

# MINIPROJECT REPORT

ON

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Title

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE



## CERTIFICATE

This is to certify that the report entitled "Title" submitted by **Student A (SJC16CS004)**, **Student B(SJC16CS012)**, **Student C (SJC16CS033)**, and **Student D (SJC16CS033)** to the APJ Abdul Kalam Technological University in partial fulfillment of the requirements for the award of the Degree of Bachelor of Technology in Artificial Intelligence and Data Science is a bonafide record of the project work carried out by them under my guidance and supervision.

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## **Acknowledgement**

(You can specify the acknowledgement as you like to express. But you have to express acknowledgement towards Principal, HoD, Coordinators, Guide, any others you would like to, without mistake in their name. The following is a sample only. Those who would like to modify it in their own style may do it.) I wish to record my indebtedness and thankfulness to all who helped me prepare this Mini Project Report titled Mini Project Report Title and present it in a satisfactory way. I would like to convey my special gratitude to Dr. V.P. Devassia, Principal, SJCET, Palai, for the moral support he provided. I express my sincere thankfulness to Dr. Arun. P, Head of the department, Department of Electronics and Communication Engineering for his co-operation and valuable suggestions. Also I express my sincere thanks to Mini project co-ordinators Mr. Sreesh. P. R and Ms. Nitha M Biju for their helpful feedback and timely assistance. I am especially thankful to my guide, Assistant Professor, Department of Electronics Communication Engineering for giving me valuable suggestions and critical inputs in the preparation of this report. I also extend my thanks to all my friends who helped me by giving motivation. Their smallest piece of advice was really valuable. Once again I convey my gratitude to all those persons who had directly or indirectly influenced my work as a whole.

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## **Abstract**

Sample: A web application for managing various blood banks and donor-recipient operations efficiently is being focused. The project consists of a central repository of various blood deposits and donors available along with their associated details hosted on a cloud server. These details include donor name, blood type, medical details and location details. The project provides options to search and find whether a particular blood group is available in any of the blood banks or among the registered blood donors efficiently using cloud server. Search results would be listed based on the distance from the requester. The system generates emails requesting blood to the selected donors. Based on donor response and preference the system will provide the personal details, contact information and direction to each other using Google Geo location services. Moreover, the system will have added features such as posting blood campaign invitations on the dashboard and shows live blood request as a popup notification in the homepage. This online life saviour system is developed on PHP with Azure cloud platform and supported by Azure SQL database.

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# Chapter 1

## Introduction

Blood is a specialized body fluid. It has four main components: plasma, red blood cells, white blood cells, and platelets. Blood has many different functions, including:

- transporting oxygen and nutrients to the lungs and tissues
- forming blood clots to prevent excess blood loss
- carrying cells and antibodies that fight infection
- bringing waste products to the kidneys and liver, which filter and clean the blood
- regulating body temperature

The blood that runs through the veins, arteries, and capillaries is known as whole blood, a mixture of plasma and red blood cells. About 7 to 8 percent of the total body weight is blood.

### 1.1 Background

Blood requirement in any emergency situation is satisfied by the blood bank itself. Later the relatives of the patient will have to compensate the blood taken from the blood bank. This is because every blood bank needs to maintain a certain unit of bloods for every blood group. Though, rare blood groups such as Bombay group and AB- are not kept in

blood banks to avoid any wastage of them in case if it got expired. Hospitals keep the record of people with rare blood group. This is kept in extreme secrecy to provide privacy and security to them. Rare blood emergencies are met in hospitals by directly inviting these people, and no more than the necessary unit of blood required is collected.

## 1.2 Motivation

A medical emergency is an acute injury or illness that poses an immediate risk to a person's life or long-term health. Any response to an emergency medical situation will depend strongly on the situation of the patient involved, and availability of resources to help them. Every hospitals that handle emergency accident cases as well as hospitals which have an operation theater will have an integrated blood bank of itself. Those who are trained to perform first aid can act within the bounds of the knowledge they have, whilst awaiting the next level of definitive care. But hospitals cannot proceed to assist patients that may need any blood transfusion during treatment. Emergency cases arriving at a hospital without a blood bank is forwarded to any of the hospitals which have an integrated blood bank.

