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CHENNAI

REPORT

Plasma Match

- A Database-Driven Platform forEnhancing Plasma Donation Efficiency and Patient Care

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Plasma Match: A Database-Driven Platform forEnhancing Plasma Donation Efficiency and Patient Care

Abstract:

The demand for plasma donations has significantly increased, highlighting the need for an efficient system to manage the plasma donation process and ensure timely matching between donors and recipients. "Plasma Match" is a sophisticated database management system developed using Structured Query Language (SQL) to optimize the plasma donation pipeline. This system is designed to facilitate the entire process, from donor registration, through health screening, to the final matching with patients requiring plasma. By leveraging the power of SQL, Plasma Match offers a robust, secure, and scalable solution that enables healthcare providers to match plasma donors accurately and efficiently with patients based on compatibility criteria such as blood type, antibodies, and medical urgency. The system prioritizes privacy and data security, implementing best practices to protect sensitive information while maintaining a user-friendly interface for both donors and healthcare administrators. The goal of Plasma Match is to streamline the plasma donation process, reduce waiting times for recipients, and contribute to better patient outcomes. Through detailed analysis and a comprehensive database design, Plasma Match demonstrates the pivotal role of database management systems in enhancing healthcare delivery and supporting critical medical treatments.

Introduction:

The Plasma Match project addresses the critical need for an optimized system to manage plasma donations and facilitate efficient donor-recipient matching in healthcare settings. Developed as a sophisticated solution, Plasma Match leverages Structured Query Language (SQL) to streamline the entire plasma donation pipeline, from donor registration to matching with patients in need. This project encompasses the design and implementation of a secure and scalable database system, ensuring accurate matching based on compatibility criteria such as blood type, antibodies, and medical urgency. Anticipated outcomes include streamlined operations within healthcare facilities, reduced waiting times for recipients, and enhanced efficiency in plasma donation processes. Moreover, Plasma Match aims to contribute to improved patient outcomes, particularly in critical medical treatments reliant on plasma transfusions. With a user-friendly interface prioritizing data privacy and security, the project holds the potential to revolutionize plasma donation management, positively impacting healthcare delivery and patient care outcomes.

Scope:

The introduction outlines the scope of the Plasma Match project, which focuses on developing an optimized system for managing plasma donations and improving the efficiency of donor-recipient matching in healthcare settings. It covers various aspects of the project, including the utilization of Structured Query Language (SQL) technology to streamline the plasma donation pipeline, from donor registration to matching with patients. Additionally, it emphasizes the design and implementation of a secure and scalable database system to ensure accurate matching based on compatibility criteria such as

blood type, antibodies, and medical urgency.

Outcomes:

The anticipated outcomes of the Plasma Match project include several key benefits for healthcare facilities, patients, and the overall plasma donation process. These outcomes encompass streamlined operations within healthcare facilities, reduced waiting times for recipients in need of plasma, and enhanced efficiency in plasma donation processes. Furthermore, the project aims to contribute to improved patient outcomes, particularly in critical medical treatments reliant on plasma transfusions. By prioritizing data privacy and security through a user-friendly interface, Plasma Match holds the potential to revolutionize plasma donation management, positively impacting healthcare delivery and patient care outcomes.

Project Objective:

The primary objective of the Plasma Match project is to optimize the plasma donation process through the implementation of a sophisticated database management system. By leveraging Structured Query Language (SQL), the system aims to streamline donor registration, health screening, and matching processes, ensuring efficient and accurate pairing between donors and recipients. Additionally, Plasma Match prioritizes privacy and data security, adhering to best practices to safeguard sensitive information. Ultimately, the project seeks to reduce waiting times for recipients, enhance patient outcomes, and contribute to the overall improvement of healthcare delivery.

Modules:

1. User Management Module

Functionality: *Handles user registration, login, and role-based access control.*

Key Operations:

- *User Registration: Collects and stores user information in the users table.*
- *User Login: Authenticates users based on credentials stored in the users table.*
- *Role-Based Permissions: Determines user capabilities in the system based on the type field.*

2. Donor Management Module

Functionality: *Manages donor information, registration, and health screening data.*

Key Operations:

- *Donor Registration: Stores donor details in the donors table, including blood type and contact information.*
- *Health Screening Records: Maintains records of donor health screenings to ensure eligibility.*

3. Inventory Management Module

Functionality*: Keeps track of blood inventory levels and manages supply data.*

Key Operations:

- *Inventory Updates: Updates the blood_inventory table after each donation or transfusion.*
- *Inventory Monitoring: Tracks available blood types and quantities to manage supply efficiently.*

4. Matching Module

Functionality: *Matches donors with recipients based on compatibility and need.*

Key Operations*:*

- Matching Algorithm: Uses data from the donors and requests tables to align donors with recipients based on blood type and urgency.

- Match Tracking: Records the outcomes of matches in the requests table.

The "Plasma Match" system effectively integrates these modules to ensure a streamlined and efficient process for managing plasma donations. The implementation leverages PHP and MySQL to handle complex data interactions and user management, ensuring a secure and user-friendly environment for both donors and administrative users.

