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CMSC 508 Database Project Proposal

Problem Statement:

The database will be used in a blood bank. The blood bank database will contain information about the blood donors who are interested in donating blood voluntarily. The blood donors will be registered by the employees and the blood will be drawn and stored in blood inventory. The *Blood Donor* entity will store information common to all blood donors, and it will include the following information: first name, last name, date of birth, gender, date of donation, address, phone number, and the blood group.

In addition to *Blood Donor* information, blood *Recipient* information will be stored in the database by the employee. The blood *Recipient* entity data will include the first and last name of the blood recipient, the date of birth, the gender of the recipient, date of transfusion, visits, and the blood group. This entity will include general information about the blood recipient, but essentially it will be used to accurately match the blood donor and blood recipient blood groups. The *Blood* entity will contain the following attributes: BloodBagNo, Hemoglobin content, BloodAmount, BloodType, and Cost; the *Employee* entity will contain the following attributes: EmpID, FirstName, LastName, Date of Birth, Sex, Phone Number, Address, and Salary; and the *Blood Inventory* entity will contain the following attributes: BloodNo, Description, BloodType, Order, Quantity.

Additional information will contain the number of times of donation along with date of donation. Only employees will be able to search for a donor with a specific blood group when blood is needed. If blood is able to be obtained from any donor of this system, the receiver information will be recorded in the system along with the blood donation date. Receiver information consists of the patient's first and last name, number which is used to contact the donor, and the date of donation. Only Employees will be able to register or modify the blood donor's information and the blood inventory.

The entity sets that of the database:

- Blood Donor
- Recipient
- Blood
- Blood Inventory
- Employees

The operations to be performed to maintain the database:

- Add or modify the blood donor information
- Add or modify the blood recipient information
- Add the group types to the blood bank
- Enter the group types are added to the blood bank
- Search for a specific blood group

Some queries that could be asked of the database include:

1. What is the current stock of the blood inventory?
2. What is the hemoglobin count of a certain BloodBagNo?
3. What is the gender of the recipient?
4. Which blood donors have a specific blood group?
5. What is the contact information of a specific blood donor?
6. What is the name of a specific blood recipient?
7. How many recipients are waiting for blood donations?
8. What is the list of the patients according to the priority of blood need?
9. Which employee is in charge for which donor and recipient?
10. When was the first time the blood donor donated?
11. What date did the patient receive the blood?
12. Which blood groups are going to expire soon?
13. What is the cost of a blood transfusion?
14. What is the list of all available blood donors?
15. What is the name of the employee that worked with a specific patient on a specific date?
16. What is the address of a certain employee?
17. What is the salary of a certain employee?
18. How many blood donations took place today?
19. How many times has a specific donor donated?
20. How many visits did the blood recipient have so far?

Table 1: Domain Constraints of Entities

Entity	Attribute	Domain
Blood Donor	Blood_id	Unique numeric value
	Blood_type	String Value
	Name	String Value
	Date_of_birth	Numeric value in the format Month/Day/Year (MM/DD/YYYY)
	Sex	String Value
	Date_of_donation	Numeric value in the format Month/Day/Year (MM/DD/YYYY)
	Address	Variable length alphanumeric value. Contains a street num, street, name, city, state, zip code
	Phone	10-digit numeric value (includes area code)
Recipient	Receiptient_id	Unique numeric value
	Name	String value
	Date_of_birth	Numeric value in the format Month/Day/Year (MM/DD/YYYY)
	Sex	String value
	Blood_type	String value
	Date_of_rec	Numeric value in the format Month/Day/Year (MM/DD/YYYY)
Blood	Blood_bag_No	Unique numeric value
	Hemoglobin content	INT value
	Blood_amount	INT value
	Blood_type	INT value
	Cost	INT value
Blood Inventory	Blood_No	Unique numeric value
	Blood_type	String value
	Description	String Value: any additional information regarding a stored blood

	Order quality	INT value
Employee	emp_id	Unique numeric value
	name	String value
	date_of_birth	Numeric value in the format Month/Day/Year (MM/DD/YYYY)
	sex	String value
	phone	10-digit phone number
	address	Variable length alphanumeric value. Contains a street num, street, name, city, state, zip code
	salary	INT value

