's accounts(add/delete/edit), where he can get and give information from/into database.

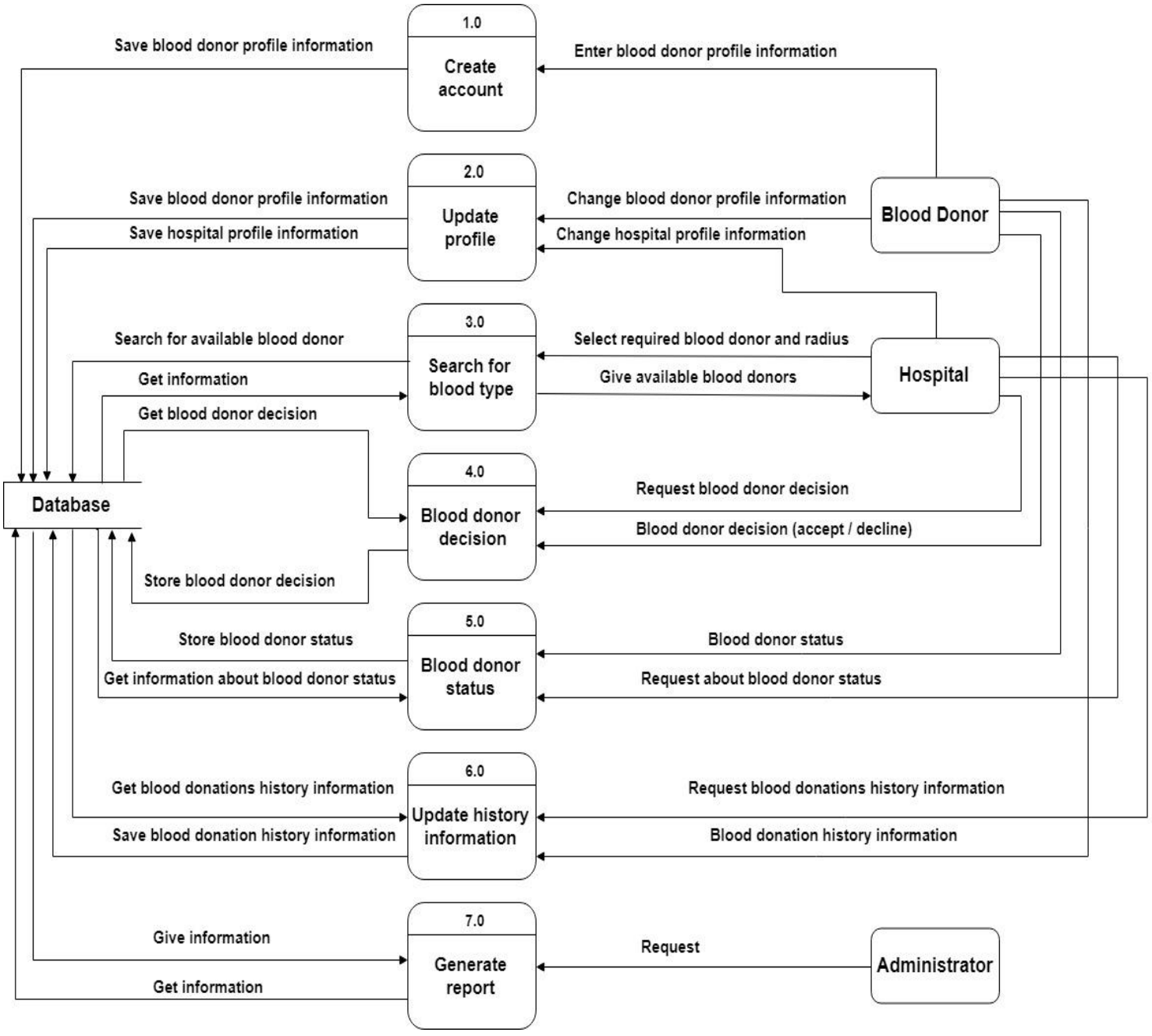

Figure 7: Data Flow Diagram level 1 of A Drop Equals Life Application

5. Algorithmic Design:

5.1 Pseudo Code:

```
if (account type is hospital)
        enter (email, password);
        press (login);
        if (forgot password)
                send email to reset password;
        end if
        while (valid hospital is false)
                display on screen (fail massage);
                enter (email, password);
                press (login);
         end while
         if (location permission is false)
                set location permission to true;
                detect hospital location;
                put hospital marker at its location;
        else
                detect hospital location;
                put hospital marker at its location;
        end if
        if (hospital needs blood is true)
                select required blood type;
                select radius;
                send blood type requests;
        else
                wait;
        end if
else
        if (blood donor has account ())
                open (sign in activity);
                enter (email, password);
                press (login);
                if (forgot password)
                        send email to reset password;
                end if
                while (valid user is false)
                        display on screen (fail massage);
                        enter (email, password);
                        press (login);
                end while
        else
                press (create a new account);
                open (signup activity);
                enter (email, name, password, phone number, blood type, age, gender, profile picture, last date of donation and diseases);
```

```
        end if
        open (blood donor activity);
        change available switch (on/off);
        if (location permission is false)
                put location permission true;
        end if


        if (location permission is true)
                if (available switch is on)
                        if (age status is allowed and diseases status is allowed)
                                detect current blood donor location;
                                put blood donor marker at his current location;
                                if (blood donor has closed the app)
                                        give a message;
                                end if
                                if (blood donor received blood request from hospital)
                                        set blood donor decision (yes/no);
                                        give a message;
                                        if (blood donor decision is yes)
                                                update status;
                                                show shortest path to the hospital;
                                                start the ride;
                                                if (blood donor canceled the request)
