

DESIGN AND IMPLEMENTATION OF BLOOD BANK DONOR MANAGEMENT SYSTEM



BY

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**BEING A PROJECT SUBMITTED TO THE DEPARTMENT OF
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DECLARATION

I, UMAR HARANDE ADAMU solemnly declare that this project is the product of my own endeavor and that all sources have been adequately and duly acknowledged and that all the inadequacies in this project are the product of my own shortcomings. And that this project has not been submitted in this faculty or elsewhere.

DEDICATION

This project is dedicated to Almighty Allah for his bounties bestowed on me before, during and after my year of program. After him, I will like to dedicate this project to my parents MR AND MRS ADAMU HARANDE, who were the ones who stood by me and also helped me in countless number of ways during the entire year of study.

APPROVAL PAGE

This project has been read and approved as meeting the requirements for Bachelor of Science in Information Technology project in the Department of Information Technology, Faculty of Computing, Bayero University Kano.

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ACKNOWLEDGEMENT

All thanks be to Almighty Allah for his countless blessing, guidance, the courage and the opportunity given to me to successfully complete my undergraduate Program, may His protection and blessing continue to be with us (Ameen). May the Peace and blessing of Allah be upon our Noble Prophet Muhammad (S.A.W) the greatest man that ever lived, his entire household, his Companions in their entirety, and all us who will follow his path till the Day of Judgment, (Ameen).

I wish to express my thanks to my beloved Parents for their moral support, towards the completion of this program successfully.

Lastly, I acknowledge the effort of my Supervisor, and the entire staff of Faculty of Computing, Bayero University Chapter for their relevant suggestion and contribution towards the completion of this program and also thankful to all my friend. May your right hands be ever extended in giving and never in want.

ABSTRACT

The objective of this research project is to develop a blood bank donor management system that enhances the efficiency and effectiveness of blood donation programs. The system aims to facilitate the process of blood donation and improve the accessibility and quality of blood donation services. The project uses a web-based platform that enables donors to sign up, log in, and access their profiles, donation history. Additionally, it provides a dashboard for patients and hospital staff to request and track blood donations and an administrative dashboard for managing donor information, blood inventory, and donation campaigns. The project employs the Unified Modeling Language (UML) methodology to analyze, design, and implement the system.

The research evaluates the developed system by testing it with a sample of blood donors and hospital staff. The results show that the system improves the efficiency and effectiveness of blood donation programs, as it enhances the accuracy of donor information, reduces the waiting time for blood donations, and improves the availability and accessibility of blood products. Furthermore, the system provides real-time updates on blood inventory levels and donation campaigns, which enables blood banks to respond quickly to emergencies and meet the demands of patients.

The study concludes with recommendations for future research and development to enhance the system's features and expand its scope to reach a wider audience. These recommendations include integrating the system with mobile applications, social media platforms, and other communication channels to reach more potential donors and improve their engagement with the blood donation process.

In summary, this research project presents a blood bank donor management system that enhances the efficiency and effectiveness of blood donation programs. The system provides a user-friendly interface for donors, patients, doctor, and administrators to access and manage donor information, blood inventory, and donation campaigns. The system's implementation can help blood banks and health organizations to improve their services, meet the demands of patients, and save more lives.

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CHAPTER ONE

1.1 Introduction

The term “blood bank” refers to a division of a hospital laboratory where the storage of blood products occurs and where proper testing is performed to reduce the risk of transfusion-related event (Sulaiman et al., 2015).

There are lots of communication gaps among patients (accepting blood), donors (who donate boldly), blood banks, and hospitals in the country. Blood is usually collected from donors, i.e., unpaid donor give blood voluntarily while paid donors give blood with a cost. Blood Donation Management System in which electronic information about the donors and organizations related to donating blood is created. Through this application, any person interested in donating blood can register himself as a donor. Moreover, general consumer wants to request to have blood online, he can also take the help of this system. As soon as any update occurs in the blood database, the changes are reflected in all the interfaces used. So, the system provides a simple and quick interaction among various groups connected with the blood banks. It is designed to overcome the drawbacks of the existing (Ali et al., 2015).

1.2 Background of the Study

For hospitals, a blood bank known as a blood collection center, also is an area in which collected blood bags are stored and preserved for future use in blood transfusion services. Blood transfusion is a medical operation where a patient requires blood or blood products as a life-saving measure. Most blood banks are still running manual systems in their processes. As such, there is a lack of efficiency because it is still paper-based in collecting information about donors. The lack of proper documentation may endanger patients’ health due to the possibility of having contaminated blood bags. The contamination happened when there is an incomplete donor’s medical history record and the blood bags. Hence, a web-based blood bank donor management system might be needed to address these issues and problems encountered to ensure blood transfusion safety.

The use of blood transfusions has a long history, dating back to the 19th century. The first

successful blood transfusion was performed in 1818, using blood from a lamb to treat a 15-year-old boy. However, it was not until the 20th century that blood banks were established, making it possible to safely collect, store, and distribute blood products. (Ali et al., 2015)

The first blood bank was established in 1936 by Dr. Bernard Fantus, who was the head of the therapeutics department at Cook County Hospital in Chicago, Illinois. He recognized the need for a central location where blood could be collected, stored, and distributed to patients in need. Dr. Fantus established the first blood bank at Cook County Hospital, and the concept quickly spread to other hospitals around the world.

Since that time, blood banks have become a vital part of the healthcare system, providing a reliable source of blood and blood products for patients in need. The development of computer-based donor management systems has made it possible to more efficiently and effectively manage the collection, storage, and distribution of blood and blood products. This system would help to improve the safety and availability of blood, and have made it possible for blood banks to serve a larger number of patients.

1.3 Statement of the Problem

The percentage of people donating blood is increasing day by day due to awareness to donate blood for those needed. The blood received have to be managed thoroughly so that there will be no negative effect on the blood receiver once they received blood.

Despite advances in technology, nowadays, most blood bank systems are running a manual system. As such, there is a prevalent problem in the availability of needed blood types. For instance, when a person needs a certain type of blood and this type is not available in the hospital, family members send messages through social media to those who can donate to them and this process takes longer than the life of the patient to the most dangerous. In addition, it seems that there is a lack of proper documentation about blood donors and their medical history. This may lead to blood bag contamination and may affect blood transfusion safety.

At present, the public can only know about blood donation events through conventional media

means such as radio, newspaper, or television advertisements. There is no information regarding the blood donation programs available on any of the portals.

The current method used to store, record, and keep track of bloodstock is mostly done manually. With the manual system, there are problems in managing the donors' records. The records of the donor might not be kept safely and there might be missing donor records due to human error or disasters. Besides that, errors might occur when the staff keeps more than one record for the same donor.

There is no centralized database of volunteer donors. So, it becomes tedious for a person to search for blood in case of an emergency. The only option is to manually search and match donors and then make phone calls to every donor (Sharma, Vidhya Nandan Pandey & Ganesh, 2015).

Without an automated management system, there are also problems in keeping track of the actual amount of each blood type in the blood bank.

1.4 Aim and Objectives

This research aims to design and implement an online blood bank donor management system. This web-based system provides:

1. To analyze the requirement of the propose system
2. To design and develop the system based on the requirement
3. To test and validate the system

1.5 Scope and Limitations

This research study covers the basic operations of blood banks, namely: donor registration, monitoring of blood bags or products' inventories, and monitoring of blood bags or products' issuance. The system will be a web-based responsive database application system design for bayero university clinic that supports four categories of users Admin, Patients, doctor and donors and each user activities will run independently without affecting the operation of another. The system will also integrate the online reservation module that will enable patients request for blood online

1.6 Significance of the Project

The findings of this study will benefit blood banks in managing blood donation donors, activities, and blood bags. This will allow the hospital to decide if a particular type of blood is needed and currently unavailable in the hospital, however, available in another nearby hospital. Furthermore, managing the blood bags in the blood bank will be much easier because each blood bag has information about the donor, and donation activity details. Also, the doctor can use this system to serve blood bags to their patient and monitor the details of the donor.

The main advantages of the system are:

- i. Blood bank staff can find and manage the donor details on the system easily.
- ii. The hospital can be alerted about issued blood bags and their availability.
- iii. The system is systematized and organized in managing blood donor records and blood donation activities.

1.7 Methodology

The methodology for the project blood bank donor management system" (BBDM) involves a combination of qualitative and quantitative research approaches, and iterative development approach. The following steps outline the key components of the methodology:

To design the proposed system

Unified Modeling Language (UML) was used to model the proposed system. The specific diagrams that were used include: Use case models – which show the interaction between users and the system; sequence diagrams – which show the flow of information within the proposed system; and activity diagram - which show the flow of activities within the proposed system

To implement and deploy the system as a mobile app

The system will be developed for Android mobile phones, The tools required include:

- I. HTML: Hypertext Markup Language, the basic function is creating web pages. The goal of the web browser is to read the documents as web pages; and it is also possible to include

scripts written in several languages, such as JavaScript, which an impact on the behavior of web pages (Wikipedia, 2013).

- II. PHP: A scripting language that is integral part of HTML to add functionality that native HTML is unable to do. Originally designed for web development to produce dynamic web pages, “PHP allows you to collect processes and utilize data to create a desired output” (Bradley, 2013).
- III. MySQL: A database system, queries, and features easily paired with PHP because it works side by side with ease. Uses MSQl to store many kinds of data, information and graphics. Also, it is easily accessible from anywhere in the world (Bradley, 2013).
- IV. JavaScript: A programming language developed for the design of interactive sites and creating web applications. JavaScript can interact effectively with HTML source code, enabling web authors access to their sites with dynamic content (QuinStreet Inc, 2013).

1.7.1 Project Document Organization

The rest of this project is outlined as follows: Chapter 1 discuss on background of the study, problem statement, aim and objective and significant of the study Chapter 2 provides the literature review for the project. In Chapter 3, the system analysis and design were performed. In Chapter 4 the implementation of the system was presented and discussed. Chapter 5 rounds off the project by providing a summary, recommendation, and conclusion.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section discusses findings and observations done by some research works on web-based blood bank management systems. The gathered information on these related papers strengthens and supports the research study.

The primary purpose of a blood bank donor management system is to ensure the safety of the blood supply by carefully screening donors and monitoring the quality of the donated blood. It also helps to ensure that blood is available when it is needed.

2.2 REVIEW OF THE EXISTING SYSTEM

All these projects are on blood bank management systems means how to manage blood banks and how can a recipient can access blood more easily than previous old traditional methods. Many peoples try to improve blood banks by working in their ways and these are some of them.

