King Khalid University

College Of Science And Arts, Sara Abidah

Department Of Computer Science

Project Title

Blood Bank System

Student Name	Student ID
Hanan Falah Alqhtany	441805053
Rahaf Ali Jaza	443807823
Raneem Abdullah Al-Barqi	442805898
Haneen Mohammed	441807761
Taif Bandar Dajim	442805872
Tsnim Ahmed Mehany	441815167

Supervised by:

Dr. Omnia Al-Shathly Saidani Al-Nafati

Submitted to King Khalid University in fulfilment of requirements for the B.Sc. Degree in Computer Science

Academic Year 2024/1445 (Semester I)

Department of Computer Science

College of Science and Arts, Sara Abidah

King Khalid University

BONAFIDE CERTIFICATE

We certify that we have read this graduation project report as examining committee, examined the students in its contents and that in our opinion it is adequate as a project document for B.Sc. in Computer Science

Supervisor	**Examiner 1**	**Examiner 2**
Name:	Name:	Name:
Signature:	Signature:	Signature:
Date: / /2024	Date: / /2024	Date: / /2024

ACKNOWLEDGEMENTS

All gratitude to Allah, Lord of the universes, The Entirely Merciful, the Merciful, who persistently directs us through our entire life and who gave us the usefulness and plausibility to accomplish that work.

Then we would like to thank our project supervisor Dr. Omnia Al-Shathly, who her office was always open whenever we ran into a trouble spot or had a question about our research or project.

She consistently allowed this thesis to be our own work but steered us in the right direction whenever she thought we needed it.

We must express our very profound gratitude to our parents for providing us with unfailing support and continuous encouragement throughout our years of study and through the process of researching and writing this thesis. This accomplishment would not have been possible without them. Thanks everyone.

TABLE OF CONTENT

LIST OF FIGURES

LIST OF TABLES

Chapter I: Introduction

1.1 Introduction

The revelation of information technology has changed many things in our lives, it has changed the way we live, the way we think, the way we behave, the way we work, the way we enjoy, the way we learn, the way we deal with other people, environments, cultures and everything has changed after the revelation of information technology. Information technology has served the humanity in all fields of life, such as education, medicine, management, politics, industry, economic, communication, entertainment, commercial, and all fields of life without exception and facilitates the services to human in all these fields.

Saudi Arabia's Vision 2030 places a strong emphasis on the role of technology in driving economic diversification, social development, and improving the quality of education. As part of this vision, the digital age has become a catalyst for innovation and transformation across various sectors. In the realm of education, technology offers immense potential to enhance the learning environment and streamline administrative processes.

The proposed application aligns with the principles of Saudi Arabia’s Vision 2030 by embracing technological advancement, digital innovation and focusing on community.

Blood bank. It is a study of a website that provides blood to those in need of different blood types by storing the blood types of donors and performing analyzes to determine the need or the most requested of the various blood types and searching for donors for them automatically.

This project is developed for Three perspectives i.e. hospital, volunteer donors and patient.

This website reduces the time to a greater extent that is searching for the required blood through blood banks and hospitals.

Thus this website provides the required information in less time and also helps in quicker decision making.

This blood bank system is an online website so it is easily available to everyone. When a person wants to donate blood he has to register to the system. Donor registration is very easy, to get register to the system he has to fill up registration form. After submitting the registration form he can create username and password. Donor have to give information like blood group, contact details etc. donor can also change his account information when he wants using his username and password

There are two user of Websites. First is admin user who can manage all the operation of the Web Application and second is an unregistered user, who has limited rights. The Project fronted has been developed on using HTML, Bootstrap (CSS, JavaScript, JQuery) And Laravel business logic has been written in PHP database is MySQL.

1.2 Problem Statement:

1. Hospitals, and patients often struggle to quickly find the right blood type when emergencies arise.
2. The existing process of searching for blood donors and matching them with recipients can be time-consuming and inefficient.
3. Less awareness among people about blood donation and blood transfusion.
4. There shortage and sometimes unavailability of rare blood groups due to less modules i.e. patient and donors.

1.3 Proposed Solution:

The proposed solution is of a website that provides blood to those in need of different blood types by storing the blood types of donors and performing analyzes to determine the need or the most requested of the various blood types and searching for donors for them automatically.

1.4 Project Aim and Objectives:

Because of the problems that the system face we will try to solve some of these problems during the system that we will design and it will enhance the work and achieves goals:

1. Minimize the time taken to find and provide the required blood type during emergencies.

2. User-Friendly Interface: accessible to hospitals, donors, and patients, allowing easy access to blood type information.
3. To provide dynamic database that is storing donors and Patients Information and can communicate with them easily.
4. Some blood types are rare so the system can find the required donors with the required blood type easily from the huge database by using search feature.

And the primary goal that we want to achieve it during this system is to offer the service and the health care to patient and enhance it, especially in the emergency cases that may cause someone's life in some situations.

Also, during this system we hope to serve this country that is rich for our heats by offering such electronic system like this that enhance the performance of the institutions.

1.5 Scope of the Project:

The **blood bank project** aims to create a web platform that facilitates the efficient exchange of blood between donors and recipients. Here's a brief overview of its scope:

1. Donor Registration and Blood Type Storage:

- Donors can register on the website, providing their blood type information.
- The system stores donor details, including blood type, contact information, and availability for donation.

2. Recipient Requests and Matching:

- Recipients (hospitals, clinics, or individuals) can submit requests for specific blood types.
- The system analyzes the requests and identifies the most urgent needs based on blood type scarcity and criticality.
- It automatically searches for matching donors based on their registered blood types.