                                                        update status;
                                                end if
                                                if (blood donor arrived the request)
                                                        update status;
                                                end if
                                        else
                                                update status;
                                        end if
                                else
                                        wait;
                                end if
                        else
                                give an error message;
                        end if
                else
                        wait;
                end if
        end if
end if
```

5.2 Flow chart:

A Drop Equals Life Application gives us two options when it's started, the first is blood donor and the second one is hospital.

In blood donor option, we can choose either sign in or sign up, to sign up blood donor needs to enter his email, name, password, phone number, blood type, age, gender, profile picture, last date of donations and diseases, in order to sign in, blood donor needs to enter his email and password then A Drop Equals Life Application will check if he is a valid user or not, if he is not he need to enter his email and password again, otherwise donor activity will open.

In donor activity, A Drop Equals Life Application will request the location permission, blood donor has a switch (on/off), this switch represents donor availability, when switch is on A Drop Equals Life Application will check his validity of age and diseases, if valid A Drop Equals Life Application will detect current blood donor location, put a blood donor marker at his location where donor now is available to donate, if blood donor closed the app permanently he will receive a notification that tell him that he is not available anymore else he will wait for a hospital request by pressing on home or back button or turn off the screen .

If blood donor received a blood request, then he can either accept or decline, he can also cancel the request, all that including his arrival will be updated as status of blood donor to hospital, when he accepts the request, he can close the app permanently.

In hospital option, hospitals will have already an account and own location, so they have only a sign in option, in order to sign in, hospital need to enter their email and password, then A Drop Equals Life

Application will check if it is a valid hospital or not, if it is not hospital needs to enter email and password again, otherwise hospital activity will open.

In hospital activity, A Drop Equals Life Application will request the location permission, detect current hospital location, put hospital marker at hospital location.

Now if Hospital needs a blood, they select required blood type and radius, A Drop Equals Life Application will search, give the available blood donors, hospital can send blood request to the available donors in selected radius.

