CC-215

Database System

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Database Design and Implementation in MySQL

- Entity Relationship Diagram
- Relational schema\table schema
- Normalization
- Common Commands
- Implementation in MySQL

Question:

Hospital System with Shifts and Medical History Logs

Doctors, nurses, and administrative staff are assigned shifts based on availability and department load. Patient histories include lab reports, prescriptions, allergies, surgeries, and emergency visits. Each ward has capacity rules. The billing system integrates lab, pharmacy, and consultation charges and generates receipts. Insurance claims are digitally filed and tracked through the portal.

Entity Relationship Diagram:

Notations used in ERD:

Chen and Crow’s Foot are two different notations used in ERDs (Entity-Relationship Diagrams).

They both represent the same concepts (entities, attributes, relationships), but in different styles:

Chen Model:

Uses rectangles for entities, ellipses for attributes, and diamonds for relationships. It's simple and used in conceptual design.

Crow’s Foot Model:

Uses boxes for entities and lines with symbols (like a crow’s foot) for relationships. It’s more detailed and used in logical/physical design.

ER Diagram using Chen Model

Specialization is orange here

Attributes of specialization is blue

Superclass is red

Attributes of superclass is light purple

Relationships are green

Simple entities are dark purple

Attributes of Simple entities are yellow

Weak entity ->patient history (when a weak entity is fully dependent on a strong entity (patient) than double rectangle used for weak entity, double diamond for identifying relationships, double line)

Relational schema\table schema from ERD

Staff (Staff-Id, name, salary)

Specialization:

- **Doctor** (Staff-Id, specialization)
- **Nurse** (Staff-Id, nurse-rank)
- **Administrative staff** (Staff-Id, role)

Shift (Shift-Id, start-time, end-time, day)

Staffshift (Staff-Id, shift-Id) (3rd table of staff and shift)

Patient (Patient-Id, Ward-id, name)

Patientstaff (patient-Id, Staff-id) (3rd table of staff and patient)

Ward (Ward-id, name)

wardNurse (Ward-Id, staff-id) (3rd table of Ward and nurse)

Receipts (Receipts-id, staff-id, patient-id, insurance-id, amount)

Insurance claim (insurance-id, total-amount, claim-date, patient_id, staff_id, last_date)

Patient history (H-id, patient-id, H-type) (weak entity has a partial key that cannot uniquely identify the entity and relies on foreign key from strong entity to create a composite primary key)

Specialization:

- **Lab report** (H-id,patient_id, test-type)
- **Surgery** (H-id,patient_id surgeon-name)
- **Prescription** (H-id,patient_id, medicine-name)

Normalization

First Normal Form (1NF)

Definition:

- No multivalued attributes (each attribute holds atomic values).
- Each field contains only one value.
- Each record is unique.

As all entities have atomic attributes, no multivalued attributes. Each record in every table is unique with a clear primary key. Therefore, the above table schema is in First Normal Form (1NF).

Second Normal Form (2NF)

Definition:

- Must be in 1NF.
- No partial dependency (non-prime attributes depend on the whole primary key, not part of it).
- If the table has a composite primary key, each non-key attribute must depend on the whole composite key, not just a part of it.

- **Tables with Primary Key and Attributes Dependent on It:** These tables have single primary keys and their attributes fully depend on the primary key, such as

Staff, Doctor, Nurse, Administrative staff, Shift, Ward (satisfy the 2NF)

In Doctor, Nurse, Administrative staff the staff-Id act as Primary key and foreign key at the same time.

- **Tables with Composite Primary Key:** These tables use composite keys to handle many-to-many relationships such as **StaffShift, PatientStaff,**

WardNurse (individually ids act as foreign keys but together they act as composite primary key) **(satisfy the 2NF)**

- **Tables with Attributes Dependent on Primary Key, with Foreign Keys:** These tables have single primary keys, and their attributes depend on the primary key, but they also include foreign keys referencing other tables such as **Patient, Receipt. (satisfy the 2NF)**

  Patient history: weak entity has a partial key that cannot uniquely identify the entity and relies on foreign key from strong entity to create a composite primary key

  - **Lab Report(H_id,Patient-Id, Test-Type)**

  (H-Id,patient_id) together form composite primary key ,inherited from patient_history. attribute Test-Type depends on both H-Id,patient_id . (satisfy the 2NF)

  - **Surgery(H-Id,patient_id, Surgeon-Name)**

  (H-Id,patient_id) together form composite primary key ,inherited from patient_history. Attribute Surgeon-Name depends on H-Id,patirnt_id .

  (satisfy the 2NF)

  - **Prescription(H-Id,patient_id, Medicine-Name)**

  (H-Id,patient_id) together form composite primary key ,inherited from patient_history. Attribute Medicine-Name depends on H-Id,patient_id. (satisfy the 2NF)

So all the tables are in 2NF as there is no partial dependency

Third Normal Form (3NF)

Definition:

- Must be in 2NF.

- No transitive dependency (non-prime attribute should not depend on another non-prime attribute).

Staff table: Name and Salary depend directly on Staff-Id.

Doctor/Nurse/Admin: specialization, nurse-rank, and role depend directly on Staff-Id.

Receipts: Amount depends directly on Receipts-id.

Insurance claim: total-amount, claim-date depend on Insurance-id.

PatientHistory specialization (Lab Report, Surgery, Prescription) are separated correctly.

No non-key attribute depends on another non-key attribute.

As there are no transitive dependencies, and non-prime attributes depend only on the primary key,

the database satisfies Third Normal Form (3NF).

So the tables are in normal form as it satisfies all the conditions of normalization

Common commands

1. To see existing databases:

show databases;

2. To Create a database:

CREATE DATABASE database_name;

3.To use the database:

USE database_name;

4.To create table:

```
CREATE TABLE table_name (
  column1_name DATA_TYPE CONSTRAINT,
  column2_name DATA_TYPE CONSTRAINT,
  …);
```

5.To see tables in database:

show tables;

6.to insert data in tables:

insert into table_name values(‘value1’,’value2’,…);

6.to describe table:

desc table_name;

7.To see the table with values;

SELECT * FROM table_name;

8.To update the existing values:

UPDATE table_name SET column_name = new_value

WHERE condition;

9.To add new column:

alter table table_name add new_column_name datatype(domain);

10.To add foreign key to existing table:

alter table table_name add new_column_name datatype(domain);

alter table table_name add constraint constraint_name foreign key (column_name) references referenced_table (referenced_column);

11.To see specific column from table:

select column_name from table_name;

12.To see specific cell from table:

select column_name from table_name where condition;

13.To Rename column in output temporarily:

select column_name as new_column_name from table_name;

14.To add foreign key at the time of table creation:

CREATE TABLE table_name (Column_name datatype constraint, FOREIGN KEY (column_name) REFERENCES referenced_table (referenced_column);

15.To create a Composite Primary Key:

create table table_name (column1 datatype, column2

datatype, -- other columns primary key (column1, column2));

16.To define a Primary Key that also acts as a Foreign Key in a Junction Table:

create table junction_table (fk1 datatype, fk2 datatype,-- other column primary key (fk1, fk2), foreign key (fk1) references parent_table1(primary_key_column), foreign key (fk2) references parent_table2(primary_key_column)

);

17. To perform Arithmetic Operations in SQL:

select column1, column2 + column3 as addition, column2 - column3 as subtraction, column2 * column3 as multiplication,column2 / column3 as division,column2 % column3 as modulus from table_name;

18.To use the DISTINCT clause (to remove duplicate values):

select distinct column_name from table_name;

19. To use the ORDER BY clause (to sort the result set):

select column_name from table_name order by column_name asc;

select column_name from table_name order by column_name desc;

20. To use Relational Operators in SQL (for comparisons in WHERE clause):

select column_name from table_name where

column_name = value; (Equal to)

select column_name from table_name where column_name > value; (Greater than)

select column_name from table_name where column_name <= value; (Less than or equal to)

21. To use Aggregate Functions in SQL (for calculations on a set of values):

select count(column_name) from table_name; (Counts number of non-null values)

select sum(column_name) from table_name; (Returns the total sum)

select avg(column_name) from table_name; (Returns the average value)

select min(column_name) from table_name; (Returns the minimum value)

select max(column_name) from table_name;
(Returns the maximum value)

22. To use the BETWEEN operator (for a range of values):

select column_name from table_name where column_name between value1 and value2;

23. To use the AND operator (to combine multiple conditions that must all be true):

select column_name from table_name where condition1 and condition2;

24. To use the LIKE operator (for pattern matching):

select column_name from table_name

where column_name like 'pattern';

25. To use the GROUP BY clause (to group rows sharing the same values):

select column_name, aggregate_function(column_name)

from table_name group by column_name;

26. To use the HAVING clause (to filter groups created by GROUP BY):

select column_name, aggregate_function(column_name)

from table_name group by column_name having condition;

JOIN

JOIN is used to combine rows from two or more tables based on a related column between them. It helps you fetch data that is related across tables.

Types of JOINs with queries:

27. To perform an INNER JOIN (returns matching rows from both tables):

select a.column1, b.column2 from table1 a inner join table2 b on a.common_column = b.common_column;

28. To perform a LEFT JOIN (returns all rows from the left table and matching rows from the right table):

select a.column1, b.column2 from table1 a left join table2 b on a.common_column = b.common_column;

29. To perform a RIGHT JOIN (returns all rows from the right table and matching rows from the left table):

select a.column1, b.column2 from table1 a right join table2 b on a.common_column = b.common_column;

30. To perform a CROSS JOIN (returns the Cartesian product of both tables):

select a.column1, b.column2 from table1 a cross join table2 b;

Join more than two tables (Multiple Table JOIN):

select a.column1, b.column2, c.column3 from table1 a

join table2 b on a.common_column =

b.common_column join table3 c on b.common_column = c.common_column;

VIEW:

31. To create a VIEW (a virtual table based on a query):

create view view_name as select column1, column2, ...

from table_name where condition;

32. To use TRUNCATE (to remove all rows from a table quickly):

truncate table table_name;

33. To use a Subquery (a query inside another query):

select column_name from table_name where column_name = (select column_name from

another_table where condition);

34. To show privileges of the current user or database:
show privileges;

35.Create user username identified by password:

create user username identified by password;

36.Create role role_name:

create role role_name;

Implementation in MySQL

- show databases;
- create database hospital;
- use hospital;
- creatr table Staff(Staff_id int(3) primary key,name varchar(100),salary decimal(10,2));
- desc staff;
- insert into Staff values('1','Dr.dawood','80000.00');
- insert into Staff values('2','nurse Huma','50000.00'),('3','Admin Adnan','40000.00');
- select * from Staff;

- CREATE TABLE Doctor (Staff_Id INT PRIMARY KEY, specialization VARCHAR(100), FOREIGN KEY (Staff_Id) REFERENCES Staff(Staff_Id));
- CREATE TABLE Nurse (Staff_Id INT PRIMARY KEY,nurse_rank VARCHAR(100), FOREIGN KEY (Staff_Id) REFERENCES Staff(Staff_Id));
- CREATE TABLE AdministrativeStaff (Staff_Id INT PRIMARY KEY, role VARCHAR(100), FOREIGN KEY (Staff_Id) REFERENCES Staff(Staff_Id));
- INSERT INTO Doctor VALUES (1, 'Cardiology');
- INSERT INTO Nurse VALUES (2, 'Senior');
- INSERT INTO AdministrativeStaff VALUES (3, 'Receptionist');
- desc Doctor;
- desc Nurse;
- desc   AdministrativeStaff;
- select * from Doctor;
- select * from Nurse;
- select * from AdministrativeStaff;

