BLOOD BANK CALL-UP SYSTEM

CASE STUDY: MBALE REGIONAL BLOOD BANK

By

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A PROJECT REPORT SUBMITTED TO THE DEPARTMENT OF COMPUTER STUDIES FOR PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE BACHELOR OF INFORMATION TECHNOLOGY OF BUSITEMA UNIVERSITY.

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DECLARATION.

I, **ADILU ENOCK** declare that the project was typically based on my work, findings, research and effort.

I also confirm that the research is only prepared for my academic requirement, not for any other purpose. It might not be used in the interest of the opposite party of the organization.

SIGNATURE……DATE…10th Oct-2024

APPROVAL

This is to acknowledge that this project report is for Adilu Enock, with registration number BU/UP/2021/3010. It was done under my supervision and was completed successfully.

SIGNATURE.....DATE...10th/Oct/2024

DEDICATION

I dedicate this work to my favorite persons that have supported me throughout this entire journey.

Sincere appreciation to my uncle **WEKOYE RONALD** who has been a strong rock and always provided me with maximum support and encouragement from the start to the end. I also dedicate this to my lovely mother and father, **AUMA SYLVIA** and **OKAPEACE GASTUS** respectively. Thank you for your support and may the Almighty reward you abundantly.

I also dedicate this report to my supervisor **MR OBOTH ANDREW** who guided me on how to formulate this entire report successfully. If it was not for him, I would not have been able to shoot the tip of this mountain.

AKNOWLEDGEMENT

I would like to thank the Almighty God for enabling me to complete this entire period of my research.

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Lastly, I would like to thank my supervisor, **MR OBOTH ANDREW** for his un-ending encouragement and support during this entire research period. I will forever be grateful.

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LIST OF ACRONYMS

DFD Data Flow Diagram

ERD Entity Relationship Diagram

SPMS Student Project Management System

HTML Hypertext markup language

CSS. Cascading style sheets

PHP. Hypertext Preprocessor

RAD Rapid Application Development

SDLC System Development Life Cycle

SSADM Structured system analysis and design methodology

ABSTRACT

In Mbale Regional Blood bank, there are different activities that take place including, blood donation, blood donation drives among others. This research focuses on the development of a Blood Bank Call-up system to address the challenges of manual record keeping, lack of awareness about blood donation and its benefits and limited communication channels. The system aims to improve blood donation accessibility and efficiency by transitioning from manual registers to a digital platform to streamline data management and improve the matching process between donors and recipients. An automated Blood Bank Call-up system will furthermore enhance communication by providing a platform for dissemination of information about upcoming blood drives, educational resources on blood donation and facilitating direct communication between potential blood donors and the blood bank.

The methodologies used include the Structured System Analysis and Design (SSAD) which was used for analysis and designing the system as well as the RAD (Rapid Application Development) which was easy to deliver a working system with all the modules worked upon one after the other. Furthermore, I went ahead and employed MySQL as a database management system, PHP as the technology which is an open-source general purpose scripting language that is especially suited for web development and can be embedded into HTML. In addition, HTML (Hyper-text Markup Language) and CSS (Cascading Style Sheets) which are the core web scripting languages for building web pages and web applications were used. HTML provided the structure of web pages whereas CSS was mainly used to control the styling and layout of web pages.

I also used CSS libraries like bootstrap for easy and uniform styling as well as font awesome for the icons in the system. Google fonts, which is an online repository for various font styles was also used in order to work on the appearance of the interfaces of the system.

CHAPTER ONE

1.0 INTRODUCTION

Blood donation is the process of transferring blood from a healthy person to the needy through healthy centers. It is the most precious gift that anyone can give to another person also known as the gift of life. In the recent years Information Technology has played a big role in the aspect of blood donation by enabling communication between donors and recipients, keeping records of dono \mrs, recipients, blood bank using different systems to capture and store information.

However blood donation can be made efficient and meaningful when there is a platform where donors and recipients engage themselves in.

In recent years there is a persistent shortage of blood supply in many parts of the world, which hinders the delivery of essential services. According to the World Health Organization (WHO), only 60 countries collect enough blood to meet their national needs, while 40 countries collect half of the requirements.

Charles R. Drew was an African American surgeon and researcher who pioneered in the field of blood transfusions and blood storage. Living through a time of extreme racial prejudice, he protested against blood donor segregation and campaigned for better treatment of black doctors. Earning himself the nickname “Father of the Blood Bank” his legacy is still felt to this day, with around 20% of donated red blood cells being given to people with blood cancer. (Tan SY, Merritt C. Charles Richard Drew, (1904-1950), (Father of blood banking. Singapore Med J, 2017).

Other similar existing systems include; Blood Donor: This app connects blood donors with recipients in India. It allows users to register as donors, search for donors by blood type and location, and request blood donations when needed. Developed by the E-Raktkosh team of Centre for Development of Advanced Computing (CDAC) under the Digital India scheme.

Blood Donor by Health4TheWorld: This app connects donors and recipients globally. It enables users to register as donors, find nearby blood banks, and receive notifications about urgent blood donation needs. (Scharrer, I., 2020)

Simply Blood: Founded by Kiran Verma, Delhi, India in 2016 along with five college pass outs from Ambala District, Haryana launched Simply Blood app on January 29, 2017, in Delhi (Bhatt, Mital Rajnikant. Systematic studies on Orchidaceae of Gujarat. Diss. Maharaja Sayajirao University of Baroda (India), 2019.)

American Red Cross Blood Donor App: The American Red Cross offers an app that helps users schedule blood donation appointments, track their donation history, and receive notifications about blood shortages and emergencies. (Diba, S. N. ,2018).

According to the ongoing research many efforts have been undertaken to employ mobile apps to make blood donations more convenient and create communities around donating blood. The case study findings suggest a high level of readiness of using mobile apps for blood donation among the younger generation (National library of medicine, 2023).

1.1 BACKGROUND OF STUDY.

The case study is Mbale Regional Blood Bank in Mbale City within Mbale Regional Hospital.

Initially in the Mbale Regional Blood Bank, there are a group of trained professionals who organize and mobilize for blood donation drives in the communities such as schools, universities, religious gathering places such as churches, mosques among others. The professionals organize the gathering and teach people on the benefits of blood donation, screen them by asking some questions such as their HIV status, check their blood pressure, carryout other medical checks, fill forms with their personal information, take physical checks such check on weight, hemoglobin levels. The people willing to donate blood are registered their names manually in the register book and those who have recently donated at least three times are given cards for recognition at any hospital in case they become victims of those who need blood they can get it at free cost without making any payment. The blood collected from this communities is then transported to

the blood bank centers and later can be distributed to different medical centers to the patients who may need the blood.

In this situation there is no connection between the people who donate blood and the recipients and there are no platforms where blood donation drives can be posted to let the people within the communities aware of when donation are to be carried out, how to access the concerned people and also to educate the people about the benefits of blood donation. This has discouraged the communities to donate blood thus making blood shortage in this region a great concern in the hospital other medical centers. This has resulted to death of a number of citizens in the region.

The general idea of the study is to develop a Blood Bank Call-up System is to manage the records of the donors and the people who need blood.

1.2 PROBLEM STATEMENT.

There exists a significant shortage of blood supply in many regions, including the Eastern region of Uganda, due to several factors including lack of awareness, fear, and misconceptions about blood donation. Additionally, there is a lack of effective communication between blood donors and recipients, leading to difficulties in matching donors with those in need of blood. As a result, individuals requiring blood transfusions, such as patients with anemia, cancer, or trauma, face challenges in accessing timely and sufficient blood donations leading to death. This shortage has resulted in adverse consequences, including preventable deaths in healthcare facilities, as evidenced by the reported deaths due to blood shortage in Mbale Regional Blood Bank (East News, 2023). These issues highlight the urgent need for an efficient system that can bridge the gap between blood donors and recipients, promote awareness about blood donation, and facilitate real-time interaction between the two parties. Therefore, the development of a Blood Bank Call-up System provides a solution to address these challenges and improve the accessibility and efficiency of blood donation processes hence minimizing on mortality.

1.3 OBJECTIVES OF THE STUDY.

1.3.1 MAIN OBJECTIVE.

The main objective of the project is to develop a Blood Bank Call-up System.