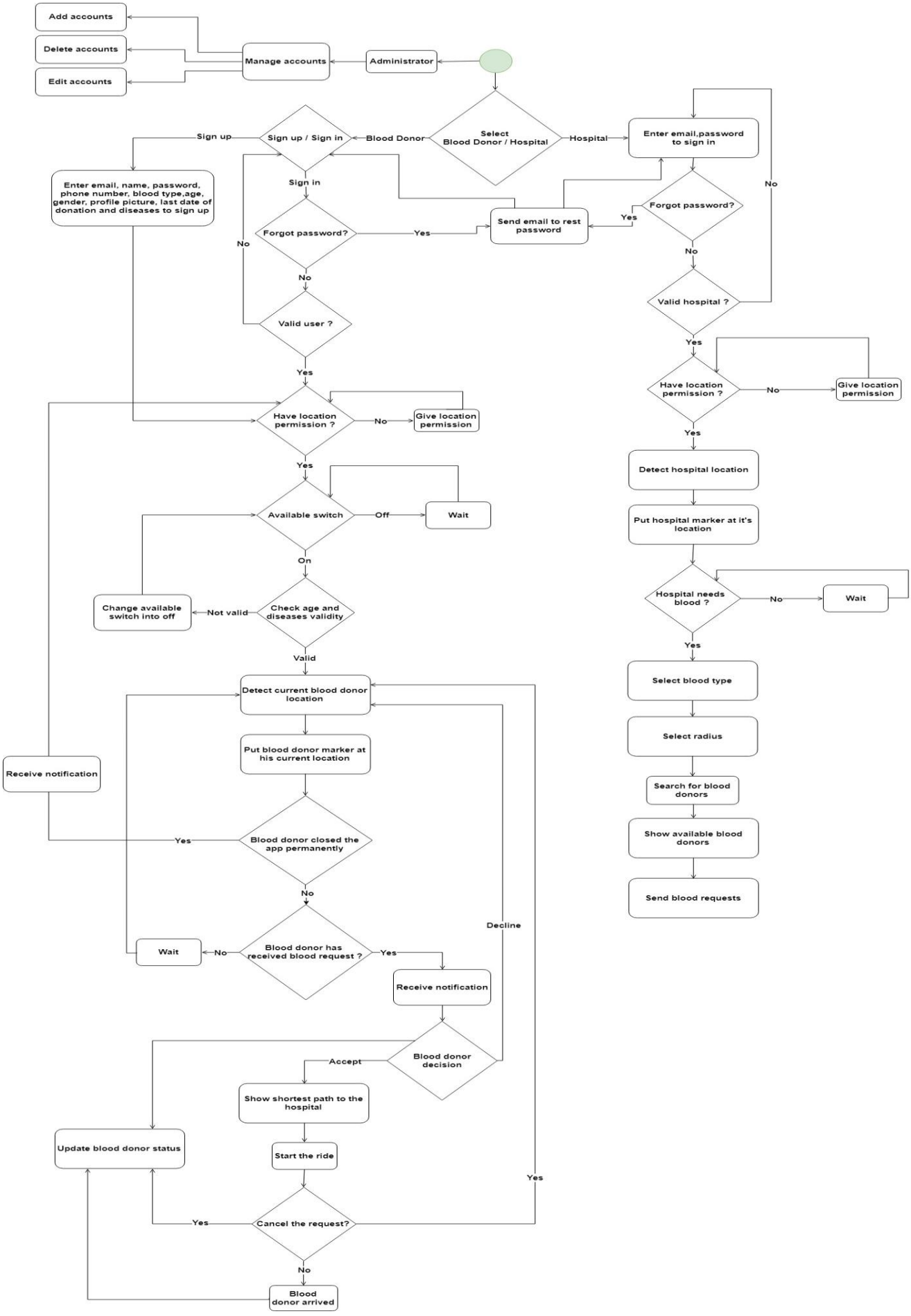

Figure 8: Flow chart of A Drop Equals Life Application

6. Application design:

6.1 The start-up:

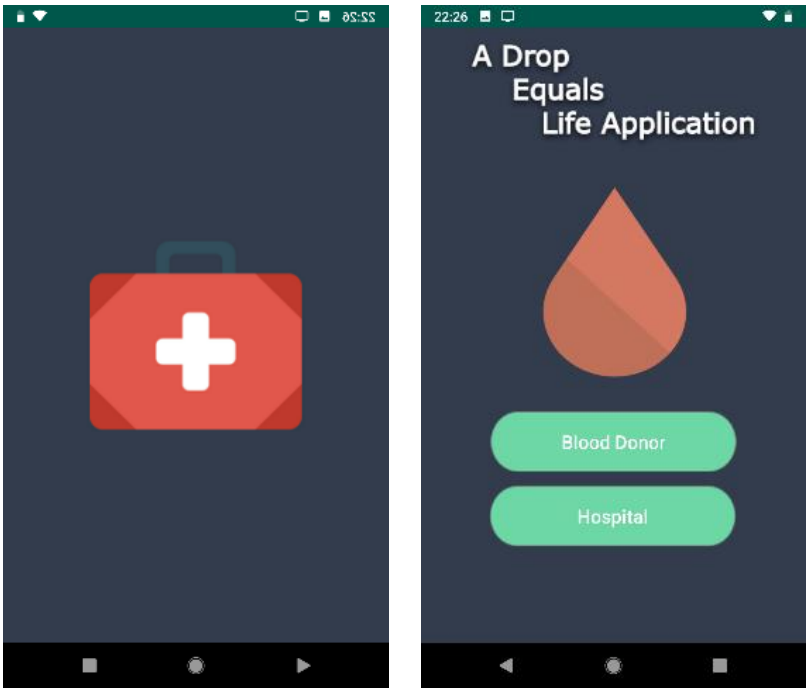

Figure 9: The start-up of A Drop Equals Life Application

When app is opened it will make user choose either blood donor or hospital as in Figure 9.

