



# LAB REPORT

## CSE312: Database Management System Lab

Submitted To

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# LAB REPORT

05

[Report Number]

Experiment No: 04	Experiment Name: Advanced SQL Querying with Nested Subqueries and Joins.
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## Experiment Details:

The CREATE TABLE statement for the Faculty table:

Code: CREATE TABLE Faculty ( Id INT PRIMARY KEY, Name VARCHAR(50), Designation VARCHAR(50), Salary DECIMAL(10, 2) );

The CREATE TABLE statement for the Student\_b\_i table:

Code: CREATE TABLE Student\_b\_i ( Id INT PRIMARY KEY, Name VARCHAR(50), Email VARCHAR(100), Phone VARCHAR(15) );

The CREATE TABLE statement for the Course\_b\_i table:

Code: CREATE TABLE Course\_b\_i ( CID INT PRIMARY KEY, CName VARCHAR(50), Credit INT );

The CREATE TABLE statement for the Employee table :

Code: CREATE TABLE Employee ( ID INT PRIMARY KEY, Name VARCHAR(50), Age INT, Salary DECIMAL(10, 2) );

The CREATE TABLE statement for the Enrollment table :

Code: CREATE TABLE Enrollment ( SID INT, CID INT, FOREIGN KEY (SID) REFERENCES Student\_b\_i(Id), FOREIGN KEY (CID) REFERENCES Course\_b\_i(CID), PRIMARY KEY (SID, CID) );

The CREATE TABLE statement for the Takes table :

Code: CREATE TABLE Takes ( FID INT, CID INT, FOREIGN KEY (FID) REFERENCES Faculty(Id), FOREIGN KEY (CID) REFERENCES Course\_b\_i(CID), PRIMARY KEY (FID, CID) );

DATA Insert into all table:

Faculty: Inserts records for faculty members.

Code: INSERT INTO Faculty (Id, Name, Designation, Salary) VALUES

```
(1, 'sohag', 'Associate Professor', 95000),  
(2, 'rezowan', 'Professor', 80000),  
(3, 'sumi', 'Assistant Professor', 75000),  
(4, 'MMI', 'Lecturer', 65000);
```

Student\_b\_i: Inserts records for students.

```
Code: INSERT INTO Student_b_i (Id, Name, Email, Phone) VALUES  
(101, 'Rayhan', 'rayhan@gmail.com', '01755679418'),  
(102, 'sumi', 'sumi@gmail.com', '01796991295'),  
(103, 'sohag', 'sohag2879@gmail.com', '01728918054');
```

Course\_b\_i: Inserts course records.

```
Code: INSERT INTO Course_b_i (CID, CName, Credit) VALUES  
(201, 'oop', 3),  
(202, 'Algorithms', 3),  
(203, 'Data Structures', 3),  
(204, 'DBMS', 3);
```

Employee: Adds records for employees.

```
Code: INSERT INTO Employee (ID, Name, Age, Salary) VALUES  
(1, 'sadman', 35, 60000),  
(2, 'sakib', 28, 55000);
```

Enrollment: Tracks which students are enrolled in which courses.

```
Code: INSERT INTO Enrollment (SID, CID) VALUES  
(101, 201),  
(101, 202),  
(102, 203),  
(103, 204);
```

Takes: Tracks which faculty members are teaching which courses.

```
Code: INSERT INTO Takes (FID, CID) VALUES (1, 201), (4, 201), (2, 202), (3, 203), (4, 204);
```

1. The query finds the **name of the faculty member with the second-highest salary** from the `Faculty` table. It excludes the highest salary using a subquery (`MAX(Salary)`). Filters the remaining salaries and sorts them in **descending order**. Finally, retrieves the **top row** from the sorted result using `LIMIT 1`.  
Code: `SELECT Name FROM Faculty WHERE Salary < (SELECT MAX(Salary) FROM Faculty) ORDER BY Salary DESC LIMIT 1;`

Alternative Query : `SELECT Name FROM Faculty ORDER BY Salary DESC LIMIT 1, 1;` An alternate way to find the second-highest salary. `ORDER BY Salary DESC` sorts all faculty by salary in descending order.

