NATIONAL INSTITUTE OF TECHNOLOGY WARANGAL

(AN INSTITUTE OF NATIONAL IMPORTANCE)

BLOOD BANK DATABASE PROJECT

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Introduction

In this project, we have designed a database management system on blood bank. Our blood bank database management system is designed to efficiently handle and organize critical information related to blood donation, storage and distribution. With a primary focus on saving lives and ensuring timely access to blood products, our system provides seamless integration for blood banks, donors, recipients and healthcare facilities.

Table of Contents

Tables

1. BLOOD_BANK TABLE

ATTRIBUTE	DATATYPE	CONSTRAINTS
BLOOD_BANK_ID	VARCHAR(20)	PRIMARY KEY
BNAME	VARCHAR2(20)	NOT NULL
CITY	VARCHAR2(20)	NOT NULL

2. DONOR TABLE

ATTRIBUTE	DATATYPE	CONSTRAINTS
DONOR_ID	VARCHAR(20)	PRIMARY KEY
DNAME	VARCHAR(20)	NOT NULL
GENDER	VARCHAR(1)	NOT NULL
AGE	INT	DERIVED
DOB	DATE	NOT NULL
BLOOD_GROUP	VARCHAR(20)	NOT NULL
BLOOD_BANK_ID	VARCHAR(20)	FOREIGN KEY

3. BLOOD TABLE

ATTRIBUTE	DATATYPE	CONSTRAINTS
BLOOD_GROUP	VARCHAR(20)	PRIMARY KEY
QUANTITY	INT	PRIMARY KEY
DONOR_ID	VARCHAR(20)	FOREIGN KEY

4. STAFF TABLE

ATTRIBUTE	DATATYPE	CONSTRAINTS
STAFF_ID	INT	PRIMARY KEY
SNAME	VARCHAR(20)	NOT NULL
SALARY	INT	NOT NULL
BLOOD_BANK_ID	VARCHAR(20)	FOREIGN KEY

5. STAFF_PHONE TABLE

ATTRIBUTE	DATATYPE	CONSTRAINTS
PHONE_NO	INT	PRIMARY KEY
STAFF_ID	INT	FOREIGN KEY

6. HOSPITAL TABLE

ATTRIBUTE	DATATYPE	CONSTRAINTS
HOSP_ID	VARCHAR(20)	PRIMARY KEY
HOSP_NAME	VARCHAR2(20)	NOT NULL
STREET	VARCHAR2(20)	NOT NULL
CITY	VARCHAR2(20)	NOT NULL
PINCODE	INT	NOT NULL

7. RECIPIENT TABLE

ATTRIBUTE	DATATYPE	CONSTRAINTS
R_ID	VARCHAR(20)	PRIMARY KEY
RNAME	VARCHAR(20)	NOT NULL
DOB	DATE	NOT NULL
HOSP_ID	VARCHAR(20)	FOREIGN KEY
BLOOD_BANK_ID	VARCHAR(20)	FOREIGN KEY
GENDER	VARCHAR(1)	NOT NULL
BLOOD_GROUP	VARCHAR(20)	NOT NULL

8. EQUIPMENT TABLE

ATTRIBUTE	DATATYPE	CONSTRAINTS
EQUIP_ID	INT	PRIMARY KEY
BLOOD_BANK_ID	VARCHAR(20)	FOREIGN KEY
PRICE	INT	NOT NULL
DATE_OF_PUR	DATE	NOT NULL
DUE	INT	NOT NULL

ER Model Assumptions

- A blood bank can have multiple donors, staff and equipment.
- Each donor can donate blood multiple times.
- Each staff member works at only one blood bank.
- Each recipient can receive blood from multiple blood banks.
- Each staff member can have multiple phone numbers.
- Age of the donor is derived from the date of birth of the donor.

Functional Dependencies and Normalization :

1. BLOOD_BANK

BLOOD_BANK_ID :- is the primary key. There exists one FD :

{ BLOOD_BANK_ID -> BNAME, CITY }

The table is in BCNF.

2. DONOR

DONOR_ID is primary key.
BLOOD_BANK_ID is foreign key.
FDs:
{ DONOR_ID -> DNAME,GENDER,DOB,BLOOD_GROUP,BLOOD_BANK_ID }
Hence, table is in BCNF.

