Blood Bank Management System

Final Year Project

Session 2022-2024

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Area of specialization	
FYP ID	MCSM-FYP-S23-08

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*The candidates confirm that the work submitted is their own and appropriate credit has been given where reference has been made to work of others.

Plagiarism Free Certificate

This is to certify that, I **M Taimoor Ali** S/D of **Dilshad Ahmad**, group leader of FYP under registration no MCSM-FYP-S23-08 at Information Technology Department, The Superior University, Lahore. I declare that my FYP report is checked by my supervisor.

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Designation: Lecturer Designation: Lecturer

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Signature: _____

Project Report

Blood Bank Management System

Change Record

Author(s)	Version	Date	Notes	Supervisor's Signature
Hadia Tanveer M.Taimoor Ali Aizaz Ahmad	1.0	5/5/2023	Changing in Gantt chart	Fiaz Ahmed
Hadia Tanveer M.Taimoor Ali Aizaz Ahmad	1.1	20/5/2023	Changing in ER Diagram	Fiaz Ahmed
Hadia Tanveer M.Taimoor Ali Aizaz Ahmad	1.2	30/5/2023	Changing in Data Flow Diagram	Fiaz Ahmed
Hadia Tanveer M.Taimoor Ali Aizaz Ahmad	1.3	6/6/2023	Changing in Class Diagram	Fiaz Ahmed

APPROVAL

PROJECT SUPERVISOR	
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PROJECT MANAGER	
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_____	
Date:_____	Signature:_____

HEAD OF THE DEPARTMENT	
Comments: _____	
_____	
Date:_____	Signature:_____

Dedication

This work is dedicated to my teachers how encourage us to make an application. The Blood Bank Management System project is dedicated to improving the efficiency and effectiveness of blood donation and distribution processes. It aims to streamline the operations of blood banks, ensuring the timely availability of blood units to patients in need. This project is dedicated to saving lives, promoting public health, and fostering a seamless connection between blood donors, blood banks, and healthcare facilities.

Acknowledgement

I am really thankful to my supervisor who has helped us to make the best. We would like to express our sincere gratitude to all the individuals and organizations who contributed to the development of the Blood Bank Management System project. Your invaluable support and collaboration have played a crucial role in creating a solution that enhances the accessibility and effectiveness of blood donation and distribution, ultimately saving lives and improving public health. Thank you for your unwavering dedication and commitment to this important cause.

Executive Summary

In this modern age many people die in the hospitals for not getting the blood at the right time during their treatment, they don't get the right blood type when they are in need.

The solution for this problem is to provide a **Mobile Application.**

A Blood Bank System is a specialized software application that helps blood banks manage the entire blood donation process, from donor registration to blood collection, testing, processing, and distribution. The system provides a centralized platform for blood bank staff to manage donor records, inventory, and blood product tracking, ensuring that the right blood product is available for the right patient at the right time.

The software also helps to ensure regulatory compliance, such as FDA standards, and provides data management tools for tracking trends and performance metrics. The ultimate goal of a Blood Bank System is to improve the efficiency, accuracy, and safety of blood management practices while maintaining high standards of quality and safety in blood banking operations. The implementation of a Blood Bank System has been shown to reduce errors, streamline workflow, and improve patient safety and outcomes.

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Chapter 1

Introduction

Chapter 1: Introduction

Blood banks and transfusion services play a critical role in ensuring that adequate supplies of blood and blood products are available for patients in need. The management of blood donations, testing, processing, storage, and distribution is a complex and highly regulated process that requires careful attention to detail and adherence to strict standards. To streamline and improve the efficiency, accuracy, and safety of blood management practices, blood banks and transfusion services use specialized software applications known as Blood Bank Systems. These systems help to manage the entire blood donation process, from donor registration to blood collection, testing, processing, and distribution. By providing a centralized platform for managing donor records, inventory, and blood product tracking, Blood Bank Systems ensure that the right blood product is available for the right patient at the right time.

1.1. Background

Blood banks play a vital role in healthcare systems by ensuring an adequate supply of blood and blood products for patients in need. The management of a blood bank involves various complex tasks, such as blood collection from donors, screening and testing for infectious diseases, storage and inventory management, blood typing and cross-matching, and distribution to hospitals or healthcare facilities when required. A Blood Bank Management System automates and digitizes the entire blood bank operation, facilitating efficient management and providing accurate real-time information. It enables blood bank personnel to effectively track and monitor the complete life cycle of blood and its components, from donation to transfusion.

1.2. Motivations and Challenges

Saving lives: Blood bank management aims to ensure an adequate and safe supply of blood to meet the needs of patients, potentially saving lives.

Blood shortages: Maintaining a consistent and sufficient blood supply can be challenging due to the variability in demand, limited blood donors, and seasonal fluctuations.

1.3. Goals and Objectives

The main objective of the Blood Bank Management System is to manage the details of Blood, Donor, Blood Group, Blood Bank, Stock. It manages all the information about Blood, Blood Cell, Stock, Blood. The project is totally built at the administrative end and thus only the administrator is guaranteed the access. The blood donation management system (BDMS) is a 24 × 7 system that provides services to the hospitals and other users. The system is easy to maintain all the information about the blood donor. Proposed work provides services to persons who pursue donors who are willing to donate blood.

- Develop a desktop application, which can easily and effectively manage information about Blood, Blood Cell, Stock, and Blood.
- Reduce paperwork

1.4. Literature Review/Existing Solutions

A blood bank management system is a critical component of healthcare organizations and plays a vital role in ensuring the efficient and effective management of blood inventory, donor records, and distribution of blood products. Several literature reviews and existing solutions have been developed to address the challenges associated with blood bank management.

Literature reviews have highlighted the significance of implementing comprehensive blood bank management systems to enhance operational efficiency, reduce errors, and improve patient safety. The existing solutions discussed above demonstrate the evolution and continuous efforts to leverage technology for better blood bank management. However, it is essential to consider specific organizational requirements, scalability, data security, and user-friendly interfaces while implementing such systems.

1.5. Gap Analysis

Today our application is working in a local hospital. In hospitals people can use this app. Soon we will make it work in international hospitals. We are currently working on it. And looking forward to adding some more features.

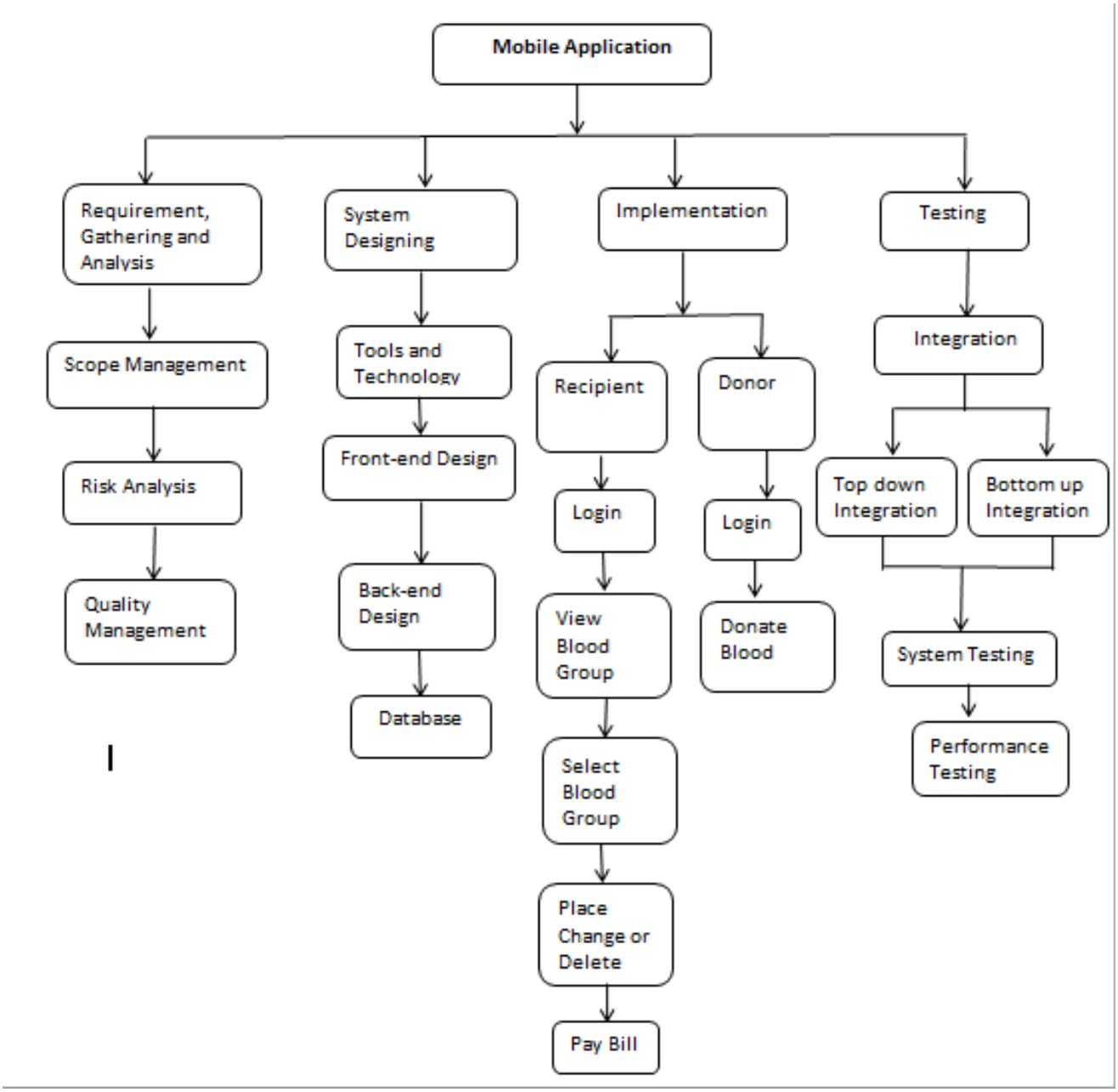
1.6. Proposed Solution

So to solve this problem we will innovate an application that can provide on time blood to the hospitals which are in need, we will provide all the information about the blood which will be required.

1.7. Project Plan

The Blood Bank System project is aimed at developing a web-based system that can be used to manage blood donations, storage, and distribution. The system will allow donors to register online, manage their profiles, and schedule blood donations. It will also enable blood banks to manage their inventory, track blood donations, and distribute blood to hospitals and other medical facilities as needed.

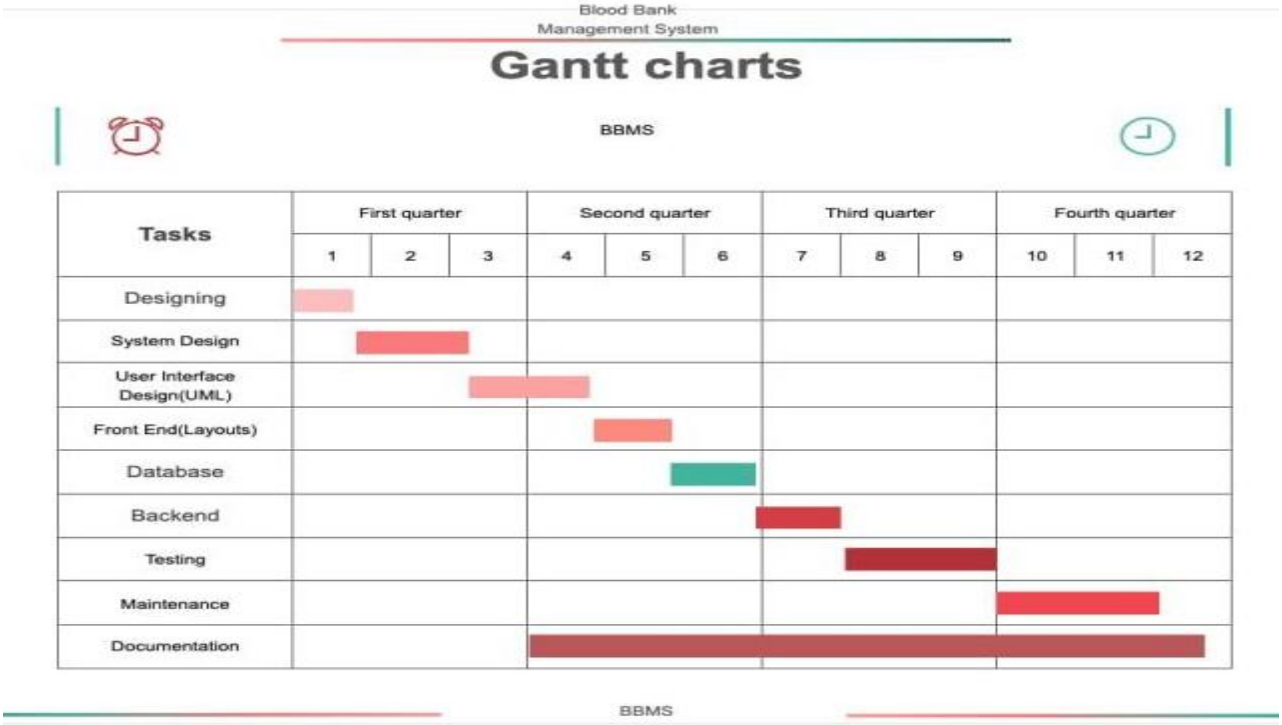
1.7.1. Work Breakdown Structure



1.7.2. Roles & Responsibility Matrix

WBS #	WBS Deliverable	Activity	Activity to complete the Deliverable	Duration (# of Days)	Responsible Team Member(s) & Roles
1	Requirement Gathering	1	Requirement analysis and put together	29	Hadia Tanveer M.Taimoor Ali Aizaz Ahmad
2	Analysis	2	Project plan analysis	18	Hadia Tanveer M.Taimoor Ali Aizaz Ahmad
3	Desgin	3	Design the architecture of App	37	Hadia Tanveer M.Taimoor Ali Aizaz Ahmad
4	Implementation	4	Make wire-frames and coding	71	Hadia Tanveer M.Taimoor Ali Aizaz Ahmad
5	Testing	5	Testing the whole project	16	Hadia Tanveer M.Taimoor Ali Aizaz Ahmad
6	Maintenance	6	Present final report	20	Hadia Tanveer M.Taimoor Ali Aizaz Ahmad
7	Documentation	7	Final documentation	207	Hadia Tanveer M.Taimoor Ali AizazAhmad

1.7.3. Gantt Chart



1.8. Report Outline

- Introduction
- Data Analysis
- Project Scope
- Goals and Objectives
- Existing Solution
- Gap Analysis
- Project Plan

Chapter 2

Software Requirement Specifications

Chapter 2: Software Requirement Specifications

2.1. Introduction

Blood banks and transfusion services play a critical role in ensuring that adequate supplies of blood and blood products are available for patients in need. The management of blood donations, testing, processing, storage, and distribution is a complex and highly regulated process that requires careful attention to detail and adherence to strict standards. To streamline and improve the efficiency, accuracy, and safety of blood management practices, blood banks and transfusion services use specialized software applications known as Blood Bank Systems. These systems help to manage the entire blood donation process, from donor registration to blood collection, testing, processing, and distribution. By providing a centralized platform for managing donor records, inventory, and blood product tracking, Blood Bank Systems ensure that the right blood product is available for the right patient at the right time.