6.2 Blood donor:

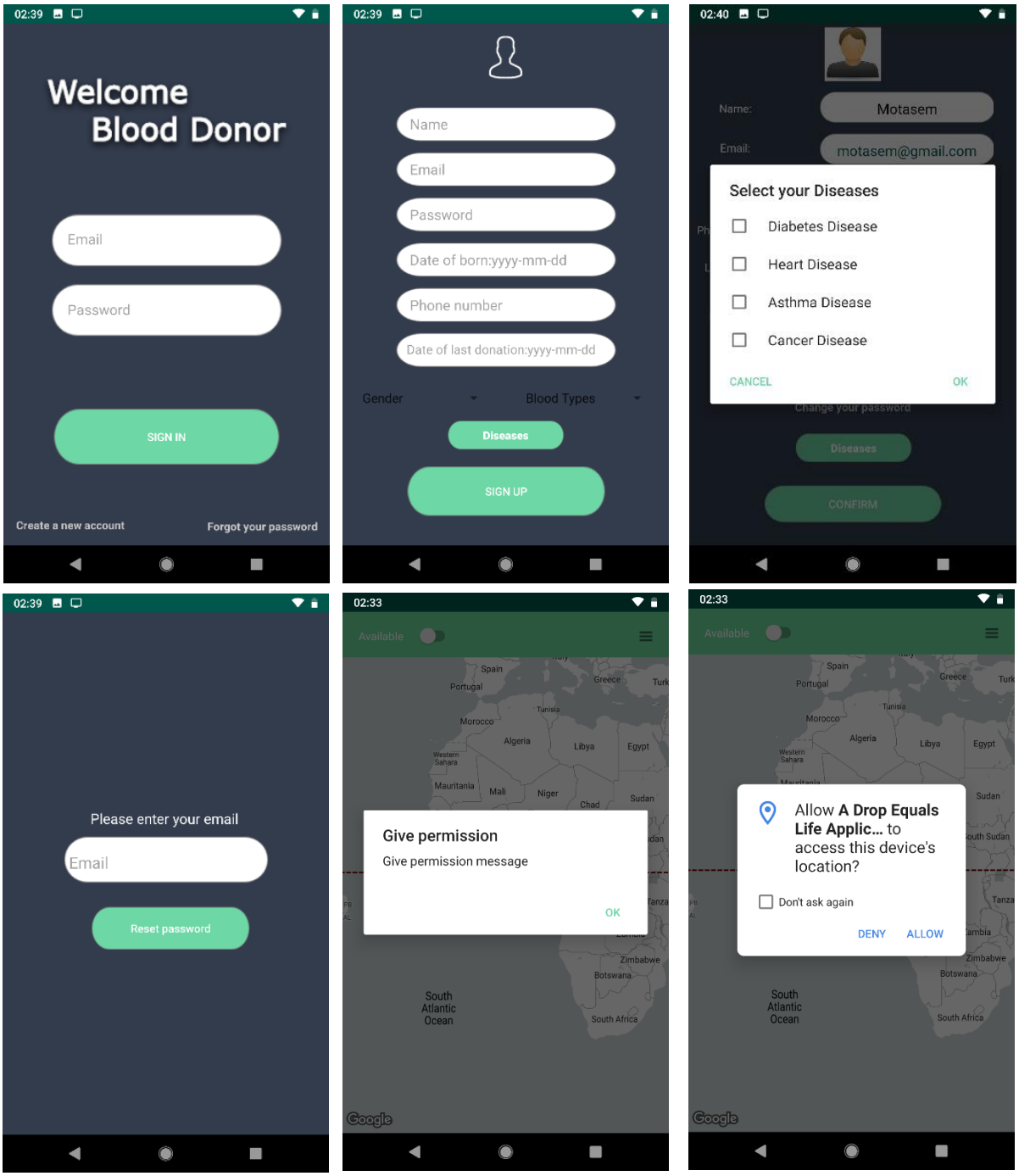

Figure 10: Blood donor Sign in/up and password forgot

When user choose blood donor, app will give a choice either to sign in or sign up or he can reset his password in forgot case, to sign up he needs to enter his name, email, password, date of born,

phone number, date of last donation, gender, blood type, diseases (diabetes, heart, asthma, cancer) and profile picture, to sign in he needs to enter his email and password , When blood donor became signed in, he will be requested about the location permission as in Figure