3. BLOOD

FDs:
{DONOR_ID,BLOOD_GROUP,QUANTITY -> BLOOD_GROUP,QUANTITY }
The table is in BCNF

4. STAFF

FDs:
{STAFF_ID->SNAME}
{STAFF_ID->SALARY}
{STAFF_ID->BLOOD_BANK_ID}

Since all the attributes depend on the primary key and has no transitive dependency, the table is in BCNF.

5. STAFF_PHONE

FDs:

{STAFF_ID , PHONE_NO ->PHONE_NO}
It is in BCNF.

6. HOSPITAL

FDs:
{HOSP_ID -> HOSP_NAME , STREET, CITY,PINCODE}
It is in BCNF.

7.EQUIPMENT

FD:
{EQUIP_ID -> BLOOD_BANK_ID, PRICE, DATE_OF_PUR }
It is in BCNF.

8.RECIPIENT

FDs:
{R_ID -> RNAME,DOB,GENDER,BLOOD_GROUP,BLOOD_BANK_ID}
It is in BCNF.

Relationship Schema

- **RECEIVES**

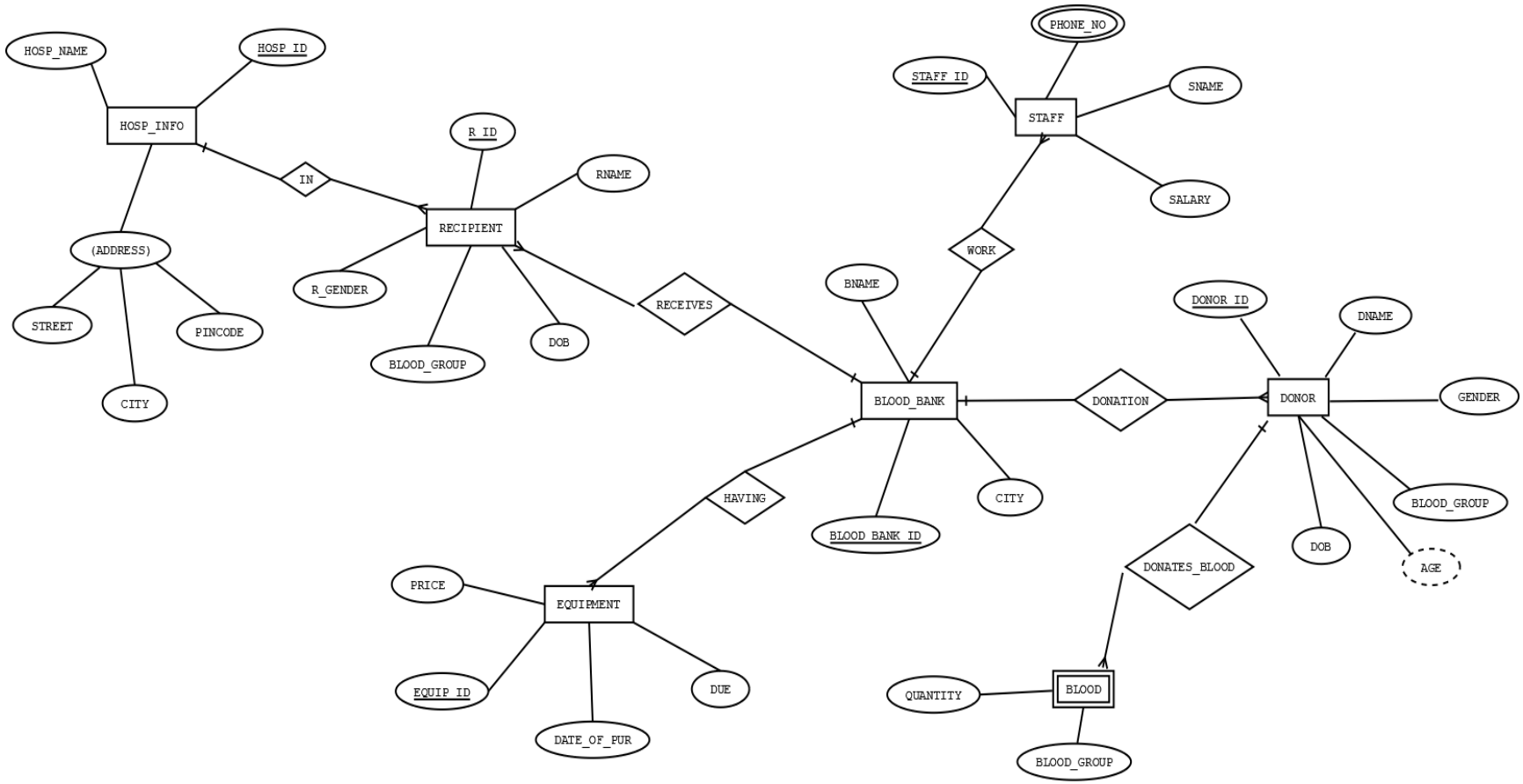
  Being a one to many relationship between BLOOD_BANK and RECIPIENT, it is merged with the RECIPIENT table by having R_ID as its primary key.

