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Blood bank management system

Abhishek Raj Nair
abhishekrajnair1@gmail.com
Marian Engineering College, Thiruvananthapuram, Kerala

Dhanush Krishnan U.
dhanush911gtr@gmail.com
Marian Engineering College, Thiruvananthapuram, Kerala

Emy Alphonsa Selastin
emyalphonsaselastin@gmail.com
Marian Engineering College, Thiruvananthapuram, Kerala

Tijo B. Gomez
tijogomez555@gmail.com
Marian Engineering College, Thiruvananthapuram, Kerala

Nitha L. Rozario
nithajino@gmail.com
Marian Engineering College, Thiruvananthapuram, Kerala

ABSTRACT

Blood is a fundamental component of the human body that is essential for human life; it delivers nutrients and oxygen to all body cells, and we chose the blood bank as our paper because of its significance. A real-time central blood bank management system based on Firebase was created to aid in the management of donor and seeker records, bloodstock monitoring, and providing a service that assures patients have speedy access to blood donors of any sort, whether volunteers, hospitals, or blood banks. The system was designed in such a way that both web-based and android-based platforms are being used. The web platform isused by blood bank system administrators to update available bloodstock information, manage blood requests and donor requests, and the mobile platform is used to search for blood supplies from registered blood banks or hospitals and motivates donors to donate blood by reminding them throughnotifications. As a result, this platform will play a critical role in making blood quickly available for patients in need, boosting the chances of saving their lives.

Keywords**:** *Blood Bank Management System, Cloud Storage, Donor, Seeker, Real-Time*

1. INTRODUCTION

The world's population is growing every year, and diseases and health problems are following behind. As the world's population grows, so does the demand for blood, as well as thenumber of potential blood donors. In comparison to non-remunerated donors, the number of voluntary donors has increased. Despite a rise in volunteer blood donors, many people are disqualified from donating blood due to a lack of knowledge about the procedure. Organizing blood donation campaigns necessitates going to the nearest blood bank to inform and obtain the necessary information, which is time-consuming and difficult. The demand for blood has expanded dramatically as a result of the expanding population and advancements in medical technology. With blood being a universal requirement, it has become more important for hospitals, clinics, and healthcare facilities to have readily available tools to assist in the identification and acquisition of donors for patients in need of various blood types. Because there is a dearth of contact between blood donors and recipients, emergency patients who require blood right away must rely on advertisements on television or social media. The majority of people who needed blood do not receive it on time,and as a result, they die. Even if they identify a donor, accepting blood from a possible donor is a lengthy procedure, and once the donor has been approved, additional personal details and information about the donor are necessary. The importance of synchronization among blood donors, hospitals,and blood banks cannot be overstated. Due to a lack of communication and coordination between blood banks and hospitals, blood is squandered.

Furthermore, in the event of a blood shortage, the existing mechanisms for accessing the donor database are ineffective. Ittakes a long time and costs a lot of money. As a result, it wouldbe advantageous if there was an automatic system and methodfor removing all of these flaws.

2 LITERATURE REVIEW

According to the data, India has the world's worst blood shortage, with a total shortfall of 41 million units and demand outstripping supply by over 400 percent, and need is on the rise. The global deficit is estimated to be 100 million units. Theproblem has hampered life-saving transfusions, which save thousands of lives each year by replacing blood lost due to surgery or injury, or providing it if the body is unable to produce enough blood. Patients with anemia, sickle cell disease, a bleeding issue like hemophilia, or cancer may require a blood transfusion. On average, a cancer patient requires at least 100 units of blood. Patients from other states come to AIIMS for treatment. When they are in

an unfamiliar location, it is difficult for them to arrange for blood. Naturally,people turn to blood banks for help. AIIMS has four blood banks, all of which strive to be fully stocked, yet even they suffer from time to time. As a result, voluntary gifts are critical.Women believe they are unable to donate blood because it weakens their immune systems. Menstruation is also considered a non-essential condition. Women's hemoglobin levels are typically low, which is one of the reasons they avoidblood donations. Due to a higher prevalence of blood-borne infections and problems during pregnancy, India extensively relies on transfusions. Every year, over 60 million trauma- induced procedures are conducted in the United States. Every day, it witnesses around 1,200 traffic collisions. Blood transfusion is required for 230 million major operations, 331 million cancer-related procedures such as chemotherapy, and 10 million pregnancy problems.
According to the WHO, appropriate supplies require atarget of 10-20 donors per 1,000 persons in any given nation.

According to government statistics, 34 out of every 1,000 eligible people must donate blood at least once a year in order to meet the expected clinical demand. If repeat voluntary non- remunerated blood donation is encouraged, the proportion canbe reduced. To meet population demands, the country needs to collect 20.3 units of whole blood per occupied bed, and 11.17 units of whole blood per occupied bed to meet yearly clinical needs.