1.6 Project Motivation:

- We believe that as more people talk about donating blood and blood transfusions, more people will be inspired to give blood, volunteer or donate financially to help fulfil our mission.
- When asked why they have not donated, many people say it is because they were never asked to donate. So we are providing a platform to make it possible for donors.
- We found that donors desire to help a family member or a friend in need of blood was the most cited motivator for blood donation
- Motivations to donate are: altruism/humanitarian, personal or family credit, social pressure, replacement and reward.

1.7 Project Benefits:

1- Achieve all the goals.

2- Speed and fast to get the information.

3- Saving time, effort and money.

4- Easy of the knowing the places that the blood exists in from any sides that are connected to the network.

5- Saving the effort for patient in searching about blood in different hospitals or centers.

7- Organizing the work mechanism in a better form.

8- Improve the level of health.

1.8 Project Organization

1.8.1 Project Plan

In our project we did the following steps depending on the time consequential:

Table 1.1: project I plan

Task	Start	Finish
Studying the problem, proposed solution, objectives, scope, motivation, features, and the propose of the project.	4/02	15/02
First chapter submission.	16/02	
Studying background, and related works of our project, and compare this works with our project.	18/02	27/02
Second chapter submission.	29/02	
Midterm presentation.	11/03	
Studying and analysing the proposed system and the used methodology.	16/03	22/03
Drawing UML diagrams that is present the components of our system and interactions between actors.	24/03	26/03
Design expected interfaces of the system and overview of the whole project.	27/03	1/4
Third- and fourth-chapters submission.	2/04	
Final representation.	7/04	

Table 1.2: project II plan

Task	Start	Finish
Designing database.	13/04	17/04
Designing user interfaces.	18/04	25/04
Database connection.	26/04	30/04
Create admin’s control panel.	1/05	4/05

Implement customer area.	10/05	14/05
Implement provider area.	15/05	19/05
Fifth chapter submission.	22/05	
Midterm presentation.	25/05	
Conducting tests to ensure that the project is working properly.	1/06	6/06
Add appendices.	7/06	10/06
Sixth- and seventh-chapters submission.	11/06	
Final representation.	14/06	

1.8.2 PROJECT THESIS ORGANIZATION

This thesis of this project can be divided into many chapters as follows:

1.Chapter One (Introduction)

This chapter contains:

- Introduction.
- Problem definition.
- Proposed Solution
- Motivation.
- Aim and objectives.
- Project scope, and features.

2.Chapter Two (Literature Review)

This chapter contains:

- Studying of related works.
- Comparison table among this related works and the proposed system.

3.Chapter Three (System Analysis)

This chapter contains:

- System requirements.
- UML diagrams.
- Database design.

4.Chapter Four (System Design)

This chapter contains:

- Design expected interfaces.
- Summary of the whole project.
- What is the expected future of the project?

1.10 Summary

The first chapter begins with the background of the study describes the problem, presents a proposed solution, and describes the objectives and features of the project.

CHAPTER II: LITERATURE REVIEW

2.1 INTRODUCTION

This chapter provides a study and analysis for similar systems to our system idea in addition to provide a comparison table among all features of the studied systems and the proposed system

2.3 RELATED WORKS

2.3.1 OneBlood:

Figure 2.1: OneBlood

OneBlood is a non-profit organization that collects blood and provides blood products to hospitals and patients across the United States.

OneBlood's electronic system is a comprehensive blood bank management platform that provides users with a wide range of features, including:

Donor registration and data management

Donor-patient matching

Blood inventory tracking

Order management

Reporting

Properties:

Ease of use: OneBlood's system features a user-friendly interface that allows users to easily navigate and complete tasks efficiently.

Efficient donor-patient matching: The system utilizes advanced algorithms to match donors with patients based on their individual needs, increasing the chances of saving lives.

Advanced inventory management: The system enables users to monitor blood inventory in real time and effectively identify future needs.

Compliance with laws and regulations: The system ensures compliance with all federal and state laws and regulations related to blood collection and distribution.

Scalability: The system can be easily scaled to meet the needs of organizations of all sizes.

Security: The system provides robust security features to protect donor and patient data.

Cons:

Cost: The cost of the OneBlood system can be high, especially for small organizations.

Complexity: The system may be somewhat complex for new users, requiring extensive training.

Data requirements: The system demands a significant amount of data from donors and patients, which may pose a burden for some organizations.

Privacy: Some of the system's data collection features may raise privacy concerns.

2.3.2 The American Red Cross:

Figure 2.2: The American Red Cross

The American Red Cross is a well-respected humanitarian organization, but like any organization, it has its strengths and weaknesses. Here's a breakdown of the pros and cons:

Pros:

Extensive reach and impact: The Red Cross has a large network of volunteers and chapters across the country, allowing them to respond effectively to disasters nationwide.

Multiple services: They offer a variety of services beyond just disaster relief, including blood donation programs, CPR training, and preparedness education.

Transparency and accountability: The Red Cross generally receives high marks for transparency in how they use donations.

Volunteer network: Their large volunteer base allows them to mobilize quickly and efficiently during emergencies.

Public trust: The Red Cross has a long history of service and enjoys a high level of public trust.

Cons:

Overhead costs: Some critics argue that the Red Cross has high administrative overhead costs, which take away from funds used for direct relief efforts.

Bureaucracy: The size and structure of the Red Cross can sometimes lead to bureaucratic hurdles that slow down relief efforts.

Fundraising controversies: There have been occasional controversies regarding fundraising practices.

Focus on disaster relief: While disaster relief is crucial, some argue they could dedicate more resources to preventative measures and long-term recovery efforts.