- **HAVING**

  Being a one to many relationship between BLOOD_BANK and EQUIPMENT, it is merged with the EQUIPMENT table by having EQUIP_ID as its primary key.

- **IN**

  Being a one to many relationship between HOSP_INFO and RECIPIENT, it is merged with the RECIPIENT table by having R_ID as its primary key.


HOSP_NAME
HOSP_ID
HOSP_INFO
IN
R_ID
RNAME
RECIPIENT
(ADDRESS)
STREET
CITY
PINCODE
R_GENDER
BLOOD_GROUP
DOB
RECEIVES
PHONE_NO
STAFF_ID
SNAME
STAFF
SALARY
WORK
BNAME
BLOOD_BANK
BLOOD_BANK_ID
CITY
DONATION
DONOR_ID
DNAME
DONOR
GENDER
BLOOD_GROUP
DOB
AGE
DONATES_BLOOD
HAVING
PRICE
EQUIPMENT
EQUIP_ID
DUE
DATE_OF_PUR
QUANTITY
BLOOD
BLOOD_GROUP

ER DIAGRAM

SQL Code:

```
 -- Create the BLOOD_BANK table
CREATE TABLE BLOOD_BANK (
    BLOOD_BANK_ID VARCHAR(20) PRIMARY KEY,
    BNAME VARCHAR(20),
    CITY VARCHAR(20)
);

-- Insert tuples into BLOOD_BANK
INSERT INTO BLOOD_BANK (BLOOD_BANK_ID, BNAME, CITY) VALUES
('BB001', 'Blood Bank 1', 'City 1'),
('BB002', 'Blood Bank 2', 'City 2');
select *from BLOOD_BANK;

-- Create the DONOR table
CREATE TABLE DONOR (
    DONOR_ID VARCHAR(20) PRIMARY KEY,
    DNAME VARCHAR(20),
    GENDER VARCHAR(1),
    BLOOD_GROUP VARCHAR(20),
    AGE INT,
    DOB DATE,
    BLOOD_BANK_ID VARCHAR(20),
    FOREIGN KEY(BLOOD_BANK_ID) REFERENCES BLOOD_BANK(BLOOD_BANK_ID)
);
SELECT *FROM DONOR;
INSERT INTO DONOR VALUES ('D001', 'Donor 1', 'M', 'O+', 30, '1994-
01-15', 'BB001');
INSERT INTO DONOR VALUES ('D002', 'Donor 2', 'F', 'A-', 25, '1999-
05-20', 'BB002');
INSERT INTO DONOR VALUES ('D003', 'Donor 3', 'M', 'AB+', 35, '1990-
07-10', 'BB001');
INSERT INTO DONOR VALUES ('D004', 'Donor 4', 'F', 'B+', 28, '1996-
03-25', 'BB002');
INSERT INTO DONOR VALUES ('D005', 'Donor 5', 'M', 'O-', 40, '1982-
09-05', 'BB001');
INSERT INTO DONOR VALUES ('D006', 'Donor 6', 'F', 'A+', 22, '2000-
11-30', 'BB002');
INSERT INTO DONOR VALUES ('D007', 'Donor 7', 'M', 'B-', 32, '1989-
05-15', 'BB001');
INSERT INTO DONOR VALUES ('D008', 'Donor 8', 'F', 'AB-', 26, '1995-
02-20', 'BB002');
INSERT INTO DONOR VALUES ('D009', 'Donor 9', 'M', 'O+', 45, '1979-
04-10', 'BB001');
INSERT INTO DONOR VALUES ('D010', 'Donor 10', 'F', 'A-', 29, '1993-
08-25', 'BB002');
```

```
-- Create the BLOOD table
CREATE TABLE BLOOD (
    BLOOD_GROUP VARCHAR(20),
    QUANTITY INT,
    DONOR_ID VARCHAR(20),
    PRIMARY KEY (DONOR_ID, BLOOD_GROUP),
    FOREIGN KEY (DONOR_ID) REFERENCES DONOR(DONOR_ID)
);
select *from BLOOD;

-- Insert tuples into BLOOD
INSERT INTO BLOOD (BLOOD_GROUP, QUANTITY, DONOR_ID) VALUES
('O+', 10, 'D001'),
('A-', 8, 'D002'),
('AB+', 12, 'D003'),
('B+', 6, 'D004'),
('O-', 15, 'D005'),
('A+', 9, 'D006'),
('B-', 5, 'D007'),
('AB-', 7, 'D008'),
('O+', 11, 'D009'),
('A-', 10, 'D010');

-- Create the STAFF table
CREATE TABLE STAFF (
    STAFF_ID INT PRIMARY KEY,
    SNAME VARCHAR(20),
    SALARY INT,
    BLOOD_BANK_ID VARCHAR(20),
    FOREIGN KEY (BLOOD_BANK_ID) REFERENCES BLOOD_BANK(BLOOD_BANK_ID)
);
SELECT *FROM STAFF;

-- Insert tuples into STAFF
INSERT INTO STAFF (STAFF_ID, SNAME, SALARY, BLOOD_BANK_ID) VALUES
(1001, 'Staff 1', 50000, 'BB001'),
(1002, 'Staff 2', 55000, 'BB002'),
(1003, 'Staff 3', 60000, 'BB001'),
