# DBMS Lab Assignment 5

# Team 4

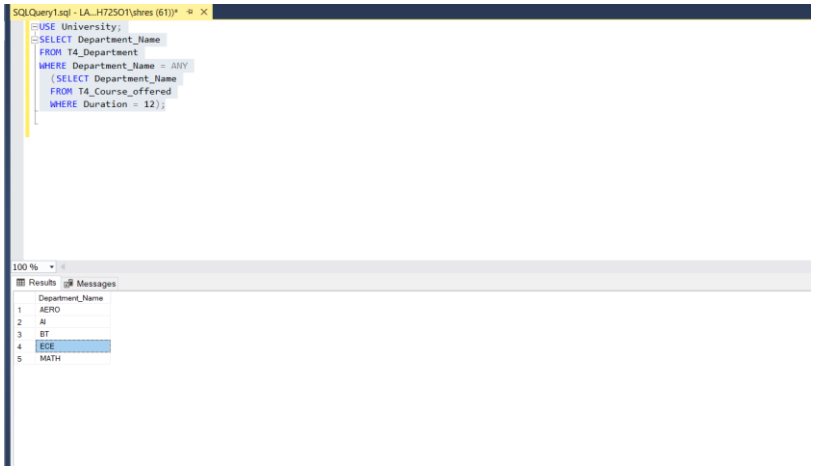
**1.Illustrate logical ANY, ALL and LIKE operator- the queries should be relevant to your respective databases 3 queries for each operator. One query explaining the difference between ANY and ALL.**

**For ANY Operator:**

**Query:**

```
USE University;
SELECT Department_Name
FROM T4_Department
WHERE Department_Name = ANY
  (SELECT Department_Name
  FROM T4_Course_offered
  WHERE Duration = 12);
```

**OUTPUT:**



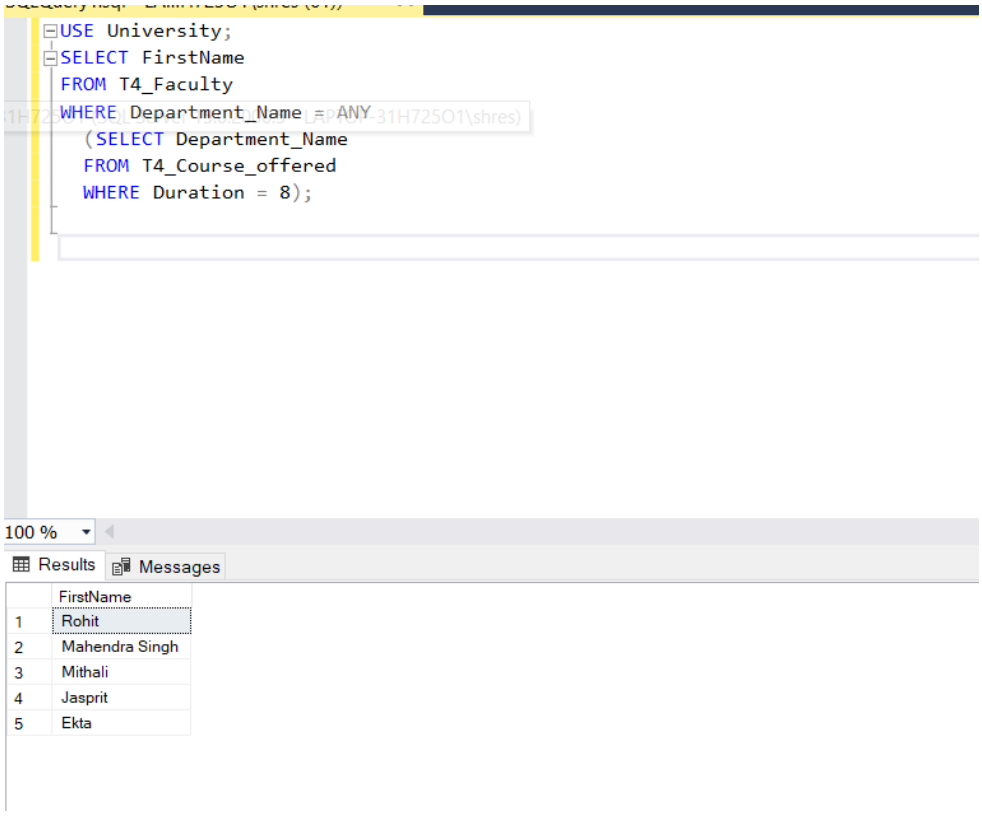

**Query:**

```
USE University;
SELECT FirstName
FROM T4_Faculty
WHERE Department_Name = ANY
  (SELECT Department_Name
```