MySQL 8.0 Command Line Client

```
+----------------+--------------+------+-----+---------+-------+
2 rows in set (0.00 sec)

mysql> select * from Doctor;
+----------+----------------+
| Staff_id | specialization |
+----------+----------------+
|        1 | Cardiology     |
+----------+----------------+
1 row in set (0.00 sec)

mysql> describe Nurse;
+------------+--------------+------+-----+---------+-------+
| Field      | Type         | Null | Key | Default | Extra |
+------------+--------------+------+-----+---------+-------+
| Staff_id   | int          | NO   | PRI | NULL    |       |
| nurse_rank | varchar(100) | YES  |     | NULL    |       |
+------------+--------------+------+-----+---------+-------+
2 rows in set (0.00 sec)

mysql> select *from Nurse;
+----------+------------+
| Staff_id | nurse_rank |
+----------+------------+
|        2 | Senior     |
+----------+------------+
1 row in set (0.00 sec)

mysql>
```

MySQL 8.0 Command Line Client

```
mysql> describe AdministrativeStaff;
+----------+--------------+------+-----+---------+-------+
| Field    | Type         | Null | Key | Default | Extra |
+----------+--------------+------+-----+---------+-------+
| Staff_id | int          | NO   | PRI | NULL    |       |
| role     | varchar(100) | YES  |     | NULL    |       |
+----------+--------------+------+-----+---------+-------+
2 rows in set (0.00 sec)

mysql> select * from hospital;
ERROR 1146 (42S02): Table 'hospital.hospital' doesn't exist
mysql> select * from AdministrativeStaff;
+----------+--------------+
| Staff_id | role         |
+----------+--------------+
|        3 | Receptionist |
+----------+--------------+
1 row in set (0.00 sec)

mysql>
```

- CREATE TABLE Shift (Shift_Id INT PRIMARY KEY, start_time TIME,end_time TIME, day VARCHAR(20));
- INSERT INTO Shift VALUES (101, '08:00:00', '14:00:00', 'Monday');
- INSERT INTO Shift VALUES (102, '14:00:00', '20:00:00', 'Monday');

```
MySQL 8.0 Command Line Client
| Staff_id | role         |
+----------+--------------+
|        3 | Receptionist |
+----------+--------------+
1 row in set (0.00 sec)

mysql> describe Shift;
+------------+-------------+------+-----+---------+-------+
| Field      | Type        | Null | Key | Default | Extra |
+------------+-------------+------+-----+---------+-------+
| Shift_id   | int         | NO   | PRI | NULL    |       |
| start_time | time        | YES  |     | NULL    |       |
| end_time   | time        | YES  |     | NULL    |       |
| day        | varchar(20) | YES  |     | NULL    |       |
+------------+-------------+------+-----+---------+-------+
4 rows in set (0.00 sec)

mysql> select * from Shift;
+----------+------------+----------+--------+
| Shift_id | start_time | end_time | day    |
+----------+------------+----------+--------+
|      101 | 08:00:00   | 14:00:00 | Monday |
|      102 | 14:00:00   | 20:00:00 | Monday |
+----------+------------+----------+--------+
2 rows in set (0.00 sec)

mysql>
```

- CREATE TABLE StaffShift (Staff_Id INT,Shift_Id INT, PRIMARY KEY (Staff_Id, Shift_Id), CONSTRAINT fk_StaffShift_Staff FOREIGN KEY (Staff_Id) REFERENCES Staff(Staff_Id), CONSTRAINT fk_StaffShift_Shift FOREIGN KEY (Shift_Id) REFERENCES Shift(Shift_Id));

- INSERT INTO StaffShift VALUES (1, 101);
- INSERT INTO StaffShift VALUES (2, 102);

```
MySQL 8.0 Command Line Client
+------------+-------------+------+-----+---------+-------+
4 rows in set (0.00 sec)

mysql> select * from Shift;
+----------+------------+----------+--------+
| Shift_id | start_time | end_time | day    |
+----------+------------+----------+--------+
|      101 | 08:00:00   | 14:00:00 | Monday |
|      102 | 14:00:00   | 20:00:00 | Monday |
+----------+------------+----------+--------+
2 rows in set (0.00 sec)

mysql> DESCRIBE StaffShift;
+----------+------+------+-----+---------+-------+
| Field    | Type | Null | Key | Default | Extra |
+----------+------+------+-----+---------+-------+
| Staff_id | int  | NO   | PRI | NULL    |       |
| Shift_id | int  | NO   | PRI | NULL    |       |
+----------+------+------+-----+---------+-------+
2 rows in set (0.00 sec)

mysql> select * from StaffShift;
+----------+----------+
| Staff_id | Shift_id |
+----------+----------+
|        1 |      101 |
|        2 |      102 |
+----------+----------+
2 rows in set (0.00 sec)

mysql>
```

- create table patient(patient_id int(3) primary key,name varchar(30));

- insert into patient values('201','Ali'),('202','Hassan');

- CREATE TABLE PatientStaff (Patient_Id INT,Staff_Id INT, PRIMARY KEY (Patient_Id, Staff_Id), CONSTRAINT fk_Patient FOREIGN KEY (Patient_Id) REFERENCES Patient(Patient_Id), CONSTRAINT fk_PatientStaff_Staff FOREIGN KEY (Staff_Id) REFERENCES Staff(Staff_Id));
- INSERT INTO PatientStaff VALUES (201, 1);
- INSERT INTO PatientStaff VALUES (202, 2);

```
MySQL 8.0 Command Line Client
+------------+---------+--------+
| Patient_id | Ward_id | name   |
+------------+---------+--------+
|        201 |     301 | Ali    |
|        202 |     301 | Hassan |
+------------+---------+--------+
2 rows in set (0.00 sec)

mysql> describe PatientStaff;
+------------+------+------+-----+---------+-------+
| Field      | Type | Null | Key | Default | Extra |
+------------+------+------+-----+---------+-------+
| Patient_id | int  | NO   | PRI | NULL    |       |
| Staff_id   | int  | NO   | PRI | NULL    |       |
+------------+------+------+-----+---------+-------+
2 rows in set (0.00 sec)

mysql> select * from PatientStaff;
+------------+----------+
| Patient_id | Staff_id |
+------------+----------+
|        201 |        1 |
|        202 |        2 |
+------------+----------+
2 rows in set (0.00 sec)

mysql>
```

- CREATE TABLE Ward (Ward_Id INT PRIMARY KEY, name VARCHAR(100));
- INSERT INTO Ward VALUES (301, 'General'), (302, 'ICU');

```
MySQL 8.0 Command Line Client
+------------+------+------+-----+---------+-------+
2 rows in set (0.00 sec)

mysql> select * from PatientStaff;
+------------+----------+
| Patient_id | Staff_id |
+------------+----------+
|        201 |        1 |
|        202 |        2 |
+------------+----------+
2 rows in set (0.00 sec)

mysql> describe Ward;
+---------+--------------+------+-----+---------+-------+
| Field   | Type         | Null | Key | Default | Extra |
+---------+--------------+------+-----+---------+-------+
| Ward_id | int          | NO   | PRI | NULL    |       |
| name    | varchar(100) | YES  |     | NULL    |       |
+---------+--------------+------+-----+---------+-------+
2 rows in set (0.00 sec)

mysql> select * from Ward;
+---------+---------+
| Ward_id | name    |
+---------+---------+
|     301 | General |
|     302 | ICU     |
+---------+---------+
2 rows in set (0.00 sec)

mysql>
```

- ALTER TABLE patient ADD ward_id INT,ADD CONSTRAINT fk_ward FOREIGN KEY (ward_id) REFERENCES ward(ward_id);
- update patient set ward_id='301' where patient_id=201;

```
MySQL 8.0 Command Line Client

mysql> desc patient;
+------------+-------------+------+-----+---------+-------+
| Field      | Type        | Null | Key | Default | Extra |
+------------+-------------+------+-----+---------+-------+
| patient_id | int         | NO   | PRI | NULL    |       |
| name       | varchar(30) | YES  |     | NULL    |       |
| ward_id    | int         | YES  | MUL | NULL    |       |
+------------+-------------+------+-----+---------+-------+
3 rows in set (0.00 sec)

mysql> select * from patient;
+------------+--------+---------+
| patient_id | name   | ward_id |
+------------+--------+---------+
|        201 | Ali    |     301 |
|        202 | Hassan |     302 |
+------------+--------+---------+
2 rows in set (0.00 sec)

mysql>
```

- CREATE TABLE WardNurse (Ward_Id INT,Staff_Id INT, PRIMARY KEY (Ward_Id, Staff_Id), CONSTRAINT fk_Ward FOREIGN KEY (Ward_Id) REFERENCES Ward(Ward_Id), CONSTRAINT fk_WardNurse_Staff FOREIGN KEY (Staff_Id) REFERENCES Staff(Staff_Id));

```
MySQL 8.0 Command Line Client
+---------+---------+
2 rows in set (0.00 sec)

mysql> describe WardNurse;
+----------+------+------+-----+---------+-------+
| Field    | Type | Null | Key | Default | Extra |
+----------+------+------+-----+---------+-------+
| Ward_id  | int  | NO   | PRI | NULL    |       |
| Staff_id | int  | NO   | PRI | NULL    |       |
+----------+------+------+-----+---------+-------+
2 rows in set (0.00 sec)

mysql> select * from WardNurse;
+---------+----------+
| Ward_id | Staff_id |
+---------+----------+
|     301 |        2 |
|     302 |        2 |
+---------+----------+
2 rows in set (0.00 sec)

mysql>
```

- CREATE TABLE Receipts (Receipts_Id INT PRIMARY KEY, Staff_Id INT, Patient_Id INT, Insurance_Id INT, amount DECIMAL(10, 2), CONSTRAINT fk_Receipts_Staff FOREIGN KEY (Staff_Id) REFERENCES Staff(Staff_Id), CONSTRAINT fk_Receipts_Patient FOREIGN KEY (Patient_Id) REFERENCES Patient(Patient_Id));

- CREATE TABLE InsuranceClaim (Insurance_Id INT PRIMARY KEY, total_amount DECIMAL(10, 2),claim_date DATE, Staff_Id INT, Patient_Id INT, CONSTRAINT fk_Receipts_Staff FOREIGN KEY (Staff_Id) REFERENCES Staff(Staff_Id), CONSTRAINT fk_Receipts_Patient FOREIGN KEY (Patient_Id) REFERENCES Patient(Patient_Id));
- INSERT INTO Receipts VALUES (401, 1, 201, 601, 1500.00);
- INSERT INTO Receipts VALUES (402, 2, 202, 602, 2000.00);
- INSERT INTO InsuranceClaim VALUES (601, 1500.00, '2025-04-01', 1, 201);
- INSERT INTO InsuranceClaim VALUES (602, 2000.00, '2025-04-02', 1, 201);

