Type of Article: Original Paper

Title:
DEVELOPMENT OF BLOOD BANK MANAGEMENT SYSTEM: BLOODCARE

Running Title:
Development of BloodCare

Abstract

Blood transfusion safety is a relevant and significant public health issue in the country. Since most blood banks are still operating on a paper-based system in Nigeria, various disadvantages are experienced by various stakeholders, which endanger the lives of patients and determine the healthcare system. This paper presents a web-based blood management system codenamed Bloodcare which allows hospitals in Nigeria to make inventories of their blood donation and retrieval online, subsequently, allowing the hospital to check the availability of blood bags anytime. The system was designed using PHP and CSS for a friendly user interface and MySQL for the backend. The system software development life cycle (SDLC) followed the waterfall model which is easy to use.

Keywords - Bloodcare, Management system, User Interface, SDLC, Waterfall Model.

INTRODUCTION

Blood transfusion safety remains an important public health concern in Nigeria. Furthermore, lack of proper record keeping of these blood products impacts negatively the morbidity and mortality in the country. By deploying a web-based blood bank management system, blood transfusion safety will be improved. Also, processes involving blood bag collection, storage, and inventory will be systematized and organized, hence, improving healthcare management (Kulshreshtha and Maheshwari, 2012)(Nzoka and Anande, 2014).

In a study by Sulaiman et al., the study designed and developed a web-based blood bank management system (BBMS) specifically designed for use in Sultanah Nur Zahirah Hospital (HSNZ) in Malaysia (Sulaiman et al., 2013). The methodology used for the development of the system is the Rational Unified Process (RUP). However, the programming tools used for the software are not stated in the study. A blood bank management information system using the Kenya National Blood Transfusion Services as case study was presented. The system was implemented in MySQL database server with capacity to create new blood banks, update blood bank, record donations, request blood and approve blood request (Nzoka and Anande, 2014).

In addition, a novel method for online blood bank management was presented (Selvamani and Kumar, 2015). This technique involves creating a capability for direct contact between the donor and the recipient, which eliminates the need of visiting the blood bank and improves the access time. This was accomplished by creating a database which contained data collected from various blood banks and hospitals (Selvamani and Kumar, 2015).

A blood bank information system based on cloud computing carried out in Indonesia was studied to propose a system of connection that involves the personal donors to help blood supply availability (Sahid Ramadhan et al., 2019). In a paper by Li et. al., the authors sought to explore the mechanisms of decision making supports in blood bank information systems (Li et al., 2008).

In a report by Wadzir, the author developed a web-based system using the rule-based decisions to ensure to have the right decision on right time (Wadzir, 2017). Also, the system can send messages to donors if any particular blood type is needed. They developed a blood bank system based on the incremental model. As such, by developing and implementing a web-based blood management information system, there was quick and timely access to donor records, and the system provided management timely, confidential and secured medical reports. There were three (3) users in the system, namely: Administrator, Donor, and Acceptor. Each user has been given a user ID and password to identify their identity (Wadzir, 2017).

The aim of this paper is to design and implement a web-based blood bank management system adaptable to Nigerian hospitals and blood banks.

MATERIALS AND METHOD

The blood bank management system, Bloodcare is a web-based blood bank and donor management system that contributes to the management of donor records and blood bank. This system allows for an online management or automation of the blood bank.