Al-Amri et al. (2019) design a Web-based Blood Donation Management System that enables individuals who want to donate blood to help the needy. It also enables hospitals to record and store the data for people who want to communicate with them, and it also provides a centralized blood bank database. The system is developed by using HTML, PHP, and MySQL as a database system to manage and store the data. The Waterfall Methodology, which is the traditional version and the classic approach of a system development life cycle, is used to develop and build the web-based blood bank. The system targets three types of user: the public who wants to donate blood, the recipients who need the donated blood, and the hospitals who that work as an intermediary to manage the communication between the donors and recipients. The main objectives for developing the website is to educate the community on the benefits of blood donation, develop a Web-Based Blood Bank System to manage the records of donors and recipients, and encourage voluntary blood donation, easily accessing any information about blood type and the distribution

of the blood in various hospitals in Jeddah, based on the hospital needs.

Teena et al. (2014) in their study entitled “A Study on Blood Bank Management”, they defined Blood Bank Information System as an information management system that contributes to the management of donor records and blood bank. The system allowed an authorized blood bank administrator to sign in with a password to manage easily the records of donors and patients who need blood. The system provided many features including the central database, quick access to the system content through the login, includes the search code to find donors on a given basis, and the ease of adding and updating donor data. The main aim of the system was to complete the process of the blood bank. This system was designed to suit all types of blood banks.. The application contains User Login Screen, Blood Management, Donor Management, Donor Registration, Blood Reservation, Recipient Management, and Blood Reservation.

Sulaiman & Sumazly (2015) developed a Web-based Blood Bank Management System (BBMS) to provide a management functional to the blood bank in order to handle the blood bag. In Kuala Terengganu, East Peninsular Coast of Malaysia has only one government hospital that handles blood bank which is currently using a standalone system. The web-based management system was developed to meet the requirements for Sultanah Nur Zahirah Hospital (HSNZ). Other hospital may have different ways and approach of handling blood bag. The methodology used to build this system uses the Rational Unified Process (RUP). The technology platform in implementing this system is MySQL database and HTML5, CSS and JavaScript for web development.

Bharat (2005) presented Bharat Blood Bank system which allow donors in India who want to donate blood can register at Bharat Blood Bank system. Bharat Blood Bank requests the donor's name, password, and ID to allow the donor to access his account, which contains information about his date of birth, blood group, gender status, email ID, mobile no, city, address, state. After that, the people who need blood can browse the site and display the list of blood donors. Bharat Blood Bank allows recipients to search by area to have more reachable donors. The website provides the phone number to the recipients to make contact with the donor.

Ayeni et al., (2019) developed a web-based system that provides information for the discovery of the blood bank centers and human donors with the highest proximity during emergencies. Web development technologies were used, and the Google Map API was used to track, calculate and

display the location of each blood bank and donor. The system thus aid users in obtaining blood faster rather than going from one hospital to another in search for a specific blood type to reduce the number of deaths caused by lack of blood during emergencies.

Priya et al., (2014) proposed an extended web application to timely update the information regarding the donors, acceptor and patients where the administrator access the whole information about blood bank management system. Also the proposed work has a Push technology with security, to protect the contact details of the donors in web application where it can be misused by third parties. It also maintains the amount of each available blood groups, if the stock of a particular blood group is lower than the required amount then the proposed method notifies the donor to donate blood.

TehGeok (2006) presented an online blood donation reservation and management system in Malaysia used by the hospital blood bank. It is a web database that contains donor and bloodstock information and it can keep track of the bloodstock in the hospital and the donation records of the donors. The website enables the public to make online reservations and includes online advertising for all blood donation events. The hospital managers can manage the donors and bloodstock appointments. The targeted users are the manager from National Blood Center, the public who want to donate blood, and the staff from participating hospitals.

Kumar et al., (2017) developed a web-based blood bank management that assists the blood donor records management and provides ease of Control of the distribution of blood products in various regions of the country that takes into account the needs of hospitals. The system developed was scalable and adaptable to meet the typically complex needs of a blood bank. Based on this study, since blood donor details and related records were captured, Therefore, manual tracking of blood donation activities was complicated and even led to incorrect information. Subsequently, researchers said that the manual system can be a waste of time, result in error results, consumes a lot of work, lacks data security, data retrieval is time-consuming, reporting is time-consuming, and the accuracy of results is less accurate. Thus, in the development and implementation of an online blood management information system, there was quick access to donor data, and the system provided management with timely, confidential, and protected medical reports. There were three (3) users of the system, namely the administrator, donor, and acceptor. The application

was developed using ASP.NET, C#.NET, and using SQL Server for the database.

Alexis et al., (2006) developed a blood-bank management system that fetch blood donors and receivers through the shared software platform. Donors can register on the website and enter their information. This system makes readily available, safe blood and other blood components, which can offer moral and accepted ways, consistent with the long-term welfare of the community. That actively encouraged voluntary blood donations, motivates and maintains good records of indexed blood donors, and educates society about the advantages of donating blood.

Liyana (2017) found that it is important for each hospital to use an information system for managing data in the blood bank. Moreover, he noted that the manual system has disadvantages for the user and for the hospital. One of the disadvantages identified was the blood bank staff should enter the details of the donor at any time that gives blood In which he led to duplication of donors and data, they may also be lost or missing after a while. As a result, the author develops a web system to help the blood bank record the details of the donor quickly and easily. The system has used regular regular decisions to ensure a good time decision. In addition, the system can send messages to donors if a particular type of blood is needed.

Sumaryanti & Lamalewa (2018) Design an E-Blood Bank Application. Is an information system which used to organize blood donation data and order blood online. The application is developed electronically so that it can provide information on blood stock in real time and connect it to blood transfusion unit, people who need blood donors, and the donor community. Hence, blood stock information can be accessed through easily accessed media at anytime and anywhere as long as it is connected to the network.

Nzoka & Ananda (2014) designed a blood bank management information system to keeps the name of the donor who is donating blood, a unique id through which the donor can view his account, password for accessing the account, date of birth of the donor, gender status of the donor, blood group of the donor, mobile no, email id, address, city, state. In the system a user clicks on the link “Post your requirement” on the homepage and provides personal details like patient’s name, age, gender, hospital name, reason for requirement, required before date, hospital area, mobile number, country name, city name and the blood group name. Once done via the “Post your requirement” link, the user can send their request which will be saved in the system

2.3 LITERATURE REVIEW TABLE

Table 2.1 Literature review table

S/N	Author(s)	Problem statement	Methodology	Advantage	Disadvantage	Remark
1	Teena et al., (2014)	The manual way of storing information regarding blood bank donor is not effective.	The PHP, HTML programming language was used to develop the web base application.	It helps to organize donor information	Donor's profile can't be update.	Normal way of storing donors' information isn't effective, using an automated system will improve the system.
2	Sumazly & Aziz, (2015)	The percentage of people donating blood is increasing day by day due to awareness to donate blood for those needed. The blood received have to be managed thoroughly so that there will be no negative	The technology platform in implementing this system is Java and MySQL for database and HTML5, CSS and JavaScript for web development.	The platform provides donor and receipt with functionalities such as being able to keep track of their tasks	The system has no administrator who's responsible for managing the system	The system provides a valuable insight into the potential benefits of computerized blood type matching system.

		effect to the blood receiver once they received blood. From				
3	Kumar et al., (2017)	The manual system can be a waste of time, result in error results, consumes a lot of work, lacks data security,	The application was developed using ASP.NET, C#.NET, and SqlServer for the database	The system provides quick access to donor data	Lacks data or information security.	Using papers to keep track of blood donor information is tiring, automating the process will help in preventing error that may occur
4	Bharat, (2005)	Difficulties in reaching out to the public on the importance of blood donation as well as blood donation events.	The design and implementation of the system is developed with PHP	They provide service through giving news and details about blood donation events	The system only provides news about blood donation events.	The system enlightens the public on blood donation as well as blood donation events.
5	Al-Amri et al. (2019)	The number of people who need blood is increasing and the availability of	The system is developed by using HTML, PHP, and MySQL as a database	Reduce human error when employees keep the records	the system doesn't provide blood stock.	The method uses in storing donor and patient who request for blood is not

		blood is decreasing due to there is no central Blood Bank that can manage the blood donation in Saudi Arabia.	system to manage and store the data			effective, thus using an automated web application will improve the method
6	Ayeni et al., (2019)	The existing blood bank management systems that help locate available blood bank centers with the needed blood type, they do not provide information on the nearest center and donor	The user interface was developed using HTML, CSS, and JavaScript. PHP was used to design the backend of the system	The system has efficiency in time management	The system has no means of authentication.	The system good in managing time but has no user login to make the system secure

2.4 RESEARCH GAPS

The importance of an effective blood bank donor management system has been widely acknowledged in previous studies. Such a system would help manage donor information and provide resources to manage patients more effectively. Despite these efforts, there remains a gap in the development and implementation of blood bank donor management systems that effectively

address the challenges faced by blood bank centers. These challenges include:

1. The need for administrators to verify patient applications through a doctor.
2. Lack of communication channel between administrators and donors.
3. Lack of validation of donor information such as age.
4. Lack of a mechanism for updating donor profiles.

In light of these gaps, this study proposes the development of a comprehensive and user-friendly blood bank donor management system in the form of a web application. This system will address the aforementioned challenges and provide a comprehensive and user-friendly solution for blood bank centers.

2.5 CONCLUSION

In conclusion, the proposed blood bank donor management system is expected to fill the existing gap in the development and implementation of blood bank donor management systems. The system will provide a comprehensive and user-friendly solution for blood bank centers and help address the challenges faced by these centers.

CHAPTER THREE

SYSTEM ANALYSIS AND DESIGN

3.1 Introduction

This chapter will discuss the steps involved in analyzing and designing the Blood Bank Donor Management System using UML. Will start by identifying the system requirements, which involves understanding the needs and expectations of stakeholders, and translating them into specific software requirements, then use UML diagrams to model the system, including use case diagrams, class diagrams, sequence diagrams, and state diagrams.

3.2 System Analysis

Systems analysis is a process of collecting factual data, understand the processes involved, identifying problems and recommending feasible suggestions for improving the system functioning. This involves studying the business processes, gathering operational data, understand the information flow, finding out bottlenecks and evolving solutions for overcoming the weaknesses of the system so as to achieve the organizational goals. System Analysis also includes subdividing of complex process involving the entire system, identification of data store and manual processes.

The major objectives of systems analysis are to find answers for each business process: What is being done, How is it being done, Who is doing it, When is he doing it, Why is it being done and How can it be improved? It is more of a thinking process and involves the creative skills of the System Analyst. It attempts to give birth to a new efficient system that satisfies the current needs of the user and has scope for future growth within the organizational constraints. The result of this process is a logical system design. Systems analysis is an iterative process that continues until a preferred and acceptable solution emerges.

3.2.1 Method of System Analysis

The system analysis of the Blood Bank Donor Management System involved a comprehensive study of the requirements and specifications of the system. This involved analyzing the processes, functions, and operations of the blood bank and identifying the necessary features required for a reliable and efficient management system.

The system analysis process involved several steps, including requirements gathering, system modeling, and system design. The requirements gathering stage involved engaging with stakeholders, including blood bank personnel, donors, and potential users, to identify their needs and expectations of the system. This helped to define the scope and objectives of the project and ensure that the system met the requirements of its intended users.

