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Fast Blood Tracking System

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ABSTRACT: In modern healthcare facilities, the efficient tracking of blood products is paramount for patient safety and effective management of resources. Traditional paper-based systems are prone to errors and delays, leading to potential risks for patients and increased operational costs. To address these challenges, we propose a fast blood tracking system leveraging advanced technologies to streamline the process and enhance overall efficiency.

The proposed system integrates RFID (Radio Frequency Identification) technology, barcode scanning, and a centralized database management system to create a seamless blood product tracking workflow. Upon arrival at the facility, each blood product is tagged with a unique RFID tag containing pertinent information such as blood type, expiration date, and donor details. As the blood products move through various stages of processing and distribution, RFID readers strategically placed throughout the facility automatically capture and update their location and status in real-time.

I. INTRODUCTION

1.1. PROJECT OVERVIEW:

In healthcare facilities around the world, the efficient management of blood is crucial for ensuring patient safety and quality of care. Blood transfusions are a common medical procedure used to treat a variety of conditions, including trauma, surgery, and chronic illnesses. However, managing the supply, demand, and quality of blood can be a complex and challenging task.

The Fast Blood Tracking System is a comprehensive software solution designed to revolutionize blood management within healthcare facilities. By automating and streamlining the processes involved in blood inventory management, donor management, blood request management, transfusion management, and expiration management, the system ensures the efficient tracking of blood from donation to transfusion. This not only improves patient safety but also enhances the overall efficiency of blood management, making it faster, more accurate, and more reliable.

The need for efficient blood tracking systems in healthcare facilities cannot be overstated. Inadequate blood management can lead to a variety of problems, including blood shortages, wastage, transfusion errors, and patient harm. In order to address these issues and ensure the safe and effective use of blood, healthcare facilities require advanced systems that can track blood from donor to recipient with speed, accuracy, and reliability. Traditional methods of blood tracking, such as manual record-keeping and paper-based systems, are prone to errors and inefficiencies. They often rely on outdated technology and lack the features necessary to effectively manage the complex processes involved in blood management. As a result, healthcare facilities are increasingly turning to automated blood tracking systems to improve efficiency, accuracy, and patient safety.

The Fast Blood Tracking System plays a critical role in modernizing blood management practices within healthcare facilities. By providing a comprehensive suite of features for managing blood inventory, donors, requests, transfusions, and expirations, the system helps healthcare providers ensure the availability of blood when needed and enhance patient safety. With its user-friendly interface, robust architecture, and stringent security measures, the Fast Blood Tracking System is an essential tool for any healthcare facility looking to improve its blood tracking processes.

The Fast Blood Tracking System provides a wide range of features to support the efficient tracking and management of blood within healthcare facilities. Some of the key features of the system include:

The system provides real-time monitoring of blood inventory, allowing healthcare facilities to track the quantity, type, and expiration date of each blood unit in stock. Automated inventory updates ensure that the inventory is always up-to-

date and accurate.

The system maintains a database of blood donors, including their personal information, medical history, and blood type. Donors can easily register, update their information, and schedule appointments for blood donation drives. Healthcare providers can submit requests for specific blood types through the system, specifying the quantity of blood units required and the desired delivery time. The system automatically matches blood requests with available blood units in the inventory and notifies the healthcare provider when the requested blood units are ready for transfusion. The system records all blood transfusions, including the patient's information, the donor's information, the transfusion date and time, and the transfused blood type. Transfusion verification mechanisms ensure that the blood type and other relevant information match the patient's requirements, reducing the risk of transfusion errors. The system monitors the expiration dates of blood units and sends alerts to healthcare providers when blood units are nearing their expiration dates. Healthcare providers can take proactive measures to prevent wastage by using soon-to-expire blood units for transfusions or by organizing donation drives to replenish the inventory. In conclusion, the Fast Blood Tracking System is a comprehensive software solution designed to streamline and manage blood tracking processes within healthcare facilities. By automating blood inventory management, donor management, blood request management, transfusion management, and expiration management, the system ensures the efficient tracking of blood from donation to transfusion. With its user-friendly interface, robust features, and stringent security measures, the Fast Blood Tracking System is an essential tool for any healthcare facility looking to improve its blood tracking processes and enhance patient safety.

