BLOOD BANK MANAGEMENT SYSTEM

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1. Introduction

The project is a web-based **Blood Bank Management System**. Its main goal is to replace the manual, paper-based methods of recording blood donations with a digital system. Blood transfusion is a critical component of modern healthcare systems and plays a vital role in emergency medicine, surgical procedures, oncology treatments, and maternal care. According to global health reports, millions of blood units are required annually to meet clinical demands; however, many regions continue to face shortages due to inefficient management systems and lack of coordinated infrastructure. In many smaller setups, information about available blood bags and donor details is kept in physical registers or Excel sheets, which makes it hard to find information quickly during an emergency. This research analyzes the requirements and foundational purpose of a robust Blood Bank Management System aimed at enhancing operational efficiency, ensuring data integrity, and supporting timely blood distribution through structured database management principles.

Source Link: https://www.who.int/news-room/fact-sheets/detail/blood-safety-and-availability

2. Requirement Analysis & Research

For a standard web development project, the requirements are broken down into what the software needs to do (Functional) and what tools we need (Non-Functional).

- **Software Requirements (Tech Stack):**
  - **Frontend: React.js**. It is the industry standard for building dynamic user interfaces.
  - **Backend: Node.js** with **Express** or FastAPI as an alternative. This handles the API logic.
  - **Database: MongoDB**. This is a NoSQL database that is very flexible and works well with JavaScript/Node.js for storing donor and inventory data.
- **Functional Requirements (What to build):**
  - We need a way to input donor details (Name, Age, Blood Group).
  - We need a way to track the inventory (How many bags of A+ are in the fridge?).
  - We need a search bar to find blood quickly.
- **System Requirements:**
  - Centralized donor and inventory management
  - Real-time tracking of blood units and expiry date
  - Blood request and approval workflow

Source Link:
https://www.scribd.com/document/517877325/software-requirement-specificationsrs-2-1501210
51830-conversion-gate01

3. Purpose of the System

The primary purpose of the proposed Blood Bank Management System is to establish a centralized, secure, and efficient platform for managing blood donation and distribution processes.

The system aims to achieve the following measurable objectives:

1. **Improve Inventory Accuracy:** Ensure real-time tracking of blood units and reduce expiry-related wastage through automated monitoring mechanisms.
2. **Enhance Donor Management:** Maintain secure and structured donor profiles while tracking donation history and eligibility status.
3. **Optimize Blood Allocation:** Enable faster identification and allocation of compatible blood units during emergencies.
4. **Reduce Human Error:** Minimize manual intervention by automating record management and request workflows.
5. **Strengthen Coordination:** Improve communication between blood banks and hospitals through centralized data access.
6. **Support Data-Driven Decision Making:** Provide administrative reporting tools for monitoring blood demand patterns and stock availability.

Source Link: https://www.who.int/publications/i/item/9789240068636

4. Existing System

Currently, many small blood banks operate using a **Manual System**:

- **Method:** Records are written by hand in logbooks or typed into standalone Excel files.
- **Limitations:**
  - **No Search:** You cannot instantly find "All donors who are A+ and live in City X" without reading every line.
  - **Data Loss:** Paper books can be damaged or lost.
  - **Lack of Access:** If the logbook is in the manager's office, the receptionist cannot answer a patient's query immediately.

Source Link: https://eraktkosh.mohfw.gov.in/BLDAHIMS/bloodbank/about.cnt

5. Target Users

The system is designed for two specific types of users :

1. **The Admin (Hospital Staff/Manager):** This user has full control. They can login, add new donors, delete expired blood bags, and update stock levels. They perform the main CRUD operations.

2. **The Public User (Patient/Donor):** They have "Read-Only" access. They can visit the website to see a table of available blood groups or search for a donor, but they cannot edit the database.

Source Link: https://eraktkosh.mohfw.gov.in/BLDAHIMS/bloodbank/about.cnt

6. Competitor / Similar Systems

It is helpful to look at real-world examples to understand the standard, even if we are building a simpler version.

- **e-RaktKosh (Government of India):** This is a massive, nation-wide system that connects thousands of blood banks. It has complex features like biometric scanning and state-level reporting. *Our project is a lightweight, single-center version of this.*

  Source Link: https://eraktkosh.mohfw.gov.in/eraktkoshPortal/#/

- **Red Cross Blood Donor App:** Focuses heavily on the donor experience, letting them track their blood journey and earn badges. *Our project will focus less on gamification and more on the core inventory management.*

  Source Link: https://www.redcrossblood.org/blood-donor-app.html

7. Features of the Proposed System

The system focuses on essential **CRUD (Create, Read, Update, Delete)** operations to ensure a functional and reliable workflow.

1. Interactive Dashboard

- **Overview:** A clean home page displaying real-time counters.
- **Visuals:** Simple cards showing "Total Donors: 150", "Available Blood Bags: 45", and "Critical Low Stock: AB-".

2. Donor Management (CRUD)

- **Create:** A digital form to register new donors (Name, Age, Blood Group, Contact, Last Donation Date).
- **Read:** A table view listing all registered donors.
- **Update:** functionality to edit a donor's contact info or update their "Last Donation Date" after they donate.
- **Delete:** Option to remove a donor record if they move away or request deletion.

3. Inventory Management

- **Add Stock (Create):** When a donation is collected, the admin adds a unit to the database (Select Blood Group -> Add Quantity).
- **View Stock (Read):** A dedicated inventory page showing the count of every blood group (A+, A-, B+, B-, etc.).
- **Issue Stock (Update/Delete):** When a hospital requests blood, the admin "Issues" the bag. This action automatically decreases the count in the database.

4. Search and Filter

- **Logic:** A filter bar on the donor and inventory pages.
- **Function:** Users can select "B Positive" from a dropdown menu, and the table will instantly filter to show only relevant records. This replaces the manual page-turning process.

Source Link: https://pmc.ncbi.nlm.nih.gov/articles/PMC8884319/

Research Paper:

Inventory management practices in the blood bank of an institute of national importance in India

https://www.researchgate.net/publication/370602395_Blood_Bank_Management_System

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