American International University-Bangladesh (AIUB)

Department of Computer Science

Faculty of Science & Technology (FST)

Blood Bank Management System

A Software Requirement Engineering Project Submitted
By

Semester: Spring_22_23		**Section:**	**Group Number:**	
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The project will be Evaluated for the following Course Outcomes

Evaluation Criteria	Total Marks (50)	
Introduction, Format, Submission, Defense	[10 Marks]	
System Overall Description & Functional Requirements	[10 Marks]	
System Quality Attributes and Project Requirements	[10 Marks]	
UML and E-R Diagram with Data Dictionary	[10 Marks]	
UI/UX Prototyping	[10 Marks]	

Software Requirements Specification

for

Blood Bank Management System

Version 3.0 approved.

Prepared by AIUB CSE DEPARTMENT

AIUB

01.05.2023

Table of Contents

Revision History

Name	Date	Reason for Changes	Version
Blood Donor	01.06.2022	Only for donate.	1.0
Blood Bank	01.01.2023	Security issues.	2.0

1. Introduction: -

In this initiative, sales and purchases of blood are recorded and managed. In this endeavor, reports on blood inventory, blood sales, and blood purchases are managed. It will assist us in identifying the blood group that requires the least amount of time to maintain, and it will be simpler to deliver blood to hospitals so that patients can receive blood on time. The Blood Bank Management System stores and displays this entire set of data. To aid more individuals attempting their finest.
Slogan: "Go and Donate Blood."

1.1. Purpose: -

The purpose of blood management is to ensure that all blood acceptors and blood donors can locate the blood they need. Blood Bank Management Software is designed and suitable for multiple Blood Banks, whether they are operating as individuals or as part of an organization. It covers the entire blood banking process, including donor requirements, donor management, mobile session component preparation, screening covering all tests, blood stock inventory maintenance, patient registration, cross-matching, and patient issues, among others.

*1.2.*Document Conventions: -

This document will be formatted in IEEE format. Front style: Times New Roman, Margin: Normal, Size of page: A4. The format for headings is 14 and sub-headings is 12. Overall, all text size is 12.

1.3. Intended Audience and Reading Suggestions: -

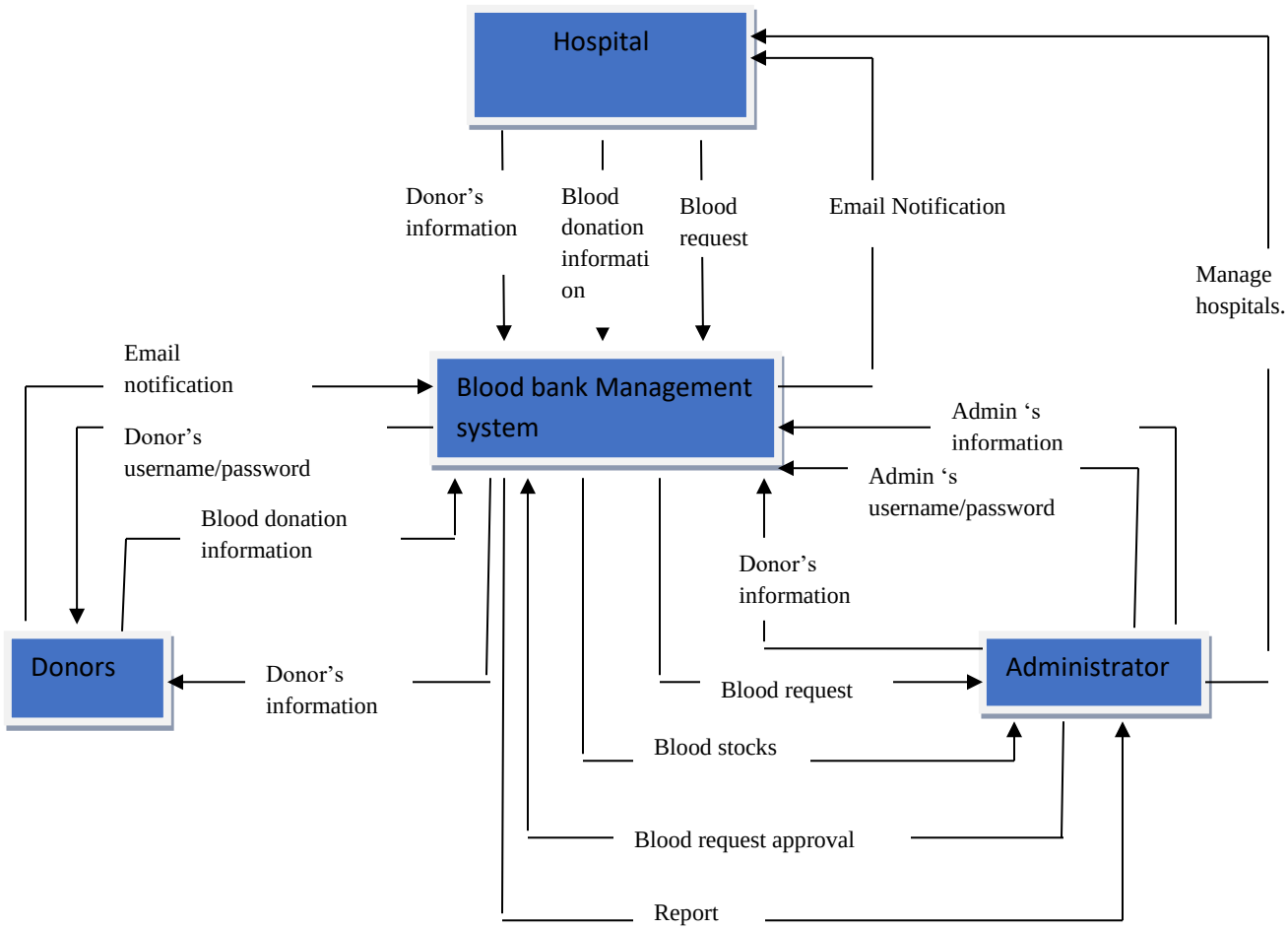
This blood bank administration system is accessible to both blood donors and those in need of blood.