1.3.2 OBJECTIVES OF THE STUDY.

i. To review the literature and determine the requirements of Blood Bank Call-up System.
ii. To analyze the requirements and design the Blood Bank Call-up System.
iii. To implement the Blood Bank Call-up System.
iv. To test and validate the Blood Bank Call-up System.

1.4 SCOPE.

Cost: The estimated cost of the project was ugx.250, 000, covering expenses such as researcher transportation, accommodation, and food, airtime, internet bundles, and software development tools for the application. This budget allocation ensures that necessary resources are allocated effectively to support project activities and deliverables.

Time Variant: The project took an approximate 10 weeks, from initiation to completion. During this period, various project activities will be undertaken, including data collection, application development, testing, and implementation. The specified time frame ensures that the Blood Bank Call-up System is developed and operational within a reasonable timeframe to address the identified blood shortage issues effectively.

Geographical Scope: Initially, the project research is focused on the Eastern region of Uganda. However, it is expected to cover a few districts initially and later expand to encompass the entire region. This phased approach allows for targeted implementation and resource allocation, considering logistical constraints such as limited transportation means for individuals, particularly during emergencies.

Functionality: The Blood Bank Call-up System is designed to manage records of blood donors and recipients, facilitating communication and interaction between the two parties. Key features include donor registration, donor search, inquiries from both donor and recipients, the application's functionality is tailored to meet the specific needs of users and stakeholders involved in the blood donation process.

Technology: The project leverages system development technology to develop the Blood Bank Call-up System. This platform choice ensures accessibility and ease of use for potential donors and recipients, enabling those in need of blood search for compatible donors. Additionally, the use of technology allows for efficient database management and faster retrieval of information, enhancing the overall user experience and effectiveness of the application.

1.5 JUSTIFICATION.

The current shortage of blood supply in the Eastern region of Uganda, as well as in many other parts of the world, underscores the critical need for innovative solutions to address the underlying issues. Lack of awareness, coupled with misconceptions about blood donation, poses significant barriers to recruiting and retaining blood donors. Furthermore, the absence of an efficient communication platform exacerbates the challenge by hindering the timely matching of blood donors with recipients in need.

The proposed Blood Bank Call-up System offers a promising solution to these pressing problems. By leveraging technology, specifically system development, the Blood Bank Call-up System can effectively engage potential blood donors and recipients, raising awareness about the importance of blood donation and facilitating seamless communication between all stakeholders involved.

Moreover, the reported deaths in healthcare facilities due to blood shortage, such as those documented in the Mbale regional hospital, serve as stark reminders of the urgent need for action. The Blood Bank Call-up System has the potential to prevent such tragic outcomes by streamlining the process of blood donation and ensuring that blood recipients are promptly notified of potential blood donors available. This real-time interaction between donors and recipients will not only enhance the efficiency of blood donation processes but also save lives that might otherwise be lost due to lack of timely access to blood.

Furthermore, the cost-effectiveness of the Blood Bank Call-up System, estimated at a reasonable cost and within a specified time frame, underscores its feasibility and practicality as a solution to address blood shortage issues. By optimizing resource allocation and maximizing outreach, the system can achieve widespread adoption and make a significant impact on improving blood donation rates and availability.

1.6 SIGNIFICANCE OF THE STUDY.

The Blood Bank Call-up System holds significant importance and potential impact, as outlined in the text provided:

Improved Accessibility and Communication: The Blood Bank Call-up System aims to bridge the gap between blood donors and recipients by providing a platform for efficient communication and interaction. This will significantly enhance the accessibility of blood donations for those in need, especially individuals with critical medical conditions such as anemia, cancer, and trauma.

Prevention of Adverse Health Outcomes: The reported incidents of deaths due to blood shortage, such as those documented in the Mbale regional hospital, highlight the urgent need for effective solutions. The Blood Bank Call-up System has the potential to prevent such tragedies by ensuring timely access to blood donations, thereby reducing the risk of adverse health outcomes and preventable deaths.

Promotion of Awareness and Engagement: By leveraging technology and mobile applications, the project aims to raise awareness about the importance of blood donation and engage potential donors. This proactive approach can help overcome misconceptions and fears surrounding blood donation, thereby increasing donor participation and retention rates.

CHAPTER TWO

LITERATURE REVIEW.

2.0 INTRODUCTION.

This chapter reviews the literature of the existing similar systems in the blood bank sector and establishes its strengths and weaknesses, reviews on the blood bank Call-up system and establishes its strengths and its weaknesses basing on the existing similar systems around the world, its functional and non-functional requirements for developing the blood bank Call-up system.

This chapter also presents a clear understanding of the blood bank Call-up system by clearly describing its art, giving relation to real world scenarios and giving its relevancies.

2.1 BLOOD.

Blood is a body fluid the circulatory system of humans and other vertebrates that delivers necessary substances such as nutrients and oxygen to the cells, and transports metabolic waste products away from those same cells. Blood is composed of cells suspend in blood plasma (Wikipedia)

Blood is a saver of all existing lives in case of emergency needs.

2.2 BLOOD BANK.

A blood bank is a place where supplies of blood or plasma for transfusion are stored (oxford dictionary)

The task of blood bank is to receive blood from various donors, to monitor the blood groups database and to send the required blood during the need to the hospital in case of emergencies.

2.3 A SYSTEM.

A system is a group of components (people, objects and processes) that work together to achieve a common goal, or multiple goals, by accepting input, processing it and producing output in an organized manner (McCallister, 2004).

A system is a set of things working together as parts of a mechanism or an interconnecting network; a complex whole (oxford dictionary).

2.4 BLOOD BANK CALL-UP SYSTEM.

Blood Bank Call-up System is a web based application that was built using php, css, mysql database, java script, html and it enables registered users to login, make inquiries from the blood bank, search for compatible blood donors by blood type and location who are willing to donate blood to those in need. The system also allows new users to register and after can login to access the system features such as search for donor, request blood from the donor, make inquiries from the blood bank.

2.5 WEAKNESSES OF THE CURRENT SYSTEM.

There is possibility of errors in record –keeping, there are many possible errors made during recording of both donors and recipients details done during the blood donation drives, transfusion in the hospitals, screening sessions and during testing blood donor candidates.

The long waiting times for donors, the time taken to find the compatible blood donors in order to save the lives of those in need of blood. This results into premature deaths due to delayed service of blood.

The inefficient blood inventory management, the current system has the difficulties in blood inventory management as to know the amount of blood in stock by blood type.

2.5 RELEVANCE OF THE BLOOD BANK CALL-UP SYSTEM.

The blood bank Call-up system has the ability to reduce the deaths of patients in many hospital who are not able to access compatible blood donors in time. This system has many advantages and positive effect as explained below.

The system provides quick and easy ways to find and locate compatible blood donors within limited time intervals by just search button click of a mouse. The saves time spent while looking for a compatible blood donor within the nearby location thus saving lives of many patients.

The system has the capability of trace error during entry of data for instance during registering of donors, form entries have validation controls to allow correct information from the users.

The system has a database for storing information about blood donation, blood donors available, and recipients in need of blood and thus making it easy for the blood bank to trace blood donors, blood requires among others.

2.6 REQUIREMENTS OF THE BLOOD BANK CALL-UP SYTEM.

2.6.1 SOFTWARE DEVELOPMENT REQUIREMENTS.

Software development requirements refers to the set of specific, measurable, and testable characteristics that a software system must have to meet the needs of its users. As defined by the IEEE Standard Glossary of Software Engineering Terminology (source: https://standards.ieee.org/ieee/729/967/), a requirement is:

Requirements serve as the foundation for software development and provide the basis for defining and verifying the software's functionality. Requirements also provide a roadmap for software development, guiding the development process and ensuring that the software system meets its intended purpose. It also serves as a reference point in communication for stakeholders – customers, end-users, and software developers.

By clearly defining the requirements for software development, stakeholders can ensure they have a common understanding of what the software system should do and how it should perform. This is important because it helps to reduce the risk of misunderstandings, which can lead to delays, cost overruns, and dissatisfaction with the final product.

