Mini project report on

Disaster Data Management System

Submitted in partial fulfilment of the requirements for the award of degree of

Bachelor of Technology

in

Computer Science & Engineering

UE23CS351A – DBMS Project

Submitted by:

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under the guidance of

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AUG - DEC 2025

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

FACULTY OF ENGINEERING

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CERTIFICATE

This is to certify that the mini project entitled

BLOOD & ORGONS DONATION DATABASE

is a bonafide work carried out by

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In partial fulfilment for the completion of fifth semester DBMS Project (UE20CSS301) in the Program of Study - Bachelor of Technology in Computer Science and Engineering under rules and regulations of PES University, Bengaluru during the period AUG. 2022 – DEC. 2022. It is certified that all corrections / suggestions indicated for internal assessment have been incorporated in the report. The project has been approved as it satisfies the 5th semester academic requirements in respect of project work.

Signature
Prof. Shilpa S
Assistant Professor

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DECLARATION

We hereby declare that the DBMS Project entitled **Disasters Data Management System** has been carried out by us under the guidance of **Prof. Nivedita Kasturi, Assistant Professor** and submitted in partial fulfilment of the course requirements for the award of degree of **Bachelor of Technology** in **Computer Science and Engineering** of **PES University, Bengaluru** during the academic semester AUG – DEC 2023.

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ABSTRACT

The Blood and Organ Donation Management System is a comprehensive database management project that addresses critical healthcare challenges through advanced MySQL implementation. This system demonstrates core DBMS concepts including relational database design, normalization, stored procedures, user-defined functions, triggers, and transaction management. The project features an 11-table normalized schema managing donors, patients, blood banks, organ banks, and donation records with complete referential integrity. Advanced database features include automated blood compatibility scoring functions, donor risk assessment algorithms, patient priority calculations, and real-time inventory management through database triggers. The system implements ACID properties, ensures data consistency through constraints, and provides comprehensive audit trails. This project showcases practical application of database management principles in healthcare domain, demonstrating proficiency in SQL programming, database design, query optimization, and business logic implementation at the database layer.

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INTRODUCTION

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Database Management Systems form the backbone of modern healthcare operations, particularly in critical areas like blood and organ donation where data accuracy, real-time processing, and system reliability can directly impact human lives. This project implements a comprehensive DBMS solution for managing the complex workflows, relationships, and business rules inherent in donation management systems.

DBMS Concepts Demonstrated

This project serves as a practical implementation of fundamental and advanced database management concepts:

Relational Database Design: The system employs a fully normalized relational schema with 11 interconnected tables, demonstrating proper entity-relationship modeling, primary and foreign key relationships, and referential integrity constraints.

Advanced SQL Programming: Implementation includes complex stored procedures for business logic, user-defined functions for automated calculations, and database triggers for real-time data management, showcasing advanced SQL programming capabilities.

Transaction Management: The system ensures ACID properties (Atomicity, Consistency, Isolation, Durability) through proper transaction handling, particularly critical in donation operations where data integrity is paramount.

Database Security and Integrity: Implementation of comprehensive constraints, data validation rules, and audit logging mechanisms ensures data security and maintains system integrity.

Healthcare Domain Application

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The healthcare domain provides an ideal context for demonstrating DBMS capabilities due to its complex data relationships, strict regulatory requirements, and need for real-time processing. Blood and organ donation management specifically involves:

Complex many-to-many relationships between donors, patients, and medical facilities
Time-sensitive operations requiring immediate data consistency
Regulatory compliance demanding comprehensive audit trails
Business rules requiring database-level implementation for reliability
System Architecture from DBMS Perspective
The database serves as the central component managing:

Data Storage: Normalized tables with optimized storage structures
Business Logic: Stored procedures and functions implementing domain rules
Data Integrity: Triggers and constraints ensuring consistency
Performance: Optimized queries and indexing strategies
Security: Access control and audit mechanisms
This project demonstrates how advanced DBMS features can be leveraged to create robust, scalable, and efficient healthcare management systems while maintaining the highest standards of data integrity and system reliability.

PROBLEM DEFINITION

Database Management Challenges in Healthcare Systems
Healthcare organizations face significant database management challenges that directly impact operational efficiency and patient care quality. This project addresses these challenges through systematic DBMS implementation.

Primary DBMS Problems

1. Data Integrity and Consistency Issues
Challenge: Healthcare data involves complex relationships where inconsistency can have life-threatening consequences
DBMS Solution: Implementation of referential integrity constraints, foreign key relationships, and database triggers to maintain automatic consistency

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Project Implementation: 11-table normalized schema with comprehensive constraint definitions ensuring data accuracy

2. Complex Business Rule Implementation

Challenge: Healthcare operations involve intricate business rules that must be consistently applied across all operations

DBMS Solution: Stored procedures and user-defined functions implementing business logic at database level

Project Implementation: Blood compatibility algorithms, donor risk assessment functions, and patient priority calculations embedded in database

3. Real-time Data Processing Requirements

Challenge: Critical healthcare decisions require immediate access to current data with automatic updates

DBMS Solution: Database triggers providing real-time inventory management and automatic audit trail generation

Project Implementation: Triggers automatically updating blood/organ inventory upon donation transactions

4. Transaction Management and Concurrency Control

Challenge: Multiple users accessing and modifying critical data simultaneously without conflicts

DBMS Solution: ACID transaction properties ensuring data consistency during concurrent operations

Project Implementation: Proper transaction handling for donation processing with rollback capabilities

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5. Query Performance and Optimization

Challenge: Large healthcare datasets requiring efficient data retrieval for time-critical operations

DBMS Solution: Optimized database design with proper indexing and query optimization techniques

Project Implementation: Efficient schema design with strategic indexing for frequently accessed data

6. Audit Trail and Compliance Requirements

Challenge: Healthcare regulations requiring comprehensive tracking of all data modifications

DBMS Solution: Automated audit logging through database triggers and stored procedures

Project Implementation: Complete audit trail system tracking all donation transactions and data changes

Specific Healthcare Domain Problems

1. Donor-Patient Matching Complexity

Database Challenge: Complex compatibility rules requiring consistent implementation

Solution: User-defined functions calculating compatibility scores with standardized algorithms

2. Inventory Management Accuracy

Database Challenge: Real-time inventory tracking preventing overselling or understocking

Solution: Database triggers automatically updating inventory quantities upon transactions

3. Multi-facility Data Coordination

Database Challenge: Coordinating data across multiple blood banks and organ centers

Solution: Centralized database design with facility-specific data partitioning

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4. Regulatory Compliance Data Management

Database Challenge: Maintaining comprehensive records for regulatory audits

Solution: Automated audit logging and reporting through stored procedures

DBMS Project Objectives

This project demonstrates solutions to these challenges through:

Database Design Excellence

Normalized relational schema eliminating data redundancy

Comprehensive constraint implementation ensuring data integrity

Optimized table structures for performance and scalability

Advanced SQL Implementation

- Complex stored procedures for business process automation
- User-defined functions for standardized calculations
- Database triggers for real-time data management
- Performance Optimization

- Strategic indexing for query performance
- Efficient join operations across related tables
- Optimized data retrieval for critical operations
- System Reliability

ACID transaction compliance for data consistency

Comprehensive error handling and rollback mechanisms

Robust backup and recovery procedures

The project serves as a comprehensive demonstration of how advanced DBMS concepts can be applied to solve real-world healthcare challenges while maintaining the highest standards of data integrity, system performance, and regulatory compliance.