FROM T4_Course_offered

WHERE Duration = 8);

**Output:**




**Query:**

USE University;

SELECT FirstName

FROM T4_Faculty

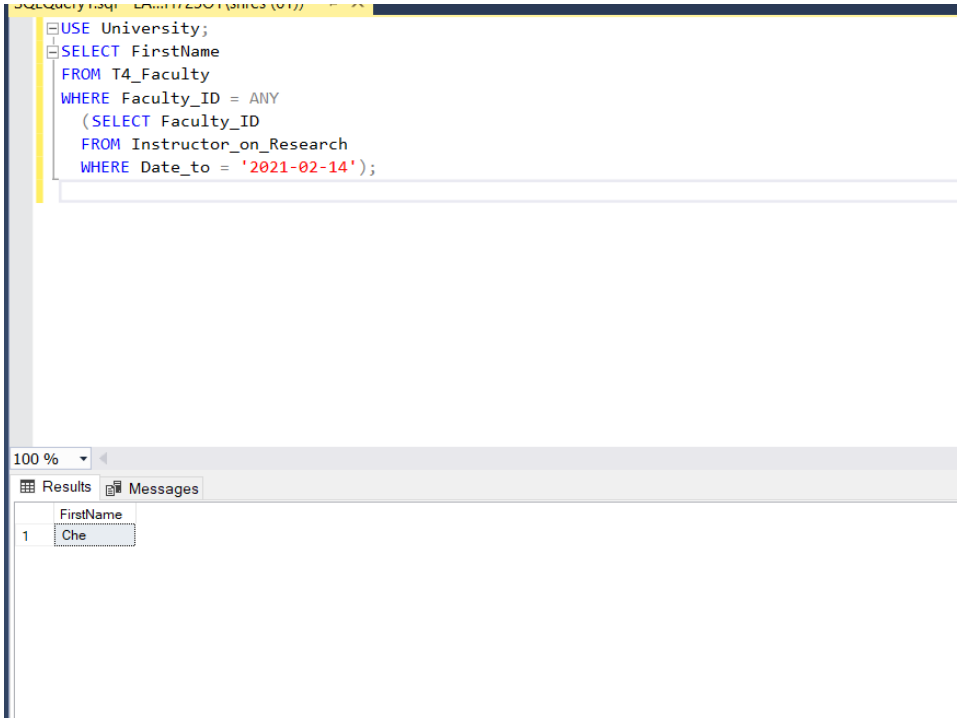
WHERE Faculty_ID = ANY

(SELECT Faculty_ID

FROM Instructor_on_Research

WHERE Date_to = '2021-02-14');

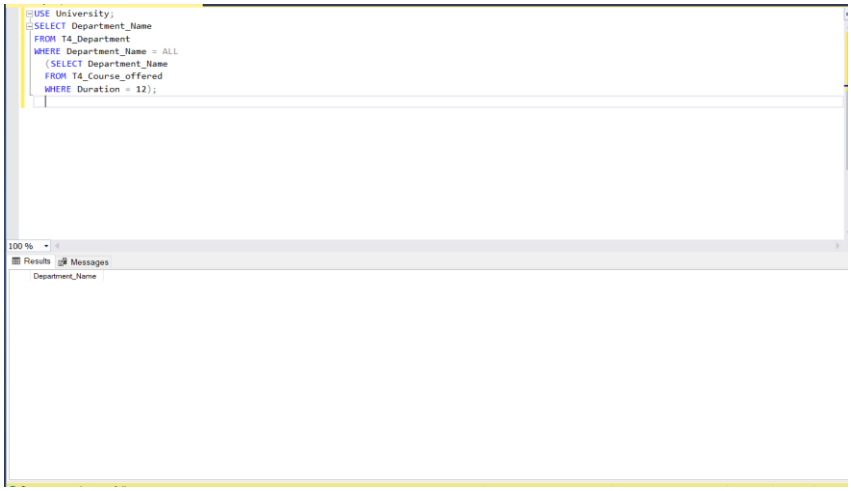
**Output:**




**For ALL operator**

```
USE University;
SELECT Department_Name
FROM T4_Department
WHERE Department_Name = ALL
 (SELECT Department_Name
 FROM T4_Course_offered
 WHERE Duration = 12);
```

