1. Introduction

Blood banks play a vital role in healthcare, collecting, storing, and providing blood to patients in need. The availability and safety of blood supplies are crucial for surgeries, medical treatments, and emergencies. However, many blood banks still rely on manual processes, which can lead to inefficiencies and errors.

The purpose of this project is to design and develop a **Blood Bank Management System** using **Microsoft SQL Server Management Studio (SSMS)**. The system will help manage donors, recipients, hospitals, blood inventory, and quality control efficiently through proper database design and query handling.

2. Problem Statement

Traditional blood bank systems face various problems such as:

- Incomplete or incorrect donor/recipient records.
- Lack of real-time availability data for blood units.
- Difficulty tracking expiry dates and contamination.
- Errors in hospital blood request management.
- No centralized system for easy data retrieval.

To solve these challenges, a structured relational database system is required that ensures data integrity, accurate tracking, and efficient reporting.

4. Objectives

This project has the following objectives:

- To design a fully normalized database using SQL Server.
- To automate the entire process of donor, recipient, hospital, and blood unit management.
- To maintain data integrity through proper SQL Server constraints and rules.
- To develop multiple reports using SQL queries for stock management, donor eligibility, quality control, and hospital requests.
- To practice and enhance SQL Server Management Studio (SSMS) skills with a real-world healthcare project.

5. Tools & Technologies

The tools and technologies used for this project include:

Technology	Description
Database Server	Microsoft SQL Server
Management Tool	SQL Server Management Studio (SSMS)

Technology	Description
Query Language	T-SQL (Transact-SQL)
Operating System	Windows OS

Microsoft SQL Server provides robust database management capabilities, while SSMS allows easy query development, table creation, and data administration.

6. Project Scope

The project will cover the following major modules:

- **Donor Management:** Storing donor personal details, blood group, disease status, and contact information.
- **Blood Collection & Inventory:** Recording collection date, expiry date, contamination status, and availability status for every blood unit.
- **Recipient Management:** Maintaining patient details who require blood transfusions.
- **Hospital Requests:** Managing hospital information and their blood requests.
- **Blood Quality Control:** Monitoring blood expiry and contamination.
- **Reporting Module:** Generating reports for stock levels, donor eligibility, contamination, expiry, and hospital requests.

7. Timeline

The proposed steps for project completion:

- Requirement analysis and dataset preparation
- Database design and table creation
- Sample data insertion
- SQL query development and reporting
- Testing and debugging
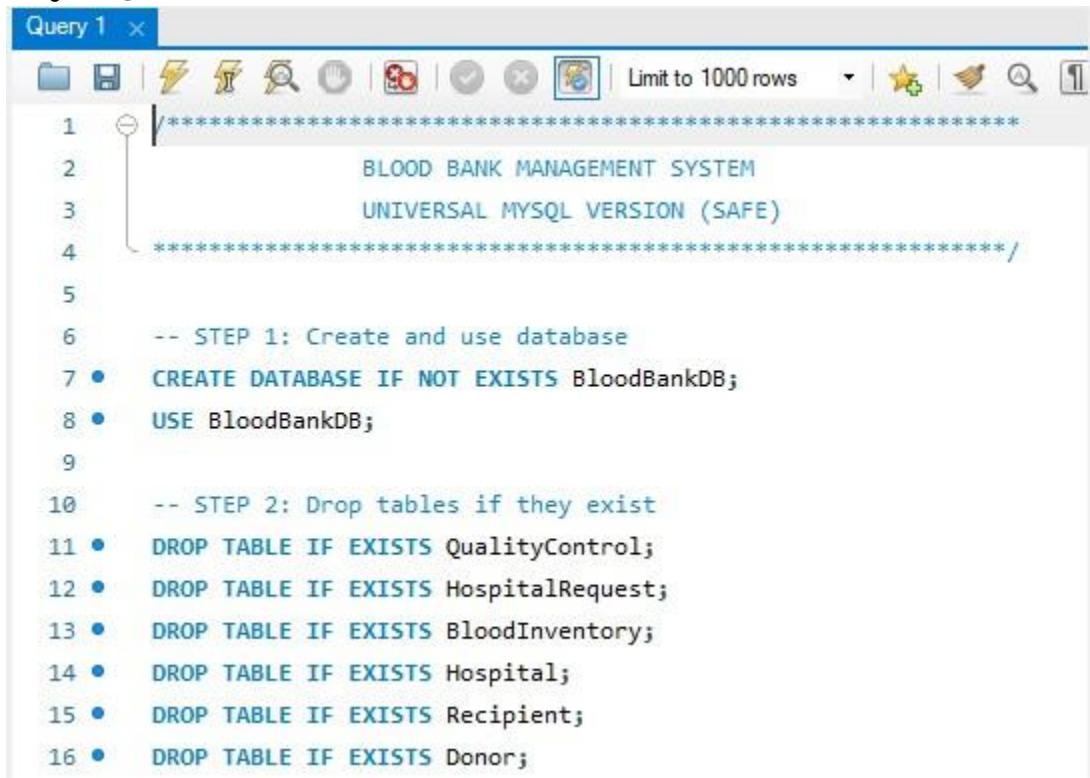- Final report preparation and submission