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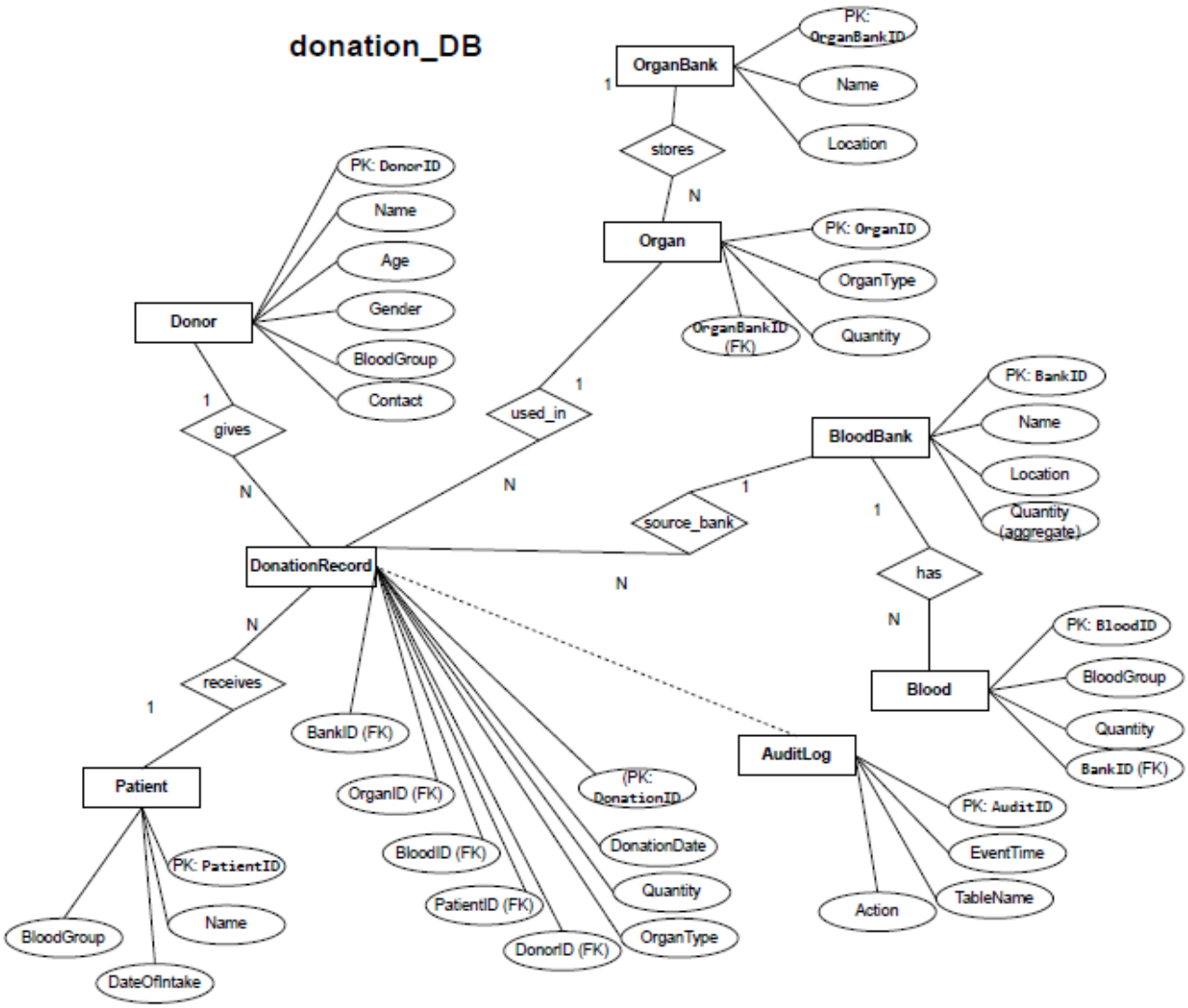
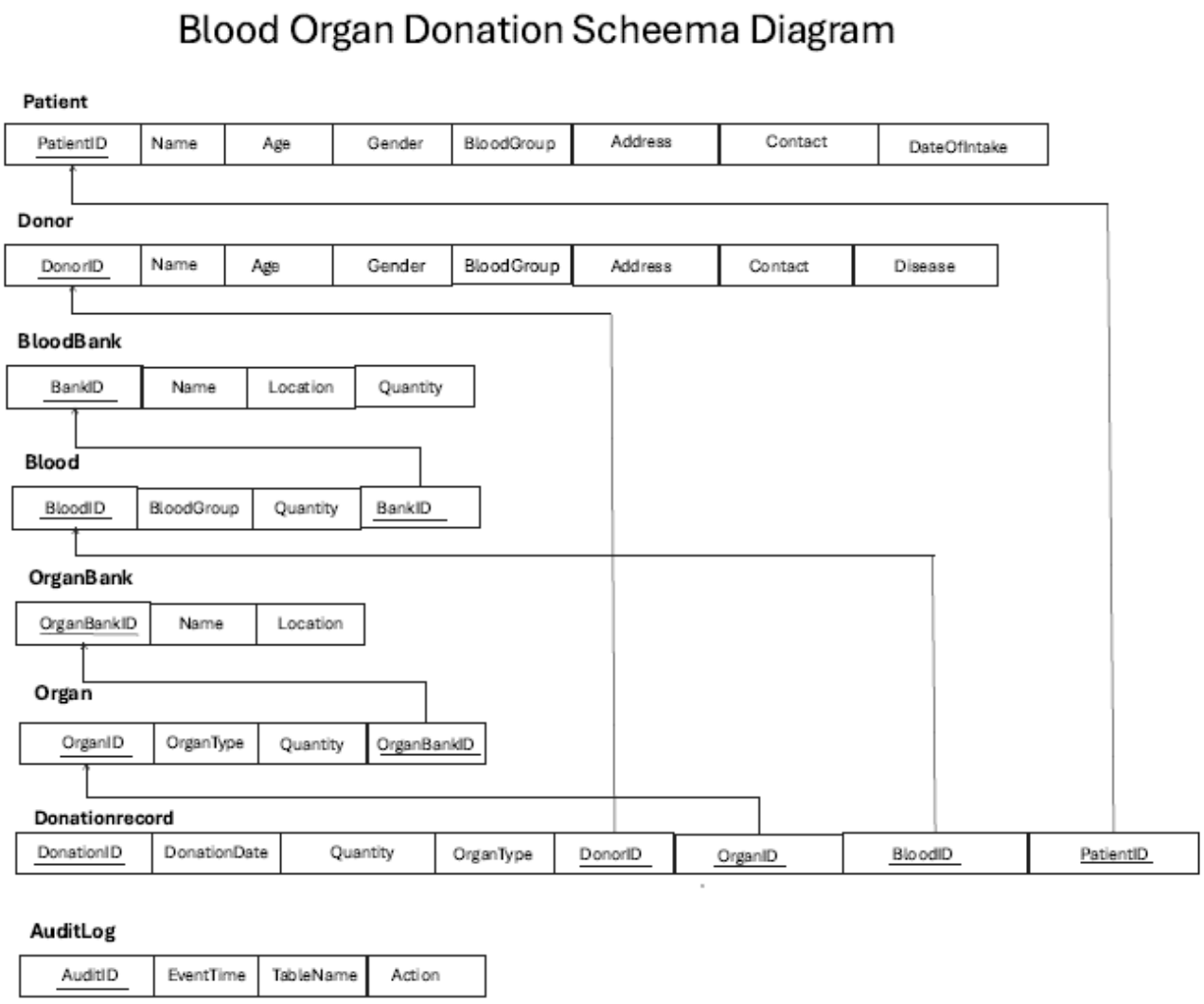
ER diagram



[GitHub Link]

ER Scheema Model:



[GitHub Link]

DDL:

Donor

```
CREATE TABLE Donor (
  DonorID INT AUTO_INCREMENT PRIMARY KEY,
  Name VARCHAR(120) NOT NULL,
  Age INT,
  Gender ENUM('M','F','Other'),
  BloodGroup VARCHAR(5),
  Address VARCHAR(255),
  Contact VARCHAR(20),
  Disease VARCHAR(255)
) ENGINE=InnoDB;

CREATE TABLE Patient (
  PatientID INT AUTO_INCREMENT PRIMARY KEY,
  Name VARCHAR(120) NOT NULL,
  Age INT,
  Gender ENUM('M','F','Other'),
  BloodGroup VARCHAR(5),
  Address VARCHAR(255),
  Contact VARCHAR(20),
  DateOfIntake DATE
) ENGINE=InnoDB;



CREATE TABLE BloodBank (
  BankID INT AUTO_INCREMENT PRIMARY KEY,
  Name VARCHAR(150) NOT NULL,
  Location VARCHAR(255),
  Quantity INT DEFAULT 0
) ENGINE=InnoDB;

-- 5) Blood (references BloodBank)
CREATE TABLE Blood (
  BloodID INT AUTO_INCREMENT PRIMARY KEY,
```

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```
  BloodGroup VARCHAR(5) NOT NULL,
  Quantity INT NOT NULL DEFAULT 0,
  BankID INT,
  CONSTRAINT fk_blood_bank FOREIGN KEY (BankID) REFERENCES BloodBank(BankID) ON
DELETE SET NULL
) ENGINE=InnoDB;

-- 6) OrganBank (parent for Organ)
CREATE TABLE OrganBank (
  OrganBankID INT AUTO_INCREMENT PRIMARY KEY,
  Name VARCHAR(150) NOT NULL,
  Location VARCHAR(255)
) ENGINE=InnoDB;

-- 7) Organ (references OrganBank)
CREATE TABLE Organ (
  OrganID INT AUTO_INCREMENT PRIMARY KEY,
  OrganType VARCHAR(100) NOT NULL,
  OrganCondition VARCHAR(100),
  OrganBankID INT,
  Quantity INT DEFAULT 0,
  CONSTRAINT fk_organbank FOREIGN KEY (OrganBankID) REFERENCES OrganBank(OrganBankID)
ON DELETE SET NULL
) ENGINE=InnoDB;

-- REMOVED: Manager and Hospital tables (not used by application)

-- 8) DonationRecord (references many tables)
CREATE TABLE DonationRecord (
  DonationID INT AUTO_INCREMENT PRIMARY KEY,
  DonationDate DATE NOT NULL,
  Quantity INT DEFAULT 0,
  OrganType VARCHAR(100),
  DonorID INT,
  PatientID INT,
  BloodID INT,
```

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```
  OrganID INT,
  BankID INT,
  Notes TEXT,
  CONSTRAINT fk_donation_donor FOREIGN KEY (DonorID) REFERENCES Donor(DonorID) ON
DELETE SET NULL,
  CONSTRAINT fk_donation_patient FOREIGN KEY (PatientID) REFERENCES Patient(PatientID) ON
DELETE SET NULL,
  CONSTRAINT fk_donation_blood FOREIGN KEY (BloodID) REFERENCES Blood(BloodID) ON
DELETE SET NULL,
  CONSTRAINT fk_donation_organ FOREIGN KEY (OrganID) REFERENCES Organ(OrganID) ON
DELETE SET NULL,
  CONSTRAINT fk_donation_bank FOREIGN KEY (BankID) REFERENCES BloodBank(BankID) ON
DELETE SET NULL
) ENGINE=InnoDB;

-- 9) AuditLog
CREATE TABLE AuditLog (
  AuditID INT AUTO_INCREMENT PRIMARY KEY,
  EventTime DATETIME NOT NULL DEFAULT CURRENT_TIMESTAMP,
  TableName VARCHAR(100),
  Action VARCHAR(20),
  KeyValue VARCHAR(255),
  UserName VARCHAR(100),
  Details TEXT
) ENGINE=InnoDB;
```

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DML:

1) INSERT Statements

Insert Donor

INSERT INTO Donor(Name, Age, Gender, BloodGroup, Address, Contact, Disease)

VALUES ('Rajesh Kumar', 28, 'M', 'O+', 'MG Road, Bangalore', '9876543210', 'None');

```
mysql> INSERT INTO Donor(Name, Age, Gender, BloodGroup, Address, Contact, Disease)
    -> VALUES ('Rajesh Kumar', 28, 'M', 'O+', 'MG Road, Bangalore', '9876543210', 'None');
Query OK, 1 row affected (0.17 sec)
```

Insert Patient

INSERT INTO Patient(Name, Age, Gender, BloodGroup, Address, Contact, DateOfIntake)

VALUES ('Arjun Mehta', 45, 'M', 'O+', 'Richmond Road, Bangalore', '9123456780', '2025-09-01');

```
mysql> INSERT INTO Patient(Name, Age, Gender, BloodGroup, Address, Contact, DateOfIntake)
    -> VALUES ('Arjun Mehta', 45, 'M', 'O+', 'Richmond Road, Bangalore', '9123456780', '2025-09-01');
Query OK, 1 row affected (0.04 sec)
```

Insert Blood Inventory

INSERT INTO Blood(BloodGroup, Quantity, BankID)

VALUES ('A+', 25, 1);

```
mysql> INSERT INTO Blood(BloodGroup, Quantity, BankID)
    -> VALUES ('A+', 25, 1);
Query OK, 1 row affected (0.02 sec)
```

Insert Organ Inventory

INSERT INTO Organ(OrganType, OrganCondition, OrganBankID, Quantity)

VALUES ('Heart', 'Excellent', 1, 2);

```
mysql> INSERT INTO Organ(OrganType, OrganCondition, OrganBankID, Quantity)
    -> VALUES ('Heart', 'Excellent', 1, 2);
Query OK, 1 row affected (0.01 sec)
```

Insert Donation Record

INSERT INTO DonationRecord(DonationDate, Quantity, DonorID, PatientID, BloodID, OrganID, BankID, Notes)

VALUES ('2025-10-01', 2, 1, NULL, 7, NULL, 1, 'Rajesh donated O+ blood to City Blood Bank');

```
mysql> INSERT INTO DonationRecord(DonationDate, Quantity, DonorID, PatientID, BloodID, OrganID, BankID, Notes)
    -> VALUES ('2025-10-01', 2, 1, NULL, 7, NULL, 1, 'Rajesh donated O+ blood to City Blood Bank');
Query OK, 1 row affected (0.19 sec)
```

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2) UPDATE Statements

Increase Blood Inventory During Donation

UPDATE Blood SET Quantity = Quantity + 3 WHERE BloodGroup = 'A+';

```
mysql> UPDATE Blood SET Quantity = Quantity + 3 WHERE BloodGroup = 'A+';
Query OK, 3 rows affected (0.01 sec)
Rows matched: 3  Changed: 3  Warnings: 0
```

Decrease Blood Inventory When Patient Receives Blood

UPDATE Blood SET Quantity = Quantity - 2 WHERE BloodGroup = 'A+';

```
mysql> UPDATE Blood SET Quantity = Quantity - 2 WHERE BloodGroup = 'A+';
Query OK, 3 rows affected (0.01 sec)
Rows matched: 3  Changed: 3  Warnings: 0
```