2. Overall Description: -

2.1 Product Perspective: -

Blood Bank Management System is designed to help the blood bank administrator to meet the demand of Blood by sending and serving the request for Blood as and when required. The proposed system gives the procedural approach of how to bridge the gap between recipient, donor, and blood banks. This Application will provide a common ground for all the three parties such as recipient, donor, and blood banks and will ensure the fulfillment of demand for blood requested by recipient or blood bank. The features of the proposed system are ease of data entry, the system should provide user-friendly interfaces, no need to maintain any manual register and form, immediate data retrieval and so on. If there is no software to keep any records in blood bank. It becomes difficult to provide any record immediately at times of emergency. Required more human efforts in maintaining the branch related information. To keep the accounts manually is also a tedious & risky job & to maintain those accounts in ledgers for a long period is also very difficult. The main aim of developing this software is to provide blood to the people who need blood. The numbers of persons who need blood are increasing in large number day by day. Using this system, the user

can search the blood group available in the city and he can also get contact number of the donor who has the same blood group. To help people who need blood, this Blood Bank software can be used effectively for getting the details of available blood groups and users can also get contact number of the blood donors having the same blood group and within the same city. Here is the simple diagram which gives us the overview of this system is given below-



2.2 **Product Functions: -**

According to this product, a Donor can create an account at home. The details of the blood inventory such as the availability of a particular type of blood is regularly updated and maintained by admin. It is confidential data, so the access is only with the administrators. The registered hospital can place an online order. The order is processed by the admin who can check the database of the blood units. If the required blood type and the amount is available, it notifies the corresponding hospitals. When the blood bank confirms the order, the details are being sent to it. These are some important functions of this product which are given below-

- Login of admin.
- Update, delete blood information.
- Change the login password of admin.
- Register the donor by himself.
- Register the donor by system admin.
- Login of the donor
- Change the login password of donor.
- Change personal contact details by the donor himself.
- Change personal contact details by the system admin.
- Withdraw reg. details by the donor.
- Withdraw reg. details by the admin.
- Send blood donation details to the relevant donors.
- Send blood testing details.

Dataflow diagram of blood bank Management system: -

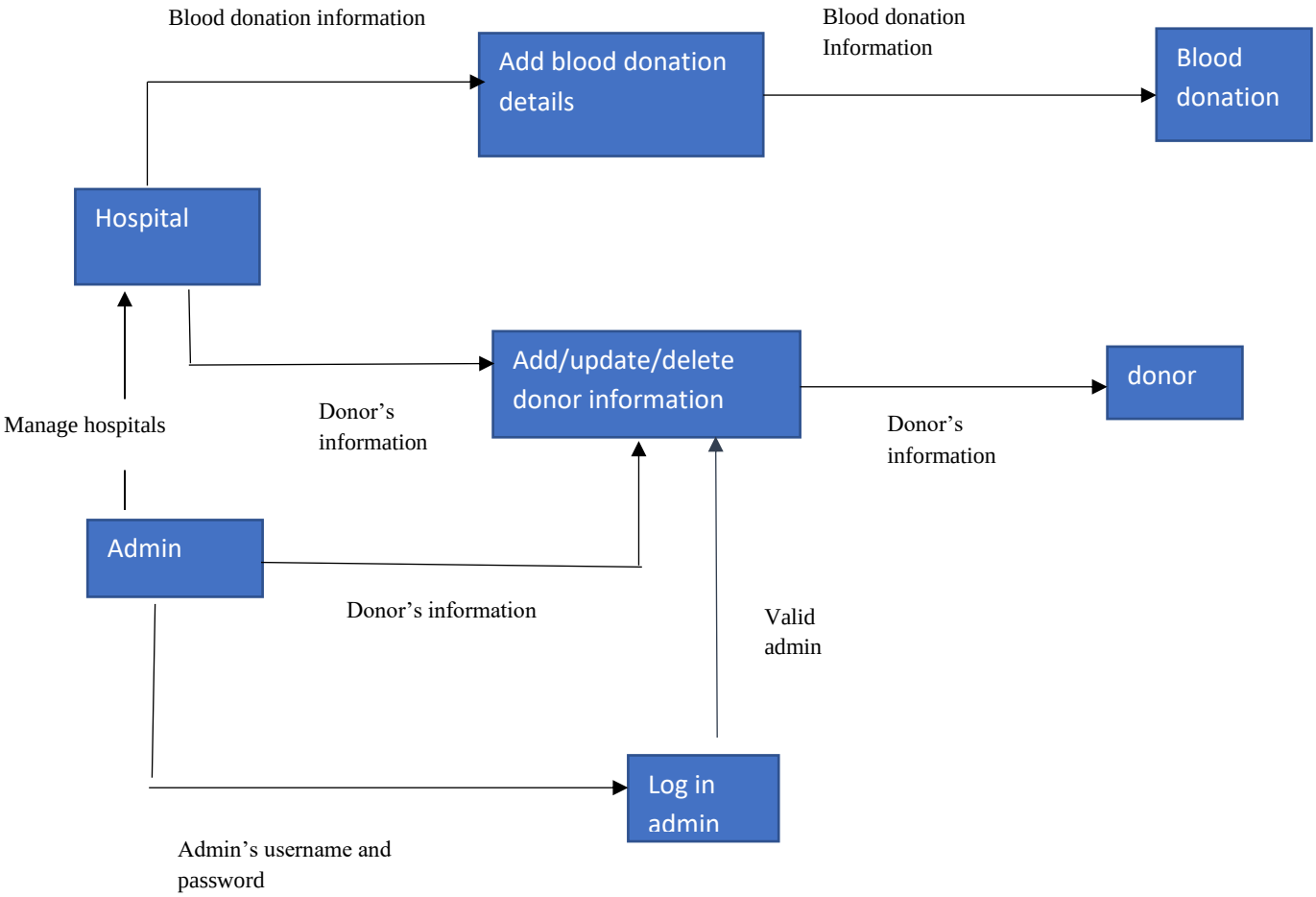


Figure: Dataflow diagram

2.3 User Classes and Characteristics

In here the system admin and the donor are the system users. According to my assumptions the donor who will register to the system from the website and he or she has the ability to realize small instructions and fill the application without any errors and upload the health condition certificate to the systems. Users are very generous to attend the donation with such a small announcement by Email & SMS Messages.

System Owner: The Blood Bank

Key functions: -

- Blood bank information view/update
- View donor information
- Manage recipient blood request.

System Users: Admin and Donors

- **Admin**: Admin has full access to the system which means he can manage any activity about the system. He is the most privileged user who can access the system.

Key functions: -

- Manage registration for users.
- Manage donor request for donor.
- Manage blood bank information like update, delete.
- Manage hospital and recipient details.
- Manage doctors.
- Administer the charges.
- Generate reports.