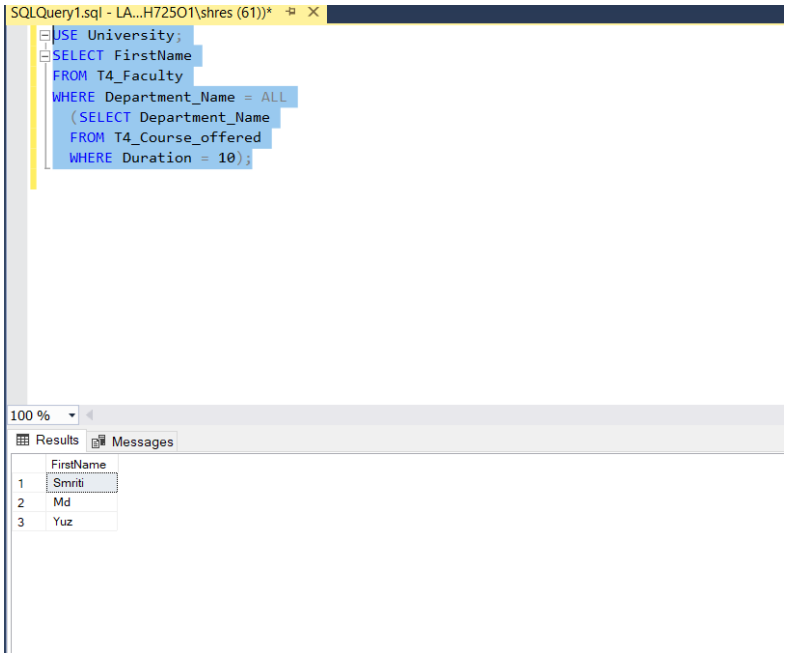
**Output:**



**Query :**

```
USE University;

SELECT FirstName

FROM T4_Faculty

WHERE Department_Name = ALL

 (SELECT Department_Name

 FROM T4_Course_offered

 WHERE Duration = 10);
```

**Output:**




**Query:**

```
USE University;

SELECT FirstName

FROM T4_Faculty

WHERE Faculty_ID = ALL

 (SELECT Faculty_ID

 FROM Instructor_on_Research

 WHERE Date_to = NULL);
```

**Output:**

```
USE University;
SELECT FirstName
FROM T4_Faculty
WHERE Faculty_ID = ALL
  (SELECT Faculty_ID
  FROM Instructor_on_Research
  WHERE Date_to = NULL);
```

100 %

Results | Messages

| | FirstName |
|---|---|
| 1 | Virat |
| 2 | Rohit |
| 3 | Mahendra Singh |
| 4 | Mithali |
| 5 | Ajinkya |
| 6 | Shubhman |
| 7 | Harleen |
| 8 | Jasprit |
| 9 | Ekta |
| 10 | Hardik |
| 11 | Ravi |
| 12 | Ravindra |
| 13 | Che |
| 14 | Kuldeep |
| 15 | Smriti |
| 16 | Md |
| 17 | Yuz |
| 18 | Rishabh |
| 19 | Shikhar |
| 20 | Bhuvi |

**For LIKE Operator :**

**Query:**

USE University;

SELECT FirstName

FROM T4_Faculty

WHERE FirstName LIKE 'm%';