II. PROBLEM STATEMENT

The following problems arise when using the blood bank's existing system:

2.1. PERSONAL PROFILE ACCESSIBILITY:

The donor's information can only be updated by the administrators of the blood bank. A donor can update their information by calling, faxing, e-mailing, but not by themselves. This is a waste of time just for updating a piece of information and it may be difficult for some donors.

2.2. DONOR MANAGEMENT:

Develop a system that provides functions to support donors in viewing and managing their information conveniently. Implement features that allow donors to access their blood donation history, update their personal information, and receive notifications about upcoming donation drives.

2.3. BLOOD AVAILABILITY:

Develop a system that enables healthcare providers to quickly find out the availability of required blood groups in blood banks. Implement a real-time inventory management system that maintains records of blood stocks, including the quantity, type, and expiration date of each blood unit.

2.4. RECORD MAINTENANCE:

Develop a centralized database system to maintain records of blood donors, blood donation information, and blood stocks. Implement features for recording donor information, donation dates, blood types, and other relevant details in a structured and organized manner.

2.5. DONOR COMMUNICATION:

Develop a system that automatically informs donors of their blood test results after donation. Implement automated notification mechanisms to send test results to donors via email or SMS, ensuring timely communication and feedback.

2.6. BLOOD REQUEST MANAGEMENT:

Develop a system that supports searching, matching, and requesting for blood, convenient for administrators. Implement features that allow healthcare providers to search for specific blood types, match blood requests with available blood units, and submit requests for blood transfusions efficiently.

III. MOTIVATION AND IDEA BEHIND THE PROJECT

3.1. MOTIVATION:

Even in this day and age we get text messages and people use such primitive methods to obtain blood during the case of a life-threatening emergencies. There are existing systems in place but the bureaucracy makes the process highly inefficient even in the case of a life and death emergency. Human life is invaluable and regardless of whoever it is life must be protected and saved at all costs. We also wanted to build a tool so that hospital has scheduled access of blood when they need it for surgeries and various other medical procedures. So, to do our part in saving human life we decided to build a tool that would help patients and hospitals to get access to blood in case of an emergency or for scheduled medical procedures.

3.2. IDEA BEHIND THE PROJECT:

When a person or hospital needs blood, they can get access to it by using our application. The app also aims to provide information about donation camps and the type of blood needed at the donation camps. There are also features to test the eligibility of a donor and the donor can become a member to volunteer at donation camps. Hospitals can get scheduled access for blood on the day of a medical procedure by submitting the necessary documents. This app mainly aims at coming up with an algorithm to sort the priority of access to blood according to the parameters of quantity, availability and time constraints.

3.3. SYSTEM WORKFLOW:

The following is the typical workflow of the Fast Blood Tracking System:

3.3.1. Donor Management:

Donors register in the system and provide their personal information, including their blood type. Donors can view and manage their information, donation history, and test results through the donor portal.

3.3.2. Blood Availability:

Healthcare providers can quickly find out the availability of required blood groups in blood banks. The system maintains real-time records of blood stocks, including the quantity, type, and expiration date of each blood unit.

3.3.3. Record Maintenance:

The system maintains centralized records of blood donors, blood donation information, and blood stocks in a structured and organized manner. Detailed records of blood donors, including their personal information, medical history, and blood type, are stored in the system. Donors can easily register, update their information, and schedule appointments for blood donation drives. The system records all blood donations, including the donor's information, donation date and time, blood type, and quantity donated. This information is stored in a structured and organized manner, allowing healthcare providers to easily access and retrieve donation records as needed. Real-time records of blood stocks, including the quantity, type, and expiration date of each blood unit in stock, are maintained by the system. Automated inventory updates ensure that the inventory is always up-to-date and accurate.

3.3.4. Donor Communication:

Effective communication with donors is essential for maintaining a steady supply of blood within healthcare facilities. The Fast Blood Tracking System provides automated communication mechanisms to keep donors informed and engaged throughout the donation process. After donating blood, donors receive automated notifications of their blood test results. This ensures timely communication and feedback, encouraging donors to continue donating blood in the future. Automated appointment reminders are sent to donors, reminding them of upcoming blood donation drives and encouraging them to schedule appointments. Donors have the option to provide feedback on their donation experience through the system. This feedback helps healthcare facilities improve their blood donation processes and encourages donor retention.