8. Expected Deliverables

Upon project completion, the following deliverables will be submitted:

- Complete SQL Server database with all required tables and constraints.
- Insert scripts with sample data for testing.
- T-SQL queries for reports and data retrieval.
- Complete project report with system details.

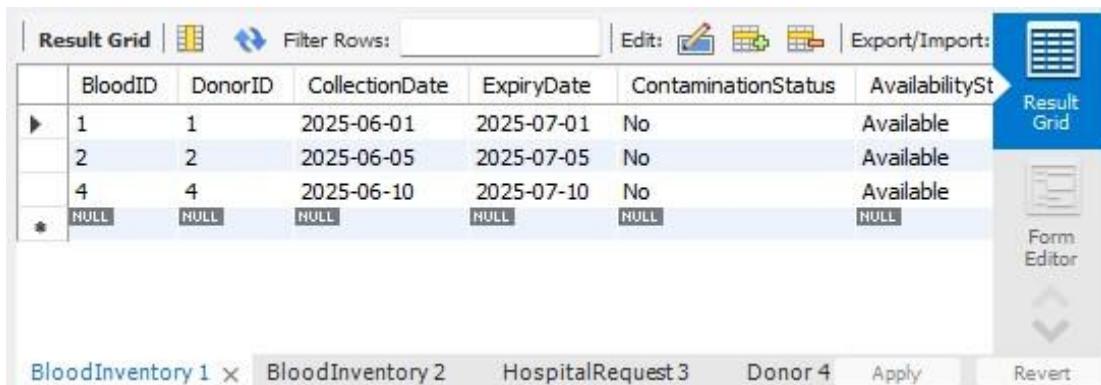- Demonstration of database implementation.

OUTPUT:

MySQL CODE:

```
/***************************************************************
                 BLOOD BANK MANAGEMENT SYSTEM
                 UNIVERSAL MYSQL VERSION (SAFE)
   ***************************************************************/

   -- STEP 1: Create and use database
   CREATE DATABASE IF NOT EXISTS BloodBankDB;
   USE BloodBankDB;

   -- STEP 2: Drop tables if they exist
   DROP TABLE IF EXISTS QualityControl;
   DROP TABLE IF EXISTS HospitalRequest;
   DROP TABLE IF EXISTS BloodInventory;
   DROP TABLE IF EXISTS Hospital;
   DROP TABLE IF EXISTS Recipient;
   DROP TABLE IF EXISTS Donor;
```

BLOOD INVENTORY TABLE OUTPUT:

BloodID	DonorID	CollectionDate	ExpiryDate	ContaminationStatus	AvailabilitySt
1	1	2025-06-01	2025-07-01	No	Available
2	2	2025-06-05	2025-07-05	No	Available
4	4	2025-06-10	2025-07-10	No	Available
NULL	NULL	NULL	NULL	NULL	NULL

BloodInventory 1 ×   BloodInventory 2   HospitalRequest 3   Donor 4   Apply   Revert

HOSPITAL REQUEST TABLE OUTPUT:

DONOR TABLE OUTPUT:

C++ CRUD OPERATIONS:


```
BLOOD BANK MANAGEMENT SYSTEM
*****************************
1. Insert Donor Data
2. Delete Donor Data
3. Update Donor Contact
4. View All Donors
0. Exit
Enter Choice: |
```

9. CONCLUSION:

The Blood Bank Management System project, developed using MySQL and C++ with CRUD operations, effectively demonstrates the practical application of database systems in managing vital healthcare data. The system allows for seamless handling of donor and recipient information, as well as real-time tracking of blood inventory, ensuring efficiency, accuracy, and reliability.

The use of C++ for implementing CRUD (Create, Read, Update, Delete) operations provided a structured and fast-performing interface, while MySQL ensured secure and organized data storage. Together, these technologies created a responsive and functional system capable of addressing many challenges faced by traditional, manual blood bank operations.

This project enhanced my technical skills in database connectivity, structured programming, and data management. It also highlighted the importance of digital solutions in healthcare, where timely access to accurate information can make a significant difference. Overall, the project serves as a meaningful step towards building smart, life-saving systems through technology.