**GROUP 1**

**ASSIGNMENT 2 ENTITY RELATIONSHIP AND BUSINESS RULES**

**OVERVIEW:**

We organized and categorized various kinds of health care facilities and the information associated with them using the concepts of supertype and subtype. This method aids in effectively modeling and controlling intricate blood bank systems.

A summary of supertypes and subtypes in Blood bank management is provided below:

# A diagram of a blood bank management Description automatically generated

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# TOTAL SPECIALIZATION RULE

# An Employee must be a voluteer or a medical professional or a hourly employee.

# DISJOINT RULE

# A employee can be a volunteer or a medical professional or a hourly employee but not all at the same time. It is a Ternary Relationship.

# A diagram of a company Description automatically generated

# ENTITY-RELATIONSHIP DIAGRAM

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# PK -PRIMARY KEY FK- FOREIGN KEY

# CARDINALITY RELATIONSHIP:

# Blood Camp (Camp\_id) and Donor Eligibility Generalisation (Camp\_id):

# One-to-Many: One Blood Camp can have Many Donor Eligibility Generalization records. This means that for each blood camp (identified by Camp\_id in the "Blood Camp" table), there can be multiple donor eligibility records in the "Donor Eligibility Generalization" table, each associated with different donors who participated in that camp.

# Donor Information (Donor\_id) and Donor Eligibility Generalization (Donor\_id): One-to-Many: One donor's information in the "Donor Information" table can be associated with Many donor eligibility records in the "Donor Eligibility Generalization" table. This indicates that a single donor can participate in multiple blood donation camps (as indicated by the Camp\_id foreign key in the "Donor Eligibility Generalisation" table), and each of those camp participation records can have different eligibility criteria based on age, health status, nationality, risk factors, and hemoglobin levels.

* **Organization Center (Organisation\_id) and Inventory (Organization\_id):**

**One-to-Many:** One organization center (identified by Organization\_id in the "Organization Center" table) can be associated with Many inventory records in the "Inventory" table. This means that a single organization center can manage and maintain multiple inventory records, each related to different aspects of blood supply, such as different blood groups, availability, and collection details.

* **Organization Center (Organization\_id) and Accounts (Organization\_id):**

**One-to-Many:** One organization center (identified by Organization \_id in the "Organization Center" table) can be associated with Many account records in the "Accounts" table. This indicates that a single organization center can have multiple financial records related to different aspects of its operations, such as operational costs, equipment costs, camp costs, and blood bag costs.

* **Organization Center (Organization \_id) and Human Resource (Organization\_id):**

**One-to-Many:** One organization center (identified by Organization \_id in the "Organization Center" table) can be associated with Many human resource records in the "Human Resource" table. This implies that a single organization center can employ and manage multiple employees, each represented by a record in the "Human Resource" table. These records include employee information such as employee type, date of joining (DOJ), employment status, salary, and shift timing.

* **Inventory (collection\_type) and Hospital Donor (collection\_type):**

**Many-to-Many**: Many inventory records (identified by collection\_id in the "Inventory" table) can be associated with Many hospital donor records (identified by collection\_type in the "Hospital Donor" table). This indicates a Many-to-Many relationship, where items from the inventory can be used in multiple hospital donation events, and each donation event can involve multiple items from the inventory.

* **Blood Bag Information (Specimen\_id) and Blood Transfusion Management (Transfusion\_ID):**

**One-to-One:** One blood bag information record (identified by Specimen\_id in the "Blood Bag Information" table) can be associated with One blood transfusion management record (identified by Transfusion\_ID in the "Blood Transfusion Management" table). This indicates that each blood bag, with its specific information such as blood group, collection date, and expiry date, is associated with a single, corresponding blood transfusion management record that represents a specific transfusion event.

* **Organization Center (Hospital\_id) and Emergency Line (Hospital\_id):**

**One-to-Many:** One organization center (identified by Hospital\_id in the "Organization Center" table) can be associated with Many emergency line records (identified by Hospital\_id in the "Emergency Line" table). This indeed suggests that there are multiple emergency lines, each linked to a specific organization center. The organization center may be responsible for managing or responding to emergencies reported through these lines.

* **Organization Center (Organization\_id) and Donor Information (Organization\_id):**

**One-to-Many:** One organization center (identified by Organization\_id in the "Organization Center" table) can be associated with Many records of donor information (identified by Organization\_id in the "Donor Information" table). This indeed suggests that a single organization center may manage information for multiple donors. Each donor's information is represented by a record in the "Donor Information" table, and the Organization\_id likely indicates the organization center responsible for managing donor-related data.