2.6.2 FUNCTIONAL REQUIREMENTS FOR BLOOD BANK CALL-UP SYSTEM.

Functional requirements Blood Bank Call-up System describe what this system and its component should do. These requirements specify the functionalities the software must provide alongside each function's inputs and expected outputs. The examples are as per the users.

To search for blood donors basing on blood type and location.

To register as new users.

To send inquiries to the blood donors selected.

As for the goal of the Blood Bank Call-up System is to reduce the gap between blood donors and recipients, reduce on the time spent on searching for compatible blood donors and save lives as many as possible.

However, the system also has the admin panel, that enables him perform various activities such as:

To delete/update user details.

To publish/ hide donors from the user home page.

To print recipient inquiry reports.

To add/delete blood groups.

To edit/update user profile.

2.6.3 NON- FUNCTIONAL REQUIREMENTS FOR BLOOD BANK CALL-UP SYSTEM.

Non-functional requirements describe how well the software system should perform rather than its specific behaviors. These requirements specify the quality attributes of the software system, such as performance, security, usability, and reliability.

Usability: The Blood Bank Call-up System provides an interactive user-friendly interface that is easily understandable for all users.

Availability: The Blood Bank Call-up System is available for its users to avoid interruption by reducing on the down time through the technical support from the system administrator.

Security: The Blood Bank Call-up System Only authorized users must be able to access the system and view and modify the data, navigate through the system accessing its features.

Dependability: The Blood Bank Call-up system provides consistent performance with easy tracking of records and updating of records.

Maintainability: The Blood Bank Call-up is easy maintainable and adding new features and making changes to the software must be as simple as possible.

CHAPTER THREE.

METHODOLOGY

3.0 INTRODUCTION.

This chapter laid out and presented the system design, data collection methods, sampling strategies, data analysis and ethical considerations that were used in the study

3.1 AREA OF STUDY.

The study was conducted at Mbale Regional Blood Bank because of its being the major distributer of blood in the eastern region henceforth the research was based on how blood requires can be able to get potential blood donors with ease. This was done to improve on the ways on how blood donation process is done, thus saving lives of many.

3.2 SAMPLING.

This study involved 7 respondents from whom data was collected namely; 3 blood donors, 2 nurses who are professional at the blood bank, 1 patient who required blood and 2 students who wish to voluntarily need to donate blood. Non probability sampling was used as it involved non-random selection based on convenience allowing one to easily collect data from the respondents.

The method was used due to its affordability and cost-effectiveness since it does not involve all the population where the research was carried out from.

3.3 SYTEM DEVELOPMENT.

SSADM (Structured Systems Analysis and Design Method) is a widely used computer in application development method in the UK Standard BS7738.

SSADM divides an application development project into modules, stages, steps and tasks. It provides a framework for describing a project in a way that's suited to managing it. SSADM's objectives are to do the following:

i. improve project management and control;

ii. make more effective use of experienced and inexperienced development staff;

iii. develop better quality systems;

iv. make projects resilient to the loss of staff;

v. enable projects to be supported by computer-based tools such as computer-aided software engineering systems (CASE); and

vi. Establish a framework for good communications among project participant (ben lutkevich, 2020).

The major development approach employed for this project was the Structured System Analysis and Design Methodology (SSADM).

SSADM follows the waterfall life cycle model starting from the feasibility study to the physical design stage of development. One of the main features of SSADM is the intensive user involvement in the requirements analysis stage. The users are made to sign off each stage as they are completed assuring that requirements are met.

The users are provided with clear, easily understandable documentation consisting of various diagrammatic representations of the system (Turner, 2000). SSADM breaks up a development project into stages, modules, steps and tasks. The first and foremost model developed in SSADM is the data model.

3.4 DATA COLLECTION

Sampling Methods.

The study considered non probability sampling i.e. purposive sampling as it involved the researcher to use their expertise to select a sample that was most useful to the purposes of research. It was used in qualitative research as one got detailed knowledge about a specific phenomenon rather than making statistical references. Henceforth interviews and document review were used for data collection.

3.4.1 Interviews.

This technique involved asking open-ended questions to converse with respondents and collect elicit data about a subject. This involved the interviewer who in most cases is the subject matter expert to understand respondent opinions in a well planned and executed series of questions and answers. These were used as they help one explain, better understand and explore research subjects' opinions, behavior, experiences and phenomenon.

3.4.2 Document Review.

This involved reading journals about similar systems, websites of different blood banks, and different documents from archives such as reports about similar systems, browsing through the internet on topics about similar systems. This helped to clearly understand the topic of the research study.

3.5 SYSTEM ANALYSIS

There are a number of tools that were used to represent facts from the collected data. The tools included; the System Architecture, a Context Diagram, Data Flow Diagram and Use case Diagrams and Entity Relationship diagram. These clearly represent the raw facts gathered during the data collection process, while defining the behavior and interactions among the various components of the system as well;

3.5.1 System Architecture.

This is a conceptual model that defines the structure, behavior, and other views of a system (Cooper, 2011). This was used to clearly show the interactions and behavior among the various components of the system.

3.5.2 Context Diagram.

Relationships were established between the data items to show how the different entities relate with the system. The context diagram therefore shows the basic interaction of the system with its environment.

3.5.3 Data Flow Diagram.

A Data Flow Diagram (DFD) is a graphical representation of the flow of data through an information system. It can as well be used for the visualization of data processing. System designers usually start by drawing a context diagram to show the interaction between the system and outside entities. The Data Flow Diagram shows how the data moves /flows within the system.

3.5.4 Use case Diagram

A use case diagram is a visual representation of the relationships between actors/users and the system itself, showing how the actors interact with the system to achieve specific goals. The use case diagram helped to effectively model and communicate the system's functionality, making it easier to design, develop and test software thereby meeting users' needs.

3.5.5 Entity Relationship Diagram

An entity relationship diagram is a visual representation of data showing how entities of a system relate to each other. An entity relationship diagram shows the different system entities and the relationships between these entities. It is composed of entity types and specific relationships that exist between the entities.

3.6 SYSTEM IMPLEMENTATION.

The tools employed in the implementation of Blood Bank Call-up System include the following:

Visual Studio Code which enabled the researcher to write the dynamically generated pages easily and very quickly because it was used as the main text editor.

Hypertext markup language (HTML), Cascading style sheets (CSS) and Bootstrap used to develop user interfaces.

The system was implemented on Windows 10 pro Operating System environment and the back end implemented using MySQL database server.

MySQL was very useful in constructing the database of the Blood Bank Call-up System. A database is a collection of interrelated data stored with minimum redundancy to serve

many users quickly and efficiently. Database was used in order to make data access easy, quick, inexpensive and flexible for the user.

I also used Java Script to trigger events in the system.

I used tools like PHP to implement the back end and HTML programming languages to implement the system interfaces in a Visual Studio Code programming environment. I also used XAMPP server as a server side database tool for implementing databases. Interaction with the system interface was done by clicking and typing where asked.

3.7 TESTING AND VALIDATION.

Both unit testing and integration testing were performed on the Blood Bank Call-up System to clarify the specifications of the system to reveal possible faults and establish confidence in the system.

Unit testing focused on one function at a time in that whenever the researcher designed a function, it would be tested instantly before proceeding to design another function.

Integration testing was done after all the different modules had been put together to make a complete system. Integration aimed at ensuring that all the modules of the system work hand in hand and that they could be integrated to form a complete working system.

In the end, user testing was performed. This involved the potential users of the system to test the system if it met their requirements.

Software validation was done by the researcher to check whether the software product satisfies or fits the intended use i.e., if the software met the user requirements, not as specification artifacts or as needs of those who would operate the software only; but, as the needs of all the stakeholders (such as blood donors, blood recipients, users and administrators of the system).

3.6 Ethical Considerations

i. **Confidentiality:** The researcher protected any piece of sensitive information that was provided by respondents to protect it from unauthorized access, disclosure or tampering.

ii. **Respect for intellectual property**: During the course of this research project, the researcher endeavored never to copy, or plagiarize other people's work but instead

considered text citation and referencing in a bid to acknowledge the source of the information, that is, statistics, tables, expressions and phrases.

iii. **Honesty:** The data results, methods, procedures and publication status were reported honestly by the researcher. The researcher did not falsify or fabricate data and neither did she deceive the public nor colleagues on the data collected and the reasons for collecting data.