- CREATE TABLE PatientHistory (patient_id INT,history_id INT, history_type VARCHAR(50), PRIMARY KEY (patient_id, history_id), FOREIGN KEY (patient_id) REFERENCES Patient(patient_id));
- INSERT INTO PatientHistory VALUES (701, 201, 'LabReport');
- CREATE TABLE LabReport (patient_id INT, H_Id INT(3) , test_name varchar(30), PRIMARY KEY (patient_id, history_id), FOREIGN KEY (patient_id, history_id) REFERENCES PatientHistory(patient_id, history_id));
- CREATE TABLE Surgery (patient_id int, H_Id INT(3) , surgeon_name VARCHAR(100),surgery_type varchar(30) PRIMARY KEY (patient_id, history_id),FOREIGN KEY (patient_id, history_id) REFERENCES PatientHistory(patient_id, history_id));
- CREATE TABLE Prescription (patient_id int ,H_Id INT(3) , medicine_name VARCHAR(100),duration int(3) PRIMARY KEY (patient_id, history_id),FOREIGN KEY (patient_id, history_id) REFERENCES PatientHistory(patient_id, history_id));

```
MySQL 8.0 Command Line Client
mysql> INSERT INTO labreport VALUES (202, 2, 'X-Ray');
Query OK, 1 row affected (0.01 sec)

mysql> INSERT INTO surgery VALUES (202, 2, 'Leg Fracture Repair', 'Dr. Dawood');
Query OK, 1 row affected (0.01 sec)

mysql> INSERT INTO prescription VALUES (202, 2, 'Painkillers', '7 days');
Query OK, 1 row affected (0.01 sec)

mysql> select * from patienthistory;
+------------+------------+------------------+
| patient_id | history_id | history_type     |
+------------+------------+------------------+
|        201 |          1 | General Checkup  |
|        202 |          2 | Accident Surgery |
+------------+------------+------------------+
2 rows in set (0.00 sec)

mysql> select * from labreport;
+------------+------------+------------+
| patient_id | history_id | test_name  |
+------------+------------+------------+
|        201 |          1 | Blood Test |
|        202 |          2 | X-Ray      |
+------------+------------+------------+
2 rows in set (0.00 sec)

mysql> select * from prescription;
+------------+------------+----------------------+----------+
| patient_id | history_id | medication_name      | duration |
+------------+------------+----------------------+----------+
|        201 |          1 | Vitamin D Supplement | 30 days  |
|        202 |          2 | Painkillers          | 7 days   |
+------------+------------+----------------------+----------+
2 rows in set (0.00 sec)

mysql> select * from surgery;
+------------+------------+--------------------+--------------+
| patient_id | history_id | surgery_type       | surgeon_name |
+------------+------------+--------------------+--------------+
|        202 |          2 | Leg Fracture Repair | Dr. Dawood   |
+------------+------------+--------------------+--------------+
1 row in set (0.00 sec)
```

Some queries used in DB Hospital with implementation:

- Show tables;
- update Staff set salary= salary+500 where staff_id=1;
- alter table Staff add contact_num varchar(15);
- alter table Staff drop column contact_num;
- DELETE FROM nurse WHERE staff_id = 4;
- DELETE FROM staff WHERE staff_id = 4;
- RENAME TABLE hospital_ward TO ward;
- SELECT H_Id, H_type FROM patient_history;
- SELECT test_type FROM lab_report;
- SELECT name AS staff_name FROM staff;
- select * from staff order by salary DESC;
- select * from patient order by name ASC;
- select Staff_id,name,salary,(salary+500) AS Total_salary from staff;
- select * from staff where salary>40000 AND Staff_id=3;
- select * from patient where Ward_id IN (301,302);
- select * from patient where name='Ali' OR name='Hassan';
- select * from staff where salary>40000 AND (name='Dr.Dawood' OR name='Nurse Huma');
- select * from staff where salary>40000 AND salary<90000;
- select* from staff where name like 'Dr.%';
- select* from staff where name like '_u%';
- select* from staff where salary between 40000 and 80000 0r name ='Admin Adnan';
- select COUNT(*) AS Total_staff FROM staff;

- select AVG(salary) AS avg_salary FROM staff;
- select MIN(salary) FROM staff;
- select MIN(salary) FROM staff GROUP BY name;
- select AVG(salary) FROM staff GROUP BY name HAVING COUNT(*)>0;

MySQL 8.0 Command Line Client

```
Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> use hospital
Database changed
mysql> show tables;
+---------------------+
| Tables_in_hospital  |
+---------------------+
| administrativestaff |
| doctor              |
| insuranceclaim      |
| labreport           |
| nurse               |
| patient             |
| patienthistory      |
| patientstaff        |
| prescription        |
| receipts            |
| shift               |
| staff               |
| staffshift          |
| surgery             |
| ward                |
| wardnurse           |
+---------------------+
16 rows in set (0.01 sec)

mysql> INSERT INTO Staff VALUES (4,'NURSE Amna',48000);
Query OK, 1 row affected (0.01 sec)

mysql> INSERT INTO Nurse VALUES (4,'Junior');
Query OK, 1 row affected (0.01 sec)

mysql> select * from Nurse;
+----------+------------+
| Staff_id | nurse_rank |
+----------+------------+
|        2 | Senior     |
|        4 | Junior     |
+----------+------------+
2 rows in set (0.00 sec)

mysql>
```

MySQL 8.0 Command Line Client

```
| prescription        |
| receipts            |
| shift               |
| staff               |
| staffshift          |
| surgery             |
| ward                |
| wardnurse           |
+---------------------+
16 rows in set (0.01 sec)

mysql> INSERT INTO Staff VALUES (4,'NURSE Amna',48000);
Query OK, 1 row affected (0.01 sec)

mysql> INSERT INTO Nurse VALUES (4,'Junior');
Query OK, 1 row affected (0.01 sec)

mysql> select * from Nurse;
+----------+------------+
| Staff_id | nurse_rank |
+----------+------------+
|        2 | Senior     |
|        4 | Junior     |
+----------+------------+
2 rows in set (0.00 sec)

mysql> UPDATE Staff SET salary = salary + 5000 WHERE Staff_id=1;
Query OK, 1 row affected (0.02 sec)
Rows matched: 1  Changed: 1  Warnings: 0

mysql> select * from Staff;
+----------+-------------+----------+
| Staff_id | name        | salary   |
+----------+-------------+----------+
|        1 | Dr. Dawood  | 85000.00 |
|        2 | Nurse Huma  | 50000.00 |
|        3 | Admin Adnan | 40000.00 |
|        4 | NURSE Amna  | 48000.00 |
+----------+-------------+----------+
4 rows in set (0.00 sec)

mysql>
```

MySQL 8.0 Command Line Client

```
mysql> ALTER TABLE Staff ADD contact_number VARCHAR(14);
Query OK, 0 rows affected (0.04 sec)
Records: 0  Duplicates: 0  Warnings: 0

mysql> select * from Staff;
+----------+-------------+----------+----------------+
| Staff_id | name        | salary   | contact_number |
+----------+-------------+----------+----------------+
|        1 | Dr. Dawood  | 85000.00 | NULL           |
|        2 | Nurse Huma  | 50000.00 | NULL           |
|        3 | Admin Adnan | 40000.00 | NULL           |
|        4 | NURSE Amna  | 48000.00 | NULL           |
+----------+-------------+----------+----------------+
4 rows in set (0.00 sec)

mysql> ALTER TABLE Staff DROP COLUMN contact_number;
Query OK, 0 rows affected (0.04 sec)
Records: 0  Duplicates: 0  Warnings: 0

mysql> select * from Staff;
+----------+-------------+----------+
| Staff_id | name        | salary   |
+----------+-------------+----------+
|        1 | Dr. Dawood  | 85000.00 |
|        2 | Nurse Huma  | 50000.00 |
|        3 | Admin Adnan | 40000.00 |
|        4 | NURSE Amna  | 48000.00 |
+----------+-------------+----------+
4 rows in set (0.00 sec)

mysql> DELETE FROM Nurse WHERE Staff_id=4;
Query OK, 1 row affected (0.01 sec)

mysql> DELETE FROM Staff WHERE Staff_id=4;
Query OK, 1 row affected (0.01 sec)

mysql>
```

Type here to search 78% 33°C 11:32 AM 5/2/2025

MySQL 8.0 Command Line Client

```
| shift               |
| staff               |
| staffshift          |
| surgery             |
| wardnurse           |
+---------------------+
16 rows in set (0.00 sec)

mysql> RENAME TABLE hospitaward TO Ward;
Query OK, 0 rows affected (0.03 sec)

mysql> select * from Ward;
+---------+---------+
| Ward_id | name    |
+---------+---------+
|     301 | General |
|     302 | ICU     |
+---------+---------+
2 rows in set (0.00 sec)

mysql> select h_id,h_type from PatientHistory;
+------+--------------+
| h_id | h_type       |
+------+--------------+
|  701 | LabReport    |
|  702 | Surgery      |
|  703 | Prescription |
+------+--------------+
3 rows in set (0.00 sec)

mysql> select amount from Receipts;
+---------+
| amount  |
+---------+
| 1500.00 |
| 2000.00 |
+---------+
2 rows in set (0.00 sec)

mysql> select test_type from LabReport
```

Type here to search 75% 33°C 11:52 AM 5/2/2025

MySQL 8.0 Command Line Client

```
mysql>  select test_type from LabReport where h_id=701;
+------------+
| test_type  |
+------------+
| Blood Test |
+------------+
1 row in set (0.00 sec)

mysql> select name AS StaffName from Staff;
+-------------+
| StaffName   |
+-------------+
| Dr. Dawood  |
| Nurse Huma  |
| Admin Adnan |
+-------------+
3 rows in set (0.00 sec)

mysql> select * from Staff;
+----------+-------------+----------+
| Staff_id | name        | salary   |
+----------+-------------+----------+
|        1 | Dr. Dawood  | 85000.00 |
|        2 | Nurse Huma  | 50000.00 |
|        3 | Admin Adnan | 40000.00 |
+----------+-------------+----------+
3 rows in set (0.00 sec)

mysql>
```

MySQL 8.0 Command Line Client

```
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affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> use Hospital;
Database changed
mysql> show tables;
+---------------------+
| Tables_in_hospital  |
+---------------------+
| administrativestaff |
| doctor              |
| insuranceclaim      |
| labreport           |
| nurse               |
| patient             |
| patienthistory      |
| patientstaff        |
| prescription        |
| receipts            |
| shift               |
| staff               |
| staffshift          |
| surgery             |
| ward                |
| wardnurse           |
+---------------------+
16 rows in set (0.00 sec)

mysql> SELECT * FROM staff ORDER BY salary DESC;
+----------+-------------+----------+
| Staff_id | name        | salary   |
+----------+-------------+----------+
|        1 | Dr. Dawood  | 85000.00 |
|        2 | Nurse Huma  | 50000.00 |
|        3 | Admin Adnan | 40000.00 |
+----------+-------------+----------+
3 rows in set (0.03 sec)

mysql>
```

MySQL 8.0 Command Line Client

```
+----------+-------------+----------+
|        1 | Dr. Dawood  | 85000.00 |
|        2 | Nurse Huma  | 50000.00 |
|        3 | Admin Adnan | 40000.00 |
+----------+-------------+----------+
3 rows in set (0.03 sec)

mysql> SELECT * FROM patient ORDER BY name ASC;
+------------+---------+--------+
| Patient_id | Ward_id | name   |
+------------+---------+--------+
|        201 |     301 | Ali    |
|        202 |     301 | Hassan |
+------------+---------+--------+
2 rows in set (0.02 sec)

mysql> SELECT Staff_id,name,salary,(salary+5000) AS total_salary from staff;
+----------+-------------+----------+--------------+
| Staff_id | name        | salary   | total_salary |
+----------+-------------+----------+--------------+
|        1 | Dr. Dawood  | 85000.00 |     90000.00 |
|        2 | Nurse Huma  | 50000.00 |     55000.00 |
|        3 | Admin Adnan | 40000.00 |     45000.00 |
+----------+-------------+----------+--------------+
3 rows in set (0.00 sec)

mysql> select * from staff WHERE salary>40000 AND Staff_id=3;
Empty set (0.00 sec)

mysql> select * from staff WHERE salary<40000 OR Staff_id=1;
+----------+-----------+----------+
| Staff_id | name      | salary   |
+----------+-----------+----------+
|        1 | Dr. Dawood | 85000.00 |
+----------+-----------+----------+
1 row in set (0.00 sec)

mysql>
```