(1004, 'Staff 4', 65000, 'BB002'),
(1005, 'Staff 5', 70000, 'BB001'),
(1006, 'Staff 6', 75000, 'BB002'),
(1007, 'Staff 7', 80000, 'BB001'),
(1008, 'Staff 8', 85000, 'BB002'),
(1009, 'Staff 9', 90000, 'BB001'),
(1010, 'Staff 10', 95000, 'BB002');

-- Create the STAFF_PHONE table
CREATE TABLE STAFF_PHONE (
    PHONE_NO INT,
```

```
    STAFF_ID INT,
    PRIMARY KEY (PHONE_NO, STAFF_ID),
    FOREIGN KEY (STAFF_ID) REFERENCES STAFF(STAFF_ID)
);
SELECT *FROM STAFF_PHONE;

-- Insert tuples into STAFF_PHONE
INSERT INTO STAFF_PHONE (PHONE_NO, STAFF_ID) VALUES
(123456789, 1001),
(234567890, 1002),
(345678901, 1003),
(456789012, 1004),
(567890123, 1005),
(678901234, 1006),
(789012345, 1007),
(890123456, 1008),
(901234567, 1009),
(123456789, 1010);

-- Create the HOSPITAL table
CREATE TABLE HOSPITAL (
    HOSP_ID VARCHAR(20) PRIMARY KEY,
    HOSP_NAME VARCHAR(20),
    STREET VARCHAR(20),
    CITY VARCHAR(20),
    PINCODE INT
);
SELECT *FROM HOSPITAL;

-- Insert tuples into HOSPITAL
INSERT INTO HOSPITAL (HOSP_ID, HOSP_NAME, STREET, CITY, PINCODE)
VALUES
('H001', 'Hospital 1', 'Street 1', 'City 1', 12345),
('H002', 'Hospital 2', 'Street 2', 'City 2', 23456);

-- Create the RECIPIENT table
CREATE TABLE RECIPIENT (
    R_ID VARCHAR(20) PRIMARY KEY,
    RNAME VARCHAR(20),
    DOB DATE,
    GENDER VARCHAR(1),
    BLOOD_GROUP VARCHAR(20),
    HOSP_ID VARCHAR(20),
    BLOOD_BANK_ID VARCHAR(20),
    FOREIGN KEY (BLOOD_BANK_ID) REFERENCES
BLOOD_BANK(BLOOD_BANK_ID),
    FOREIGN KEY (HOSP_ID) REFERENCES HOSPITAL(HOSP_ID)
);
SELECT *FROM RECIPIENT;
```

```
-- Insert tuples into RECIPIENT
INSERT INTO RECIPIENT (R_ID, RNAME, DOB, GENDER, BLOOD_GROUP,
HOSP_ID, BLOOD_BANK_ID) VALUES
('R001', 'Recipient 1', '1990-02-10', 'M', 'AB+', 'H001', 'BB001'),
('R002', 'Recipient 2', '1985-07-20', 'F', 'O-', 'H002', 'BB002'),
('R003', 'Recipient 3', '1978-12-15', 'M', 'B+', 'H001', 'BB001'),
('R004', 'Recipient 4', '1995-05-25', 'F', 'A-', 'H002', 'BB002'),
('R005', 'Recipient 5', '1980-09-30', 'M', 'AB-', 'H001', 'BB001'),
('R006', 'Recipient 6', '1998-11-05', 'F', 'O+', 'H002', 'BB002'),
('R007', 'Recipient 7', '1973-04-15', 'M', 'B-', 'H001', 'BB001'),
('R008', 'Recipient 8', '1989-02-20', 'F', 'A+', 'H002', 'BB002'),
('R009', 'Recipient 9', '1976-06-10', 'M', 'O+', 'H001', 'BB001'),
('R010', 'Recipient 10', '1992-08-25', 'F', 'A-', 'H002', 'BB002');

-- Create the EQUIPMENT table
CREATE TABLE EQUIPMENT (
    EQUIP_ID INT PRIMARY KEY,
    PRICE INT,
    DATE_OF_PUR DATE,
    DUE INT,
    BLOOD_BANK_ID VARCHAR(20),
    FOREIGN KEY (BLOOD_BANK_ID) REFERENCES BLOOD_BANK(BLOOD_BANK_ID)
);
SELECT *FROM EQUIPMENT;

-- Insert tuples into EQUIPMENT
INSERT INTO EQUIPMENT (EQUIP_ID, PRICE, DATE_OF_PUR, DUE,
BLOOD_BANK_ID) VALUES
(2001, 5000, '2022-01-10', 3, 'BB001'),
(2002, 7000, '2021-11-20', 2, 'BB002'),
(2003, 6000, '2022-02-15', 4, 'BB001'),
(2004, 8000, '2022-03-05', 5, 'BB002'),
(2005, 5500, '2022-04-08', 3, 'BB001'),
(2006, 6500, '2022-05-12', 4, 'BB002'),
(2007, 7500, '2022-06-18', 2, 'BB001'),
(2008, 9000, '2022-07-25', 3, 'BB002'),
(2009, 5800, '2022-08-30', 4, 'BB001'),
(2010, 7200, '2022-09-05', 5, 'BB002');
```