3.3.6. Blood Request Management:

Efficient management of blood requests is essential for ensuring that patients receive the blood they need in a timely manner. The Fast Blood Tracking System provides a comprehensive blood request management system to streamline the process of matching blood requests with available blood units. Healthcare providers can submit requests for specific blood types through the system, specifying the quantity of blood units required and the desired delivery time. The system automatically matches blood requests with available blood units in the inventory, prioritizing the closest match in terms of blood type and expiration date. Healthcare providers can track the status of their blood requests in real-time,

receiving notifications when the requested blood units are ready for transfusion.

IV. ANALYSIS AND DESIGN

4.1. ANALYSIS OF THE EXISTING SYSTEM:

There are two types of process in the existing system: the blood donation process by donors, and the blood request process by hospitals. In both processes, an administrator is in charge of managing the blood inventory in the blood bank.

Blood Donation Process by Donors:

When a new donor comes to donate blood, they are required to fill out their personal information during the registration process before making a donation. After the donation, the donor is given a donor identification card with their name, blood type and a barcode to be used as a reference for future donations. The barcode is used to retrieve the donor's record containing their personal information, medical history and donation information, including blood results.

Only blood bank administrators have the authority to access the donor's records, since the system is only available for their use within the organization. This makes it difficult for donors to make changes to their personal information within the system. That is, for donors to update their personal information, such as their phone number, mailing address, or e-mail, they cannot update the information by themselves, but have to contact the blood bank center to update their information. At the back the card is a table that contains number of donations, date, location, and the blood collector's signature. Existing donors can submit their donor ID cards to retrieve their personal information and donation records and start the blood donation process, and they will be given a new card after they have donated blood for a total of eight times. Having a donor ID card may be a tangible reminder to people that they are helping lives as a blood donor; however, possessing a physical card comes with drawbacks such as loss or damage. To ensure donors can still identify themselves with the system, other credentials, such as username and password, can be used as a safeguard if their donor ID card is lost or damaged. If the donated blood is disqualified, the donor will be notified through postal mail that their blood component is reactive to viruses, meaning that there is a positive result of the blood being infected, and the organization will also inform the donor to perform another blood test at the blood bank to confirm the result of blood. If the blood is qualified, the administrator then will deposit the blood into the inventory for future requests.

Blood Request Process by Hospitals:

Hospitals can request for blood by calling in or e-mailing the blood bank the type of blood and the quantity that is in need. The administrator is responsible in 16 checking the availability of the blood type according to the request. If the requested blood type is available, the administrator will withdraw the blood from the inventory and transfer it to the hospital. However, if the requested blood is unavailable, the administrator will send an e-mail to inform the hospital.

4.2. REQUIREMENT ANALYSIS:

4.2.1. Registration of donor:

Requires an interface for the registering the details of the donor.

4.2.2. Donor:

To be able to view their donation records, including where and when they made donations, and the blood results for each, to learn of their donated blood quality and schedule their next donations. To be able to view and update their personal information, including name, contact address, and phone number, to keep their donor's information record up-to-date with the blood bank. To be notified of the blood results of their previous donation by e-mail, to know the success of their donation.

4.2.3. Health Information:

Attributes- Body Weight, Pulse Rate, Hemoglobin, Weight of Bag, Blood pressure, Temperature.

4.2.4. Donation Details:

Attributes- Blood group, Number of bags, Donation date.

4.2.6. Administrator:

To be able to create, update, delete, and query donor's records in order to manage donor information. To be able to create, update, delete, and retrieve donation records to manage information about donations made. To be able to deposit

donated blood into inventory when donations are made. To be able to withdraw blood from the inventory and keep a record of blood stocks to always keep count of the blood bags. To be able to create, update, delete, and retrieve request records from hospitals to manage hospital requests for blood. To be able to create, update, delete, and query hospital's records in order to manage hospital information. To be able to send e-mails to donors for their user account and blood results through the system. To be able to send e-mail responding to hospitals for their blood requests through the system.

4.3. BENEFIT ANALYSIS:

- Users do not have to contact the hospital to know the results of their blood donation. They can view their results through the website by logging-in with their username and password.
- The reports and information are kept in electronic form and can be easily maintained by the administrators, and donors may access their donation records whenever they want to.
- The reports of donations are kept in electronic files so that they may last longer and have less chance of being lost or damaged.
- Administrators of the system can easily manage blood stock and blood withdrawals that have been requested by the hospitals.