2.1.1 Purpose

Blood Bank Management is specially designed for the purpose of donating blood and adding donors record. The whole project is designed in java languages and different variables, classes etc. have been used for the development for this project. Its easy to operate and understand by users.

2.1.2 Document Conventions

Our document consists of following important conventions

- UML (Unified Modeling Language)
- ERD (Entity Relation Diagram)
- AD (Architecture Diagram)
- Sequence Diagram
- Activity Diagram

2.1.3 Intended Audience and Reading Suggestions

Intended Audience:

The intended audience for a blood bank management system includes blood bank administrators, staff members, healthcare professionals, donors, and regulatory authorities involved in the operation and administration of blood banks.

Reading Suggestions:

1. "Blood Banking and Transfusion Medicine: Basic Principles and Practice" by Christopher D. Hillyer et al. - A comprehensive textbook covering blood banking and transfusion medicine, including blood collection, testing, processing, storage, and administration.

2. "Standards for Blood Banks and Transfusion Services" by AABB - Guidelines and standards for blood bank and transfusion service operations, covering quality management, personnel qualifications, blood collection, testing, storage, distribution, and adverse event reporting.

3. "Information Systems for Blood Transfusion Services" by WHO - A guide focusing on the implementation and management of information systems in blood transfusion services, covering data management, inventory control, donor management, and quality assurance.

4. "Blood Bank Management System: A Comprehensive Review" by Jigar Patel et al. - A research paper providing an overview of blood bank management systems, including benefits, features, and challenges, as well as the use of information technology in streamlining operations.

5. "Design and Development of Blood Bank Management System" by Bhushan Jawale et al. - A research paper focusing on the design and development of a blood bank management system, highlighting the role of technology in improving efficiency and reducing errors.

These resources serve as valuable references for understanding and implementing blood bank management systems.

2.1.4 Product Scope

The blood management system is a comprehensive software solution designed to streamline and optimize the management of blood products and transfusion processes within healthcare institutions.

It encompasses a range of functionalities, including inventory management, blood product tracking, donor management, patient transfusion records, and compatibility testing, and reporting. The system aims to enhance patient safety, reduce waste, improve efficiency, and ensure regulatory compliance throughout the entire blood supply chain, from donation to transfusion.

2.1.5 References

- https://www.sundas.org/
- https://indushospital.org.pk/blood-donor/
- https://www.lnh.edu.pk/services/blood-bank
- https://shaukatkhanum.org.pk/join-us/blood-donors-club/

2.2 Overall Description

2.2.1 Product Perspective

The blood bank management system is a software product that serves as a centralized platform for efficiently managing and tracking blood inventory, donations, and transfusion processes within a healthcare institution. It provides a user-friendly interface for staff to input and access data, automates various tasks, ensures regulatory compliance, and facilitates seamless communication between different stakeholders involved in the blood supply chain. The system aims to enhance operational efficiency, improve patient safety, and optimize the utilization of blood products.

2.2.2 User Classes and Characteristics

The blood bank management system caters to multiple user classes with distinct characteristics:

1. Administrators: They are responsible for overall system management, configuration, and user access control. They require advanced functionalities for system setup, customization, and generating comprehensive reports.

2. Laboratory Technicians: They perform various tasks like blood grouping, cross-matching, and issuing blood products. They need an intuitive user interface for data entry, result interpretation, and inventory management.

3. Donors: Individuals who donate blood need a user-friendly interface to schedule appointments, view their donation history, and receive notifications for eligibility.

4. Transfusion Specialists: These healthcare professionals are involved in patient transfusion decisions and require access to patient records, compatibility reports, and transfusion guidelines.

5. Medical Staff: Physicians and nurses require real-time access to patient transfusion records, blood availability, and alerts for critical situations.

The system should accommodate these user classes with varying levels of technical expertise, ensuring ease of use, security, and role-based access control to cater to their specific needs efficiently.

2.2.3 Operating Environment

Particular	Client System	Server System
Operating System	Window 2000 prof/ linux	Window,Linux,Mac OS
Processor	Pentium 4, 1.2GHz	Pentium 4, 2 GHz
Hard Disk	40 GB	100 GB
RAM	256 MB	512

2.2.4 Design and Implementation Constraints

When designing and implementing a blood bank management system, there are several constraints that need to be taken into consideration. Here are some common design and implementation constraints for a blood bank management system

- Security
- Reliability
- Scalability
- Integration
- User Interface
- Regulatory Compliance
- Backup and Recovery
- Performance
- Cost

By considering these design and implementation constraints, you can develop a blood bank management system that meets the specific requirements of the organization while adhering to industry standards and best practices.

2.2.5 Assumptions and Dependencies

Assumptions and dependencies of a blood bank management system may include:

Assumptions:

- **Availability of a reliable database:** The project assumes the existence of a well-maintained and up-to-date database containing relevant information about blood donors, recipients, blood types, and inventory levels.
- **Access to necessary infrastructure:** The project assumes that the blood bank has access to essential infrastructure, including computers, servers, and network connectivity, to support the implementation of the management system.
- **Trained personnel:** It is assumed that the blood bank has adequately trained staff who can operate and manage the system effectively, including data entry, retrieval, and analysis.
- **Stakeholder cooperation:** The project assumes the cooperation and engagement of various stakeholders, including blood bank staff, management, donors, recipients, and relevant

authorities, to support the successful implementation and utilization of the blood bank management system.

Dependencies:

- **Integration with existing systems:** The project may depend on the integration of the blood bank management system with other existing systems, such as hospital information systems or laboratory systems, to facilitate seamless information exchange and coordination.
- **Compliance with regulatory requirements:** The project depends on the blood bank adhering to regulatory standards and guidelines related to blood banking, ensuring the system's compliance with privacy, security, and data protection regulations.
- **Adequate blood supply:** The project's success relies on a continuous and sufficient supply of blood donations to meet the needs of recipients. Collaboration with blood donation drives, hospitals, and other stakeholders is essential for maintaining an adequate blood inventory.

These assumptions and dependencies need to be considered during the planning, implementation, and ongoing management of a blood bank management system project to ensure its effectiveness and sustainability.

2.3 External Interface Requirements

2.3.1 User Interfaces

The user interface of a blood bank management system typically includes the following components:

- Dashboard
- Donor Management
- Recipient Management
- Inventory Management

- Request Processing
- Reporting & Analytic
- Settings

2.3.2 Hardware Interfaces

The hardware interface of blood bank management system typically includes the following components:

- 1GHz or High Processor
- 512 MB RAM
- 500 MB Hard Disk

2.3.3 Software Interfaces

Software interfaces of a blood bank management system refer to the user interfaces or graphical interfaces through which users interact with the system. These interfaces are designed to provide an intuitive and user-friendly experience, enabling users to perform various tasks and access necessary information. The software interfaces typically include screens, menus, forms, buttons, and other visual elements that facilitate the input, retrieval, and manipulation of data within the blood bank management system. They aim to streamline user workflows, enhance data visibility, and ensure efficient navigation through different functionalities of the system.

2.3.4 Communications Interfaces

The communication interface of a blood bank management system refers to the mechanism through which the system communicates and exchanges information with external entities or systems. This interface enables seamless integration with external systems, such as laboratory equipment, electronic medical records (EMR) systems, donor registries, and other healthcare applications. It allows for the secure transmission of data, such as donor information, blood test

results, inventory updates, and blood product requests, between the blood bank management system and external stakeholders. The communication interface may utilize standard protocols, such as HL7 (Health Level Seven) or DICOM (Digital Imaging and Communications in Medicine), to ensure interoperability and standardized data exchange in the healthcare ecosystem.

2.4 System Features

There are:

- Donor management-donor registration, managing donor database, recording their physical and medical statistics.
- Inventory management in blood banks for storage and issuance of blood.
- Online transform of blood from one blood bank to another.
- Blood requisition and issuance of blood.
- Discarding expired and unsuitable blood (less Qty., reactive, clotting, hydrolysis).
- Being a web-based system, it can be implemented throughout the state. Separate user accounts can be created for each blood bank.
- Patient register/blood sample receiving register, donor register, blood issue register and discarded blood report.
- Fridge wise stock position and printing of fridge stickers.
- List of donors who are eligible for donation on a particular date with contact number.
- Camp wise donor list and printing of donor cards.

2.4.1 System Feature 1

2.4.1.1 Description and Priority

The Blood Bank Management System is a vital software solution that facilitates the efficient and organized management of blood inventory, donor records, and blood distribution. It prioritizes the secure and accurate tracking of blood units, ensuring their availability when

needed for medical emergencies. This system enables seamless coordination among blood banks, hospitals, and donors, improving patient care and saving lives by expediting the process of locating and acquiring compatible blood units in a timely manner. The primary focus of this system is to streamline operations, enhance inventory management, and prioritize the safety and well-being of patients.

2.4.1.2 Stimulus/Response Sequences

- Donation request - Response: Search and verify availability.
- Donor registration - Response: Store information and update inventory.
- Hospital blood request - Response: Check, reserve, and arrange delivery.
- Expiring blood unit - Response: Alert for utilization or disposal.
- Inconclusive compatibility test - Response: Alert for further testing.
- Blood unit recall - Response: Identify, notify, and replace/dispose.
- Donor eligibility change - Response: Update profile and notify stakeholders.

2.4.1.3 Functional Requirements

- Login of admin.
- Blood Donor.
- Change the login password of the admin.
- Register the donor by himself.
- Register the donor by system admin.
- Login of the donor.
- Change the login password of the donor.

- Change personal contact details by the donors 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.

2.4.2 System Feature 2

2.4.2.1 Description and Priority

A blood bank management system is a software application designed to efficiently manage and track blood inventory, donor information, and blood transfusion processes. Its priority lies in ensuring the availability of safe and compatible blood units for patients in need, reducing wastage, maintaining accurate records, and facilitating timely and effective communication among blood banks, hospitals, and donors. This system plays a critical role in saving lives by streamlining blood donation and transfusion processes, improving operational efficiency, and enhancing overall patient care.

2.4.2.2 Stimulus/Response Sequences

Stimulus/Response Sequences in a blood bank management system:

1. Donor Registration:

Stimulus: Donor visits the blood bank for registration.

Response: Blood bank staff collects donor information, performs medical screening, and adds the donor's details to the system.

2. Blood Inventory Update:

Stimulus: Blood units are received or used for transfusion.

Response: Blood bank staff updates the inventory in the system, recording details such as blood type, quantity, and expiration dates.

3. Blood Request:

Stimulus: Hospital requests specific blood units for a patient.

Response: Blood bank staff checks the inventory, identifies suitable units, and reserves them for the patient.

4. Blood Cross matching:

Stimulus: Patient's blood sample is provided for cross matching.

Response: The system matches the patient's blood type with available donor units to determine compatibility and safety.

5. Blood Transfusion:

Stimulus: Authorized personnel initiate a blood transfusion procedure.

Response: The system verifies the blood units, records the transfusion details, and updates the inventory accordingly.

6. Donor Notification:

Stimulus: Blood inventory levels fall below a certain threshold.

Response: The system sends notifications to eligible donors, reminding them to donate and replenish the stock.

7. Reports and Analytic:

Stimulus: Periodic analysis and reporting requirements.

Response: The system generates reports on inventory levels, blood utilization, donor trends, and other relevant metrics for monitoring and decision-making purposes.

These stimulus/response sequences help streamline the operations of a blood bank management system, ensuring efficient blood donation, inventory management, and transfusion processes while maintaining accurate records and enhancing patient care.