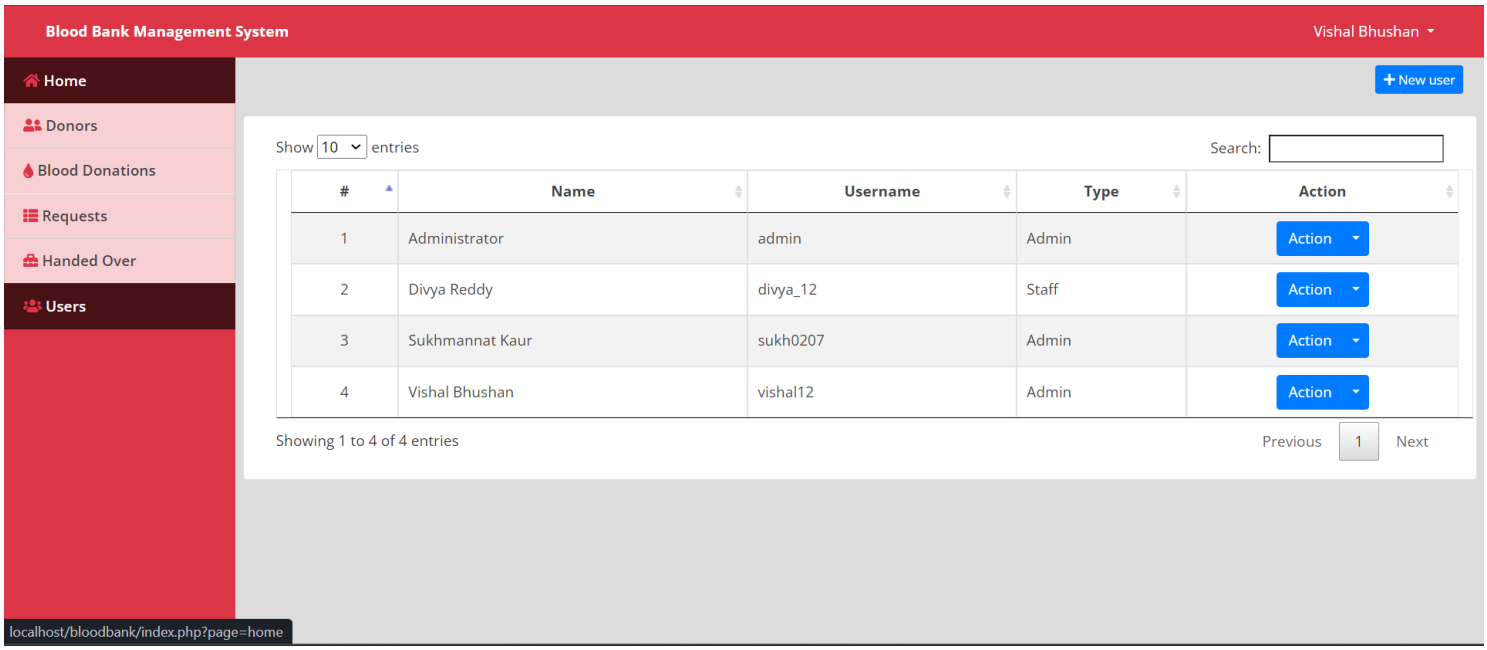
Tables:

1. *Donor Table:*
    - *Columns: Donor_ID (Primary Key)*
    - *Name*
    - *Blood_Type*
    - *Contact_Info*
2. *Health Screening Table:*
    - *Screening_ID (Primary Key)*
    - *Donor_ID (Foreign Key referencing Donor Table)*
    - *Screening_Date*
    - *Health_Status*
3. *Recipient Table:*
    - *Columns: Recipient_ID (Primary Key)*
    - *Name*
    - *Blood_Type*
    - *Contact_Info*
4. *Matching Table:*
    - *Match_ID (Primary Key)*
    - *Donor_ID (Foreign Key referencing Donor Table)*
    - *Recipient_ID (Foreign Key referencing Recipient Table)*
    - *Match_Date*
    - *Match_Status*
5. *Antibodies Table:*
    - *Columns: Antibody_ID (Primary Key)*
    - *Antibody_Type*

Explanation for tables:

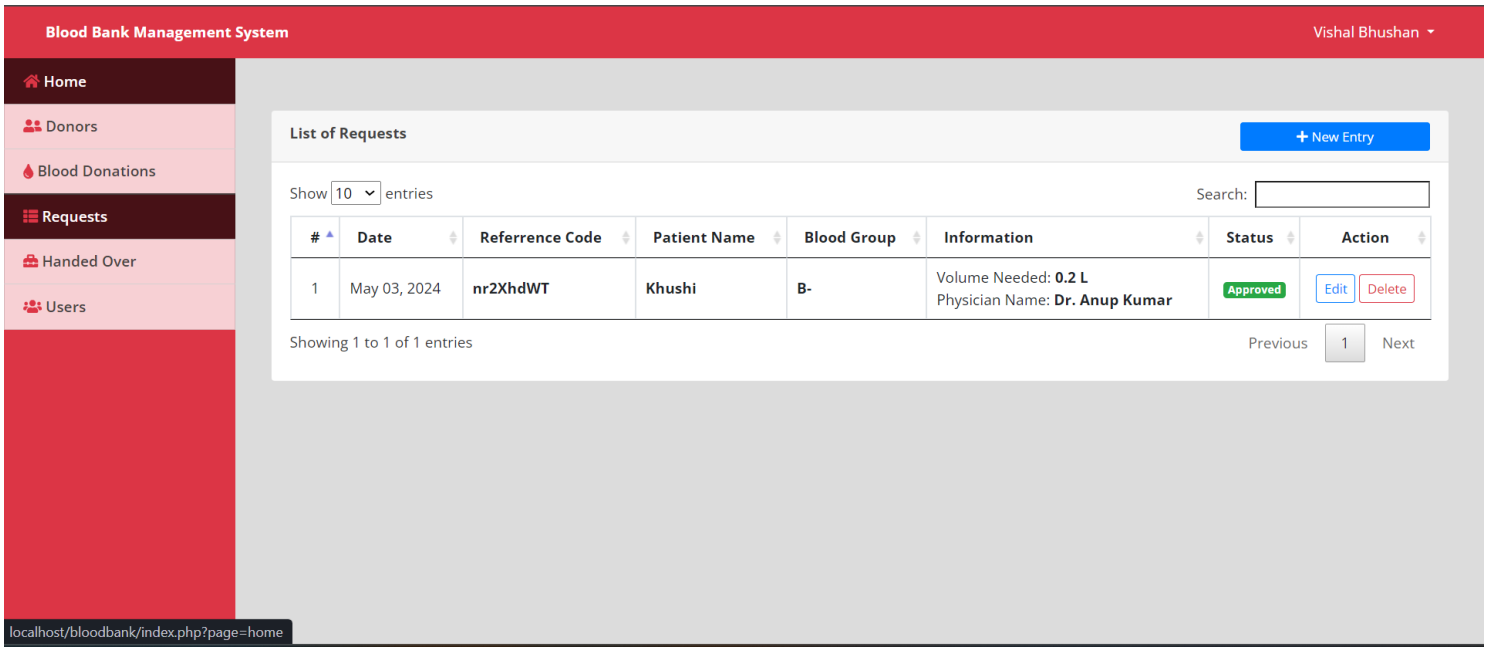
1. *Donor Entity:*
    - *Attributes: Donor_ID (unique identifier), Name, Blood_Type, Contact_Info*
    - *Represents individuals who donate plasma.*
    - *Donors undergo health screenings and may possess specific antibodies in their plasma.*
2. *Health Screening Entity:*
    - *Attributes: Screening_ID (unique identifier), Donor_ID (foreign key referencing Donor Entity), Screening_Date, Health_Status*
    - *Stores information related to the health screening process undergone by donors.*
    - *Tracks the health status of donors and their eligibility for plasma donation.*
3. *Recipient Entity:*
    - *Attributes: Recipient_ID (unique identifier), Name, Blood_Type, Contact_Info*
    - *Represents patients in need of plasma transfusions.*
    - *Recipients are matched with suitable donors based on their blood type and health status.*
4. *Matching Entity:*
    - *Attributes: Match_ID (unique identifier), Donor_ID (foreign key referencing Donor Entity), Recipient_ID (foreign key referencing Recipient Entity), Match_Date, Match_Status*
    - *Stores the matching information between donors and recipients.*
    - *Tracks successful matches between donors and recipients for plasma transfusions.*
5. *Antibodies Entity:*
    - *Attributes: Antibody_ID (unique identifier), Antibody_Type*
    - *Represents specific antibodies present in donors' plasma.*
    - *Donors may possess various antibodies that are essential for matching with compatible recipients for plasma donation.*

Output Screenshots with eplanation:

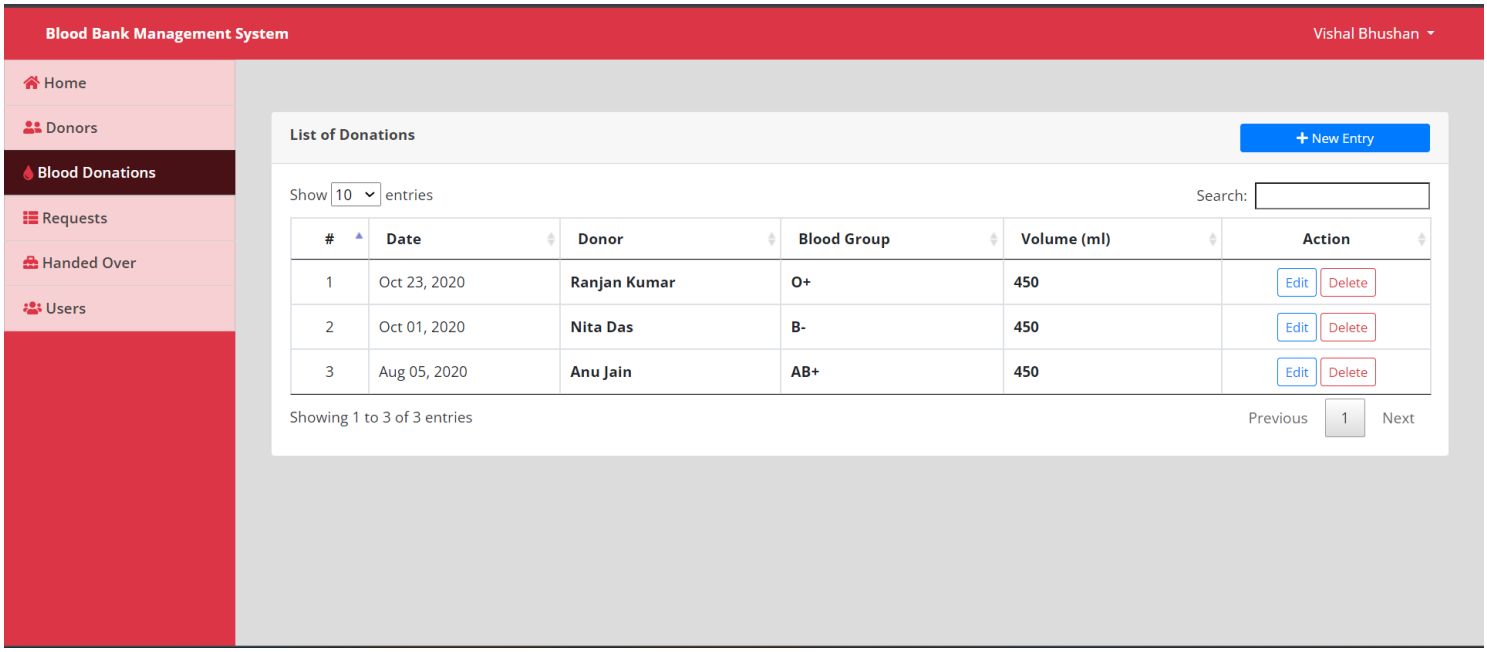


Web interface displaying a list of users with options for actions like editing or deleting user records.