CHAPTER FOUR

FIELD STUDY AND SYSTEM DESIGN

4.0 INTRODUCTION.

This chapter presents the results from field study. It highlights the strengths and weakness of the current system. This chapter describes system requirements (user requirements, functional requirements, and non-functional requirements) and the design of the system (system architecture, context diagram, data flow diagram, Use case diagrams entity relationship diagram and the flow chart diagram).

4.1 System Study and Analysis

The study was carried out at Mbale Regional Blood Bank, Mbale. The main purpose of this study was to find out the challenges faced by blood donors and blood recipients during the blood donation process. It involved studying the existing system to identify its strengths and weaknesses. Information for this study was gathered using various fact finding methods including interviews and document review.

4.2 Findings from interview

A total of 5 respondents were interviewed and the responses are presented below;

The opinions of the respondents based on the question; can you describe your experience during the blood donation process?

The respondents especially the blood doors pointed out that in most cases, charts are pinned in public places to inform them about the blood donations and these usually have a place and time and so the donors usually converge in those designated places and donate their blood usually one liter per person.

The opinions of the respondents based on the question; can you describe your experience in accessing blood for transfusions?

Usually, the person in need of blood submits a request to the doctors by filling a form and specifies their blood type and the reason why they need the blood. Thereafter, the form is submitted to the person in charge of the blood bank to check for any available blood compatible

with the recipient's blood type. If the compatible blood is available, the patient is given the blood and if not, the patient is provided with other solutions.

The opinions of the respondents based on the question; what are some of the challenges faced during this blood donation process?

Many of the respondents pointed out the lack of awareness about the blood donation drives especially for the donors, inefficient communication between the donors and recipients and also lack of sufficient blood for the patients among others.

The opinions of the respondents based on the question; do you believe a system that connects blood donors and recipients would be beneficial? Why or why not?

Many respondents were in support of the proposed system and some pointed out that this system would bridge the communication gap between the recipients of the blood and the blood donors. Other respondents pointed out that the proposed system would be beneficial in managing and tracking the records of donors.

The opinions of the respondents based on the question; what features do you think are essential for a new Blood Call up system?

The respondents pointed out various features that included a portal for announcements about the blood drives, another feature was a form that could allow blood recipients locate their blood donors among others.

4.3 Weaknesses of the current system.

There is possibility of errors in record –keeping, there are many possible errors made during recording of both donors and recipients details done during the blood donation drives, transfusion in the hospitals, screening sessions and during testing blood donor candidates.

The long waiting times for donors, the time taken to find the compatible blood donors in order to save the lives of those in need of blood. This results into premature deaths due to delayed service of blood.

The inefficient blood inventory management, the current system has the difficulties in blood inventory management as to know the amount of blood in stock by blood type.

4.4 Functional Requirements.

4.5 Non Functional Requirements.

Nonfunctional requirements are requirements that define how the system performs. These requirements support the functional requirements and determine how the system must perform. The following are the systems nonfunctional requirements;

i. **Performance:**

The system shall handle high volume of concurrent users without any performance degradation and the system shall provide fast response time for all user interactions.

ii. **Security:**

The system shall ensure secure storage and transmission of user data including personal and medical information.

The system shall also implement robust authentication and authorization mechanisms.

iii. **Scalability:**

The system shall accommodate an increasing number of users and data over time.

iv. **Reliability:**

The system shall available 24/7 with minimal downtime. The system shall also include backup and recovery mechanisms to prevent data loss.

v. **Usability:**

The system shall be accessible to users with varying levels of technical expertise and the system shall also have a user friendly interface.

4.6. Minimum Hardware and Software Requirements

4.6.1 Hardware Requirements

The hardware requirements include;

1. A Universal hard disk drive.
2. A hard disk of at least 80GB.
3. Random Access Memory (RAM) not less than 1GB.
4. An uninterruptible power supply (UPS).

4.6.2 Software Requirements

The software specifications required on the computer system include;

1. XAMPP (Version3. 2.4).
2. Windows 7 or higher version.
3. Internet browser such as Google Chrome.
4. The system should have 32/64 bits Operating System.

4.7 System Design

The design follows system development methods. In this study, Rapid Application Development was used.

The design stages included; system architecture, Context Flow Diagram, Data Flow Diagram and System modelling using Use Case Diagrams.

4.7.1 System Architecture

System architecture encompasses the design of the system's components, their relationships and how they interact to achieve system objectives. It gives the high level structure and organization of a complex system.

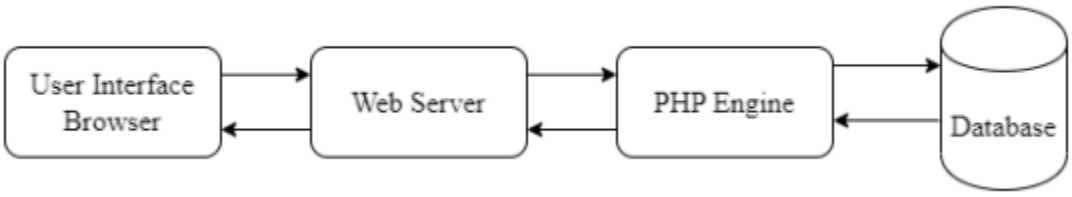


Figure 1 System architecture

The user first interacts with the user interface which enables him/her to place a request to the database. The request is passed to server which processes it and include a command to link the available database, the query is executed by the database through the PHP engine which acts as a tool to transform the request to a format both the database and the server can understand. The results are passed to the user through the same process.

4.7.2 Context Diagram

A context diagram shows the system's interactions with the external entities. It is like a map that outlines the system's boundaries and its key relationships with the outside world (Webber, 2000).

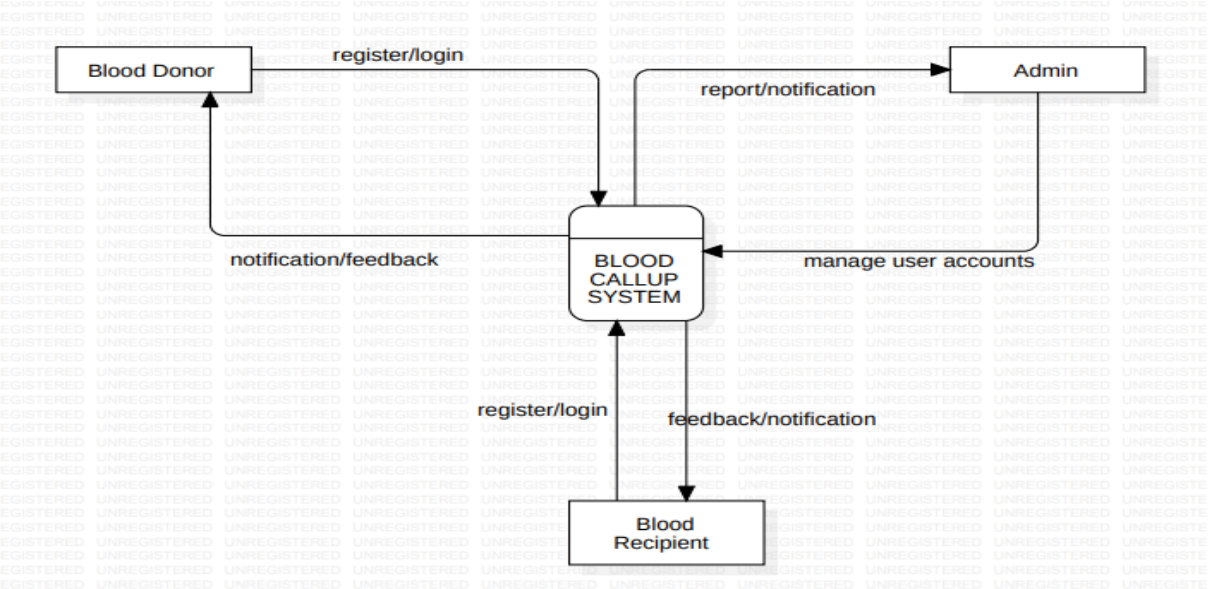


Figure 2 Context diagram

4.7.3 Data Flow Diagram

The data flow diagram is a graphical representation of how data flows within the system or process.