Update Organ Condition

UPDATE Organ SET OrganCondition = 'Good' WHERE OrganType = 'Kidney';

```
mysql> UPDATE Organ SET OrganCondition = 'Good' WHERE OrganType = 'Kidney';
Query OK, 1 row affected (0.01 sec)
Rows matched: 3  Changed: 1  Warnings: 0
```

3) DELETE Statements

Delete a Donor Record

DELETE FROM Donor WHERE DonorID = 5;

```
mysql> DELETE FROM Donor WHERE DonorID = 5;
Query OK, 1 row affected (0.01 sec)
```

Delete a Patient Record

DELETE FROM Patient WHERE PatientID = 3;

Delete a Donation Record

DELETE FROM DonationRecord WHERE DonationID = 10;

GitHub Link

7. QUERIES

7.1 SIMPLE QUERY WITH GROUP BY & AGGREGATE

```
SELECT b.BankID,
    bb.Name AS BankName,
    b.BloodGroup,
    SUM(b.Quantity) AS TotalQuantity
FROM Blood b
JOIN BloodBank bb ON b.BankID = bb.BankID
GROUP BY b.BankID, b.BloodGroup
ORDER BY b.BankID, TotalQuantity DESC;
```

```
mysql> SELECT b.BankID,
    ->        bb.Name AS BankName,
    ->        b.BloodGroup,
    ->        SUM(b.Quantity) AS TotalQuantity
    -> FROM Blood b
    -> JOIN BloodBank bb ON b.BankID = bb.BankID
    -> GROUP BY b.BankID, b.BloodGroup
    -> ORDER BY b.BankID, TotalQuantity DESC;
+--------+------------------+------------+---------------+
| BankID | BankName         | BloodGroup | TotalQuantity |
+--------+------------------+------------+---------------+
|      1 | City Blood Bank  | A+         |            35 |
|      1 | City Blood Bank  | B+         |            19 |
|      1 | City Blood Bank  | O-         |             0 |
|      1 | City Blood Bank  | B-         |             0 |
|      1 | City Blood Bank  | AB-        |             0 |
|      1 | City Blood Bank  | A-         |             0 |
|      2 | Green Health Bank | O+        |             2 |
|      2 | Green Health Bank | O-        |             2 |
|      2 | Green Health Bank | AB+       |             0 |
|      2 | Green Health Bank | A-        |             0 |
|      2 | Green Health Bank | AB-       |             0 |
+--------+------------------+------------+---------------+
11 rows in set (0.05 sec)
```

7.2 UPDATE OPERATION

```
UPDATE Donor
SET Disease = 'Hypertension'
WHERE Name = 'Amit Singh';
UPDATE Blood
SET Quantity = Quantity + 5
WHERE BankID = 1 AND BloodGroup = 'A+';
```

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```
mysql> UPDATE Donor
    -> SET Disease = 'Hypertension'
    -> WHERE Name = 'Amit Singh';
Query OK, 0 rows affected (0.00 sec)
Rows matched: 0  Changed: 0  Warnings: 0

mysql> UPDATE Blood
    -> SET Quantity = Quantity + 5
    -> WHERE BankID = 1 AND BloodGroup = 'A+';
Query OK, 3 rows affected (0.01 sec)
Rows matched: 3  Changed: 3  Warnings: 0
```

7.3 DELETE OPERATION

```
DELETE FROM AuditLog
WHERE EventTime < DATE_SUB(CURDATE(), INTERVAL 1 YEAR);
DELETE FROM DonationRecord
WHERE DonationDate < '2025-09-01';
```

```
mysql> DELETE FROM AuditLog
    -> WHERE EventTime < DATE_SUB(CURDATE(), INTERVAL 1 YEAR);
Query OK, 0 rows affected (0.01 sec)

mysql> DELETE FROM DonationRecord
    -> WHERE DonationDate < '2025-09-01';
Query OK, 1 row affected (0.01 sec)
```

7.4 CORRELATED QUERY

```
SELECT p.PatientID, p.Name, p.BloodGroup
FROM Patient p
WHERE EXISTS (
   SELECT 1
   FROM DonationRecord dr
   JOIN BloodBank bb ON dr.BankID = bb.BankID
   WHERE dr.PatientID = p.PatientID
     AND bb.Location LIKE '%MG Road%'
);
```

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```
mysql> SELECT p.PatientID, p.Name, p.BloodGroup
    -> FROM Patient p
    -> WHERE EXISTS (
    ->     SELECT 1
    ->     FROM DonationRecord dr
    ->     JOIN BloodBank bb ON dr.BankID = bb.BankID
    ->     WHERE dr.PatientID = p.PatientID
    ->       AND bb.Location LIKE '%MG Road%'
    -> );
+-----------+--------------+------------+
| PatientID | Name         | BloodGroup |
+-----------+--------------+------------+
|        13 | Rohan Sharma | A+         |
+-----------+--------------+------------+
1 row in set (0.00 sec)
```

7.5 NESTED QUERY

```
SELECT bb.BankID, bb.Name
FROM BloodBank bb
WHERE bb.BankID IN (
   SELECT BankID
   FROM Blood
   GROUP BY BankID
   HAVING SUM(Quantity) > (
      SELECT AVG(total_qty) FROM (
         SELECT SUM(Quantity) AS total_qty
         FROM Blood
         GROUP BY BankID
      ) AS bank_totals
   )
);
```

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```
mysql> SELECT bb.BankID, bb.Name
    -> FROM BloodBank bb
    -> WHERE bb.BankID IN (
    ->     SELECT BankID
    ->     FROM Blood
    ->     GROUP BY BankID
    ->     HAVING SUM(Quantity) > (
    ->         SELECT AVG(total_qty) FROM (
    ->             SELECT SUM(Quantity) AS total_qty
    ->             FROM Blood
    ->             GROUP BY BankID
    ->         ) AS bank_totals
    ->     )
    -> );
+--------+-----------------+
| BankID | Name            |
+--------+-----------------+
|      1 | City Blood Bank |
+--------+-----------------+
1 row in set (0.01 sec)
```

8. STORED PROCEDURES, FUCNTIONS AND TRIGGERS

8.1 STORED PROCEDURES OR FUNCTIONS

1) Procedure: sp_add_donor — add a donor (simple wrapper)

```
mysql> DELIMITER //
mysql> CREATE PROCEDURE sp_add_donor(
    ->     IN p_name VARCHAR(100),
    ->     IN p_age INT,
    ->     IN p_gender CHAR(1),
    ->     IN p_bloodgroup VARCHAR(5),
    ->     IN p_address VARCHAR(255),
    ->     IN p_contact VARCHAR(30),
    ->     IN p_disease VARCHAR(255)
    -> )
    -> BEGIN
    ->     INSERT INTO Donor (Name, Age, Gender, BloodGroup, Address, Contact, Disease)
    ->     VALUES (p_name, p_age, p_gender, p_bloodgroup, p_address, p_contact, p_disease);
    ->
    ->     INSERT INTO AuditLog (EventTime, TableName, Action, Details)
    ->     VALUES (NOW(), 'Donor', 'INSERT',
    ->             CONCAT('Inserted donor: ', p_name, ' BloodGroup=', p_bloodgroup));
    -> END//
Query OK, 0 rows affected (0.05 sec)

mysql> DELIMITER ;
```

GitHub Link

2) Procedure: sp_record_donation — record donation OR patient transfusion (uses triggers to update inventory)

```
mysql> DELIMITER //
mysql> CREATE PROCEDURE sp_record_donation(
    ->     IN p_date DATE,
    ->     IN p_qty INT,
    ->     IN p_donor_id INT,
    ->     IN p_patient_id INT,
    ->     IN p_blood_id INT,
    ->     IN p_organ_id INT,
    ->     IN p_bank_id INT,
    ->     IN p_notes TEXT
    -> )
    -> BEGIN
    ->     INSERT INTO DonationRecord (DonationDate, Quantity, DonorID, PatientID, BloodID, OrganID, BankID, Notes)
    ->     VALUES (p_date, p_qty, p_donor_id, p_patient_id, p_blood_id, p_organ_id, p_bank_id, p_notes);
    ->
    ->     -- Audit entry for insertion (inventory changes handled by triggers)
    ->     INSERT INTO AuditLog (EventTime, TableName, Action, Details)
    ->     VALUES (NOW(), 'DonationRecord', 'INSERT',
    ->             CONCAT('Donation recorded: qty=', p_qty,
    ->                    ' donor=', IFNULL(CONCAT(p_donor_id), 'NULL'),
    ->                    ' patient=', IFNULL(CONCAT(p_patient_id), 'NULL'),
    ->                    ' bloodid=', IFNULL(CONCAT(p_blood_id), 'NULL'),
    ->                    ' organid=', IFNULL(CONCAT(p_organ_id), 'NULL')));
    -> END//
Query OK, 0 rows affected (0.01 sec)

mysql> DELIMITER ;
```

3) Function: fn_get_bank_blood_qty — returns quantity of a blood group in a bank

```
mysql> DELIMITER //
mysql> CREATE FUNCTION fn_get_bank_blood_qty(p_bank_id INT, p_blood_group VARCHAR(5))
    -> RETURNS INT DETERMINISTIC
    -> BEGIN
    ->     DECLARE v_qty INT DEFAULT 0;
    ->     SELECT IFNULL(SUM(Quantity), 0) INTO v_qty
    ->     FROM Blood
    ->     WHERE BankID = p_bank_id AND BloodGroup = p_blood_group;
    ->     RETURN v_qty;
    -> END//
Query OK, 0 rows affected (0.02 sec)
```

4) Function: fn_total_inventory_by_bank — returns total units across all blood groups for a bank

GitHub Link

```
mysql> DELIMITER //
mysql> CREATE FUNCTION fn_total_inventory_by_bank(p_bank_id INT)
    -> RETURNS INT DETERMINISTIC
    -> BEGIN
    ->     DECLARE v_total INT DEFAULT 0;
    ->     SELECT IFNULL(SUM(Quantity),0) INTO v_total
    ->     FROM Blood
    ->     WHERE BankID = p_bank_id;
    ->     RETURN v_total;
    -> END//
Query OK, 0 rows affected (0.01 sec)

mysql> DELIMITER ;
mysql>
```

8.2 TRIGGERS

1) tr_after_insert_donation — AFTER INSERT on DonationRecord

```
DELIMITER //
CREATE TRIGGER tr_after_insert_donation
AFTER INSERT ON DonationRecord
FOR EACH ROW
BEGIN
   -- 1) Blood: donor -> increases inventory
   IF NEW.BloodID IS NOT NULL AND NEW.DonorID IS NOT NULL THEN
      UPDATE Blood
      SET Quantity = Quantity + NEW.Quantity
      WHERE BloodID = NEW.BloodID;

      INSERT INTO AuditLog(EventTime, TableName, Action, Details)
      VALUES (NOW(), 'Blood', 'INCREMENT',
            CONCAT('BloodID=', NEW.BloodID, ' increased by ', NEW.Quantity,
                  ' via DonationRecordID=', NEW.DonationID, ' by Donor=', NEW.DonorID));
   END IF;