2.1 State wise Scenario

In 2016, while 16 states and UTs faced a shortage of blood supply, 18 had an excess of it. Generally, Maharashtra, Punjaband Kerala are the best performers in blood donation, with eachstate having an excess of blood supply of more than 35%. States like Sikkim, who initially faced a shortfall, had increased availability by 22%, leading to a surplus of 4%. However, sadly, incidents of wastage of blood units collected are frequent to happen in such states. Shelf life of collected blood is only 30-45 days, which means excess of blood needs to be soon sent to all needy areas. On the other end of the scale are poor performing states like Chhattisgarh, Arunachal Pradesh, Uttar Pradesh and Meghalaya who have struggled to meet their blood requirements by more than 50%.

2.2 Existing System

The operation of blood bank is still now maintained in the manual or semi-automated method. Each blood bank or hospital has its own database that store blood details in it which when a user comes for a particular blood group, he or she must go through a series of paper works.

2.3 Drawbacks of The Existing System

Presently, India's blood transfusion system (BTS) is extremely uneven, with almost no interlinkages. In absence ofinteraction and connectivity between blood banks, there is ineffective supervision of demand as well as supply in terms ofaccessibility and value of blood. A lot of blood goes waste due to poor infrastructure. There's lack of uniformity, consistency and up-to-date regulation and policies of the blood banks. Thismakes the data susceptible to errors and human mistakes whichin turn puts human lives in danger. And there is no centralizeddatabase to big a mass track. A hospital may have its own system and blood bank but co-ordination between neighboring blood banks is practically impossible. There has always been blood shortage in most of the blood banks because the blood banks fail to organize voluntary blood donation camps on a regular basis. As a result, there is always pressure on patient toprocure blood when needed. Also, sometimes it absolutely wasdifficult to get in touch with the hospitals in emergency situations. There was no centralized database of volunteer donors. So, it became really tedious for one to travel searchingfor blood just in case of emergency. The only option in such situations is to manually looked for donors, match and then make phone calls to every donor. These points indicate the need and importance of voluntary blood donations and the needfor a proper communication and synchronization between donors, seekers, blood banks and hospitals.

3. OBJECTIVE

There will always be a high risk to the medical requirements like blood due to manual intervention and management of the blood packets and lack of inter and intra communication. Hence the main objective is to make sure thatthe system is automated so as to reduce or nullify this risk [8].This system intends to streamline the process of connecting blood donors, seekers and hospitals, blood banks. It helps to find blood donation centers quickly and easily and also provides users to book an appointment to make a donation. It helps users to track their donations. It helps seekers, blood banks and hospitals to request for blood without any hassle. Itsfuturistic objective is to work hand in hand with a machine learning algorithm that will predict which blood bank requiresmore number of a particular blood group as compared to other regions with respect to the type of population living near that blood bank. Hence an effective communication is established [8].

4. METHODOLOGY

We proposed and implemented a system whichsynchronizes donors, seekers, hospitals and blood banks using a centralized database. This system has three modules which is app platform, web platform and database. The full explanationand technical details of our system is provided the following sections.

4.1 App Platform

The app platform was developed for users to easily avail services. User needs to first go through the registration process where in he or she has to fill the basic details and then login with their username and password to avail services. They can seek and donate blood through this platform. Donorscan book an appointment according to their convenience to donate blood in nearby hospitals or blood banks and can view their next donation date. Seekers will be able to request for blood and the respective hospitals or blood banks will let themknow, if they have accepted their request. In case of emergencies, if one needs to know if there is any matching blood group nearby, he or she can view the blood stock detailsin each blood banks in the app homepage itself.

App platform is built using Flutter, an open source framework to create high quality, high performance mobile applications. It is based on Dart language. IDE used are Android Studio and Visual Studio Code.

4.2 Web Platform

The web platform was developed for hospitals and blood banks to enter blood stock details, to manage requests from seekers and to manage the appointments from donors. They have to register themselves in order to avail services.

Web platform is built using Html, CSS and JavaScript. Visual Studio Code is used as the IDE.

4.3 Firebase Real time Database

Here we use Firebase real-time database to implement centralized database to store details of user, hospitals and blood banks. Firebase is a backend platform developed by Google for creating mobile and web applications. It offers real time database, different APIs, multiple authentication types and hosting platform. Firebase real time database, an API that synchronizes application data across iOS, Android, and Web devices, and stores it on Firebase's cloud. This assists us in building real-time,collaborative platform. The Firebase real time database is a cloud-hosted database in which data is stored as JSON. The data is synchronized in real time to every connected client. Allof our clients share one real time database instances and automatically receive updates with the newest data. It uses data synchronization instead of using HTTP requests. Any connected device receives the updates within milliseconds. It doesn't think about network code and provides collaborative and immersive experiences. It is also optimized for offline use that is when users go offline, the real time Database SDKs use local cache on the device to serve and store changes. When the device comes online, the local data is automatically synchronized. The use of mobile and web SDKs allows us to build our platform without the need for servers. Firebase provides several built-in security features to help manage project security goals.