International aid distribution: There have been some criticisms regarding how efficiently international aid is distributed

2.3.3 GiveBlood.org:

Figure 2.3: GiveBlood.org

GiveBlood.org is a website that connects blood donors with blood donation opportunities near them. Here's a breakdown of its potential advantages and disadvantages:

Pros:

Convenience: GiveBlood.org simplifies blood donation by providing a central location to find blood drives and donation centers.

Increased donor pool: By connecting donors to various organizations, it potentially expands the pool of potential blood donors for hospitals and blood banks.

Public awareness: The website can raise public awareness about the importance of blood donation.

Nationwide reach: If the platform has a broad reach, it can connect donors across a large geographical area.

Potentially unbiased information: Ideally, the website presents unbiased information about blood donation opportunities, allowing donors to choose based on location or personal preference.

Cons:

Limited information: The website might not provide detailed information about specific blood drives or donation centers, leaving some questions unanswered for donors.

Accuracy and timeliness: Information on GiveBlood.org relies on participating organizations to update blood drive details. Inaccurate or outdated information can be frustrating for donors.

Limited functionality: GiveBlood.org might have limited functionality compared to individual blood bank websites, potentially lacking features like appointment scheduling or donor eligibility quizzes.

Data privacy concerns: Depending on how GiveBlood.org collects and uses donor data, there could be privacy concerns.

2.4 COMPARISON OF OUR PROJECT & RELATED WROKS

After studying the related systems through defining the features of each system, we make a comparison between the features of those systems and the proposed system through the following table

Table 2.1: Comparison among related works and the proposed system

Feature	**Blood Bank Website**	**OneBlood**	**The American Red Cross**	**GiveBlood.org**
Ease of use	**High**	**High**	**High**	**High**
Scalability	**High**	High	High	High
Security	High	High	High	High
Cost	Low	High	High	High
Complexity	Low	High	High	High
Compliance with laws and regulations	High	High	High	High

2.6 SUMMARY

In this chapter, we study and analyze features, advantages, and disadvantages of the similar systems.

In addition to preparing a comparison table between the features of similar systems and our system.

CHAPTER III: SYSTEM ANALYSIS

3.1 INTRODUCTION

This chapter includes system analysis, which is a process that includes many procedures and steps to study and model the system, analyse information related to it, ensure that it works effectively in the surrounding environment, and fully understand the system to convert it into a computerized form. The system analysis steps begin by collecting data and then defining the functional, non-functional requirements, software requirements, and hardware requirements, after that we draw some diagrams to illustrate the relationship of each actor to the proposed system. Here, the outputs of the analysis stage are the inputs to the design stage. At this stage, the components and sub-systems are arranged in an integrated structure to achieve the goals of the system, and to install and build systems with specific specifications and functions.

3.2 METHODOLOGY

When starting a new project, we must follow specific steps to reach the desired result, because our project is small and easy to implement. We use the waterfall methodology, or what is also called the waterfall model, which is a linear methodology that contains some phases so that each phase must be concluded before the start of the next phase because each phase depends on the outputs of the previous phase.

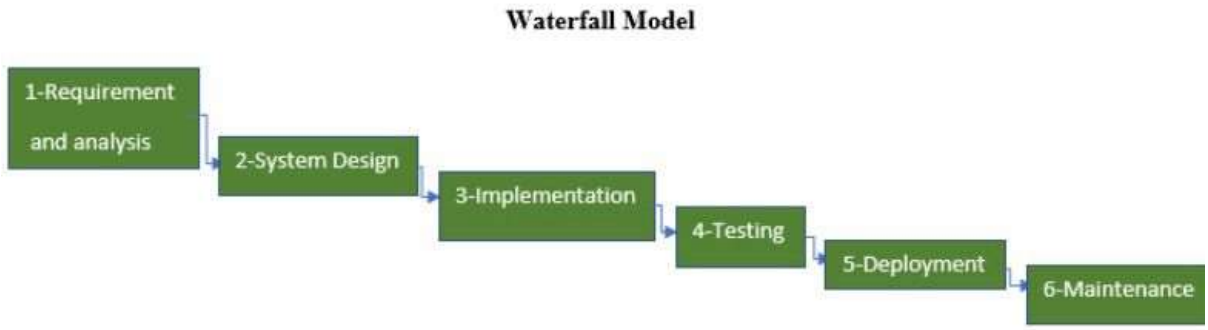

Figure 3.1: Waterfall Model

The waterfall methodology consists of several phases as follows:

1- Requirement and Analysis:

Project requirements are defined based on the objectives that users need and understand and describe the project phases, including risks, assumptions, and success measures.

2- System Design:

A technical solution to the previously identified problems is designed by collecting requirements in addition to analysing the system through database design and some schemes such as: sequence diagram, activity diagram etc.

3- Implementation:

This is the shortest phase in this model, as when the design is completed, the technical implementation will begin. Here the interfaces are implemented, notes are written, coding is done with some tests done and it is based on the project requirements.

4- Testing or Verification:

At this phase, it is ensured that all requirements of the system are met and that it works well, which ensures a good user experience.

5- Deployment:

At this phase, the program is deployed to the customers, and here the customers' opinions about their experience must be taken into consideration.

6- Maintenance:

Due to the continuous occurrence of defects and errors and the change requests received from users, a team is assigned to maintain the system periodically, improve the system and add many advantages to it.

3.3 SYSTEM REQUIREMENTS

3.3.1 FUNCTIONAL REQUIREMENTS

1- Donate

- Login
- Register
- Searching for people in need of Blood
- Manage Donations

2- Patient

- Register
- Login
- Searching for Donates
- Manage Requests

3- Hospital Admin

- Register
- Login
- Searching for people in need of Blood
- Searching for Donates

3.3.2 NON-FUNCTIONAL REQUIREMENTS

The non-functional requirements that we use in our system when designing are:

- Security

The system is designed to be secure and protected, so that all users have a username and password to easily log into the system and use its services

- Availability

It is a web application, where all services are always available.