After gathering the requirements, the next step was system modeling. This involved the creation of UML diagrams, including use case diagrams, class diagrams, sequence diagrams, activity diagrams, and state machine diagrams, to represent the system's structure, behavior, and interactions. The UML diagrams provided a clear and concise way to communicate the system's design to stakeholders, enabling them to provide feedback and suggestions for improvement.

The final step in the system analysis process was system design. This involved creating a detailed plan for the system's implementation, including software architecture, database design, user interface design, and system testing. The system design ensured that the system was designed to meet the requirements of the stakeholders and was efficient, reliable, and scalable.

3.2.2 Investigation and Analysis of the existing System

Before embarking on the development of the Blood Bank Donor Management System, an investigation and analysis of the existing system were carried out. This was done to identify the strengths and weaknesses of the current system and to determine the areas where the new system could improve.

The investigation and analysis process involved several steps, including interviews with blood bank personnel, observation of the current system in operation, and a review of the system documentation. The aim was to identify the current system's limitations, such as slow processing

times, inaccurate data, and difficulty in retrieving information.

Through the investigation and analysis, it was discovered that the existing system relied heavily on manual processes, which were prone to errors and inefficiencies. The lack of an automated system for donor management led to a significant amount of time spent on administrative tasks, such as data entry and donor record management, reducing the efficiency of the blood bank's operations.

3.2.3 Problems with the existing system

There were several problems with the existing system of the blood bank that necessitated the development of a new Blood Bank Donor Management System. These problems included:

Manual processes: The existing system relied heavily on manual processes, which were time-consuming and prone to errors. This resulted in delays in the processing of donor information, blood typing, and blood transfusion procedures.

- I. Inefficient donor management: The existing system lacked an automated system for donor management, resulting in difficulties in tracking and managing donor records. This led to inaccuracies in donor information, difficulty in retrieving information, and delays in the scheduling of donor appointments.
- II. Lack of integration: The different departments within the blood bank operated independently, resulting in a disjointed workflow and an inability to access crucial information in real-time. This led to delays and inaccuracies in blood management and distribution.
- III. Inaccurate data: The manual data entry process in the existing system was prone to errors, resulting in inaccurate data, which could lead to the wrong blood type being administered to patients, and other dangerous situations.

3.3 System Design

System Design involves defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements. In the case of the “Blood Bank Donor Management System” (BBDMS), the system design section include:

- i. **Interface Design:** This involves designing the user interface of the system. The interface was designed with a user-friendly layout and navigation system that allows users to easily access and manage their activities.
- ii. **Data Design:** This involves defining the data structures and storage mechanisms used by the system. The system uses a database to store information about donor, patients’ activities.
- iii. **Component Design:** This involves defining the individual components of the system and how they interact with each other. The system includes various components, such as a donor login module, donor dashboard module, patient login module, doctor login module, doctor dashboard module and admin login module, which will work together to provide a seamless user experience.

3.3.1 Description of the Proposed System

The blood bank donor management system will be design to replace the existing paper-based system, the new system is to use its data-based system to keep and update patient/donor record. Which is to be obtained efficiently and cost-effectively, to reduce the time and resource currently required for such a task? Blood donor order method on the current system is only can be done by visiting blood transfusion unit (BTU) office, hospitals, on the proposed system, order method can be conducted by online. Through this changing, blood donor order or reservation may be conducted at anytime and anywhere as long as the users are connected to the internet. The online order method is aims to obtain update blood stock information on blood bank in real time.

Features

Blood bank donor management system provides features such as

- I. It enables hospitals to record and store the data for people who want to communicate with them, and it also provides a centralized blood bank database.

- II. Blood Collection Management.
- III. Blood Issue Management.
- IV. Inventory Management.
- V. Stock Management.

Functional requirements include:

- i. The system should allow donor to register and login.
- ii. The system should allow patient to request for blood.
- iii. The system should allow verification of patients through doctor.

Non-functional requirements include:

- i. The system should be easy to understand.
- ii. The system should be user-friendly.
- iii. The system should have a quick response time.
- iv. The system must be secure.

3.3.2 Database Specification

An essential requirement for designing a database is to identify the different end-user requirements. Database requirements analysis seeks to gather information needed to design a database that meets the informational requirements of a user or an organization. This includes the type of data that is to be stored in the database and the conditions under which that data needs to be accessed.

3.3.2.1 DATABASE TABLES STRUCTURE

This system is a computerized system and all our information will be store in a mysql database the system database will contain table which is the patient registration relation that will store information when a patient is registered, donor table, doctor table and the admin table.

Table 1: Patient Table

Field Name	Data Type	Constraint	Description
User_ID	int(11)	Primary Key	To store the patient ID
First_Name	varchar(20)	NOT NULL	To store the Patient First Name
Last_Name	varchar(20)	NOT NULL	To store the Patient Last Name
Sex	varchar(6)	NOT NULL	To store the Patient Sex
Address	varchar(250)	NOT NULL	To store the Patient Address
Date_reg	Date	NOT NULL	To store the Registration Date
Blood_group	varchar(5)	NOT NULL	To store the Patient Blood Group
Mobile No	int(11)	NOT NULL	To store the Patient Mobile Number
Email	varchar(40)	Unique key	To store the Patient Email
Date of birth	Date	NOT NULL	To store the Patient Date of Birth
State_of_origin	varchar(20)	NOT NULL	To store the Patient State_of_origin
Password	varchar(250)	NOT NULL	To store the Password
Picture	Text	NOT NULL	To store the Image of the Patient

Table 2: Doctor Table

Field Name	Data Type	Constraints	Description
Doctor_id	int(11)	Primary key	To store the doctor id
Full_name	varchar(50)	NOT NULL	To store the doctor name
Gender	Varchar(30)	NOT NULL	To store the doctor gender

Table 3: Admin Table

Field Name	Data Type	Constraints	Description
Admin_id	int(11)	Primary key	To store the admin_id
Name	varchar(50)	NOT NULL	To store the admin name

Table 4: Donor Table

Field Name	Data Type	Constraints	Description
Donor_id	int(11)	Primary key	To store the donor id
Full_Name	varchar(50)	NOT NULL	To store the donor name
Gender	varchar(50)	NOT NULL	To store the donor gender
Location	Varchar(250)	NOT NULL	To store the donors location
Blood_group	varchar(11)	NOT NULL	To store the donor blood group

3.3.3 Choice of Programming Language

- I. HTML: Hypertext Markup Language, the basic function is creating web pages. The goal of the web browser is to read the documents as web pages; and it is also possible to include scripts written in several languages, such as JavaScript, which an impact on the behavior of web pages (Wikipedia, 2013).
- II. PHP: A scripting language that is integral part of HTML to add functionality that native HTML is unable to do. Originally designed for web development to produce dynamic web pages, “PHP allows you to collect processes and utilize data to create a desired output” (Bradley, 2013).
- III. MySQL: A database system, queries, and features easily paired with PHP because it works side by side with ease. Uses MSQl to store many kinds of data, information and graphics. Also, it is easily accessible from anywhere in the world (Bradley, 2013).
- IV. JavaScript: A programming language developed for the design of interactive sites and creating web applications. JavaScript can interact effectively with HTML source code, enabling web authors access to their sites with dynamic content (QuinStreet Inc, 2013).

3.3.4 Unified Modelling Language (UML)

UML is a standard documentation for the exhibiting of certifiable objects as an underlying stage in building up an object-oriented outline methodology. Its documentation is gotten from and brings together the documentation of three articles arranged outline and examination techniques (Margaret, 2010). It shows the overall system design that enables the right decisions to be made early in the process of developing the software. It empowers simplicity of upkeep by giving more viable visual representations of the system (Thangaraj, 2011).

UML is used primarily for software-intensive systems like systems software and business processes. The following are the most commonly used UML diagrams (Schneider et al., 1998):

- i. Use Case Diagrams
- ii. Activity diagrams
- iii. Sequence diagrams
- iv. Class Diagrams

3.3.4.1 USE CASE DIAGRAMS

A use case is a methodology used as a part of a system examination to recognize, illustrate, and form system necessities. Use case charts are used in UML (Unified Modeling Language), standard documentation for the showing of true objects and systems (Project management, 2015). A use case model is a point of view of a system that underscores the behavior of a framework as it appears to outside clients. A use case model fragments system helpfulness into trades (use cases) that are critical to clients (actors). It gets a far-reaching point of view of the key helpfulness of the structure in a way that can be easily understood by a non-specific client.

The sections of a use case diagram consolidate actors, use cases, affiliations, and the framework boundary.

- i. **Actors:** An actor is a person, organization, or external system that plays a role in one or more interactions with your system
- ii. **Use Cases:** A use case describes a sequence of actions that provide a measurable value to an actor. A use case is drawn as a horizontal ellipse on a UML use case diagram.

- iii. **Associations** are the relationship between an actor and a use case that shows that the actor communicates with the system by method for the use case.
- iv. **System Boundary:** The rectangle around the use cases is called the system boundary box and as the name suggests it indicates the scope of your system.