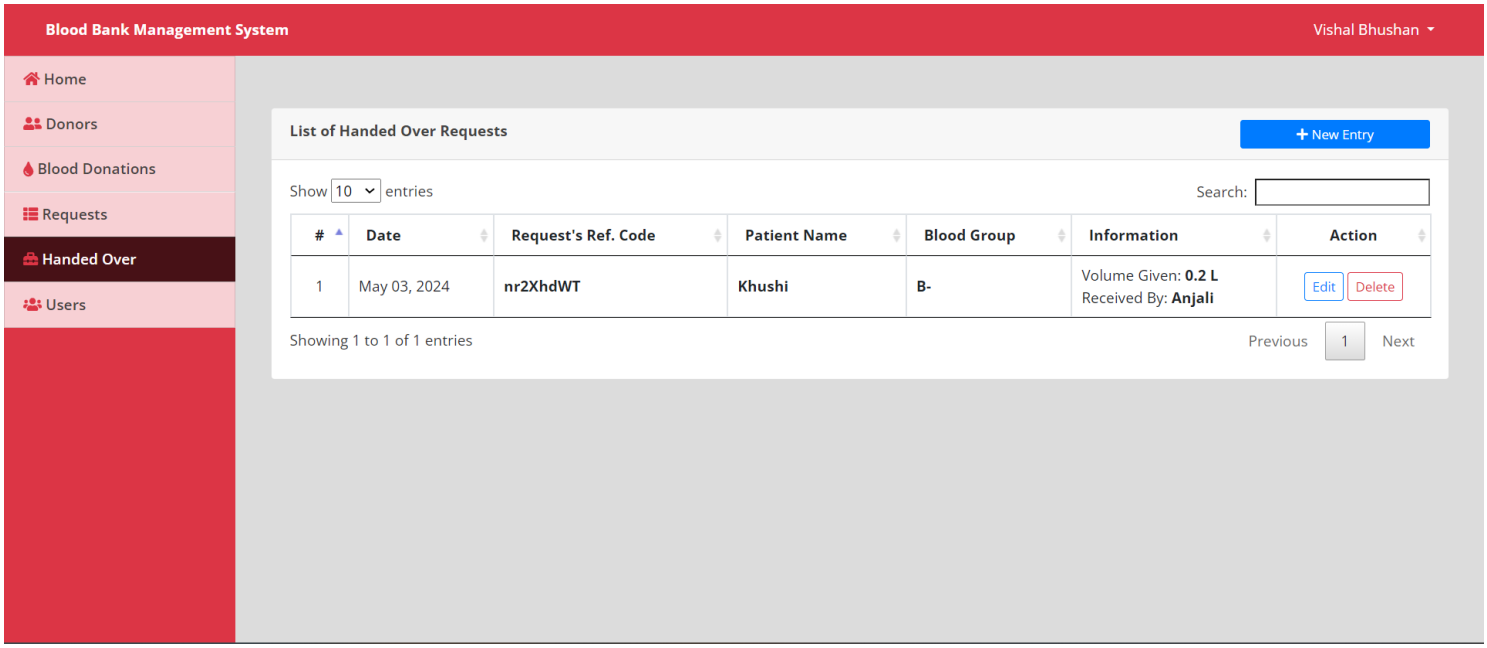
Facilitates user account management, allowing admins to control access and maintain system security.



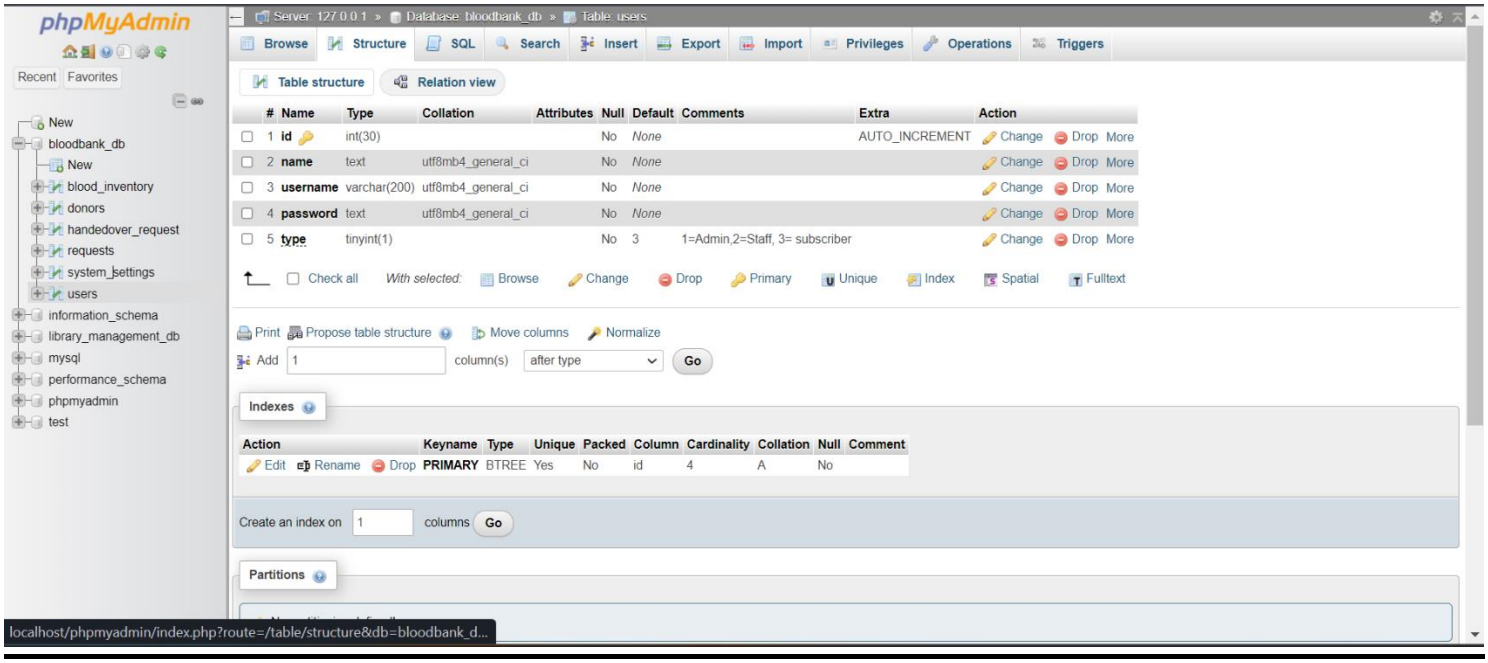
This interface part of the Blood Bank Management System shows a list of blood requests. It includes detailed information such as the date, patient name, blood group, and the volume needed, along with the status of each request.