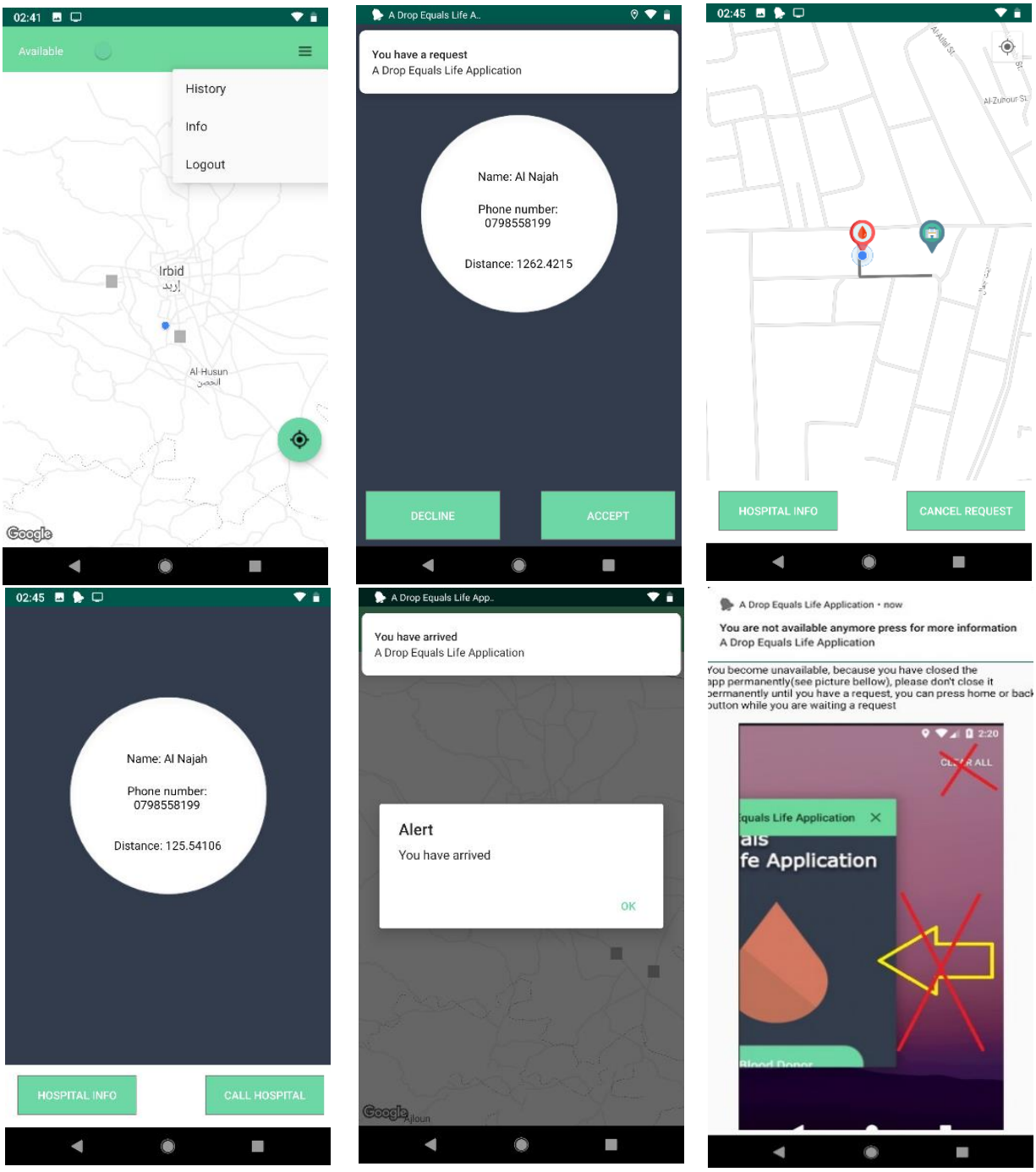

Figure 11: Blood donor request

When blood donor give the location permission, he can change the switch to become available to donate, when Blood donor become available and receive a request notification, he has two options either accept or decline the request, if his decision was accepted, the road will be drawn, he can call hospital, he can see hospital info, that show him hospital name, phone number and distance, he also can cancel the request and receive notification when he arrives , if blood donor become available and closed the app permanently he will receive a