Suppose there is some patient who needs blood urgently then how you come to know about this condition, sometimes you will not even be able to reach to that patient on time even if you wanted to. People will go from one blood bank to another to get the blood which is time-consuming and sometimes not able to reach at the time. In some blood banks, sometimes we get the blood but that may not be sufficient, so we need to search for another blood bank for more blood. If some person wants to donate the blood he/she need to come to the bank and need to fill the form then the first doctor will check his blood group and health after that only he will be allowed for donating. All these situations are very time consuming and unreliable. As we mentioned blood banks keep a certain units of blood for every blood group. Maintaining this limit consistently eliminate the need to go for a blood hunt during an emergency situation. This can be achieved by donating blood as fast as its been used from a blood bank, and by keeping and maintaining an efficient database of blood donors who are willing to donate blood

periodically as well as when called for [1].

## 1.3 Objective and Scope

The main objectives of this cloud computing based web application is to help satisfy a blood request made from anywhere anytime by maintaining all the information pertaining to blood donors, different blood groups available in each blood bank and help them manage in a best way. This system provide transparency in this field, make the process of obtaining blood from a blood bank corruption free and make the system of blood bank management effective. The system intends to make the blood search process much more efficient and quick. For that no registration to web site is needed for the requester, they are only asked for basic details and verification to contact information. The search result is filtered and ordered in such a way that donors nearest to the person requesting is listed first. This system also help to keep records of patient name and contacts, blood booking and even need for certain blood group is posted on the website to find available donors for a blood emergency. This system is developed on Azure cloud using PHP platform and supported by a MySQL database to store blood and user specific details [2]. This web application along with all the services it provide, also helps to eradicate certain spam messages and mails circulating around regarding fake or already satisfied blood emergency situations. A single platform for maintaining all genuine blood related activities and information increases the trust of the public to get involved in these activities, and encourage them to participate in blood donations.

## 1.4 Contributions

# Chapter 2

## Literature Review

### 2.1 System Description

Donating blood is a safe, simple, and rewarding experience. When we arrive at a blood donation centre we will be asked to complete a donor registration form, which includes the name, address, phone number, and various other types of demographic information. He/she will also be asked to show the donor card or the type of identification required by the particular blood bank you visit.

Eligibility rules of the donor is to help protect the health and safety of the donor as well as the person who will receive a blood transfusion. Before donating, one of our medical professionals will discuss your health history with you in a private, confidential setting. After taking your pulse, blood pressure, and temperature and checking for anemia, we will determine whether you are eligible to be a donor. To donate blood or platelets, you must be in good general health, weigh at least 110 pounds, and be at least 16 years old. Parental consent is required for blood donation by 16 year old's, 16 year old's are not eligible to donate platelets. No parental consent is required for those who are at least 17 years old. If you are 76 or older, you will need your doctor's written approval for blood or platelet donation. Blood donors must wait at least 56 days between blood donations and 7 days before donating platelets. Platelet donors may donate once every seven days,

not to exceed six times in any eight-week period, and must wait 7 days before donating blood [3].

There are two types of blood donations- allogenic and directed. In 'allogenic' donation, a donor donates blood for storage in blood banks and this blood can be used for transfusion to any unknown recipient. In 'directed' donation, the donor is a relative or a family member of the recipient. There is a hybrid of these two called 'replacement donor' donation in which a friend or family member of the recipient donates blood to replace the stored blood used in transfusion, so that the availability of blood in blood banks is consistent. An event organized for people to donate blood is called a 'blood drive'.