- Usability

The web application offers good benefits to Peoples and Hospitals by communicating with each other.

- Flexibility

This web application is designed to be flexible, which means that it will be able to update its services easily.

- Performance

Provide the lowest response time as possible as.

- Scalability

The web application must be scalable enough to support as many visitors as possible.

3.3.3 SOFTWARE REQUIREMENTS

- Laravel (PHP)
- MySQL
- Windows 11 Home Operating System: 64-bit operating system, x64-based processor.

3.3.4 HARDWARE REQUIREMENTS

Computer device with perfect specifications such as:

- Processor: 11th Gen Intel(R) Core (TM) i7-1195G7 @ 2.90GHz.
- RAM of size 16 GB.
- Ethernet connection (LAN) OR a wireless adapter (Wi-Fi).
- HP Spectre x360 14 Convertible Laptop.
- Graphics card : Intel Iris Xe Graphics.

3.5 UML DIAGRAM

3.5.1 USE CASE DIAGRAM

Use case diagram provides a good understand for all use cases and the sub use cases for all actors in the system.

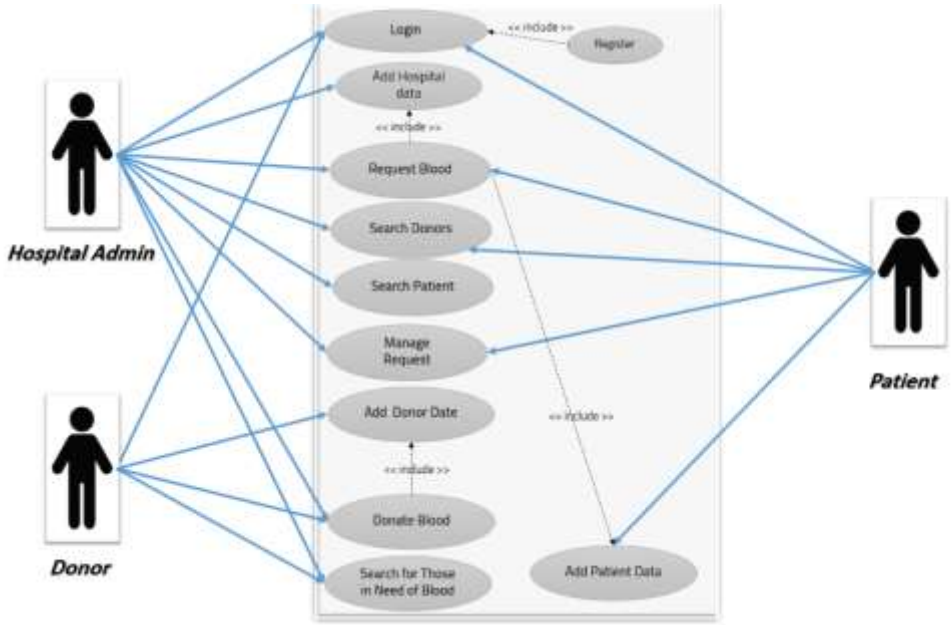

Figure 3.2: Use Case Diagram

3.5.2 SEQUENCE DIAGRAM

Sequence diagram provides a good understand for all exchanges messages between the system elements depending on time sequential for executing the process. We have three sequence diagrams for the three actors.