notification that he is not available anymore because he shouldn't close app permanently until he has a request he can press home or back button or close the screen while waiting a request as in Figure 11.

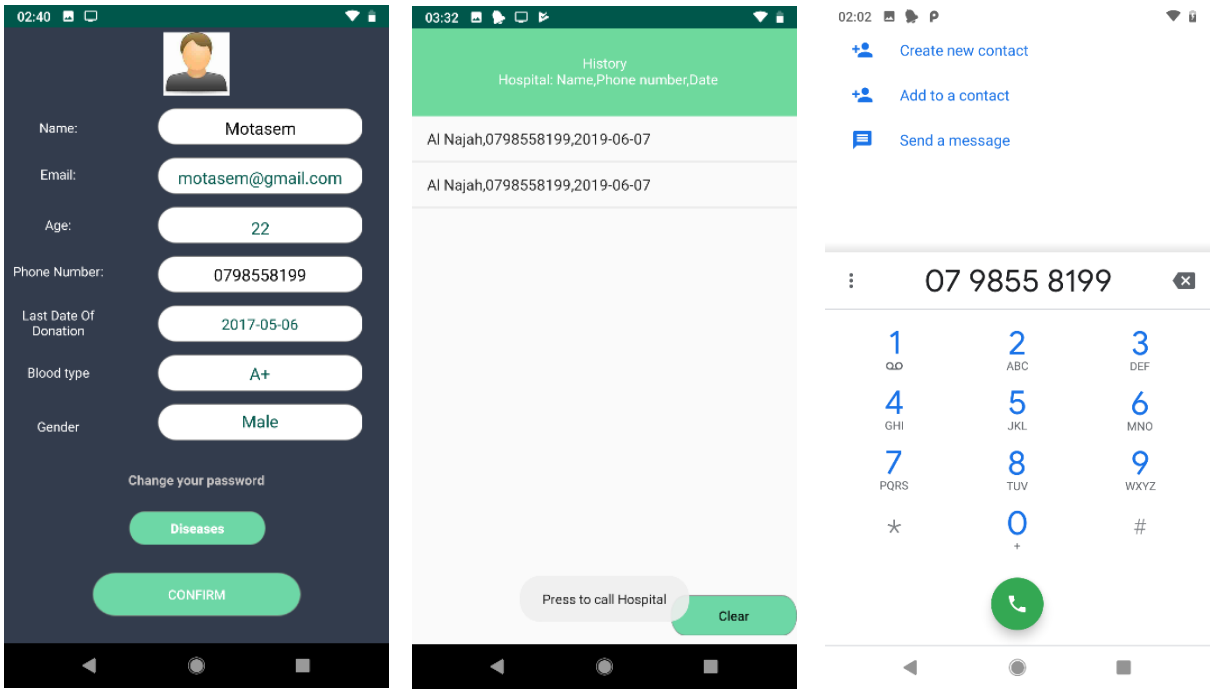

Figure 12: Blood door info and history

Blood donor can view his information where they can make changes on his name, phone number, password, he also can view the history of his successful donations that includes the name of

hospital, phone number, date of donation, call hospital by pressing on hospital in history and also there is a logout button as in Figure 12.