Firstly, a consent for donation is obtained from the donor. The donor has to go through a series of questionnaire and tests to detect whether there are any health risks that can make the donation unsafe for the recipient. Donors are examined for symptoms of diseases such as HIV, malaria, and viral hepatitis, ie, diseases that can be transmitted in a transfusion.

If a potential donor does not meet the specified criteria for health, they are 'deferred', ie, he/she may be allowed to donate later when the health criteria is met. The donor is examined and asked specific questions about their medical history to make sure that the process of blood donation will not result in any hazardous effects on them. The donor's hemoglobin level is tested to make sure that the loss of blood will not make them anemic. The donor's blood type is usually identified as type A, B, AB, or O and Rh type is also identified. Tests including a crossmatch is usually done before a transfusion process. Type O negative is referred to as the "universal donor" in the case of red cell and whole blood transfusions. For plasma and platelet transfusions, AB positive is the universal platelet donor while both AB positive and AB negative are universal plasma donors.

The blood is tested for diseases including STDs [4]. A variety of tests for infections transmitted during transmission is also conducted. Sometimes multiple tests may be used for the determination of a single disease. At each donation, the following mandatory tests are performed:

- Hepatitis B – HBsAg
- Human immunodeficiency virus – anti-HIV 1 and 2 and HIV NAT (nucleic acid testing)
- Hepatitis C – anti-HCV and HCV NAT
- Human T-cell lymphotropic virus – anti-HTLV I and II
- Syphilis – syphilis antibodies.
- Some donations are tested for cytomegalovirus (CMV) antibodies to provide CMV negative blood for patients with certain types of impaired immunity.

Blood is obtained from the donor mainly in two ways:

- The simplest way is to take the blood from a vein as whole blood. This blood is separated into parts, usually red blood cells and plasma, since most recipients need only a specific component for transfusions.
- The other method is to draw blood from the donor, separate it using a centrifuge or a filter, store the desired part, and return the rest to the donor. This process is called apheresis, and it is often done with a machine specifically designed for this purpose. This process is especially common for plasma and platelets.

Donors are observed for 10–15 minutes after donating since most reactions take place during or immediately after the donation. Blood centers typically provide refreshments or a lunch allowance to help the donor recover. The needle site is covered with a bandage and the donor is advised to keep the bandage on for some more time. Donors are also advised to avoid dehydration until a few hours after donation.

The collected blood is stored in the blood bank as separate components, and some of these components have short shelf lives. There are no storage methods to keep platelets for extended periods of time(no more than seven days). Red blood cells (RBC), which

is the most frequently used component, have a shelf life of 35–42 days at refrigerated temperatures. Plasma can be stored the longest (upto one year) and maintaining its supply not a problem.

## **2.2 Existing solutions**

There are some sources that provide an online platform for blood donation:

### **2.2.1 American Red Cross Blood Services**

The website is owned by American National Red Cross Society which is a well renowned organization for health services. [5] This website can be used by individuals who are willing to donate blood. They conduct blood drives to collect blood from donors and distribute it to the needed blood banks. They collaborate with various events like Superbowl to avail offers to the people donating blood. This website also gives provision to the user to conduct blood drives and we can also register to be part of their activities as a volunteer. But they do not provide the option to perform a emergency blood request even though that is vital part of the whole process. The website [6] provides various facilities like searching availability of blood, donor registration, and requesting blood. Latest requests are shown when one opens the website, the recent donors are also referred. The website does not provide accurate location based search results and hence it will not be a reliable source in every scenario. There is no integration with blood banks. Any random user can obtain the contact details of donors without any steps of verification, and legitimacy of donors are not verified. e-RaktKosh is a Centralized Blood Bank Management System [7]. It is an initiative of Ministry of Health and Family Welfare. It provides details about blood banks all across the nation. The details include the availability of each blood groups. But the information provided is not accurate. They also provide contact details and location information about blood banks.