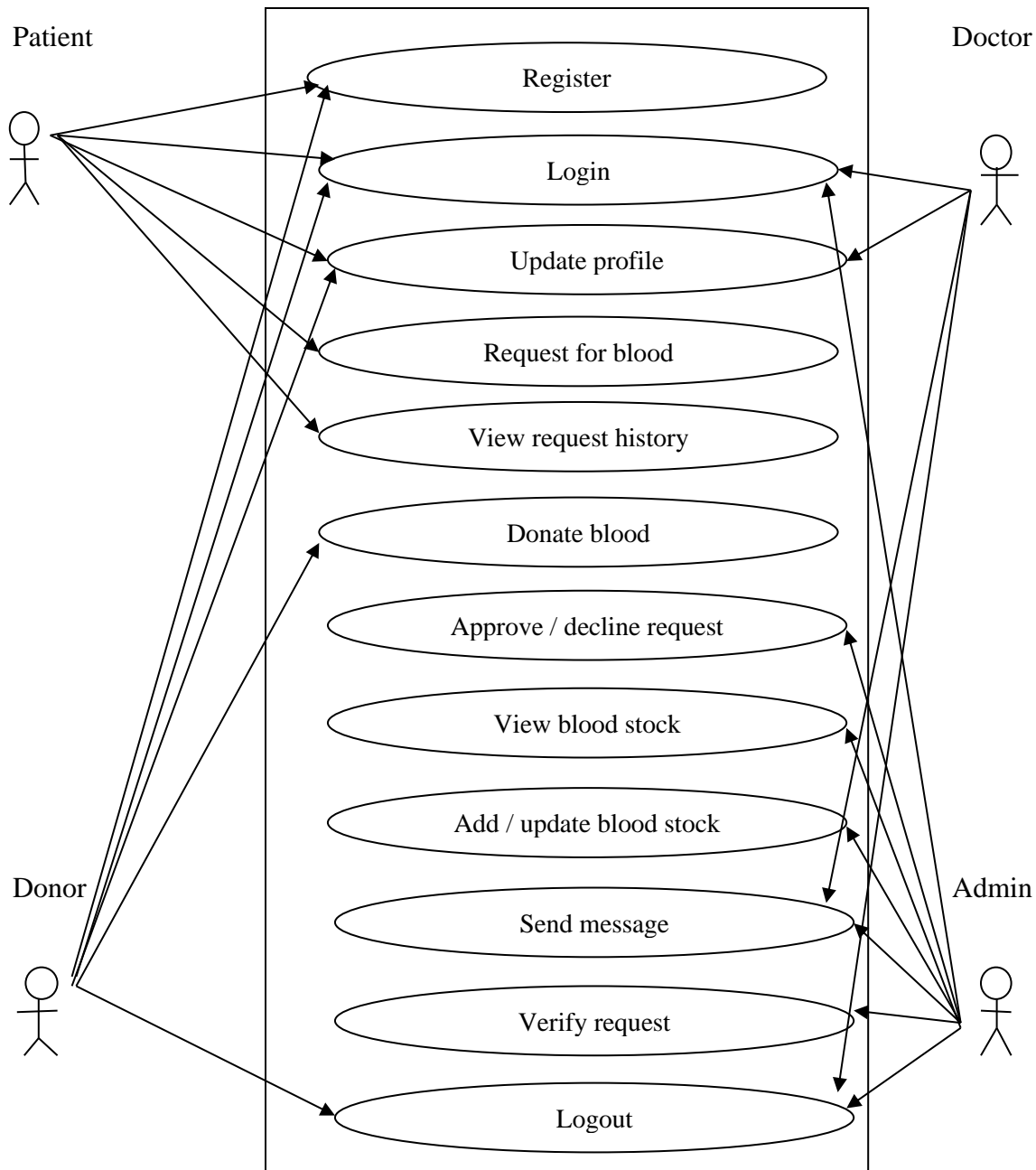


Figure 3.1: Use case diagram for blood bank donor management system

Figure 3.1 is the use case diagram of the proposed system the Admin would be responsible for managing the entire system (i.e. Manage donor, manage patient request etc.). Also, the administrators verify patient applications through a doctor. The donor and the patient at the other hands are regarded as the main users of the system that registers, request for blood, donate blood to patient in need of blood etc.

3.3.4.2 Class Diagram

The purpose of the class diagram is to model the static view of an application. The class diagram describes the attributes and operations of a class and also constraints imposed on a system.

The class diagram is static. It speaks to the static view of an application. The class diagram is not simply used for envisioning, delineating, and chronicling assorted parts of a system moreover to build executable code of the software application. A class is a depiction of a course of action of objects that have the same qualities, operations, associations, and semantics. Graphically, a class is rendered as a rectangle, ordinarily including its name, properties, and operations in discrete doled-out compartments. It likewise shows the classes inside of a particular model with each of the classes having their unmistakable traits, name, and operations that can be completed on them and class charts can likewise relate with different classes in a model.

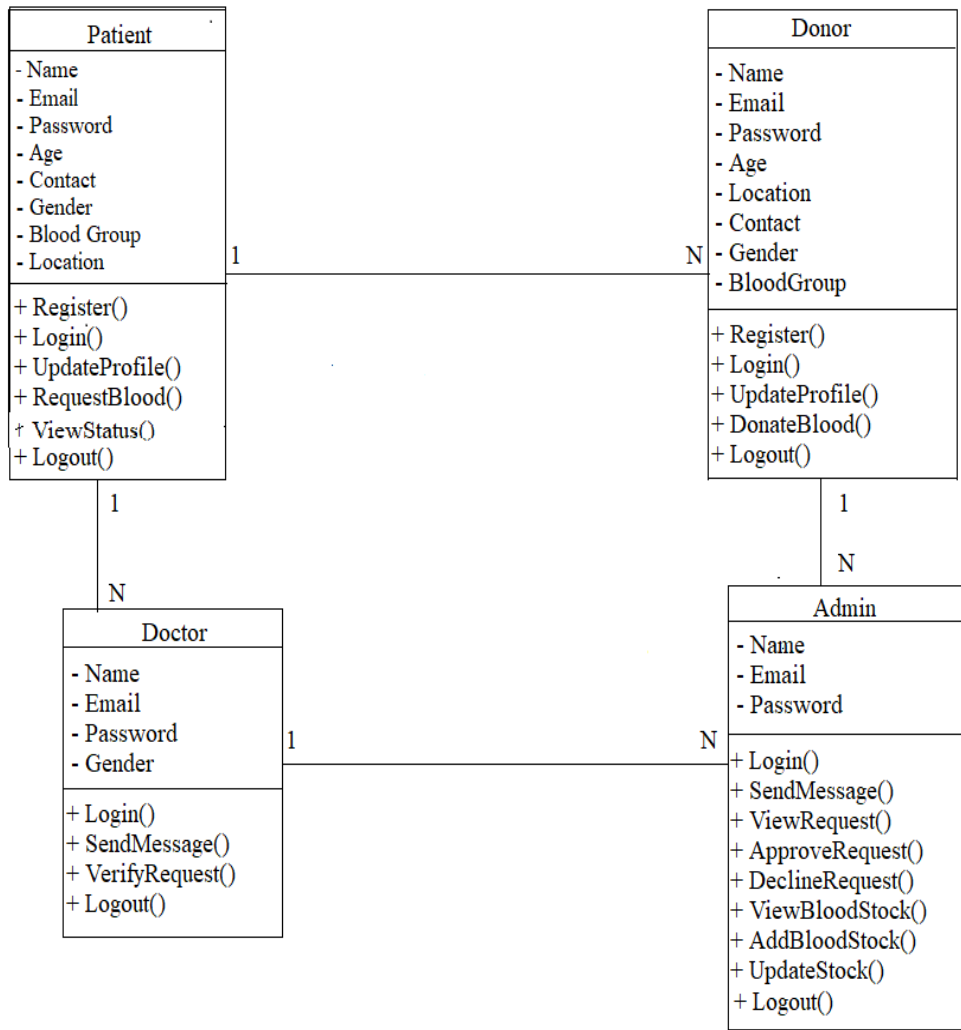


Figure 3.2: Class diagram for blood bank donor management system

3.3.4.3 SEQUENCE DIAGRAM

The Sequence Diagram models the cooperation of objects considering a period progression. It shows how the objects interface with others in a particular circumstance of a use case. It shows the course of action of objects and the messages sent and got by those objects. A sequence diagram is also a significant part used as a piece of methodology related to analysis, configuration, and documentation. A sequence diagram is otherwise called a timing diagram; event diagram or event scenario. Figure 3.3 shows the outline for the blood bank donor management system.