6.3 Hospital:

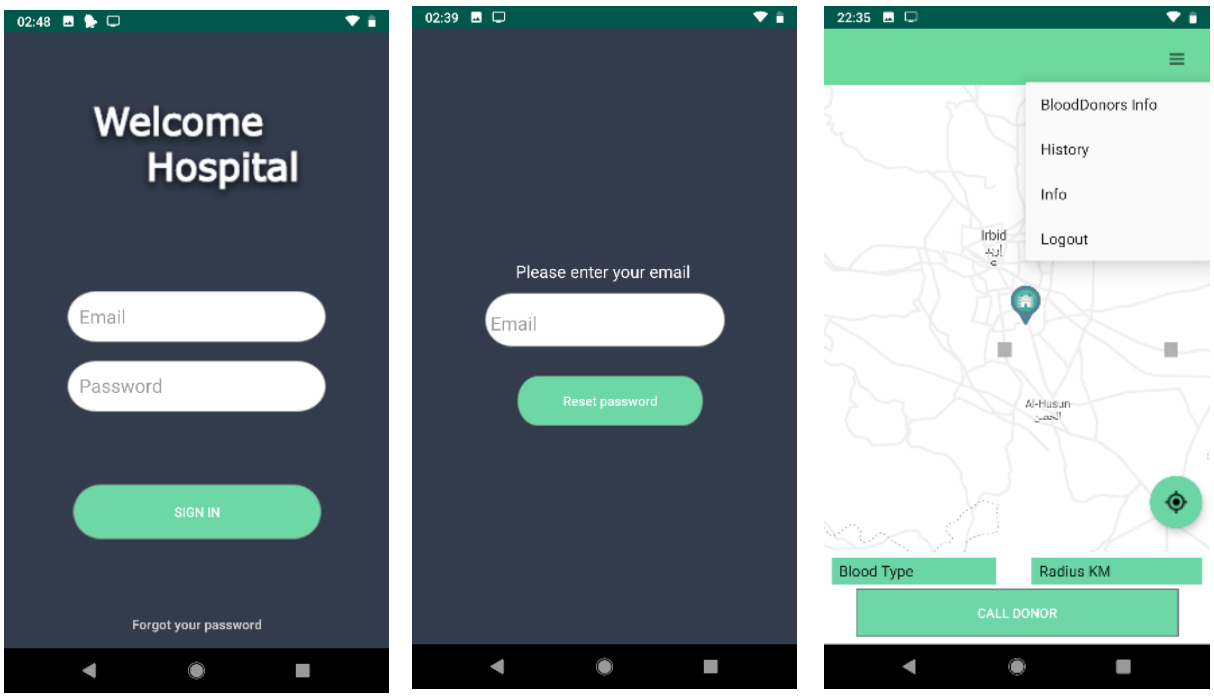

Figure 13: Hospital Sign in and password forgot

When user choose hospital, he has the ability to sign in or reset his password, to sign in, hospital needs to enter their email and password, when hospital became signed in it can select blood type, radius, see the available blood donors of required blood type and send blood requests as in Figure 13.