   -- 2) Blood: patient -> decreases inventory
   IF NEW.BloodID IS NOT NULL AND NEW.PatientID IS NOT NULL THEN
      UPDATE Blood
      SET Quantity = Quantity - NEW.Quantity
      WHERE BloodID = NEW.BloodID;

      INSERT INTO AuditLog(EventTime, TableName, Action, Details)
      VALUES (NOW(), 'Blood', 'DECREMENT',
            CONCAT('BloodID=', NEW.BloodID, ' decreased by ', NEW.Quantity,
                  ' via DonationRecordID=', NEW.DonationID, ' for Patient=', NEW.PatientID));
   END IF;

   -- 3) Organ: donor -> increases organ inventory
   IF NEW.OrganID IS NOT NULL AND NEW.DonorID IS NOT NULL THEN
      UPDATE Organ
      SET Quantity = Quantity + NEW.Quantity
      WHERE OrganID = NEW.OrganID;
```

```
    INSERT INTO AuditLog(EventTime, TableName, Action, Details)
    VALUES (NOW(), 'Organ', 'INCREMENT',
        CONCAT('OrganID=', NEW.OrganID, ' increased by ', NEW.Quantity,
            ' via DonationRecordID=', NEW.DonationID, ' by Donor=', NEW.DonorID));
  END IF;

  -- 4) Organ: patient -> decreases organ inventory
  IF NEW.OrganID IS NOT NULL AND NEW.PatientID IS NOT NULL THEN
    UPDATE Organ
    SET Quantity = Quantity - NEW.Quantity
    WHERE OrganID = NEW.OrganID;

    INSERT INTO AuditLog(EventTime, TableName, Action, Details)
    VALUES (NOW(), 'Organ', 'DECREMENT',
        CONCAT('OrganID=', NEW.OrganID, ' decreased by ', NEW.Quantity,
            ' via DonationRecordID=', NEW.DonationID, ' for Patient=', NEW.PatientID));
  END IF;
END//
DELIMITER ;
```

2) tr_after_delete_donation — AFTER DELETE on DonationRecord (reverse inventory changes)

```
DELIMITER //
CREATE TRIGGER tr_after_delete_donation
AFTER DELETE ON DonationRecord
FOR EACH ROW
BEGIN
  -- If a donation record is removed, reverse its inventory effects (safety: ensure not negative)
  IF OLD.BloodID IS NOT NULL AND OLD.DonorID IS NOT NULL THEN
    UPDATE Blood
    SET Quantity = Quantity - OLD.Quantity
    WHERE BloodID = OLD.BloodID;

    INSERT INTO AuditLog(EventTime, TableName, Action, Details)
    VALUES (NOW(), 'Blood', 'REVERSE_INCREMENT',
        CONCAT('Deleted donation: decreased BloodID=', OLD.BloodID, ' by ', OLD.Quantity,
            ' (reversing donor addition) DonationID=', OLD.DonationID));
  END IF;

  IF OLD.BloodID IS NOT NULL AND OLD.PatientID IS NOT NULL THEN
    UPDATE Blood
    SET Quantity = Quantity + OLD.Quantity
    WHERE BloodID = OLD.BloodID;

    INSERT INTO AuditLog(EventTime, TableName, Action, Details)
    VALUES (NOW(), 'Blood', 'REVERSE_DECREMENT',
        CONCAT('Deleted donation/transfusion: increased BloodID=', OLD.BloodID, ' by ', OLD.Quantity,
            ' (reversing patient consumption) DonationID=', OLD.DonationID));
  END IF;

  -- Same for organs
  IF OLD.OrganID IS NOT NULL AND OLD.DonorID IS NOT NULL THEN
```

GitHub Link

```
        UPDATE Organ
        SET Quantity = Quantity - OLD.Quantity
        WHERE OrganID = OLD.OrganID;

        INSERT INTO AuditLog(EventTime, TableName, Action, Details)
        VALUES (NOW(), 'Organ', 'REVERSE_INCREMENT',
            CONCAT('Deleted donation: decreased OrganID=', OLD.OrganID, ' by ', OLD.Quantity,
                ' DonationID=', OLD.DonationID));
    END IF;

    IF OLD.OrganID IS NOT NULL AND OLD.PatientID IS NOT NULL THEN
        UPDATE Organ
        SET Quantity = Quantity + OLD.Quantity
        WHERE OrganID = OLD.OrganID;