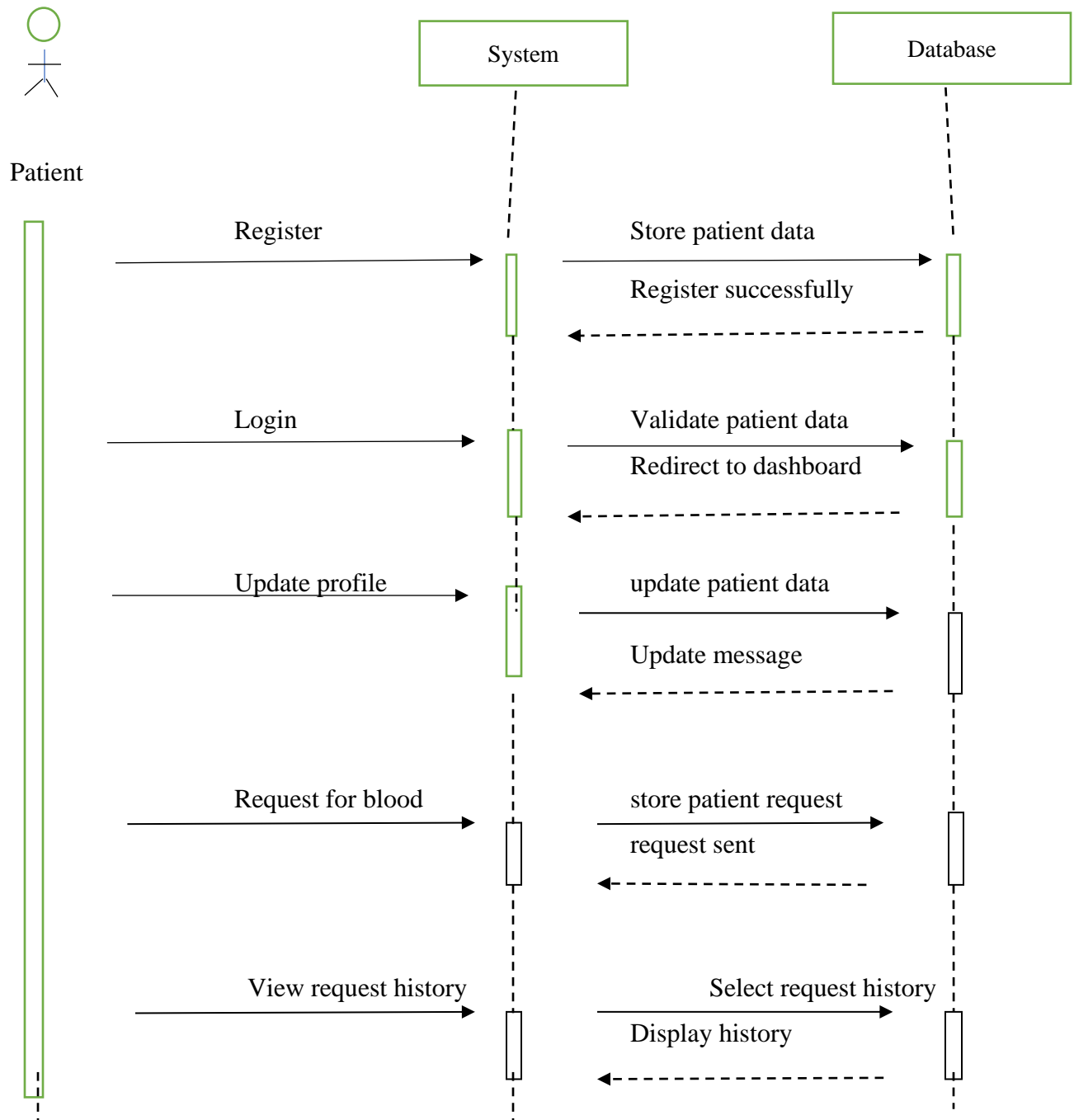


Figure 3.3: Sequence diagram for patient

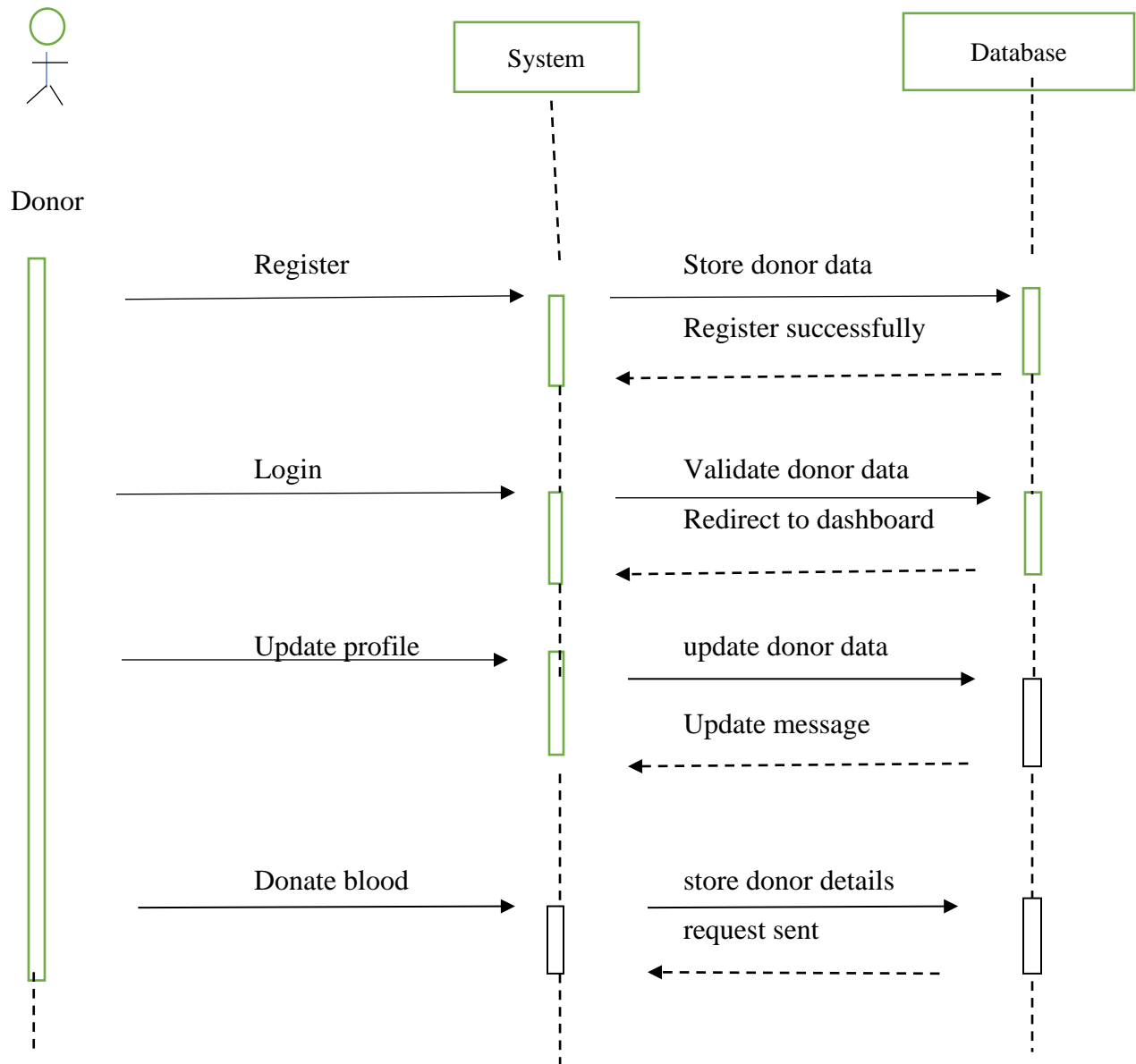


Figure 3.4: Sequence diagram for donor

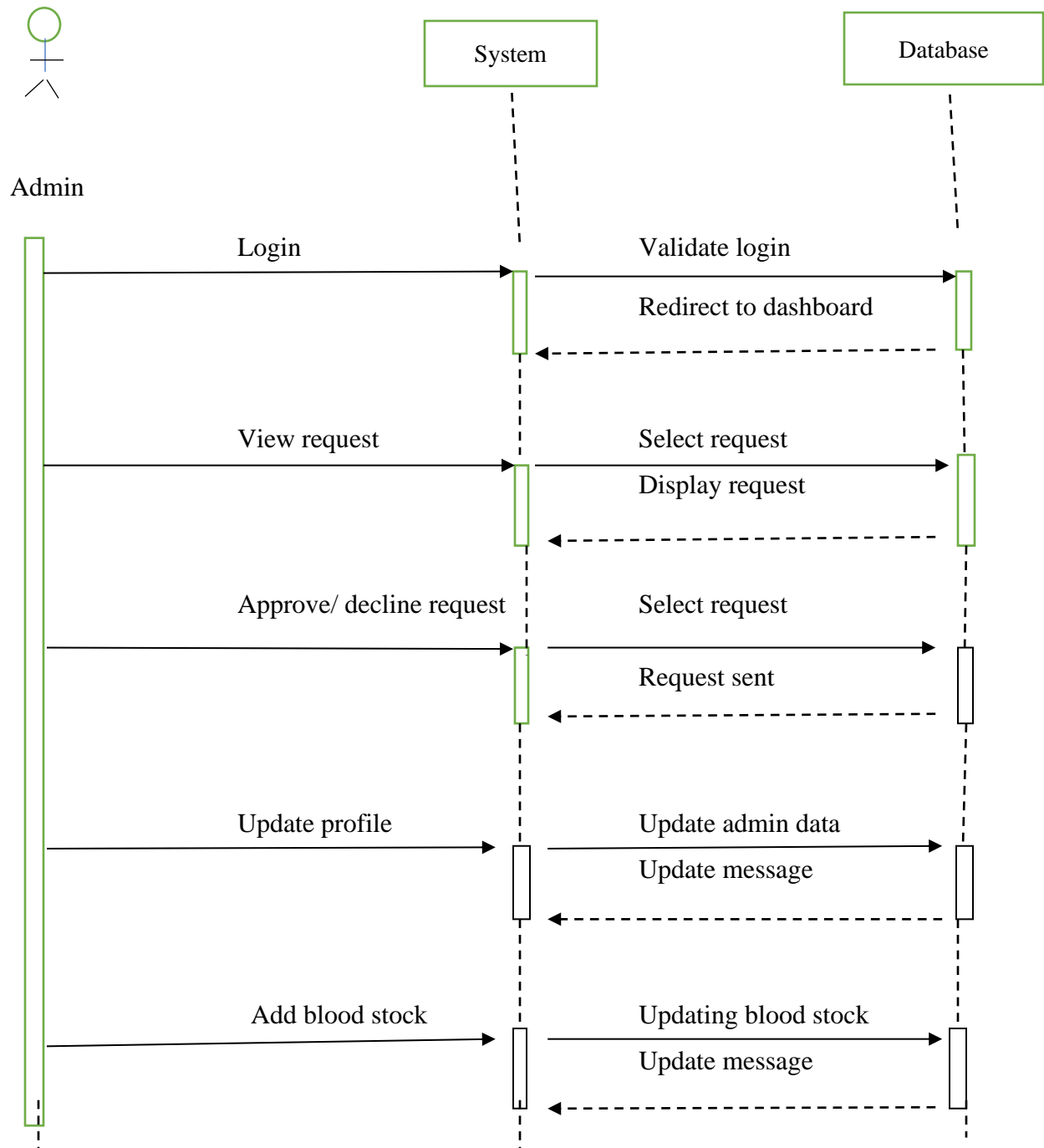


Figure 3.5: Sequence diagram for admin

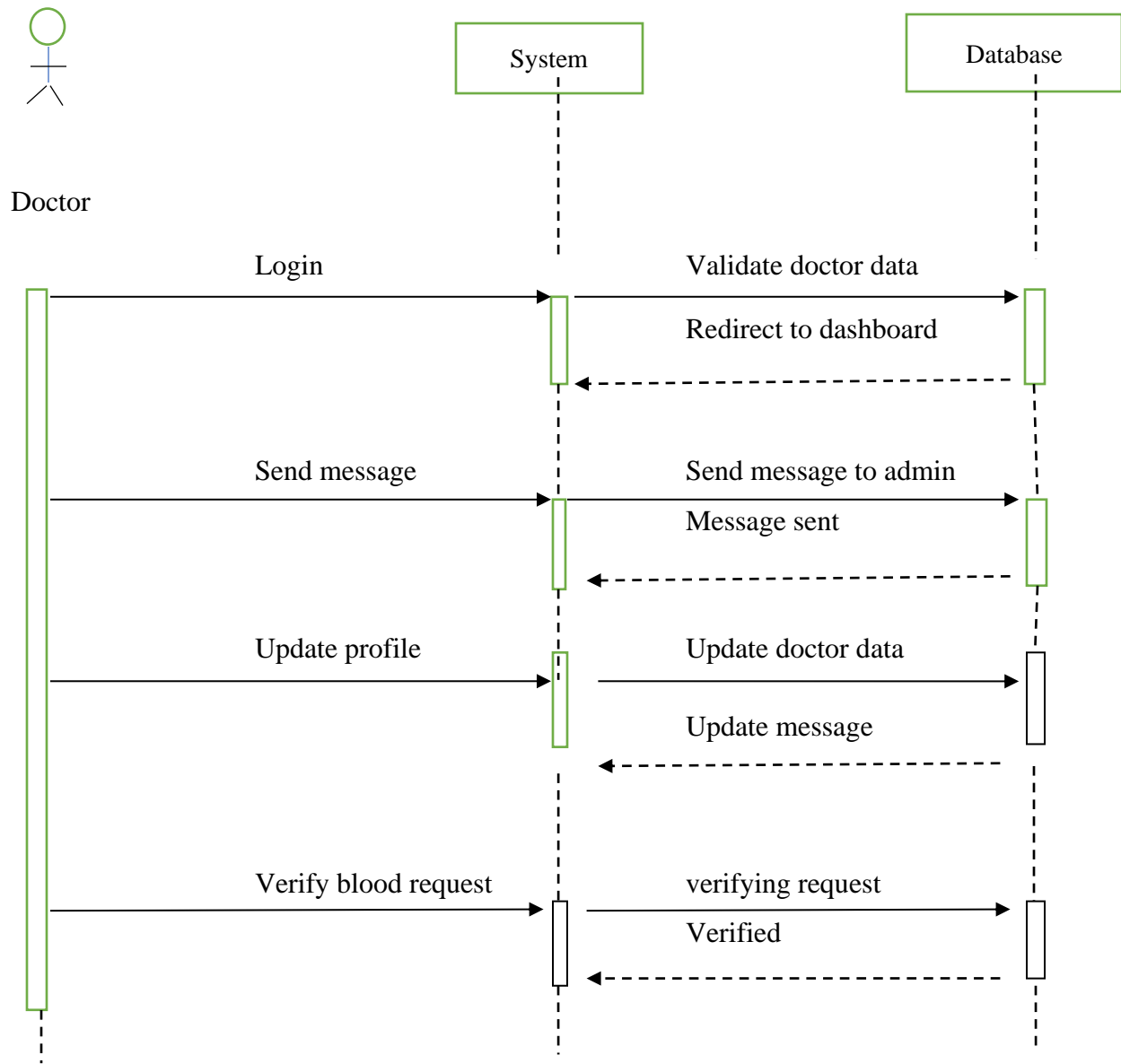


Figure 3.6: Sequence diagram for doctor

3.3.4.5 ACTIVITY DIAGRAM

An activity diagram is a flow chart to represent the stream structure of one activity to another activity. The activity can be delineated as an operation of the system. Activity diagrams are graphical representations of work procedures of stepwise activities and activities with sponsorship for choice, cycle, and concurrence. In UML, activity charts are proposed to indicate both computational and various leveled techniques (i.e., workflows). Activity charts show the general stream of control. Figure 3.7 shows the activity chart for the blood bank donor management system.

