DBMS PROJECT

BLOOD DONATION MANAGEMENT SYSTEM

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ABSTRACT:

The Blood Donation Management System is an application designed to facilitate the management of blood donation activities, including donor registration, recipient management, hospital information, and blood bank management. The system aims to streamline the process of blood donation and ensure efficient coordination between donors, recipients, hospitals, and blood banks.

Key Features:

1. **Donor Registration:** Donors can register themselves into the system by providing their personal information such as name, contact details, blood group, and age.
2. **Recipient Management:** Recipients in need of blood can register into the system, specifying their blood group and contact details. The system matches recipients with compatible donors based on blood group and availability.
3. **Hospital Information:** Hospitals can register into the system and provide their details including name, contact information, and location. Each hospital is associated with a blood bank manager responsible for managing blood donation activities.
4. **Blood Bank Management:** Blood bank managers oversee the blood donation activities within their respective hospitals. They can manage donor information, blood inventory, and coordinate blood donation drives.
5. **Reporting and Analytics:** The system provides reports and analytics on blood donation activities, including donor demographics, blood group distribution, and hospital-wise donation statistics. This helps in monitoring donation trends and planning future donation campaigns.

INTRODUCTION:

Blood donation is a critical life-saving process. However, managing blood banks and ensuring efficient blood donation procedures can be challenging. A Blood Donation Management System offers a solution by automating tasks, facilitating donor registration, and tracking blood inventory.Blood Bank Management is a browser-based system that is designed to store, process, retrieve and analyse blood related information.

This project aims at maintaining all the information pertaining to blood donors, different blood groups available in this blood bank and help them to manage in a

better way. This website provides the user or the donors a secured environment by accepting the login ID and password from the user. This application allows the user to store the donor details as soon as the donor is registered. The admin will check the donor registered details if only he/ she is capable of donating the blood then only the donor can donate the blood at their registered centres. Before that the admin will send a message or notification to the donor registered mobile number or email.

OBJECTIVES:

- Develop a user-friendly system for donor registration and blood donation scheduling.
- Manage donor information securely, including medical history and eligibility details.
- Track blood inventory levels, blood type compatibility, and expiry dates.
- Automate tasks such as appointment reminders and blood donation notifications.
- Generate reports for blood bank operations and resource allocation.

Software Requirements Specification:

Software Requirements:

- Operating system : Windows 10/11.
- Database: MySQL.
- SQL Queries
- Operating System – windows
- Microsoft SQL Server
- Microsoft word

Hardware Requirements:

Ram: 16 GB

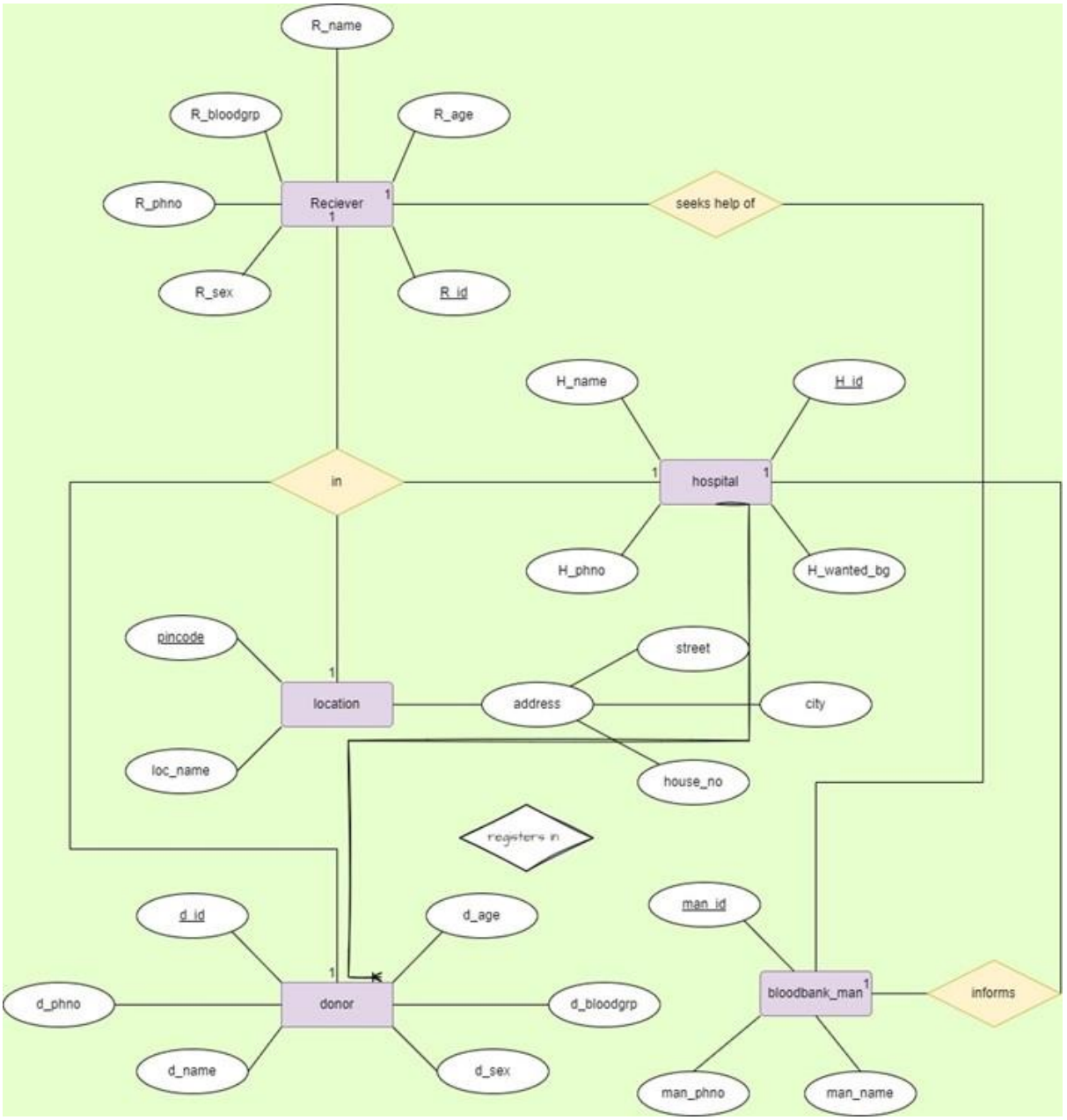
Hard disk: NO

SSD:512 GB

Monitor: 1920x1080 pixels

Conceptual Design:

ER Diagram:


R_name
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1
location
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d_sex
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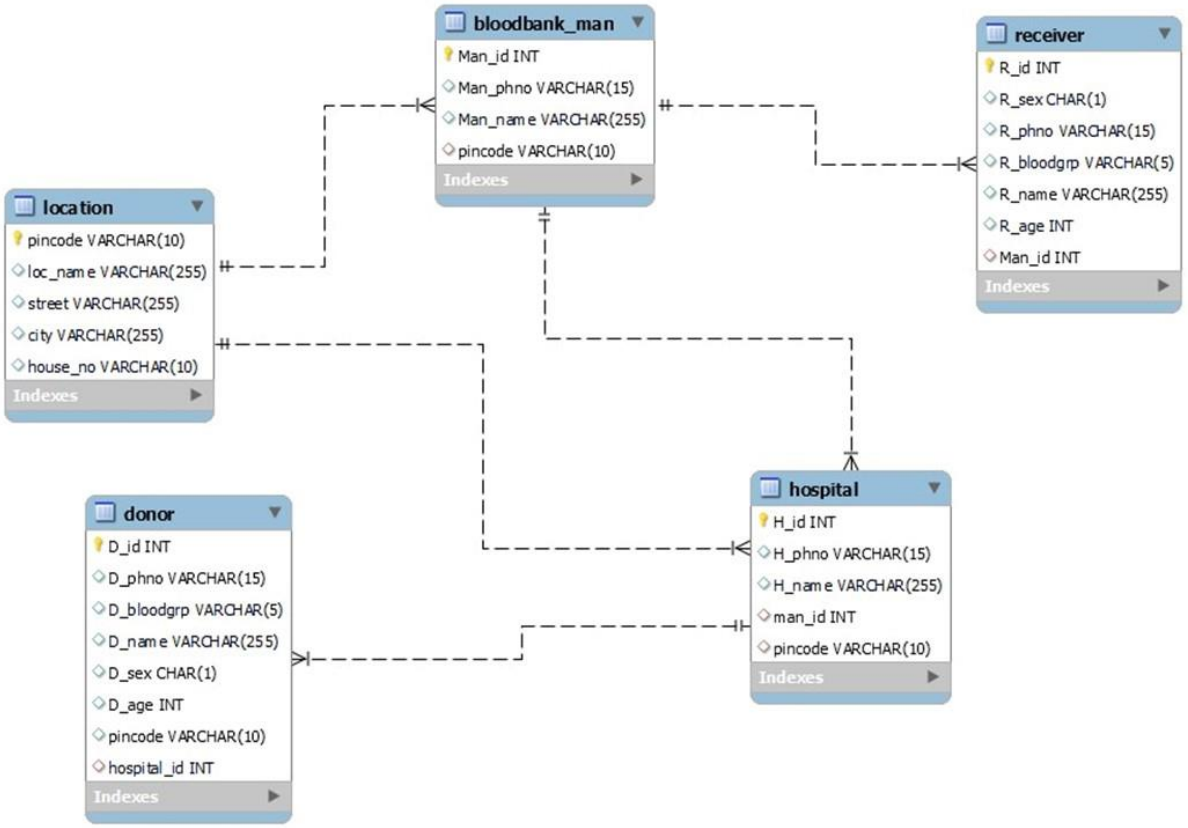
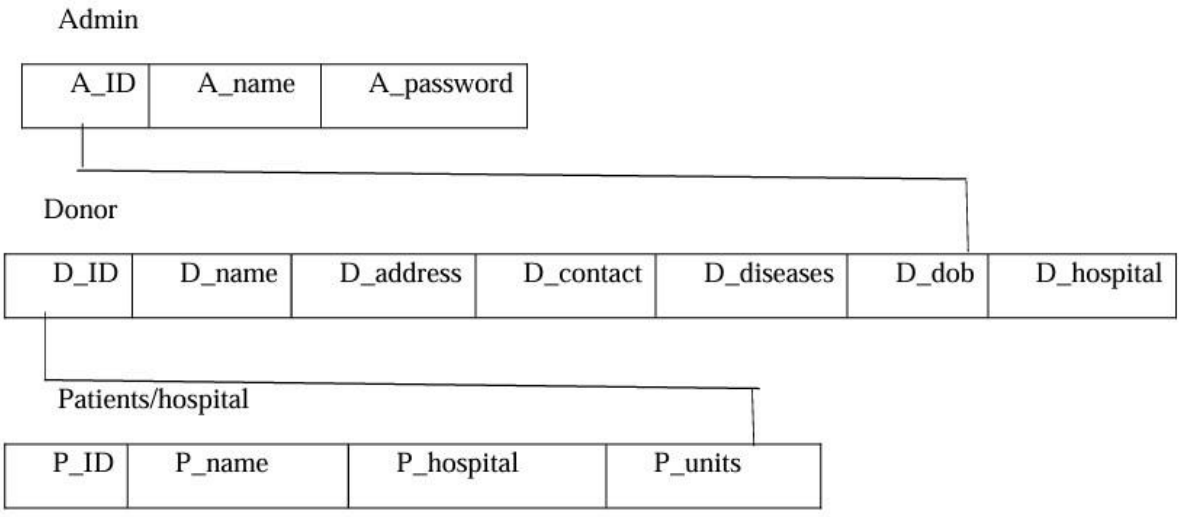


Schema Diagram:

Relational schema diagram:



Description of ER Diagram:

The Entity-Relationship (ER) diagram for the Blood Donation Management System depicts the entities, their attributes, and the relationships between them. Here's a description of the ER diagram components based on the provided schema:

1.Entities:

Donor: Represents individuals who voluntarily donate blood. Attributes include donor ID, phone number, blood group, name, sex, and age.