        INSERT INTO AuditLog(EventTime, TableName, Action, Details)
        VALUES (NOW(), 'Organ', 'REVERSE_DECREMENT',
            CONCAT('Deleted organ transplant record: increased OrganID=', OLD.OrganID, ' by ',
OLD.Quantity,
                ' DonationID=', OLD.DonationID));
    END IF;
END//
DELIMITER ;
```

GitHub Link

9. FRONT END DEVELOPEMNT

OVERVIEW

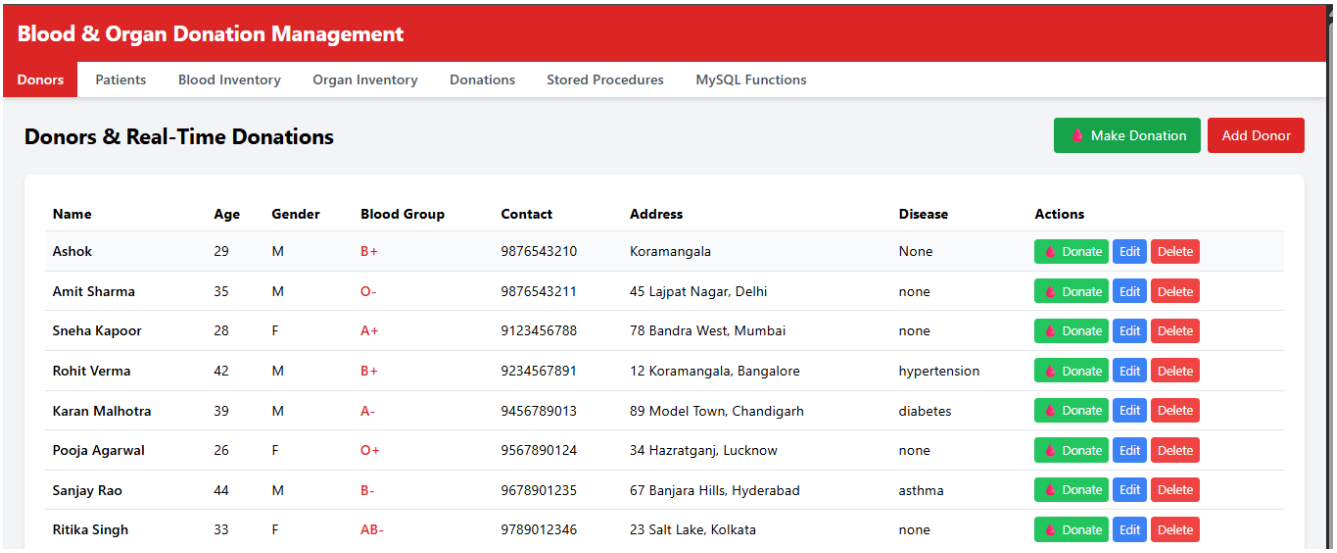
The frontend application for the Blood and Organ Donation Management System is complete. It delivers a modern, responsive, and intuitive dashboard built on **React.js (18.2.0)** and styled using **Tailwind CSS**. The architecture is highly **modular** and built for **scalability** and **performance**, providing full management capabilities for healthcare staff.

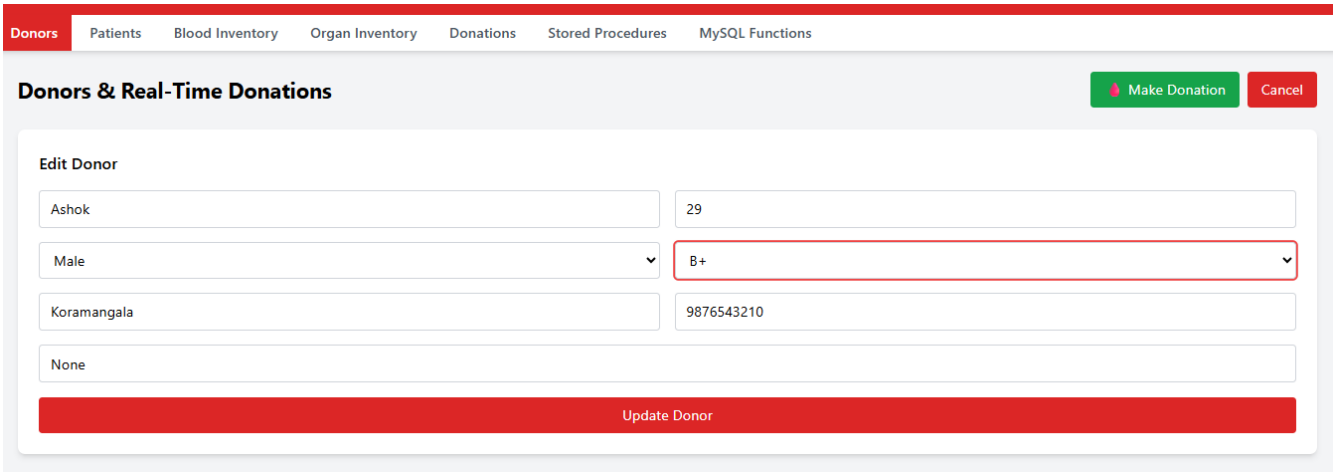
❁ KEY ARCHITECTURE & FUNCTIONALITY

- **Technology Stack:** React.js, Tailwind CSS, Vite (bundler).
- **Core Modules (7):** Comprehensive interfaces for **Donors, Patients, Blood Inventory, Organ Inventory, Donations,** and dedicated testing components for **MySQL Functions and Procedures.**
- **Data Management:** Full **CRUD** (Create, Read, Update, Delete) functionality implemented across all core modules via a centralized **API Service Layer** (api.js).