**Output:**

```
USE University;
SELECT FirstName
FROM T4_Faculty
WHERE FirstName LIKE 'm%';
```

100 %

Results | Messages

| | FirstName |
|---|---|
| 1 | Mahendra Singh |
| 2 | Mithali |
| 3 | Md |

**Query:**

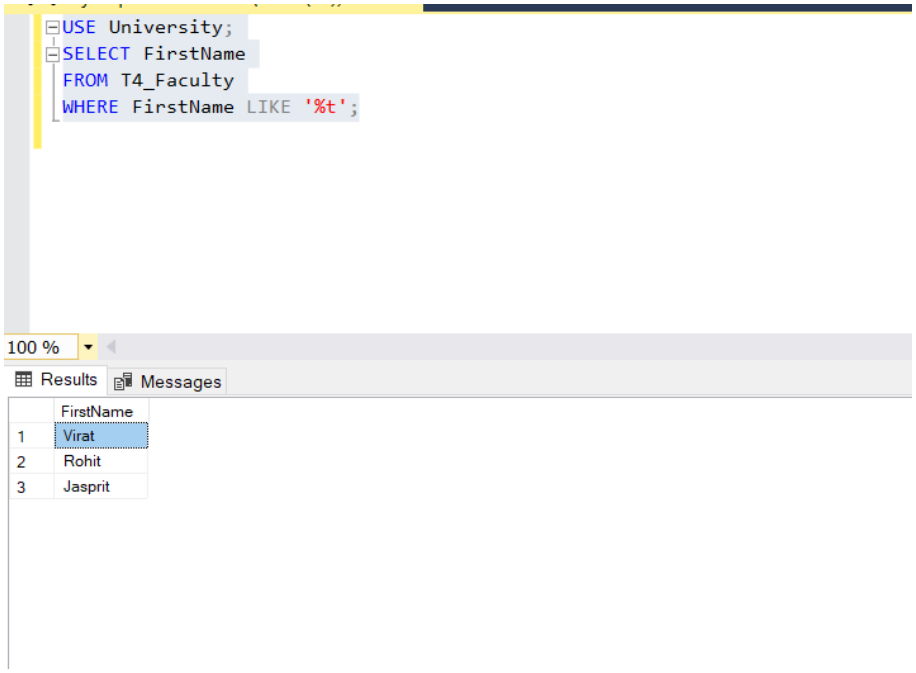
USE University;

SELECT FirstName

FROM T4_Faculty

WHERE FirstName LIKE '%t';

**Output:**




**Query :**

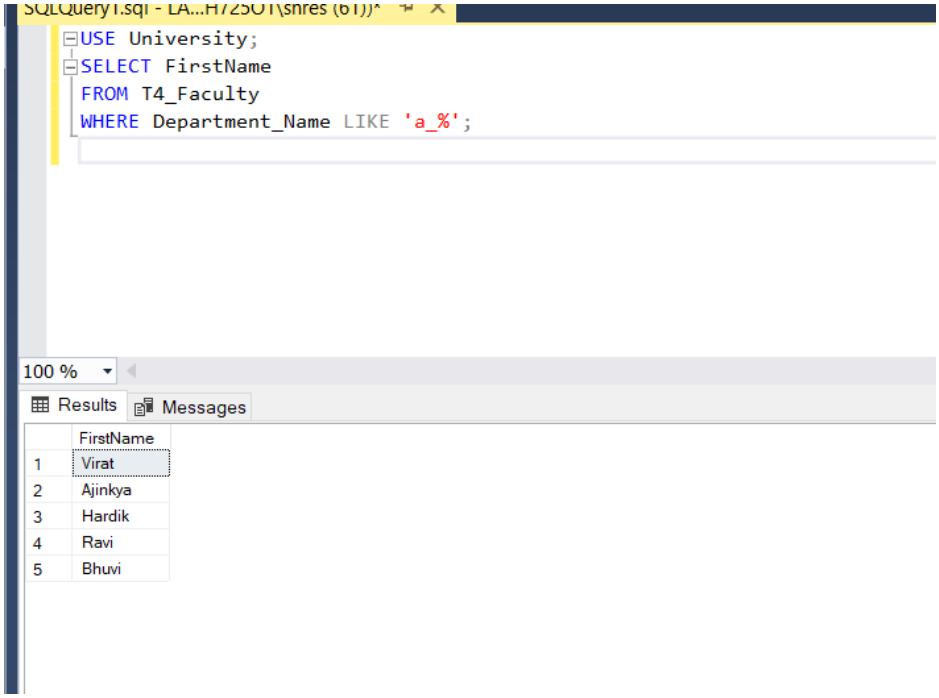
USE University;

SELECT FirstName

FROM T4_Faculty

WHERE Department_Name LIKE 'a_%';

**Output:**




**Difference between ANY and ALL operator:**

From the above queries of ANY and ALL it is clear that：

- ALL returns TRUE if ALL of the subquery values meet the condition.
- ANY returns TRUE if ANY of the subquery values meet the condition.