2.4.2.3 Functional Requirements

The system provides the following basic functionality:

- Advertisement and announcement

- Member sign-up and staff member registration
- Online appointment
- Blood request and Cross matching
- Searching functionality
- Retrieving Report

2.5 Nonfunctional Requirements

Some non-functional requirements for a BBMS project include maintainability, serviceability, environmental compatibility, data integrity, usability, scalability, reliability, recovery-ability, interoperability, capacity, performance, security, regulatory compliance and availability. Is there anything specific you would like to know about these requirements?

2.5.1 Performance Requirements

The system is interactive and the delays involved are less. When connecting to the server the delays are based editing on the distance of the two System configuration between them so there is high probability that there will be or not successful connection in less than 20 seconds for the sake of good communications.

2.5.2 Safety Requirements

Blood bank modules maintain details about the donors and recipients. These blood bank modules are linked to other modules in the software for wards and OT in the hospitals, whereby, any and all blood requirements using surgeries etc. What happens in the hospitals is known to the bank. Important information and parameters such as availability of blood, cross-matching between donor's and recipient's blood groups and Blood transfusions reactions are recorded. Also, the interactions with other blood banks within hospitals or outside and delivery/recipients of blood bags between these banks or hospitals are recorded and maintained.

- The blood request queue screen, from where all the daily transfusions can be handled.
- Fresh blood and stored blood request processing.
- Blood returns are made easy in the blood bank management system.
- Transfusion detailed and charging.
- Destruction Details.
- Blood bank management system is integrated with a lab module for blood cross match and grouping.

2.5.3 Security Requirements

- The system uses SSL (secure socket layers) in all transactions that include any Confidential customers Information
- The system must automatically log out all customers after a period of inactivity.

2.5.4 Usability Requirements

The usability requirement of blood bank management system is:

- Efficiency
- Accuracy
- Scalability
- User-friendliness
- Security
- Integration

2.5.5 Reliability Requirements

When it comes to a blood bank management system, reliability is of utmost importance to ensure the safety and availability of blood products. Here are some key reliability requirements that are typically expected from a blood bank management system:

Data integrity, availability, redundancy, fault tolerance, security, disaster recovery, traceability, audit-ability, regulatory compliance, user training, and support.

2.5.6 Maintainability/Supportability Requirements

Regular maintenance, easy troubleshooting, quick bug fixes, software updates, clear documentation, user training, technical support, and system scalability.

2.5.7 Portability Requirements

Platform independence, compatibility with different operating systems, flexibility for integration with other systems, scalability to accommodate future expansions, and easy migration to new hardware or software environments.

2.5.8 Efficiency Requirements

Fast data processing, quick response times, optimized resource utilization, scalability to handle increasing workload, efficient algorithms and data structures, minimal system downtime, and effective utilization of storage and memory resources.

2.6 Domain Requirements

- Donor management
- Inventory management
- Blood screening and Testing
- Blood request and distribution
- Blood storage and tracking

- Transfusion management
- Reporting and Analytic
- Regulatory compliance
- Integration with external systems
- Security and Privacy

Chapter 3

Use Case Analysis

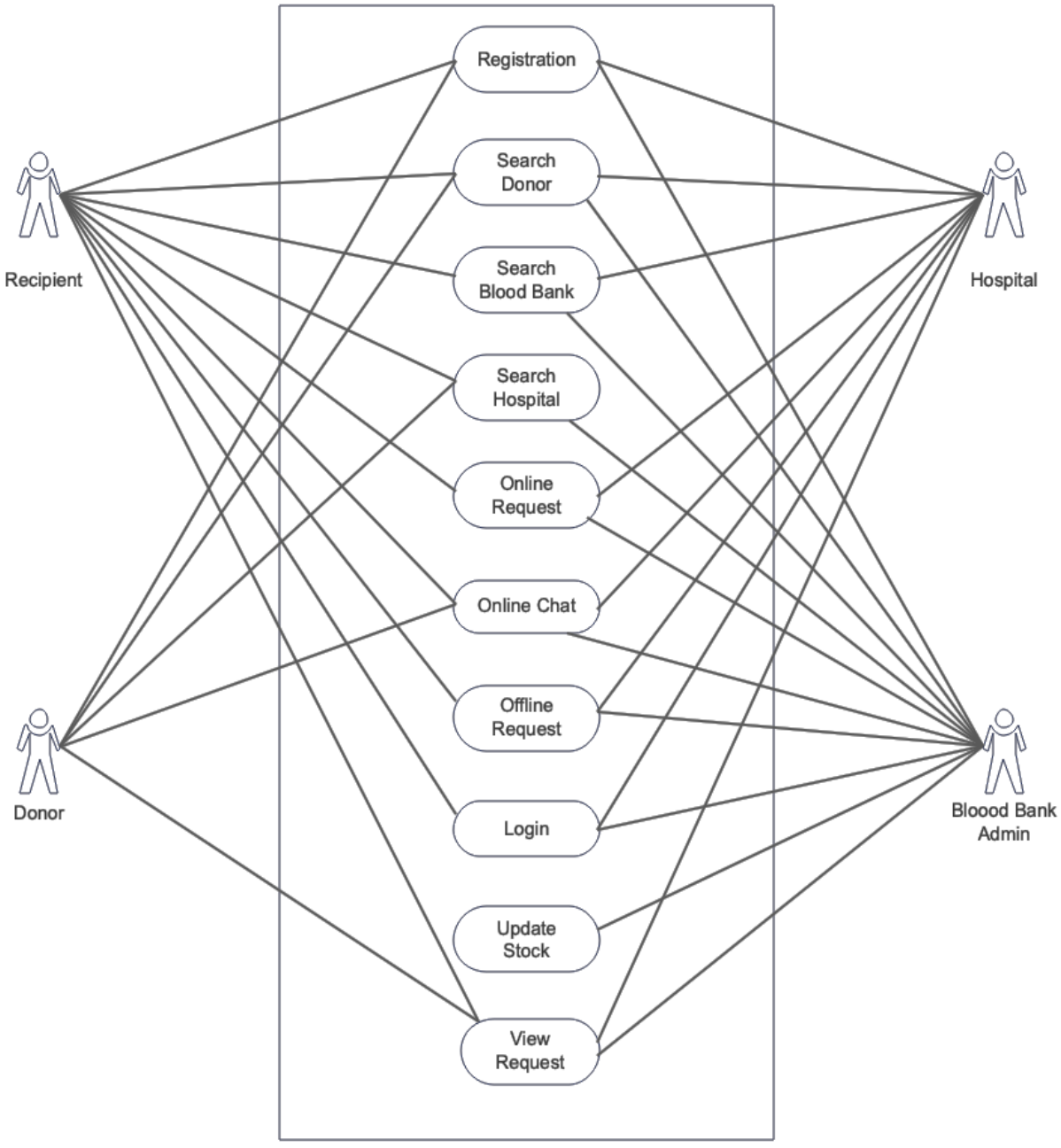
Chapter 3: Use Case Analysis

1. **Register Donor:**
    - Description: The system allows the registration of new blood donors.
        1. Basic Flow:
        2. The Administrator selects the option to register a new donor.
        3. The system prompts for the donor's personal information.
        4. The Administrator enters the donor's details (name, contact information, blood type, etc.).
        5. The system validates and stores the donor's information in the database.
2. **Blood Bank Admin:**
    - Description: The system facilitates the management of the blood inventory.
        1. Basic Flow:
        2. The Administrator selects the option to manage the blood inventory.
        3. The system displays the current blood inventory.
        4. The Administrator can add new blood units to the inventory.
        5. The Administrator can update the quantity or status of existing blood units.
        6. The system updates the inventory accordingly.
3. **Recipient:**
    - Description: The system allows users to search for suitable blood donors.
        1. Basic Flow:
        2. The User selects the option to search for blood donors.
        3. The system prompts for the required blood type and location.
        4. The User enters the desired blood type and location.
        5. The system searches the donor database for matching donors.
        6. The system displays a list of potential donors with their contact information.
        7.

4. **Description:** The system handles blood requests from hospitals or individuals.

    1. Basic Flow:
    2. The Administrator selects the option to manage blood requests.
    3. The system displays a list of pending blood requests.
    4. The Administrator can view the details of each request.
    5. The Administrator can assign a suitable donor for each request.
    6. The system updates the donor's availability and notifies the User about the assigned donor.

3.1. Use Case Model



3.2. Use Cases Description

The many features and interactions within a blood bank management system are described in the use case analysis. It covers important scenarios including adding new blood donors, keeping track of the blood supply, looking for qualified donors, dealing with blood demands, producing reports, and managing user accounts.

The study begins with the registration of donors, during which the system records and safely retains their personal data. The administration can then add or change blood units as necessary while maintaining the blood inventory. A list of probable donors for a given request is provided by the system, which also makes it easy to find blood donors based on blood type and region.

The system manages requests for blood from hospitals or individuals, and the administrator can view, allocate eligible donors, and update their availability. The blood inventory, donor statistics, and request history can all be included in reports that can be generated for tracking and analysis reasons. And finally, the system gives the administrator the ability to control user accounts, creating or changing them as needed.

This use case analysis provides a platform for further development and implementation while also serving as a foundation for understanding the fundamental functions of a blood bank management system.