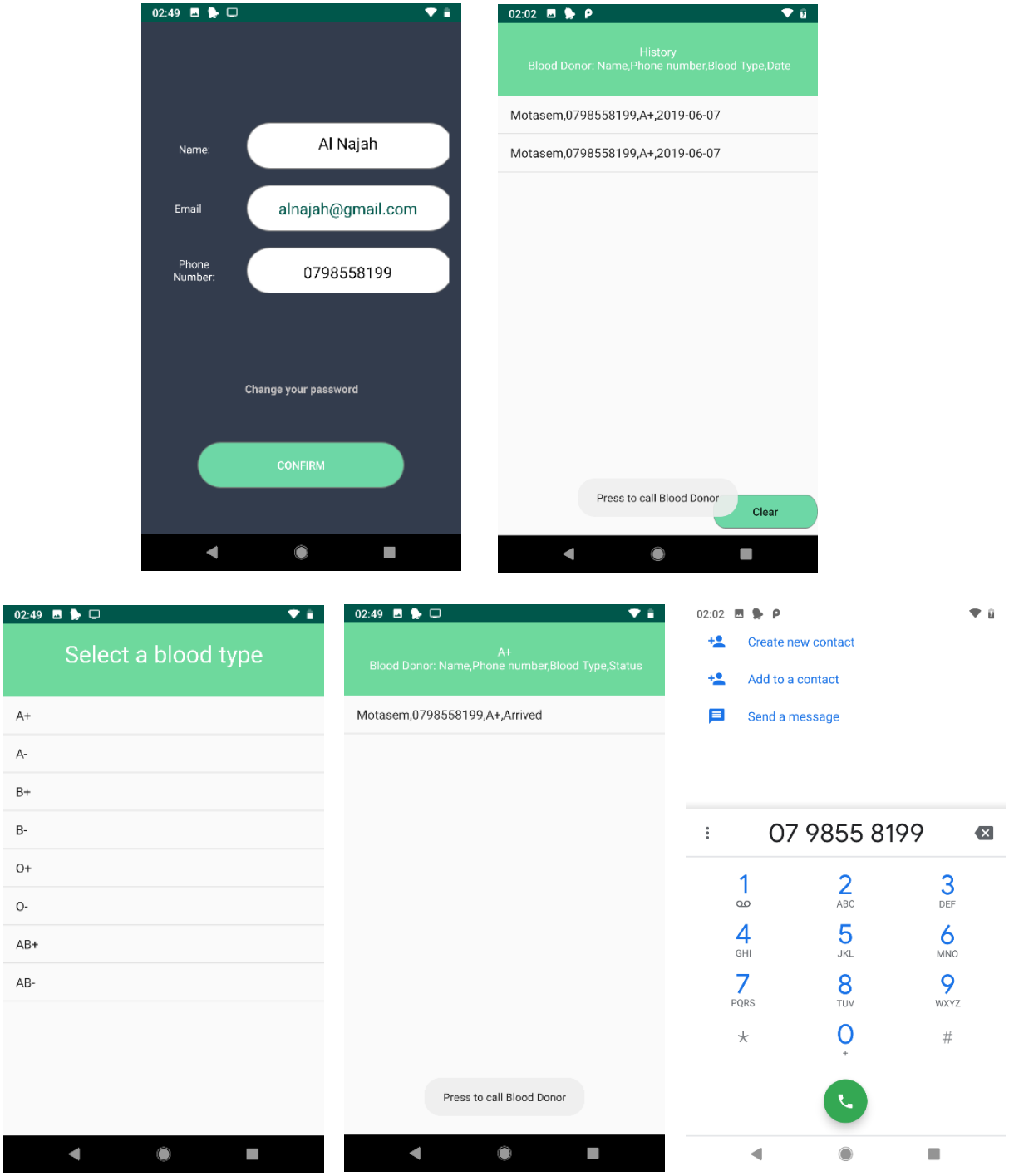

Figure 14: Hospital info, history and blood type status

And hospital have the ability to view their information, where they can make changes on name, phone number, password, also they can view the history of successful blood donations that have a clear button, it includes name of blood donor, phone number, blood type, date of donate, call blood donors by pressing on blood donor in history, also they can see the status of blood donors of requested blood type that will

be cleared in every new request of the same blood type, where they see the name of blood donors, phone number, blood type, status(accepted/declined/canceled/arrived), call blood donors by pressing on blood donor in selected blood type status, and logout as in Figure 14.

7. References:

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[2]5th World Conference on Educational Sciences - WCES 2013, Investigating Knowledge and Attitudes of blood donors and Barriers concerning blood donation in Jordan, Balkees Hesham Abdurrahman, Mohammad YN Saleh a MD, Faculty Of Medicine , University Of Jordan, Amman 11814, Jordan b RN, PhD , TVNS, Assistant Professor, Faculty Of Nursing, University Of Jordan, Amman, Jordan (https://ac.els-cdn.com/S1877042814005527/1-s2.0-S1877042814005527-main.pdf?_tid=4d1353af-b85b-480b-9dd1-5596abb3c9e7&acdnat=1552342253_fad13cc98923b190234399b2e8b6ca41).

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