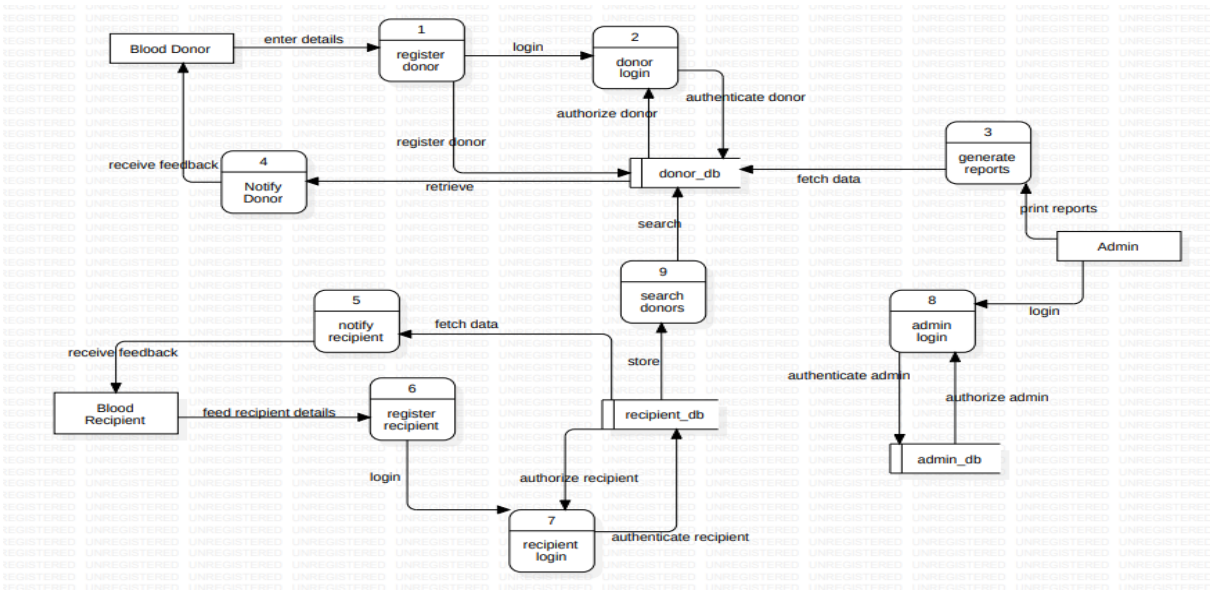


Figure 3 data flow diagram

4.7.4 Use case diagram

A use case diagram is a graphical representation of the interactions of the actors with the system. It shows how different system users interact with the system.

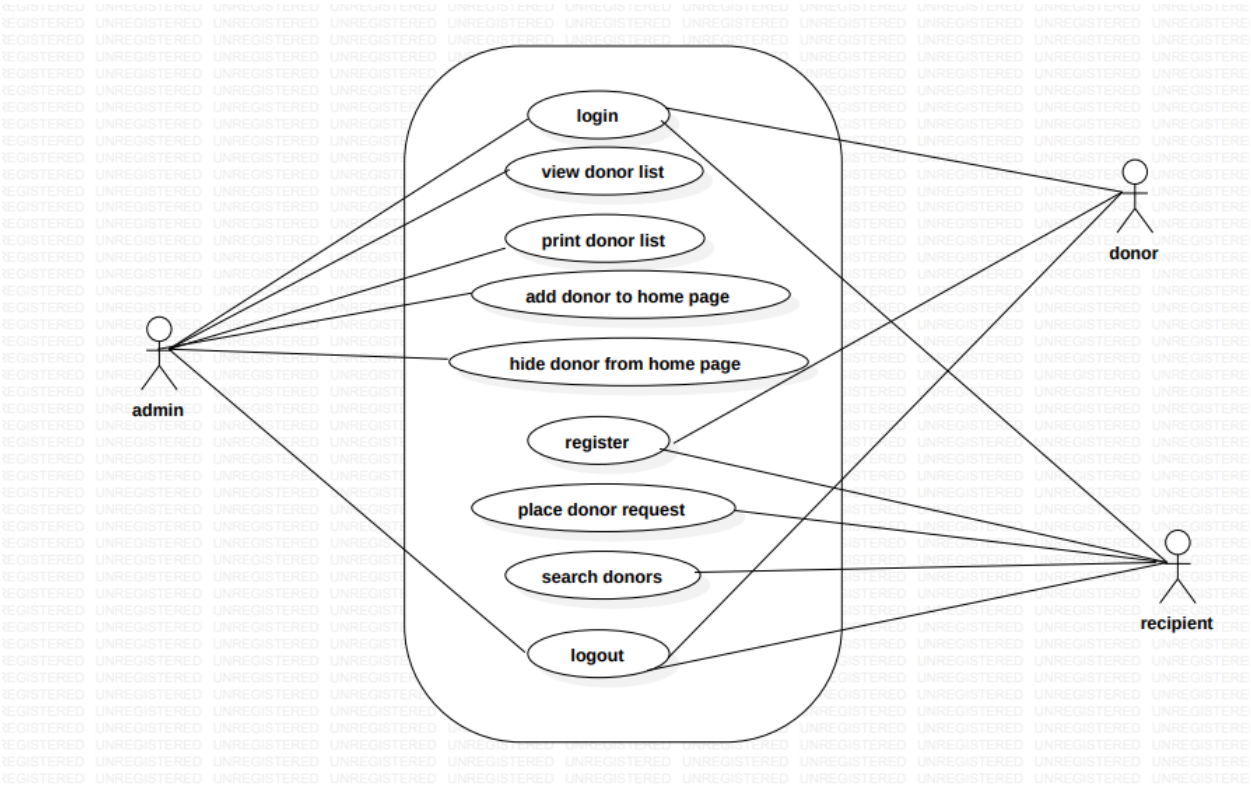


Figure 4 use case diagram

4.7.5 Entity Relationship diagram

An entity relationship diagram shows the different system entities and the relationships between these entities. It is composed of entity types and specific relationships that exist between the entities.

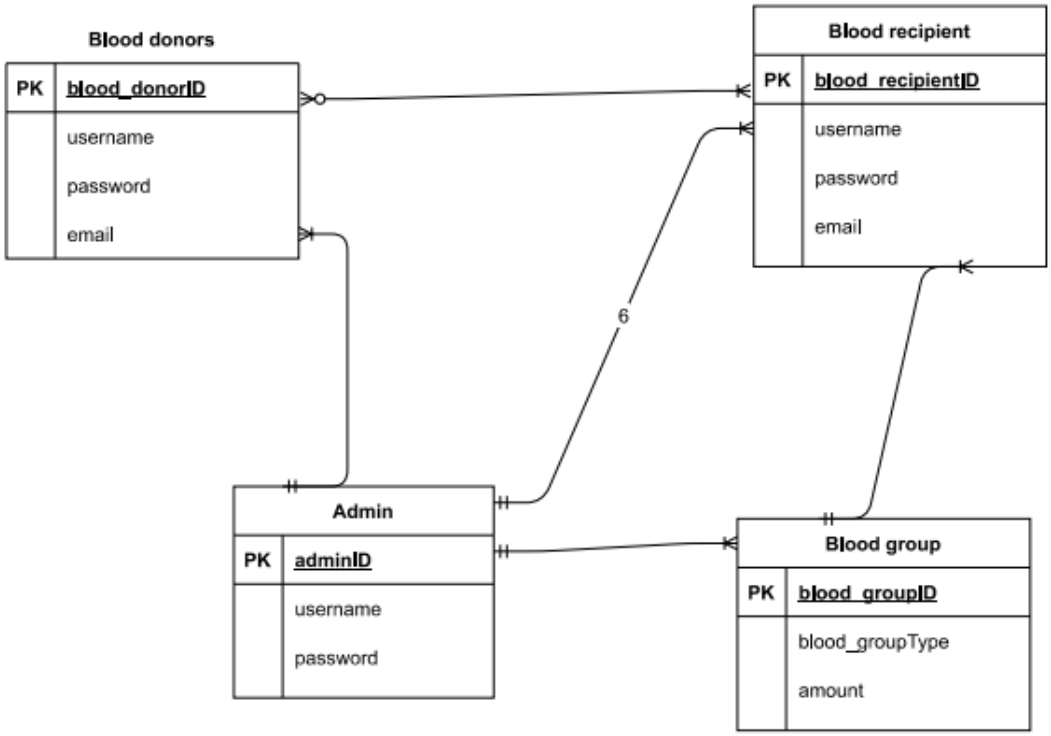


Figure 5 entity relationship diagram

4.7.6 Programming tools for the Blood bank Call up System.

- Visual Studio Code
- MySQL
- XAMPP
- HTML
- PHP

CHAPTER FIVE

IMPLEMENTATION AND TESTING

5.1 INTRODUCTION

This area focused on fulfilling the requirements i.e. functional requirements and no functional requirements into a working system. This chapter further presents the implementation of the design presented in chapter four.