V. FUNCTIONALITY

5.1. DONOR REGISTRATION:

The Fast Blood Tracking System provides a user-friendly registration process for blood donors. Donors can register in the system and provide their personal information, medical history, and blood type. The registration process is simple and convenient, allowing donors to quickly and easily sign up to donate blood.

5.2. DONOR REGISTRATION PAGE:

5.2.1. Personal Information:

Donors are required to provide their personal information, including their name, contact details, age, gender, and address.

5.2.2. Medical History:

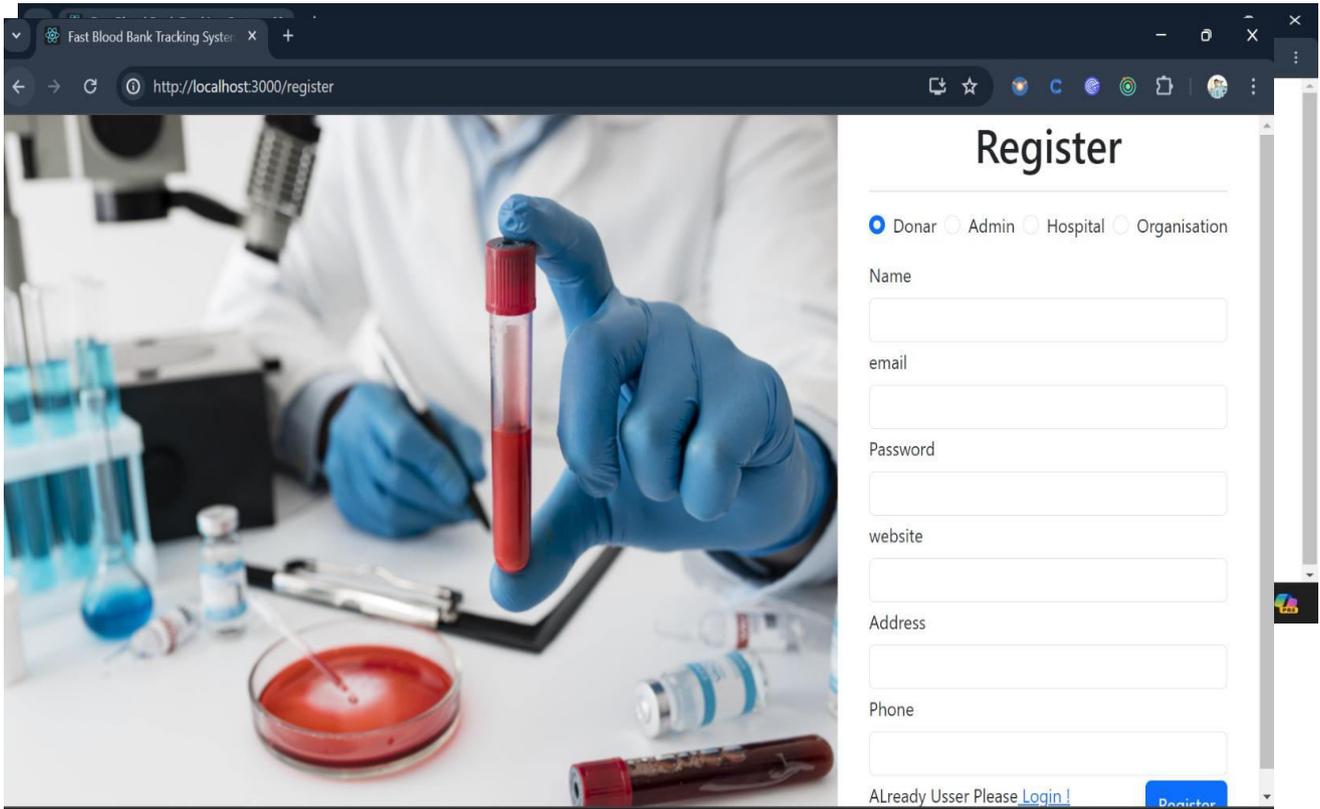
Donors are asked to provide information about their medical history, including any pre-existing conditions, medications, or allergies they may have.

5.2.3. Blood Type:

Donors are asked to specify their blood type, if known. If the donor is unsure of their blood type, they can indicate this during the registration process.

5.2.3. Appointment Scheduling:

Donors have the option to schedule appointments for blood donation drives directly through the registration page. They can select a convenient date, time, and location for their donation.