- **Donors:** They can view the blood donation events and can donate or can make requests for donation.

Key functions: -

- View the blood donation schedule.
- Also view the blood donation history
- View blood test results

2.4 **Operating Environment**

Software requirements: -

● Operating system: Windows 7 or above

● IDE: visual studio.net 2005/2010

● Front end: ASP.net

● Language: C#

● Database: MySQL server

Hardware Requirements: -

● Intel P4 1.5GHz or above

● 512MB Ram

● 80GB HDD minimum

2.5 **Design and Implementation Constraints**

The Donor and the recipient are constrained to create an account first to avail themselves of the services. The internet connection is also a constraint for this web application. The web application is also constrained by the database capacity. So, it works well with a smaller number of donors and recipients. Every donor would have a unique username and a password to log onto the website. They would also have a unique mobile number and the identity card number when they do register the website to identify each donor separately. Inside the system the administrator has more advanced functions than the donor. The hospital doctor is not a user of the system. But the doctor connects to the system in a different manner. The doctor mainly has the connection with the system admin.

2.6. **User Documentation**

User documentation is provided to the customers which gives an overview of the system. It will include the full description of the product and complete orderly followed steps to install the software. The users will get the opportunity to use the system without having any trouble. The user manual will include the email addresses to contact us in need. Tasks are listed alphabetically or logically grouped often using cross referenced indexes which helps the users to know exactly what sort of information they are looking for. These are the list for user documentation of this system:

1. **Login:** To access the system, users need to login using their username and password. If users don't have a username and password, they need to contact the administrator to create an account for them.
2. **Dashboard:** After logging in, the user will be taken to the dashboard. The dashboard provides an overview of the system, including the total number of donors, recipients, and blood units available in the inventory. It also displays the latest transactions and alerts.
3. **Admin:** Admin would have a unique username and password to log-in to the system. Admin modules allow to add new donors, delete donors who are no longer active. It also manages recipients and hospital details. It manages blood bank information details. It also generates reports, blood inventory, transactions etc.
4. **Donors:** The Donors module allows to manage donor information, including their name, contact information, and blood type. They can also view the donation history of each donor, including the date of the last donation, the type of blood donated, and the amount donated. Donors can view the blood test results.
5. **Recipients:** The Recipients are not the users. They are managed by the admin who manages recipient information, including their name, contact information, and blood type. Admin can add new recipients, edit existing recipients, and delete recipients who are no longer active. Admin can also view the transfusion history of each recipient, including the date of the last transfusion, the type of blood received, and the amount received.
6. **Blood Inventory:** The Blood Inventory module allows to manage the inventory of blood units. Admin can add new blood units, edit existing units, and delete units that are no longer usable. He can also view the current stock of each blood type and set alerts for when the stock falls below a certain threshold.
7. **Transactions:** The Transactions module allows to record blood donation and transfusion transactions. When a donor donates blood, Admin can record the details of the donation, including the donor's name, the date of the donation, and the amount donated.

8. **Reports:** The Reports module allows to generate reports based on donor, recipient, and blood inventory data. Admin can generate reports on the number of donors and recipients by blood type, the donation and transfusion history of a particular donor or recipient, and the current stock of each blood type in the inventory.
9. **Settings:** The Settings module allows to configure the system settings, including the blood types available, the threshold for inventory alerts, and the user permissions.

3. System Requirements: -

3.1. System Features:

System features refer to the functionalities and capabilities of a software system. These features describe what the system can do and how it can perform specific tasks or operations. System features can be divided into two main categories: functional and non-functional. Functional features describe the specific actions that the system can perform, such as data input, data processing, and data output. Non-functional features describe the quality attributes of the system, such as performance, reliability, security, and usability. The features of a software system are defined based on the system's requirements, which are typically gathered during the software development process through various methods, including interviews, surveys, and analysis of existing systems.

3.1.1. User Authentication: -

Functional Requirement: The system must provide a secure login mechanism to ensure only authorized users can access the system. The login credentials should be encrypted and securely stored.
Priority Level: High
Precondition: Only authorized users are allowed to log in.
Cross-references: N/A

3.1.2. Donor Management: -

Functional Requirement: The system should allow staff members to create, edit, and view donor information and eligibility status. This includes recording personal information, blood type, and eligibility criteria.
Priority Level: High
Precondition: Staff members are authorized and trained to manage donor information.
Cross-reference: Feature 2 (Blood Inventory Management) relies on accurate donor information.

3.1.3. Blood Inventory Management: -

Functional Requirement: The system should allow staff members to manage blood inventory levels. This includes tracking donations, blood testing, and blood product processing. The system should also alert staff members when inventory levels fall below a predetermined threshold.
Priority Level: High
Precondition: The system is connected to blood storage units that automatically update the inventory.

Cross-reference: 1 (Donor Management) updates the inventory with new blood products.

3.1.4. **Blood Request and Distribution: -**

Functional Requirement: The system should allow staff members to request and track blood and blood product orders, including cross-matching and distribution. This feature should be closely integrated with the blood inventory management feature.
Priority Level: High
Precondition: The inventory is accurate and up to date.
Cross-reference: Feature 2 (Blood Inventory Management) deducts blood products from inventory after an order is placed.

3.1.5. **Blood Transfusion Records: -**

Functional Requirement: The system should allow staff members to record and retrieve blood transfusion records. This includes patient information, transfusion dates, and transfusion outcomes. The system should also alert staff members to any adverse transfusion reactions.
Priority Level: High
Precondition: The patient's blood type is confirmed before the transfusion.
Cross-reference: Feature 2 (Blood Inventory Management) ensures the availability of the correct blood type.

3.1.6. **Reporting: -**

Functional Requirement: The system should provide users with the ability to generate reports. This includes inventory levels, donor eligibility, and transfusion records. Reporting is essential for quality control and to meet regulatory requirements.
Priority Level: Medium
Precondition: Data is consistently entered into the system.
Cross-reference: Features 1-4 (User Authentication, Donor Management, Blood Inventory Management, and Blood Transfusion Records) provide data for reporting.

3.1.7. **User Roles and Permissions: -**

Functional Requirement: The system should provide different user roles with appropriate permissions. This includes roles for administrators, nurses, doctors, and other staff members. The system should also limit access to certain information based on user permissions.
Priority Level: Medium
Precondition: The system has defined user roles and permissions.
Cross-reference: N/A.