5.2 Login Page

The admin, blood donor and the blood recipient all had the same login page as shown below.

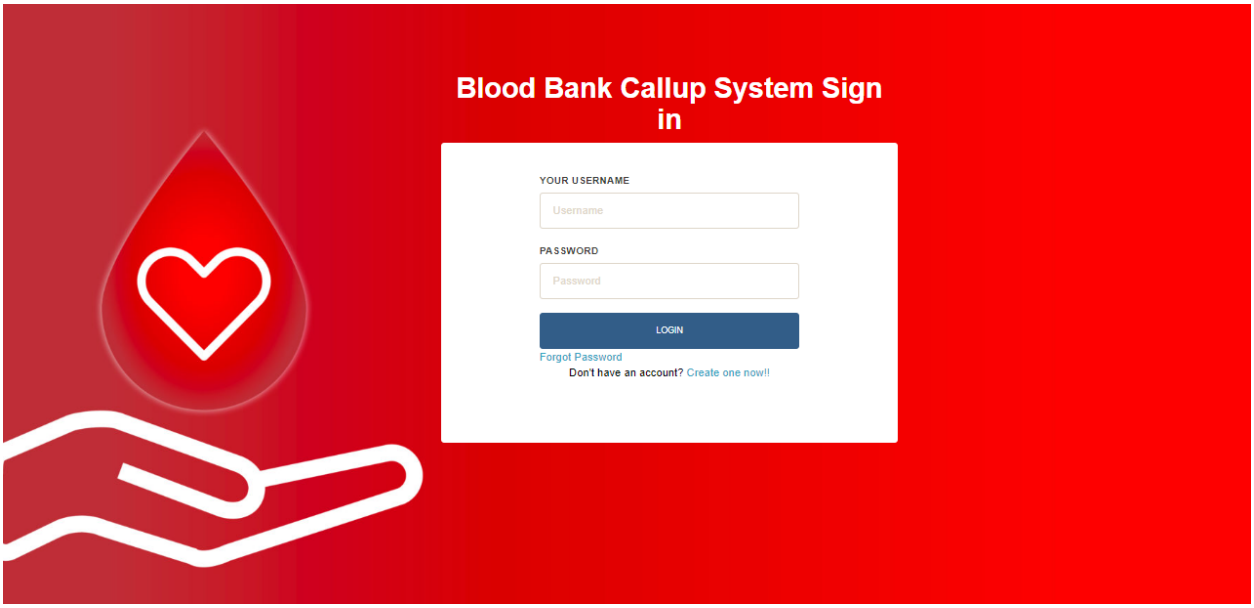


Figure 6 login page

5.3 Admin Functionalities

Admin Dashboard.