* **Organization Center (Hospital\_id) and Hospital Information (Hospital\_id):**

**One-to-Many:** One organization center (identified by Hospital\_id in the "Organization Center" table) can be associated with Many hospital information records (identified by Hospital id in the "Hospital Information" table). This suggests that a single organization center may have multiple relationships with different hospitals, each represented by a hospital information record. These records may include details about hospitals, such as name, location, frequency history, blood group data, patient names, ages, severity levels, and the number of units associated with each hospital.

# BUSINESS RULES:

# Donor Eligibility Criteria: Donors should meet the donor eligibility criteria set by the institution, such as their age, health condition, etc., which are required to donate blood.

# Donor Identity Validation: Donors must submit a valid form of identification and contact details for proper communication.

# Donor Limitation: The number of times a donor can make a blood donation should meet the FDA guidelines to prevent donor burnout.

# Appointment Booking: Appointments need to be scheduled for donation events so that resources can be managed accordingly.

# Stock Notification: Hospitals are required to notify the Blood Bank regarding their requirements so that enough stock and supply will be maintained.

# Camp Validation: The package code should be verified after delivery to Blood bank from the camps to ensure that the right shipment is received.

# Blood bag: Blood bag collected from the camp should be labeled with the expiration date, blood type instruction manual, etc.

# Emergency Services: In critical cases, emergency protocols should be followed to supply blood.

# Donor Health Screening: Before the donation, donors must go through a screening process to guarantee their safety.

# Infection Disease Testing: Screening for the search for potential risks that can occur to transfusion recipients.

# Expiry Tracking: Before the expiration date, blood packs need to be used, so they should be tracked, and if expired, they must be disposed of.

# Emergency Contact Information: In the event of adverse conditions Up-to-date contact details need to be maintained for immediate follow-up.

# CONCEPTS REFERRED:

# Entities

# Attributes

# Identifiers

# Relationships

# Cardinalities

# Entity Relationship

# Disjoint rule specialization

# Supertype and Subtype

# Generalization

# 

# TEAM INFORMATION:

# Charish/Sheik - Discussion of ER diagrams, discussions on ER drawings, and Concept discussion and content structures.

# Ashok - ER Business rules.

# Lakshmi/Sampath/Ujwala - ER General Discussion.

**GROUP 1**

**ASSIGNMENT 3 ENTITY RELATIONSHIP, BUSINESS RULES AND DATA DEFINITION LANGUAGE**

# ENTITY-RELATIONSHIP DIAGRAM

# A diagram of a company Description automatically generated

# CARDINALITY RELATIONSHIP

# Donor - Donation (Mandatory 1 to Optional Many):

# Every donor must have at least one donation recorded (hence, mandatory from the Donor side). A donor can have zero or multiple donations over time (hence, optional many from the Donation side).

# Donation - Blood Drive (Optional Many to Mandatory 1):

# A blood drive can have zero or many donations associated with it (donations might not always occur). But every donation must be linked to a specific blood drive (hence, mandatory from the Donation side).

# Blood Drive - Organization Center (Optional Many to Mandatory 1):

# An organization center can conduct zero or many blood drives over time. Every blood drive must be associated with one organization center.

# Inventory - Organization Center (Mandatory 1 to Mandatory 1):

# Every inventory is tied to an organization center (can't exist without being part of some organization center). Similarly, every organization center must maintain an inventory (even if it's empty).

# Recipient - Organization Center (Mandatory 1 to Optional Many):

# Every recipient must be linked to an organization center. An organization center can have zero or many recipients linked to it.

# Accounts - Organization Center (Mandatory 1 to Optional Many):

# Every account must be associated with an organization center. An organization center can have zero or many accounts linked to it.

# Employee - Organization Center (Mandatory 1 to Optional Many):

# Every employee works for a specific organization center. An organization center can have zero or many employees working for it.

# Organization Center - Hospital Information (Mandatory 1 to Optional Many):

# Every organization center must be associated with at least one hospital (this might be a point of consideration based on the use case, as it's unusual for a blood bank or organization center to mandatorily be linked to a hospital). A hospital might not be associated with any organization center, or it can be associated with one or more centers.

