

FUSA Bloodbank Management System v2.0
- A Digital Solution for Blood Donor Management

A Case Study Presented to Mr. Kim S. Tarayao, Faculty of the Information
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In partial fulfillment of CC 106 - Application Development & Emerging
Technologies requirements, focusing on IT-driven solutions.

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Introduction

Background of the Case

Blood donation plays a crucial role in saving lives during medical emergencies. However, many healthcare institutions still rely on manual processes such as paper records or non-specialized software (*e.g., spreadsheets*) to manage blood donor information. These outdated methods lead to inefficiencies, including inaccurate data records, delays in matching donors to patients, and high error rates in data management.

The FUSA Bloodbank Management System 2.0 was developed as a .NET Desktop Application using C# and SQL Server to address these challenges. The system focuses on blood donor data management, ensures accurate and real-time record keeping, and enhances the efficiency of healthcare institutions.

Objective of the Study

To develop a secure, reliable, and efficient blood donor management system that improves data accuracy, donor tracking, and response time during emergencies. The specific objectives are:

1. It has a basic secure authentication for authorized personnel.
2. Implement real-time data access & management to enhance operational efficiency.
3. Enable quick donor categorization by blood type for faster matching.
4. Improve data accuracy and reduce manual errors in blood donor records.
5. Support future scalability and feature enhancement such as automated notification and online access.

Statement of the Problem

Current Issues - Healthcare institutions face the following issues in managing blood donor data, and these are:

- Manual and outdated systems lead to inefficient and high error rates.
- Delays in matching donors to patients during emergencies.
- Lack of a centralized and secure database for donor records and
- Limited access to real-time updates, causing delays in decision-making.

Need for IT-driven Solutions - Key technological advancements that can enhance the system, and are:

- Automation of donor data management to eliminate manual errors.
- Real-time database updates for faster decision-making.
- Secure authentication mechanism to protect sensitive donor information and
- Data analytics to optimize blood donor matching and availability tracking.

Emerging Technologies in Blood Donor Management

To enhance the FUSA Bloodbank Management System 2.0, various emerging technologies can be integrated upon studying, these are:

- Machine Learning - Artificial Intelligence (AI) powered analytics for predicting donor availability and optimizing blood inventory.
- Cloud computing - The future version can transition to cloud-based storage for remote access and scalability.
- Blockchain Technology - A secure decentralized system that can improve data integrity and prevent tampering with donor records.
- Internet of Things (IoT) - Smart devices can track blood storage conditions and alert staff when blood supply is running low.

Proposed IT Solution

The FUSA Bloodbank Bank Management System v2.0 is a .NET Desktop Application developed using C# and SQL Server. It provides a centralized, secure, and efficient platform for blood donor management, reducing reliance on paper-based systems. ***Key features are:***

- Secure User Authentication - Ensure only authorized users can access donor records.
- Donor Data Management (CRUD Operations) - Users can Create, Read, Update, and Delete donor information.
- Donor categorization by Blood Type - allows quick identification of available donors.
- Real-time Updates - ensures instant synchronization of donor records.
- Data Security Measures - protects sensitive donor information from unauthorized access.
- Scalability for Future Enhancements - designed for future feature expansion, such as cloud integration and donor tracking.

Integration of Technologies

- C# & SQL Server - Provides a stable and secure back end for managing donor data.
- Data Encryption - Enhances security and privacy of sensitive information.
- Automated Data Validation - Reduces errors and improves accuracy in donor records.

Ethical & Security Considerations

The system ensures compliance with data privacy regulations in the Philippines by:

- Implementing a secure authentication to prevent unauthorized access.
- Encrypting donor records for confidentiality and data protection.

Cybersecurity Measures like User role-based access control (RBAC) ensure that only authorized personnel can manage donor data. And database encryption techniques to protect sensitive information from data breaches.

Ethical Use of AI & Surveillance

If AI is integrated into future versions, ethical considerations include;

- Ensuring AI does not discriminate against any donor groups and
- Transparent AI decision-making for donor-patient matching.

Implementation Strategy & Feasibility Analysis

Adoption Challenges

- Budget Constraints: Initial investment in infrastructure and licensing fees.
- Training Requirements: Staff may need training to effectively use the system.
- Legal & Policy Consideration: Compliance with healthcare data protection laws.

Stakeholder Involvement

- Healthcare Intuition and Blood Banks: Primary users of the system.
- IT Developers & System Administration: Ensure maintenance and updates.
- Medical Professionals: Provide insights into blood donation and emergency needs.

Future Potential & Scalability

- Integration with cloud services for remote access.
- Expansion to a multi-user environment for larger healthcare facilities.
- AI-powered analytics to predict blood demand and optimize donor matching.