MySQL 8.0 Command Line Client

```
|        1 | Cardiology     |
+----------+----------------+
1 row in set (0.02 sec)

mysql> select * from patient WHERE Ward_id IN (301,302);
+------------+---------+--------+
| Patient_id | Ward_id | name   |
+------------+---------+--------+
|        201 |     301 | Ali    |
|        202 |     301 | Hassan |
+------------+---------+--------+
2 rows in set (0.00 sec)

mysql> select * from patient WHERE name= 'Ali' OR name='Hassan';
+------------+---------+--------+
| Patient_id | Ward_id | name   |
+------------+---------+--------+
|        201 |     301 | Ali    |
|        202 |     301 | Hassan |
+------------+---------+--------+
2 rows in set (0.00 sec)

mysql> select * from Staff WHERE salary > 40000 AND (name = Dr.Dawood' OR name = 'Nurse Huma');
    '> ;
    '> ^C
mysql> select * from staff WHERE salary > 40000 AND (name = Dr.Dawood' OR name = 'Nurse Huma');
    '> ^C
mysql> select * from staff WHERE salary > 40000 AND (name ='Dr.Dawood' OR name = 'Nurse Huma');
+----------+-----------+----------+
| Staff_id | name      | salary   |
+----------+-----------+----------+
|        2 | Nurse Huma | 50000.00 |
+----------+-----------+----------+
1 row in set (0.00 sec)

mysql>
```

MySQL 8.0 Command Line Client

```
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owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> use hospital;
Database changed
mysql> show tables;
+---------------------+
| Tables_in_hospital  |
+---------------------+
| administrativestaff |
| doctor              |
| insuranceclaim      |
| labreport           |
| nurse               |
| patient             |
| patienthistory      |
| patientstaff        |
| prescription        |
| receipts            |
| shift               |
| staff               |
| staffshift          |
| surgery             |
| ward                |
| wardnurse           |
+---------------------+
16 rows in set (0.00 sec)

mysql> select * from staff where Salary> 40000 AND Salary < 90000;
+----------+------------+----------+
| Staff_id | name       | salary   |
+----------+------------+----------+
|        1 | Dr. Dawood | 85000.00 |
|        2 | Nurse Huma | 50000.00 |
+----------+------------+----------+
2 rows in set (0.00 sec)

mysql>
```

Type here to search 62% 29°C 9:17 PM 5/6/2025

MySQL 8.0 Command Line Client

```
+----------+------------+----------+
|        1 | Dr. Dawood | 85000.00 |
|        2 | Nurse Huma | 50000.00 |
+----------+------------+----------+
2 rows in set (0.00 sec)

mysql> select * staff WHERE name = 'Dr. Dawood' or name = 'Nurse Huma';
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'staff WHERE n
ame = 'Dr. Dawood' or name = 'Nurse Huma'' at line 1
mysql> select * from staff WHERE name = 'Dr. Dawood' or name = 'Nurse Huma';
+----------+------------+----------+
| Staff_id | name       | salary   |
+----------+------------+----------+
|        1 | Dr. Dawood | 85000.00 |
|        2 | Nurse Huma | 50000.00 |
+----------+------------+----------+
2 rows in set (0.00 sec)

mysql> select * from staff where name LIKE 'Dr.%';
+----------+------------+----------+
| Staff_id | name       | salary   |
+----------+------------+----------+
|        1 | Dr. Dawood | 85000.00 |
+----------+------------+----------+
1 row in set (0.00 sec)

mysql> select * from staff where name like '_u%';
+----------+------------+----------+
| Staff_id | name       | salary   |
+----------+------------+----------+
|        2 | Nurse Huma | 50000.00 |
+----------+------------+----------+
1 row in set (0.00 sec)

mysql> select * from patient where name like '__s%';
+------------+---------+--------+
| Patient_id | Ward_id | name   |
+------------+---------+--------+
|        202 |     301 | Hassan |
+------------+---------+--------+
1 row in set (0.00 sec)

mysql>
```

Type here to search 60% 29°C 9:25 PM 5/6/2025

MySQL 8.0 Command Line Client

```
mysql> select * from doctor where Staff_id =1 AND specialization='Cardiology';
+----------+----------------+
| Staff_id | specialization |
+----------+----------------+
|        1 | Cardiology     |
+----------+----------------+
1 row in set (0.00 sec)

mysql> select * from staff where salary between 40000 and 80000 or name ='Admin Adnan';
+----------+-------------+----------+
| Staff_id | name        | salary   |
+----------+-------------+----------+
|        2 | Nurse Huma  | 50000.00 |
|        3 | Admin Adnan | 40000.00 |
+----------+-------------+----------+
2 rows in set (0.00 sec)

mysql> select * from staff where Staff_id IN(1,2,3);
+----------+-------------+----------+
| Staff_id | name        | salary   |
+----------+-------------+----------+
|        1 | Dr. Dawood  | 85000.00 |
|        2 | Nurse Huma  | 50000.00 |
|        3 | Admin Adnan | 40000.00 |
+----------+-------------+----------+
3 rows in set (0.00 sec)

mysql> SELECT COUNT(*) AS total_staff FROM staff;
+-------------+
| total_staff |
+-------------+
|           3 |
+-------------+
1 row in set (0.01 sec)

mysql> select AVG(salary) AS avg_salary FROM staff;
+--------------+
| avg_salary   |
+--------------+
| 58333.333333 |
+--------------+
1 row in set (0.00 sec)

mysql>
```

Type here to search 59% Result 9:32 PM 5/6/2025

MySQL 8.0 Command Line Client

```
+--------------+
1 row in set (0.00 sec)

mysql> select MIN(salary) from staff;
+-------------+
| MIN(salary) |
+-------------+
|    40000.00 |
+-------------+
1 row in set (0.00 sec)

mysql> select MAX(salary) from staff;
+-------------+
| MAX(salary) |
+-------------+
|    85000.00 |
+-------------+
1 row in set (0.00 sec)

mysql> select AVG(salary) FROM staff GROUP BY name;
+--------------+
| AVG(salary)  |
+--------------+
| 85000.000000 |
| 50000.000000 |
| 40000.000000 |
+--------------+
3 rows in set (0.00 sec)

mysql> select MIN(salary) FROM staff GROUP BY name;
+-------------+
| MIN(salary) |
+-------------+
|    85000.00 |
|    50000.00 |
|    40000.00 |
+-------------+
3 rows in set (0.00 sec)

mysql>
```

Type here to search 58% Result 9:34 PM 5/6/2025

```
MySQL 8.0 Command Line Client

mysql> select MIN(salary) FROM staff GROUP BY name;
+-------------+
| MIN(salary) |
+-------------+
|    85000.00 |
|    50000.00 |
|    40000.00 |
+-------------+
3 rows in set (0.00 sec)

mysql> SELECT MAX(salary) FROM staff GROUP BY name;
+-------------+
| MAX(salary) |
+-------------+
|    85000.00 |
|    50000.00 |
|    40000.00 |
+-------------+
3 rows in set (0.00 sec)

mysql> select  AVG (salary) from staff group by name HAVING COUNT(*)>0;
+--------------+
| AVG (salary) |
+--------------+
| 85000.000000 |
| 50000.000000 |
| 40000.000000 |
+--------------+
3 rows in set (0.00 sec)

mysql>
```

Select specialization,count(*) from doctor group by specialization;

Select specialization,count(*) from doctor group by specialization having count(*)>1;

```
MySQL 8.0 Command Line Client
Database changed
mysql> select * from administrativestaff;
+----------+--------------+
| Staff_id | role         |
+----------+--------------+
|        3 | Receptionist |
+----------+--------------+
1 row in set (0.01 sec)

mysql> select * from staff;
+----------+-------------+----------+
| Staff_id | name        | salary   |
+----------+-------------+----------+
|        1 | Dr. Dawood  | 85000.00 |
|        2 | Nurse Huma  | 50000.00 |
|        3 | Admin Adnan | 40000.00 |
|        4 | temp_worker | 35000.00 |
+----------+-------------+----------+
4 rows in set (0.00 sec)

mysql> select role ,AVG(salary) from administrativestaff join staff on administrativestaff.Staff_id=staff.Staff_id group by role;
+--------------+--------------+
| role         | AVG(salary)  |
+--------------+--------------+
| Receptionist | 40000.000000 |
+--------------+--------------+
1 row in set (0.00 sec)

mysql> select * from doctor;
+----------+----------------+
| Staff_id | specialization |
+----------+----------------+
|        1 | Cardiology     |
+----------+----------------+
1 row in set (0.00 sec)

mysql> select specialization, count(*)  from doctor group by specialization;
+----------------+----------+
| specialization | count(*) |
+----------------+----------+
| Cardiology     |        1 |
+----------------+----------+
1 row in set (0.00 sec)
```

MySQL 8.0 Command Line Client

```
mysql>  select specialization, count(*)  from doctor group by specialization having count(*)<1;
Empty set (0.00 sec)

mysql> select specialization, count(*)  from doctor group by specialization having count(*)>1;
Empty set (0.00 sec)

mysql> select * from wardnurse;
+---------+----------+
| Ward_id | Staff_id |
+---------+----------+
|     301 |        2 |
|     302 |        2 |
+---------+----------+
2 rows in set (0.00 sec)
```

MySQL 8.0 Command Line Client

```
mysql> select staff.name, COUNT(wardnurse.Ward_id) from wardnurse join staff on wardnurse.Staff_id=staff.staff_id group by staff.name;
+------------+--------------------------+
| name       | COUNT(wardnurse.Ward_id) |
+------------+--------------------------+
| Nurse Huma |                        2 |
+------------+--------------------------+
1 row in set (0.00 sec)

mysql> SELECT * FROM doctor;
+----------+----------------+
| Staff_id | specialization |
+----------+----------------+
|        1 | Cardiology     |
+----------+----------------+
1 row in set (0.00 sec)

mysql>  select specialization, count(*)  from doctor group by specialization;
+----------------+----------+
| specialization | count(*) |
+----------------+----------+
| Cardiology     |        1 |
+----------------+----------+
1 row in set (0.00 sec)

mysql> select specialization, count(*)  from doctor group by specialization having count(*)>1;
Empty set (0.00 sec)

mysql> select * from wardnurse;
+---------+----------+
| Ward_id | Staff_id |
+---------+----------+
|     301 |        2 |
|     302 |        2 |
+---------+----------+
2 rows in set (0.00 sec)

mysql> select staff.name, COUNT(wardnurse.Ward_id) from wardnurse join staff on wardnurse.Staff_id=staff.staff_id group by staff.name;
+------------+--------------------------+
| name       | COUNT(wardnurse.Ward_id) |
+------------+--------------------------+
| Nurse Huma |                        2 |
+------------+--------------------------+
1 row in set (0.00 sec)
```

Type here to search 90% 30°C 10:09 PM 5/19/2025

MySQL 8.0 Command Line Client

```
mysql> select specialization,COUNT(*) FROM doctor group by specialization having COUNT(*)>1;
Empty set (0.00 sec)

mysql> select * from patientstaff;
+------------+----------+
| Patient_id | Staff_id |
+------------+----------+
|        201 |        1 |
|        202 |        2 |
+------------+----------+
2 rows in set (0.00 sec)

mysql> select staff.name, COUNT (patientstaff.patient_id from patientstaff join staff on patientstaff.Staff_id=staff.staff_id
    -> ^C
mysql> select staff.name, COUNT (patientstaff.patient_id) from patientstaff join staff on patientstaff.Staff_id=staff.staff_id
    -> join doctor on staff.staff_id=doctor.staff_id;
ERROR 1630 (42000): FUNCTION hospital.COUNT does not exist. Check the 'Function Name Parsing and Resolution' section in the Reference Manual
mysql> select * from patientstaff;
+------------+----------+
| Patient_id | Staff_id |
+------------+----------+
|        201 |        1 |
|        202 |        2 |
+------------+----------+
2 rows in set (0.00 sec)
```