Receiver: Represents individuals who are in need of blood transfusion. Attributes include receiver ID, phone number, blood group, name, sex, and age.

Hospital: Represents healthcare institutions where blood donation activities are conducted. Attributes include hospital ID, phone number, name, and pincode.

Blood Bank Manager: Represents individuals responsible for managing blood donation activities within hospitals. Attributes include manager ID, phone number, and name.

Location: Represents geographical locations associated with hospitals. Attributes include pincode, location name, street, city, and house number.

2.Relationships:

Donor-Hospital: A donor is associated with a hospital where the blood donation occurs. This is represented by the relationship between the Donor and Hospital entities.

Receiver-Hospital: A receiver is associated with a hospital where they receive blood transfusion. This is represented by the relationship between the Receiver and Hospital entities.

Hospital-Location: Hospitals are located in specific geographical locations. This is represented by the relationship between the Hospital and Location entities.
Blood Bank Manager-Hospital: Blood bank managers are associated with hospitals where they manage blood donation activities. This is represented by the relationship between the Blood Bank Manager and Hospital entities.

3.Attributes: Each entity has its own set of attributes that describe the characteristics of that entity. For example, the Donor entity has attributes like donor ID, phone number, blood group, name, sex, and age.

The ER diagram visually represents the structure of the Blood Donation Management System, showing how different entities are connected through relationships and the attributes associated with each entity.

Implementation Details:

Explanation of Implementation:

Description of tables:

1.Donor:

Description: This table stores information about individuals who voluntarily donate blood.

Attributes:

- **D_id**: Unique identifier for the donor.
- **D_phno**: Phone number of the donor.
- **D_bloodgrp**: Blood group of the donor.
- **D_name**: Name of the donor.
- **D_sex**: Gender of the donor.
- **D_age**: Age of the donor.
- **pincode**: Foreign key referencing the Location table, representing the geographical location of the donor. ○ **Hospital_id** : associated hospital id (foreign key)

2. Receiver:

Description: his table stores information about individuals who are in need of blood transfusion.

Attributes:

- **R_id**: Unique identifier for the receiver.
- **R_sex**: Gender of the receiver.
- **R_phno**: Phone number of the receiver.
- **R_bloodgrp**: Blood group of the receiver.
- **R_name**: Name of the receiver.
- **R_age**: Age of the receiver.
- **pincode**: Foreign key referencing the Location table, representing the geographical location of the receiver.

3.**Hospital**:

Description: This table stores information about healthcare institutions where blood donation activities occur.

Attributes:

- **H_id**: Unique identifier for the hospital.
- **H_phno**: Phone number of the hospital.
- **H_name**: Name of the hospital.
- **man_id**: Foreign key referencing the Bloodbank_Man table, representing the blood bank manager associated with the hospital.
- **pincode**: Foreign key referencing the Location table, representing the geographical location of the hospital.
- **H_wanted_bg**: Desired blood group needed by the hospital.

4. **Location**:

Description: This table stores information about geographical locations associated with hospitals.

Attributes:

- **pincode**: Unique identifier for the location.

- **loc_name**: Name of the location.
- **address**: Composite attribute representing the address of the location, including street, city, and house number

5. **bloodbank_man:**

Description: This table stores information about blood bank managers responsible for managing blood donation activities within hospitals.

Attributes:

- **Man_phno:** Phone number of the blood bank manager.
- **Man_id:** Unique identifier for the blood bank manager.
- **Man_name:** Name of the blood bank manager.
- **pincode:** Foreign key referencing the Location table, representing the geographical location managed by the blood bank manager.

These tables collectively manage the information related to donors, recipients, hospitals, locations, and blood bank managers in the Blood Donation Management System.

Normalisation of tables up to 3NF :

First Normal Form (1NF):

1. Donor:

- All attributes are atomic and do not contain repeating groups.
- No composite attributes.

2.Receiver:

- All attributes are atomic and do not contain repeating groups.
- No composite attributes.

3.Hospital:

- All attributes are atomic and do not contain repeating groups.

- No composite attributes.

4.Location:

- All attributes are atomic and do not contain repeating groups.
- No composite attributes.

5.Bloodbank_Man:

- All attributes are atomic and do not contain repeating groups.
- No composite attributes**.**

Second Normal Form (2NF):

To achieve 2NF, we need to ensure that there are no partial dependencies. Partial dependencies occur when non-key attributes depend on only part of the primary key.

1.Donor:

- Already in 2NF since each non-key attribute depends on the entire primary key (**D_id**).

2.Receiver:

- Already in 2NF since each non-key attribute depends on the entire primary key (**R_id**).

3.Hospital:

- Already in 2NF since each non-key attribute depends on the entire primary key (**H_id**).

4.Location:

- Already in 2NF since each non-key attribute depends on the entire primary key (**pincode**).

5.Bloodbank_Man:

- Already in 2NF since each non-key attribute depends on the entire primary key (**Man_id**).

Third Normal Form (3NF):

To achieve 3NF, we need to ensure that there are no transitive dependencies. Transitive dependencies occur when non-key attributes depend on other non-key attributes.

1,.Donor:

- No transitive dependencies present.

2.Receiver:

- No transitive dependencies present.

3.Hospital:

- H_wanted_bg (Desired blood group needed by the hospital) depends only on the Hospital entity, not on any other non-key attributes. Therefore, no transitive dependency exists.

4.Location:

- loc_name, address depend only on the pincode, which is the primary key. Therefore, no transitive dependency exists.

5.Bloodbank_Man:

- No transitive dependencies present.