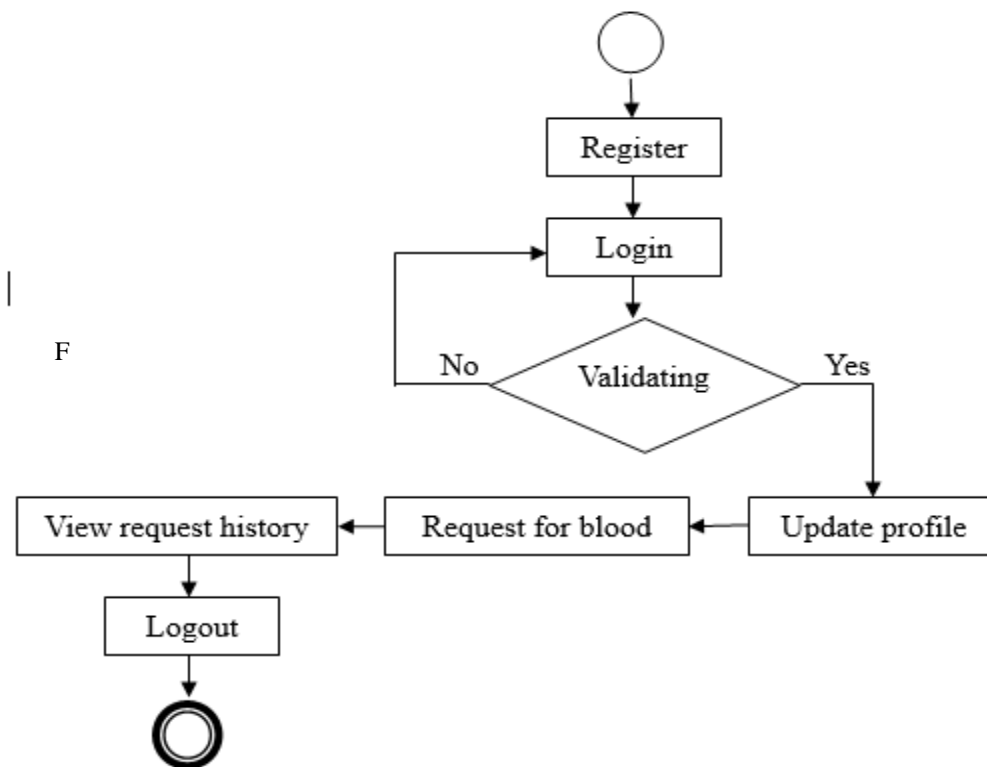


Figure 3.7: Activity diagram for patient

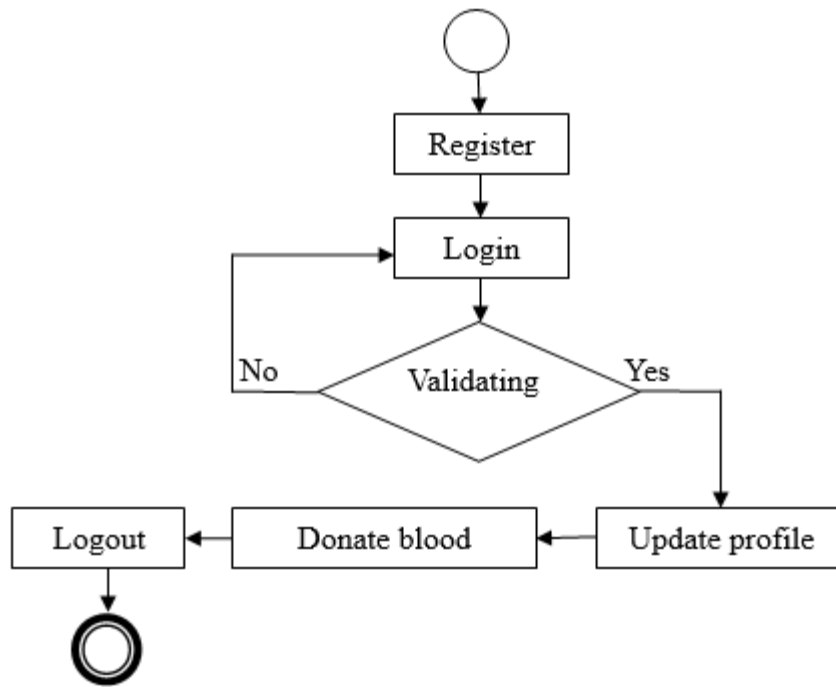


Figure 3.8: Activity diagram for donor

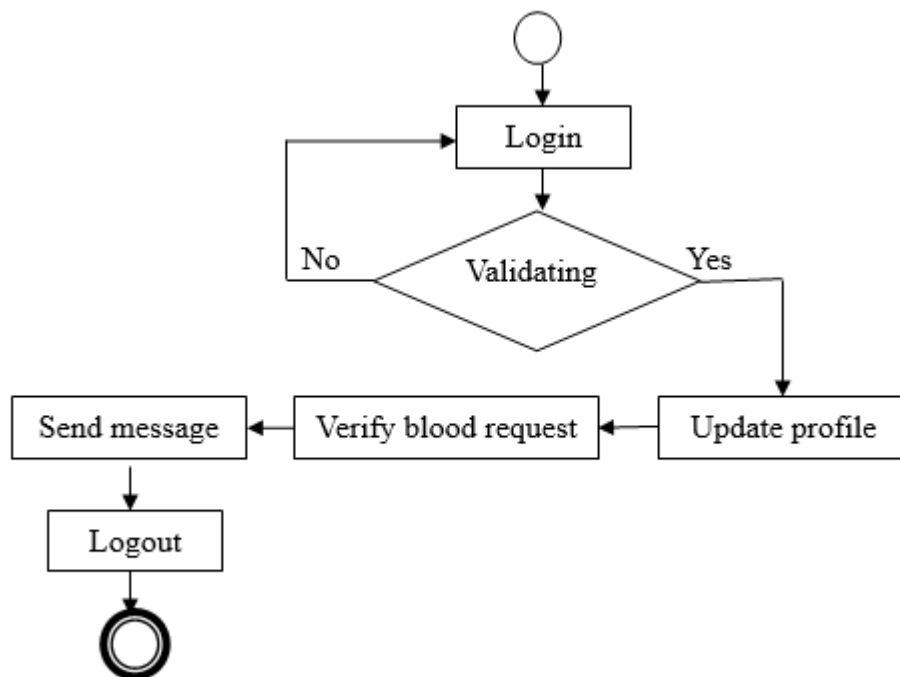


Figure 3.9: Activity diagram for doctor

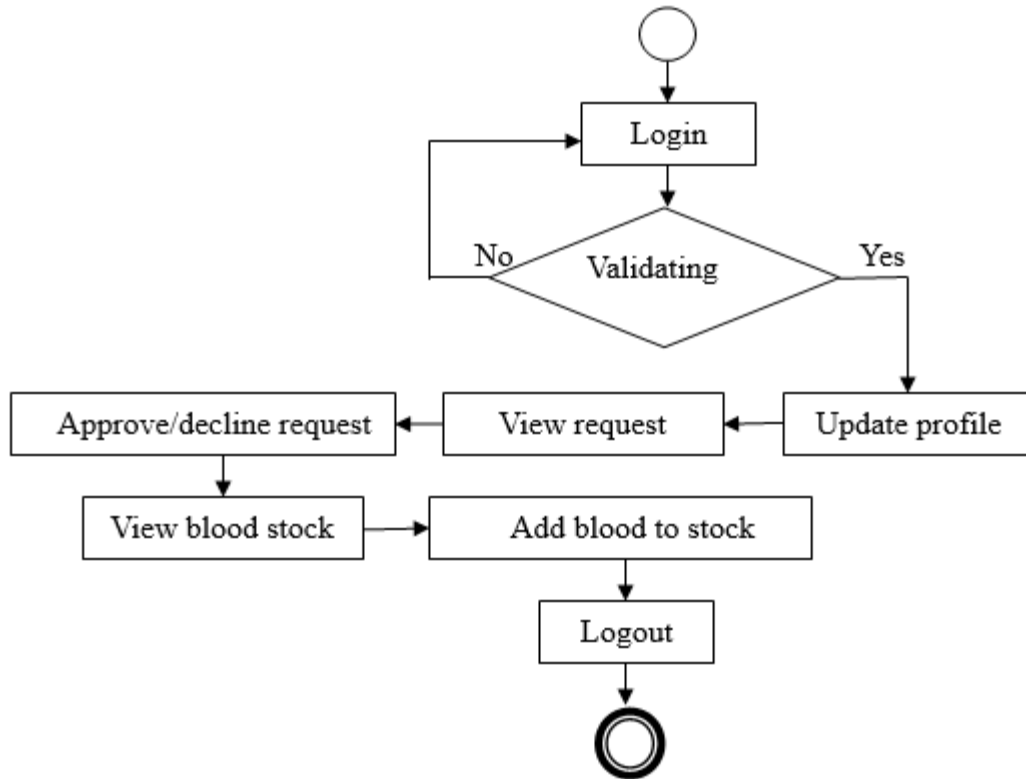


Figure 3.10: Activity diagram for admin

3.3.5 SYSTEM REQUIREMENTS

In implementing the system to ensure that the system performs effectively and efficiently as required, all the program modules for all the specified functionalities has been developed and efficiently coupled to produce a system to effectively locate and managed a blood door and a patient in times of emergencies. The minimum system requirements ensued for the effective implementation of the functionalities of each module of the system includes;

3.3.5.1 Hardware Requirements

- i. A CPU of at least 1.60 GHZ processing speed.
- ii. 1GB RAM and hard disk space of at least 250GB.
- iii. RAM: At least 1GB of RAM

3.3.5.2 Software Requirements

- i. Operating system- Certified distribution of Windows, Linux, Macintosh etc.
- ii. A web Browser such as Google chrome, Firefox, internet explorer etc.
- iii. MySQL Database System.
- iv. XAMP Server, HTML, CSS, PHP and JAVASCRIPT
- v. Text Editors (Visual studio).