System Design

System design is a problem-solving technique that entails the decomposition of the studied system into its parts with the view of studying the various functionalities and how those parts interact to accomplish the system's purpose. The system design as shown in figure 1 below shows the relationship between the users and the management system.
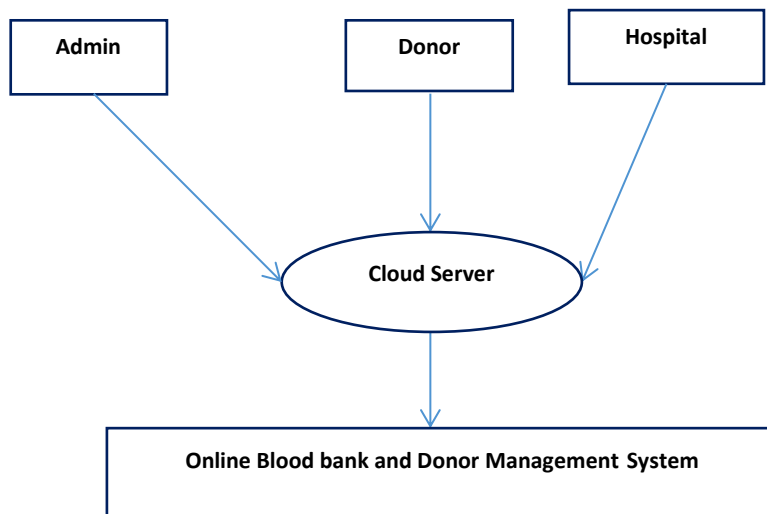
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   ┌─────────┐      ┌─────────┐      ┌──────────┐
   │  Admin  │      │  Donor  │      │ Hospital │
   └─────────┘      └─────────┘      └──────────┘
              \          │          /
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                ╭─────────────────╮
                │   Cloud Server   │
                ╰─────────────────╯
                        │
                        ▼
   ┌──────────────────────────────────────────────────┐
   │ Online Blood bank and Donor Management System     │
   └──────────────────────────────────────────────────┘
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Figure 1: The System Design Diagram

System Implementation

The Waterfall design model has been selected as the software development life cycle model for the development of the blood bank management system called Bloodcare. The Waterfall design model phases are presented in figure 2 below. By utilizing this model or methodology, changes and alterations in software requirements can be effected in the next iteration of the certain step. This is done until the software requirements have been met and properly implemented. The steps in the waterfall design model include requirement analysis, system design, implementation, testing, deployment and maintenance phase.
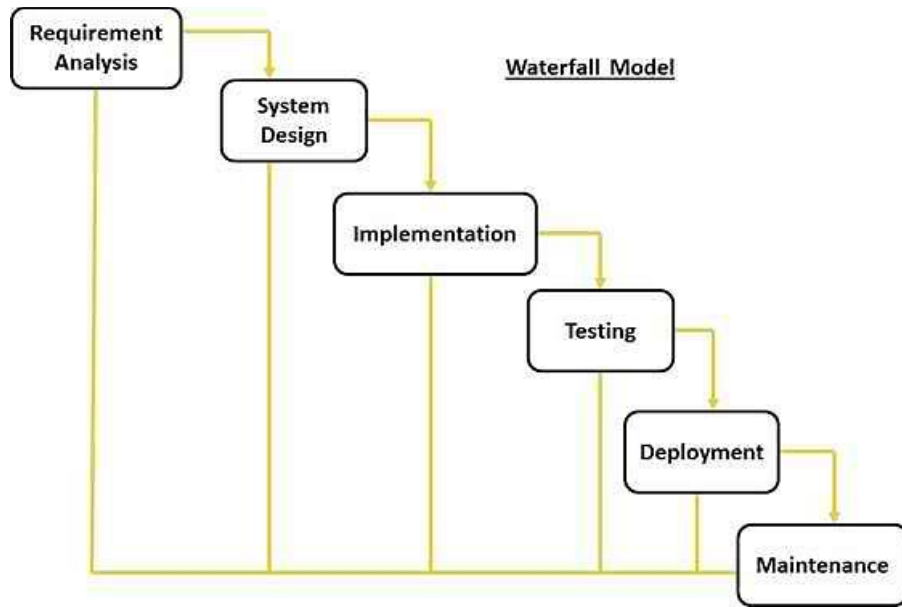
Figure 2: Waterfall Model for Software Development Life Cycle

System Development Tools

The system uses PHP and JavaScript are used for creative Graphical User Interface on the websites to give the best user experience to the user and the administrator by providing good Human-Computer Interaction capabilities. MySQL has been utilised as an open-source SQL database to store data and files which serves as the backend of the system.

RESULTS AND DISCUSSION

In figure 3, this is the landing page for all users. This interface is accessible not only for the registered user of the system but also can be access by the public. Guest users get to this page to login or register as a new user. This page also displays the donors' eligibility requirements and gives details about the process for donating blood.