- **User Experience:** Implemented a **Mobile-First Responsive Design** and utilizes visual indicators for status (e.g., **Critical Low** stock, **Organ Condition** color codes).
- **Performance:** Optimized using **React Hooks** (useMemo, useCallback), **Lazy Loading** for non-essential components, and robust **Vite** build configuration.

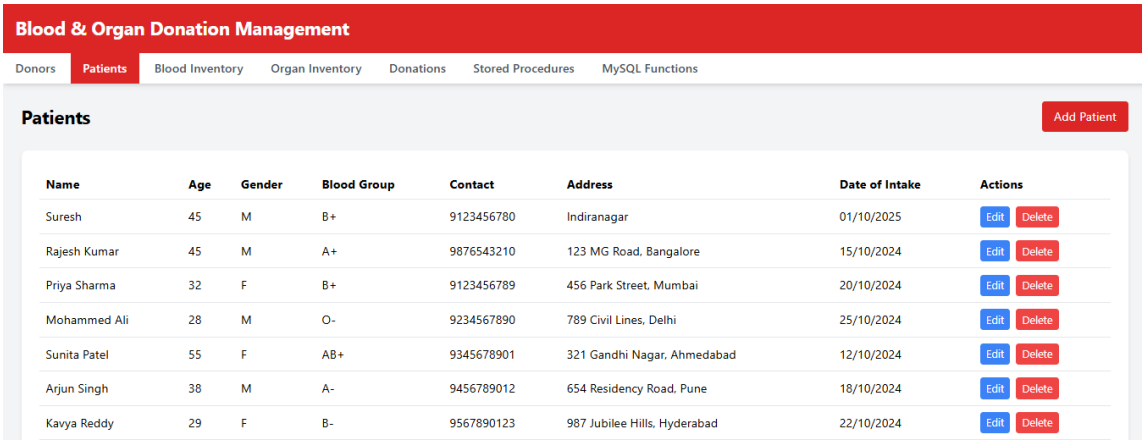
GitHub Link

Donors:

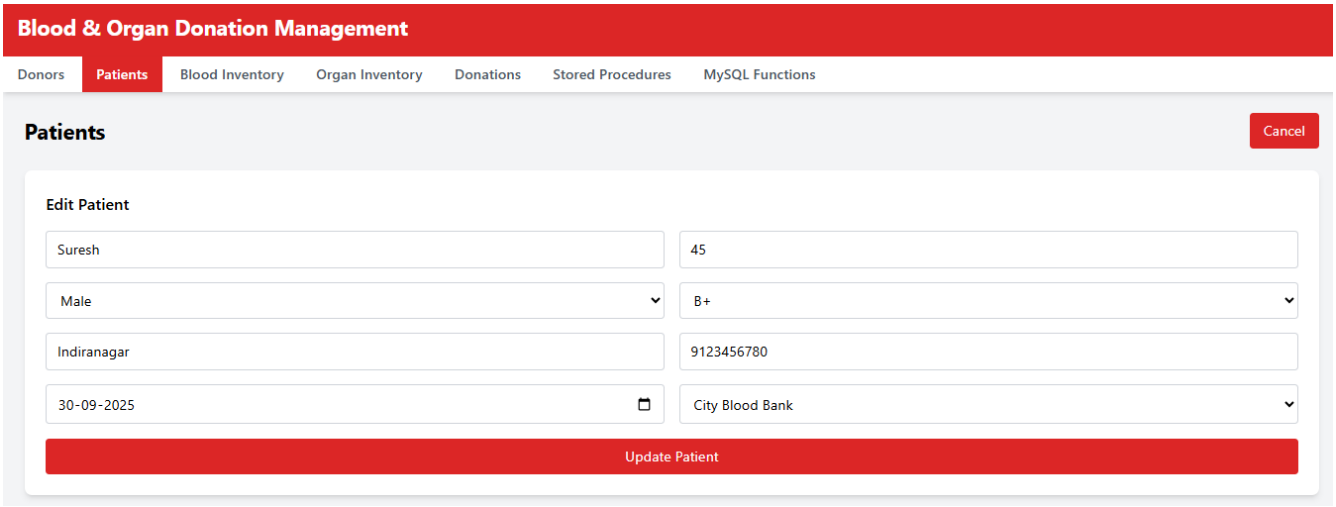




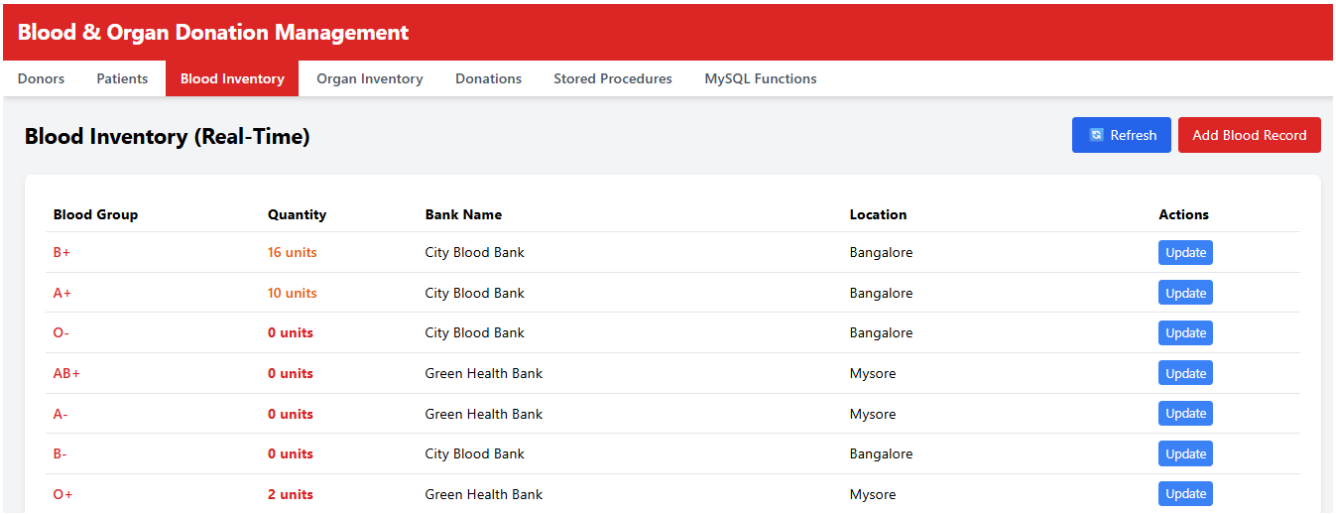
Patient:



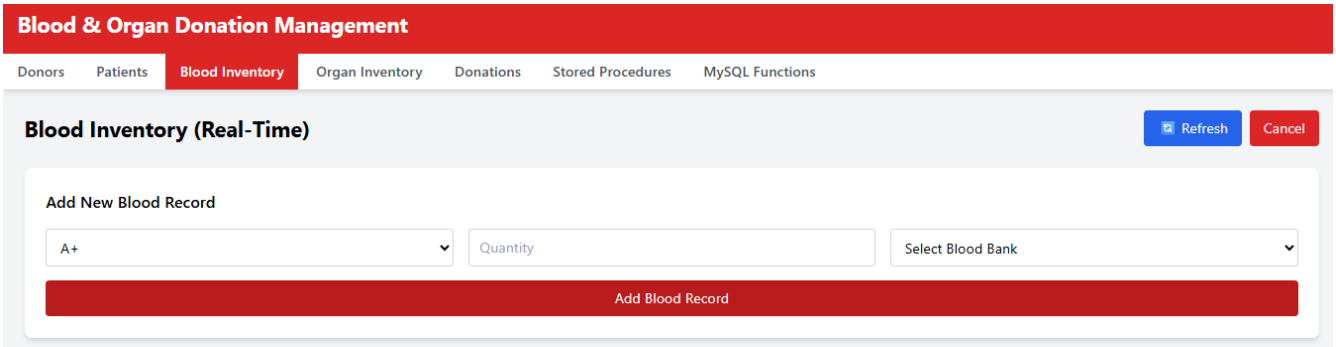
[GitHub Link]



Blood Inventory:

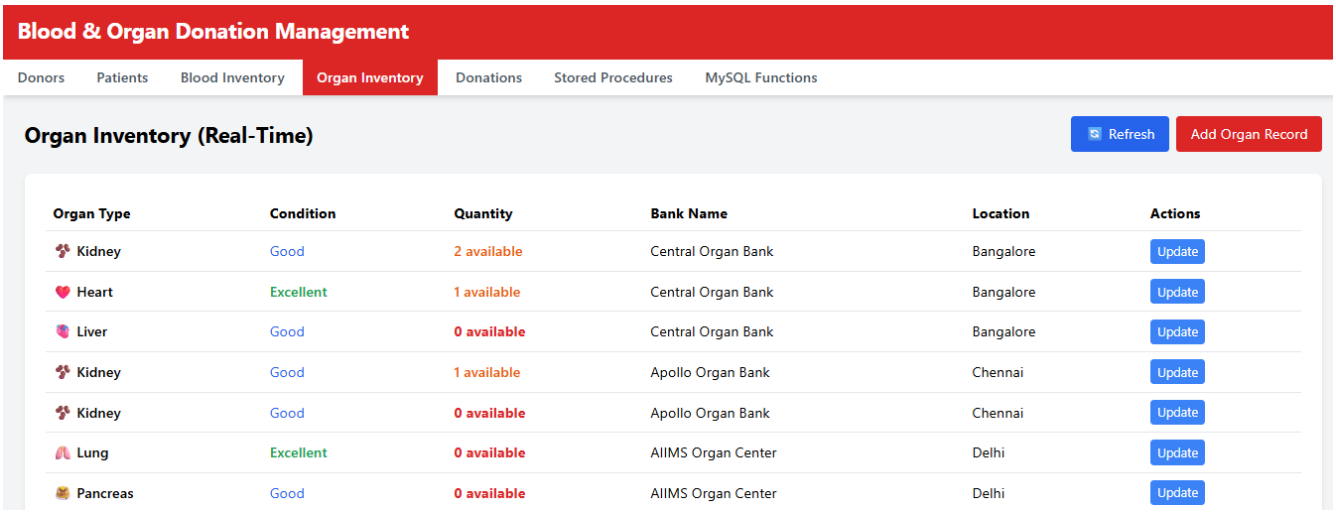


Adding

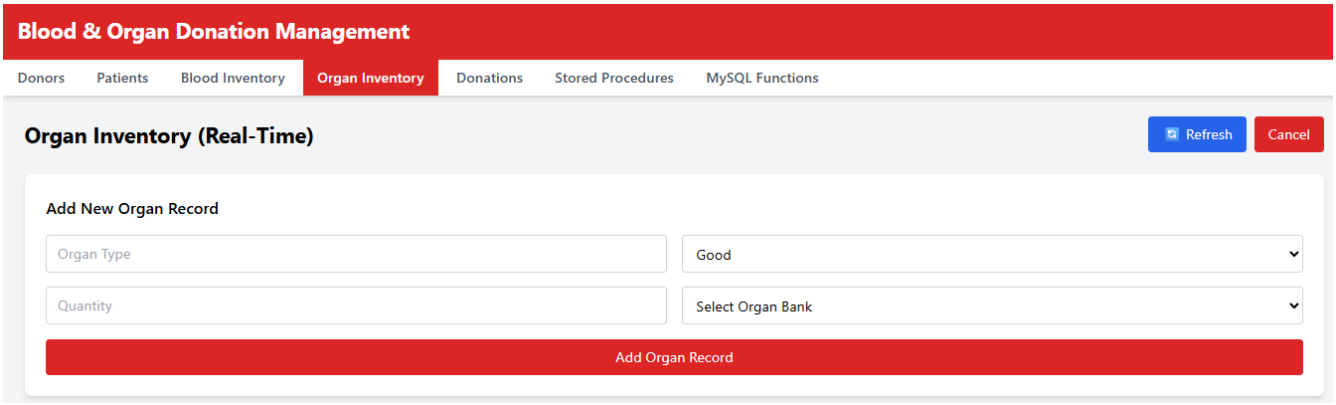


[GitHub Link]

Organs Inventory:

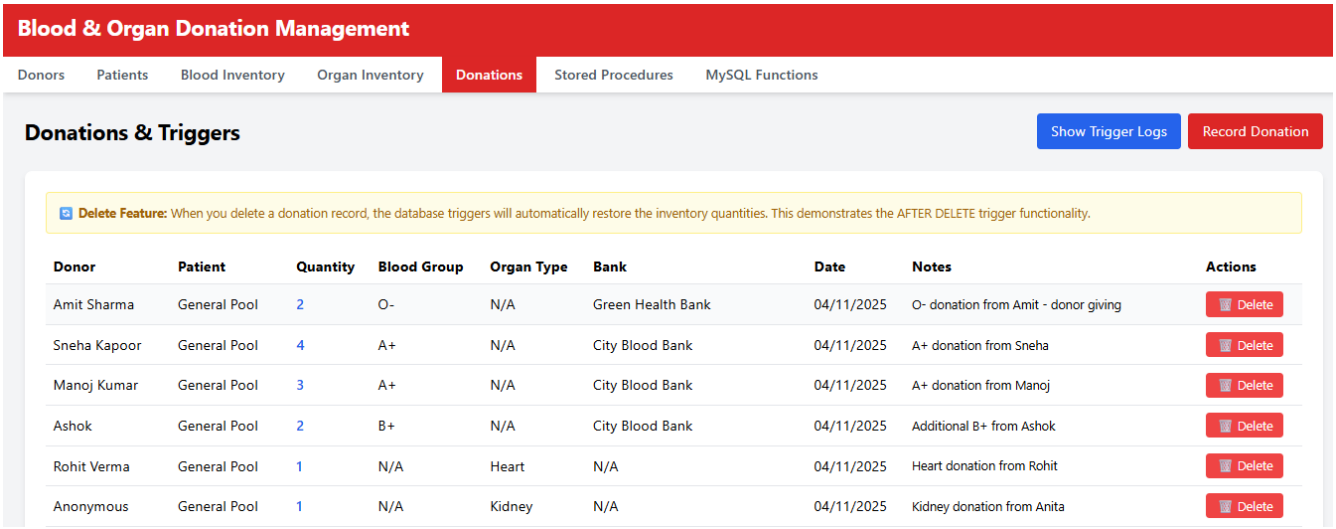


Adding

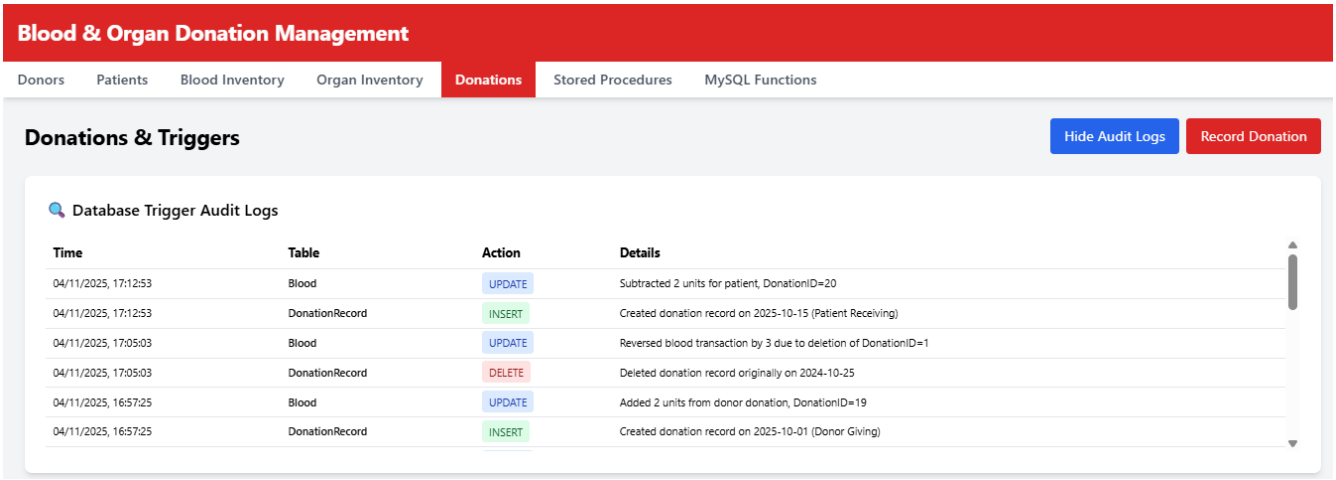


Donations:

[GitHub Link]

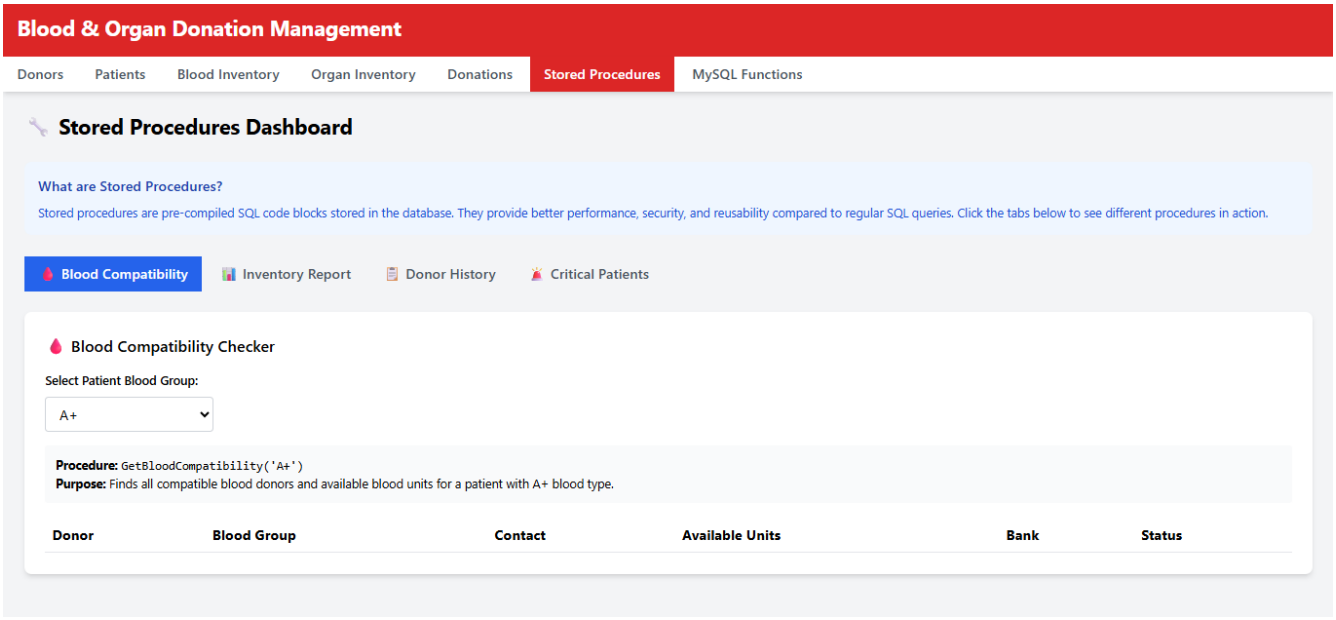


Triggers

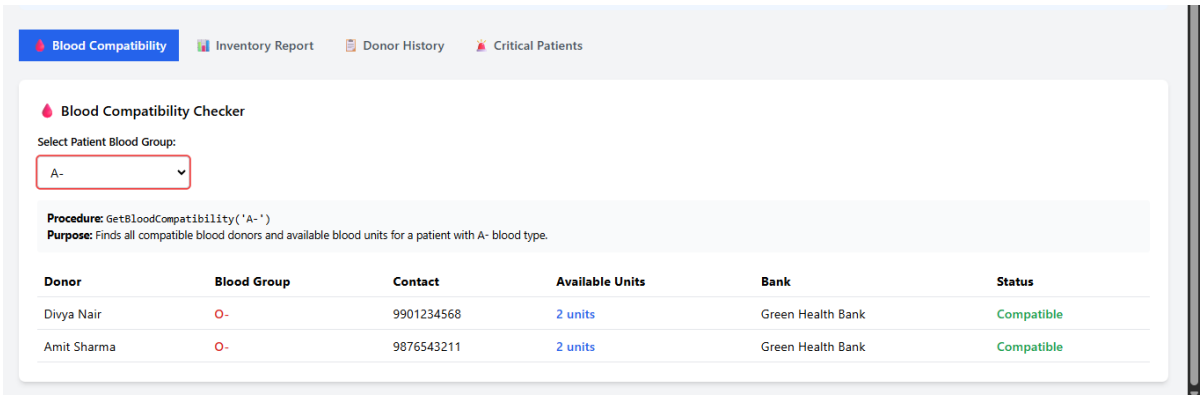


Procedures Call:

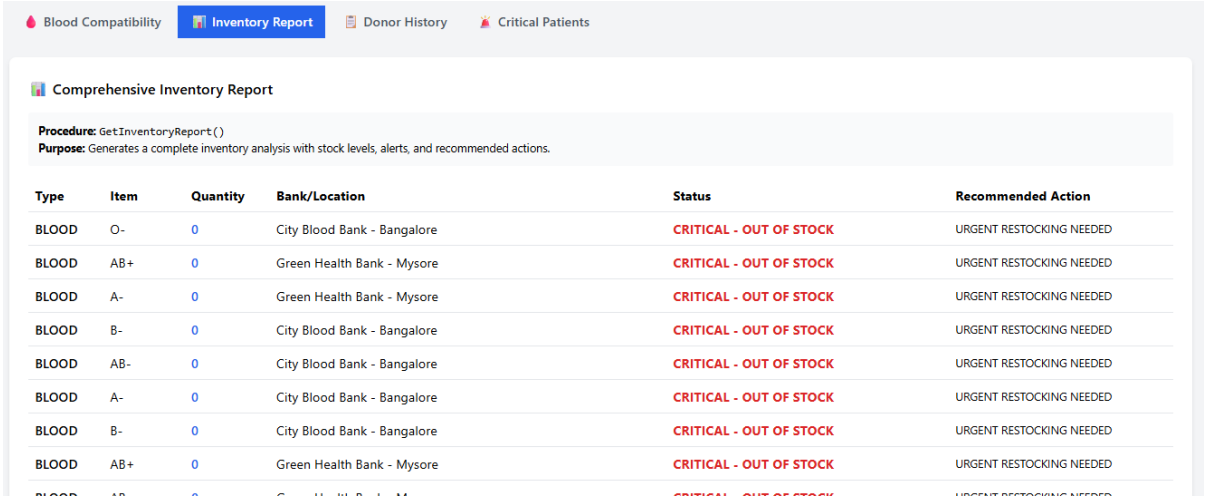
[GitHub Link]



Compabilit checking

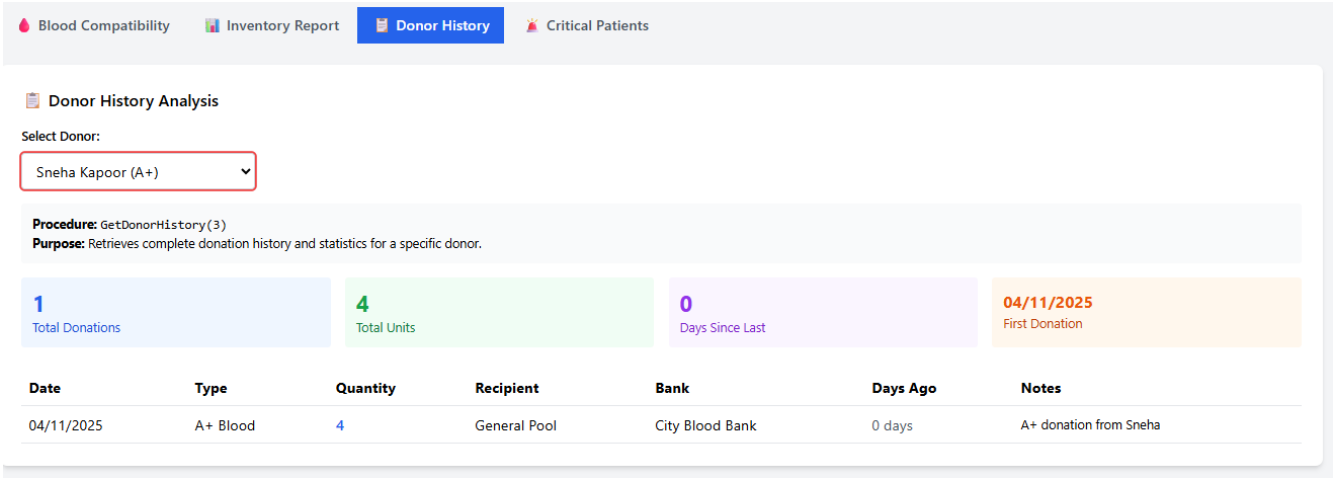


Invertory report :

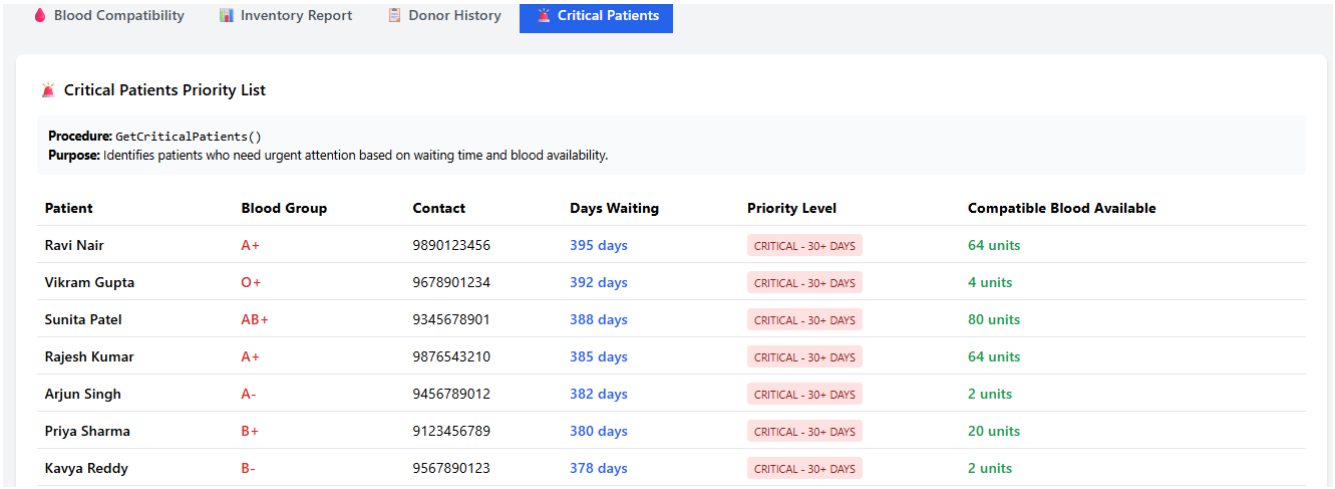


Donor History :

[GitHub Link]

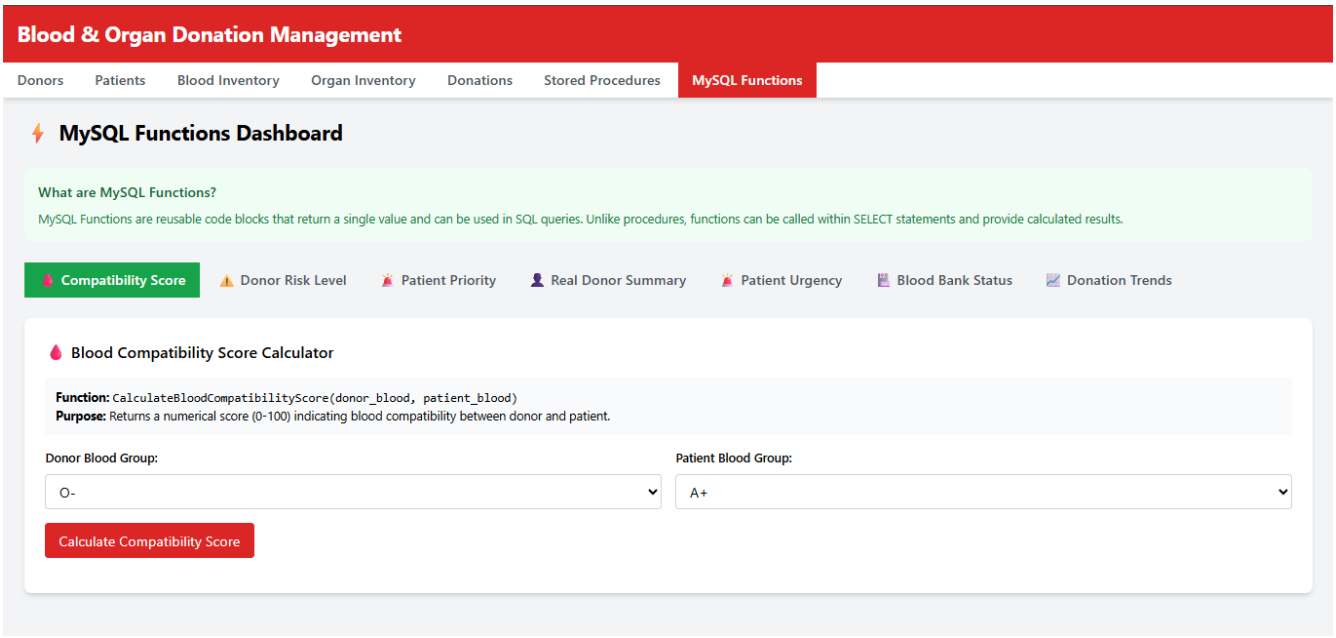


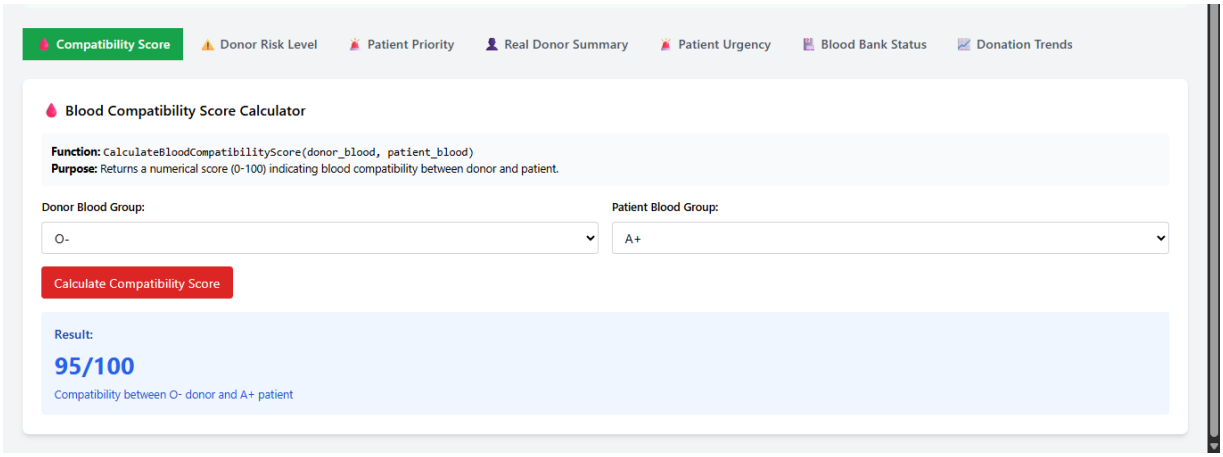
Critical patients:

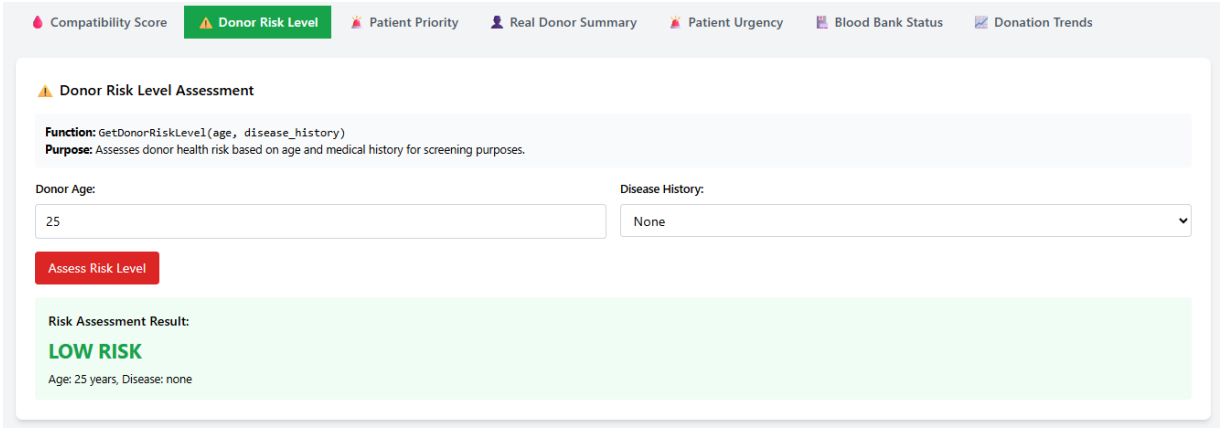


[GitHub Link]

MySQL Functions Dashboard







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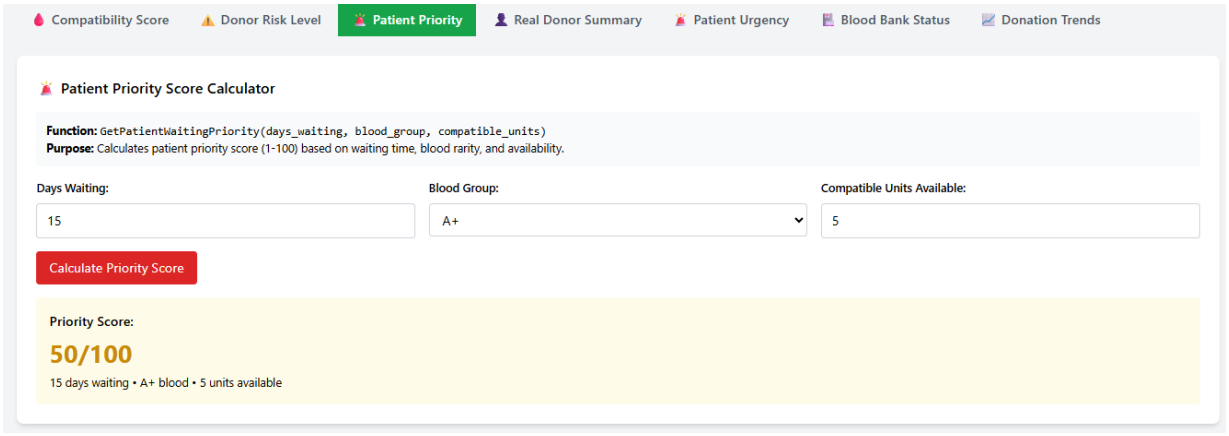