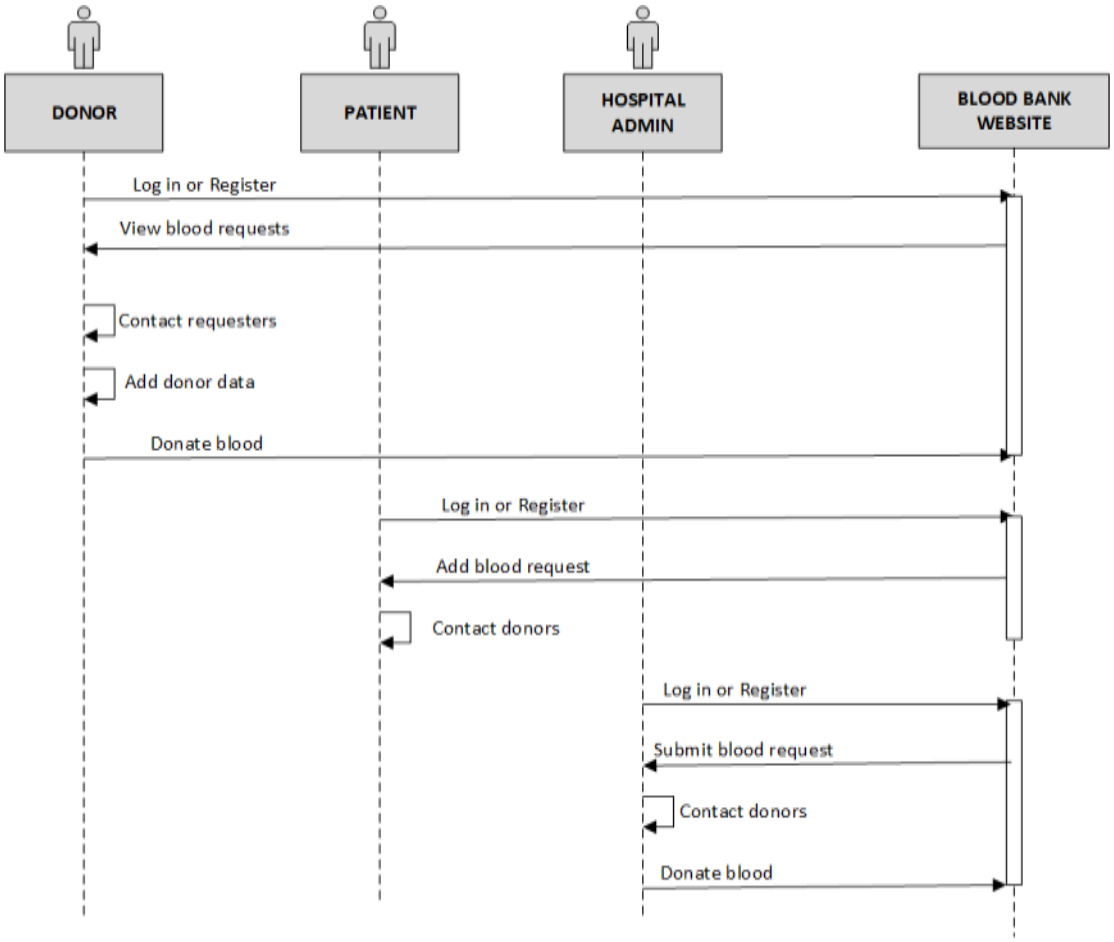

Figure 3.3: Admin Sequence Diagram

3.5.3 ACTIVITY DIAGRAM

Activity diagram provides an illustration for the logical movements and connections among the process steps for each actor in the system.