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## 2.3 Summary



# Chapter 3

## Proposed Methodology

### 3.1 Overview of the Proposed System

### 3.2 Block Diagram

#### 3.2.1 Data Collection

#### 3.2.2 Feature Extraction

#### 3.2.3 Classification/Prediction

Blood requests can be raised either by blood banks or by individuals. If the requestor is a blood bank, the procedure is much simple. Since blood banks are already our registered users, the system directly processes the blood request and form a result that contains donors with the searched blood group. Now the system will send notification to all the selected donors. Then we record donor response. If the donor response is to accept the request, the blood requirement is satisfied and, the requestor and donor can contact each

other. when a request is rejected by a donor, we will wait for the response from other donors and if no donors accepts the request, the system will inform the requestor to make a new query with other set of selected donors.

When the requestor is an individual, system has to verify the request to ensure that the requestor is genuine. When an individual logs in to the system, his name and contact informations are mandatory. and we use OTP verification to authenticate the request. Inorder to validate the request, the individual has to submit a valid doctor certificate. The doctor certificate can be verified by either the administrator or a verified donor. If the user tries to misuse the system or provide fake documents the individual will be temporarily blocked with prior warning.

### **3.3 Summary**

Administrator is responsible for verification of requests and donor accounts. Verification is done by validating the documents uploaded by the users. Notifications about blood donation campaigns sent to users are managed by administrator. The system also provides a search facility to search for the availability of a particular unit of blood in that area, without providing information about donors. Administrator is responsible for maintaining the log of the blood requests satisfied through the system. Donor accounts which are inactive for a period of about six months should be deactivated with prior warning inorder to make sure that search results for requests will list only active donors. Administrator provides donors with the privilege to report fake requests, and the respective requestor will be temporarily blocked by the administrator.

## Chapter 4

# Results and Discussions

### 4.1 Performance Evaluation

The use case diagram, given in figure 4.1, for the proposed system is described as follows: The Different users in the system are Requestor, Donor and Administrator. Administrator maintains the information about blood availability in blood banks and, processes and validates the requests for actions raised by the Requestor; he is responsible for maintaining the database of donors and keeping the log of blood donations. Requestor is the user who raises blood requirements in the system. A Requestor can be either an individual or a blood bank. If the Requestor is a blood bank, there is no need of another registration procedure, since blood banks are already a part of the system (they are already registered users). But, if the Requestor is an individual, he/she has to go through a registration procedure, where his request is validated inorder to maintain the privacy of donors (ie, not disclosing donor details to malicious users). Requestor can search for nearby blood banks and available donors. He is also responsible for responding to donor and administrator. The third user is the Donor. He responds to the requests raised by Requestors either by accepting or rejecting them. If he accepts the request, he can contact the Requestor and the blood requirement will be satisfied and, if he rejects, that particular Donor is removed from the results and the search results will be updated.