3.4 Conclusion

This chapter presented the research methodology, which formed the core of this project. The proposed methodology consists of two phases, which are system analysis phase and systems design phase. The next chapter discusses system implementation and testing.

CHAPTER FOUR

SYSTEM IMPLEMENTATION AND TESTING

4.1 Introduction

Blood bank donor management system is implemented and tested in this chapter, which also provides an overview of the platforms and programming languages used. The student activity planner is implemented and tested in this chapter, which also provides an overview of the platforms and programming languages used.

4.2 System Implementation

The implementation of the Blood Bank Donor Management System involved several steps, including the creation of a database, development of the user interface and system functionality, and testing to ensure that the system meets the stakeholders' requirements and expectations. Below are some of the tool and platform for the implementation

- I. **HTML:** Hypertext Markup Language, the basic function is creating web pages. The goal of the web browser is to read the documents as web pages; and it is also possible to include scripts written in several languages, such as JavaScript, which an impact on the behavior of web pages (Wikipedia, 2013).
- II. **PHP:** A scripting language that is integral part of HTML to add functionality that native HTML is unable to do. Originally designed for web development to produce dynamic web pages, “PHP allows you to collect processes and utilize data to create a desired output” (Bradley, 2013).
- III. **MySQL:** A database system, queries, and features easily paired with PHP because it works side by side with ease. Uses MSQL to store many kinds of data, information and graphics. Also, it is easily accessible from anywhere in the world (Bradley, 2013).
- IV. **JavaScript:** A programming language developed for the design of interactive sites and creating web applications. JavaScript can interact effectively with HTML source code, enabling web authors access to their sites with dynamic content (QuinStreet Inc, 2013).
- V. **Visual Studio Code (Vscode):** Visual Studio Code is a free and open-source code editor developed by Microsoft. It is available for Windows, macOS, and Linux, and supports many programming languages, including JavaScript, Python, C++, and Java, among others. Vscode is designed to be

highly customizable, with a wide range of extensions and themes available to enhance the editor's functionality and appearance. It includes features such as code highlighting, auto-completion, debugging, Git integration, and IntelliSense, which provides smart code completion and suggestions based on the code being written. One of the strengths of Vscode is its extensibility. Developers can install extensions to add new functionality or customize the editor to their specific needs. Extensions can be created by anyone using the Vscode Extension API, and there are thousands of extensions available in the Visual Studio Marketplace, covering a wide range of use cases.

4.2.1 Description of the developed System

The developed Blood Bank Donor Management System is a comprehensive solution designed to manage blood donations in a blood bank. The system comprises several components, including a user interface, a database, and system functionality.

The user interface is designed to be intuitive, user-friendly, and easy to navigate. The user interface includes features such as donor sign-up, donor login, patient registration, doctor login, and donor/patient information management.

The database is designed to be efficient, secure, and scalable, with the ability to store a large amount of data while maintaining data integrity and confidentiality. The database schema defines the tables, columns, and relationships between them, providing a structured and organized way of storing data.

4.2.2 PROGRAM MODULES AND INTERFACES

This section contains screenshots that show the different interfaces and their functionalities.

4.2.2.1 WELCOME PAGE

The below picture shows the first page that will be see by admin, patient, donor and doctor before go further with this system.

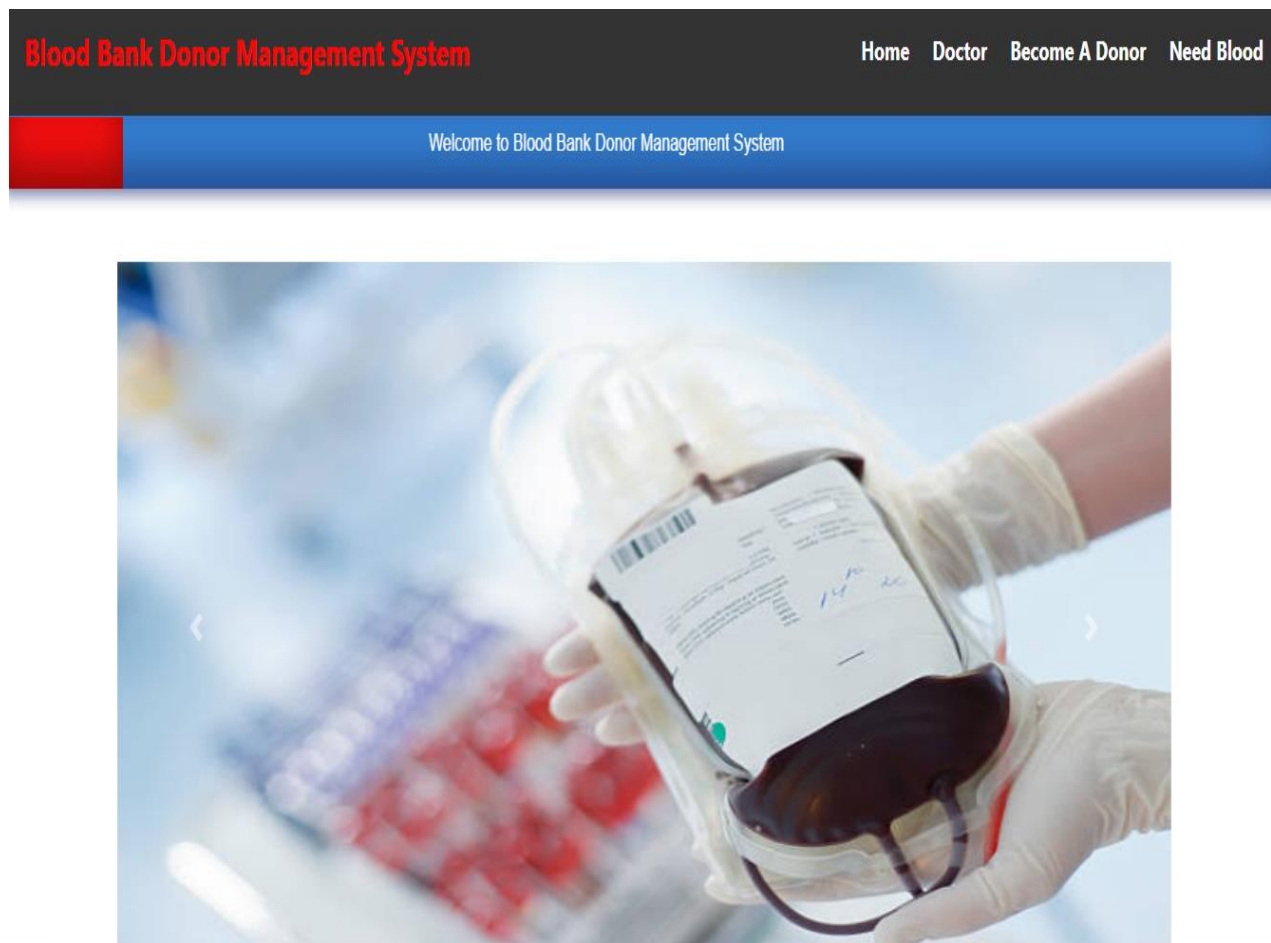


Figure 4.1 Welcome Page

4.2.2.2 PATIENT REQUEST FORM

Below shows the patient request form. Where patient fill up the form in order to request for blood. The request form typically includes fields for the user to enter name, email, blood group etc. Once the patient submit the request, they are redirected to the patient dashboard.

Bank Donor Management System

DoctorBecome A DonorNeed Blood

Need Blood

*Full Name**

*Mobile Number**

Email Id

*Gender**

Male

*Blood Group**

Select

*Age**

Submit

Figure 4.2 Patient Request Form

4.2.2.3 PATIENT DASHBOARD

Patient can update their profile if they want to change their information, request for blood and view request history once directed to the dashboard. But some of the information are read only and cannot be edited.

Blood Bank Donor Management System

DoctorBecome A DonorNeed Blood

ProfileNeed BloodHistory

Profile Page

First Name	Surname
Email	Mobile Number
Age	Male
	B+

Update Profile

Figure 4.3 Patient profile page

[Profile](#)[Need Blood](#)[History](#)

Request Blood Page

Preferred Day

dd-----yyyy

Preferred Time

--:-- --

Assigned Doctor

Dr Umar

Reason

Submit

Figure 4.4 Request Blood Page

[Profile](#)[Need Blood](#)[History](#)

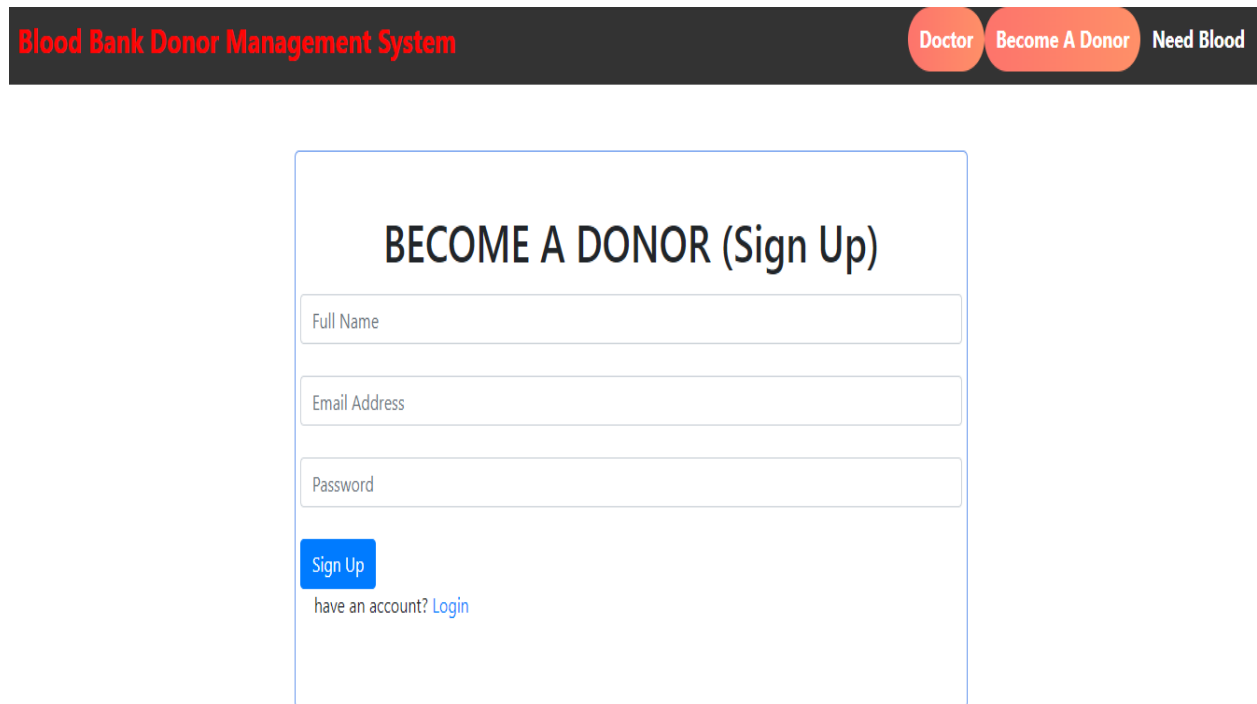
History Page

#	Request ID	Day	Time	Status
1	HDHH26	20-1-2023	12:20	Approved
2	HDHH2	20-2-2023	12:20	Pending
3	HDHH6	20-1-2023	1:20	Approved

Figure 4.5 History Page

4.2.2.4 DONOR SIGN IN PAGE

The donor sign-in page is the page that allows donor to enter their login credentials, such as username and password, to access the system. The sign-in page typically includes fields for the user to enter their login information and also includes options for creating a new account. Once the donor has entered their login credentials correctly, they are redirected to the donor dashboard.