All tables are already in 3NF. They have been normalised to ensure data integrity, reduce redundancy, and facilitate efficient data management and querying in the Blood Donation Management System.

Code :

Conversion of ER diagram into tables:

```
create database project;

use project;

CREATE TABLE Location ( pincode
    VARCHAR(10) PRIMARY KEY,
    loc_name VARCHAR(255), street
    VARCHAR(255), city VARCHAR(255),
    house_no VARCHAR(10)
);


CREATE TABLE Donor (
            D_id INT AUTO_INCREMENT PRIMARY KEY,
            D_phno VARCHAR(15),
            D_bloodgrp VARCHAR(5),
            D_name VARCHAR(255),
            D_sex CHAR(1),
            D_age INT, pincode
            VARCHAR(10),
            hospital_id INT,
            CONSTRAINT fk_donor_hospital FOREIGN KEY (hospital_id) REFERENCES Hospital(H_id)
);


CREATE TABLE Bloodbank_Man (
    Man_id INT AUTO_INCREMENT PRIMARY KEY,
    Man_phno VARCHAR(15),
    Man_name VARCHAR(255),
    pincode VARCHAR(10),
    CONSTRAINT fk_bloodbank_man_location_pincode FOREIGN KEY (pincode) REFERENCES Location(pincode)
);
CREATE TABLE Receiver (
    R_id INT AUTO_INCREMENT PRIMARY KEY,
```

```
    R_sex CHAR(1),
    R_phno VARCHAR(15),
    R_bloodgrp VARCHAR(5),
    R_name VARCHAR(255),
    R_age INT,
    D_id INT,
    CONSTRAINT fk_receiver_donor_id FOREIGN KEY (D_id) REFERENCES Donor(D_id)
);

CREATE TABLE Hospital (
    H_id INT AUTO_INCREMENT PRIMARY KEY,
    H_phno VARCHAR(15),
    H_name
    VARCHAR(255), man_id
    INT, pincode
    VARCHAR(10),
    CONSTRAINT fk_hospital_man_id FOREIGN KEY (man_id) REFERENCES Bloodbank_Man(Man_id),
    CONSTRAINT fk_hospital_location_pincode FOREIGN KEY (pincode) REFERENCES Location(pincode)
);
```

- Drop the existing foreign key constraint

```
ALTER TABLE Receiver DROP FOREIGN KEY fk_receiver_donor_id;
```

- Add a new foreign key constraint to establish a relation between Receiver and Bloodbank_Man

```
ALTER TABLE Receiver
ADD CONSTRAINT fk_receiver_bloodbank_man_id FOREIGN KEY (D_id) REFERENCES Bloodbank_Man(Man_id);
ALTER TABLE Receiver DROP FOREIGN KEY fk_receiver_bloodbank_man_id;
ALTER TABLE Receiver DROP COLUMN D_id;
ALTER TABLE Receiver ADD COLUMN Man_id INT;
```

```
ALTER TABLE Receiver

ADD CONSTRAINT fk_receiver_bloodbank_man_id FOREIGN KEY (Man_id) REFERENCES Bloodbank_Man(Man_id);
```

Creation of data in the tables:

```
INSERT INTO Location (pincode, loc_name, street, city, house_no) VALUES

('12345', 'Central Square', '123 Main Street', 'Metropolis', '123'),

('56321', 'Downtown Plaza', '456 Elm Street', 'Cityville', '456'),

('12335', 'West End', '789 Oak Street', 'Metropolis', '789'),

('52321', 'East Side', '321 Pine Street', 'Cityville', '321'),

('12445', 'North Ridge', '654 Maple Street', 'Metropolis', '654'),

('53321', 'South Terrace', '987 Birch Street', 'Cityville', '987');


INSERT INTO Bloodbank_Man (Man_phno, Man_name, pincode) VALUES

('7777777777', 'David White', '12345'),

('6666666666', 'Sarah Green', '56321'),

('5555555555', 'Daniel Thomas', '12335'),

('4444444444', 'Emma Baker', '52321'),

('3333333333', 'James Lee', '12445'),

('2222222222', 'Olivia Smith', '53321');



INSERT INTO Hospital (H_phno, H_name, man_id, pincode) VALUES

('1111111111', 'City General Hospital', 7, '12345'),

('2222222222', 'Community Medical Center', 8, '56321'),

('3333333333', 'Metropolitan Health Clinic', 7, '12335'),

('4444444444', 'Unity Emergency Hospital', 8, '52321'),

('5555555555', 'Global Health Center', 7, '12445'),

('6666666666', 'National Hospital', 8, '53321');
```

```
INSERT INTO Receiver (R_sex, R_phno, R_bloodgrp, R_name, R_age, Man_id)
VALUES
        ('M', '1234567890', 'A+', 'Alex Johnson', 30, 7),
        ('F', '9876543210', 'B-', 'Sophia Brown', 25, 8),
        ('M', '1112223333', 'AB+', 'Ryan Davis', 40, 9),
        ('F', '4445556666', 'O-', 'Emma Garcia', 22, 10),
        ('M', '7778889999', 'A-', 'Daniel Wilson', 45, 11),
        ('F', '3332221111', 'B+', 'Olivia Taylor', 28, 12);

INSERT INTO Donor (D_phno, D_bloodgrp, D_name, D_sex, D_age, pincode, hospital_id)
VALUES
('9999999999', 'O+', 'Michael Rodriguez', 'M', 35, '12345', 13),
('8888888888', 'AB-', 'Emily Martinez', 'F', 28, '56321', 14),
('7777777777', 'B+', 'William Thompson', 'M', 30, '12335', 13),
('6666666666', 'A-', 'Sophia Clark', 'F', 32, '52321', 14),
('5555555555', 'B-', 'Matthew Hernandez', 'M', 27, '12445', 13),
('4444444444', 'AB+', 'Olivia Davis', 'F', 26, '53321', 14);
```

Sql Queries (subqueries, aggregate functions, joins) on the created tables:

-- Calculate the average age of donors.

```
SELECT AVG(D_age) AS average_age FROM Donor;
```

-- Find the hospital with the highest number of donors.

```
SELECT * FROM Hospital WHERE pincode = (SELECT pincode FROM Donor GROUP BY pincode ORDER BY COUNT(*) DESC LIMIT 1);
```

-- List the names of donors along with the name and phone number of the blood bank manager of the hospital they are associated with.

```
SELECT d.D_name AS donor_name, bb.Man_name AS blood_bank_manager,
bb.Man_phno AS blood_bank_manager_phno

FROM Donor d

INNER JOIN Hospital h ON d.pincode = h.pincode

INNER JOIN Bloodbank_Man bb ON h.man_id = bb.Man_id;
```

-- Count the number of donors for each blood group

```
SELECT D_bloodgrp, COUNT(*) AS donor_count

FROM Donor GROUP BY D_bloodgrp;
```

-- Find all receivers who are associated with hospitals managed by 'David White'.

```
SELECT * FROM Receiver WHERE man_id = (SELECT Man_id FROM Bloodbank_Man
WHERE Man_name = 'David White');
```

-- Retrieve the details of donors who are from hospitals located in 'East Side' and have a blood group of 'A+'.

```
SELECT * FROM Donor d INNER JOIN Hospital h ON

d.pincode = (select pincode from location where loc_name ='East Side') AND d.D_bloodgrp
= 'A+';
```

-- Find all hospitals that do not have any donors associated with them.

```
SELECT * FROM Hospital WHERE pincode NOT IN (SELECT DISTINCT pincode FROM
Donor);
```

-- Retrieve the name and phone number of the hospital along with the total count of donors associated with each hospital.

SELECT h.H_name AS hospital_name, h.H_phno AS hospital_phno, COUNT(d.D_id) AS total_donors

FROM Hospital h LEFT JOIN Donor d ON h.pincode = d.pincode GROUP BY h.H_id;

Creation of views using the tables:

-- View for Blood Group Distribution among Donors:

CREATE VIEW Blood_Group_Distribution AS SELECT D_bloodgrp, COUNT(*) AS count FROM Donor

GROUP BY D_bloodgrp;

-- View for Hospitals with Their Location Information

CREATE VIEW Hospitals_With_Location AS SELECT h.*, l.pincode AS location_pincode, l.loc_name, l.city

FROM Hospital h INNER JOIN Location l ON h.pincode = l.pincode;

-- view for Blood bank managers with their hospital count

CREATE VIEW Bloodbank_Managers_With_Hospital_Count AS SELECT bb.*, COUNT(h.H_id) AS hospital_count

FROM Bloodbank_Man bb LEFT JOIN Hospital h ON bb.pincode = h.pincode GROUP BY bb.Man_id; select * from Bloodbank_Managers_With_Hospital_Count;

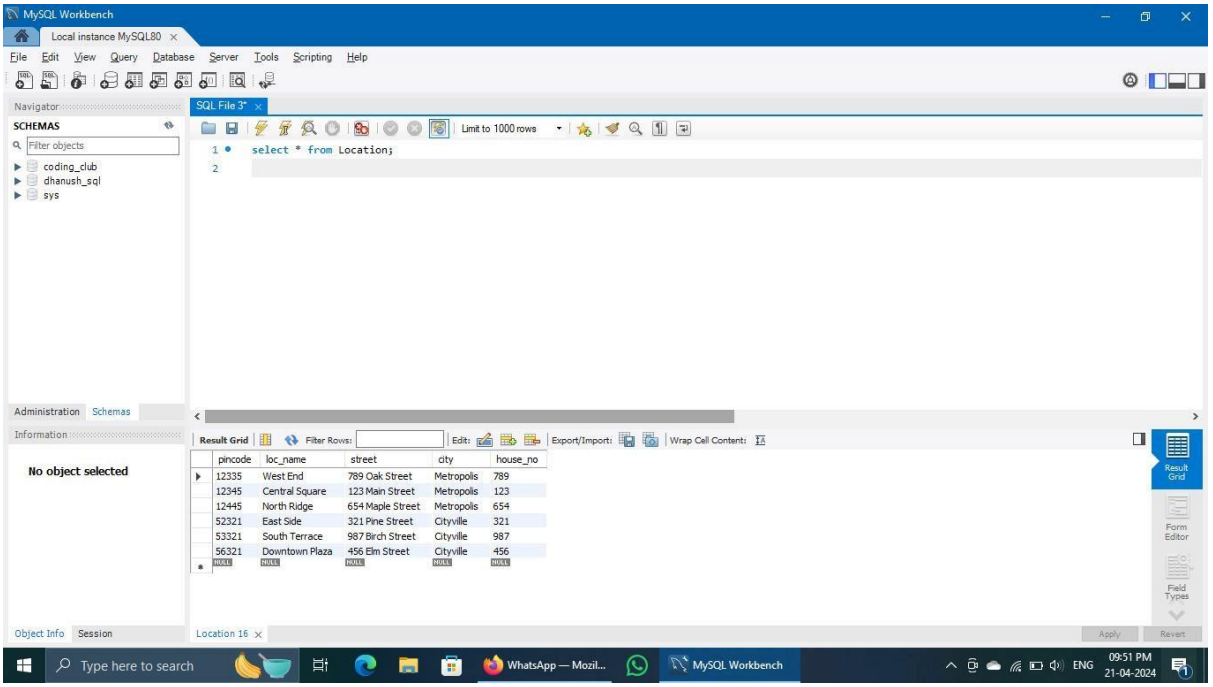
-- CREATE VIEW **Receivers_With_Donor_Count_By_Bloodgroup** AS SELECT r.*, d.D_bloodgrp, COUNT(*) AS donor_count

FROM Receiver r LEFT JOIN Donor d ON r.R_bloodgrp = d.D_bloodgrp GROUP BY r.R_id, d.D_bloodgrp; select * from Receivers_With_Donor_Count_By_Bloodgroup;