Table 2: Domain Constraints for Relationships

Relationship	Attribute	Domain
Donates	Blood_id (PK)	Unique numeric value
	Blood_bag_No (PK)	Unique numeric value
Receives	Recipient_id (PK) (PK)	Unique numeric value
	Blood_bag_No (PK)	Unique numeric value
Registers	emp_id (PK)	Unique numeric value
	Blood_id (PK)	Unique numeric value
Interacts	Receiptient_id (PK)	Unique numeric value
	emp_id (PK)	Unique numeric value
Manages	Blood_No (PK)	Unique numeric value
	emp_id (PK)	Unique numeric value

Table 3: Relationship Functionality

Relationship	Functionality	Justification
Donates	One-to-Many	One donor can donate blood many times
Receives	Many-to-One	Many patients can receive blood from same donor
Registers	Many-to-One	Many donors may register blood donation with a single receptionist.
Interacts	Many-to-Many	Many employees can interact with blood recipients and many blood donors can be interacted with by employees.
Manages	One-to-Many	One employee can manage many blood inventories.

Functional Dependencies

Blood Donor (BloodID, BloodType, FirstName, LastName, DOB, sex, dateOfdonation, address, phone)

FDs: BloodID \rightarrow FirstName, LastName, DOB, sex, dateOfdonation, address, phone

Recipient (ReceiptientID, FirstName, LastName, DOB, sex, BloodType, DateOfReq)

FDs: ReceiptientID \rightarrow FirstName, LastName, DOB, sex, BloodType, DateOfReq

Blood (BloodBagNo, Hemoglobin content, BloodAmount, BloodType, Cost)

FDs: BloodBagNo \rightarrow BloodBagNo, Hemoglobin content, BloodAmount, BloodType, Cost

Blood Inventory (BloodNo, BloodType, Description, Order, Quantity)

FDs: BloodNo \rightarrow BloodNo, BloodType, Description, Order, Quantity

Employee (EmpID, FirstName, LastName, DOB, Sex, Phone, Address, Salary)

FDs: EmpID \rightarrow EmpID, FirstName, LastName, DOB, Sex, Phone, Address, Salary

Donates (BloodID, BloodBagNo)

FDs: BloodID \rightarrow BloodBagNo

Receives (BloodBagNo, RecipientID)

FDs: BloodID \rightarrow RecipientID

Registers (BloodID, EmpID)

FDs: BloodID \rightarrow EmpID

Interacts (EmpID, RecipientID)

FDs: EmpID \rightarrow RecipientID

Manages (EmpID, BloodNo)

FDs: EmpID \rightarrow BloodNo

Sample Data for Each Entity

Blood Donor								
BloodID	Blood Type	First Name	Last Name	DOB	Sex	Date of Donation	Address	Phone
001	O+	Drew	Brees	01/15/1979	M	05/20/2019	5555 New Orleans Saints Rd	555-555-5555
002	AB-	Aaron	Rodgers	12/02/1983	M	04/15/2020	4444 Green Bay Packers St.	444-555-6666
003	B+	Tom	Brady	08/03/1977	M	06/01/2020	6666 Tampa Bay Buccs Ave.	777-888-9999

Recipient							
Recipient ID	Blood Type	First Name	Last Name	DOB	Sex	Date of Receive	Visits
111	AB	Padme	Amidala	04/27/1982	F	04/30/2020	4
222	O-	Ahsoka	Tano	09/12/1998	F	06/07/2018	3
333	B+	Anakin (Vader)	Skywalker	06/12/1987	M	08/14/2019	27 (Cause lava)

Employee							
EmpID	First Name	Last Name	DOB	Sex	Phone Number	Address	Salary
101	Katniss	Everdeen	05/08/1998	F	888-777-6666	1111 Victors Village Rd.	100,000
202	Peeta	Mellark	04/20/1998	M	777-333-2222	4545 Bakers Rd.	50,000
303	Gale	Hawthorne	08/20/1996	M	444-666-2425	1234 Seam St.	12,000

Blood Inventory				
BloodNo	Description	Blood Type	Order	Quantity
25547	No Complications	AB-	1st	12
37597	No Complications	B+	2nd	30
42785	No Complications	O-	3rd	51

Blood				
BloodBagNo	Hemoglobin Count	Blood Type	Blood Amount	Cost
0025	13	O+	1 pint	\$200
0027	16	AB+	1 pint	\$300
0032	14.5	A-	0.5 pint	\$275