Blood Bank Donor Management System Doctor Become A Donor Need Blood

BECOME A DONOR (Sign Up)

Full Name

Email Address

Password

Sign Up

have an account? [Login](#)

Figure 4.6 Sign Up Page

4.2.2.5 DONOR DASHBOARD

Donor can update their profile if they want to change their information, donate blood and view donation history once directed to the dashboard. But some of the information are read only and cannot be edited.

Blood Bank Donor Management System

DoctorBecome A Donor

Profile

Donate Blood

History

Message

Profile Page

First Name

Surname

Email

Mobile Number

Age

Male

Address

B+

Update Profile

Figure 4.7 Donor profile page

Blood Bank Donor Management System

DoctorBecome A Donor

Profile

Donate Blood

History

Message

Donate Blood Page

Preferred Day

Preferred Time

Reason

Submit

Figure 4.8 Donate Blood Page

4.2.2.6 DOCTOR SIGN IN PAGE

Below shows the sign in page for doctor. Only authorized user can use the system. Once the doctor has entered their login credentials correctly, they are redirected to the doctor dashboard.

The screenshot displays the 'Blood Bank Donor Management System' interface. At the top, a dark header bar contains the system name in red on the left and navigation links 'Doctor', 'Become A Donor', and 'Need Blood' on the right. The main content area features a light blue box titled '(Doctor) Sign In'. Inside this box are two input fields: 'Email Address' and 'Password', followed by a blue 'Sign In' button. The bottom of the page has a black footer bar with the text 'COPYRIGHT © 2023 Blood Bank Donor Management System' in white.

Figure 4.9 Doctor sign in Page

4.2.2.7 DOCTOR DASHBOARD

Doctor can update their profile if they want to change their information, view patient request history and verify the request through sending message to the admin once directed to the dashboard.

Profile Requests Message

Profile Page

First Name

Surname

Email

Mobile Number

Age

Male

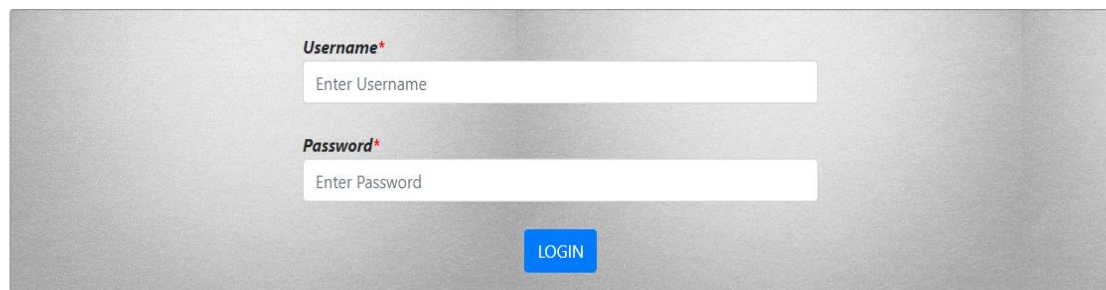
Update Profile

Figure 4.10 Doctor Profile Page

4.2.2.8 ADMIN LOGIN PAGE

Below show the login page for admin. Once the admin has entered their login credentials correctly, they are redirected to the doctor dashboard.

**Blood Bank Donor
Management System
Admin Login Portal**



The image shows a screenshot of the Admin Login Portal for the Blood Bank Donor Management System. The page has a light gray background. At the top, the title 'Blood Bank Donor Management System Admin Login Portal' is displayed in a bold, yellow-green font. Below the title, there is a dark gray rectangular box containing the login form. Inside this box, the 'Username*' label is in bold black text, followed by a white input field with the placeholder text 'Enter Username'. Below this, the 'Password*' label is in bold black text, followed by a white input field with the placeholder text 'Enter Password'. At the bottom center of the dark gray box is a blue rectangular button with the word 'LOGIN' in white capital letters.

Username*
Enter Username

Password*
Enter Password

LOGIN

Figure 4.11 Admin Login Page

4.2.2.9 ADMIN DASHBOARD

Below shows the management page for admin where admin can register donor, view donor & patient request, manage blood stock.

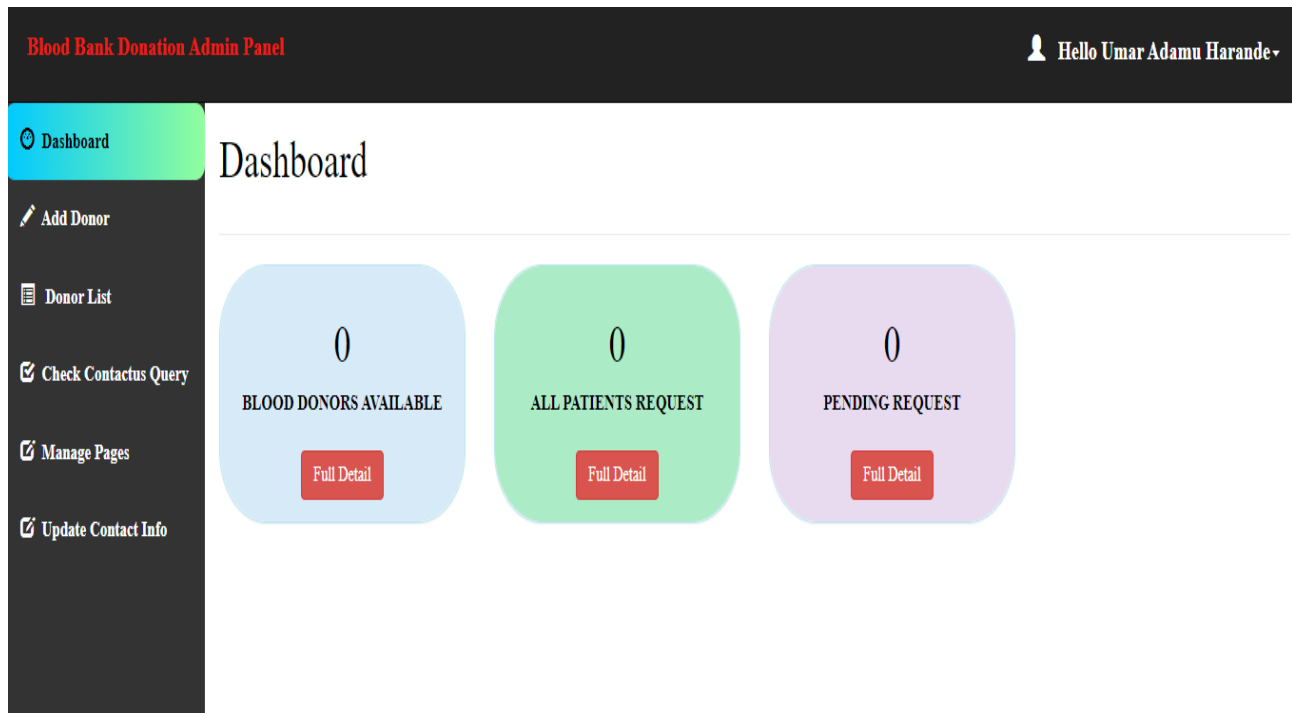


Figure 2.12 Admin Dashboard

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

Blood Bank Donor Management System project provides an overview of the project's key findings and achievements, as well as recommendations for future work. In this chapter, we will summarize the project's objectives and outcomes, highlight the strengths and limitations of the system, and suggest areas for further improvement.

5.2 Summary

The Blood Bank Donor Management System project aimed to design and develop a system that would improve the efficiency and accuracy of blood bank operations, enhance donor engagement, and streamline the blood donation process. Throughout the project, I used a variety of tools and techniques, including UML modeling, database design, to create a functional and user-friendly system.

The resulting Blood Bank Donor Management System includes donor sign up and login, patient and donor dashboards, and administrative. The system is designed to ensure that blood products are managed efficiently, reducing the risk of errors, and enhancing the experience of donors and healthcare professionals.

Overall, the project was successful in achieving its objectives, and I believe that the Blood Bank Donor Management System has the potential to make a significant impact on the healthcare industry.

5.3 Conclusion

The Blood Bank Donor Management System is a critical tool for managing and tracking blood donations and transfusions. This system provides a centralized location for donors, healthcare professionals, and administrators to access important information related to blood donation and transfusion. By implementing this system, blood banks can improve their efficiency and accuracy in managing their blood products and donor information, and ultimately provide better care for

their patients.

Throughout this project, I have designed and implemented a Blood Bank Donor Management System, which includes features such as donor sign up, donor login, donor dashboard, patient dashboard, and admin dashboard.

The Blood Bank Donor Management System's design and implementation have been successful in meeting the project's objectives. However, there is still room for improvement in terms of the system's scalability, integration with other healthcare systems, and advanced reporting capabilities.

5.4 Recommendations

Based on the findings and limitations of the Blood Bank Donor Management System project, we recommend the following areas for further work:

- I. **Integration with Mobile Applications:** To improve the accessibility of the Blood Bank Donor Management System, integration with mobile applications can be explored. The use of mobile applications can provide donors and healthcare professionals with an easy and convenient way to access the system's features and services from their mobile devices. This can include features such as blood donation scheduling, real-time blood inventory tracking, and donor health information management. The integration with mobile applications can be achieved through the development of native or hybrid applications or through the use of mobile web applications.
- II. **Integrating the Blood Bank Donor Management System with social media** can help to improve awareness and engagement with potential donors. Social media platforms can be used to share information about blood donation campaigns, promote donation events, and provide educational materials about the importance of blood donation. Additionally, social media can be used to create online communities of donors, where they can share their experiences and encourage others to donate. The integration with social media can be achieved through the development of custom social media strategies or through the use of existing social media integrations.

In conclusion, the integration of the Blood Bank Donor Management System with social media, and mobile application can provide additional benefits and enhance the system's functionality and usability. By exploring these integration options, I can ensure that the system remains innovative and responsive to the evolving needs of the healthcare industry.

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APPENDIX

INTERVIEW CHECKLIST