-- CREATE VIEW **Donors_With_Bloodgroup_And_Agegroup** AS

```
SELECT D_id, D_name, D_bloodgrp,
    CASE
        WHEN D_age BETWEEN 18 AND 30 THEN '18-30'
        WHEN D_age BETWEEN 31 AND 45 THEN '31-45'
        WHEN D_age BETWEEN 46 AND 60 THEN '46-60'
        ELSE 'Above 60'
    END AS age_group FROM Donor; select * from
Donors_With_Bloodgroup_And_Agegroup;
```

Screenshots:


MySQL Workbench
Local instance MySQL80
File Edit View Query Database Server Tools Scripting Help
SCHEMAS
coding_club
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sys
SQL File 3*
select * from Location;
Result Grid
pincode loc_name street city house_no
12335 West End 789 Oak Street Metropolis 789
12345 Central Square 123 Main Street Metropolis 123
12445 North Ridge 654 Maple Street Metropolis 654
52321 East Side 321 Pine Street Cityville 321
53321 South Terrace 987 Birch Street Cityville 987
56321 Downtown Plaza 456 Elm Street Cityville 456
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Location 16
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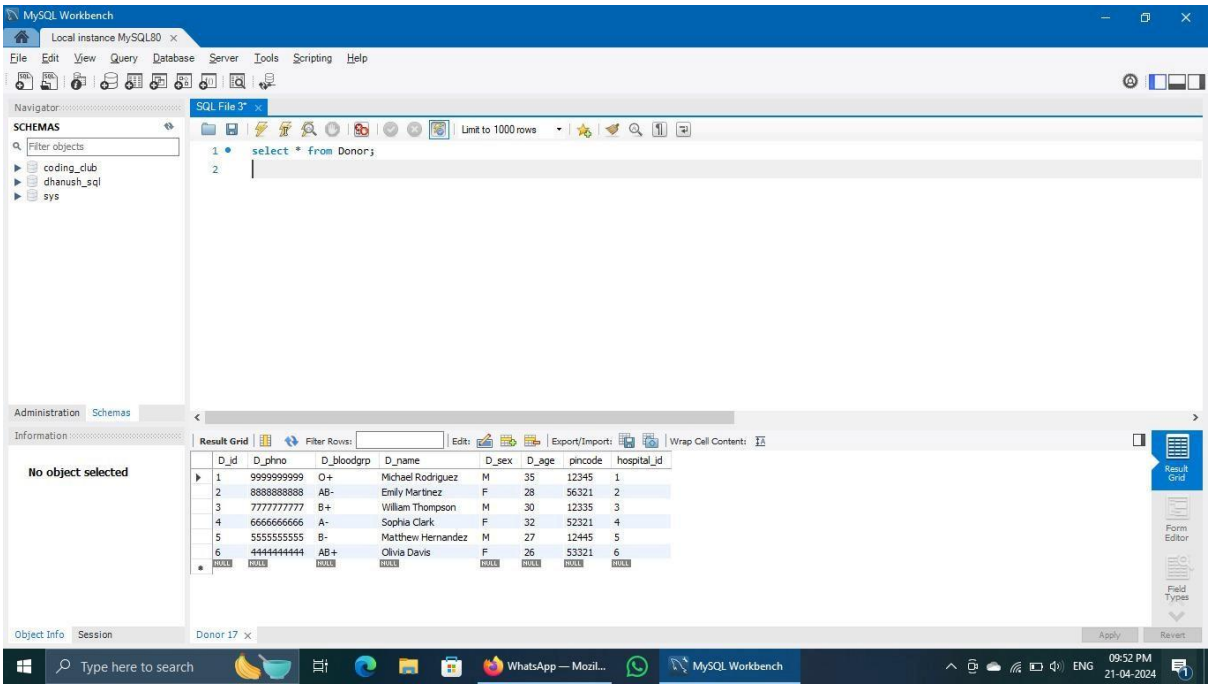
MySQL Workbench
Local instance MySQL80
File Edit View Query Database Server Tools Scripting Help
SCHEMAS
coding_club
dhanush_sql
sys
SQL File 3*
select * from Donor;
Result Grid
D_id D_phno D_bloodgrp D_name D_sex D_age pincode hospital_id
1 9999999999 O+ Michael Rodriguez M 35 12345 1
2 8888888888 AB- Emily Martinez F 28 56321 2
3 7777777777 B+ William Thompson M 30 12335 3
4 6666666666 A- Sophia Clark F 32 52321 4
5 5555555555 B- Matthew Hernandez M 27 12445 5
6 4444444444 AB+ Olivia Davis F 26 53321 6
No object selected
Donor 17
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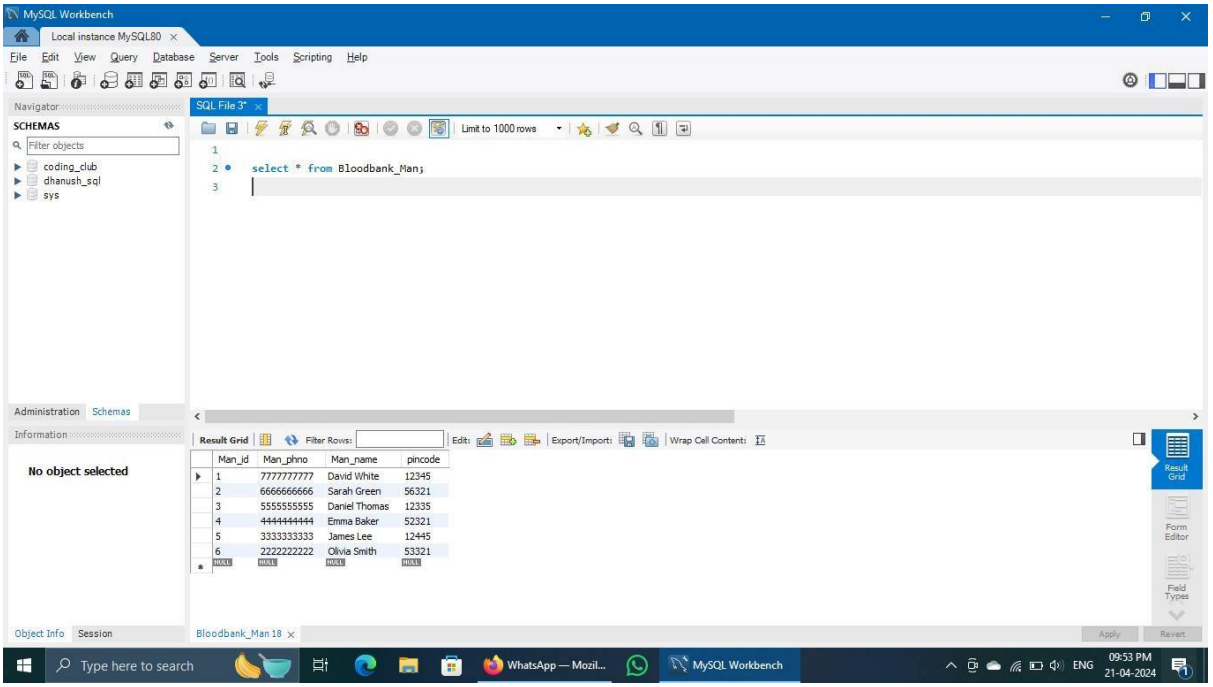
MySQL Workbench
Local instance MySQL80
File Edit View Query Database Server Tools Scripting Help
SCHEMAS
coding_club
dhanush_sql
sys
SQL File 3*
select * from Bloodbank_Man;
Result Grid
Man_id Man_phno Man_name pincode
1 7777777777 David White 12345
2 6666666666 Sarah Green 56321
3 5555555555 Daniel Thomas 12335
4 4444444444 Emma Baker 52321
5 3333333333 James Lee 12445
6 2222222222 Olivia Smith 53321
No object selected
Bloodbank_Man 18
Type here to search
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ENG
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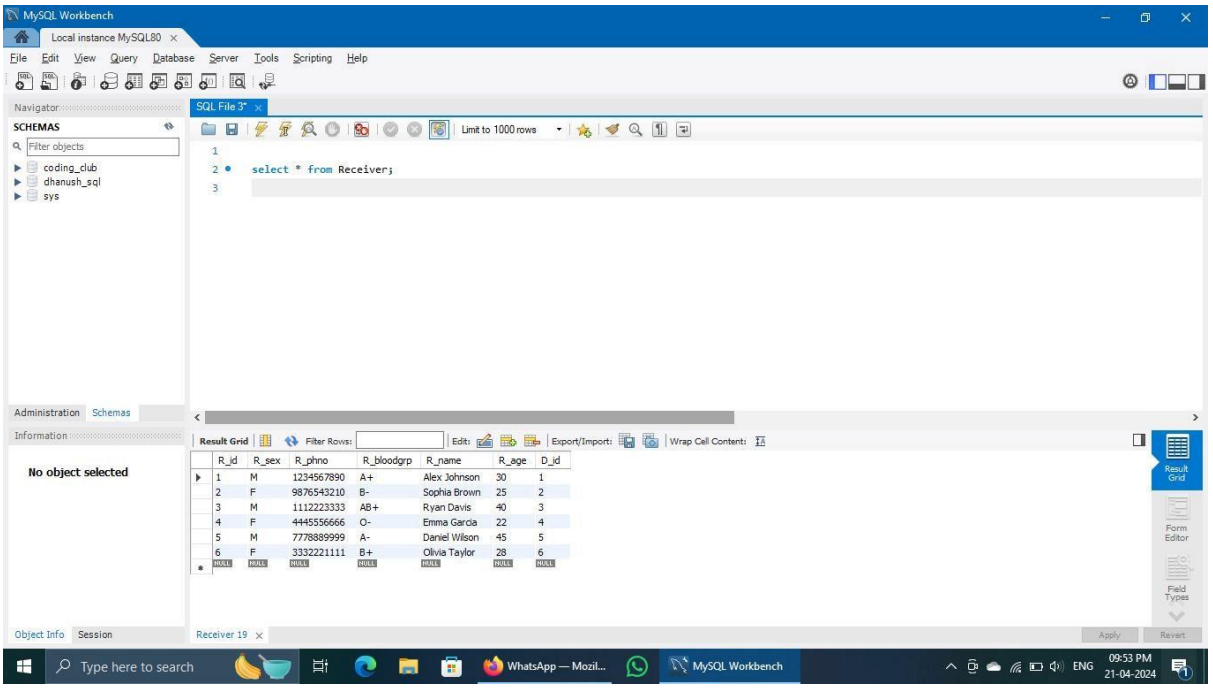
21-04-2024