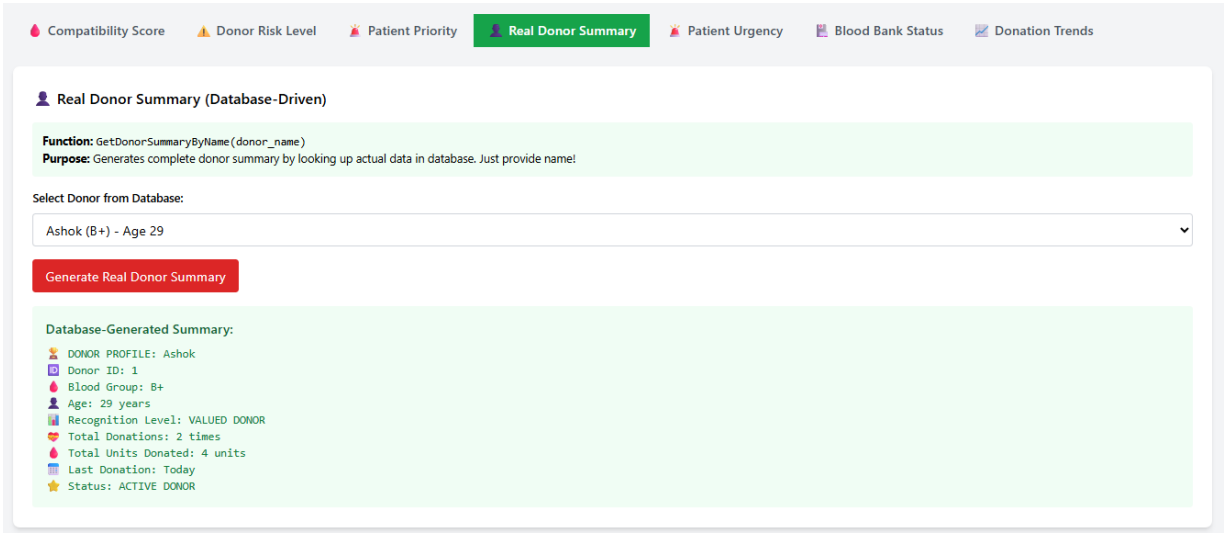
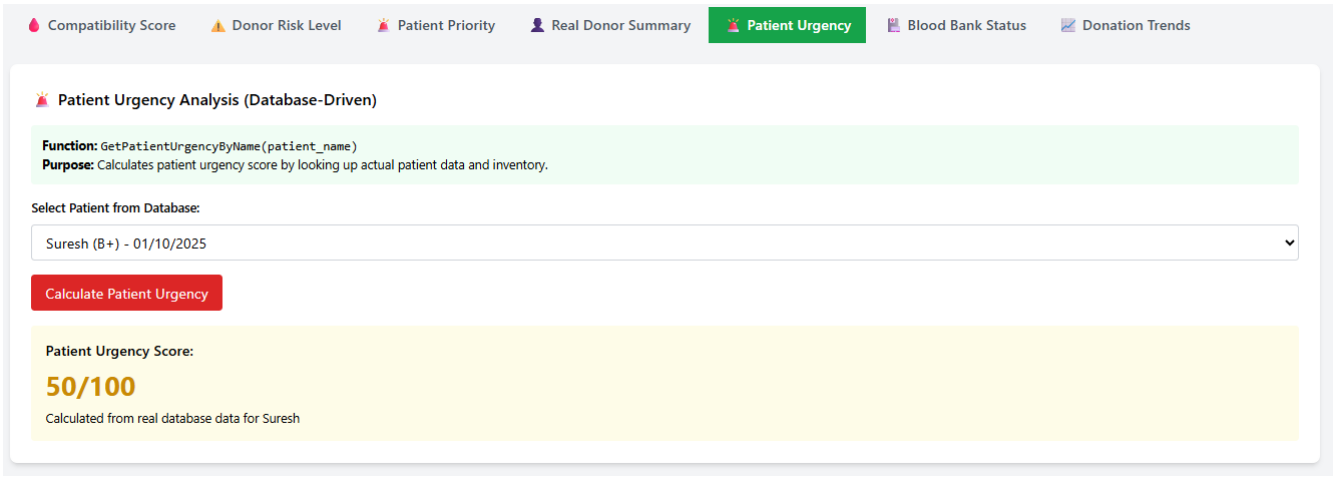
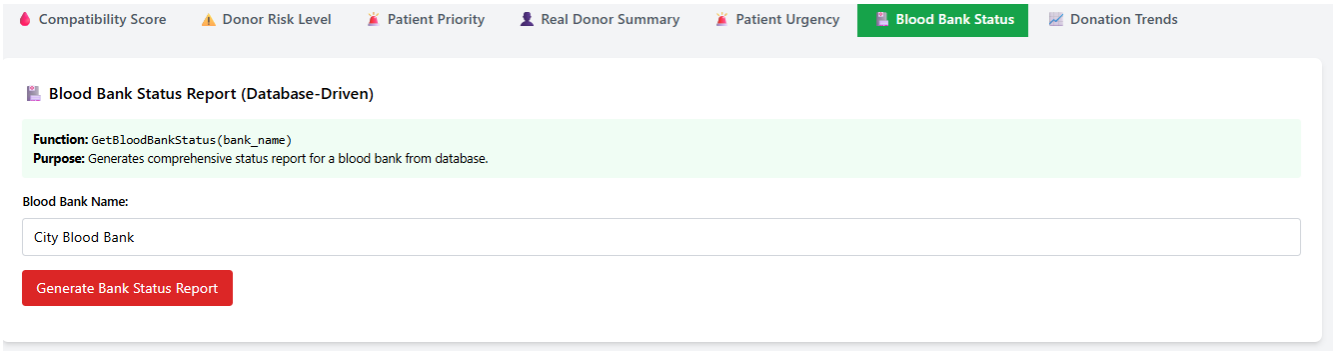
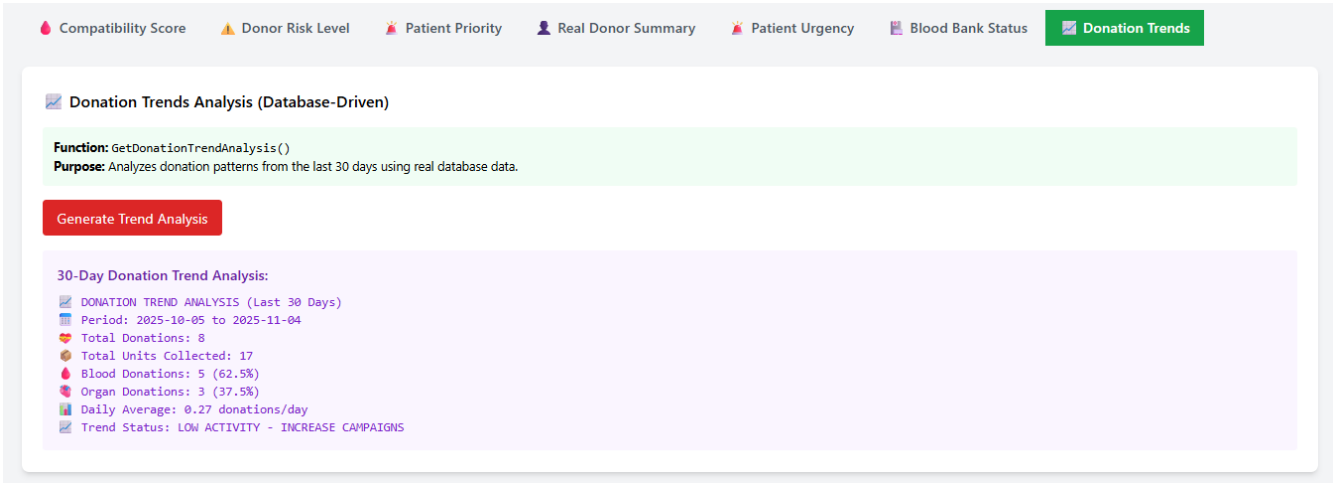

Compatibility Score
Donor Risk Level
Patient Priority
Real Donor Summary
Patient Urgency
Blood Bank Status
Donation Trends
Patient Priority Score Calculator
Function: GetPatientWaitingPriority(days_waiting, blood_group, compatible_units)
Purpose: Calculates patient priority score (1-100) based on waiting time, blood rarity, and availability.
Days Waiting:
15
Blood Group:
A+
Compatible Units Available:
5
Calculate Priority Score
Priority Score:
50/100
15 days waiting • A+ blood • 5 units available


Compatibility Score
Donor Risk Level
Patient Priority
Real Donor Summary
Patient Urgency
Blood Bank Status
Donation Trends
Real Donor Summary (Database-Driven)
Function: GetDonorSummaryByName(donor_name)
Purpose: Generates complete donor summary by looking up actual data in database. Just provide name!
Select Donor from Database:
Ashok (B+) - Age 29
Generate Real Donor Summary
Database-Generated Summary:
DONOR PROFILE: Ashok
Donor ID: 1
Blood Group: B+
Age: 29 years
Recognition Level: VALUED DONOR
Total Donations: 2 times
Total Units Donated: 4 units
Last Donation: Today
Status: ACTIVE DONOR


Compatibility Score
Donor Risk Level
Patient Priority
Real Donor Summary