- DONOR

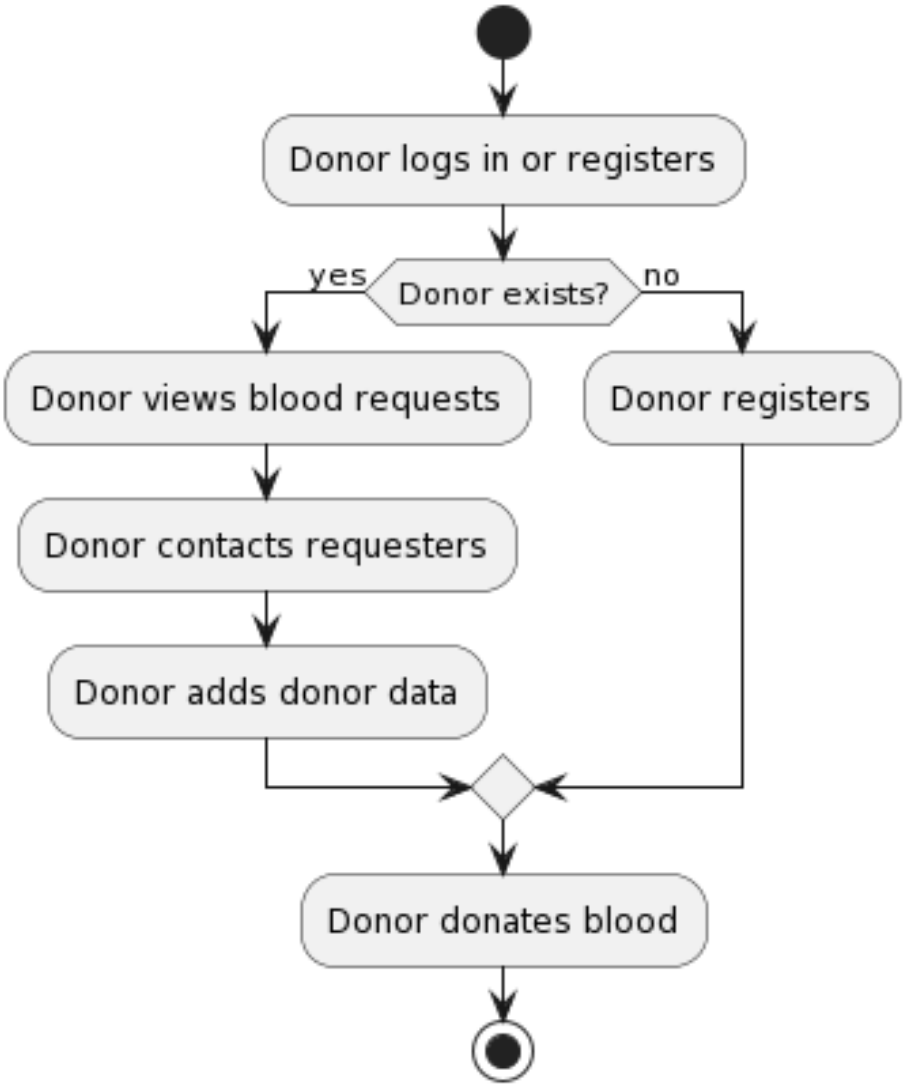

Figure 3.4: Donor Activity Diagram

- PATIENT

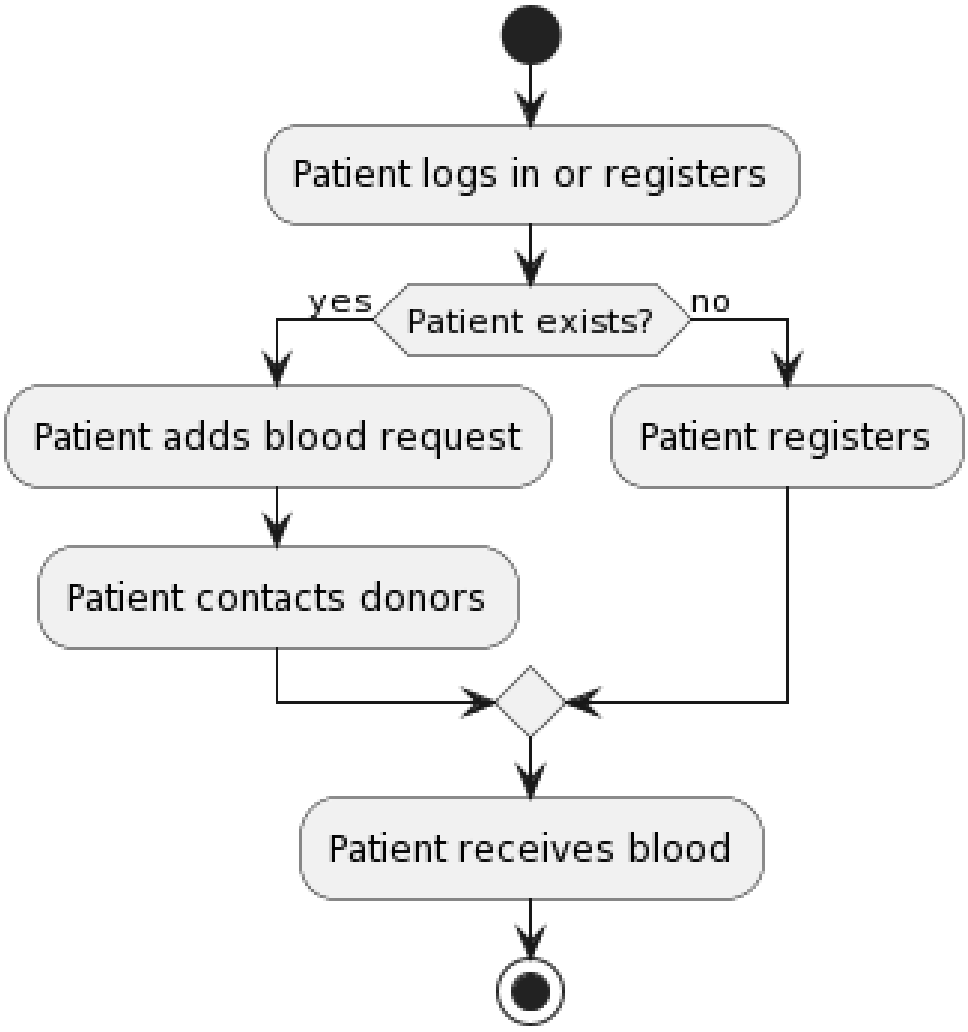

Figure 3.5: Patient Activity Diagram

- HOSPITAL ADMIN

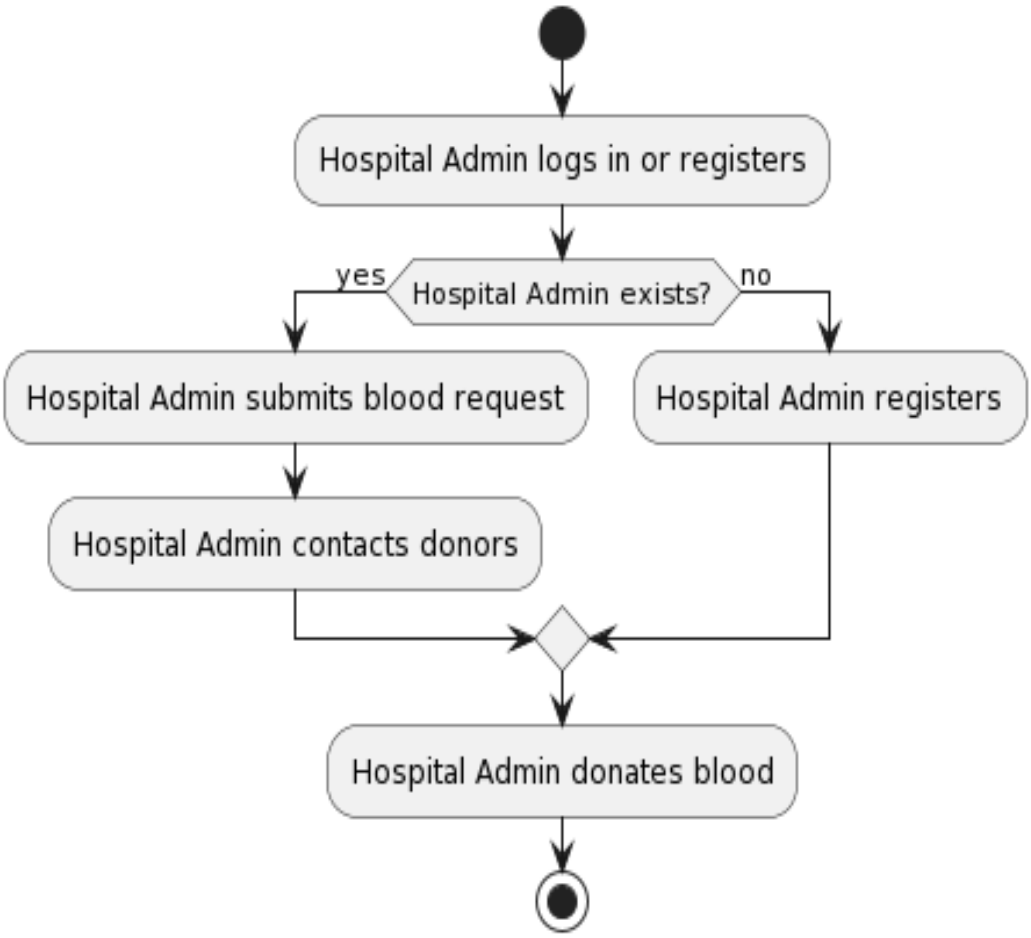

Figure 3.6: Hospital Admin Activity Diagram

3.6 DATABASE DESIGN

Database design define the database structure through drawing the Entity Relationship (ER) and class diagrams as UML diagrams.

3.6.1 ENTITY RELATIONSHIP DIAGRAM

This diagram describes all entities in the system including the attributes for each entity, and the relations between these entities.