MySQL Workbench
Local instance MySQL80
File Edit View Query Database Server Tools Scripting Help
SCHEMAS
coding_club
dhanush_sql
sys
SQL File 3*
select * from Receiver;
Result Grid
R_id R_sex R_phno R_bloodgrp R_name R_age D_id
1 M 1234567890 A+ Alex Johnson 30 1
2 F 9876543210 B- Sophia Brown 25 2
3 M 1112223333 AB+ Ryan Davis 40 3
4 F 4445556666 O- Emma Garcia 22 4
5 M 7778889999 A- Daniel Wilson 45 5
6 F 3332221111 B+ Olivia Taylor 28 6
No object selected
Receiver 19
Type here to search
WhatsApp — Mozil...
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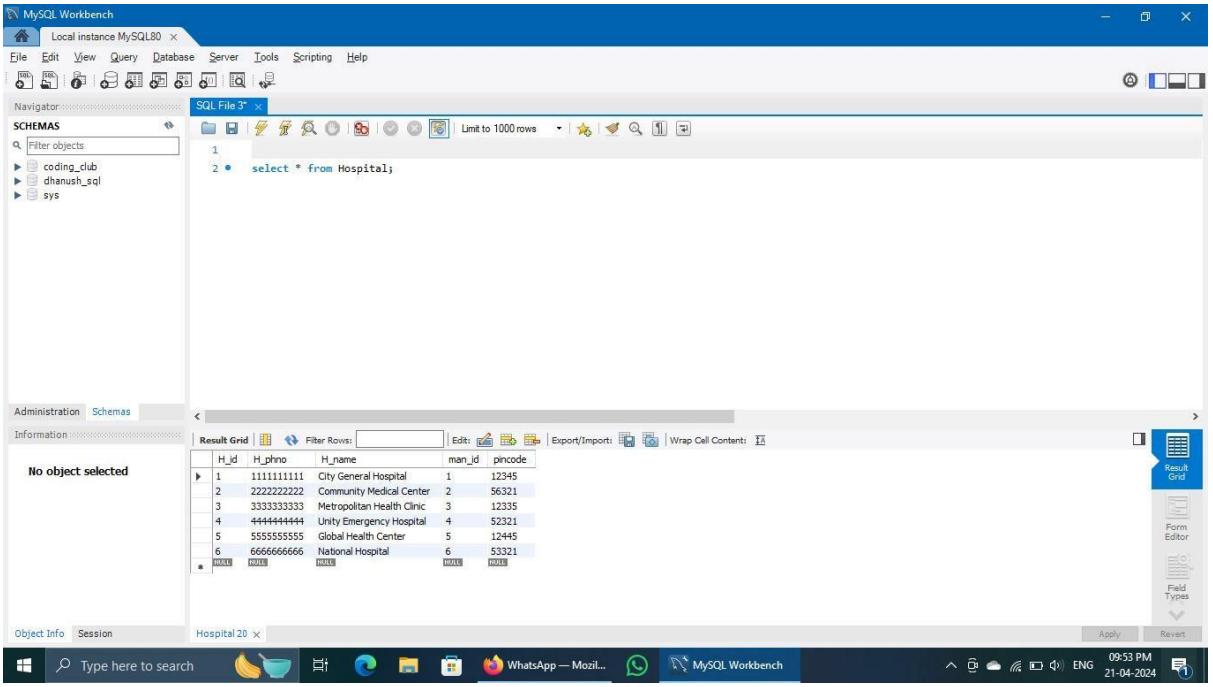
ENG
09:53 PM
21-04-2024



