

FUSA Bloodbank Management System v2.0 - for Humans

C# .NET Desktop Application Integrated with SQL Server

A Final Project Submitted to Mr. Jeremiah C. Laman, Faculty of the
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In partial fulfillment of the requirements for the course SIA 101

- System Integrated and Architecture 1

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Project Background and Problem

In today's healthcare, blood donation is a vital key for helping and saving individuals during medical emergencies. But how do they manage this crucial data to be gathered and properly stored? Still, some healthcare institutions continue to rely on manual processes such as paper records or non-specialized software (*like spreadsheets*) to manage blood donors. These can result often in inefficiencies such as inaccurate data records, delays in matching donors to patients, and even worse, high error rates in data management. This can lead to unreliable and long consumption of time of blood to identify the suitable blood donor that the blood recipient needs, particularly during life-critical situations.

As we develop this Project FUSA Bloodbank Management System v2.0, addresses the problem or we just thought that what if there is a better way, a better way to provide an efficient solution? Let's take a look at this system. This system was developed as a .NET Desktop application using C# language and SQL Server (2022). The system offers basic but essential features like secure user login, donor data management, and functional CRUD (*Create, Read, Update & Delete*) operations. Although some features lack or need to be added/improved, we developers are looking forward to evolving the system in coming versions just like we started our first version. Bloodbank administrators can efficiently track and update donor information, categorize donors by blood type, and ensure real-time data. This application does not eliminate the dependence on paper systems because we cannot pressure healthcare institutions to evolve their existing data management but to answer that there is a better way by a reliable digital platform for storing, retrieving, and managing critical information.

To end this because we are now reaching 300 words as a maximum, the Project FUSA Bloodbank Management System v2.0 believes that empowering healthcare institutions to manage blood donors effectively and ensuring a faster, reliable response and promotes efficiency, accuracy, and accessibility in bloodbank operations that contribute to life-saving situations.

The objective of the Software

In this part, the Project FUSA Bloodbank Management System v2.0 general objective is to provide a reliable, efficient, and user-friendly .NET Desktop application developed using C# and SQL server. The software aims the following;

1. Better way Blood Donor Management - reduce manual and error-prone processes with a secure and digital platform for storing and retrieving.
2. Enhance Operational Efficiency - Save precious time for medical facilities the ability to instantly classify donors based on their blood types, update donor records instantly, and shorten the time it takes to pair eligible donors with receivers in an emergency.
3. Support Core functionalities - The system offers basic but essential features like secure user login, donor data management, and functional CRUD (*Create, Read, Update & Delete*) operations.
4. Promote Scalability and Future Development - Over time, software needs to adapt to what needs of the user and foundation for continuous improvement by allowing additional features to be added in future versions.
5. Improve Response Time during Critical Situations - A faster and more reliable solution for identifying suitable donors, ensuring timely blood transfusions, and goal of supporting life-saving healthcare operations.

For the specific objective of this project, the following are;

Develop a Secure Authentication System	Implement Real-Time Data Access and Management
Efficient Donor Information Management Module	Support Scalability for Future Enhancements
Enable Donor Categorization by Blood Type	Optimize System Performance for Critical Situations
Enhance Data Accuracy and Reduce Errors	Align with the FUSASIS code of conduct

The Scope and Limitations of the Software

The scope of Project FUSA Bloodbank Management System v2.0 is a .NET Desktop application developed using C# and SQL Server are the following;

1. Secure User Authentication - allows only authorized bloodbank administrators and staff to access the system using secure login credentials.
2. Donor Data Management - provides a module to create, read, update, and delete (CRUD) donor information, including personal details and blood type.
3. Donor Categorization - enables the sorting and filtering of donor data based on blood type to facilitate quick identification during critical medical situations.

4. Real-Time Data Updates - ensures real-time access and updates to donor records, improving accuracy and reducing delays in data retrieval.
5. Data Security - implements basic security protocols to protect donor information from unauthorized access.
6. Modular Design for Scalability - the system is designed with the potential for future enhancements in the coming version, such as donor availability tracking, automated notifications, and reporting features.

Since this is an academic project and despite the system's capabilities, limitations are always there and arise from individuals or entities who have realistic expectations or want how the system behaves, features, and operates. We developers eagerly need those comments, suggestions, and even constructive criticism to take as a bridge to enhance and develop the system, robustly. Here are the following limitations as of v2.0;

1. Offline Dependency - operates only as a desktop application and does not support cloud-based access or remote connectivity.
2. Limited Features - advanced features like donor availability tracking, automated reminders, detailed reporting, and integration with external systems are not yet implemented.
3. Single-User Environment - currently supports single-user access at a time, which may limit collaborative use in larger healthcare institutions.
4. No Integration with External/Existing Systems - cannot integrate with other healthcare platforms, such as hospital management systems or external databases.
5. Reliance on Manual Input - data must be entered manually, which may still be prone to errors if not handled properly by the administrators.
6. Limited Data Security - while basic security is in place, the system lacks advanced encryption and cybersecurity measures for sensitive donor data like using pass_hash.

More limitations can arise after submitting this project but we developers keep in mind that we take that as a bridge to enhance and develop in coming versions.