QUERIES :

1)Calculate Average Equipment Price per Blood Bank

```
SELECT B.BLOOD_BANK_ID, B.BNAME, AVG(E.PRICE) AS
AVG_EQUIPMENT_PRICE
FROM BLOOD_BANK B
JOIN EQUIPMENT E ON B.BLOOD_BANK_ID = E.BLOOD_BANK_ID
GROUP BY B.BLOOD_BANK_ID, B.BNAME;
```

2) Calculate Blood Availability per Blood Group

```
SELECT B.BLOOD_GROUP, SUM(B.QUANTITY) AS TOTAL_AVAILABLE_BLOOD
FROM BLOOD B
GROUP BY B.BLOOD_GROUP;
```

3)Find Staff with Highest Salary in Each Blood Bank

```
SELECT S.STAFF_ID, S.SNAME, S.SALARY, S.BLOOD_BANK_ID
FROM STAFF S
JOIN (
  SELECT BLOOD_BANK_ID, MAX(SALARY) AS MAX_SALARY
  FROM STAFF
  GROUP BY BLOOD_BANK_ID
) T ON S.BLOOD_BANK_ID = T.BLOOD_BANK_ID
AND S.SALARY = T.MAX_SALARY;
```

4) Calculate Blood Usage per Blood Bank

```
SELECT B.BLOOD_BANK_ID, B.BNAME, SUM(BD.QUANTITY)
AS TOTAL_BLOOD_USED
FROM BLOOD_BANK B
JOIN DONOR D ON B.BLOOD_BANK_ID = D.BLOOD_BANK_ID
JOIN BLOOD BD ON D.DONOR_ID = BD.DONOR_ID
GROUP BY B.BLOOD_BANK_ID, B.BNAME;
```

5) Calculate Percentage of Blood Types

```
SELECT BLOOD_GROUP,
     COUNT(*) AS TOTAL_COUNT,
     ROUND(COUNT() * 100.0 / (SELECT COUNT() FROM BLOOD), 2)
AS PERCENTAGE
FROM BLOOD
GROUP BY BLOOD_GROUP;
```

6) Calculate Total Revenue from Equipment Sales

```
SELECT B.BLOOD_BANK_ID, B.BNAME, SUM(E.PRICE) AS TOTAL_REVENUE
FROM BLOOD_BANK B
JOIN EQUIPMENT E ON B.BLOOD_BANK_ID = E.BLOOD_BANK_ID
GROUP BY B.BLOOD_BANK_ID, B.BNAME;
```