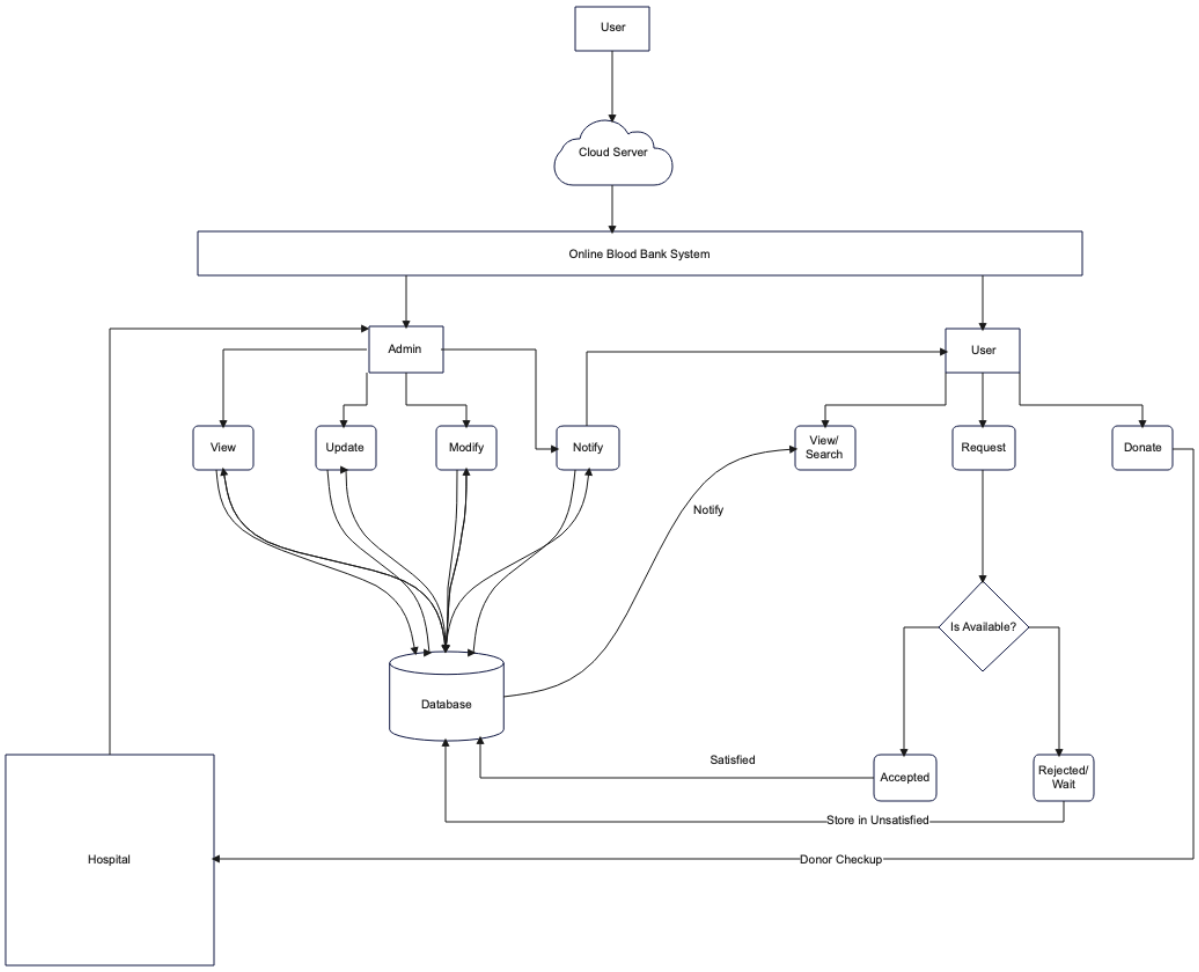
Chapter 4

System Design

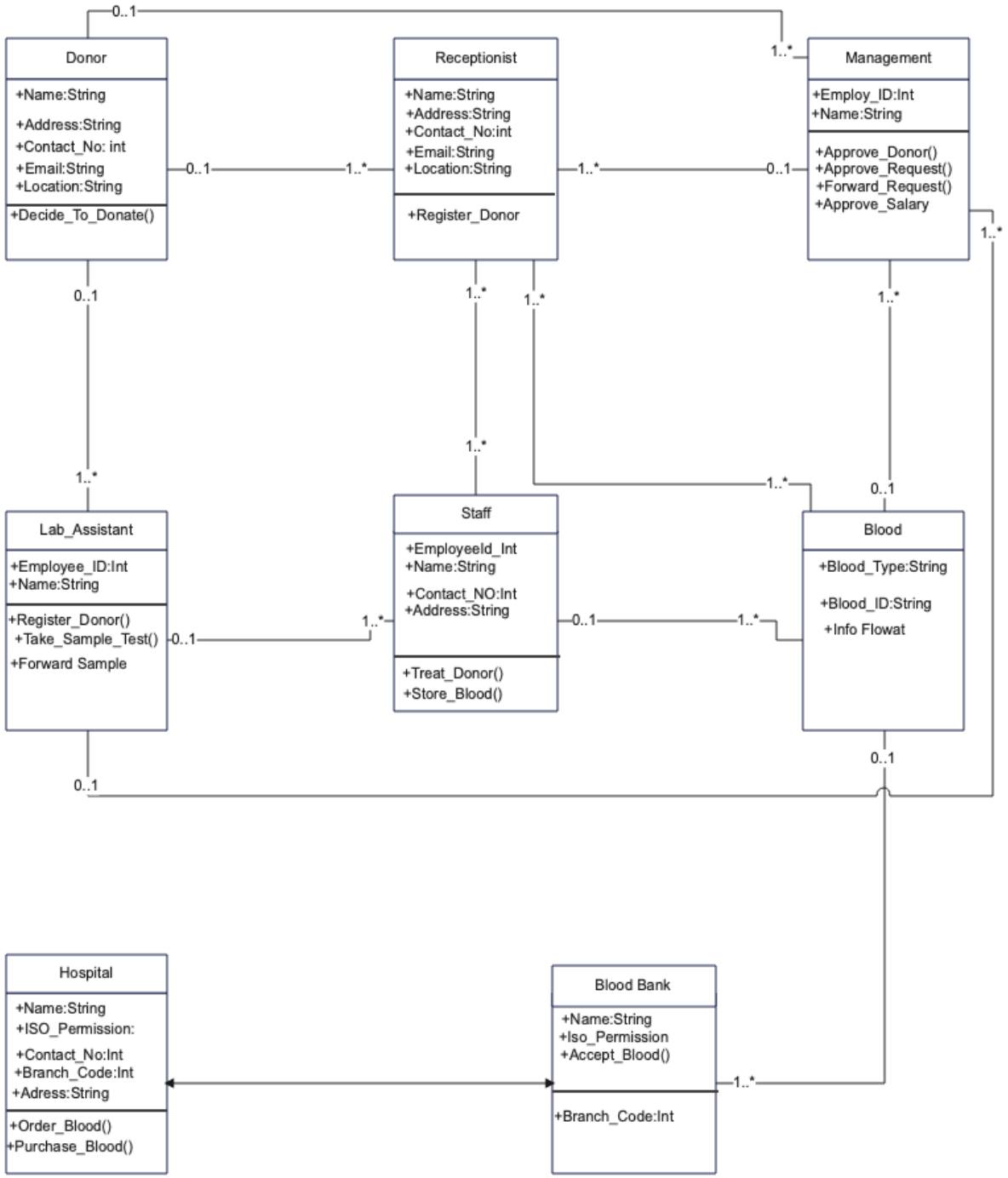
Chapter 4: System Design

The Blood Bank Management System follows a client-server architecture with a back-end server and client-side user interfaces. The server-side employs a robust technology stack, such as a web application framework, to handle request processing, data storage, and business logic. It utilizes a relational database management system (RDBMS) to store and manage donor and blood inventory data, ensuring data integrity and security. The client-side interfaces are developed using web technologies, providing intuitive and user-friendly access to the system via web browsers. The interfaces are designed to be responsive and adaptable across various devices. The system emphasizes scalability to accommodate a growing number of users and data. Security measures, such as authentication and authorization mechanisms, are implemented to protect sensitive information. System performance and optimization techniques are employed to ensure efficient data retrieval and processing.

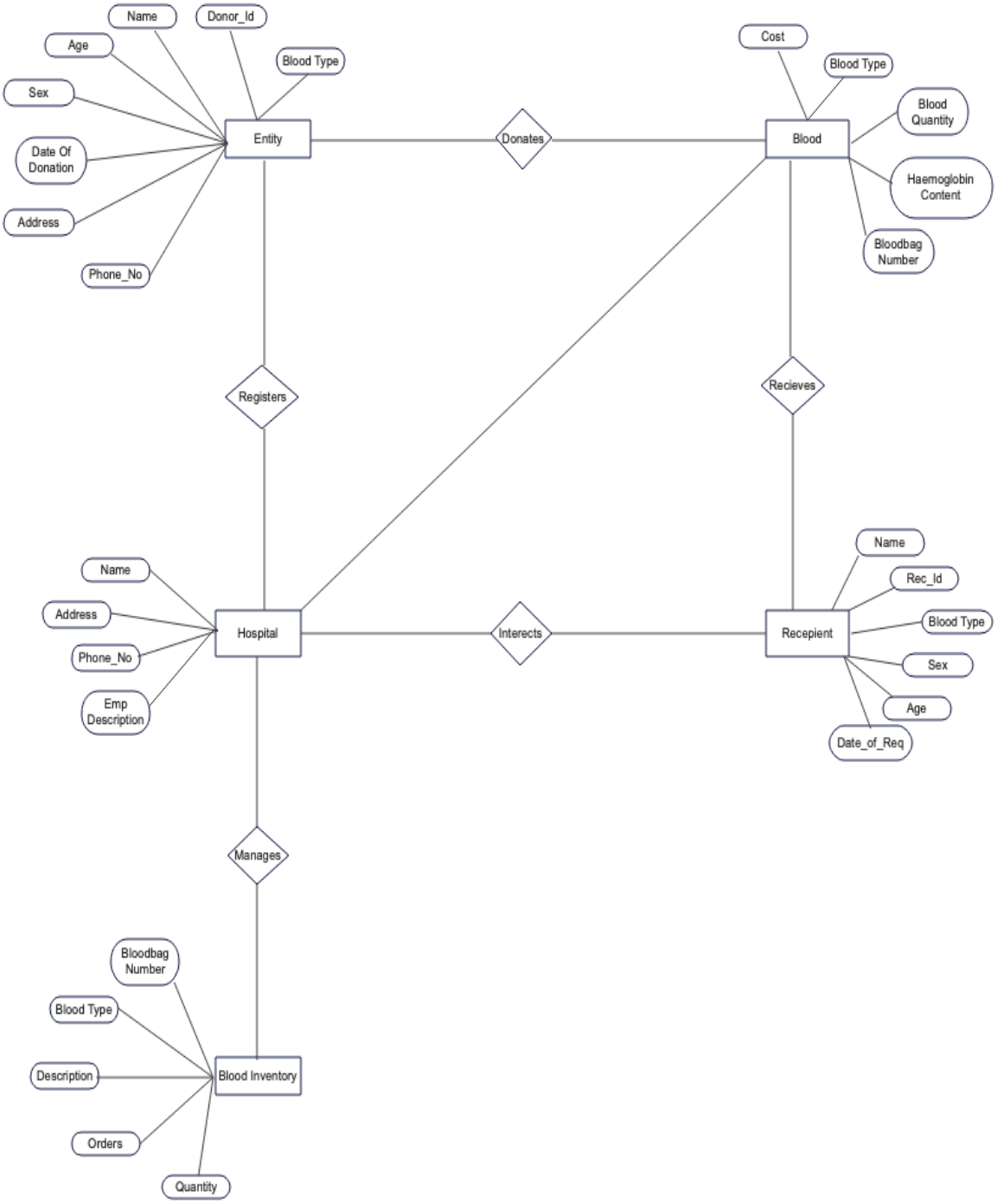
4.1. Architecture Diagram



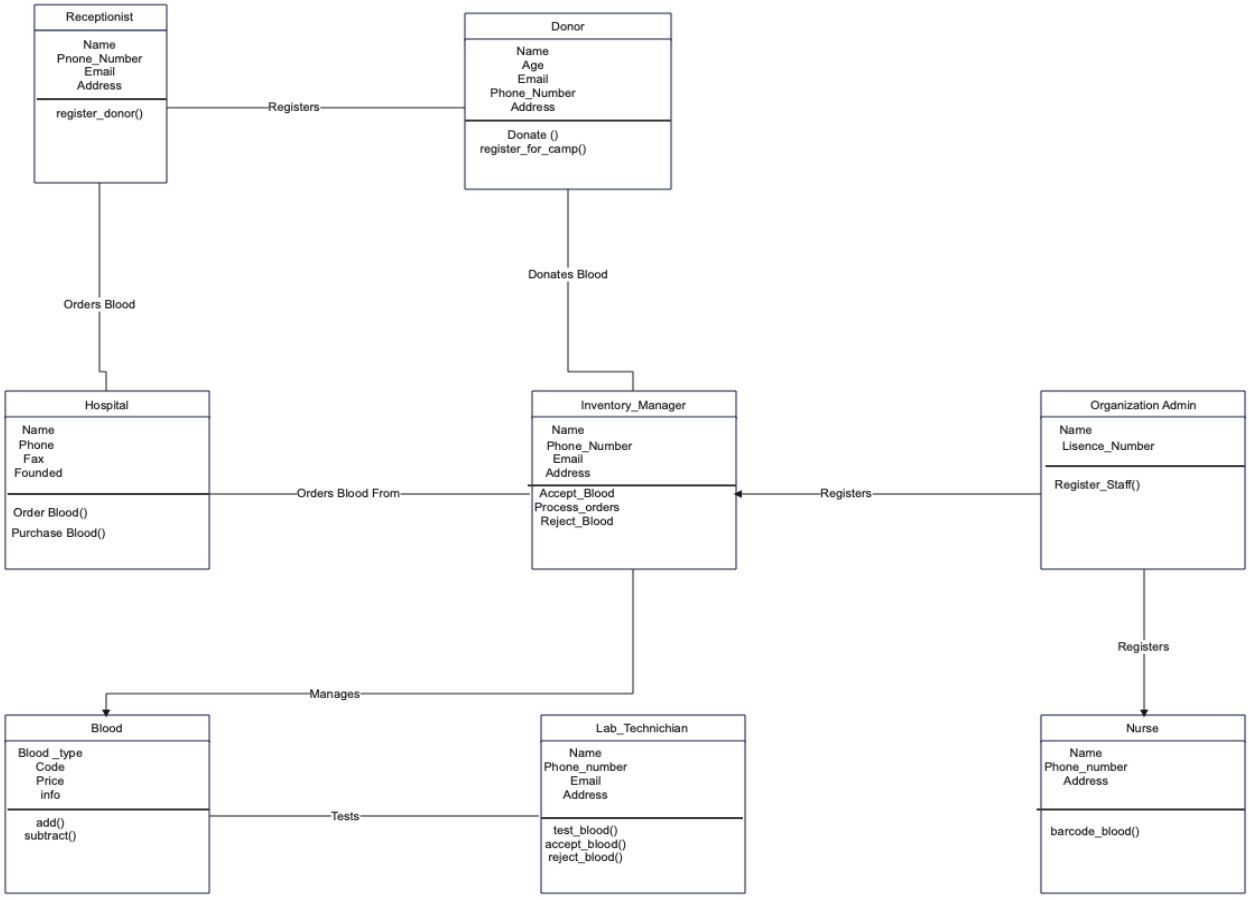
4.2. Domain Model



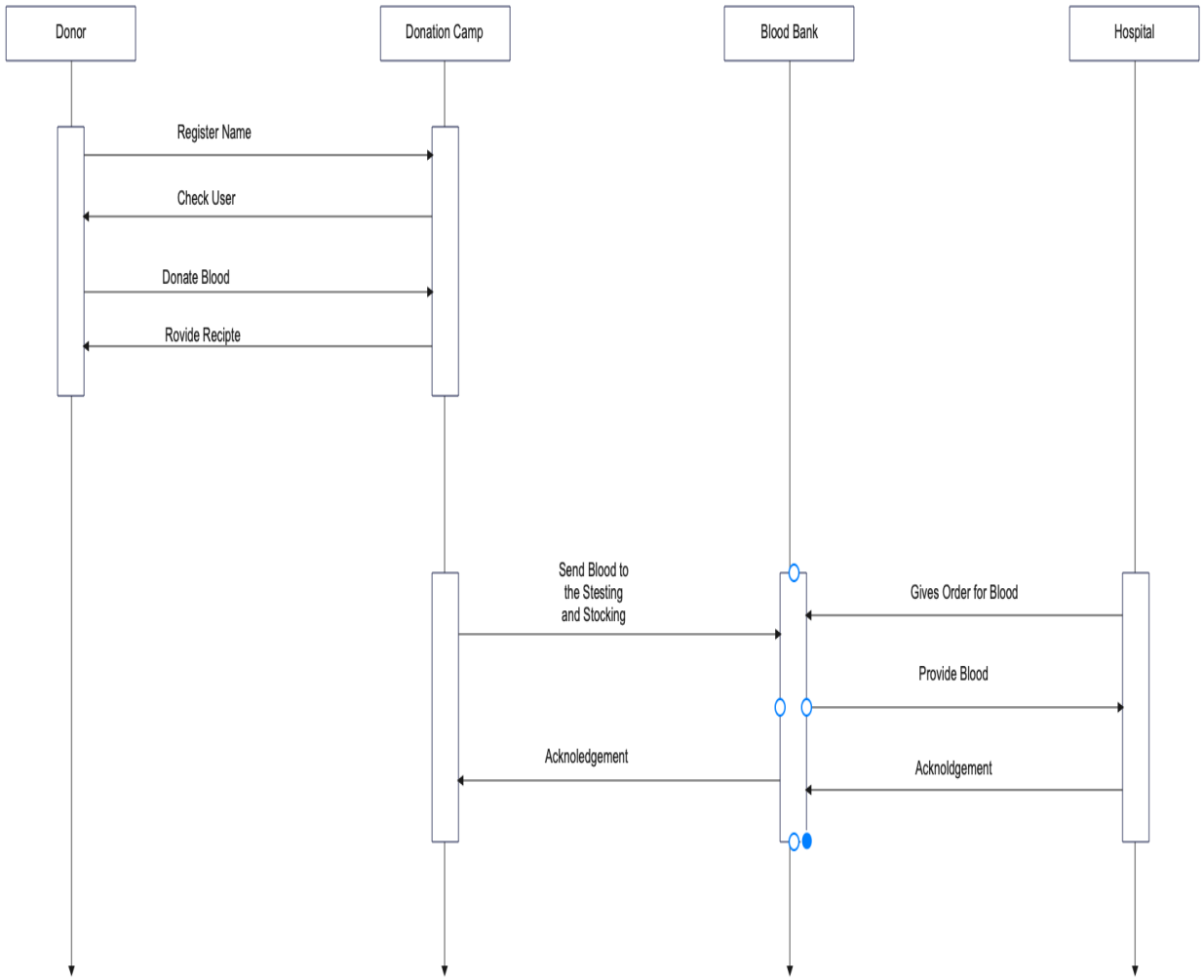
4.3. Entity Relationship Diagram with data dictionary