Donor login page

5.2.4. Administrator Registration:

In addition to donor registration, the Fast Blood Tracking System also allows administrators to register and manage their accounts. Administrators have access to additional features and functionalities within the system, allowing them to oversee and coordinate blood management activities within their organization.

5.3. ADMINISTRATOR REGISTRATION PAGE:

5.3.1. Organization Details:

Administrators are required to provide details about their organization, including the name, type, and location of the organization.

5.3.2. Contact Information:

Administrators are asked to provide their contact information, including their name, email address, phone number, and position within the organization.

5.3.3. Login Credentials:

Administrators are prompted to create a username and password for their account. These credentials will be used to log in to the system and access the administrative dashboard.

Admin login page

5.3.4. Organization Registration:

The Fast Blood Tracking System allows various types of organizations, such as blood camps, nursing homes, private company hospitals, ashrams, Dharamshala, sansthans, national and international hospitals, to register and manage their blood bank details.

5.4. ORGANIZATION REGISTRATION PAGE:

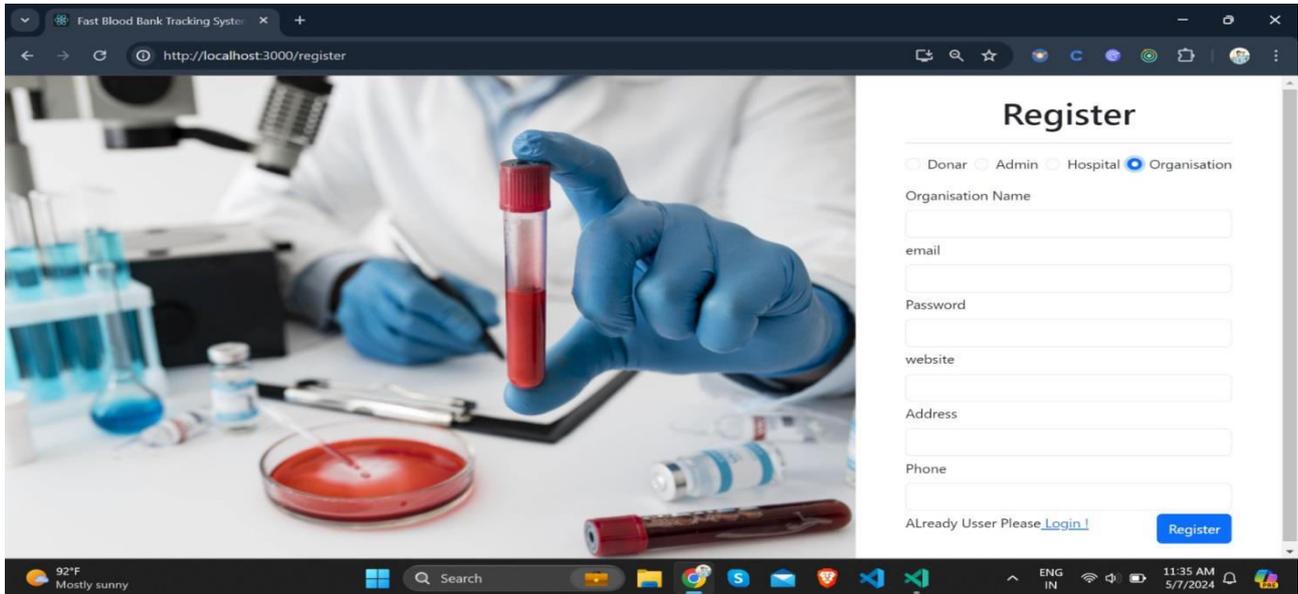
5.4.1. Organization Type:

Organizations are asked to specify their type, such as blood camp, nursing home, private company hospital, ashram,

Dharamshala, sansthan, national hospital, or international hospital.

5.4.2. Organization Details:

Organizations are required to provide details about their organization, including the name, location, and contact information.



Organization login page

5.4.3. Blood Bank Details:

Organizations with blood banks are asked to provide details about their blood bank, including the blood types available, the quantity of blood units in stock, and the expiration dates of the blood units.

5.5. LOGIN CREDENTIALS:

Organizations are prompted to create a username and password for their account. These credentials will be used to log in to the system and access their organization's dashboard.