**2. Query for each Aggregate function.**

**Query:**

/* creating new table with Salary values for Faculty for aggregate functions computations */

CREATE TABLE T4_Faculty_Salary

(

Faculty_ID INT PRIMARY KEY FOREIGN KEY REFERENCES T4_Faculty(Faculty_ID) NOT NULL ,

Salary INT

);

INSERT INTO T4_Faculty_Salary

VALUES

(100, 120000),

(101, 100000),

(102, 125000),

(103, 100000),

(104, 90000),

(105, 100000),

(106, 80000),

(107, 90000),

(108, 70000),

(109, 75000),

(110, 85000),

(111, 90000),

(112, 100000),

(113, 75000),

(114, 95000),

(115, 75000),

(116, NULL),

(117, 85000),

(118, 90000),

(119, 90000),

(120, 95000)

;

**i) COUNT commands**

/* number of records in table */

SELECT COUNT(*)

FROM T4_Faculty_Salary;

**Output:**

```
/* number of records in table */

SELECT COUNT(*)
FROM T4_Faculty_Salary;
```

100 %

Results | Messages

| | (No column name) |
|---|---|
| 1 | 21 |

/* number of values in Salary column */

SELECT COUNT(Salary)

FROM T4_Faculty_Salary;

**Output:**

```
/* number of values in Salary column */

SELECT COUNT(Salary)
FROM T4_Faculty_Salary;
```

100 %

Results | Messages

| | (No column name) |
|---|---|
| 1 | 20 |

/* number of distinct Salary values */

SELECT COUNT(DISTINCT Salary)

FROM T4_Faculty_Salary;

**Output:**

```
/* number of distinct Salary values */

SELECT COUNT(DISTINCT Salary)
FROM T4_Faculty_Salary;
```

00 %

Results | Messages

| | (No column name) |
|---|---|
| 1 | 9 |

**ii) SUM commands**

/* Sum of all salaries*/

SELECT SUM(Salary)

FROM T4_Faculty_Salary;

**Output:**

```
/* Sum of all salaries*/
SELECT SUM(Salary)
FROM T4_Faculty_Salary;
```

.00 %

Results | Messages

| | (No column name) |
|---|---|
| 1 | 1830000 |

/* Sum of distinct salaries*/

SELECT SUM(DISTINCT Salary)

FROM T4_Faculty_Salary;

**Output:**

```
/* Sum of distinct salaries*/
SELECT SUM(DISTINCT Salary)
FROM T4_Faculty_Salary;
```

00 %

Results | Messages

| | (No column name) |
|---|---|
| 1 | 840000 |

**iii) AVG commands**

SELECT AVG(Salary)

FROM T4_Faculty_Salary;

**Output:**

```
/* average of all salaries*/
SELECT AVG(Salary)
FROM T4_Faculty_Salary;
```

100 %

Results | Messages

| | (No column name) |
|---|---|
| 1 | 91500 |

/* average of specified salary */

SELECT AVG(Salary)

FROM T4_Faculty_Salary

WHERE Salary>90000;

**Output:**

```
/* average of specified salary */

SELECT AVG(Salary)
FROM T4_Faculty_Salary
WHERE Salary>90000;
```

00 %

Results | Messages

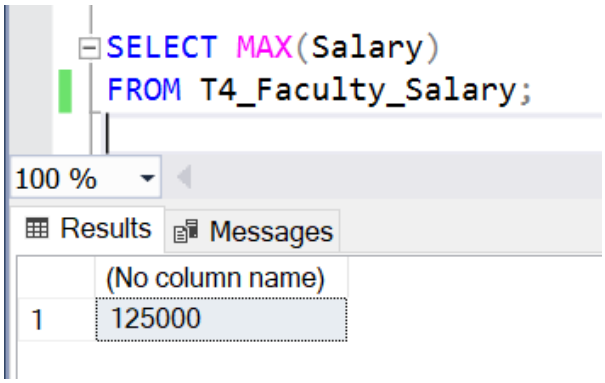
| | (No column name) |
|---|---|
| 1 | 104375 |

**iv) MAX command**

SELECT MAX(Salary)

FROM T4_Faculty_Salary;

**Output:**

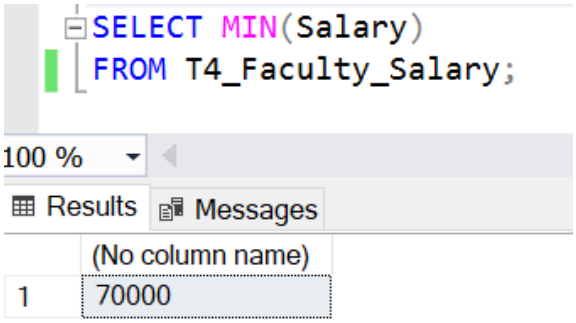



**v) MIN command**

SELECT MIN(Salary)