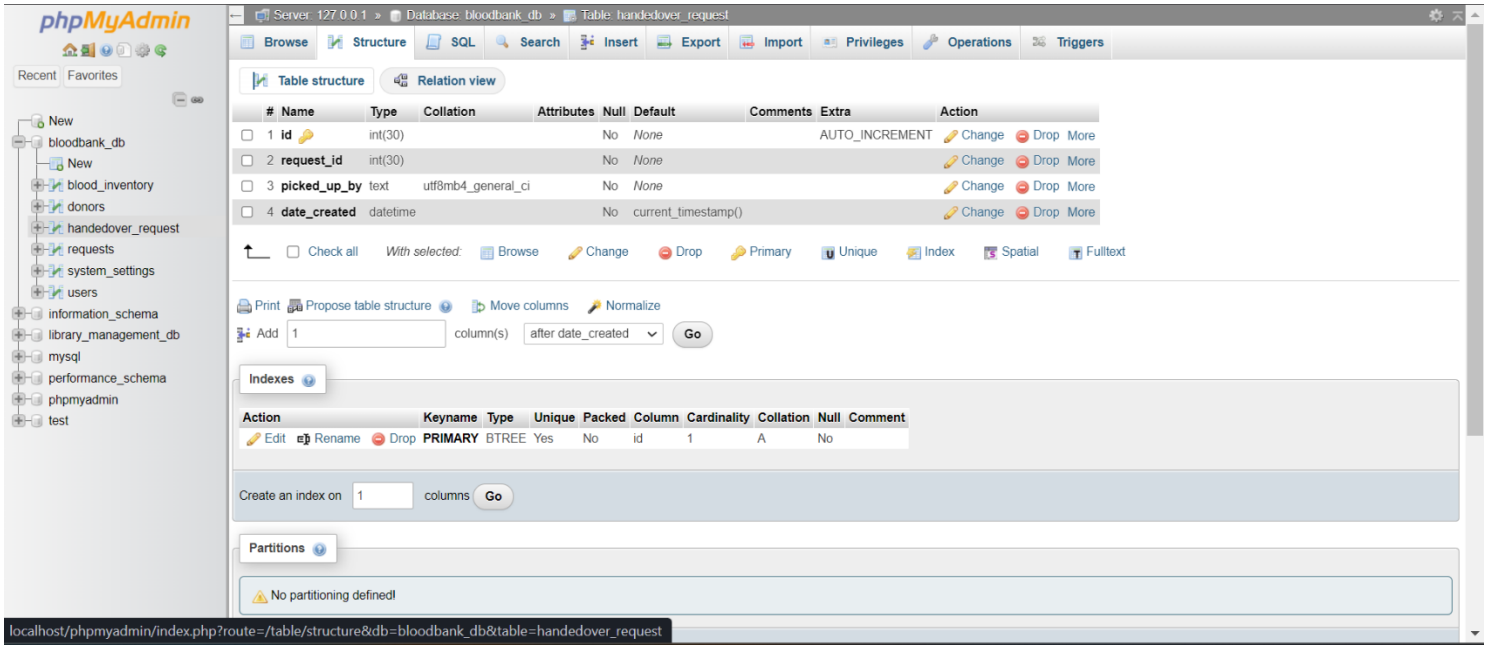


This table is crucial for managing the blood bank's inventory, allowing staff to monitor available supplies and ensure that demands are met efficiently.



This table helps manage and document the final step in the blood donation process, ensuring proper tracking and accountability for each donation handed over.





This screenshot shows the handover_request table in the phpMyAdmin interface. It includes fields like id, request_id, picked_up_by, and date_created, which are essential for tracking the handover of blood donations to respective recipients or transporters.