3.1.8. **Integration with External Systems: -**

Functional Requirement: The system should be able to integrate with external systems, such as laboratory information systems, electronic health records, and other hospital systems. Integration can improve data accuracy and reduce manual data entry.
Priority Level: Medium
Precondition: External systems support integration with the blood management system.

Cross-reference: N/A.

3.1.9. **User Interface: -**

Functional Requirement: The system should have a user-friendly interface with clear navigation and easily accessible features. A user-friendly interface can improve user adoption and reduce user error.
Priority Level: Low
Precondition: N/A.
Cross-reference: N/A.

3.1.10. **System Performance: -**

Functional Requirement: The system should have fast response times and be able to handle multiple user requests simultaneously. A fast and responsive system can improve user satisfaction and productivity.
Priority Level: Low
Precondition: The system meets the hardware and software requirements
Cross-reference: N/A.

3.1.11. **System Security: -**

Functional Requirement: The system should have robust security measures, including encryption, access controls, and intrusion detection. Security is essential to protect sensitive patient and donor information.
Priority Level: High
Precondition: The system meets the hardware and software requirements
Cross-reference: N/A.

Priority Component Ratings:
Benefit: A measure of the overall benefit of the feature to the system and its users.
Penalty: A measure of the overall penalty to the system and its users if the feature is not implemented or fails.
Cost: A measure of the overall cost to implement and maintain the feature.
Risk: A measure of the overall risk associated with implementing or not implementing the feature.

Using a relative scale from 1 to 9, with 1 being low and 9 being high, the priority component ratings for the features are as follows: -

Feature	Benefit	Penalty	Cost	Risk
User Authentication	9	9	7	9
Donor Management	8	8	6	8
Blood Inventory Management	9	9	7	9
Blood Request and Distribution	8	8	7	8
Blood Transfusion Records	9	9	7	9
Reporting	6	6	7	6
User Roles and Permissions	6	6	5	6
Integration with External Systems	7	7	9	7
User Authentication	5	4	6	5
System Performance	6	7	6	7

The priority ratings are based on a relative scale from 1 to 9 for each of the four components: benefit, penalty, cost, and risk. Features with a higher rating in the benefit component are considered more important for the system and its users, while features with a higher rating in the penalty component are more critical to implement to avoid negative consequences. Cost ratings consider the resources required to implement and maintain the feature, while risk ratings assess the potential risks associated with implementing or not implementing the feature.
Overall, the User Authentication, Blood Inventory Management, and Blood Transfusion Records features have the highest priority ratings due to their high benefit, penalty, and risk ratings. The User Interface and System Performance features have lower priority ratings, with the User Interface having a higher benefit rating and the System Performance having a higher risk rating.

3.2. **Non-Functional/Quality Requirements: -**

3.2.1. **Performance: -**

The system must have fast response times and be able to manage large amounts of data without performance issues.
Priority: High
Precondition: The system must be able to handle multiple requests simultaneously.
Cross-references: Blood Inventory Management, Blood Request and Distribution, Reporting.

3.2.2. **Reliability: -**

The system should have data backup and recovery mechanisms to prevent data loss.
Priority: High
Precondition: The system must be able to operate without errors or data loss.
Cross-references: Donor Management, Blood Inventory Management, Blood Request and Distribution.

3.2.3. **Security: -**

The system should have a robust security mechanism with encryption, access control, and intrusion detection.
Priority: High
Precondition: The system must protect sensitive patient and donor information.
Cross-references: User Authentication, Donor Management, Blood Transfusion Records.

3.2.4. **Scalability: -**

The system should have an architecture that can scale up or down depending on the system's requirements.
Priority: Medium
Precondition: The system must be able to handle an increasing number of users and data.
Cross-references: Blood Inventory Management, Blood Request and Distribution.

3.2.5. **Usability: -**

The system should provide clear and concise user guidance and documentation.
Priority: Medium
Precondition: The system must be user-friendly and easy to navigate.
Cross-references: User Interface, User Authentication, Donor Management.

3.2.6. **Maintainability: -**

The system should have modular architecture and well-written code to allow for easy maintenance.
Priority: Low
Precondition: The system must be easy to maintain and update.
Cross-references: Integration with External Systems. A trained user shall be able to submit a complete request for a chemical selected from a vendor catalog in an average of four and a maximum of six minutes.

3.3. **Project Requirements: -**

3.3.1. **Tools**: -
There are various tools and technologies that can be used for the development of a Blood Management System. Some of the commonly used tools and technologies for this purpose are:

1. *Programming Languages:* The system can be developed using programming languages like Java, Python, or C#.
2. *Integrated Development Environment (IDE):* An IDE such as Eclipse or Visual Studio can be used to write, test, and debug the code.
3. *Web Development Framework:* A web development framework like Spring, Django, or ASP.NET can be used to develop the web-based interface of the system.
4. *Relational Database Management System (RDBMS):* An RDBMS like MySQL, Oracle, or SQL Server can be used to store the data related to blood donors, blood inventory, and blood transfusion records.
5. *Automated Testing Tools:* Tools such as Selenium or JUnit can be used for automated testing of the system.
6. *Version Control System:* A version control system like Git or SVN can be used to manage the code repository and track changes made to the code.
7. *Agile Project Management Tools:* Tools such as JIRA or Trello can be used to manage the project requirements, track progress, and assign tasks to team members.
8. *Deployment Tools:* Deployment tools like Jenkins or Docker can be used to automate the deployment of the system on different environments, including development, testing, and production.

It is common for software developers to use various tools for testing during the development process, including Selenium. Selenium is an open-source tool that is widely used for automated testing of web applications. It provides a range of features and capabilities for functional testing, regression testing, and compatibility testing.
In week 6 of the blood management system project, the system developer has identified a need for Selenium tools to perform testing activities. This is a reasonable request and can be beneficial for ensuring the quality and reliability of the system.
However, it is important to note that the use of Selenium tools should be integrated into a larger testing strategy that includes manual testing, exploratory testing, and other types of testing as well. Automated testing tools like Selenium can be powerful, but they cannot replace human testing completely. Therefore, it is essential to strike a balance between automated and manual testing to ensure thorough and effective testing of the system.
Additionally, it is important to ensure that the use of Selenium tools is properly integrated into the development process and does not cause delays or disruptions to other aspects of the project. This may require additional planning and coordination between the development and testing teams to ensure that everyone is on the same page and that testing activities are conducted efficiently and effectively.