MySQL 8.0 Command Line Client

```
mysql> select staff.name,COUNT(patientstaff.patient_id) from patientstaff join staff on patientstaff.Staff_id=staff.staff_id
    -> join doctor on staff.staff_id=doctor.staff_id
    -> group by staff.name;
+------------+--------------------------------+
| name       | COUNT(patientstaff.patient_id) |
+------------+--------------------------------+
| Dr. Dawood |                              1 |
+------------+--------------------------------+
1 row in set (0.00 sec)

mysql> select staffshift.shift_id,COUNT(staffshift.Staff_id) from staffshift
    -> group by staffshift.Shuft_id;
ERROR 1054 (42S22): Unknown column 'staffshift.Shuft_id' in 'group statement'
mysql> select staffshift.shift_id,COUNT(staffshift.Staff_id) from staffshift
    -> group by staffshift.Shift_id;
+----------+---------------------------+
| shift_id | COUNT(staffshift.Staff_id) |
+----------+---------------------------+
|      101 |                         1 |
|      102 |                         1 |
+----------+---------------------------+
2 rows in set (0.00 sec)

mysql> select ward.name, COUNT(patient.patient_id) from ward join patient on ward.Ward_id=patient.Ward_id
    -> group by ward.name;
+---------+--------------------------+
| name    | COUNT(patient.patient_id) |
+---------+--------------------------+
| General |                        2 |
| ICU     |                        1 |
+---------+--------------------------+
2 rows in set (0.00 sec)
```

MySQL 8.0 Command Line Client

```
mysql> SELECT name
    ->  FROM Staff
    ->  WHERE Staff_Id IN (
    ->    SELECT Staff_Id FROM Receipts WHERE amount > 1500
    -> );
+------------+
| name       |
+------------+
| Nurse Huma |
+------------+
1 row in set (0.00 sec)

mysql> SELECT name
    -> FROM Ward
    -> WHERE Ward_Id IN (
    ->   SELECT Ward_Id FROM WardNurse
    -> );
+---------+
| name    |
+---------+
| General |
| ICU     |
+---------+
2 rows in set (0.00 sec)

mysql>
mysql> SELECT name
    -> FROM Staff
    -> WHERE Staff_Id IN (SELECT Staff_Id FROM WardNurse);
+------------+
| name       |
+------------+
| Nurse Huma |
+------------+
1 row in set (0.00 sec)

mysql> SELECT name,
    ->  (SELECT surgeon_name FROM Surgery WHERE Surgery.H_Id = PatientHistory.H_Id) AS surgeon
    -> FROM Patient
    -> JOIN PatientHistory ON Patient.Patient_Id = PatientHistory.Patient_Id
    -> WHERE PatientHistory.H_type = 'Surgery';
+--------+-----------+
| name   | surgeon   |
+--------+-----------+
```

Type here to search 89% 30°C 10:10 PM 5/19/2025

MySQL 8.0 Command Line Client

```
mysql> SELECT name,
    -> (SELECT surgeon_name FROM Surgery WHERE Surgery.H_Id = PatientHistory.H_Id) AS surgeon
    -> FROM Patient
    -> JOIN PatientHistory ON Patient.Patient_Id = PatientHistory.Patient_Id
    -> WHERE PatientHistory.H_type = 'Surgery';
+--------+-----------+
| name   | surgeon   |
+--------+-----------+
| Hassan | Dr.Dawood |
+--------+-----------+
1 row in set (0.00 sec)

mysql> SELECT name, salary,
    -> (SELECT specialization FROM Doctor WHERE Doctor.Staff_Id = Staff.Staff_Id) AS specialization
    -> FROM Staff
    -> WHERE Staff_Id IN (SELECT Staff_Id FROM Doctor);
+------------+----------+----------------+
| name       | salary   | specialization |
+------------+----------+----------------+
| Dr. Dawood | 85000.00 | Cardiology     |
+------------+----------+----------------+
1 row in set (0.00 sec)

mysql> SELECT name FROM Patient
    -> WHERE Patient_Id IN (
    -> SELECT Patient_Id FROM PatientHistory WHERE H_type = 'LabReport');
+------+
| name |
+------+
| Ali  |
+------+
1 row in set (0.00 sec)

mysql> SELECT name
    -> FROM Patient
    -> WHERE Patient_Id IN (
    -> SELECT Patient_Id FROM PatientHistory WHERE H_type = 'LabReport'
    -> );
+------+
| name |
+------+
| Ali  |
+------+
1 row in set (0.00 sec)
```

Type here to search 89% 30°C 10:12 PM 5/19/2025

MySQL 8.0 Command Line Client

```
mysql> SELECT name, salary,
    -> (SELECT specialization FROM Doctor WHERE Doctor.Staff_Id = Staff.Staff_Id) AS specialization
    -> FROM Staff
    -> WHERE Staff_Id IN (SELECT Staff_Id FROM Doctor);
+------------+----------+----------------+
| name       | salary   | specialization |
+------------+----------+----------------+
| Dr. Dawood | 85000.00 | Cardiology     |
+------------+----------+----------------+
1 row in set (0.00 sec)

mysql> SELECT name FROM Patient
    -> WHERE Patient_Id IN (
    -> SELECT Patient_Id FROM PatientHistory WHERE H_type = 'LabReport');
+------+
| name |
+------+
| Ali  |
+------+
1 row in set (0.00 sec)

mysql> SELECT name
    -> FROM Patient
    -> WHERE Patient_Id IN (
    -> SELECT Patient_Id FROM PatientHistory WHERE H_type = 'LabReport'
    -> );
+------+
| name |
+------+
| Ali  |
+------+
1 row in set (0.00 sec)

mysql>
```

Type here to search 89% 30°C 10:12 PM 5/19/2025

join

Select MySQL 8.0 Command Line Client

```
Enter password: *************
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 32
Server version: 8.0.41 MySQL Community Server - GPL

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owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> use hospital;
Database changed
mysql> show tables;
+---------------------+
| Tables_in_hospital  |
+---------------------+
| administrativestaff |
| doctor              |
| doctorlist          |
| insuranceclaim      |
| labreport           |
| nurse               |
| patient             |
| patienthistory      |
| patientinfo         |
| patientstaff        |
| prescription        |
| receipts            |
| shift               |
| staff               |
| staffshift          |
| surgery             |
| ward                |
| wardnurse           |
+---------------------+
18 rows in set (0.00 sec)

mysql> select * from staff;
+----------+-------------+----------+
| Staff_id | name        | salary   |
+----------+-------------+----------+
```

Select MySQL 8.0 Command Line Client

```
mysql> select * from staff;
+----------+-------------+----------+
| Staff_id | name        | salary   |
+----------+-------------+----------+
|        1 | Dr. Dawood  | 85000.00 |
|        2 | Nurse Huma  | 50000.00 |
|        3 | Admin Adnan | 40000.00 |
+----------+-------------+----------+
3 rows in set (0.00 sec)

mysql> select * from doctor;
+----------+----------------+
| Staff_id | specialization |
+----------+----------------+
|        1 | Cardiology     |
+----------+----------------+
1 row in set (0.00 sec)

mysql> select staff.name,doctor.specialization from staff inner join doctor on staff.staff_id=doctor.staff_id;
+------------+----------------+
| name       | specialization |
+------------+----------------+
| Dr. Dawood | Cardiology     |
+------------+----------------+
1 row in set (0.00 sec)

mysql> select staff.name,doctor.specialization from staff outer join doctor on staff.staff_id=doctor.staff_id;
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'outer join do
ctor on staff.staff_id=doctor.staff_id' at line 1
mysql> select staff.name,doctor.specialization from staff left join doctor on staff.staff_id=doctor.staff_id;
+-------------+----------------+
| name        | specialization |
+-------------+----------------+
| Dr. Dawood  | Cardiology     |
| Nurse Huma  | NULL           |
| Admin Adnan | NULL           |
+-------------+----------------+
3 rows in set (0.00 sec)

mysql> select staff.name,doctor.specialization from staff right join doctor on staff.staff_id=doctor.staff_id;
+------------+----------------+
| name       | specialization |
+------------+----------------+
```

Select MySQL 8.0 Command Line Client

```
mysql> select staff.name,doctor.specialization from staff right join doctor on staff.staff_id=doctor.staff_id;
+------------+----------------+
| name       | specialization |
+------------+----------------+
| Dr. Dawood | Cardiology     |
+------------+----------------+
1 row in set (0.00 sec)

mysql> select * from staff cross join nurse;
+----------+------------+----------+----------+------------+
| Staff_id | name       | salary   | Staff_id | nurse_rank |
+----------+------------+----------+----------+------------+
|        1 | Dr. Dawood | 85000.00 |        2 | Senior     |
|        2 | Nurse Huma | 50000.00 |        2 | Senior     |
|        3 | Admin Adnan | 40000.00 |        2 | Senior     |
+----------+------------+----------+----------+------------+
3 rows in set (0.01 sec)

mysql> select * from staff natural join nurse;
+----------+------------+----------+------------+
| Staff_id | name       | salary   | nurse_rank |
+----------+------------+----------+------------+
|        2 | Nurse Huma | 50000.00 | Senior     |
+----------+------------+----------+------------+
1 row in set (0.00 sec)

mysql> select * from patient;
+------------+---------+--------+
| Patient_id | Ward_id | name   |
+------------+---------+--------+
|        201 |     301 | Ali    |
|        202 |     301 | Hassan |
+------------+---------+--------+
2 rows in set (0.00 sec)

mysql> select * from patientstaff;
+------------+----------+
| Patient_id | Staff_id |
+------------+----------+
|        201 |        1 |
|        202 |        2 |
+------------+----------+
2 rows in set (0.00 sec)
```

Select MySQL 8.0 Command Line Client

```
mysql> select patient.name ,patientstaff.Staff_id from patient inner join patientstaff on patient.Patient_id=patientstaff.Patient_id;
+--------+----------+
| name   | Staff_id |
+--------+----------+
| Ali    |        1 |
| Hassan |        2 |
+--------+----------+
2 rows in set (0.00 sec)

mysql> select patient.name ,patientstaff.Staff_id from patient left join patientstaff on patient.Patient_id=patientstaff.Patient_id;
+--------+----------+
| name   | Staff_id |
+--------+----------+
| Ali    |        1 |
| Hassan |        2 |
+--------+----------+
2 rows in set (0.00 sec)

mysql> select patient.name ,patientstaff.Staff_id from patient right join patientstaff on patient.Patient_id=patientstaff.Patient_id;
+--------+----------+
| name   | Staff_id |
+--------+----------+
| Ali    |        1 |
| Hassan |        2 |
+--------+----------+
2 rows in set (0.00 sec)

mysql> select * from patient cross join patientstaff;
+------------+---------+--------+------------+----------+
| Patient_id | Ward_id | name   | Patient_id | Staff_id |
+------------+---------+--------+------------+----------+
|        202 |     301 | Hassan |        201 |        1 |
|        201 |     301 | Ali    |        201 |        1 |
|        202 |     301 | Hassan |        202 |        2 |
|        201 |     301 | Ali    |        202 |        2 |
+------------+---------+--------+------------+----------+
4 rows in set (0.00 sec)

mysql> select * from patient natural join patientstaff;
+------------+---------+--------+----------+
| Patient_id | Ward_id | name   | Staff_id |
+------------+---------+--------+----------+
|        201 |     301 | Ali    |        1 |
|        202 |     301 | Hassan |        2 |
```