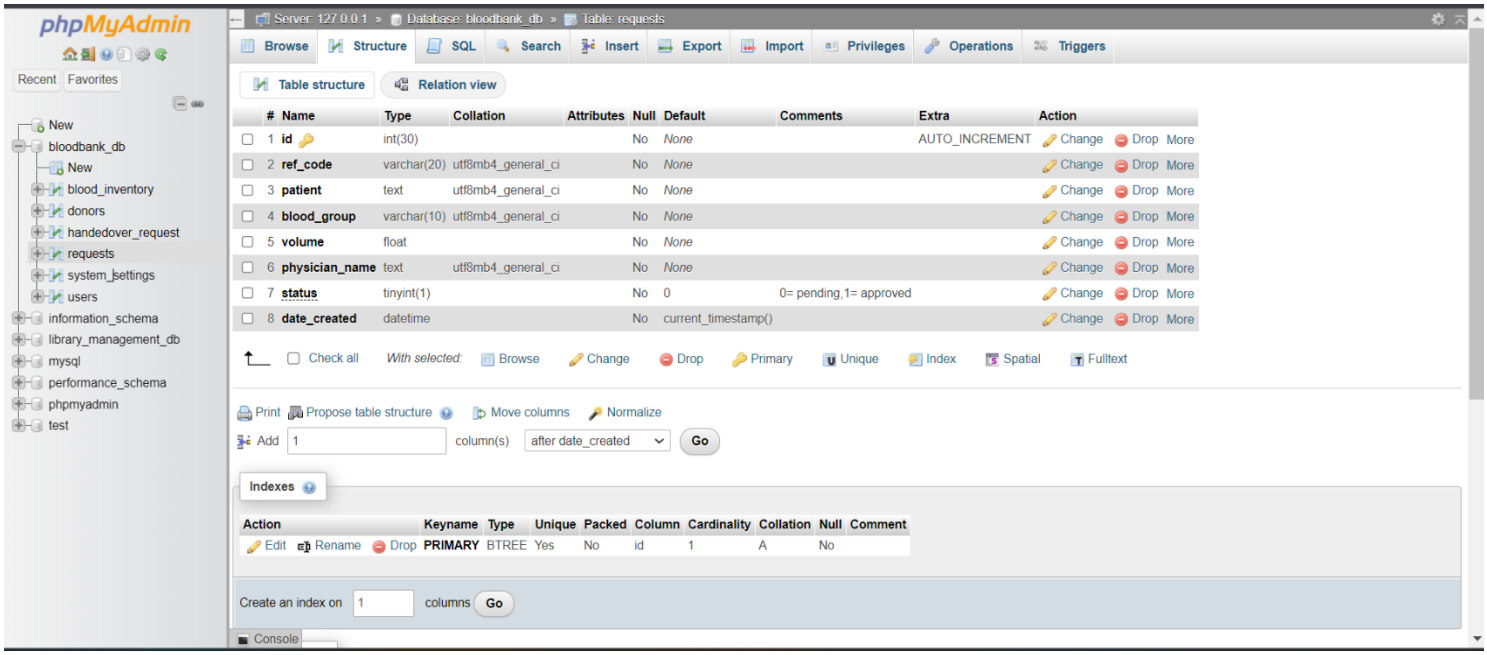
Key Fields and Implementation

*- *id*: Unique identifier for each handover event (auto-increment).*

*- *request_id*: Links to the requests table to identify the specific donation request.*

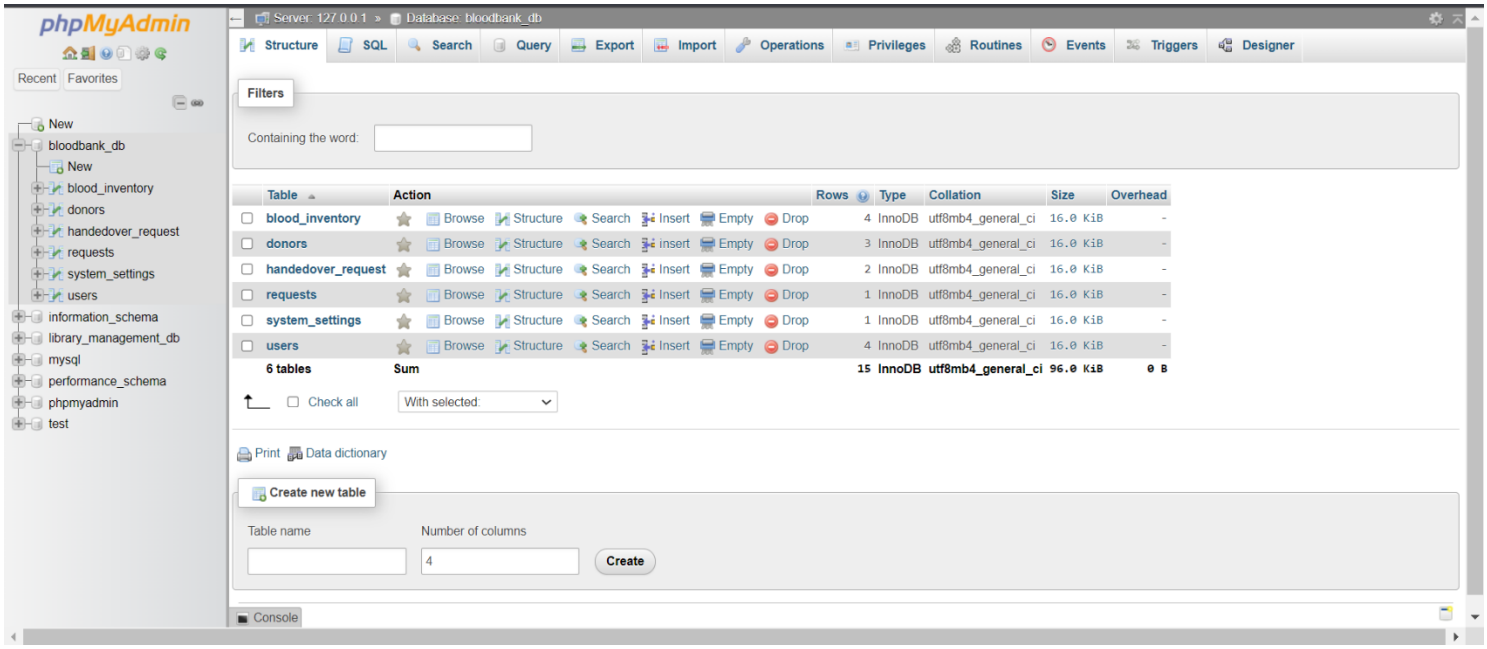
*- *picked_up_by*: Name of the person or entity who picked up the donation.*

*- *date_created*: Timestamp indicating when the handover was recorded.*



This screenshot from the blood_inventory table captures data about the current blood stock, including id, blood_group, volume, status, donor_id, request_id, and date_created.

