BLOOD BANK MANAGEMENT SYSTEM

BY: RAGHVENDRA SINGH SHAKTAWAT

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Executive Summary:

My project focuses on the design of a database that stores the data for the Blood Bank Management System. The Blood Bank's primary focus is to facilitate the supply of blood to hospitals, health care clinics, medical and military facilities, educational centers, and research institutes, which save the patient's life. This database includes all of the pertinent data required for each donation/transfusion, including the necessary pre-examination for the process. A Blood bag entity shows the available stocks across all locations and can be narrowed down to a specific location.

Blood Bank Management System keeps track of available blood when requested by an acceptor. Existing systems are manual, time-consuming, and are not so effective. Blood Bank Management System automates distribution capability. This database supports thousands of records for each blood bank.

By using this system, searching the available blood becomes easy and saves a lot of time than the manual system. It will hoard, operate, recover, and analyze information concerned with the administrative and inventory management within a blood bank. Thus, I developed this system in a manageable manner to be time, cost, and resource-efficient, and that little human resource is needed.

II. MODEL WALKTHROUGH

1. **Central Entity:** In this model, the blood bag entity will be central to the database model. The relationships between the Donor and the Recipient and the requests are established through the blood bag entity. From the blood bag entity, any donation or transfusion takes place and is recorded.

2. **The Three Specializations:**
   The three different kinds of specializations are represented in my model.

1. Separate subtype tables were utilized for the three main people in the Blood Bank Management System, i.e., Donor, Recipient, and the Nurse. This is favored for this scenario to distinguish the roles of each type of people. The Donor deals with donating the blood to the blood bank. The Recipient collects the blood from the blood bank for transfusion. The Nurse is the medical personnel assisting the complete process of blood bank management, so they have very specific and separate roles reflected in separate relationships.
2. The second specialization is the combination of the subtype tables and one supertype table. This was displayed in the relationships stemming from the blood bag entity, which serves as the supertype table. The subtypes are donation and transfusion records. The different types of services stored different data, but they also have common data and also a common set of relationships as blood bags.
3. The third specialization is the use for one table with the absence of subtype tables. The requests table characterizes this form of specialization. Keeping this as one table makes queries easy without leaving many unused columns.

Limitations:

My model's limitation is that it does not have the ability to store details on blood quality, including expiration date or disposal date.

Lessons learned:

I found it interesting to work on this project and design the database in the healthcare field, which is my strongest area of knowledge. I did brainstorming on establishing the relationships between entities and asked myself what scenarios could be part of the Blood Bank Management System. It has been included in the project the need status of the patient or recipient. Still, the medical conditions, diagnosis, and a physician involved in the transfusion process have not been included for the sake of keeping the project as simple as possible. However, I think it would be more realistic if these aspects were included.

Queries and Descriptions:

1. Write a query to find out hemoglobin level for the donation type "PowerRed."
   This query helps to identify, what kind of blood product is transfused in reference to the pre-examination values.

   ```
   SELECT preexam.Hemoglobin FROM preexam
   JOIN donation ON donation.PreexamFK = preexam.preexamID
   JOIN donationrecords ON donationrecords.DonationRecordID =
   donation.DonationRecordsFK
   JOIN bloodbags ON bloodbags.BloodBagID = donationrecords.BloodBagsFK
   WHERE DonationType = 'PowerRed';
   ```

   --- Returns 1 row

2. Write a query to find out the total amount of blood a donor donated in descending order.
   This track is needed to identify number of times a donor donated the blood. The next safe donation date also can be assumed. It is important because during a regular donation, around 470ml of whole blood can be donated. For next time donation, the donor has to meet certain criteria.

   ```
   SELECT donor.DonorID, donor.FirstName, donor.LastName,
   COUNT(donation.DonorFK) as TimesDonated,
   SUM(donation.AmountDonated) as TotalAmount
   FROM donor JOIN donation ON donor.DonorID = donation.DonorFK
   GROUP BY donor.DonorID
   ORDER BY TotalAmount desc;
   ```

---- Returns 9 rows

3. A patient named Emily McFelice developed complications after receiving a transfusion. Write a query to find the donor or donors who gave any blood that she received.
   This gives me the details such as which recipient received blood from which donor and helps in tracking the donor.

```
SELECT donor.DonorID, donor.FirstName, donor.LastName FROM donor
JOIN donation ON donation.DonorFK = donor.DonorID
JOIN donationrecords ON donationrecords.DonationRecordID =
donation.DonationRecordsFK
JOIN bloodbags ON donationrecords.BloodBagsFK = bloodbags.BloodBagID
JOIN transfusionrecords ON transfusionrecords.BloodBagsFK =
bloodbags.BloodBagID
JOIN transfusion ON transfusionrecords.TransfusionFK =
transfusion.TransfusionID
JOIN recipient ON transfusion.RecipientFK = recipient.recipientID
WHERE recipient.FirstName = 'Emily' AND recipient.LastName = 'McFelice'
```

   --- Returns 1 row

4. How many requests are generally made in each year and what is the maximum and minimum blood quantity requested in each year?
   Tracking the numbers are very important in every healthcare system because it reflects how many lives saved in a year with blood donation. This query came to my mind when I heard about one in seven people entering the hospital need blood and around 4.5 million Americans will need blood transfusion each year.

```
SELECT
MAX(requests.QuantityRequested) as Maximum_requests,
MIN(requests.QuantityRequested) as Minimum_requests,
COUNT(requests.QuantityRequested) as Total_requests,
 year(requests.DateRequested) as Requested_year
 FROM requests
 GROUP BY requests.DateRequested;
```

   --- Returns 4 rows

5. Extract the information of people who can donate the blood to A+ patients?
   Risks for the patient receiving blood may be due to incompatible blood types. So, to keep track on patients' blood type is necessary.

```
SELECT distinct recipient.FirstName, recipient.LastName, recipient.NeedStatus,
recipient.BloodGroup from recipient
WHERE recipient.BloodGroup NOT IN ('B+', 'B-', 'AB+', 'AB-')
ORDER BY recipient.FirstName, recipient.NeedStatus;
```

--- Returns 4 rows

6. How many serious requests (High need status) were served by the blood bank? Pulling out the information on how many emergency people got blood from the blood bank is critical.

```
SELECT recipient.FirstName, recipient.LastName, recipient.BloodGroup,
recipient.NeedStatus, transfusion.AmountReceived  from recipient, transfusion
WHERE recipient.RecipientID = transfusion.RecipientFK HAVING
recipient.NeedStatus = 'high'
ORDER BY transfusion.AmountReceived;
```

--- Returns 2 rows

7. Find out the average values of every laboratory tests involved in preexam? This gives me the information on what is the average deviation of individuals from normal values for the tests and vitals involved.

```
SELECT ROUND(AVG(preexam.SystolicBloodPressure),2) AS
Average_systolicbloodpressure,
ROUND(AVG(preexam.DiastolicBloodPressure),2) AS
Average_diastolicbloodpressure,
ROUND(AVG(preexam.Temperature),2) AS Average_temperature,
ROUND(AVG(preexam.Hemoglobin),2) AS Average_hemoglobin,
ROUND(AVG(preexam.PulseRate),2) AS Average_pulserate
FROM preexam;
```

--- Returns 1 row