Significance of the Study

The Project FUSA Bloodbank Management System v2.0 is designed to address inefficiencies in blood donor management that are currently faced by healthcare institutions. By replacing manual and error-prone processes with a reliable, efficient, and user-friendly digital platform, the study and system contribute significantly to the following areas:

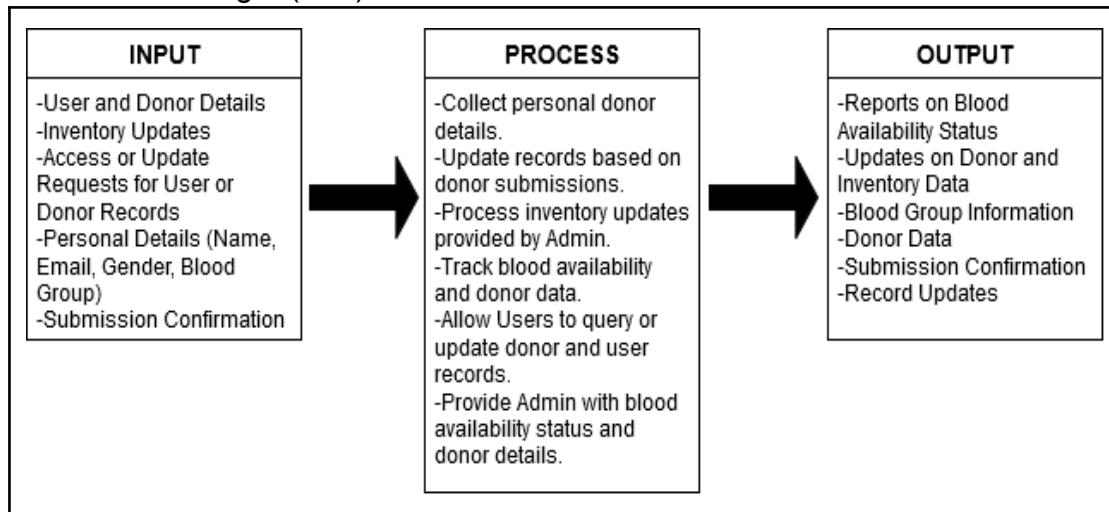
1. Healthcare Institutions - offer an efficient way to manage blood donor data, reducing human error and administrative delays. This is especially critical during life-saving situations where timely and accurate matching of donors to recipients can make a difference.
2. Bloodbank Administrators and Staff - enhance daily operations by providing tools for secure user authentication, real-time data access, and donor categorization. It saves time, enhances accuracy, and reduces the workload associated with manual data handling.
3. Donor and Recipients - ensures that blood donors' information is securely stored and promptly retrieved when needed. For recipients, the faster identification of suitable donors increases the accuracy of timely treatment and positive medical outcomes.
4. Academic Contribution - since this is an academic project, the system demonstrates the application of programming languages like C# and SQL Server to solve real-world problems. It serves as a model for future software development projects and inspires further innovation in healthcare technology.
5. Future Innovations in Bloodbank Management - developers are always focusing on scalability and modular design, it provides a foundation for the integration of advanced features in future versions, such as donor availability tracking, automated notifications, and cloud-based functionality.
6. Societal Impact - contributes to the broader healthcare ecosystem by promoting efficiency, accuracy, and accessibility. It understands the importance of technology in addressing critical healthcare challenges and improving outcomes in emergencies.

Software Framework

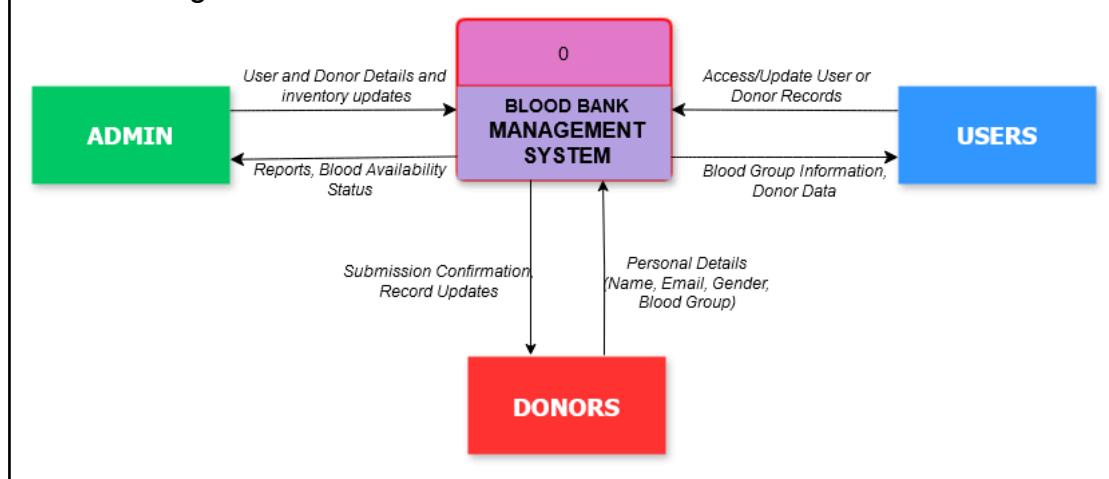
The Project FUSA Bloodbank Management System v2.0 follows a structured approach to ensure the efficient and secure management of blood donor information. This framework is built upon core functionalities such as secure authentication, data management, and real-time updates, providing a reliable digital platform for healthcare institutions.

1. Business Logic Layer (BLL) - it handles the core rules, workflows, and validation of the application. Processes data between the UI and the database.
2. Data Access Layer (DAL) - it manages communication with the database, including querying, inserting, updating, and deleting data.
3. User Interface (UI) - the front-end layer where users interact with the application.

Software Paradigm (IPO)



Context Diagram



Dataflow Diagram