4. Design and Interface Requirements: -

4.1. UML Diagrams: -

4.1.1. Use Case Diagram: -

A use case diagram at its simplest is a representation of a user's interaction with the system. Cases include in following use case diagram:

- Donation camp
- Reception table
- Donate blood
- Process & test blood
- Store blood
- Order blood
- Purchase blood

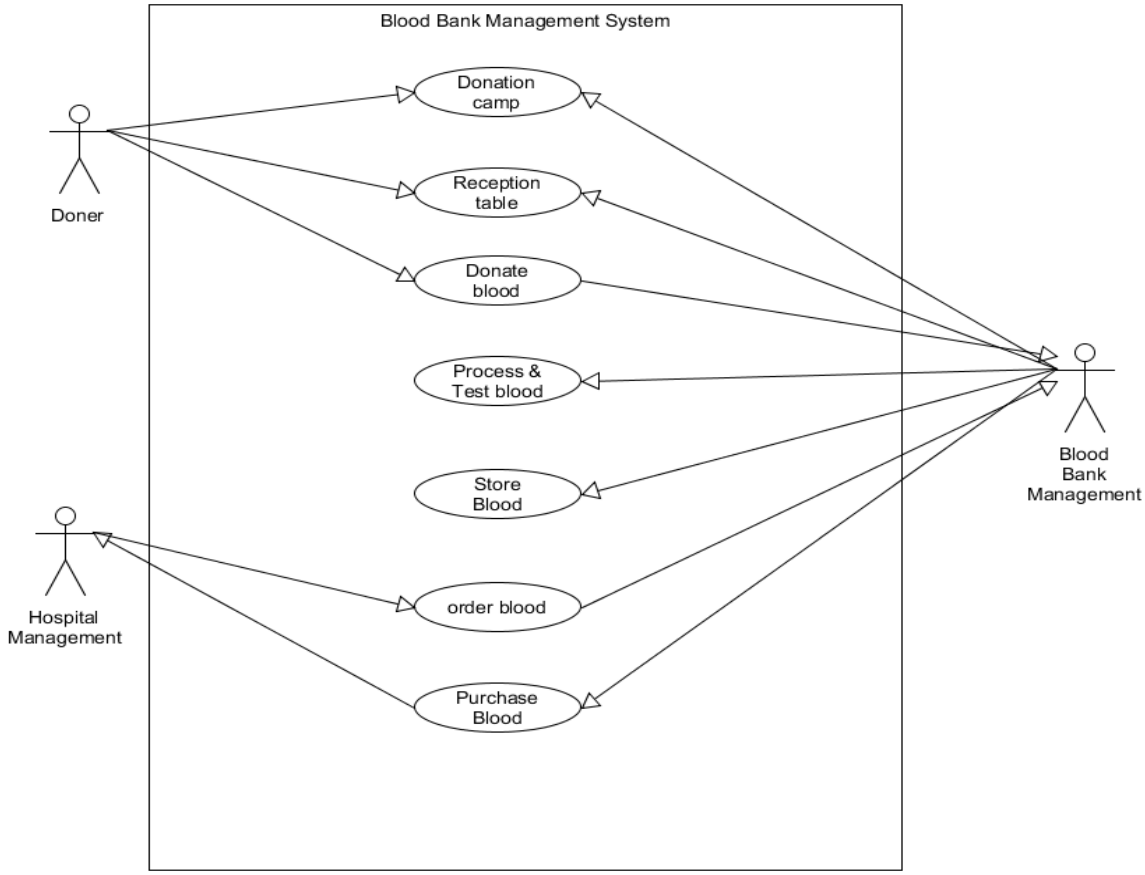


Figure: Use Case diagram of the System

4.1.2. **Class Diagram: -**

A class diagram in the UML is a type of static structure diagram that describes the structure of a system by showing the systems classes, their attributes, operations (or methods) and the relationship among objects.

Classes included in following diagram:

- Doner
- Receptionist
- Doctor
- Nurse
- Lab technician
- Blood
- Blood bank
- Hospital