2. The query retrieves the names of students who are enrolled in courses with 3 credits.  
**Student\_b\_i:** Contains student details. Filters students whose IDs match those in the Enrollment table for courses with 3 credits from the Course\_b\_i table.  
**Code:** `SELECT Name FROM Student_b_i WHERE Id IN ( SELECT SID FROM Enrollment WHERE CID IN ( SELECT CID FROM Course_b_i WHERE Credit = 3 ) );`
3. This query retrieves the names of faculty members who teach the DBMS course. **Course\_b\_i:** Filters courses with the name "DBMS" to get their CID. **Takes:** Matches those CIDs to find the FID (faculty IDs) teaching the course. **Faculty:** Retrieves the names of the corresponding faculty members.  
**Code:** `SELECT Name FROM Faculty WHERE Id IN ( SELECT FID FROM Takes WHERE CID IN ( SELECT CID FROM Course_b_i WHERE CName = "DBMS" ) );`
4. This query retrieves the names of students who are attending courses taught by the faculty member "MMI". **Faculty:** Finds the Id of the faculty member named "MMI". **Takes:** Uses this Id to find the CID (course IDs) taught by "MMI". **Enrollment:** Finds the SID (student IDs) of students enrolled in those courses. **Student\_b\_i:** Retrieves the names of these students.  
**Code:** `SELECT Name FROM Student_b_i WHERE Id IN ( SELECT SID FROM Enrollment WHERE CID IN ( SELECT CID FROM Takes WHERE FID IN ( SELECT Id FROM Faculty WHERE Name = "MMI" ) ) );`
5. This query retrieves **all details of faculty members** who teach courses attended by the student named "**Rayhan**".

**Student\_b\_i:** Finds the `Id` of the student named "Rayhan".

**Enrollment:** Uses the `SID` to find the `CID` (course IDs) of courses Rayhan is enrolled in.

**Takes:** Finds the `FID` (faculty IDs) of instructors teaching these courses.

**Faculty:** Retrieves all details of these faculty members.

**Code:** `SELECT * FROM Faculty WHERE Id IN ( SELECT FID FROM Takes WHERE CID IN ( SELECT CID FROM Enrollment WHERE SID IN ( SELECT Id FROM Student_b_i WHERE Name = "Rayhan" ) ) );`

Obtained Output:

	Desired Output?

```

# mysql -u root -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 8
Server version: 10.4.32-MariaDB mariadb.org binary distribution

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

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

MariaDB [(none)]> use EVS;
Database changed
MariaDB [EVS]> CREATE TABLE Faculty (
  ->   Id INT PRIMARY KEY,
  ->   Name VARCHAR(50),
  ->   Designation VARCHAR(50),
  ->   Salary DECIMAL(10, 2)
  -> );
Query OK, 0 rows affected (0.017 sec)

MariaDB [EVS]> CREATE TABLE Student_b_i (
  ->   Id INT PRIMARY KEY,
  ->   Name VARCHAR(50),
  ->   Email VARCHAR(100),
  ->   Phone VARCHAR(15)
  -> );
Query OK, 0 rows affected (0.020 sec)

MariaDB [EVS]> CREATE TABLE Course_b_i (
  ->   CID INT PRIMARY KEY,
  ->   CName VARCHAR(50),
  ->   Credit INT
  -> );
Query OK, 0 rows affected (0.016 sec)

MariaDB [EVS]> CREATE TABLE Employee (
  ->   ID INT PRIMARY KEY,
  ->   Name VARCHAR(50),
  ->   Age INT,
  ->   Salary DECIMAL(10, 2)
  -> );
Query OK, 0 rows affected (0.017 sec)

MariaDB [EVS]> CREATE TABLE Enrollment (
  ->   SID INT,
  ->   CID INT,
  ->   FOREIGN KEY (SID) REFERENCES Student_b_i(Id),
  ->   FOREIGN KEY (CID) REFERENCES Course_b_i(CID),
  ->   PRIMARY KEY (SID, CID)
  -> );
Query OK, 0 rows affected (0.050 sec)

MariaDB [EVS]> CREATE TABLE Takes (
  ->   FID INT,
  ->   CID INT,
  ->   FOREIGN KEY (FID) REFERENCES Faculty(Id),
  ->   FOREIGN KEY (CID) REFERENCES Course_b_i(CID),
  ->   PRIMARY KEY (FID, CID)
  -> );
Query OK, 0 rows affected (0.050 sec)