4.4. Class Diagram



4.5. Sequence / Collaboration Diagram



4.6. Operation contracts

1. **Contract C01: Sign Up**

Operation:	Sign up (Full Name, Enter ID Number, Email,Password ,Phone number)
Cross Reference:	Use cases: Sign Up
Pre-Condition:	User Registration
Post Condition:	User has registered

2. **Contract C02: Login**

Operation:	Login (Email, Password)
Cross Reference:	Use cases: Login
Pre-Condition:	User Registration
Post Condition:	Login Successful

3. **Contract C03: Main Menu**

Operation:	Main Menu (Recipient Requests,Profile Page,Email Notifications)
Cross Reference:	Use cases: Main Menu
Pre-Condition:	Login.
Post Condition:	**Blood Requests**

4. **Contract C04: Blood Request For Donor**

Operation:	Blood Requests(Email Notification).
Cross Reference:	Use cases: Email Notification

Pre-Condition:	Users must Login .
Post Condition:	Email Notification Receive

5. Contract C05: Recipient Sending Request

Operation:	Recipient Request(Send Email)
Cross Reference:	Use cases: Send Email Request
Pre-Condition:	User login
Post Condition:	Email Notification Send

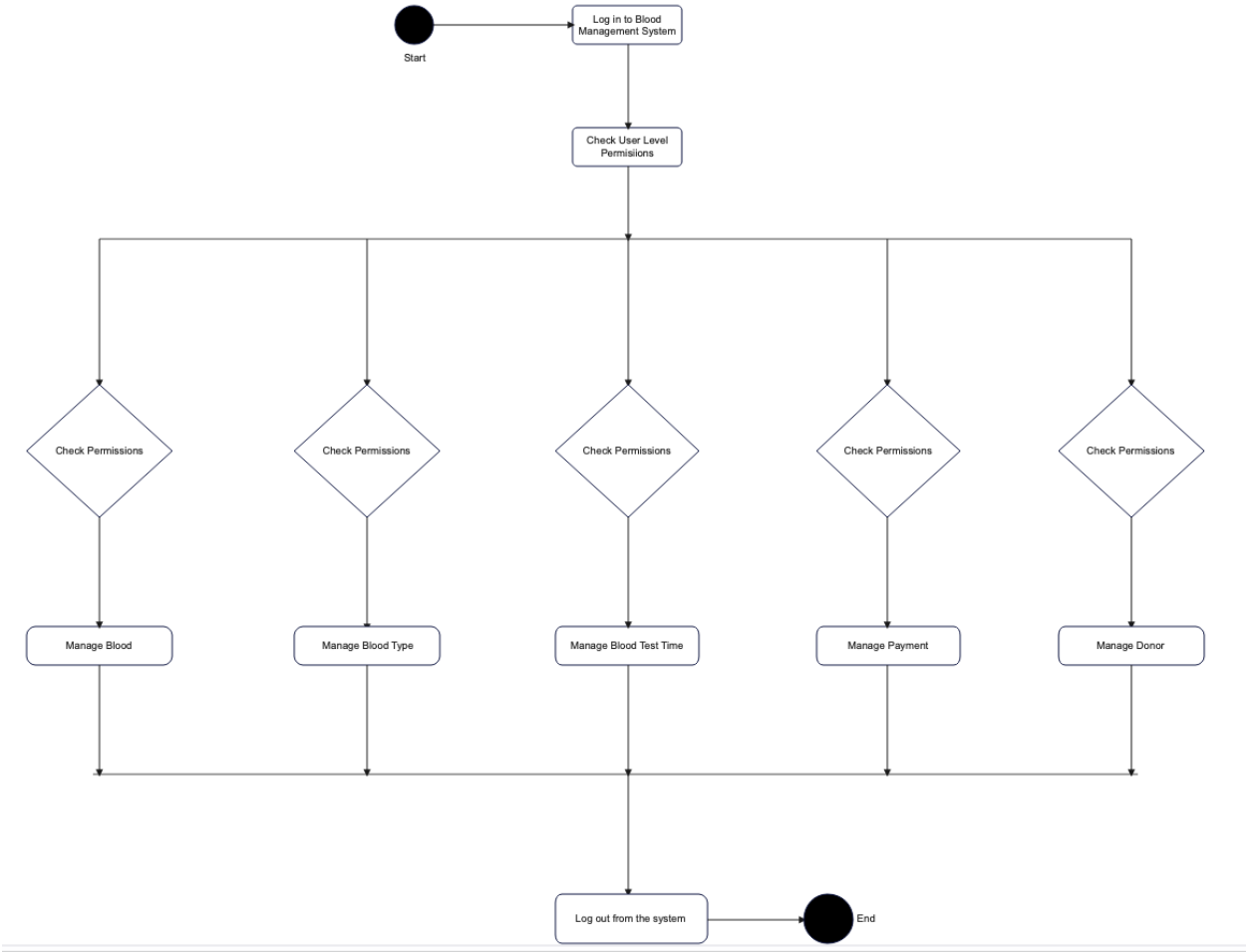
6. Contract C06: Donor Approves Request

Operation:	Donor Approves Request
Cross Reference:	Use cases: Request Approve
Pre-Condition:	User is logged
Post Condition:	User Send Request.

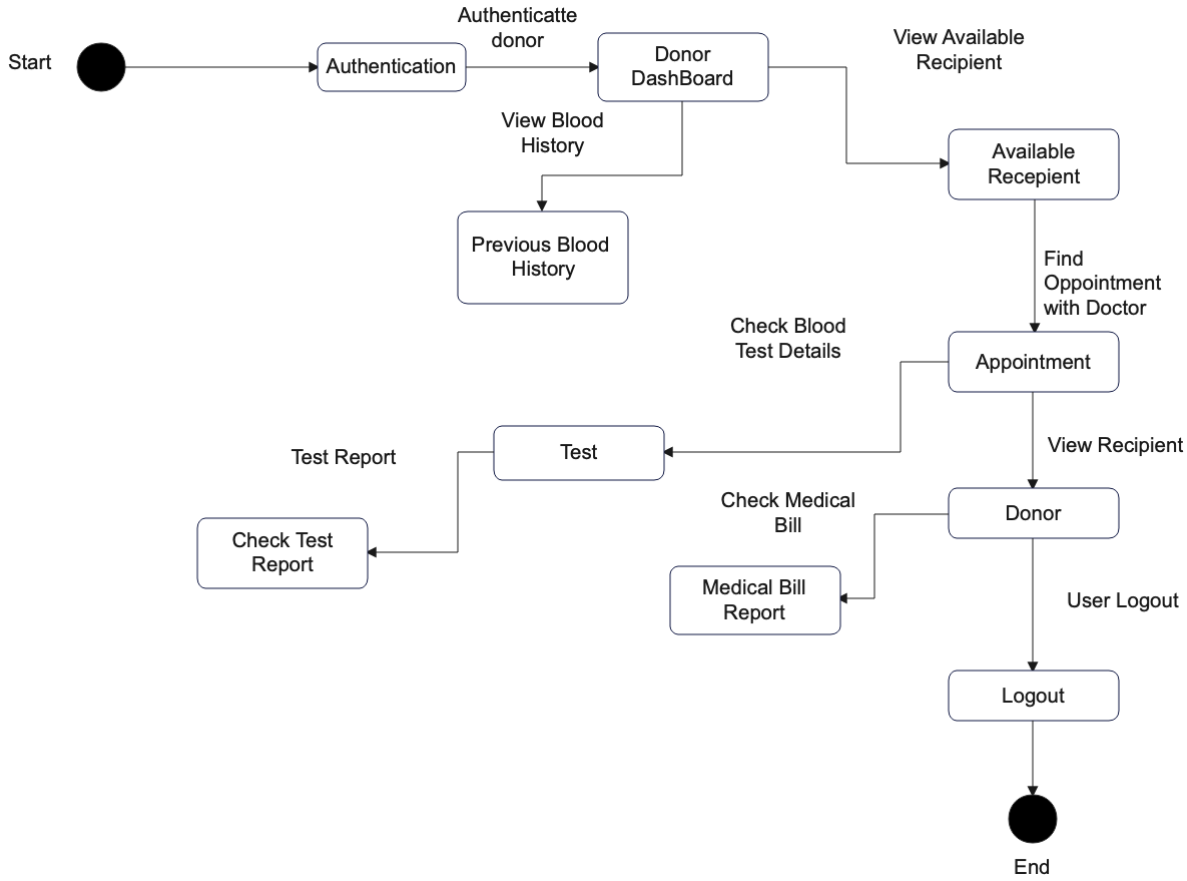
7. Contract C07: Chat

Operation:	Chat Between Donor and Recipient
Cross Reference:	Use cases: Chat
Pre-Condition:	Recipient Approve The Request
Post Condition:	Thay can now chat