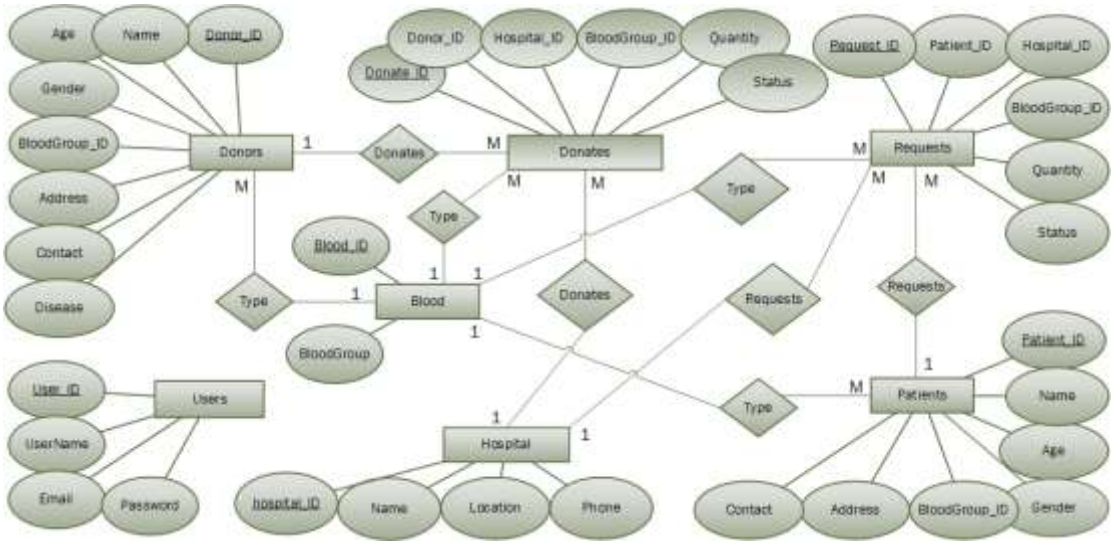

Figure 3.7: ER Diagram

3.6.2 CLASS DIAGRAM

It is a diagram that describes all objects in the system including the database fields and the relations between all objects in the system.

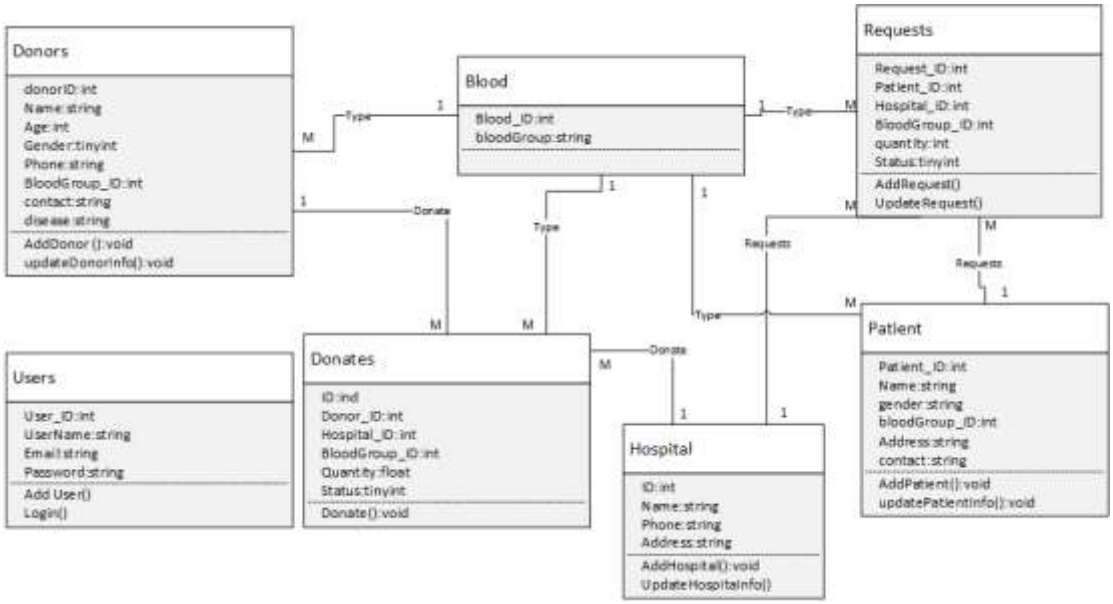

Figure 3.8: Class Diagram

3.7 DATABASE TABLES

Database tables define the fields data types and names for it and the primary key and foreign key in each table.

Table 3.1: Blood Table

Field name	Data type	Constraints
blood_id	Int	PK
Blood_group	Nvarchar(5)	

Table 3.2: Donors Table

Field name	Data type	Constraints
donor_id	Int	PK
donor_name	Nvarchar(50)	
age	int	
gender	tinyInt	
Blood_group_ID	int	FK
Address	Nvarchar(50)	
Contact	Nvarchar(50)	
disease	Nvarchar(50)	

Table 3.3: Donate Table

Field name	Data type	Constraints
donate_id	Int	PK
donor_id	int	FK
hospital_id	int	FK
bloodGroup_id	int	FK
quantity	float	
status	Int	

Table 3.4: Hospital Table

Field name	Data type	Constraints
hospital_id	Int	PK
name	Nvarchar(250)	
location	Nvarchar(250)	
phone	int	

Table 3.5: Patients Table

Field name	Data type	Constraints
patient_id	Int	PK
patient_name	Nvarchar(50)	
age	int	
gender	Nvarchar(50)	
bloodGroup_id	int	FK
address	Nvarchar(50)	
cotact	Nvarchar(50)	

Table 3.6: Requests Table

Field name	Data type	Constraints
request_id	Int	PK
patient_id	int	FK
hospital_id	int	FK
bloodGroup_id	int	FK
quantity	float	
status	Int	

Table 3.6: Users Table

Field name	Data type	Constraints
user_id	Int	PK
user_name	Nvarchar(50)	
email	Nvarchar(50)	
password	int	

Keywords:

PK = Primary Key, it's meant this value is a unique value.