```

YES/NO

```
MariaDB [EVS]> INSERT INTO Faculty (Id, Name, Designation, Salary) VALUES
-> (1, 'sohag', 'Associate Professor', 95000),
-> (2, 'rezowan', 'Professor', 80000),
-> (3, 'sumi', 'Assistant Professor', 75000),
-> (4, 'MMI', 'Lecturer', 65000);
Query OK, 4 rows affected (0.105 sec)
Records: 4 Duplicates: 0 Warnings: 0
```

```
MariaDB [EVS]> INSERT INTO Student_b_i (Id, Name, Email, Phone) VALUES
-> (101, 'Rayhan', 'rayhan@gmail.com', '01755679418'),
-> (102, 'sumi', 'sumi@gmail.com', '01796991295'),
-> (103, 'sohag', 'sohag2879@gmail.com', '01728918054');
Query OK, 3 rows affected (0.011 sec)
Records: 3 Duplicates: 0 Warnings: 0
```

```
MariaDB [EVS]> INSERT INTO Course_b_i (CID, CName, Credit) VALUES
-> (201, 'oop', 3),
-> (202, 'Algorithms', 3),
-> (203, 'Data Structures', 3),
-> (204, 'DBMS', 3);
Query OK, 4 rows affected (0.012 sec)
Records: 4 Duplicates: 0 Warnings: 0
```

```
MariaDB [EVS]> INSERT INTO Employee (ID, Name, Age, Salary) VALUES
-> (1, 'sadman', 35, 60000),
-> (2, 'sakib', 28, 55000);
Query OK, 2 rows affected (0.012 sec)
Records: 2 Duplicates: 0 Warnings: 0
```

```
MariaDB [EVS]> INSERT INTO Enrollment (SID, CID) VALUES
-> (101, 201),
-> (101, 202),
-> (102, 203),
-> (103, 204);
Query OK, 4 rows affected (0.015 sec)
Records: 4 Duplicates: 0 Warnings: 0
```

```
MariaDB [EVS]> INSERT INTO Takes (FID, CID) VALUES
-> (1, 201),
-> (4, 201),
-> (2, 202),
-> (3, 203),
-> (4, 204);
Query OK, 5 rows affected (0.013 sec)
```

1.

```

MariaDB [EVS]> SELECT Name
-> FROM Faculty
-> WHERE Salary < (SELECT MAX(Salary) FROM Faculty)
-> ORDER BY Salary DESC
-> LIMIT 1;

```

```

+-----+
| Name   |
+-----+
| rezowan |
+-----+
1 row in set (0.002 sec)

```

```

MariaDB [EVS]> SELECT Name
-> FROM Faculty
-> ORDER BY Salary DESC
-> LIMIT 1, 1;

```

```

+-----+
| Name   |
+-----+
| rezowan |
+-----+
1 row in set (0.001 sec)

```

2.

```

MariaDB [EVS]> SELECT Name
-> FROM Student_b_i
-> WHERE Id IN (
-> SELECT SID
-> FROM Enrollment
-> WHERE CID IN (
-> SELECT CID
-> FROM Course_b_i
-> WHERE Credit = 3
-> )
-> );

```

```

+-----+
| Name   |
+-----+
| Rayhan |
| sumi   |
| sohag  |
+-----+
3 rows in set (0.002 sec)

```

3.



```

MariaDB [EVS]> SELECT Name
-> FROM Faculty
-> WHERE Id IN (
->     SELECT FID
->     FROM Takes
->     WHERE CID IN (
->         SELECT CID
->         FROM Course_b_i
->         WHERE CName = "DBMS"
->     )
-> );
+-----+
| Name |
+-----+
| MMI |
+-----+
1 row in set (0.009 sec)

```

4.

```

FROM Enrollment... at line 3
MariaDB [EVS]> SELECT Name
-> FROM Student_b_i
-> WHERE Id IN (
->     SELECT SID
->     FROM Enrollment
->     WHERE CID IN (
->         SELECT CID
->         FROM Takes
->         WHERE FID IN (
->             SELECT Id
->             FROM Faculty
->             WHERE Name = "MMI"
->         )
->     )
-> );
+-----+
| Name |
+-----+
| Rayhan |
| sohag |
+-----+
2 rows in set (0.002 sec)

```

5.

```

MariaDB [EVS]> SELECT *
-> FROM Faculty
-> WHERE Id IN (
->     SELECT FID
->     FROM Takes
->     WHERE CID IN (
->         SELECT CID
->         FROM Enrollment
->         WHERE SID IN (
->             SELECT Id
->             FROM Student_b_i
->             WHERE Name = "Rayhan"
->         )
->     )
-> );

```

Id	Name	Designation	Salary
1	sohag	Associate Professor	95000.00
2	rezowan	Professor	80000.00
4	MMI	Lecturer	65000.00

3 rows in set (0.002 sec)