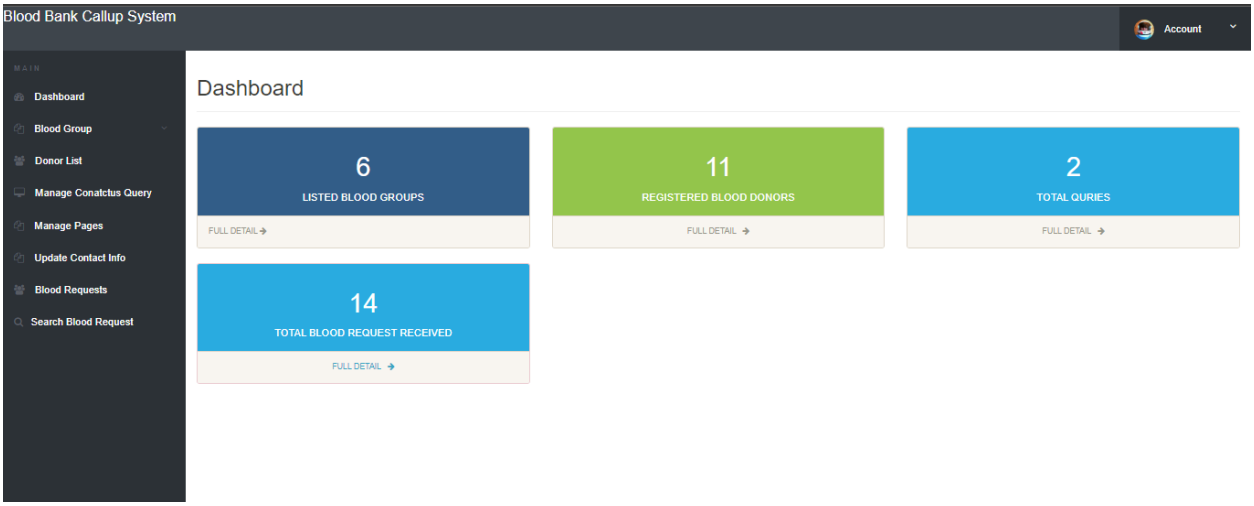


Figure 7 admin dashboard

Admin: Manage Blood Groups

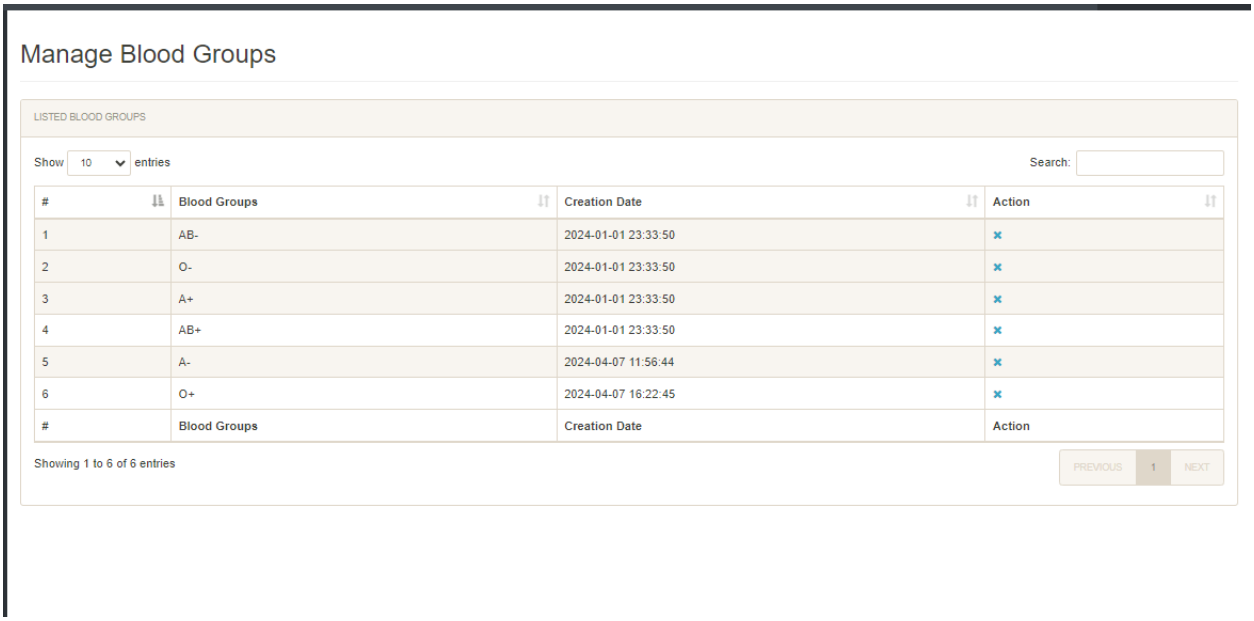


Figure 8 blood groups

Admin: View donor list

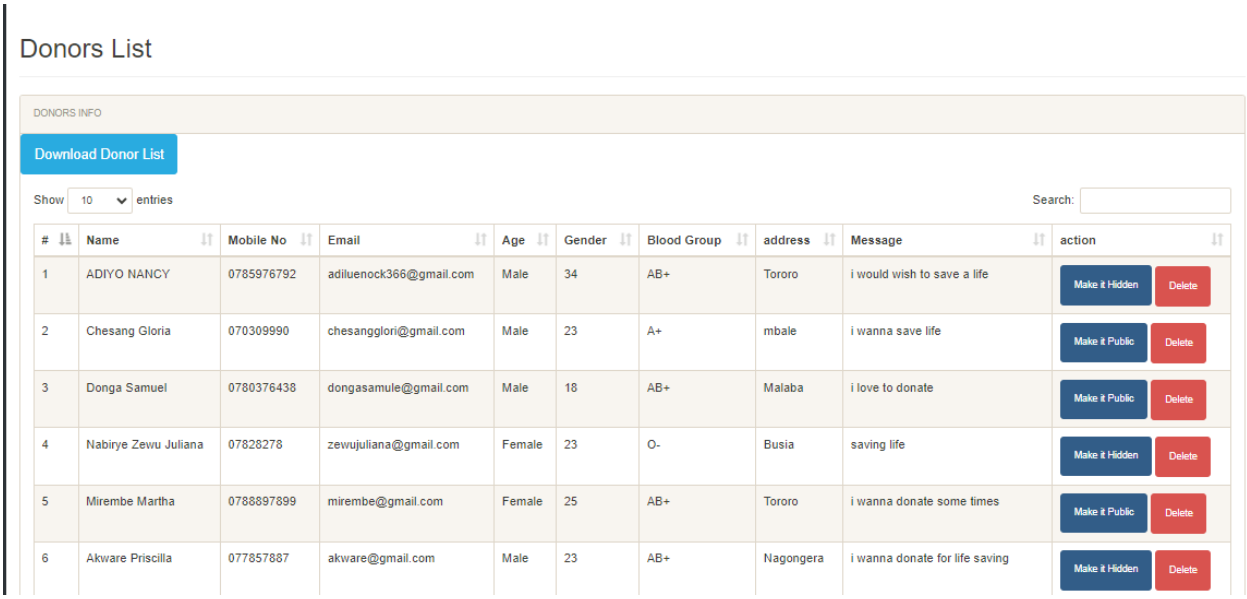


Figure 9 donor list

Admin: View user queries

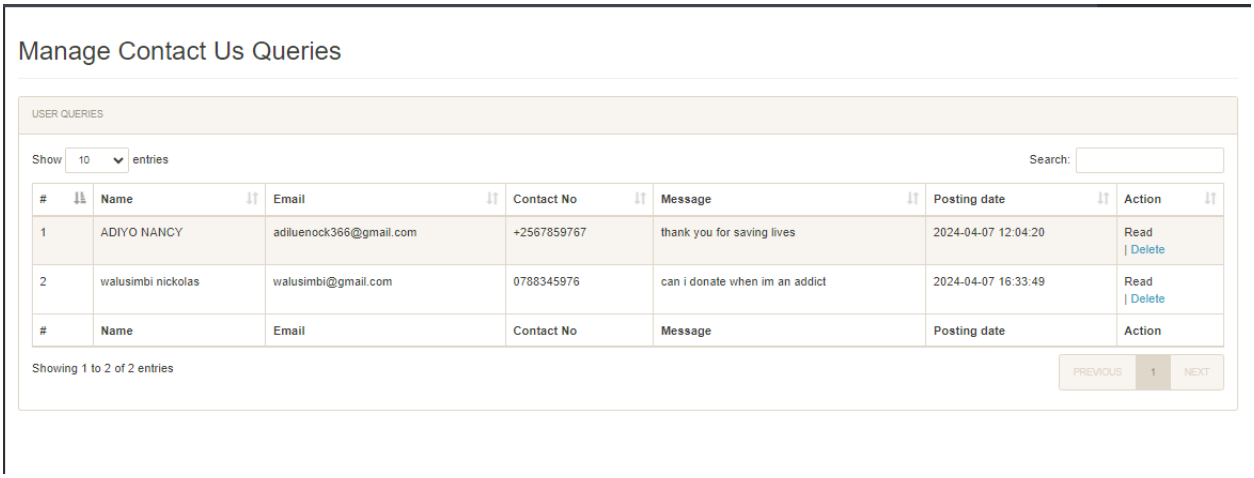
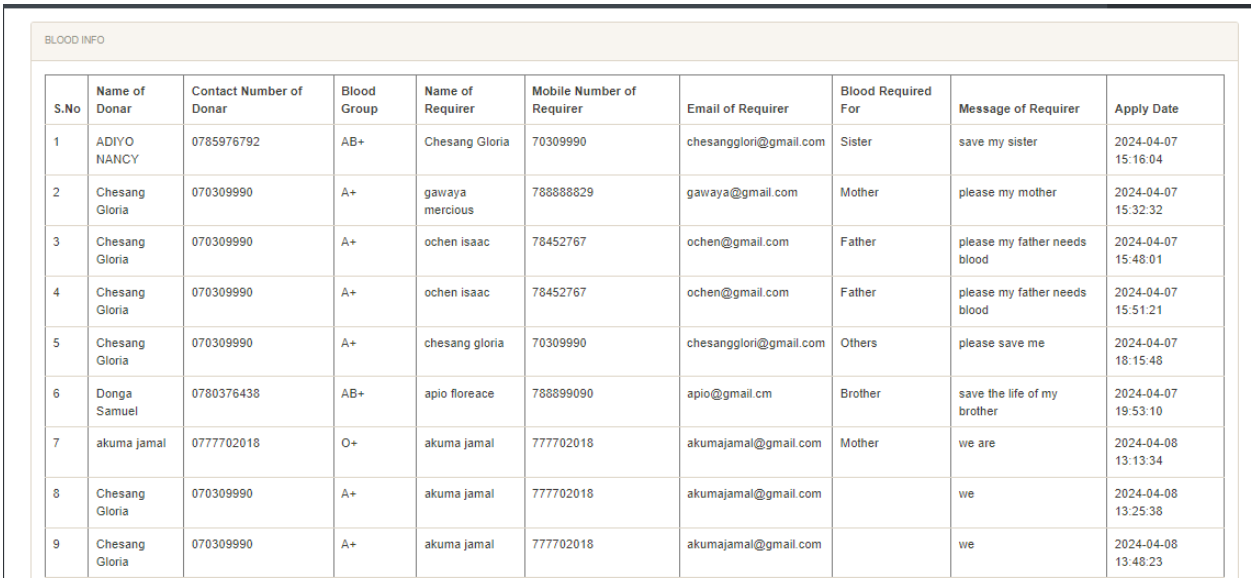