4.4 System Design

A summary of the methodology is shown in figure 1 showing three modules app platform, web platform and database.

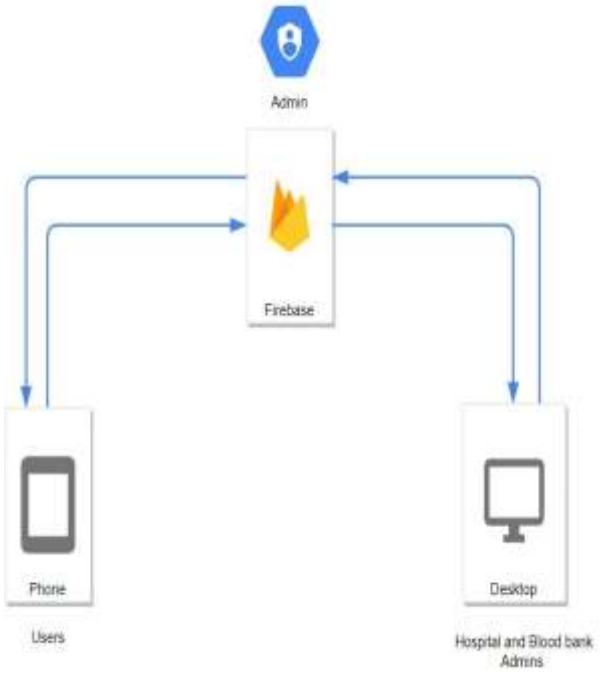

Fig. 1. Illustration of the system

5. RESULTS

The need for a web platform in this system is because the huge organization like the blood banks and hospitals have a classic reception model where the system needs to keep a track of the data and needs to have a better view of the activities going on [5]. It provides real time analytics of the donations and requests of blood.

Fig. 2. Registration page for blood bank

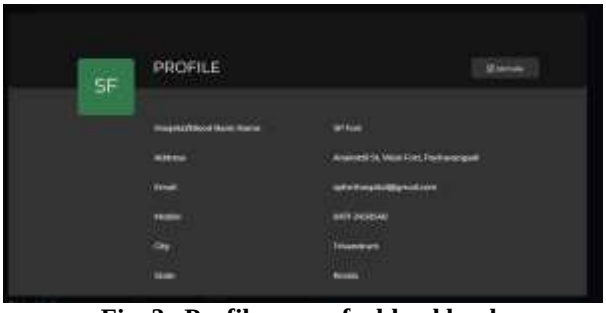

Fig. 3. Profile page of a blood bank

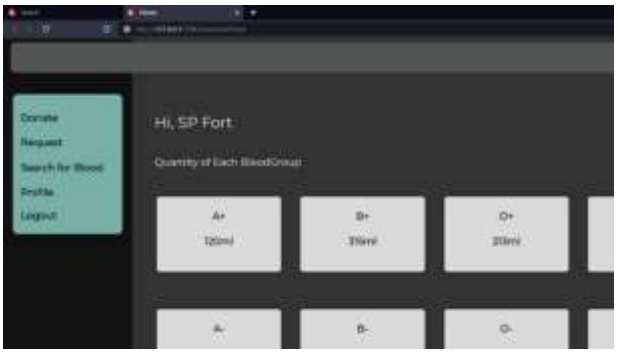

Fig. 4. Blood stock page

Fig. 5. Search page

Fig. 6. Database

Our Life Stream mobile application is available for android devices, having android version above 6. The app has many functionalities: a user can donate voluntarily as per the need ofvarious blood banks or hospitals near him. The user can send a donation request via the app, and can book an appointment as per his or her convenience. Users can also request for blood and the blood banks will notify whether their request has beenaccepted.

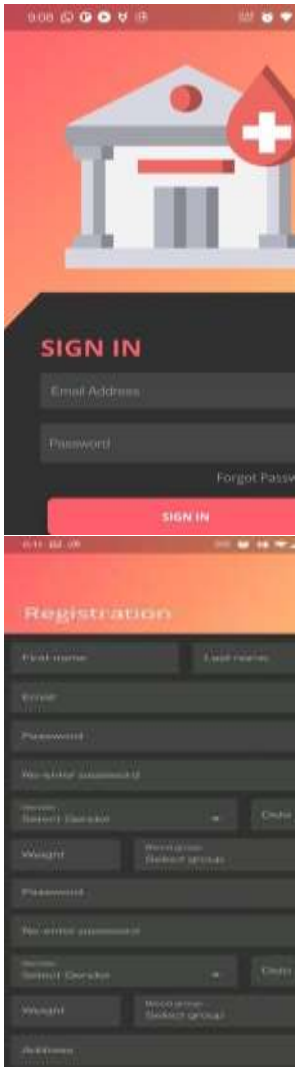

Fig. 7. Sign in and sign up page in app

6. CONCLUSION

This project focuses on how to meet the blood needs of victims or patients in need of blood by creating a communication platform to facilitate the blood request. To attain this goal, hospitals must be supported and collaborated with.

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