5.5.1. Login Pages:

The Fast Blood Tracking System provides separate login pages for donors, administrators, and organizations, allowing each user type to access their respective accounts and perform specific actions within the system.

5.5.2. Donor Login Page:

Donors can log in to the system using their registered email address and password. Once logged in, they can view and update their donor information, schedule appointments for blood donation drives, and receive notifications about upcoming events.

5.5.3. Administrator Login Page:

Administrators can log in to the system using their registered username and password. Once logged in, they can access the administrative dashboard, where they can manage donor information, track blood inventory, submit blood requests, and perform other administrative tasks.

5.5.4. Organization Login Page:

Organizations can log in to the system using their registered username and password. Once logged in, they can access their organization's dashboard, where they can manage their blood bank details, track blood inventory, submit blood requests, and view donation statistics.

By providing user-friendly registration pages and login pages for donors, administrators, and organizations, the Fast

Blood Tracking System ensures that all users can easily access and manage their accounts within the system. Whether it's scheduling blood donation appointments, tracking blood inventory, or submitting blood requests, the system provides a seamless and efficient user experience for all users.

VI. FEATURES

The Fast Blood Tracking System provides the following key features:

6.1. USER-FRIENDLY INTERFACE:

A user-friendly web application interface that allows donors, healthcare providers, and administrators to access the system conveniently from any device with an internet connection.

6.2. DONOR PORTAL:

A dedicated portal for donors to view and manage their information, donation history, and test results. Donors can also schedule appointments for blood donation drives and receive notifications about upcoming events.

6.3. REAL-TIME INVENTORY MANAGEMENT:

A real-time inventory management system that provides up-to-date information about the availability of blood stocks in blood banks, including the quantity, type, and expiration date of each blood unit.

6.4. CENTRALIZED DATABASE:

A centralized database system that maintains records of blood donors, blood donation information, and blood stocks in a structured and organized manner.

6.5. AUTOMATED COMMUNICATION:

Automated communication mechanisms to inform donors of their blood test results after donation. Donors receive notifications via email or SMS, ensuring timely communication and feedback.

6.6. BLOOD REQUEST MANAGEMENT:

A comprehensive blood request management system that supports searching, matching, and requesting for blood. Healthcare providers can search for specific blood types, match blood requests with available blood units, and submit requests for blood transfusions efficiently.

VII. RESULT ANT CONCLUSION

The Fast Blood Tracking System represents a significant advancement in blood management technology, aiming to streamline and optimize the blood donation and transfusion process within healthcare facilities. By leveraging modern technologies such as web-based interfaces, mobile applications, and IoT devices, the system provides real-time information about blood inventory, automated blood request management, and seamless donor communication.

One of the key features of the Fast Blood Tracking System is its ability to provide accurate and up-to-date information about blood availability. Healthcare providers can easily access information about the quantity and type of blood units available in the inventory, allowing them to make informed decisions and ensure timely access to blood supplies for patients in need.

Furthermore, the system's automated blood request management module simplifies the process of matching blood requests with available blood units, reducing the time and effort required to fulfill blood requests. Healthcare providers can submit blood requests through the system, and the system automatically matches the requests with available blood units based on factors such as blood type, quantity, and expiration date.

The Fast Blood Tracking System also facilitates seamless communication with blood donors, allowing donors to register, schedule appointments for blood donation drives, and receive notifications about their blood test results. By providing donors with a user-friendly and convenient platform to donate blood, the system encourages regular blood donation and helps maintain a steady supply of blood within healthcare facilities.

In conclusion, the Fast Blood Tracking System represents a comprehensive and efficient solution for blood management within healthcare facilities. By providing real-time information about blood availability, streamlining blood request management, and facilitating seamless communication with blood donors, the system helps improve the



efficiency, safety, and effectiveness of blood transfusion processes, ultimately enhancing patient care and outcomes.