FROM T4_Faculty_Salary;

**Output:**




**3.Illustrate the usage of order by, group by and having clause .**

**Solution:**

**a)Usage of ORDER BY:**

**Query:**

Use University;

SELECT * FROM T4_Student

ORDER BY Date_of_birth DESC;

**Output:**

SQLQuery2.sql - lo...4D3ELOL\DELL (67))* | SQLQuery1.sql - lo...4D3ELOL\DE

```
Use University;
SELECT * FROM T4_Student
ORDER BY Date_of_birth DESC;
```

110 %

Results | Messages

| | Student_ID | first_Name | last_Name | Phone_num | Date_of_birth | Gender |
|---|---|---|---|---|---|---|
| 1 | 13 | Sam | Curran | 202 | 1998-06-03 | M |
| 2 | 5 | Josh | Philippe | 101 | 1997-06-01 | M |
| 3 | 10 | Ashleigh | Gardner | 166 | 1997-04-15 | F |
| 4 | 19 | Amy | Jones | 208 | 1993-06-13 | F |
| 5 | 2 | Pat | Cummins | 300 | 1993-05-08 | M |
| 6 | 17 | Nat | Sciver | 206 | 1992-08-20 | F |
| 7 | 7 | Meg | Lanning | 165 | 1992-03-25 | F |
| 8 | 20 | Danni | Wyatt | 209 | 1991-04-22 | F |
| 9 | 11 | Joe | Root | 200 | 1990-12-30 | M |
| 10 | 16 | Heather | Knight | 205 | 1990-12-26 | F |
| 11 | 8 | Ellyse | Perry | 168 | 1990-11-03 | F |
| 12 | 14 | Jos | Buttler | 203 | 1990-09-08 | M |
| 13 | 6 | Alyssa | Healy | 166 | 1990-03-24 | F |
| 14 | 4 | Mitchell | Starc | 185 | 1990-01-30 | M |
| 15 | 1 | Steve | Smith | 490 | 1989-06-02 | M |
| 16 | 18 | Sarah | Taylor | 207 | 1989-05-20 | F |
| 17 | 9 | Rachel | Haynes | 170 | 1986-12-26 | F |
| 18 | 3 | David | Warner | 250 | 1986-10-27 | M |
| 19 | 12 | Eoin | Morgan | 201 | 1986-09-10 | M |
| 20 | 15 | Stuart | Broad | 204 | 1986-06-24 | M |

**Query:**

Use University;

SELECT * FROM T4_Student

ORDER BY first_Name DESC,Student_ID ASC;

**Output:**

SQLQuery2.sql - lo...4D3ELOL\DELL (67))* | SQLQuery1.sql - lo...4D3ELOL\DEL

```
Use University;
SELECT * FROM T4_Student
ORDER BY first_Name DESC,Student_ID ASC;
```

110 %

Results | Messages

| | Student_ID | first_Name | last_Name | Phone_num | Date_of_birth | Gender |
|---|---|---|---|---|---|---|
| 1 | 15 | Stuart | Broad | 204 | 1986-06-24 | M |
| 2 | 1 | Steve | Smith | 490 | 1989-06-02 | M |
| 3 | 18 | Sarah | Taylor | 207 | 1989-05-20 | F |
| 4 | 13 | Sam | Curran | 202 | 1998-06-03 | M |
| 5 | 9 | Rachel | Haynes | 170 | 1986-12-26 | F |
| 6 | 2 | Pat | Cummins | 300 | 1993-05-08 | M |
| 7 | 17 | Nat | Sciver | 206 | 1992-08-20 | F |
| 8 | 4 | Mitchell | Starc | 185 | 1990-01-30 | M |
| 9 | 7 | Meg | Lanning | 165 | 1992-03-25 | F |
| 10 | 5 | Josh | Philippe | 101 | 1997-06-01 | M |
| 11 | 14 | Jos | Buttler | 203 | 1990-09-08 | M |
| 12 | 11 | Joe | Root | 200 | 1990-12-30 | M |
| 13 | 16 | Heather | Knight | 205 | 1990-12-26 | F |
| 14 | 12 | Eoin | Morgan | 201 | 1986-09-10 | M |
| 15 | 8 | Ellyse | Perry | 168 | 1990-11-03 | F |
| 16 | 3 | David | Warner | 250 | 1986-10-27 | M |
| 17 | 20 | Danni | Wyatt | 209 | 1991-04-22 | F |
| 18 | 10 | Ashleigh | Gardner | 166 | 1997-04-15 | F |
| 19 | 19 | Amy | Jones | 208 | 1993-06-13 | F |
| 20 | 6 | Alyssa | Healy | 166 | 1990-03-24 | F |