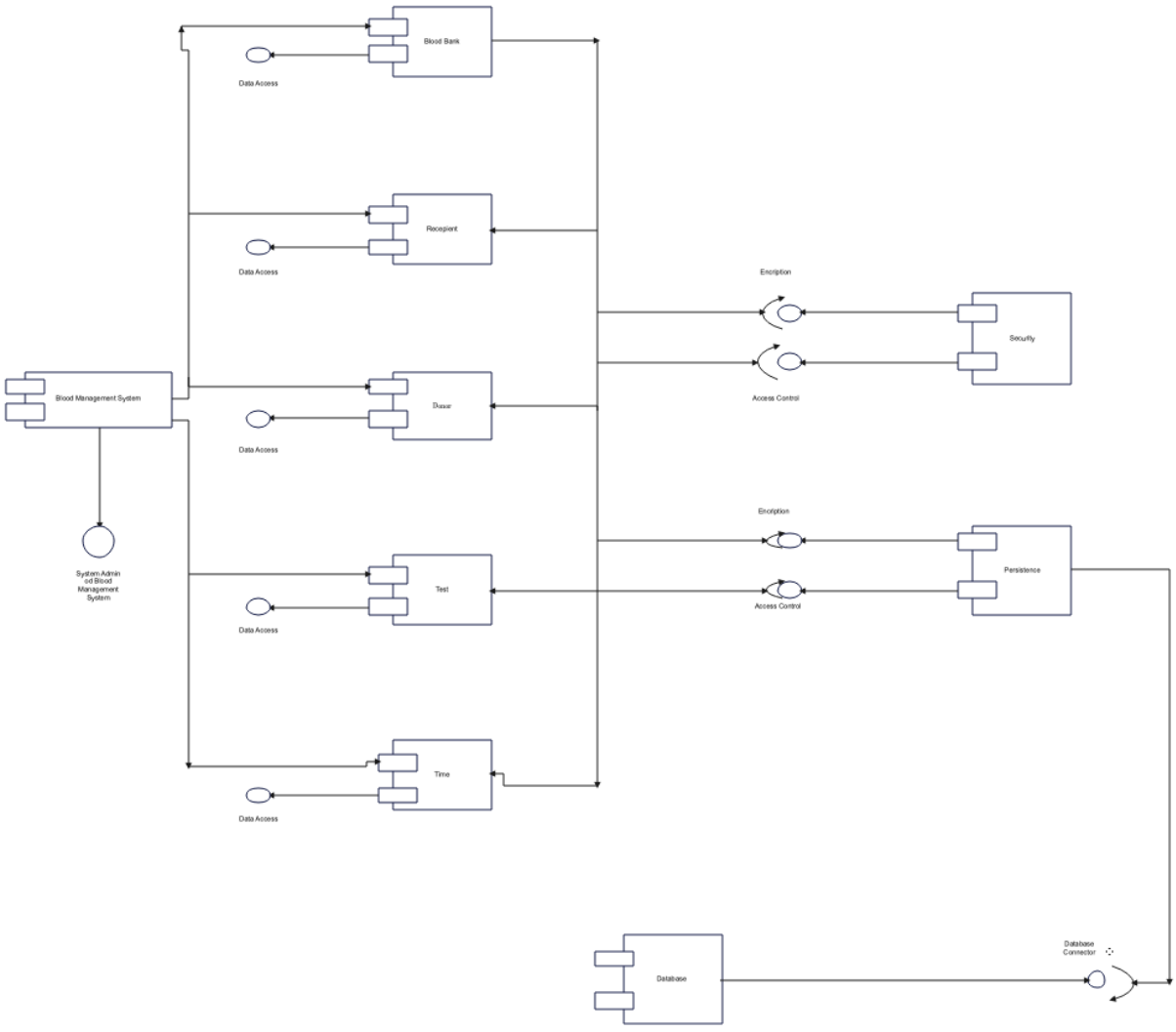
4.7. Activity Diagram



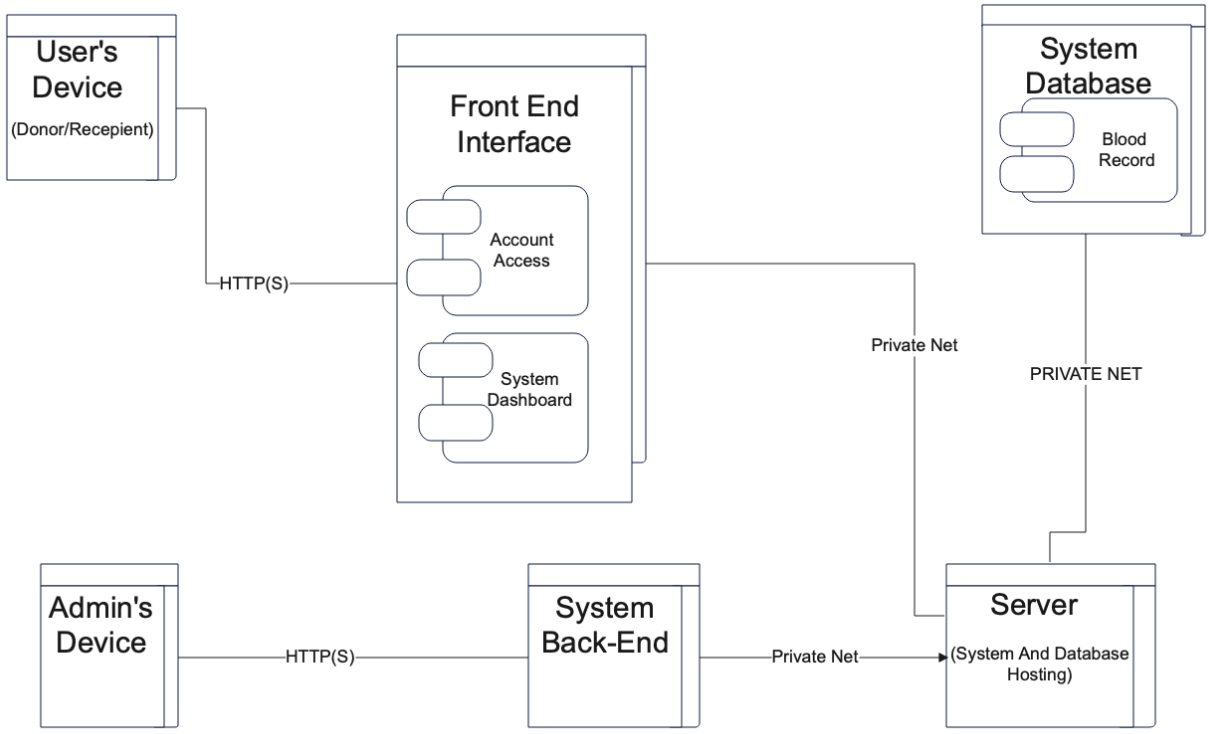
4.8. State Transition Diagram



4.9. Component Diagram

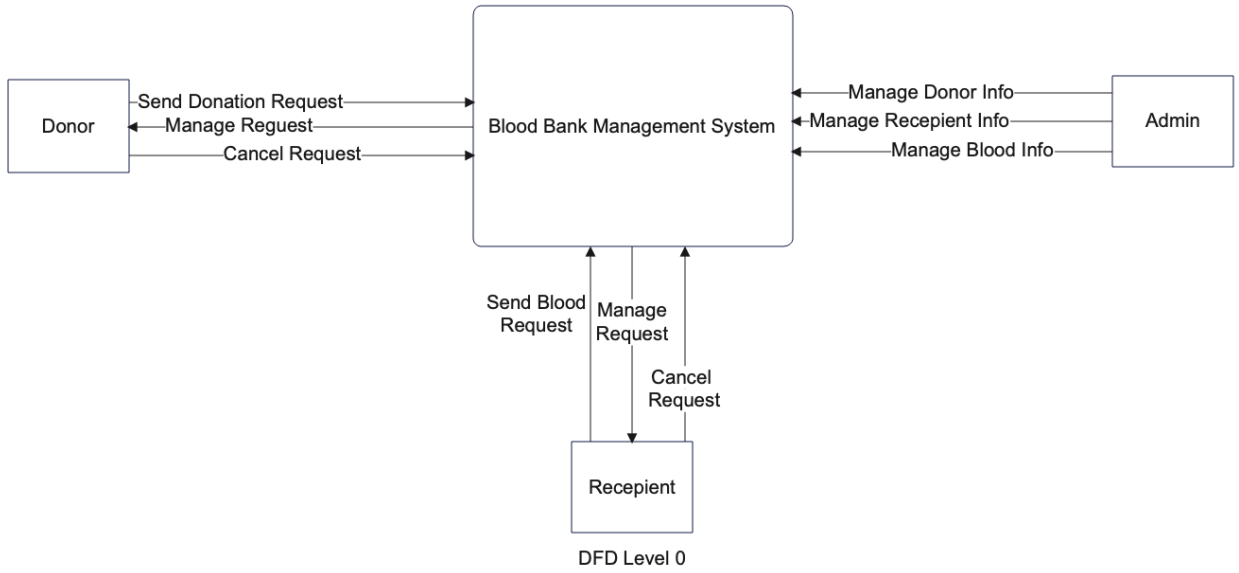


4.10. Deployment Diagram



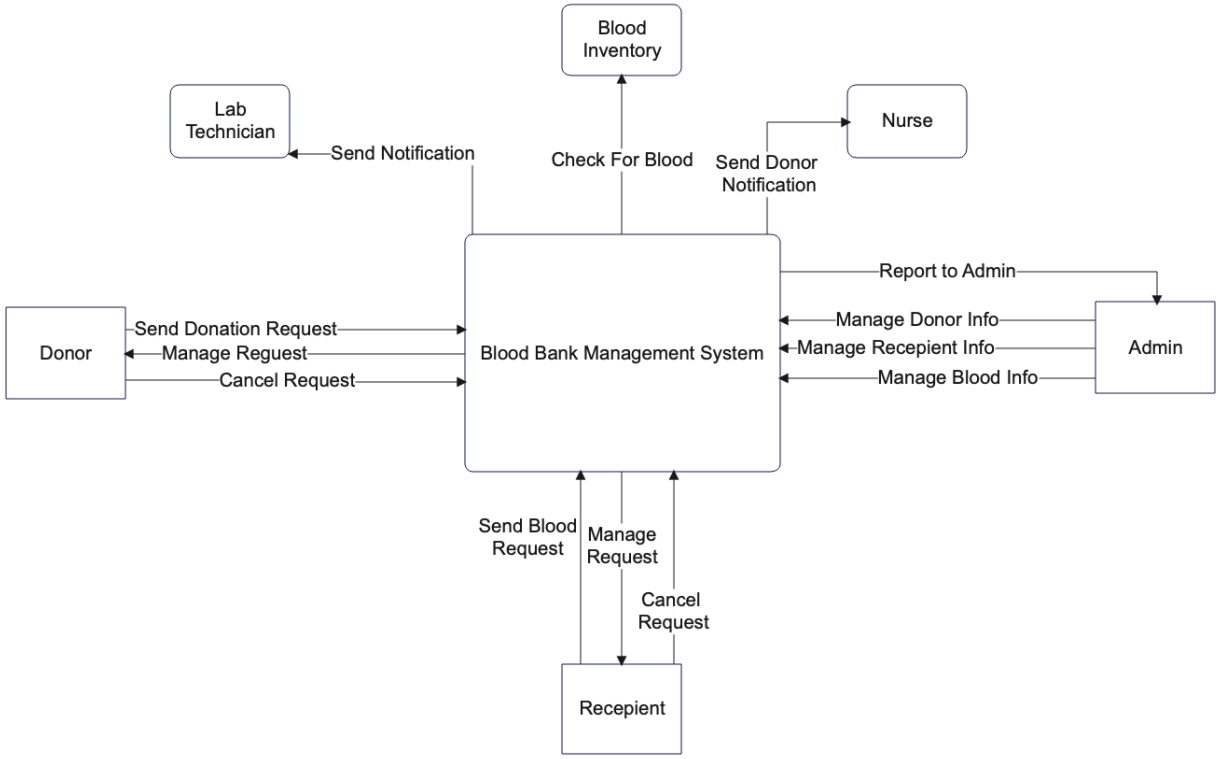
4.11. Data Flow diagram

DFD LEVEL 0

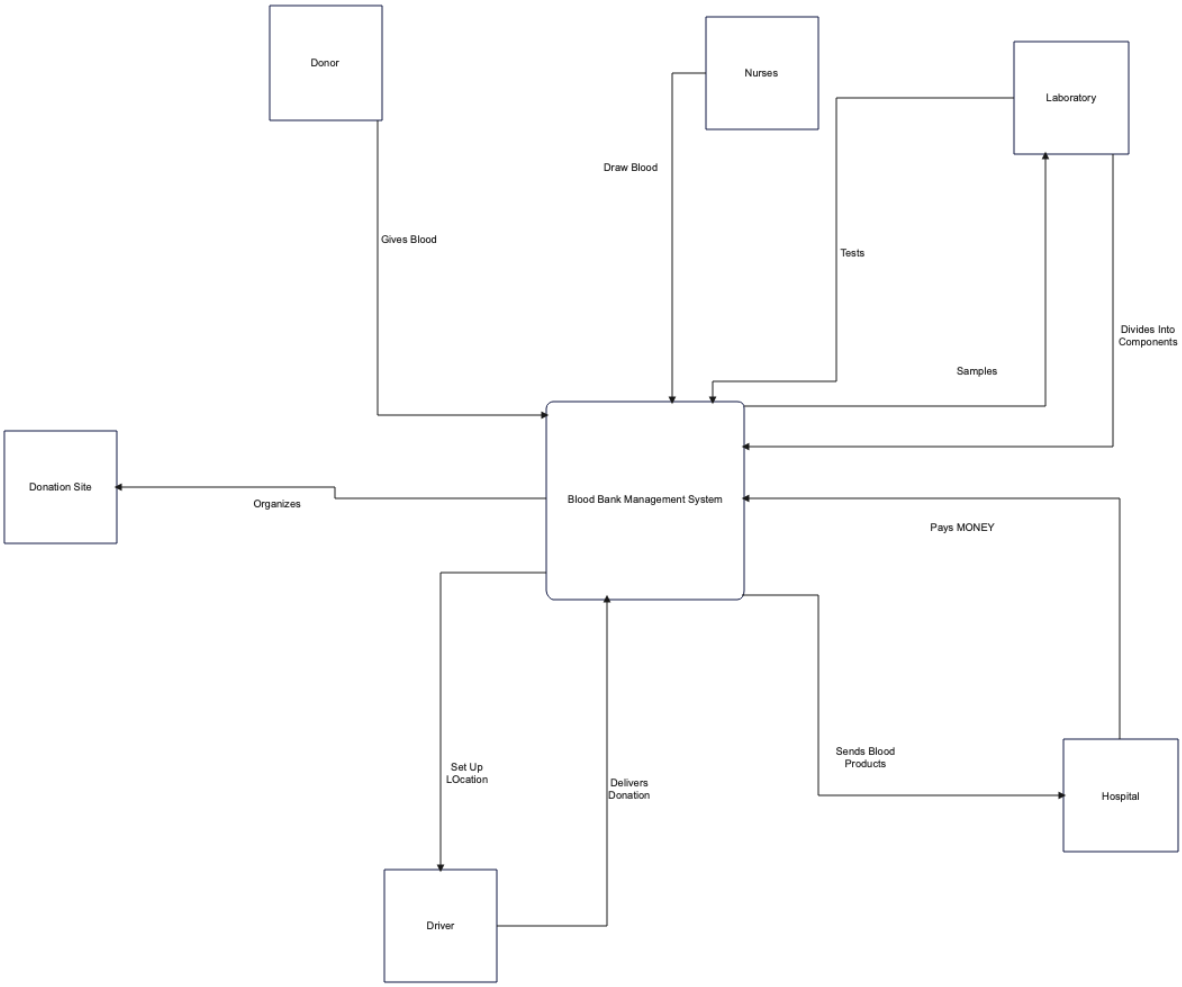


DFD Level 0

DFD LEVEL 1



DFD LEVEL 2


Donor
Nurses
Laboratory
Draw Blood
Gives Blood
Tests
Divides Into Components
Samples
Donation Site
Organizes
Blood Bank Management System
Pays MONEY
Set Up LOcation
Delivers Donation
Sends Blood Products
Hospital
Driver

Chapter 5

Implementation

Important Flow Control/Pseudo codes

- Services that this application will provide are the following:
- There are two types of users
- 1. Users who want to provide information about themselves
- They will be able to create a profile with the necessary information (contact, location, etc.)
- They are blood seekers.
- 2. Users who want to donate.
- They will be able to access profiles based on the criteria they specify.