# BUSINESS RULES:

1. **Donor Eligibility Criteria**: Donors should meet the donor eligibility criteria set by the institution, such as their age, health condition, etc., which are required to donate blood.
2. **Donor Eligibility Criteria:** Donations are only accepted when donors are registered, and Every donation's time and date should be recorded in the system's database.
3. **Donor Identity Validation:** Donors must submit a valid form of identification and contact details for proper communication.
4. **Donor Limitation:** The number of times a donor can make a blood donation should meet the FDA guidelines to prevent donor burnout.
5. **Recipient Eligibility**: A recipient (patient) needs to provide accurate identification and necessary medical data to request blood bags.
6. **Stock Notification:** Organization center needed to be notified regarding the requirements so that enough stock and supply will be maintained.
7. **Camp Validation**: After delivery from donation camps to the Organization Center, the package code should be verified to ensure the correct shipment is received.
8. **Blood bag:** Blood bag collected from the camp should be labeled with the expiration date, according to the blood type instruction manual, etc.
9. **Donor Health Screening**: Before the donation, donors must go through a Pre-screening process to guarantee their safety.
10. **Infection Disease Testing**: Screening for the search for potential risks that can occur to transfusion recipients should be handled at the Organization center.
11. **Expiry Tracking**: Before the expiration date, blood packs need to be used, so they should be tracked, and if expired, they must be disposed of.
12. **Emergency Contact Information**: In the event of adverse conditions Up-to-date contact details need to be maintained for immediate follow-up.

**DATA DEFINITION LANGUAGE**

**LIVE LINK:** [**https://livesql.oracle.com/apex/livesql/s/s7p6vm2g6up98i7ipp9rhajt**](https://livesql.oracle.com/apex/livesql/s/s7p6vm2g6up98i7ipp9rhajt)

* + **DONOR TABLE**

CREATE TABLE DONOR (

Donor\_ID NUMBER PRIMARY KEY,

Donor\_Name VARCHAR2(255) NOT NULL,

Donor\_Age NUMBER,

Donor\_DOB DATE NOT NULL,

Donor\_Blood\_group VARCHAR2(5) NOT NULL,

Donor\_Gender CHAR(1),

Donor\_Contact NUMBER(15) UNIQUE NOT NULL,

Emergency\_Contact NUMBER(15) UNIQUE NOT NULL,

Donor\_Address VARCHAR2(255) NOT NULL,

Total\_Donations NUMBER DEFAULT 0

)

* **ORGANIZATION CENTER TABLE**

CREATE TABLE ORGANIZATION\_CENTER (

Organization\_Center\_ID NUMBER PRIMARY KEY,

Organization\_Branch VARCHAR2(255) NOT NULL,

Organization\_Contact VARCHAR2(15) UNIQUE NOT NULL,

Organization\_Address VARCHAR2(255) NOT NULL,

Organization\_Capacity NUMBER CHECK (Organization\_Capacity>=0)

)

* **BLOOD DRIVE TABLE**

CREATE TABLE BLOOD\_DRIVE (

Blood\_Drive\_ID NUMBER PRIMARY KEY,

Drive\_Location VARCHAR2(255) NOT NULL,

Drive\_Date DATE NOT NULL,

Drive\_Pre\_Screening VARCHAR2(255) NOT NULL,

Blood\_Bag\_Count NUMBER CHECK (Blood\_Bag\_Count >= 0) NOT NULL

);

* **DONATION TABLE**

CREATE TABLE DONATION (

Donation\_ID NUMBER PRIMARY KEY,

Blood\_Drive\_ID NUMBER NOT NULL,

Donor\_ID NUMBER NOT NULL,

Date\_of\_Donation DATE NOT NULL,

Amount\_Collected NUMBER CHECK (Amount\_Collected > 0) NOT NULL,

FOREIGN KEY (Blood\_Drive\_ID) REFERENCES BLOOD\_DRIVE(Blood\_Drive\_ID),

FOREIGN KEY (Donor\_ID) REFERENCES DONOR(Donor\_ID)

);

* **HOSPITAL INFORMATION TABLE**

CREATE TABLE HOSPITAL\_INFORMATION (

Hospital\_ID NUMBER PRIMARY KEY,

Organization\_ID NUMBER NOT NULL,

Hospital\_Name VARCHAR2(255) NOT NULL UNIQUE,

Hospital\_Location VARCHAR2(255) NOT NULL,

Hospital\_Type VARCHAR2(50) NOT NULL,

Hospital\_Contact\_Details VARCHAR2(15) NOT NULL,

FOREIGN KEY (Organization\_ID) REFERENCES ORGANIZATION\_CENTER(Organization\_Center\_ID)