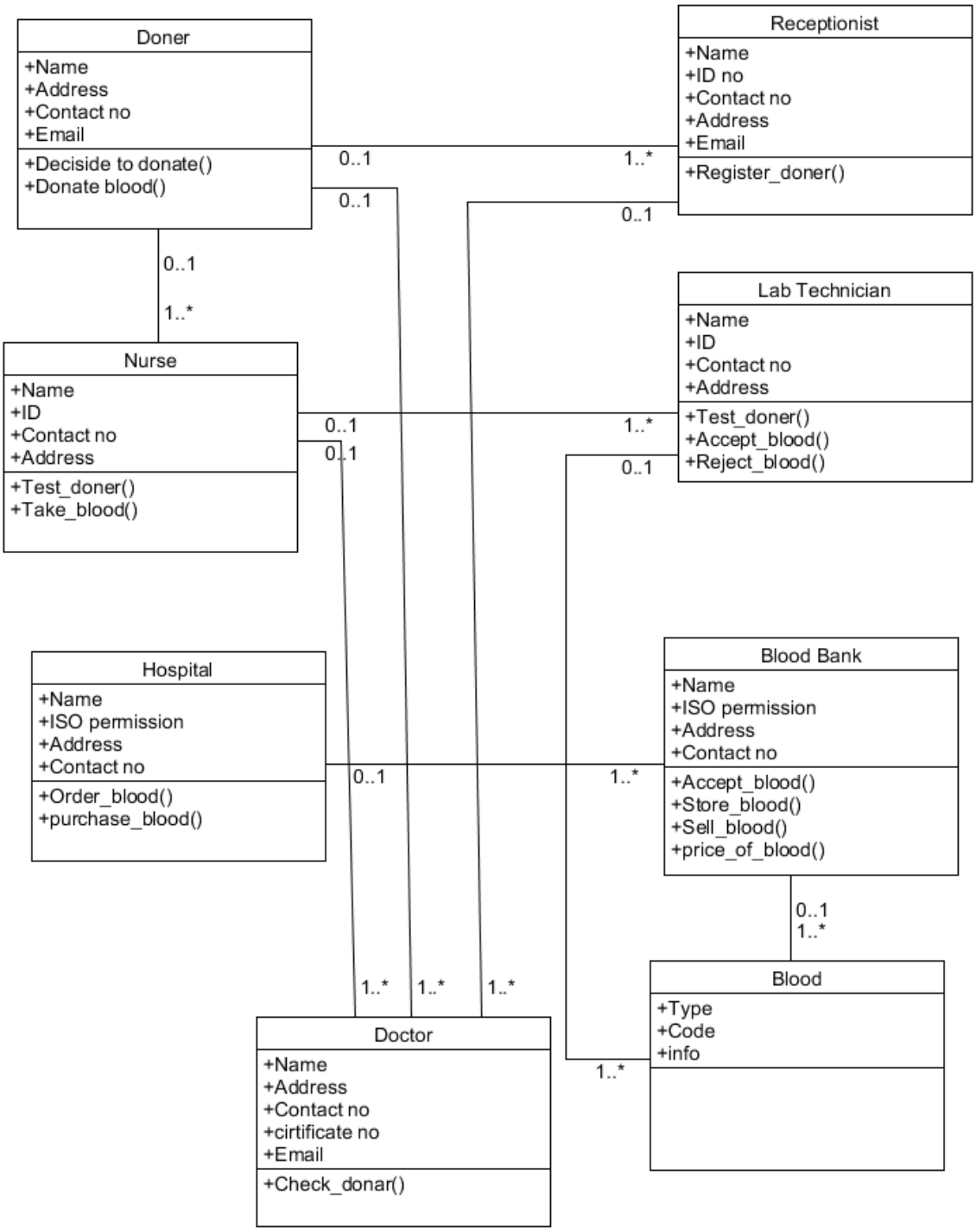


Figure: Class Diagram of the system

4.1.3. **Activity Diagram: -**

Activity Diagrams are representations of workflows of stepwise activities and actions with support for choice, iteration and concurrency. The process of activity diagram is same as state diagram, In this diagram, conditions are checked using Rectangle.

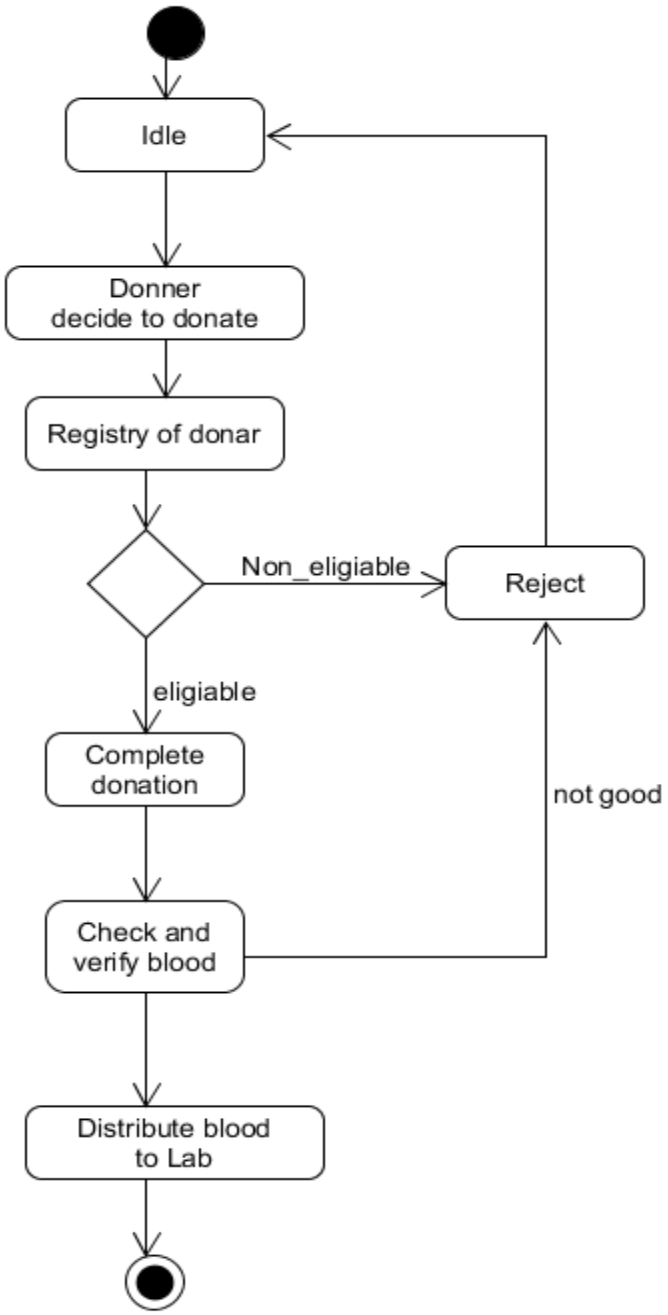
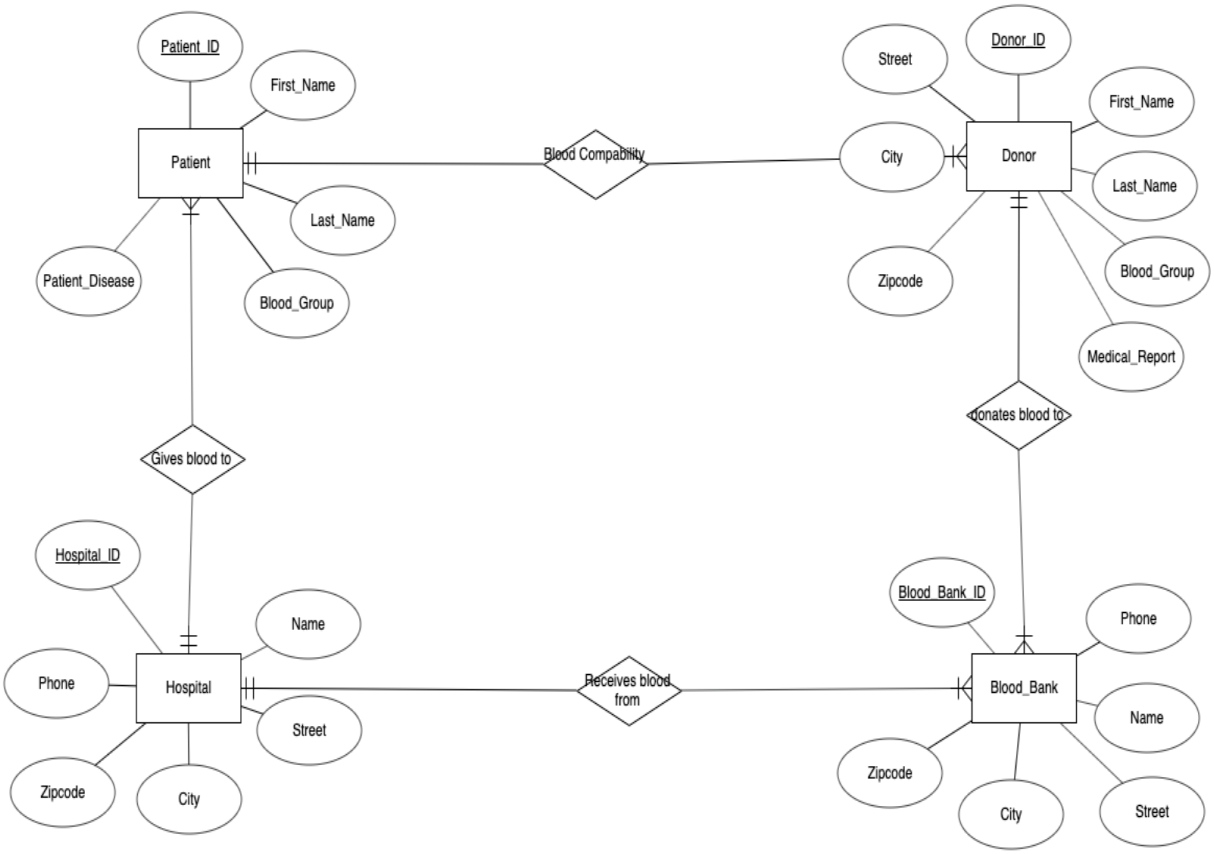