Key Fields and Implementation
- **id*: Auto-incremented ID for each inventory entry.*
- **blood_group*: Blood type of the stored unit.*
- **volume*: Quantity of blood available.*
- **status*: Indicates whether the blood is in stock (1) or has been used (2).*
- **donor_id*: Reference to the donor from whom the blood was collected.*
- **request_id*: Association with specific requests for blood.*
- **date_created*: Date and time when the entry was added to the inventory.*



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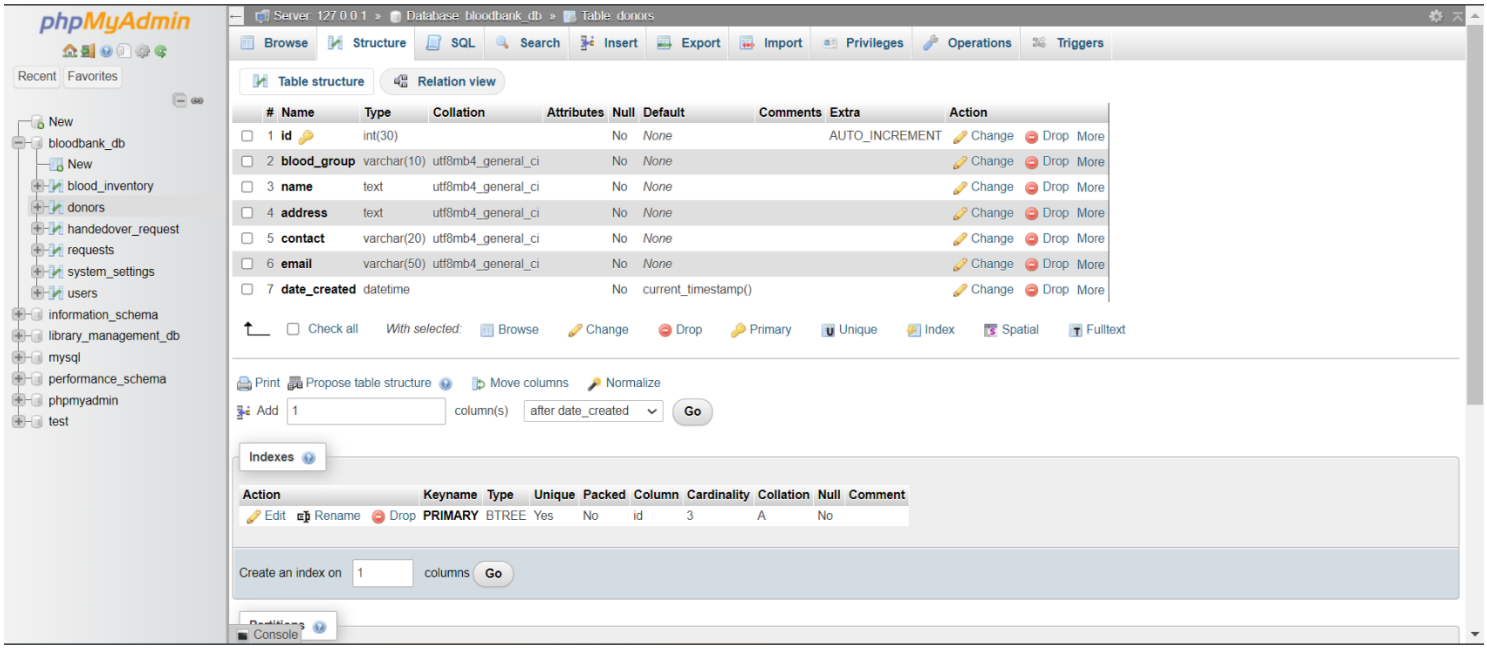