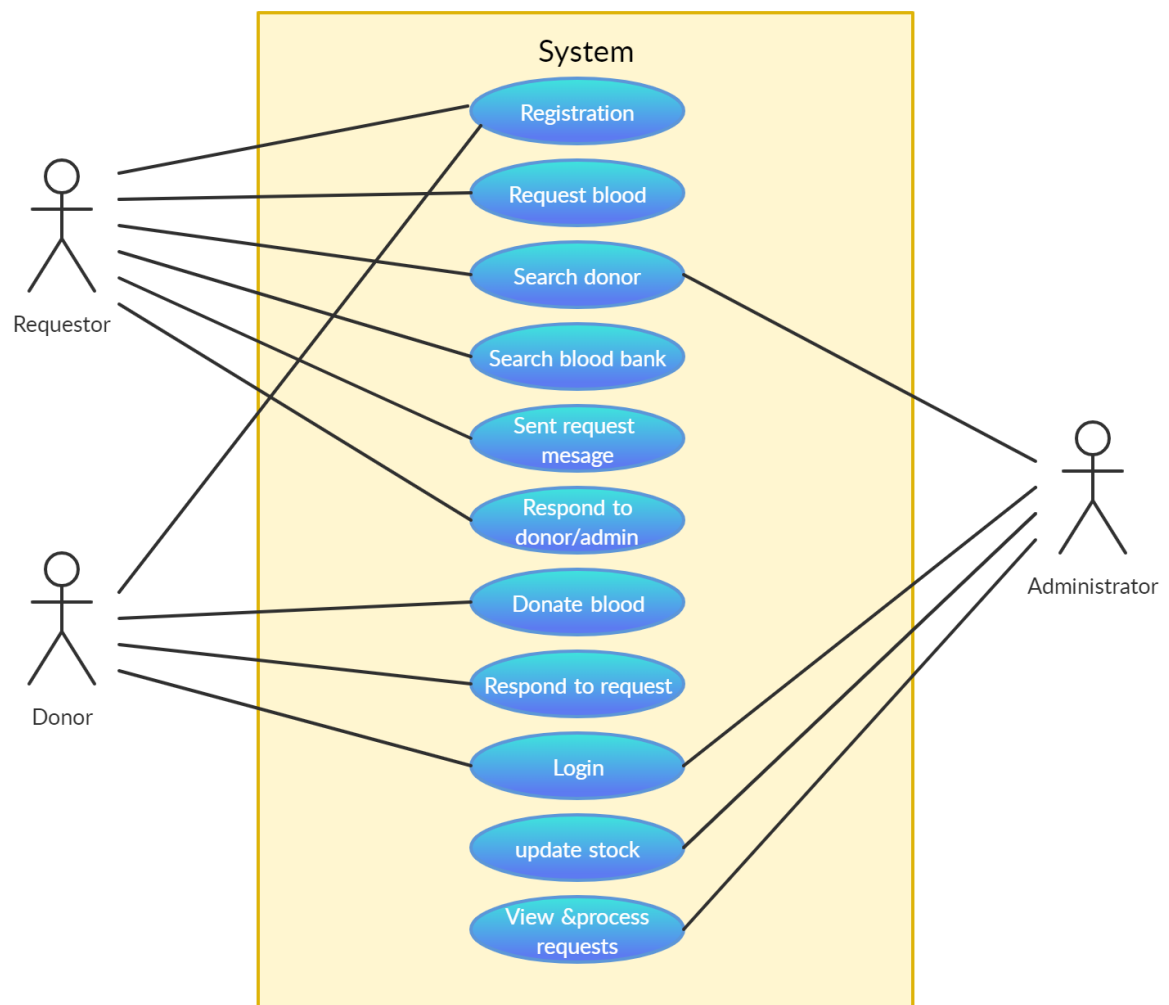


Figure 4.1: Use caase diagram

## 4.2 XXXX

Activity diagram for processing blood requirements given in figure 4.2 is depicted below. Requestor initiates a blood request by registering through the portal and provides the necessary information for the request. The request is validated in the server side either by the Administrator or by a 'verified' Donor. On receipt of a request, the database of available Donors and blood banks is searched and results are formulated. These results are then send back to the Requestor. Requestor selects a number of Donors and his blood request is registered on the log simultaneously. A notification is sent to those Donors selected by the Requestor. Donor recieves the request and, he can either accept or reject the request. If the Donor accepts the request, the request is verified and recorded, the Requestor will be informed that his request has been satisfied and then, donor and requestor can communicate with each other. If the Donor rejects the request, the search results gets updated by removing his name from the list. If every Donor rejects the request, the search results become empty and we have to inform the Requestor that none of the selected Donors are available so that he can select new Donors and send request to them.