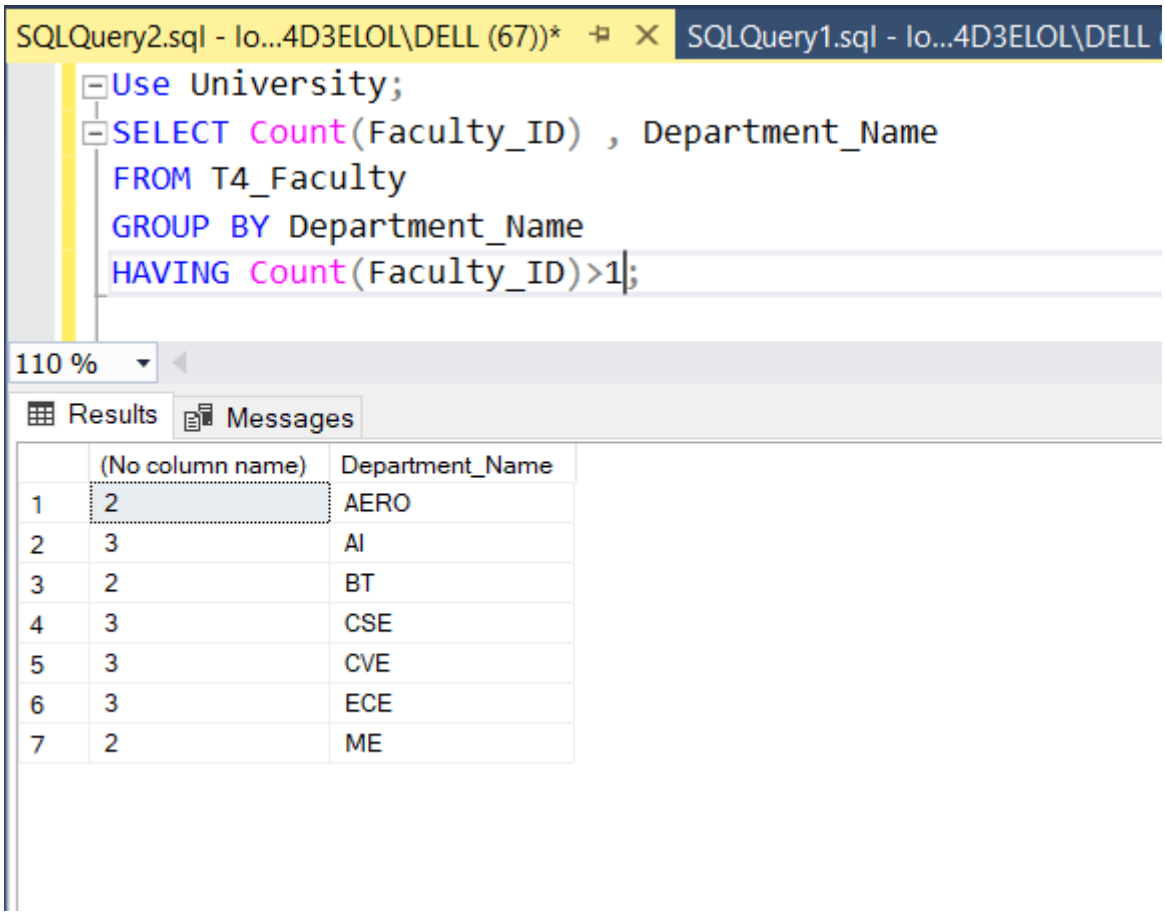
**b)Usage of GROUP BY and having clause:**

**Query:**

```
Use University;

SELECT Count(Faculty_ID) , Department_Name

FROM T4_Faculty

GROUP BY Department_Name
```

HAVING Count(Faculty_ID)>1;

**Output:**




| | (No column name) | Department_Name |
|---|---|---|
| 1 | 2 | AERO |
| 2 | 3 | AI |
| 3 | 2 | BT |
| 4 | 3 | CSE |
| 5 | 3 | CVE |
| 6 | 3 | ECE |
| 7 | 2 | ME |

**Query:**

Use University;