Select MySQL 8.0 Command Line Client

```
mysql> select * from patient natural join patientstaff;
+------------+---------+--------+----------+
| Patient_id | Ward_id | name   | Staff_id |
+------------+---------+--------+----------+
|        201 |     301 | Ali    |        1 |
|        202 |     301 | Hassan |        2 |
+------------+---------+--------+----------+
2 rows in set (0.00 sec)

mysql> select PatientHistory.H_type,LabReport.test_type from PatientHistory inner join LabReport on PatientHistory.H_id=LabReport.H_id;
+-----------+------------+
| H_type    | test_type  |
+-----------+------------+
| LabReport | Blood Test |
+-----------+------------+
1 row in set (0.00 sec)

mysql> select PatientHistory.H_type,LabReport.test_type from PatientHistory left join LabReport on PatientHistory.H_id=LabReport.H_id;
+--------------+------------+
| H_type       | test_type  |
+--------------+------------+
| LabReport    | Blood Test |
| Surgery      | NULL       |
| Prescription | NULL       |
+--------------+------------+
3 rows in set (0.00 sec)

mysql> select PatientHistory.H_type,LabReport.test_type from PatientHistory right join LabReport on PatientHistory.H_id=LabReport.H_id;
+-----------+------------+
| H_type    | test_type  |
+-----------+------------+
| LabReport | Blood Test |
+-----------+------------+
1 row in set (0.00 sec)

mysql> select PatientHistory.H_type,LabReport.test_type from PatientHistory cross  join LabReport on PatientHistory.H_id=LabReport.H_id;
+-----------+------------+
| H_type    | test_type  |
+-----------+------------+
| LabReport | Blood Test |
+-----------+------------+
1 row in set (0.00 sec)

mysql> select * from PatientHistory cross join LabReport;
```

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Select MySQL 8.0 Command Line Client

```
mysql> select PatientHistory.H_type,LabReport.test_type from PatientHistory cross  join LabReport on PatientHistory.H_id=LabReport.H_id;
+-----------+------------+
| H_type    | test_type  |
+-----------+------------+
| LabReport | Blood Test |
+-----------+------------+
1 row in set (0.00 sec)

mysql> select * from PatientHistory cross join LabReport;
+------+------------+--------------+------+------------+
| H_id | Patient_id | H_type       | H_id | test_type  |
+------+------------+--------------+------+------------+
|  701 |        201 | LabReport    |  701 | Blood Test |
|  702 |        202 | Surgery      |  701 | Blood Test |
|  703 |        201 | Prescription |  701 | Blood Test |
+------+------------+--------------+------+------------+
3 rows in set (0.00 sec)

mysql> select * from PatientHistory natural  join LabReport;
+------+------------+-----------+------------+
| H_id | Patient_id | H_type    | test_type  |
+------+------------+-----------+------------+
|  701 |        201 | LabReport | Blood Test |
+------+------------+-----------+------------+
1 row in set (0.00 sec)

mysql> select * from shift;
+----------+------------+----------+--------+
| Shift_id | start_time | end_time | day    |
+----------+------------+----------+--------+
|      101 | 08:00:00   | 14:00:00 | Monday |
|      102 | 14:00:00   | 20:00:00 | Monday |
+----------+------------+----------+--------+
2 rows in set (0.00 sec)

mysql> select * from staffshift;
+----------+----------+
| Staff_id | Shift_id |
+----------+----------+
|        1 |      101 |
|        2 |      102 |
+----------+----------+
2 rows in set (0.00 sec)
```

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Select MySQL 8.0 Command Line Client

```
mysql> desc shift;
+------------+-------------+------+-----+---------+-------+
| Field      | Type        | Null | Key | Default | Extra |
+------------+-------------+------+-----+---------+-------+
| Shift_id   | int         | NO   | PRI | NULL    |       |
| start_time | time        | YES  |     | NULL    |       |
| end_time   | time        | YES  |     | NULL    |       |
| day        | varchar(20) | YES  |     | NULL    |       |
+------------+-------------+------+-----+---------+-------+
4 rows in set (0.00 sec)

mysql>  select staff.name,shift.day,shift.start_time, shift.end_time from staff join staffshift on staff.staff_id= staffshift.staff_id
    -> join shift on staffshift.shift_id=shift.Shift_id;
+------------+--------+------------+----------+
| name       | day    | start_time | end_time |
+------------+--------+------------+----------+
| Dr. Dawood | Monday | 08:00:00   | 14:00:00 |
| Nurse Huma | Monday | 14:00:00   | 20:00:00 |
+------------+--------+------------+----------+
2 rows in set (0.00 sec)
```

```
mysql> insert into staff values(4,'temp_worker',35000);
Query OK, 1 row affected (0.01 sec)

mysql> insert into patient values(203,302,'sara');
Query OK, 1 row affected (0.01 sec)

mysql> insert into insuranceclaim values(603,3000.00,'2025-04-03');
Query OK, 1 row affected (0.01 sec)

mysql> insert into shift values( 103,'20:00:00','02:00:00','tuesday');
Query OK, 1 row affected (0.01 sec)
```

Select MySQL 8.0 Command Line Client

```
mysql> select * from staff;
+----------+-------------+----------+
| Staff_id | name        | salary   |
+----------+-------------+----------+
|        1 | Dr. Dawood  | 85000.00 |
|        2 | Nurse Huma  | 50000.00 |
|        3 | Admin Adnan | 40000.00 |
|        4 | temp_worker | 35000.00 |
+----------+-------------+----------+
4 rows in set (0.00 sec)

mysql> select * from patient;
+------------+---------+--------+
| Patient_id | Ward_id | name   |
+------------+---------+--------+
|        201 |     301 | Ali    |
|        202 |     301 | Hassan |
|        203 |     302 | sara   |
+------------+---------+--------+
3 rows in set (0.00 sec)

mysql> select * from shift;
+----------+------------+----------+---------+
| Shift_id | start_time | end_time | day     |
+----------+------------+----------+---------+
|      101 | 08:00:00   | 14:00:00 | Monday  |
|      102 | 14:00:00   | 20:00:00 | Monday  |
|      103 | 20:00:00   | 02:00:00 | tuesday |
+----------+------------+----------+---------+
3 rows in set (0.00 sec)

mysql> select * from insuranceclaim;
+--------------+--------------+------------+
| Insurance_id | total_amount | claim_date |
+--------------+--------------+------------+
|          601 |      1500.00 | 2025-04-01 |
|          602 |      2000.00 | 2025-04-02 |
|          603 |      3000.00 | 2025-04-03 |
+--------------+--------------+------------+
3 rows in set (0.00 sec)

mysql>
```

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Select MySQL 8.0 Command Line Client

```
mysql> select patient.name ,patientstaff.Staff_id from patient right join patientstaff on patient.Patient_id=patientstaff.Patient_id;
+--------+----------+
| name   | Staff_id |
+--------+----------+
| Ali    |        1 |
| Hassan |        2 |
+--------+----------+
2 rows in set (0.00 sec)

mysql> select * from patient cross join patientstaff;
+------------+---------+--------+------------+----------+
| Patient_id | Ward_id | name   | Patient_id | Staff_id |
+------------+---------+--------+------------+----------+
|        201 |     301 | Ali    |        202 |        2 |
|        201 |     301 | Ali    |        201 |        1 |
|        202 |     301 | Hassan |        202 |        2 |
|        202 |     301 | Hassan |        201 |        1 |
|        203 |     302 | sara   |        202 |        2 |
|        203 |     302 | sara   |        201 |        1 |
+------------+---------+--------+------------+----------+
6 rows in set (0.00 sec)

mysql> select * from patient natural join patientstaff;
+------------+---------+--------+----------+
| Patient_id | Ward_id | name   | Staff_id |
+------------+---------+--------+----------+
|        201 |     301 | Ali    |        1 |
|        202 |     301 | Hassan |        2 |
+------------+---------+--------+----------+
2 rows in set (0.00 sec)

mysql>  select patient.name ,patientstaff.Staff_id from patient left join patientstaff on patient.Patient_id=patientstaff.Patient_id;
+--------+----------+
| name   | Staff_id |
+--------+----------+
| Ali    |        1 |
| Hassan |        2 |
| sara   |     NULL |
+--------+----------+
3 rows in set (0.00 sec)

mysql> select staff.name,doctor.specialization from staff right join doctor on staff.staff_id=doctor.staff_id;
+------------+----------------+
```

Type here to search 99% 32°C 7:22 PM 5/19/2025

Select MySQL 8.0 Command Line Client

```
| Hassan |        2 |
+--------+----------+
2 rows in set (0.00 sec)

mysql> select * from patient cross join patientstaff;
+------------+---------+--------+------------+----------+
| Patient_id | Ward_id | name   | Patient_id | Staff_id |
+------------+---------+--------+------------+----------+
|        201 |     301 | Ali    |        202 |        2 |
|        201 |     301 | Ali    |        201 |        1 |
|        202 |     301 | Hassan |        202 |        2 |
|        202 |     301 | Hassan |        201 |        1 |
|        203 |     302 | sara   |        202 |        2 |
|        203 |     302 | sara   |        201 |        1 |
+------------+---------+--------+------------+----------+
6 rows in set (0.00 sec)

mysql> select * from patient natural join patientstaff;
+------------+---------+--------+----------+
| Patient_id | Ward_id | name   | Staff_id |
+------------+---------+--------+----------+
|        201 |     301 | Ali    |        1 |
|        202 |     301 | Hassan |        2 |
+------------+---------+--------+----------+
2 rows in set (0.00 sec)

mysql>  select patient.name ,patientstaff.Staff_id from patient left join patientstaff on patient.Patient_id=patientstaff.Patient_id;
+--------+----------+
| name   | Staff_id |
+--------+----------+
| Ali    |        1 |
| Hassan |        2 |
| sara   |     NULL |
+--------+----------+
3 rows in set (0.00 sec)

mysql> select staff.name,doctor.specialization from staff right join doctor on staff.staff_id=doctor.staff_id;
+------------+----------------+
| name       | specialization |
+------------+----------------+
| Dr. Dawood | Cardiology     |
+------------+----------------+
1 row in set (0.00 sec)
```

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MySQL 8.0 Command Line Client

```
Enter password: *************
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 22
Server version: 8.0.41 MySQL Community Server - GPL

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affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> use hospital;
Database changed
mysql> show tables;
+---------------------+
| Tables_in_hospital  |
+---------------------+
| administrativestaff |
| doctor              |
| insuranceclaim      |
| labreport           |
| nurse               |
| patient             |
| patienthistory      |
| patientstaff        |
| prescription        |
| receipts            |
| shift               |
| staff               |
| staffshift          |
| surgery             |
| ward                |
| wardnurse           |
+---------------------+
16 rows in set (0.00 sec)

mysql> select staff.name,shift.name,shift.day,shift.start_time,shift.end_time from staff inner join staffshift on staff.staff_id=staffshift.staff_id inner join shift on
 staffshift.staff_id=shift.shift_id;
ERROR 1054 (42S22): Unknown column 'shift.name' in 'field list'
mysql>  select staff.name,shift.day,shift.start_time,shift.end_time from staff inner join staffshift on staff.staff_id=staffshift.staff_id inner join shift on staffshif
t.staff_id=shift.shift_id;
Empty set (0.03 sec)
```