Patient Urgency
Blood Bank Status
Donation Trends
Patient Urgency Analysis (Database-Driven)
Function: GetPatientUrgencyByName(patient_name)
Purpose: Calculates patient urgency score by looking up actual patient data and inventory.
Select Patient from Database:
Suresh (B+) - 01/10/2025
Calculate Patient Urgency
Patient Urgency Score:
50/100
Calculated from real database data for Suresh

[GitHub Link]


Compatibility Score
Donor Risk Level
Patient Priority
Real Donor Summary
Patient Urgency
Blood Bank Status
Donation Trends
Blood Bank Status Report (Database-Driven)
Function: GetBloodBankStatus(bank_name)
Purpose: Generates comprehensive status report for a blood bank from database.
Blood Bank Name:
City Blood Bank
Generate Bank Status Report


Compatibility Score
Donor Risk Level
Patient Priority
Real Donor Summary
Patient Urgency
Blood Bank Status
Donation Trends
Donation Trends Analysis (Database-Driven)
Function: GetDonationTrendAnalysis()
Purpose: Analyzes donation patterns from the last 30 days using real database data.
Generate Trend Analysis
30-Day Donation Trend Analysis:
DONATION TREND ANALYSIS (Last 30 Days)
Period: 2025-10-05 to 2025-11-04
Total Donations: 8
Total Units Collected: 17
Blood Donations: 5 (62.5%)
Organ Donations: 3 (37.5%)
Daily Average: 0.27 donations/day
Trend Status: LOW ACTIVITY - INCREASE CAMPAIGNS

[GitHub Link]