BLOODEX: A COMPREHENSIVE BLOOD BANK MANAGEMENT SYSTEM FOR
PHILIPPINE RED CROSS - MUNTINLUPA CHAPTER

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INTRODUCTION

The study focused on streamlining and modernizing the information side of blood bank operations through the development of a progressive web application. The study was conducted exclusively within the blood bank operations of the Red Cross Muntinlupa Chapter, focusing on blood donation activities, donor management, and blood request and inventory systems. The system is accessible using a Progressive Web App (PWA) with functionalities available to blood bank administrators, donors, requesters, and organizations. The web application was developed using HTML5, JavaScript, Bootstrap, PHP 8.2 for APIs, and MySQL for the backend. The system was evaluated by 40 respondents, including blood bank administrators, requesters, and PRC administrators. The system provides a centralized and automated platform for managing blood inventory, ensuring precise tracking of blood units, expiration dates, and available blood types. It also allows for manual adjustment of inventory levels, predictive analytics, and alerts for low or critical inventory. The proposed BBMS enhances the overall efficiency, safety, and effectiveness of blood bank operations, saves more lives, and meets the increasing demand for blood products. The system was developed by the Philippine Red Cross. It aims to streamline the blood donation process. It also aims to improve user engagement and incentivize donations. The system was designed to address the unique challenges encountered by blood banks. It includes automated inventory management, efficient record-keeping, and enhanced communication with donors and requesters. It was developed to address a need for blood in the Philippines, which faces a critical need for the blood. It is also intended to improve the system's functional suitability and usability.

METHOD

The system's database structure is depicted through an Entity-Relationship Diagram (ERD) The use of a Database Management System (DBMS) to manage the database was needed. These functions encompassed a wide array of tasks essential for the management and maintenance of the blood bank system. This section discusses the procedures followed on how the mobile application was developed based on the design specification.Use Case Diagram of the SystemBLOODEX Web Application 83 The system followed a client-server architecture, where the client was the user's device. The server hosted the backend logic and the database. The Bootstrap framework expedited the development process while maintaining a high level of consistency in the user interface. For the front end of the system, separate HTML files were created for users such as donors, requesters, organizations, and the blood bank administrators. The system successfully supports the entire blood request process and provides clear and efficient steps for completing a blood request. BLOODEX Web Application 96 is an integrated web application that handles user interactions and data seamlessly. The system provides a process for scheduling an appointment, completing necessary screenings, and preparing for the day of the blood drive. It also provides notifications and messages regarding the request and status of the request in real time. The application is available on the iOS and Android versions of the BloodEX mobile app, and is available for download from the Android app store and the iOS app store. The BloodEX app is a free and open-source app. The system was tested through functional suitability and usability testing in accordance with the criteria of ISO 25010. The frontend of the system was designed using HTML for structuring content and CSS for styling. On the backend, PHPBLOODEX Web Application could process HTTP and HTTPS requests, interacting with a MySQL database to manage andretrieve data securely. The admin views donor andrequester profiles, including the date and the number of units collected. The BloodDriveActivities table logged information about the drives organized by facilitators. The BLOODEX Web Application (PWA) was developed using HTML, CSS, and JavaScript for interactive elements using Visual Studio Code. It was designed to handle user

registration, authentication, profile management, blood donation, contact form submissions, and other functions. The PWA was tested across   various devices and browsers to ensure compatibility. The local development environment XAMPP was set up to run the Apache web server, Apache, and PHP on the developers' devices. The database connection was configured in the project's code. BLOODEX Web Application was designed to be a Progressive Web App (PWA) mobile. It was developed using a combination of PHP and HTML and CSS. The frontend interacted with the backend through API (Application Programming) endpoints. The system was able to handle increased user load without significant performance issues. It also had a simple registration form and a dashboard displaying donation history. It included a straightforward interface for requesting and requesting blood and requesting a blood badge. The application was tested in the local development environment to assess backend functionality. The system verifies compliance with PRC guidelines and schedules the event accordingly. It tracks all the blood drives that encourage more people to donate and collect blood. The frontend, developed using HTML, CSS, Bootstrap CSS, andJavaScript, ensures a responsive and visually appealing user interface. The application can function offline and provides a native, browser-like experience through the browser. The Service Worker determines whether to fetch resources from the Cache or makeBLOODEX Web Application. The API Gateway acts as a centralized entry point for client requests.