Figure: Activity Diagram

4.1.4. **E-R Diagram: -**

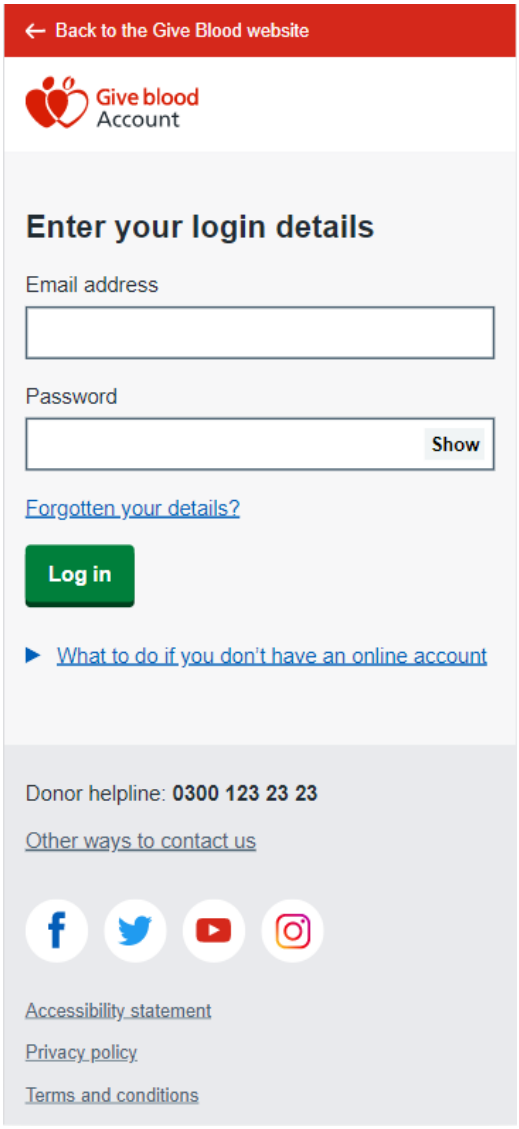


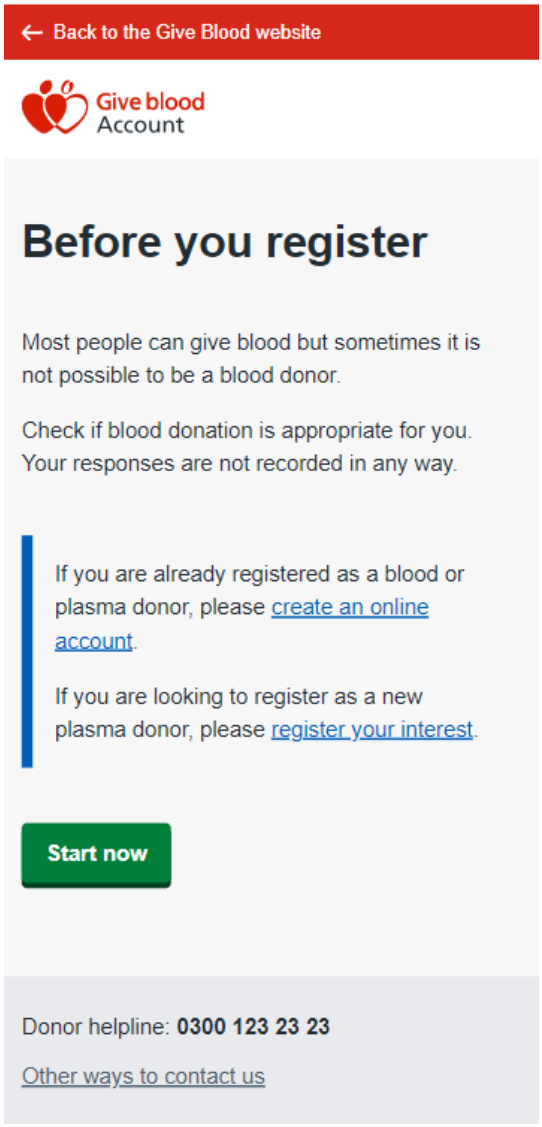
4.2. **Data Dictionary: -**

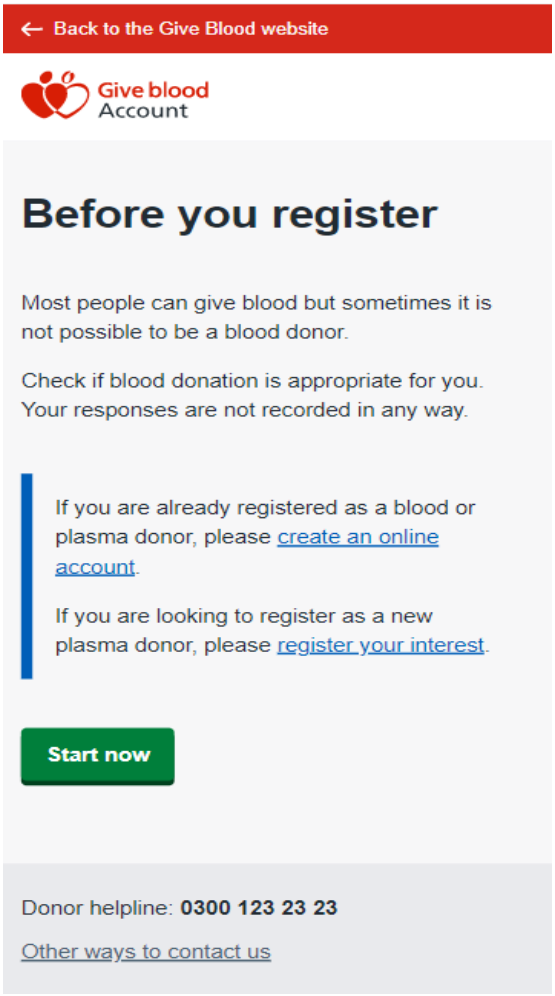
4.3. **UI/UX Design Specification: -**

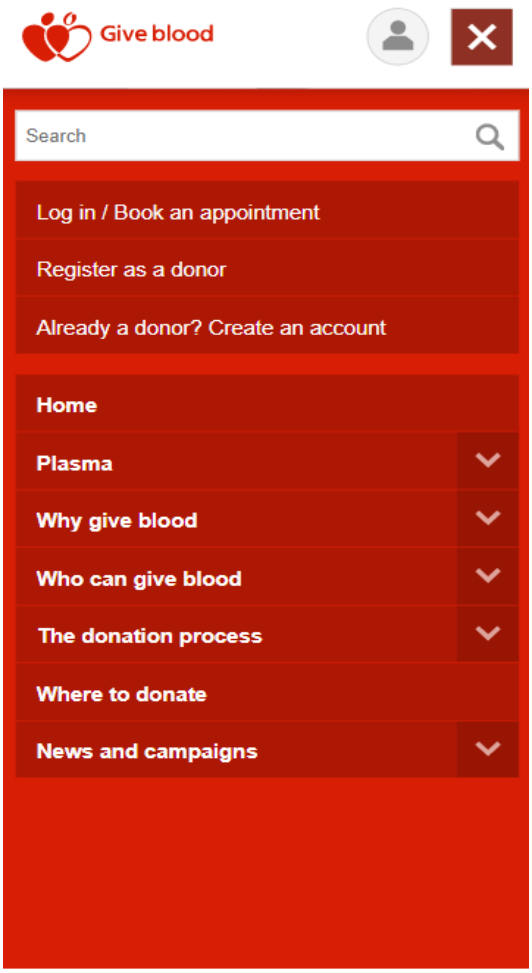
Projects are designed with agreed and feasible functionality and features. The design will not always be exact. Here is a preview of the original project.

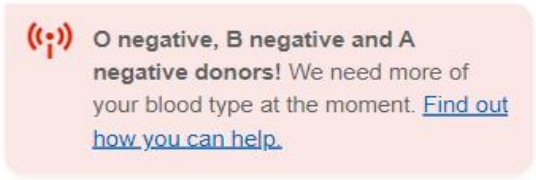
UI/UX Design: -

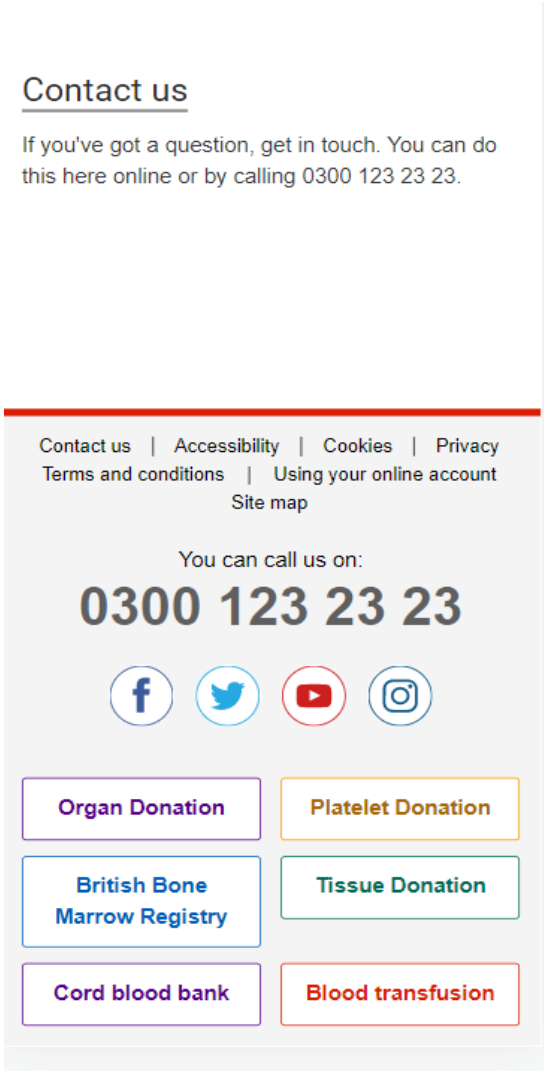

Back to the Give Blood website
Give blood
Account
Enter your login details
Email address
Password
Show
Forgotten your details?
Log in
What to do if you don't have an online account
Donor helpline: 0300 123 23 23
Other ways to contact us
Accessibility statement
Privacy policy
Terms and conditions


Back to the Give Blood website
Give blood
Account
Before you register
Most people can give blood but sometimes it is not possible to be a blood donor.
Check if blood donation is appropriate for you. Your responses are not recorded in any way.
If you are already registered as a blood or plasma donor, please create an online account.
If you are looking to register as a new plasma donor, please register your interest.
Start now
Donor helpline: 0300 123 23 23
Other ways to contact us


Back to the Give Blood website
Give blood
Account
Before you register
Most people can give blood but sometimes it is not possible to be a blood donor.
Check if blood donation is appropriate for you. Your responses are not recorded in any way.
If you are already registered as a blood or plasma donor, please create an online account.
If you are looking to register as a new plasma donor, please register your interest.
Start now
Donor helpline: 0300 123 23 23
Other ways to contact us


Give blood
Search
Log in / Book an appointment
Register as a donor
Already a donor? Create an account
Home
Plasma
Why give blood
Who can give blood
The donation process
Where to donate
News and campaigns





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[1] "BDRCS," [Online]. Available: https://bdrcs.org/donate-blood/.

[2] "Rokto," [Online]. Available: https://www.rokto.co/.

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