Type here to search 97% 30°C 11:38 PM 5/15/2025

MySQL 8.0 Command Line Client

```
mysql>  select staff.name,shift.day,shift.start_time,shift.end_time from staff inner join staffshift on staff.staff_id=staffshift.staff_id inner join shift on staffshif
t.staff_id=shift.shift_id;
Empty set (0.03 sec)

mysql> select staff.name, patient.name as PatientName from staff left join patientstaff on staff.staff_id=patientstaff.staff_id left join patient on patientstaff.patien
t_id=patient.patient_id;
+-------------+-------------+
| name        | PatientName |
+-------------+-------------+
| Dr. Dawood  | Ali         |
| Nurse Huma  | Hassan      |
| Admin Adnan | NULL        |
+-------------+-------------+
3 rows in set (0.02 sec)

mysql> select staff.name, patient.name as PatientName from staff right join patientstaff on staff.staff_id=patientstaff.staff_id right join patient on patientstaff.pati
ent_id=patient.patient_id;
+------------+-------------+
| name       | PatientName |
+------------+-------------+
| Dr. Dawood | Ali         |
| Nurse Huma | Hassan      |
+------------+-------------+
2 rows in set (0.00 sec)

mysql> select staff.name as StaffName,shift.start_time,shift.end_time,shift.day from staff join staffshift on staff.staff_id =staffshift.staff_id join shift on staffshi
ft.shift_id=shift.shift_id;
+------------+------------+----------+--------+
| StaffName  | start_time | end_time | day    |
+------------+------------+----------+--------+
| Dr. Dawood | 08:00:00   | 14:00:00 | Monday |
| Nurse Huma | 14:00:00   | 20:00:00 | Monday |
+------------+------------+----------+--------+
2 rows in set (0.00 sec)
```

MySQL 8.0 Command Line Client

```
| surgery              |
| ward                 |
| wardnurse            |
+----------------------+
16 rows in set (0.00 sec)

mysql> select staff.name,shift.name,shift.day,shift.start_time,shift.end_time from staff inner join staffshift on staff.staff_id=staffshift.staff_id inner join shift on
 staffshift.staff_id=shift.shift_id;
ERROR 1054 (42S22): Unknown column 'shift.name' in 'field list'
mysql>  select staff.name,shift.day,shift.start_time,shift.end_time from staff inner join staffshift on staff.staff_id=staffshift.staff_id inner join shift on staffshif
t.staff_id=shift.shift_id;
Empty set (0.03 sec)

mysql> select staff.name, patient.name as PatientName from staff left join patientstaff on staff.staff_id=patientstaff.staff_id left join patient on patientstaff.patien
t_id=patient.patient_id;
+-------------+-------------+
| name        | PatientName |
+-------------+-------------+
| Dr. Dawood  | Ali         |
| Nurse Huma  | Hassan      |
| Admin Adnan | NULL        |
+-------------+-------------+
3 rows in set (0.02 sec)

mysql> select staff.name, patient.name as PatientName from staff right join patientstaff on staff.staff_id=patientstaff.staff_id right join patient on patientstaff.pati
ent_id=patient.patient_id;
+-------------+-------------+
| name        | PatientName |
+-------------+-------------+
| Dr. Dawood  | Ali         |
| Nurse Huma  | Hassan      |
+-------------+-------------+
2 rows in set (0.00 sec)

mysql> select staff.name as StaffName,shift.start_time,shift.end_time,shift.day from staff join staffshift on staff.staff_id =staffshift.staff_id join shift on staffshi
ft.shift_id=shift.shift_id;
+------------+------------+----------+--------+
| StaffName  | start_time | end_time | day    |
+------------+------------+----------+--------+
| Dr. Dawood | 08:00:00   | 14:00:00 | Monday |
| Nurse Huma | 14:00:00   | 20:00:00 | Monday |
+------------+------------+----------+--------+
2 rows in set (0.00 sec)
```

Type here to search 96% Dog... 11:39 PM 5/15/2025

MySQL 8.0 Command Line Client

```
mysql> SELECT Patient.name AS PatientName, Staff.name AS DoctorName, Doctor.specialization, Ward.name AS WardName FROM Patient JOIN PatientStaff ON Patient.Patient_Id =
 PatientStaff.Patient_Id JOIN Staff ON PatientStaff.Staff_Id = Staff.Staff_Id JOIN Doctor ON Staff.Staff_Id = Doctor.Staff_Id JOIN Ward ON Patient.Ward_id = Ward.Ward_I
d;
+-------------+------------+----------------+----------+
| PatientName | DoctorName | specialization | WardName |
+-------------+------------+----------------+----------+
| Ali         | Dr. Dawood | Cardiology     | General  |
+-------------+------------+----------------+----------+
1 row in set (0.02 sec)
```

```
mysql> describe receipts;
+--------------+---------------+------+-----+---------+-------+
| Field        | Type          | Null | Key | Default | Extra |
+--------------+---------------+------+-----+---------+-------+
| Receipt_id   | int           | NO   | PRI | NULL    |       |
| Staff_id     | int           | YES  | MUL | NULL    |       |
| Patient_id   | int           | YES  | MUL | NULL    |       |
| Insurance_id | int           | YES  |     | NULL    |       |
| amount       | decimal(10,2) | YES  |     | NULL    |       |
+--------------+---------------+------+-----+---------+-------+
5 rows in set (0.00 sec)
```

Type here to search 96% 30°C 11:40 PM 5/15/2025

MySQL 8.0 Command Line Client

```
mysql> describe shift;
+------------+-------------+------+-----+---------+-------+
| Field      | Type        | Null | Key | Default | Extra |
+------------+-------------+------+-----+---------+-------+
| Shift_id   | int         | NO   | PRI | NULL    |       |
| start_time | time        | YES  |     | NULL    |       |
| end_time   | time        | YES  |     | NULL    |       |
| day        | varchar(20) | YES  |     | NULL    |       |
+------------+-------------+------+-----+---------+-------+
4 rows in set (0.00 sec)

mysql> describe staffshift;
+----------+------+------+-----+---------+-------+
| Field    | Type | Null | Key | Default | Extra |
+----------+------+------+-----+---------+-------+
| Staff_id | int  | NO   | PRI | NULL    |       |
| Shift_id | int  | NO   | PRI | NULL    |       |
+----------+------+------+-----+---------+-------+
2 rows in set (0.00 sec)

mysql> select staff.name as staffname,shift.start_time,shift.end_time,shift.day from staff join staffshift on staff.staff_id=staffshift.staff_id join shift on staffshif
t.shift_id=shift.shift_id;
+------------+------------+----------+--------+
| staffname  | start_time | end_time | day    |
+------------+------------+----------+--------+
| Dr. Dawood | 08:00:00   | 14:00:00 | Monday |
| Nurse Huma | 14:00:00   | 20:00:00 | Monday |
+------------+------------+----------+--------+
2 rows in set (0.00 sec)

mysql> SELECT Patient.name AS PatientName, Receipts.amount AS PaidAmount, InsuranceClaim.total_amount AS InsuranceCovered FROM Patient JOIN Receipts ON Patient.Patient_
Id = Receipts.Patient_Id JOIN InsuranceClaim ON Receipts.Insurance_Id = InsuranceClaim.Insurance_Id WHERE Receipts.amount > InsuranceClaim.total_amount;
Empty set (0.00 sec)

mysql> select staff.name as staffname,shift.day,shift.start_time,shift.end_time from staff cross join shift;
+-------------+--------+------------+----------+
| staffname   | day    | start_time | end_time |
+-------------+--------+------------+----------+
| Dr. Dawood  | Monday | 14:00:00   | 20:00:00 |
| Dr. Dawood  | Monday | 08:00:00   | 14:00:00 |
| Nurse Huma  | Monday | 14:00:00   | 20:00:00 |
| Nurse Huma  | Monday | 08:00:00   | 14:00:00 |
| Admin Adnan | Monday | 14:00:00   | 20:00:00 |
| Admin Adnan | Monday | 08:00:00   | 14:00:00 |
```

Type here to search 96% 30°C 11:40 PM 5/15/2025

MySQL 8.0 Command Line Client

```
mysql> select staff.name as staffname,shift.day,shift.start_time,shift.end_time from staff cross join shift;
+-------------+--------+------------+----------+
| staffname   | day    | start_time | end_time |
+-------------+--------+------------+----------+
| Dr. Dawood  | Monday | 14:00:00   | 20:00:00 |
| Dr. Dawood  | Monday | 08:00:00   | 14:00:00 |
| Nurse Huma  | Monday | 14:00:00   | 20:00:00 |
| Nurse Huma  | Monday | 08:00:00   | 14:00:00 |
| Admin Adnan | Monday | 14:00:00   | 20:00:00 |
| Admin Adnan | Monday | 08:00:00   | 14:00:00 |
+-------------+--------+------------+----------+
6 rows in set (0.00 sec)

mysql> select * from staff cross join shift;
+----------+-------------+----------+----------+------------+----------+--------+
| Staff_id | name        | salary   | Shift_id | start_time | end_time | day    |
+----------+-------------+----------+----------+------------+----------+--------+
|        1 | Dr. Dawood  | 85000.00 |      102 | 14:00:00   | 20:00:00 | Monday |
|        1 | Dr. Dawood  | 85000.00 |      101 | 08:00:00   | 14:00:00 | Monday |
|        2 | Nurse Huma  | 50000.00 |      102 | 14:00:00   | 20:00:00 | Monday |
|        2 | Nurse Huma  | 50000.00 |      101 | 08:00:00   | 14:00:00 | Monday |
|        3 | Admin Adnan | 40000.00 |      102 | 14:00:00   | 20:00:00 | Monday |
|        3 | Admin Adnan | 40000.00 |      101 | 08:00:00   | 14:00:00 | Monday |
+----------+-------------+----------+----------+------------+----------+--------+
6 rows in set (0.00 sec)

mysql> select * from staff natural join doctor;
+----------+------------+----------+----------------+
| Staff_id | name       | salary   | specialization |
+----------+------------+----------+----------------+
|        1 | Dr. Dawood | 85000.00 | Cardiology     |
+----------+------------+----------+----------------+
1 row in set (0.00 sec)

mysql> select * from staff natural join doctor natural join staffshift;
+----------+------------+----------+----------------+----------+
| Staff_id | name       | salary   | specialization | Shift_id |
+----------+------------+----------+----------------+----------+
|        1 | Dr. Dawood | 85000.00 | Cardiology     |      101 |
+----------+------------+----------+----------------+----------+
1 row in set (0.00 sec)

mysql> create view doctorlist as select staff.staff_id,staff.name,doctor.specialization from staff join doctor on staff.staff_id=doctor.staff_id;
```

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MySQL 8.0 Command Line Client

```
mysql> create view doctorlist as select staff.staff_id,staff.name,doctor.specialization from staff join doctor on staff.staff_id=doctor.staff_id;
Query OK, 0 rows affected (0.04 sec)

mysql> select * from doctorlist;
+----------+------------+----------------+
| staff_id | name       | specialization |
+----------+------------+----------------+
|        1 | Dr. Dawood | Cardiology     |
+----------+------------+----------------+
1 row in set (0.00 sec)

mysql> create staffsalaries as select staff_id ,name,salary from staff;
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'staffsalaries
 as select staff_id ,name,salary from staff' at line 1
mysql> create view patientInfo as select patient_id,name from patient;
Query OK, 0 rows affected (0.02 sec)

mysql> select * from patientInfo;
+------------+--------+
| patient_id | name   |
+------------+--------+
|        201 | Ali    |
|        202 | Hassan |
+------------+--------+
2 rows in set (0.00 sec)

mysql> create staffSalaries as select staff_id ,name,salary from staff;
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'staffSalaries
 as select staff_id ,name,salary from staff' at line 1
mysql> select * from doctor join staff on doctor.staff_id=staff.staff_id;
+----------+----------------+----------+------------+----------+
| Staff_id | specialization | Staff_id | name       | salary   |
+----------+----------------+----------+------------+----------+
|        1 | Cardiology     |        1 | Dr. Dawood | 85000.00 |
+----------+----------------+----------+------------+----------+
1 row in set (0.00 sec)

mysql> show privileges;
+-----------------------------+-------------------------------------+-------------------------------------------------+
| Privilege                   | Context                             | Comment                                         |
+-----------------------------+-------------------------------------+-------------------------------------------------+
| Alter                       | Tables                              | To alter the table                              |
| Alter routine               | Functions,Procedures                | To alter or drop stored functions/procedures    |
| Create                      | Databases,Tables,Indexes            | To create new databases and tables              |
```