Figure 10 user queries

Admin: View Blood requests information



BLOOD INFO

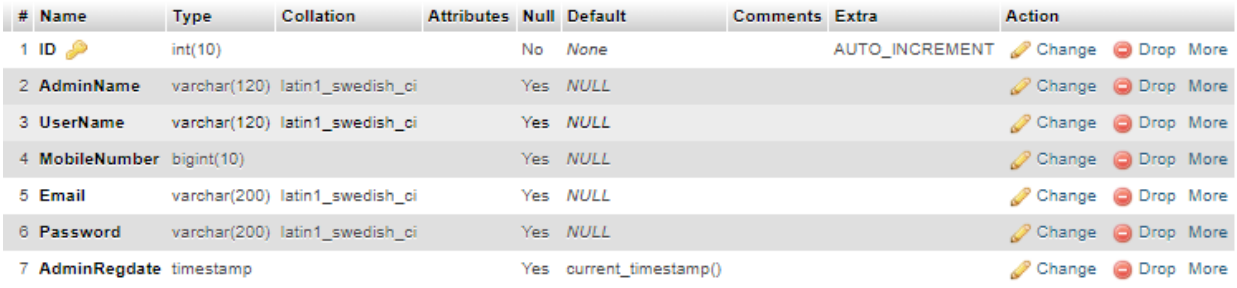
S.No	Name of Donar	Contact Number of Donar	Blood Group	Name of Requirer	Mobile Number of Requirer	Email of Requirer	Blood Required For	Message of Requirer	Apply Date
1	ADIYO NANCY	0785976792	AB+	Chesang Gloria	70309990	chesangglori@gmail.com	Sister	save my sister	2024-04-07 15:16:04
2	Chesang Gloria	070309990	A+	gawaya mercious	788888829	gawaya@gmail.com	Mother	please my mother	2024-04-07 15:32:32
3	Chesang Gloria	070309990	A+	ochen isaac	78452767	ochen@gmail.com	Father	please my father needs blood	2024-04-07 15:48:01
4	Chesang Gloria	070309990	A+	ochen isaac	78452767	ochen@gmail.com	Father	please my father needs blood	2024-04-07 15:51:21
5	Chesang Gloria	070309990	A+	chesang gloria	70309990	chesangglori@gmail.com	Others	please save me	2024-04-07 18:15:48
6	Donga Samuel	0780376438	AB+	apio floreace	788899090	apio@gmail.cm	Brother	save the life of my brother	2024-04-07 19:53:10
7	akuma jamal	0777702018	O+	akuma jamal	777702018	akumajamal@gmail.com	Mother	we are	2024-04-08 13:13:34
8	Chesang Gloria	070309990	A+	akuma jamal	777702018	akumajamal@gmail.com		we	2024-04-08 13:25:38
9	Chesang Gloria	070309990	A+	akuma jamal	777702018	akumajamal@gmail.com		we	2024-04-08 13:48:23

Figure 11 blood requests information

5.4 Data Storage

The system stored the information sent by the admin, blood donors and blood recipients, as well as the information of blood groups and contact us queries into a relational database. Some of the tables include;

Admin table



#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	ID	int(10)			No	*None*		AUTO_INCREMENT	Change Drop More
2	AdminName	varchar(120)	latin1_swedish_ci		Yes	*NULL*			Change Drop More
3	UserName	varchar(120)	latin1_swedish_ci		Yes	*NULL*			Change Drop More
4	MobileNumber	bigint(10)			Yes	*NULL*			Change Drop More
5	Email	varchar(200)	latin1_swedish_ci		Yes	*NULL*			Change Drop More
6	Password	varchar(200)	latin1_swedish_ci		Yes	*NULL*			Change Drop More
7	AdminRegdate	timestamp			Yes	current_timestamp()			Change Drop More

Figure 12 admin table

Blood donors table

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	id	int(11)			No	None		AUTO_INCREMENT	Change Drop More
2	FullName	varchar(100)	latin1_swedish_ci		Yes	NULL			Change Drop More
3	MobileNumber	char(11)	latin1_swedish_ci		Yes	NULL			Change Drop More
4	EmailId	varchar(100)	latin1_swedish_ci		Yes	NULL			Change Drop More
5	Gender	varchar(20)	latin1_swedish_ci		Yes	NULL			Change Drop More
6	Age	int(11)			Yes	NULL			Change Drop More
7	BloodGroup	varchar(20)	latin1_swedish_ci		Yes	NULL			Change Drop More
8	Address	varchar(255)	latin1_swedish_ci		Yes	NULL			Change Drop More
9	Message	mediumtext	latin1_swedish_ci		Yes	NULL			Change Drop More
10	PostingDate	timestamp			No	current_timestamp()			Change Drop More
11	status	int(1)			Yes	NULL			Change Drop More
12	Password	varchar(250)	latin1_swedish_ci		Yes	NULL			Change Drop More

Figure 13 blood donors table

Blood group table

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	id	int(11)			No	None		AUTO_INCREMENT	Change Drop More
2	BloodGroup	varchar(20)	latin1_swedish_ci		Yes	NULL			Change Drop More
3	PostingDate	timestamp			No	current_timestamp()			Change Drop More

Figure 14 blood group table

Blood recipient table

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	ID	int(10)			No	None		AUTO_INCREMENT	Change Drop More
2	BloodDonarID	int(10)			Yes	NULL			Change Drop More
3	name	varchar(250)	latin1_swedish_ci		Yes	NULL			Change Drop More
4	EmailId	varchar(250)	latin1_swedish_ci		Yes	NULL			Change Drop More
5	ContactNumber	bigint(10)			Yes	NULL			Change Drop More
6	BloodRequirefor	varchar(250)	latin1_swedish_ci		Yes	NULL			Change Drop More
7	Message	mediumtext	latin1_swedish_ci		Yes	NULL			Change Drop More
8	ApplyDate	timestamp			Yes	current_timestamp()			Change Drop More

Figure 15 blood recipients table

Contact us queries table

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	id	int(11)			No	None		AUTO_INCREMENT	Change Drop More
2	name	varchar(100)	latin1_swedish_ci		Yes	NULL			Change Drop More
3	EmailId	varchar(120)	latin1_swedish_ci		Yes	NULL			Change Drop More
4	ContactNumber	char(11)	latin1_swedish_ci		Yes	NULL			Change Drop More
5	Message	longtext	latin1_swedish_ci		Yes	NULL			Change Drop More
6	PostingDate	timestamp			No	current_timestamp()			Change Drop More
7	status	int(11)			Yes	NULL			Change Drop More

Figure 16 contact us queries

5.5 System Testing

Testing is the process of executing the program in order to identify errors. Testing was done after completion of the system and it was done in two different ways including unit testing and integration testing.

The entire system was tested using codes, class modules and modules. This ensured accuracy and efficiency of the system before it was given to the users.

CHAPTER SIX

DISCUSSION, CONCLUSION AND RECOMMENDATION

6.0 INTRODUCTION

In this chapter, we discuss the findings for developing a Blood Call up system in relation to the set objectives and methodology. The important findings from the study are highlighted below including conclusions and recommendations.

6.1 DISCUSSION

The discussion of this chapter is based on the theme of objectives stated in chapter one.

Objective (1): To review the literature and determine the requirements of Blood Bank Call up System

The requirements of the study were got from two sources. These include; Library research and field research. Library research was conducted on the previously done project about a similar topic. This guided me on alignment of my project work. The library research generated requirements that were used in the design of the DFD, database design and a few others which led to the fulfillment of the functional and non- functional requirements. The field research helped me to get to know how the existing system works, the respondents' views and perception towards the Blood Call up system which also generated the requirements that were used for designing the interfaces.

Objective (2): To analyze the requirements and design the Blood Bank Call up System

The system was designed depending on the requirements followed by the RAD from SSADM. The design stage included architecture, context diagram, data flow diagram, use case diagram and database design, which enabled the smooth flow of data.

Objective (3): To implement the Blood Bank Call up System

System implementation was done using the implementation tools which included; VS code ditor, Google chrome, MySQL, HTML, XAMPP server and windows to fulfill the implementation where I came up with interfaces as illustrated in chapter 5.

Objective (4): To test and validate the Blood Bank Call up System.

The system was tested during and after implementation. Each component was tested (Unit testing) and the whole system was also tested (system testing).

Unit testing was done to test individual system modules where every part of the interface was tested to check whether it works properly. This was essential during the identification of errors in specific units of the code thereby easing the debugging task.

Integration testing was done after all the individual modules had been put together to make a complete system. Integration testing was aimed at ensuring that all modules of the system worked hand in hand and that they could be integrated to form a complete working system.

6.2 CONCLUSION

The Blood Call up system should be deployed for use since most of the users agreed that the system performs its functions that suit their needs especially when it came to addressing the challenges of the existing system that have been discussed in the previous chapters. This implies that the Blood Call up system is deemed fit for adoption in Mbale Regional blood bank.

6.3 RECOMMENDATIONS

I recommend that my Blood Call up system should be adopted by the different regional blood banks so as to improve the effectiveness and availability of blood within the different blood banks.

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APPENDINCES

Appendix 1: Interview Guide

1. Can you describe your experience during the blood donation process?
2. Can you describe your experience in accessing blood for transfusions?
3. What are some of the challenges faced during this blood donation process?
4. Do you believe a system that connects blood donors and recipients would be beneficial? Why or why not?
5. What features do you think are essential for a new Blood Call up system?