RESULTS

The application was specifically developed for the Philippine Red Cross Muntinlupa. It is designed to cater to blood donation and request services within the Metro area only. The system can provide key performance indicators and analytics to help with inventory alerts. Push notifications were not implemented in the development of the application. Users found the application generally satisfactory, but there were areas of improvement. The mobile application received its lowest rating in the "Usability" criterion, with a weighted mean of 3.53, yet it is still deemed "Highly Acceptable" The blood donation app is integrated with the Google Maps API. The app is described as "Highly Acceptable" by the PRC. The system verified compliance with PRC guidelines and scheduled the event accordingly. The PRC admin was able to track all the current and upcoming blood drive events set by organizations. The web application garnered its highest rating in the "Maintainability" category, attaining a weighted mean of 3.99, described as 'Highly acceptable' The application was developed using Vanilla PHP integrated with the JavaScript language. The landing page, as shown in Figures 16 to 17, provides information about the system, including details about the blood fiercelybank and its members. Visitors can view and access various content, such as the blood donation process, user feedback, inquiry submissions, and the top donors of the month. On the dashboard (refer to Figure 26), administrators can monitor the current inventory of blood. The blood bank admin has the ability to edit the information and update changes from the database. The study developed a Progressive Web Application (PWA) to serve as a comprehensive blood bank management system. The app streamlines the information management of blood donations, requests, and inventory handling for the Philippine Red Cross - Muntinlupa Chapter. The test results for functional suitability and performance efficiency of the developed application are presented in the following tables. The project description, project structure, project capabilities, and viewpoints of evaluation of the project are also included in this chapter. The study developed the BLOODEX app for the Red Cross in the Philippines. The BLOODEX app was designed for easy accessibility through any web browser. It was designed to cater to both blood donors and blood requesters.

Notifications and messages were accessible both on the web app and through SMS notifications. The system verified compliance with PRC guidelines and schedules events accordingly. The app was also able to track all the blood drives that has encouraged more people to donate, which resulted in more blood supplies. It can also easily export these tables by downloading them as PDFs or print them out. BLOODEX Web Application 123 includes a profile picture, the user's full name (including middle name), date, gender, blood type, address, occupation, and ID. The application also includes APIs for SMS and email notifications, ensuring seamless and real-time communication with users. There is a monthly automated download of the database available within the system. The system does not automate ID verification. The screening form contains questions from the Philippine Red Cross (refer to Figure 36). Accessed the blood request.

DISCUSSION

The blood bank management system can be used to promote blood donation, ensuring timely and accurate blood supply to recipients, and contributing to the improvement and preservation of lives. The system's comprehensive features and user-friendly interface render it an invaluable tool in the blood donation process. The researchers recommend the following for future continuation of this study:Integration with Google or Facebook Accounts for Enhanced Accessibility. Push notifications in the mobile app would significantly improve user communication and engagement. A native Android application would address the limitations of a native iOS application. BLOODEX was developed as a Progressive Web App (PWA) using PWA Builder. The web application was effectively constructed utilizing HTML5, CSS3, JavaScript, and the Bootstrap CSS Framework. BLOODEX provides seamless access to available blood stocks, facilitates communication with blood banks, and offers real-time updates on the status of blood requests. The system significantly enhances efficiency and efficacy, contributing to timely access to safe blood transfusions and ultimately saving more lives. The straightforward registration process eliminates manual data.