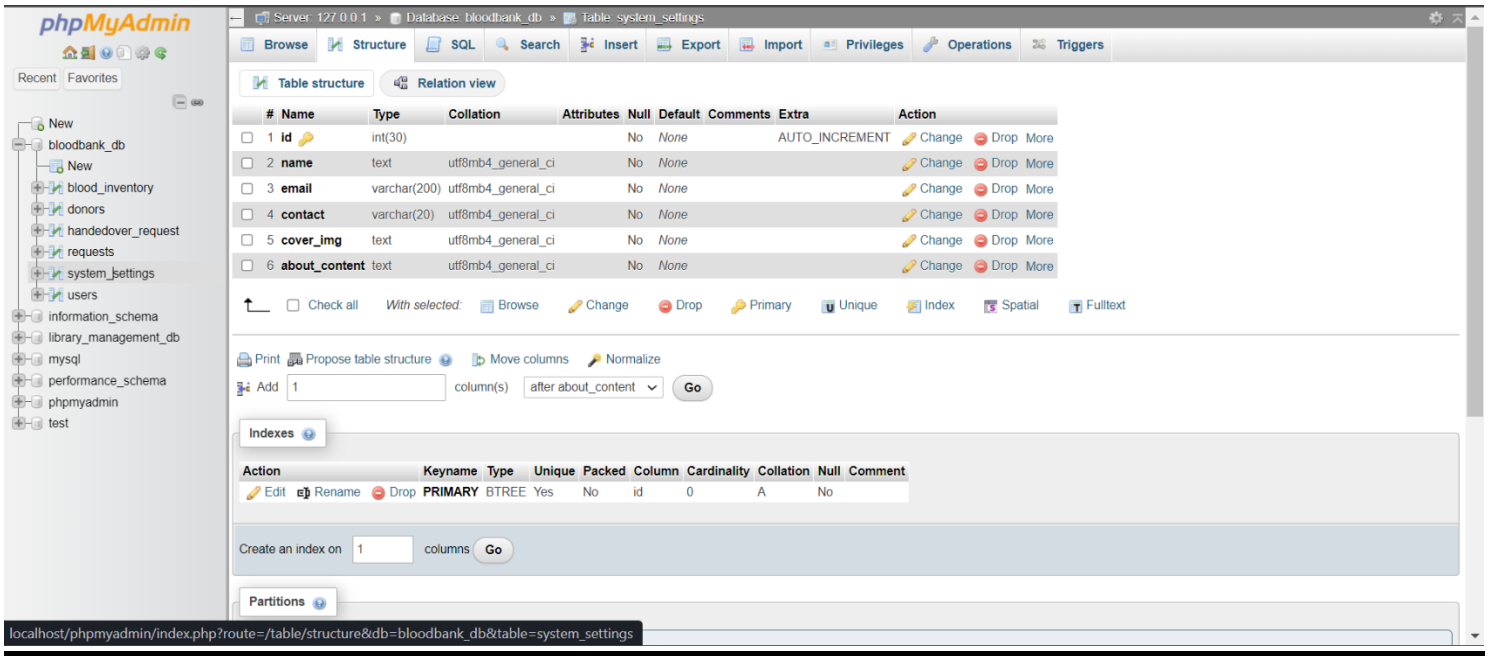

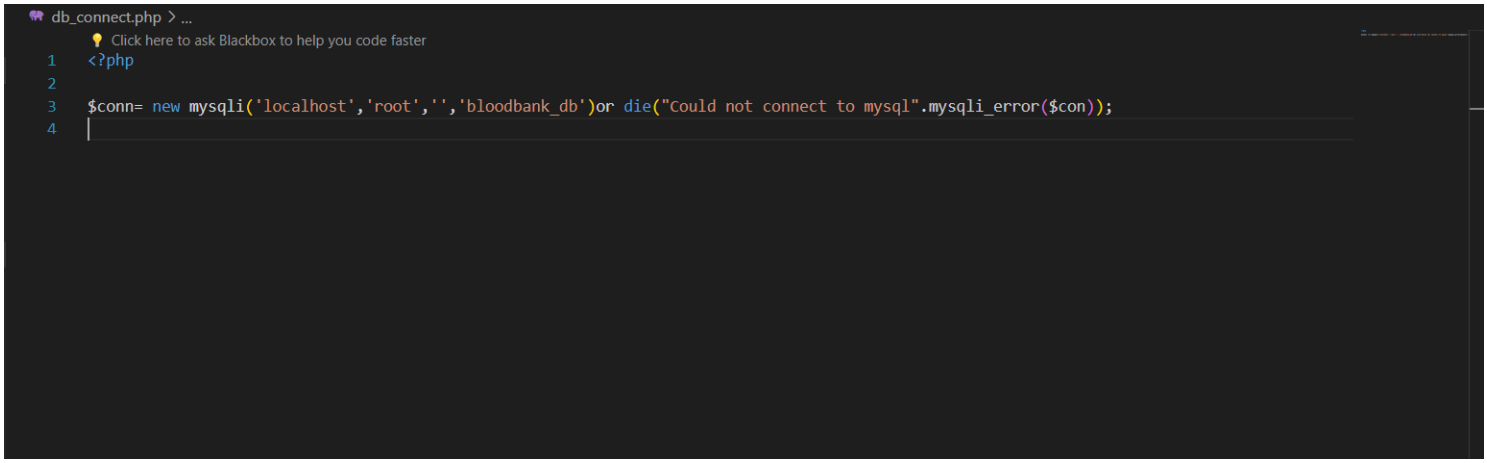

This PHP script shows the database connection setup used in the project. It establishes a connection to the MySQL server and selects the bloodbank_db database.

Key Components and Implementation
*- *Connection Setup*: The mysqli function is used to connect to the database server with specified credentials (localhost, root, password, and database name).*
*- *Error Handling*: The script includes error handling to output a message if the connection fails, which helps in debugging during development.*
This script is essential for the backend functionality of the system, allowing all other PHP scripts to interact with the database.

Conclusion:

The "Plasma Match" project represents a significant advancement in managing plasma donations and facilitating efficient donor-recipient matching in healthcare settings. Through the implementation of a sophisticated database-driven platform, the project addresses the critical need for an optimized system to streamline the entire plasma donation pipeline, from donor registration to matching with patients in need.

By leveraging the power of Structured Query Language (SQL), Plasma Match offers a robust, secure, and scalable solution that enables healthcare providers to accurately and efficiently match plasma donors with patients based on compatibility criteria such as blood type, antibodies, and medical urgency. The system prioritizes privacy and data security, implementing best practices to protect sensitive information while maintaining a user-friendly interface for both donors and healthcare administrators.

The anticipated outcomes of the Plasma Match project include streamlined operations within healthcare facilities, reduced waiting times for recipients, and enhanced efficiency in plasma donation processes. Furthermore, the project aims to contribute to improved patient outcomes, particularly in critical medical treatments reliant on plasma transfusions.

Through detailed analysis and a comprehensive database design, Plasma Match demonstrates the pivotal role of database management systems in enhancing healthcare delivery and supporting critical medical treatments. The integration of modules such as User Management, Donor Management, Inventory Management, and Matching ensures a seamless and efficient process for managing plasma donations, ultimately revolutionizing plasma donation management and positively impacting healthcare delivery and patient care outcomes.