## 4.3 Comparison with State-of-the-Art methods

The sequence diagram is depicted in figure 4.3. First event is the blood requirement raised by the Requestor through the web portal. On receipt of the request, we search the database for matching Donors and formulate a result. Then this result is sent to the requestor so that he can select some Donors. The system will collect the contact details of the selected donors and, notifications about the blood requirement are sent to the selected donors via emails. Based on the response of the Donor, two events are likely to happen. If the Donor accepts the request, the system will update the database with his donation status and the processed request, and the system will notify the Requestor that his blood requirement has been satisfied. Incase the Donor rejects the request system will search for other available donors and informs the Requestor about it.

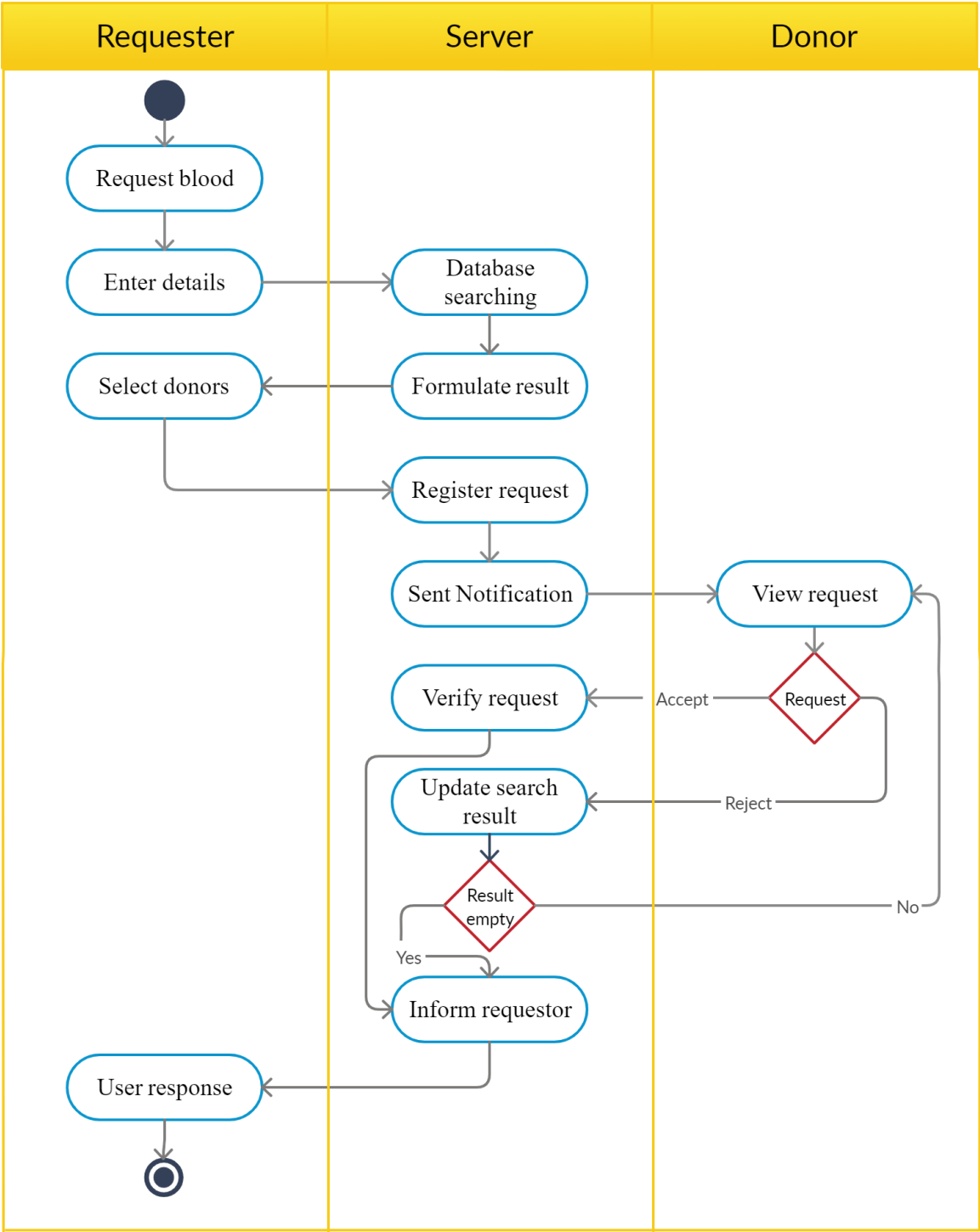


Figure 4.2: Activity diagram

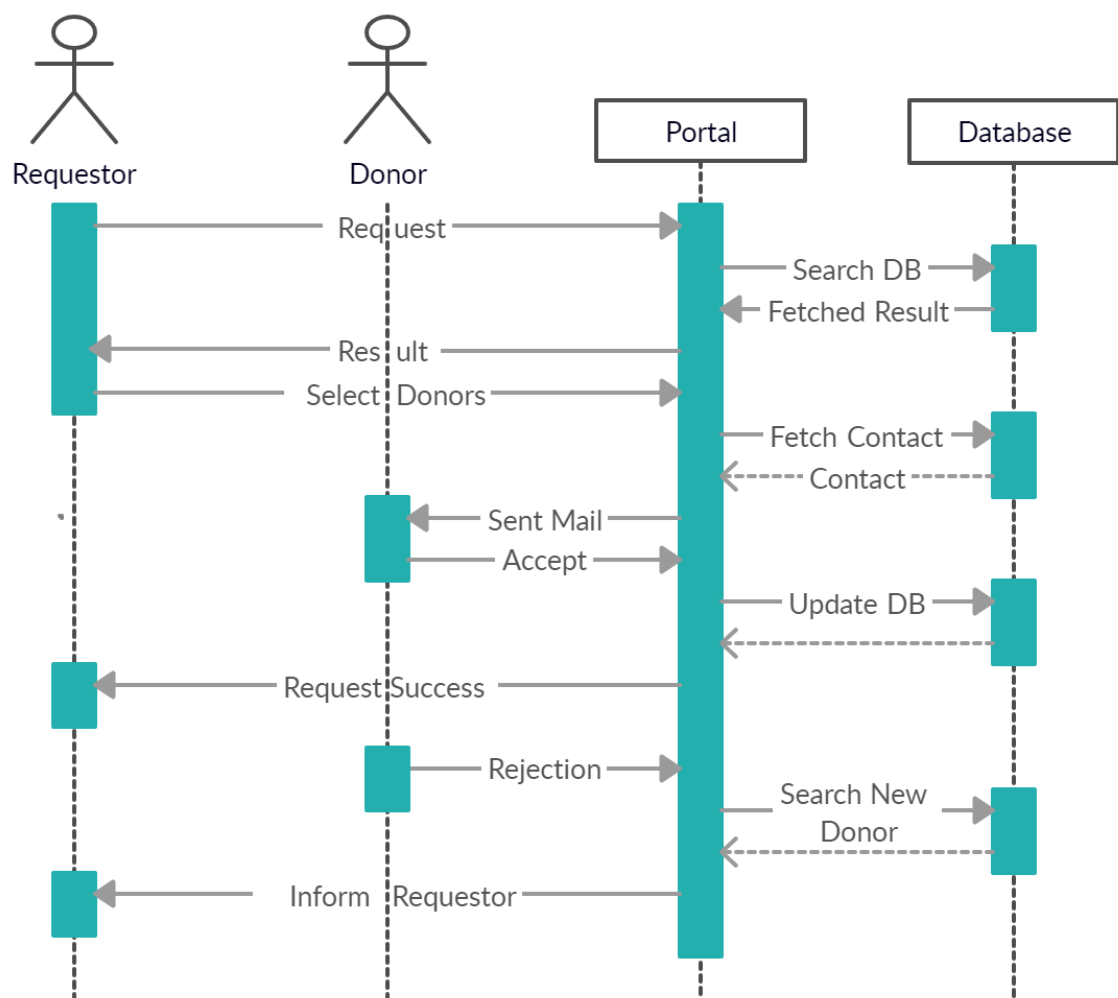


Figure 4.3: Sequence diagram

## 4.4 Discussion

Entity relationship diagram depicts the basic structure of the database we use in our system. The ER diagram for our proposed system is given in figure 4.4 which shows the relationship between the entities of our system. We have six entities in our system which are blood banks, blood bank administrators, blood, donors, requestors and administrator. Administrator manages all the blood banks and, he is responsible for maintaining the system. He has a unique employee id. Blood bank