FK = Foreign Key, it's used to build a relationship between the two tables.

Int = The datatype of this field is integer.

Nvarchar = The datatype of this field is character.

3.8 SUMMARY

In this chapter, we have analyzed the system requirements and drawn a diagram to clarify the relationship of each actor to the proposed system so that we can make to the design of the system.

CHAPTER IV: SYSTEM DESIGN

4.1 INTRODUCTION

Design is the process of defining the elements of a system such as the architecture, modules and components, the different interfaces of those components and the data that goes through that system. It is the next stage after the process of collecting information and analyzing the system.

4.2 EXPECTED INTERFACES DESIGN

Designing the expecting interfaces of the system presents the general elements design in the template such as the colors, fonts, and the main links.

The following interfaces are samples of the general design of the system template.

- **Home page**

Figure 4.1: Home page

- **Login page**

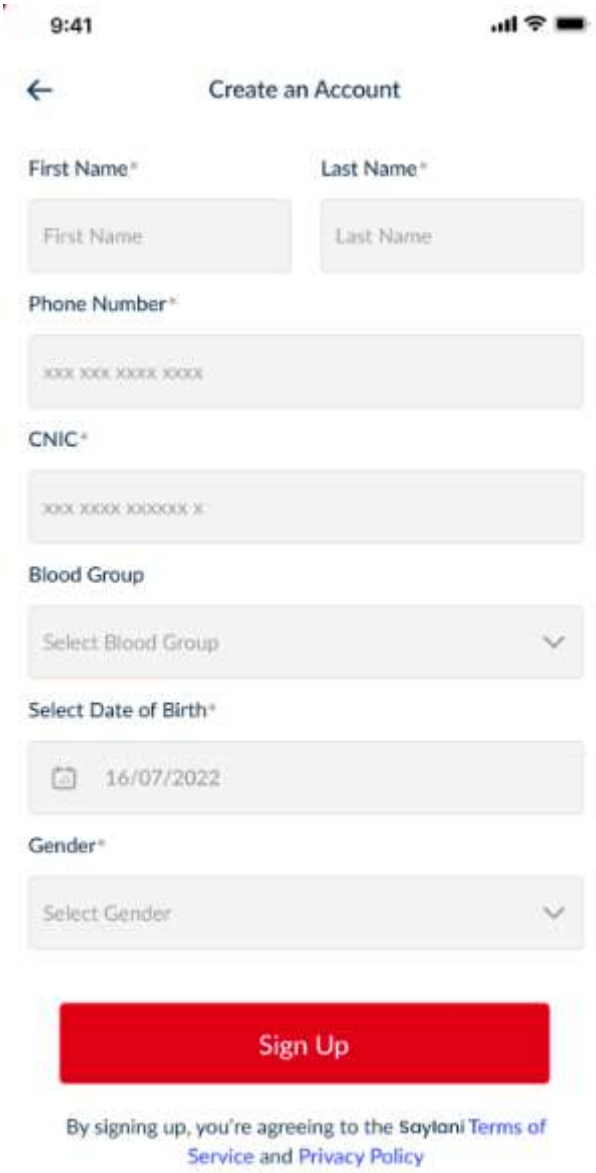

Figure 4.2: Login page

- **Search Blood Group page**

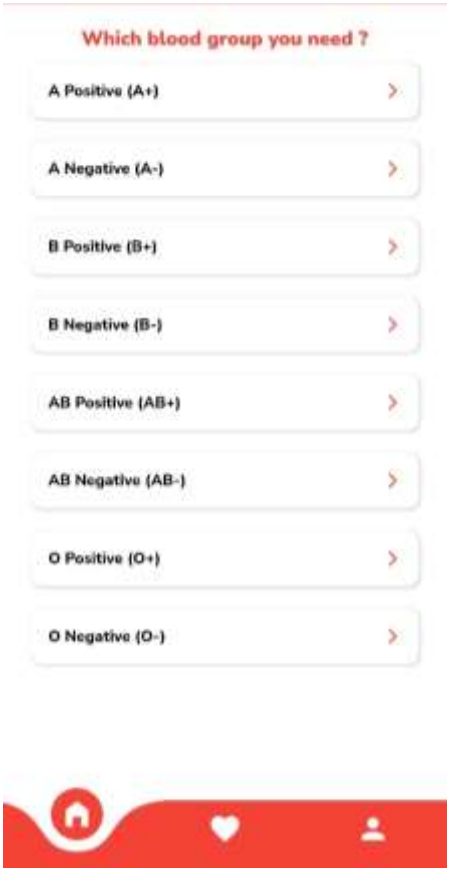

Figure 4.3: Search Blood Group page

4.3 FUTURE WORK

- Implementing the web application using the programming languages.
- Testing the performance of the web application and the results.
- Deploying the web application.

4.4 CONCLUSION

In this project, we identified the problem statement in addition to the objectives and the main objective of implementing the project which is to create a web platform that facilitates the efficient exchange of blood between donors and recipients.

We studied systems that are similar to our project to explain the features of each as well as compare them with the features of our application.

We analysed the system by defining the system requirements, and we designed the main components of the system using UML diagrams.

We worked on designing the expected interface of our web application, in addition to mentioning the future work of the application.