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MySQL 8.0 Command Line Client

```
mysql> show privileges;
+-----------------------------+-------------------------------------+-------------------------------------------------+
| Privilege                   | Context                             | Comment                                         |
+-----------------------------+-------------------------------------+-------------------------------------------------+
| Alter                       | Tables                              | To alter the table                              |
| Alter routine               | Functions,Procedures                | To alter or drop stored functions/procedures    |
| Create                      | Databases,Tables,Indexes            | To create new databases and tables              |
| Create routine              | Databases                           | To use CREATE FUNCTION/PROCEDURE                |
| Create role                 | Server Admin                        | To create new roles                             |
| Create temporary tables     | Databases                           | To use CREATE TEMPORARY TABLE                   |
| Create view                 | Tables                              | To create new views                             |
| Create user                 | Server Admin                        | To create new users                             |
| Delete                      | Tables                              | To delete existing rows                         |
| Drop                        | Databases,Tables                    | To drop databases, tables, and views            |
| Drop role                   | Server Admin                        | To drop roles                                   |
| Event                       | Server Admin                        | To create, alter, drop and execute events       |
| Execute                     | Functions,Procedures                | To execute stored routines                      |
| File                        | File access on server               | To read and write files on the server           |
| Grant option                | Databases,Tables,Functions,Procedures | To give to other users those privileges you possess |
| Index                       | Tables                              | To create or drop indexes                       |
| Insert                      | Tables                              | To insert data into tables                      |
| Lock tables                 | Databases                           | To use LOCK TABLES (together with SELECT privilege) |
| Process                     | Server Admin                        | To view the plain text of currently executing queries |
| Proxy                       | Server Admin                        | To make proxy user possible                     |
| References                  | Databases,Tables                    | To have references on tables                    |
| Reload                      | Server Admin                        | To reload or refresh tables, logs and privileges |
| Replication client          | Server Admin                        | To ask where the slave or master servers are    |
| Replication slave           | Server Admin                        | To read binary log events from the master       |
| Select                      | Tables                              | To retrieve rows from table                     |
| Show databases              | Server Admin                        | To see all databases with SHOW DATABASES        |
| Show view                   | Tables                              | To see views with SHOW CREATE VIEW              |
| Shutdown                    | Server Admin                        | To shut down the server                         |
| Super                       | Server Admin                        | To use KILL thread, SET GLOBAL, CHANGE MASTER, etc. |
| Trigger                     | Tables                              | To use triggers                                 |
| Create tablespace           | Server Admin                        | To create/alter/drop tablespaces                |
| Update                      | Tables                              | To update existing rows                         |
| Usage                       | Server Admin                        | No privileges - allow connect only              |
| ENCRYPTION_KEY_ADMIN        | Server Admin                        |                                                 |
| INNODB_REDO_LOG_ARCHIVE     | Server Admin                        |                                                 |
| RESOURCE_GROUP_USER         | Server Admin                        |                                                 |
| FIREWALL_EXEMPT             | Server Admin                        |                                                 |
| SET_USER_ID                 | Server Admin                        |                                                 |
| SERVICE_CONNECTION_ADMIN    | Server Admin                        |                                                 |
| GROUP_REPLICATION_ADMIN     | Server Admin                        |                                                 |
```

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MySQL 8.0 Command Line Client

```
| GROUP_REPLICATION_ADMIN      | Server Admin                        |                                                    |
| AUDIT_ABORT_EXEMPT           | Server Admin                        |                                                    |
| GROUP_REPLICATION_STREAM     | Server Admin                        |                                                    |
| CLONE_ADMIN                  | Server Admin                        |                                                    |
| SYSTEM_USER                  | Server Admin                        |                                                    |
| AUTHENTICATION_POLICY_ADMIN  | Server Admin                        |                                                    |
| SHOW_ROUTINE                 | Server Admin                        |                                                    |
| BACKUP_ADMIN                 | Server Admin                        |                                                    |
| CONNECTION_ADMIN             | Server Admin                        |                                                    |
| PERSIST_RO_VARIABLES_ADMIN   | Server Admin                        |                                                    |
| RESOURCE_GROUP_ADMIN         | Server Admin                        |                                                    |
| SESSION_VARIABLES_ADMIN      | Server Admin                        |                                                    |
| SYSTEM_VARIABLES_ADMIN       | Server Admin                        |                                                    |
| APPLICATION_PASSWORD_ADMIN   | Server Admin                        |                                                    |
| FLUSH_OPTIMIZER_COSTS        | Server Admin                        |                                                    |
| AUDIT_ADMIN                  | Server Admin                        |                                                    |
| BINLOG_ADMIN                 | Server Admin                        |                                                    |
| BINLOG_ENCRYPTION_ADMIN      | Server Admin                        |                                                    |
| FLUSH_STATUS                 | Server Admin                        |                                                    |
| FLUSH_TABLES                 | Server Admin                        |                                                    |
| FLUSH_USER_RESOURCES         | Server Admin                        |                                                    |
| REPLICATION_APPLIER          | Server Admin                        |                                                    |
| INNODB_REDO_LOG_ENABLE       | Server Admin                        |                                                    |
| XA_RECOVER_ADMIN             | Server Admin                        |                                                    |
| PASSWORDLESS_USER_ADMIN      | Server Admin                        |                                                    |
| TABLE_ENCRYPTION_ADMIN       | Server Admin                        |                                                    |
| ROLE_ADMIN                   | Server Admin                        |                                                    |
| REPLICATION_SLAVE_ADMIN      | Server Admin                        |                                                    |
| SENSITIVE_VARIABLES_OBSERVER | Server Admin                        |                                                    |
| TELEMETRY_LOG_ADMIN          | Server Admin                        |                                                    |
+------------------------------+-------------------------------------+----------------------------------------------------+
69 rows in set (0.00 sec)

mysql> create user UMER IDENTIFIED BY 'qwerty';
Query OK, 0 rows affected (0.04 sec)

mysql> grant on Hospital.patient to umer;
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'on Hospital.p
atient to umer' at line 1
mysql> create role assistant;
Query OK, 0 rows affected (0.01 sec)

mysql> grant assistant to umer;
ERROR 3523 (HY000): Unknown authorization ID `umer`@`%`
```

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MySQL 8.0 Command Line Client

```
| REPLICATION_SLAVE_ADMIN      | Server Admin                        |                                                    |
| SENSITIVE_VARIABLES_OBSERVER | Server Admin                        |                                                    |
| TELEMETRY_LOG_ADMIN          | Server Admin                        |                                                    |
+------------------------------+-------------------------------------+----------------------------------------------------+
69 rows in set (0.00 sec)

mysql> create user UMER IDENTIFIED BY 'qwerty';
Query OK, 0 rows affected (0.04 sec)

mysql> grant on Hospital.patient to umer;
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'on Hospital.p
atient to umer' at line 1
mysql> create role assistant;
Query OK, 0 rows affected (0.01 sec)

mysql> grant assistant to umer;
ERROR 3523 (HY000): Unknown authorization ID `umer`@`%`
mysql> grant assistant to UMER;
Query OK, 0 rows affected (0.01 sec)

mysql> SELECT * FROM staff where salary>50000;
+----------+------------+----------+
| Staff_id | name       | salary   |
+----------+------------+----------+
|        1 | Dr. Dawood | 85000.00 |
+----------+------------+----------+
1 row in set (0.00 sec)

mysql> slect * from staff where salary>50000 and name like 'Dr.%';
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'slect * from
staff where salary>50000 and name like 'Dr.%'' at line 1
mysql> select * from staff where salary>50000 and name like 'Dr.Dawood';
Empty set (0.00 sec)

mysql> select name from patient where patient_id in (select patient_id from receipts where amount>1500);
+--------+
| name   |
+--------+
| Hassan |
+--------+
1 row in set (0.00 sec)

mysql> select patient.name(select max(receipts.amount) from receipts where receipts.patient_id=patient.patient_id) as MAXamount from patient;
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'select max(re
```

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MySQL 8.0 Command Line Client

```
mysql> select * from staff;
+----------+-------------+----------+
| Staff_id | name        | salary   |
+----------+-------------+----------+
|        1 | Dr. Dawood  | 85000.00 |
|        2 | Nurse Huma  | 50000.00 |
|        3 | Admin Adnan | 40000.00 |
+----------+-------------+----------+
3 rows in set (0.00 sec)

mysql> select name,salaryfrom staff where salary>(select AVG(salary) from staff);
ERROR 1054 (42S22): Unknown column 'name' in 'field list'
mysql> select name,salary ,Staff_id from staff where salary>(select AVG(salary) from staff);
+------------+----------+----------+
| name       | salary   | Staff_id |
+------------+----------+----------+
| Dr. Dawood | 85000.00 |        1 |
+------------+----------+----------+
1 row in set (0.00 sec)

mysql> select name,salary ,Staff_id from staff where salary=(select AVG(salary) from staff);
Empty set (0.00 sec)

mysql> select name,salary ,Staff_id from staff where salary in(select min(salary) from staff);
+-------------+----------+----------+
| name        | salary   | Staff_id |
+-------------+----------+----------+
| Admin Adnan | 40000.00 |        3 |
+-------------+----------+----------+
1 row in set (0.00 sec)

mysql> select name,salary ,Staff_id from staff where salary in(select max(salary) from staff);
+------------+----------+----------+
| name       | salary   | Staff_id |
+------------+----------+----------+
| Dr. Dawood | 85000.00 |        1 |
+------------+----------+----------+
1 row in set (0.00 sec)

mysql> select name,salary ,Staff_id from staff where salary in(select max(salary) from staff group by staff_id;
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near '' at line 1
mysql> select name,salary ,Staff_id from staff where salary in(select max(salary) from staffgroup by staff_id);
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'by staff_id)'
 at line 1
```

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MySQL 8.0 Command Line Client

```
mysql> SELECT name, salary, Staff_Id FROM staff WHERE (name, salary) IN (SELECT name, MAX(salary) FROM staff GROUP BY name);
+-------------+----------+----------+
| name        | salary   | Staff_Id |
+-------------+----------+----------+
| Dr. Dawood  | 85000.00 |        1 |
| Nurse Huma  | 50000.00 |        2 |
| Admin Adnan | 40000.00 |        3 |
+-------------+----------+----------+
3 rows in set (0.00 sec)

mysql> select name,salary,staff_id from staff where( name,salary) in (select salary from staff where salary> 50000 group by salary);
ERROR 1241 (21000): Operand should contain 2 column(s)
mysql> select name,salary,staff_id from staff where salary in(select salary from staff where salary> 50000 group by salary);
+------------+----------+----------+
| name       | salary   | staff_id |
+------------+----------+----------+
| Dr. Dawood | 85000.00 |        1 |
+------------+----------+----------+
1 row in set (0.00 sec)

mysql> select name,salary,staff_id from staff where(name,salary) in (select name,min(salary) from staff group by name);
+-------------+----------+----------+
| name        | salary   | staff_id |
+-------------+----------+----------+
| Dr. Dawood  | 85000.00 |        1 |
| Nurse Huma  | 50000.00 |        2 |
| Admin Adnan | 40000.00 |        3 |
+-------------+----------+----------+
3 rows in set (0.00 sec)

mysql>
```

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