Figure 3: The Bloodcare Homepage

In figure 4, donors land on this page after they are logged in successfully. The donors are able to view their donation records, view and update their individual records, check for their appointments and make new appointments with the blood bank.
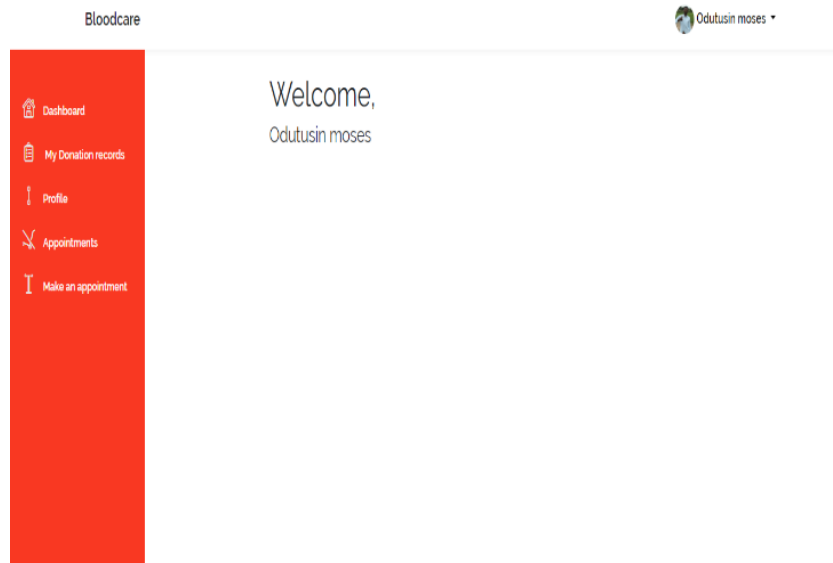

Figure 4: The Bloodcare Donor's Dashboard Interface

In figures 5 and 6, the donation record interface displays all donation records of the specific donor and the donor appointments can be managed from the appointment interface respectively and can cancel any of the appointment if necessary.
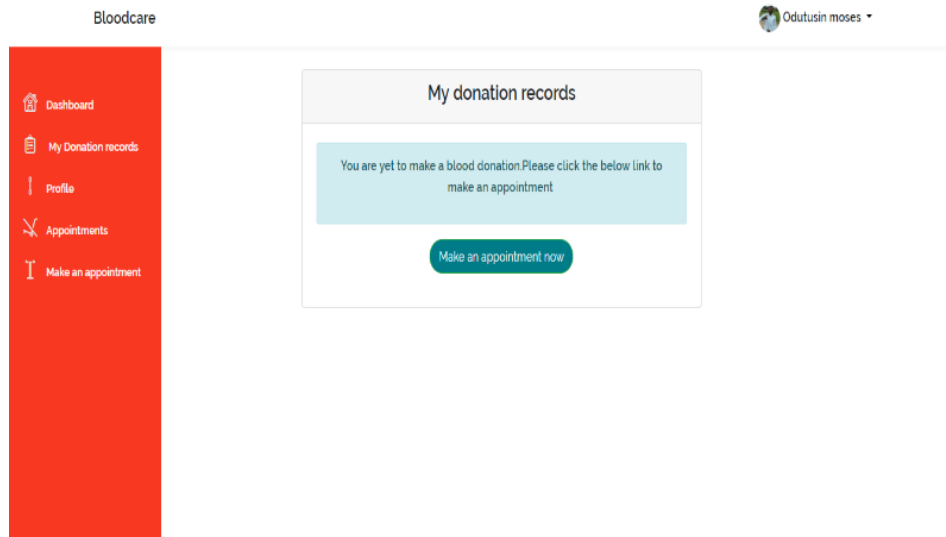