administrators have the authority to register and verify the donors. Basic informations like age, blood group and contact details of the donor are stored in the database and every donor have a unique donor id. Blood donated by the donors are stored in the blood bank for future use. Each unit of blood has its unique unit id and expiry date for blood is also noted. Each blood banks stores a minimum amount for each blood group inorder to satisfy emergency requests. A requestor can order blood from the blood bank incase of blood requirement. Each request is stored with a request id and contact information of the requestor.

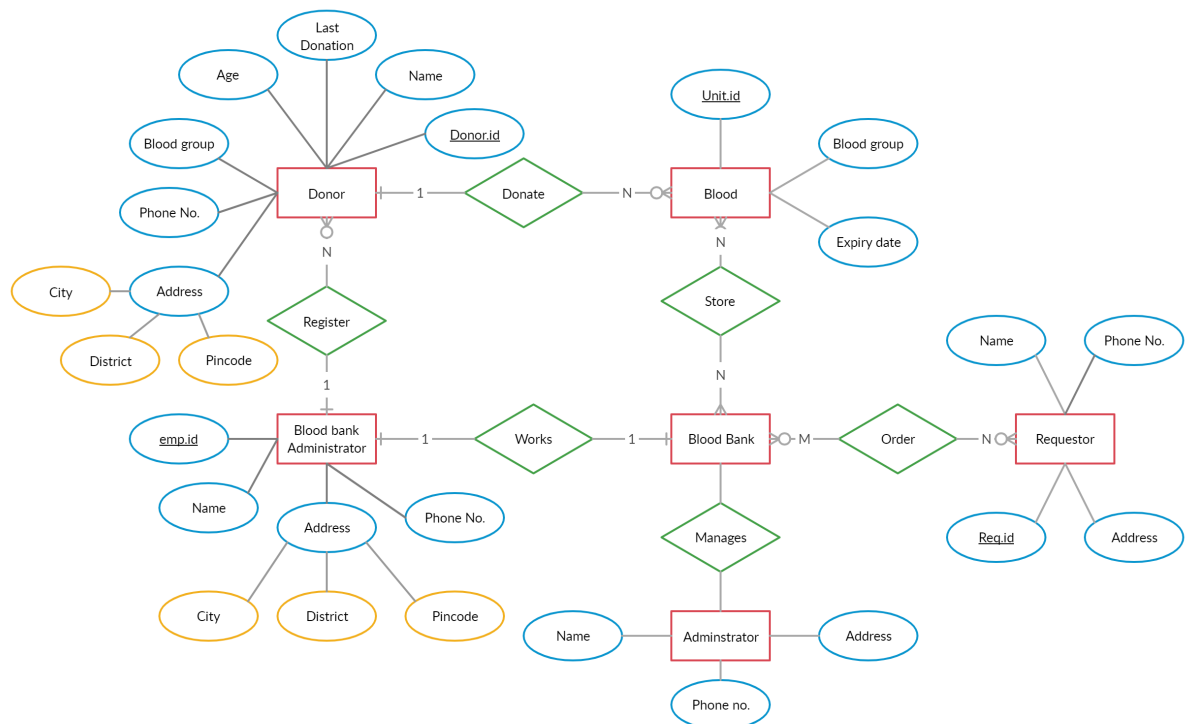


Figure 4.4: Entity Relationship diagram



## Conclusion

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