);

* **EMPLOYEE TABLE**

CREATE TABLE EMPLOYEE (

Employee\_ID NUMBER PRIMARY KEY,

Organization\_ID NUMBER NOT NULL,

Employee\_Name VARCHAR2(255) NOT NULL,

Employee\_Role VARCHAR2(255) NOT NULL,

Employee\_Type VARCHAR2(50) NOT NULL,

Employee\_DOJ DATE NOT NULL,

Employee\_Status VARCHAR2(50)NOT NULL,

Employee\_Salary NUMBER NOT NULL CHECK (Employee\_Salary >= 0),

FOREIGN KEY (Organization\_ID) REFERENCES ORGANIZATION\_CENTER(Organization\_Center\_ID)

);

* **ACCOUNTS TABLE**

CREATE TABLE ACCOUNTS (

Invoice\_ID NUMBER PRIMARY KEY,

Organization\_ID NUMBER NOT NULL,

Operational\_cost NUMBER NOT NULL CHECK (Operational\_cost >= 0),

Equipment\_cost NUMBER NOT NULL CHECK (Equipment\_cost >= 0),

Camp\_cost NUMBER NOT NULL CHECK (Camp\_cost >= 0),

Blood\_Sales\_Revenue NUMBER NOT NULL CHECK (Blood\_Sales\_Revenue >= 0),

FOREIGN KEY (Organization\_ID) REFERENCES ORGANIZATION\_CENTER(Organization\_Center\_ID)

);

* **RECIPIENT TABLE**

CREATE TABLE RECIPIENT (

Recipient\_ID NUMBER PRIMARY KEY,

Organization\_ID NUMBER NOT NULL,

Recipient\_Name VARCHAR2(255) NOT NULL,

Recipient\_Address VARCHAR2(255) NOT NULL,

Recipient\_age NUMBER NOT NULL CHECK (Recipient\_age >= 0 AND Recipient\_age <= 100),

Recipient\_Gender CHAR(1) CHECK (Recipient\_Gender IN ('M', 'F', 'O')) NOT NULL,

Recipient\_Blood\_Group VARCHAR2(5) NOT NULL,

Blood\_Bags\_Count NUMBER NOT NULL CHECK (Blood\_Bags\_Count >= 0),

FOREIGN KEY (Organization\_ID) REFERENCES ORGANIZATION\_CENTER(Organization\_Center\_ID)

);

* **PATIENT TABLE**

CREATE TABLE PATIENT (

Patient\_ID NUMBER PRIMARY KEY,

Hospital\_ID NUMBER NOT NULL,

Patient\_Name VARCHAR2(255) NOT NULL,

Patient\_Address VARCHAR2(255) NOT NULL,

Patient\_age NUMBER NOT NULL CHECK (Patient\_age >= 0 AND Patient\_age <= 100),

Patient\_Gender CHAR(1) CHECK (Patient\_Gender IN ('M', 'F', 'O')) NOT NULL,

Patient\_Blood\_Group VARCHAR2(5) NOT NULL,

Patient\_Severity VARCHAR2(50) NOT NULL,

FOREIGN KEY (Hospital\_ID) REFERENCES HOSPITAL\_INFORMATION(Hospital\_ID)

);

* **INVENTORY TABLE**

CREATE TABLE INVENTORY (

Inventory\_ID NUMBER PRIMARY KEY,

Organization\_ID NUMBER NOT NULL,

Blood\_group VARCHAR2(5) NOT NULL,

Availability VARCHAR2(50) CHECK (Availability in ('Available' , 'Not Available')) NOT NULL,

Date\_collected DATE NOT NULL,

collection\_Source VARCHAR2(255) NOT NULL,

RBC NUMBER NOT NULL,

WBC NUMBER NOT NULL,

Platelets NUMBER NOT NULL,

Plasma NUMBER NOT NULL,

No\_units\_available NUMBER CHECK (No\_units\_available >= 0) NOT NULL,

Donation\_ID NUMBER UNIQUE NOT NULL,

FOREIGN KEY (Organization\_ID) REFERENCES ORGANIZATION\_CENTER(Organization\_Center\_ID),

FOREIGN KEY (Donation\_ID) REFERENCES DONATION(Donation\_ID)

)