Figure 5. The Blood Bank Management System Donation Record Interface
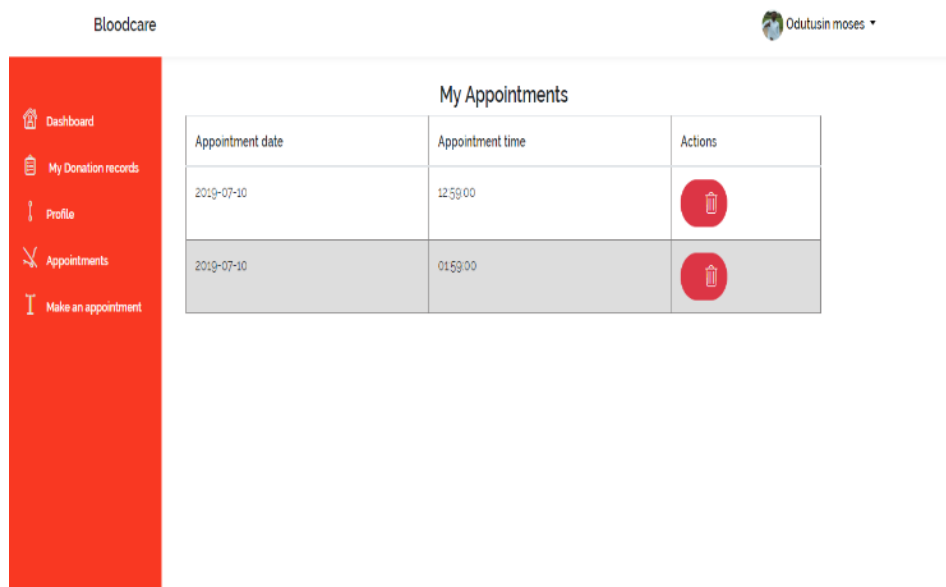

Figure 6. The Bloodcare Appointment Interface

Figure 7 present the blood stock record. The admin can view, update and perform other operations on donated blood and their vital record by every donor.
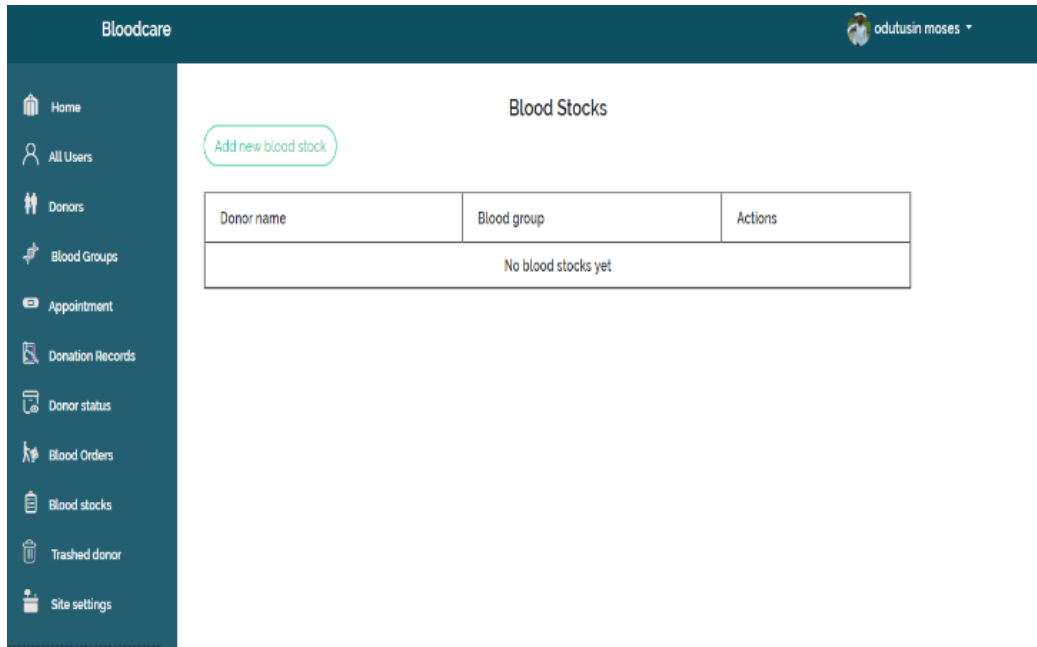
Figure 7. The Blodcare Blood Stock's Page

CONCLUSION

Bloodcare is a blood bank management system that is developed to manage blood bank in Nigerian hospitals across the nation. Bloodcare had been developed in accordance to user requirements. This blood bank management system has been able to effectively and efficiently manage and administer the processes involved in running a blood bank from the donation of blood, to proper cataloguing of donated bloods according to blood groups and genotypes, to disbursing blood as at when needed.

5.   REFERENCES

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