Conclusion & Recommendations

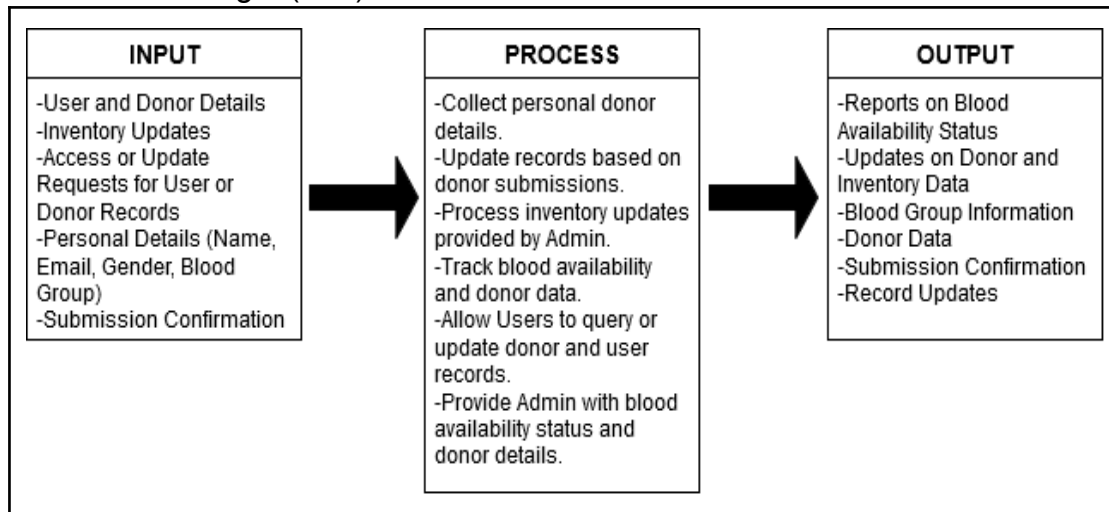
The FUSA Bloodbank Management System v2.0 addresses critical inefficiencies in blood donor management by offering real-time data access, donor categorization, and enhanced security. The system reduces manual errors, improves response time, and lays the foundation for future innovations.

Final Recommendations

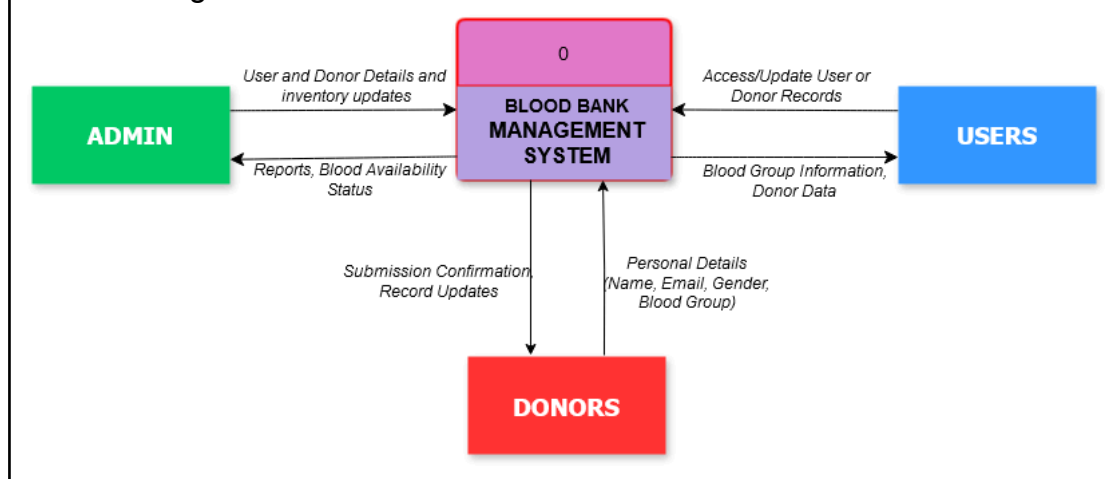
1. Upgrade Security Measures - Implement advanced encryption techniques for data security.
2. Enables Multi-User Access - Expand system capabilities for collaboration use in large hospitals.
3. Integrates cloud-based features - Ensures remote access and real-time synchronization.
4. AI-Powered Donor Matching - Utilize machine learning to enhance donor-recipient compatibility.
5. Automated Alerts & Notifications - Notify hospitals when blood supply is low or a suitable donor is available.

When conducting this study, it was found that by adopting these recommendations, healthcare can maximize efficiency, ensuring faster, more reliable, and error-free blood donor management.

Software Paradigm (IPO)



Context Diagram



Dataflow Diagram