The screenshot shows a web browser displaying the 'Blood Bank APP' interface. The page title is 'Blood Bank APP' and the user is logged in as 'Welcome'. A sidebar on the left contains navigation options: 'Inventory', 'Donar', 'Hospital', and 'Orgnaisation'. The main content area is titled '+Add Inventory' and displays a table with the following data:

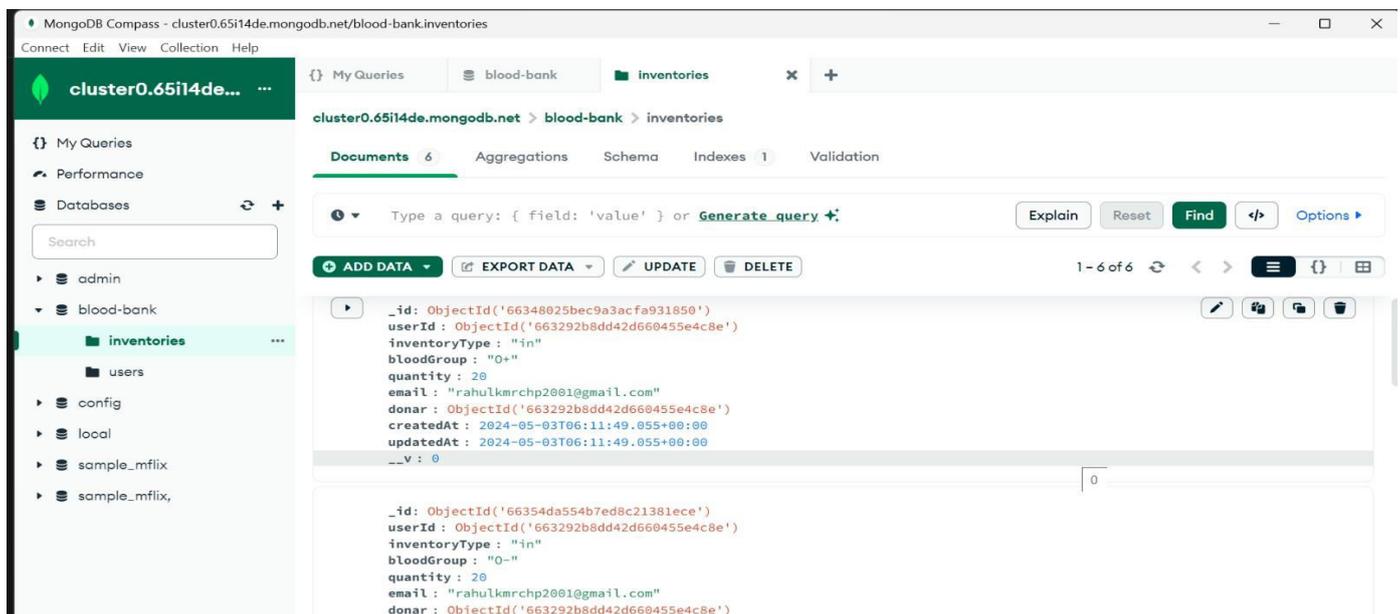
Blood group	Inventory Type	Donar Type	Quantity	Time & Date
AB-	in	20 (ML)	t	07/05/2024 00:50 AM
O+	in	10 (ML)	t	06/05/2024 21:26 PM
O+	in	10 (ML)	t	06/05/2024 21:26 PM
O+	in	10 (ML)	t	06/05/2024 21:26 PM
O+	in	10 (ML)	t	06/05/2024 21:26 PM
O-	in	20 (ML)	t	04/05/2024 02:18 AM
O+	in	20 (ML)	t	03/05/2024 11:41 AM

The screenshot shows the MongoDB Compass interface. The database is 'blood-bank' and the collection is 'users'. The interface displays two documents in the collection:

```

{ "_id": ObjectId("6632920fdd42d660455e4c86"),
  "role": "donar",
  "email": "aims@gmail.com",
  "password": "$2a$10$GDCXss8Sn1GhG4jVNd0T/usMf8uKxkK9HnLce5gSUoxm/jnOr9WIq",
  "address": "bihar",
  "phone": "7970589071",
  "createdAt": 2024-05-01T19:03:43.746+00:00,
  "updatedAt": 2024-05-01T19:03:43.746+00:00,
  "__v": 0 }

{ "_id": ObjectId("663292b8dd42d660455e4c8e"),
  "role": "donar",
  "email": "rahulkmrchp2001@gmail.com",
  "password": "$2a$10$Qw1Ps12niL,42fTEdxjmXeHzuHNX6Yw/x0.mV33RBYp06c2d0PV2G",
  "address": "bihar",
  "phone": "7970589071",
  "createdAt": 2024-05-01T19:06:32.368+00:00,
  "updatedAt": 2024-05-01T19:06:32.368+00:00,
  "__v": 0 }
    
```



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