–calculate the average age of donors:

–Find the hospital with the highest number of donars:

```
102
103 •  SELECT * FROM Hospital WHERE pincode = (SELECT pincode FROM Donor GROUP BY pincode ORDER
104
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

H_id	H_phno	H_name	man_id	pincode
1	1111111111	City General Hospital	1	12345
NULL	NULL	NULL	NULL	NULL

Result Grid | Form Editor | Field Types

```
101 •  SELECT AVG(D_age) AS average_age FROM Donor;
102
103 •  SELECT * FROM Hospital WHERE pincode = (SELECT pincode FROM Donor GROUP BY pincode ORDER
104
105
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

donor_name	blood_bank_manager	blood_bank_manager_phno
Michael Rodriguez	David White	7777777777
Emily Martinez	Sarah Green	6666666666
William Thompson	Daniel Thomas	5555555555
Sophia Clark	Emma Baker	4444444444
Matthew Hernandez	James Lee	3333333333
Olivia Davis	Olivia Smith	2222222222

Result Grid | Form Editor | Field Types

```
94
95 •  SELECT D_bloodgrp, COUNT(*) AS donor_count
96    FROM Donor GROUP BY D_bloodgrp;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

D_bloodgrp	donor_count
O+	1
AB-	1
B+	1
A-	1
B-	1
AB+	1

Result Grid | Form Editor | Field Types

Read Only

```
109 •  SELECT * FROM Donor d INNER JOIN Hospital h ON
110    d.pincode = (select pincode from location where loc_name ='East Side') AND d.D_bloodgrp =
111
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

D_id	D_phno	D_bloodgrp	D_name	D_sex	D_age	pincode	hospital_id	H_id	H_phno	H_name	man_i

Result Grid | Form Editor | Field Types

```
110     d.pincode = (select pincode from location where loc_name ='East Side') AND d.D_bloodgrp =
111
112 •   SELECT * FROM Hospital WHERE pincode NOT IN (SELECT DISTINCT pincode FROM Donor);
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

H_id	H_phno	H_name	man_id	pincode
NULL	NULL	NULL	NULL	NULL

Result Grid | Form Editor | Field Types

```
113
114 •   SELECT h.H_name AS hospital_name, h.H_phno AS hospital_phno, COUNT(d.D_id) AS total_donor
115     FROM Hospital h LEFT JOIN Donor d ON h.pincode = d.pincode GROUP BY h.H_id;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

hospital_name	hospital_phno	total_donors
City General Hospital	1111111111	1
Community Medical Center	2222222222	1
Metropolitan Health Clinic	3333333333	1
Unity Emergency Hospital	4444444444	1
Global Health Center	5555555555	1
National Hospital	6666666666	1

Result Grid | Form Editor | Field Types

Conclusion:

This Blood Donation Management System offers a comprehensive solution for managing blood banks and streamlining the donation process. The system provides functionalities for donor registration, blood inventory management, and report generation.

Limitations and Future Scope:

- Briefly discuss any limitations of the current system (e.g., scalability, specific functionalities not implemented).

- Mention potential areas for future development (e.g., mobile application integration, advanced blood bank analytics).
- Application can be further developed to include more features of user-friendly interfaces.
- Future developers may extend this project to include the generation of donation slips for donors. In addition, various function can be added.
- Ability to sort donor and patients' queries.
- Improve the effectiveness.
- To integrate this blood bank management system with other health care provider centre, hospital, blood banks. ● Notification through SMS and email.

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