Deployment Environment

In the Deployment environment we work on android studio to build our android based application.

5.1. Important Flow Control/Pseudo codes

1. User Authentication Flow:

```
if user clicks on "Login" button:
   prompt user for username and password
   if entered username and password are valid:
      grant access to the system
   else:
      display error message
else if user clicks on "Register" button:
   prompt user for necessary registration details
   create a new user account
   display successful registration message
```

2. Data Retrieval and Processing:

```
query = "SELECT * FROM users WHERE username = 'desired_username'"
result_set = execute_query(query)

if result_set is not empty:
   user_data = process_user_data(result_set)
```

```
  display_user_profile(user_data)
else:
  display_error_message("User not found")
```

3.User Interface Interaction:

```
onButtonClicked(event):
  if event is "Submit":
    validate_input_fields()
    if input is valid:
      process_data()
      display_success_message()
    else:
      display_error_message("Invalid input. Please check your entries.")

  else if event is "Cancel":
    clear_input_fields()
    hide_modal_dialog()
```

5.2. Components, Libraries, Web Services and stubs

- Gson. Gson is a Java library used for serializing and deserializing Java objects from and into JSON. ...
- Retrofit. From their site: "Retrofit turns your REST API into a Java interface.” ...
- Event Bus. ...
- Active Android. ...
- Universal Image Loader

5.3. Deployment Environment

For the deployment environment we are using android studio to build our university project.

5.4. Tools and Techniques

Tool	Android Studio 2022.3.1
Languages	JAVA, XML
Data base	Firebase

Table 6 : tool and technique

5.5. Best Practices / Coding Standards

- Testing on android studio
- Use java language
- Use xml language

5.6. Version Control

After some time, we modified the version, and right now we are just working on version 1. Version 1.5 is the most recent of several updated and completed versions of the project, dating back to its inception.

Chapter 6

Testing and Evaluation

Chapter 6: Testing and Evaluation

A functional black box testing technique called use case testing aids in the identification of test scenarios that run the entire system through each transaction from beginning to end.

6.1. Use Case Testing

6.1.1.

Test Suite ID	TS001
Test Case ID	TC001
Test Case Summary	To verify that by clicking Signup button username, password, email, phone# and address store in users detail in database.
Related Requirement	RSoo1: User should able to Sign up.
Prerequisites	No
Test Procedure	1. Select fields in Signup form. 2. Enter user data in fields. 3. Click Signup button.

Test Data	Valid username: Aizaz, aizaz Invalid username: @Aizaz .@/aizaz ,Aizaz?/ Valid password: Aizaz@123$%, Aizaz$789@19 Invalid password: 7®=ΔAizaz,7_Aizaz+)(Valid email:aizaz@gmail.com, 77aizaz@yahoo.com Invalid email: aizaz.com, taimoor@yahoo Valid phone# :03567829538 Invalid phone: @9753489%, 1()#/&#754
Expected Result	1. If username, password, email and phone# are valid then store user data by clicking signup button. 2. If given inputs are invalid then display related feild error message. 3. If fields are empty then highlight the related field.
Actual Result	1. If name is valid, the result is as expected. 2. If username or password are invalid then clicking the Login button invalid message display. 3. If fields are empty then related field highlighted.
Status	Pass
Remarks	This test case is simple and easy.
Created By	Aizaz Ahmad

Date of Creation	21/12/2023
Executed By	Aizaz Ahmad
Date of Execution	04/01/19
Text Environment	OS: Android Studio Version 2023.1.1

Table 7 : Use case of Sign up

6.1.2:

Test Suite ID	TS001
Test Case ID	TC002
Test Case Summary	To verify Authentication or Login.
Related Requirement	RS002: User should able to Login.
Prerequisites	User should Signup first.
Test Procedure	1. Select Username field and enter username. 2. Select Password field and enter password. 3. Click Login button.

Test Data	Valid username: Aizaz,aizaz Invalid username: @Aizaz .@/aizaz ,Aizaz?/ Valid password: Aizaz@123$%, Aizaz$789@19 Invalid password: 7®=ΔAizaz,7_Aizaz+)(
Expected Result	1. If username and password are valid then clicking the Login button user successfully login. 2. If username or password are invalid then clicking the Login button invalid message display. 3. If fields are empty then related field highlighted
Actual Result	1. If fields are valid, the result is as expected. 2. If username or password are invalid then clicking the Login button invalid message display. 3. If fields are empty then related field highlighted.
Status	Pass
Remarks	This test case is simple and easy.
Created By	Aizaz Ahmad
Date of Creation	21/12/2023
Executed By	Aizaz Ahmad
Date of Execution	21/12/2023
Text Environment	OS: Android Studio Version 2023.1.1

Table 8 : use case of login

6.1.3:

Test Suite ID	TS001
Test Case ID	TC003
Test Case Summary	To verify that donors, Recipients, Hospitals and Blood Banks once signup if they forgot their password then they are able to retrieve it through their signed up email.
Related Requirement	RS003: user should able to update data.
Prerequisites	user should login.
Test Procedure	1. Select fields. 2. Enter data in fields. 3. Click forgot password button.
Test Data	21/12/2023
Expected Result	1. If entered data is valid then update data by clicking update button 2. If username or password are invalid then clicking the Login button invalid message display. 3. If fields are empty then related fields are highlighted.
Actual Result	1. If fields are valid, the result is as expected. 2. If username or password are invalid then clicking the Login button invalid message display. 3. If fields are empty then related fields highlighted.
Status	Pass
Remarks	This test case is simple and easy.
Created By	Aizaz Ahmad
Date of Creation	21/12/2023
Executed By	Aizaz Ahmad
Date of Execution	21/12/2023
Text Environment	OS: Android Studio Version 2023.1.1

Table 9 : use case of update password

6.1.4:

Test Suite ID	TS002
Test Case ID	TC004
Test Case Summary	To verify that donors, Recipients, Hospitals and Blood Banks once signup if they are deleted in the database by performing crud operation by clicking the Delete button.
Related Requirement	RS004: Admin can delete data.
Prerequisites	Admin should login.
Test Procedure	Click delete button.
Expected Result	If data is deleted by click button then message will appear
Actual Result	If action is valid, the result is as expected.
Status	Pass
Remarks	This test case is simple and easy.
Created By	Aizaz Ahmad
Date of Creation	21/12/2023
Executed By	Aizaz Ahmad
Date of Execution	21/12/2023
Text Environment	OS: Android Studio Version 2023.1.1

Table 10 : use case of delete data

6.1.5:

Test Suite ID	TS002
Test Case ID	TC005
Test Case Summary	To verify that data is available in different Blood Types
Related Requirement	RS005: User should be able to Explore different blood types.
Prerequisites	User should login.
Test Procedure	1. Select Blood types in dashboard. 2. Check profile names in bloodtypes 3. Click on the profile to view their info.
Expected Result	1.The profiles shown in the specific blood type section selected by the user.
Actual Result	1.The profiles shown in the specific blood type section selected by the user.
Status	Pass
Remarks	This test case is simple and easy.
Created By	Aizaz Ahmad
Date of Creation	21/12/2023
Executed By	Aizaz Ahmad
Date of Execution	21/12/2023
Text Environment	OS: Android Studio Version 2023.1.1

Table 11: use case of search data

6.1.6:

Test Suite ID	TS002
Test Case ID	TC006
Test Case Summary	To verify that record is display.
Related Requirement	RS006: User should be able to view data.
Prerequisites	User should login.
Test Procedure	1.Recepient should be able to view Donors. 2. Donors should be able to view the recepients.
Expected Result	1.They both can see each other info.
Actual Result	1.They both can see each other info
Status	Pass
Remarks	This test case is simple and easy.
Created By	Aizaz Ahmad
Date of Creation	21/12/2023
Executed By	Aizaz Ahmad
Date of Execution	21/12/2023
Text Environment	OS: Android Studio Version 2023.1.1

Table 12 : use case of record to display

6.2. Equivalence partitioning

1	User name is alphabetic.	valid
2	User name is not alphabetic.	invalid
3	Password is equal to 10 or greater than 15 characters in length.	valid
4	Password is 2 to 16 characters in length.	invalid
5	Password include one uppercase letter & one lowercase letter.	valid
6	Password include '_'.	invalid
7	Email without '@' and '.com'.	invalid
8	Email with '@' and '.com'.	valid
9	Price only be numeric.	valid
10	Price is alphabetic.	invalid
11	Search product with alphabetic.	valid
12	Search product with special character (/,%,^,#,@).	invalid
13	No search product name entered	invalid
14	Brand name alphabetic	valid
15	Brand name with special character	invalid
16	Empty field	invalid

6.3. Boundary value analysis

Sr.		Partition 1	Partition 2	Partition 3
1.	Password	Less than 8 character	1 – 8 character	9 – 12
2.	Phone	<=0	1 - 11	9 – 12

Table 13: boundary analysis

6.4. Data flow testing

The connection that exists between two entities when they work together to complete a certain task in data flow. For example, during the registration and sign-up processes, etc.

6.5. Unit testing

We tested each of our various panel codes independently during unit testing by running separate tests on several machines and verifying that each test was successfully completed and operating as expected.

6.6. Performance testing

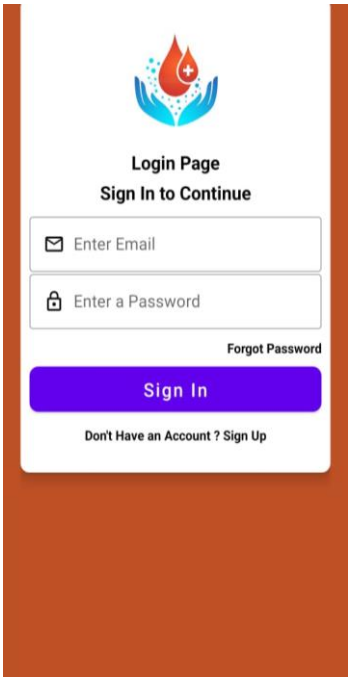
In performance testing, the website is put in a specific scenario, such as having 100 users attempt to register at once, to see how the system handles the recovery and produces comprehensive findings. Therefore, based on the findings we gathered, more than 50 people were able to register on our website.

6.7. Stress Testing

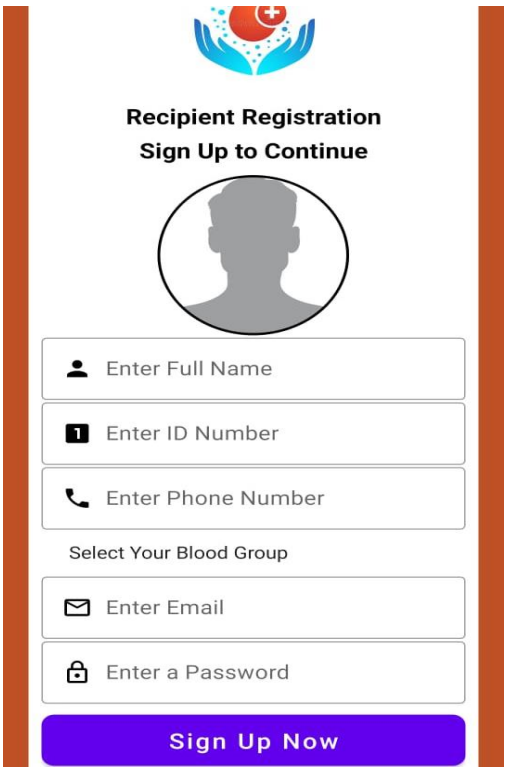
Let's say if 50 Recipients contact 50 Donors at the same time for the same blood type. Our application performed well under these circumstances.

Activity	Description
Register	The user can register and save his/her information into the system
Login	The user can login using his/her credentials
Type of user	Upon registering, the user specifies which type of user they are
Manage profiles	The user can edit/disable their accounts
Browse Categories	The donators can browse the categories of lup they want to donate to.
Search Profiles	The donators can search profiles based on the nearest
Call user	The user can call the phone number of the user
Send Notification	The donator can send notification for possible donation
Add Reviews	The donators can add reviews concerning user
Confirm Donation	The user can confirm receiving donations
Check Notification	The user can check notifications for possible donations
Log out	The user can log out

Interface for Login:



Interface for Signup:



Chapter 7

Summary, Conclusion and Future Enhancements

Chapter 7: Summary, Conclusion & Future Enhancements

7.1. Project Summary

Now that the project Blood Bank Management System is completed so that I can explain the purpose of the app it is basically a mobile app. The blood bank management system serves to efficiently manage the collection, storage and distribution of blood. Its purpose is to ensure the availability of blood units, maintain their quality, track donations, match donor information with recipients, and facilitate quick access to blood during emergencies or for medical procedures. It also helps in inventory management, reducing wastage and ensuring proper handling of blood products.

7.2. Achievements and Improvements

The Biggest improvements here are we are able to enhance our skills in the field of software engineering we used firebase database to store the information of users and we made this project in android studio.

7.3. Critical Review

Our system's most important components are its speed, user-friendliness, affordability, ability to meet users' individual needs at runtime, and feature set, which might be needed by any kind of business. It required a great deal of time and effort to handle all these factors.

7.4. Lessons Learnt

We learn a great deal from this project. Our proficiency with XML, Android Studio, and numerous other technologies, as well as management principles and problem-solving techniques, are all improved by working on this project. This project improves not only our technical capabilities but also our personal development abilities, such as dedication and teamwork.

7.5. Future Enhancements/Recommendations

As previously mentioned, there's always potential for improvement. Improvements will continue since we intend to establish this website as our own startup.

The system was constructed using Jawa and XML, but as we improve its functionality, accessibility, and efficiency, we plan to scale it up—as we think it will eventually do. We improve the interface's usability.

Appendices

Appendix A: User Manual

In this appendix section we describe the different phases of user interface and also describe how user can use our project

Appendix A: E-donation

A.1. Login

User can login by entering name and password.

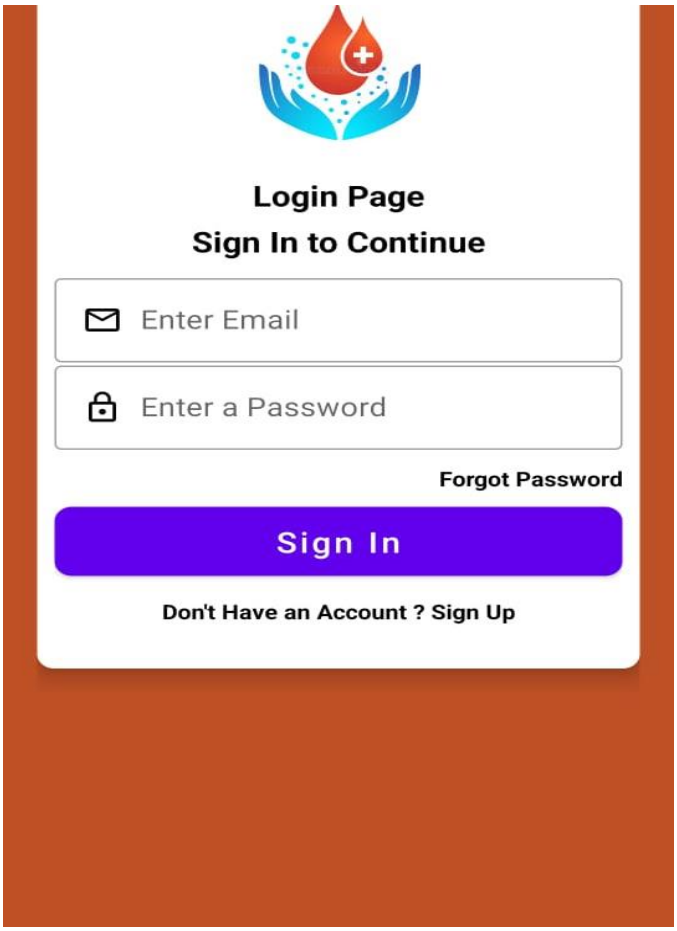
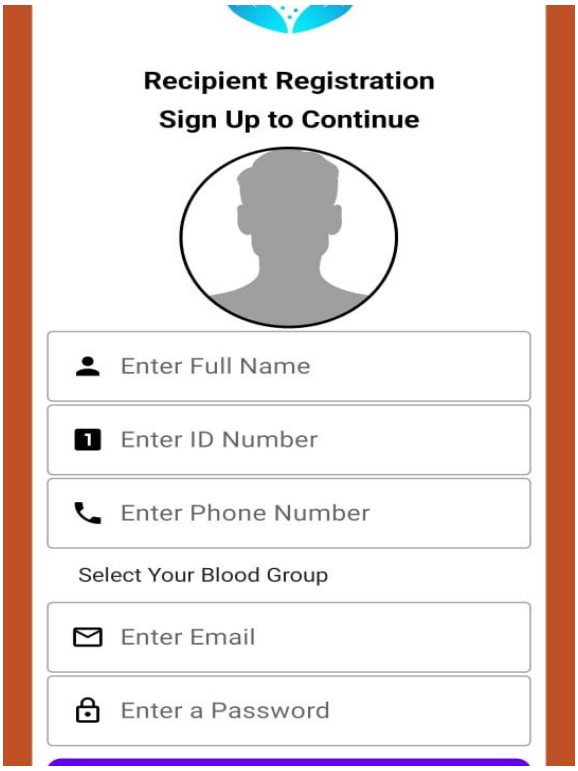


Figure 34: interface of login

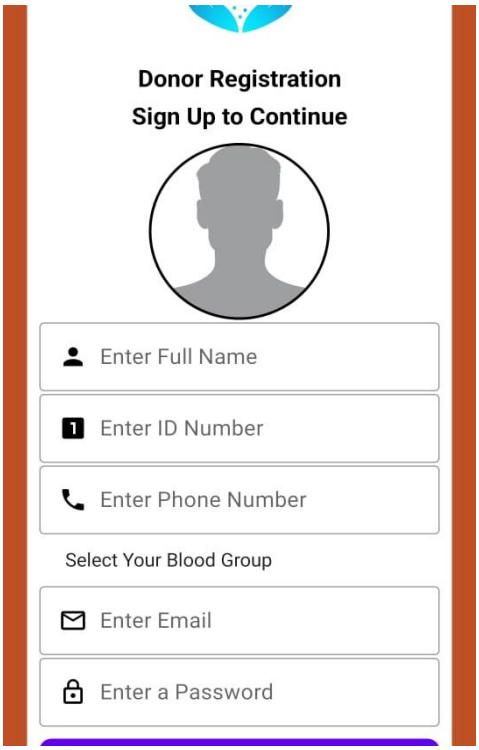
A.1.2 Signup

UIn the signup section the user can signup as donor or recipient or as both.

Recipient Signup:



Donor Signup:



A.1.3 Select functionalities

Recipient can select the specific blood section in which he wants to contact the donor.

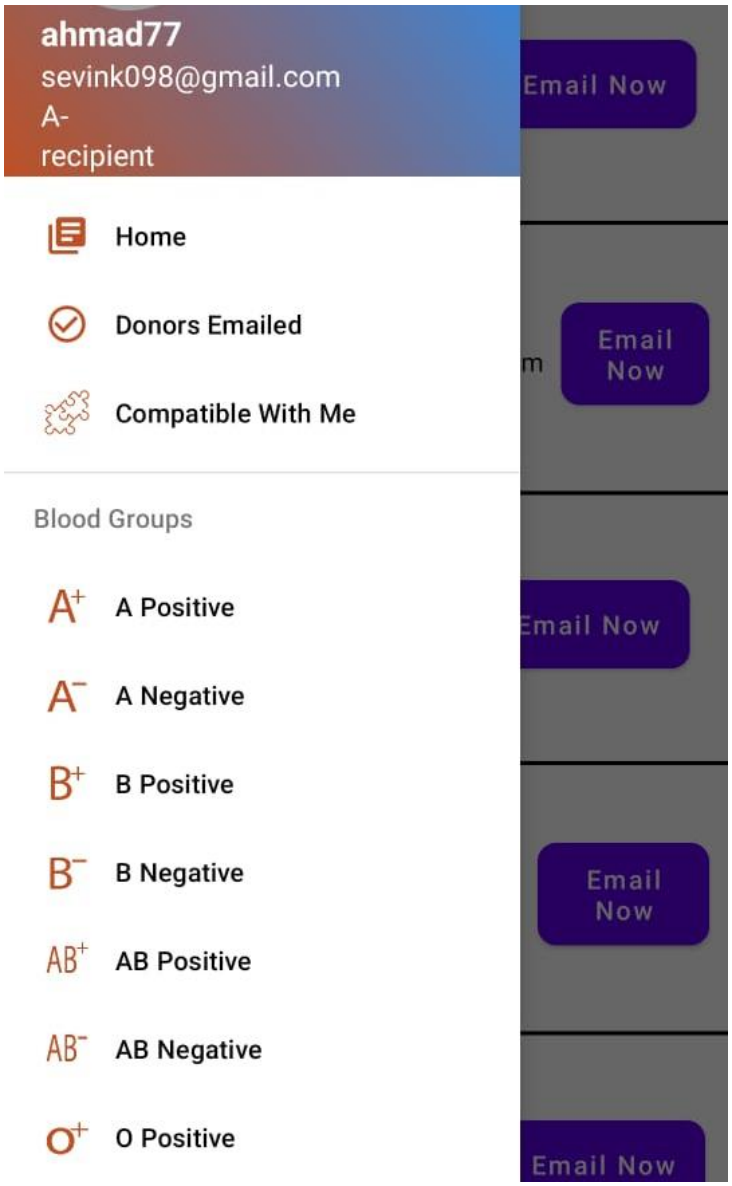


Figure 36: interface of functionalities

Appendix B: Administrator Manual

We go over the many stages of the admin interface in this appendix part, along with details on how the admin can control the system.

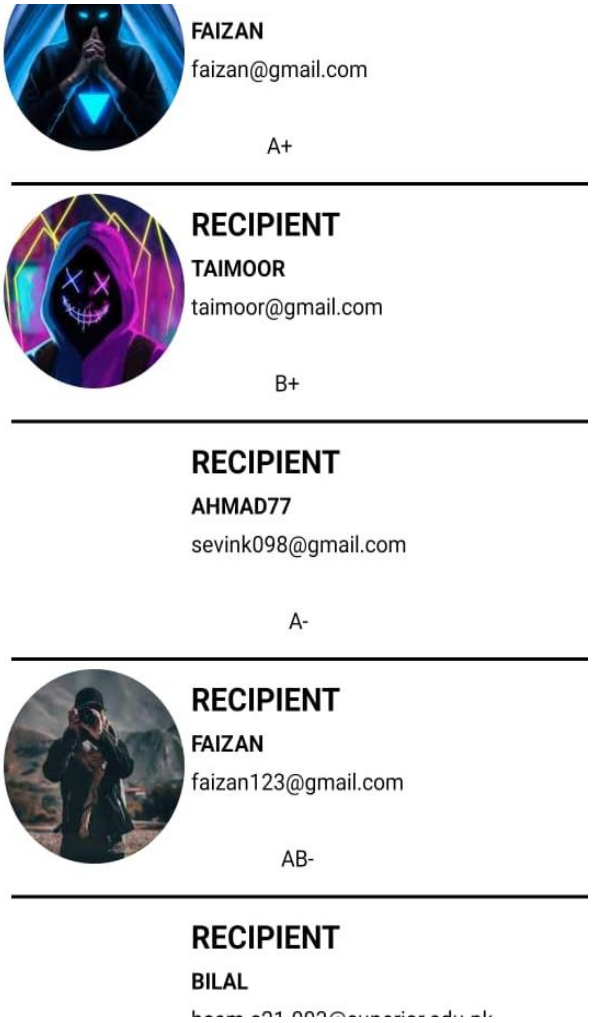
B.1. Login

Users can login by entering the password and username.

B.1.1. **Manage Donor Panel**

Admin can have a full access of and record of donations of Blood donated and consumed by the user.

Donors DashBoard:



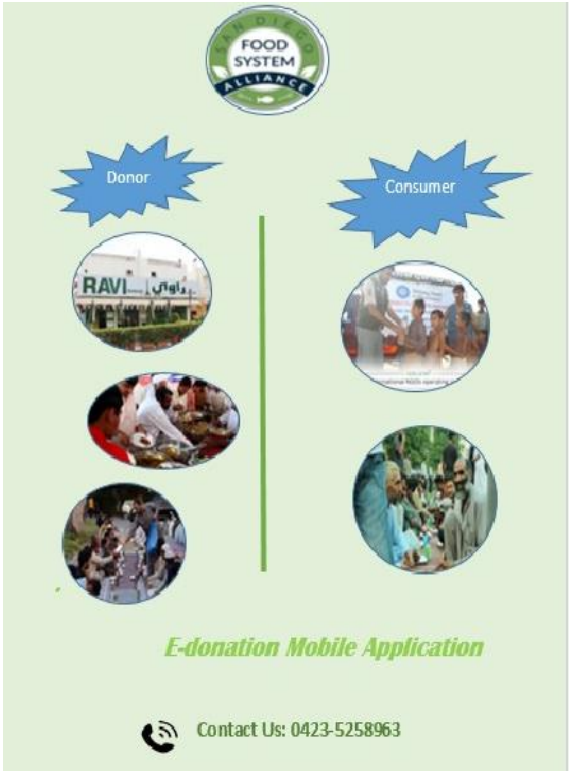
Appendix C: Information / Promotional Material

In Appendix we add promotional material about our application and application. We add these for promote our application.

C.1. Broacher

C.2. Flyer

C.3. Banner



Reference and Bibliography

Reference and Bibliography

[1]Smith, J. (2019). Blood Bank Management: Challenges and Solutions.

[2]Johnson, R. (2020). Blood Banking and Transfusion Medicine. Oxford University Press.

[3]Brown, A. (2018). Innovations in Blood Banking. Journal of Medical Sciences, 15(3), 123-135.

[4]Patel, S. (2017). Advancements in Blood Inventory Management. In M. Rodriguez (Ed.), Proceedings of the International Conference on Healthcare Systems (pp. 45-56). IEEE.

[5]World Health Organization. (2022). Blood Safety and Availability. https://www.who.int/en/news-room/fact-sheets/detail/blood-safety-and-availability

[6]Smith, J. (2019). *Blood Bank Management: Challenges and Solutions.*

[7]Johnson, R. (2020). *Blood Banking and Transfusion Medicine.* Oxford University Press.

[8]Brown, A. (2018). Innovations in Blood Banking. *Journal of Medical Sciences, 15*(3), 123-135.

[9]Patel, S. (2017). Advancements in Blood Inventory Management. In M. Rodriguez (Ed.), *Proceedings of the International Conference on Healthcare Systems* (pp. 45-56). IEEE.