SELECT Count(Course_name) As Number_of_Courses , Department_Name

FROM T4_Course_offered

GROUP BY Department_Name

HAVING Count(Course_name)>0

ORDER BY Count(Course_name) ASC;

**Output:**

SQLQuery2.sql - lo...4D3ELOL\DELL (67))* | SQLQuery1.sql - lo...4D3ELOL\DELL (60))*

```
Use University;
SELECT Count(Course_name) As Number_of_Courses , Department_Name
FROM T4_Course_offered
GROUP BY Department_Name
HAVING Count(Course_name)>0
ORDER BY Count(Course_name) ASC;
```

110 %

Results | Messages

| | Number_of_Courses | Department_Name |
|---|---|---|
| 1 | 1 | AERO |
| 2 | 1 | CSE |
| 3 | 1 | CVE |
| 4 | 1 | HSE |
| 5 | 1 | MATH |
| 6 | 1 | ME |
| 7 | 2 | ECE |
| 8 | 2 | AI |
| 9 | 2 | BT |

**4. Use Aggregate function with group by and having**

**a)**

**Query:**

```
SELECT Faculty_ID, AVG(Salary)
FROM T4_Faculty_Salary
GROUP BY Faculty_ID
HAVING AVG(Salary)>80000
```

**Output:**

Results | Messages

| | Faculty_ID | (No column name) |
|---|---|---|
| 1 | 100 | 120000 |
| 2 | 101 | 100000 |
| 3 | 102 | 125000 |
| 4 | 103 | 100000 |
| 5 | 104 | 90000 |
| 6 | 105 | 100000 |
| 7 | 107 | 90000 |
| 8 | 110 | 85000 |
| 9 | 111 | 90000 |
| 10 | 112 | 100000 |
| 11 | 114 | 95000 |
| 12 | 117 | 85000 |
| 13 | 118 | 90000 |
| 14 | 119 | 90000 |

**b)**

**Query:**

```
SELECT Faculty_ID,SUM(Salary)
FROM T4_Faculty_Salary
GROUP BY Faculty_ID
HAVING SUM(Salary)>100000
```

**Output:**

Results | Messages

| | Faculty_ID | (No column name) |
|---|---|---|
| 1 | 100 | 120000 |
| 2 | 102 | 125000 |

**c)**

**Query:**

```
SELECT Faculty_ID,MAX(Salary)
FROM T4_Faculty_Salary
GROUP BY Faculty_ID
HAVING Faculty_ID>110
```

**Output:**

Results | Messages

| | Faculty_ID | (No column name) |
|---|---|---|
| 1 | 111 | 90000 |
| 2 | 112 | 100000 |
| 3 | 113 | 75000 |
| 4 | 114 | 95000 |
| 5 | 115 | 75000 |
| 6 | 116 | NULL |
| 7 | 117 | 85000 |
| 8 | 118 | 90000 |
| 9 | 119 | 90000 |

**d)**

**Query:**

```
SELECT Faculty_ID,MIN(Salary)
FROM T4_Faculty_Salary
GROUP BY Faculty_ID,Salary
HAVING Salary<100000
```

**Output:**

Results | Messages

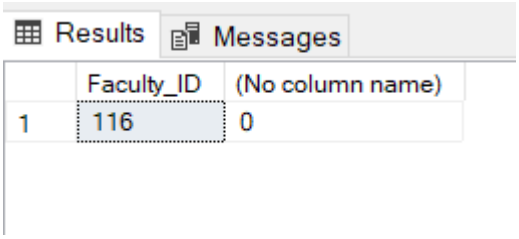
| | Faculty_ID | (No column name) |
|---|---|---|
| 1 | 104 | 90000 |
| 2 | 106 | 80000 |
| 3 | 107 | 90000 |
| 4 | 108 | 70000 |
| 5 | 109 | 75000 |
| 6 | 110 | 85000 |
| 7 | 111 | 90000 |
| 8 | 113 | 75000 |
| 9 | 114 | 95000 |
| 10 | 115 | 75000 |
| 11 | 117 | 85000 |
| 12 | 118 | 90000 |
| 13 | 119 | 90000 |

**e)**

**Query:**

```
SELECT Faculty_ID,COUNT(Salary)
FROM T4_Faculty_Salary
GROUP BY Faculty_ID,Salary
HAVING COUNT(Salary)<1
```

**Output:**




**7. INNER JOIN, LEFT OUTER JOIN, RIGHT OUTER JOIN- 3 queries for each instance**

**and**

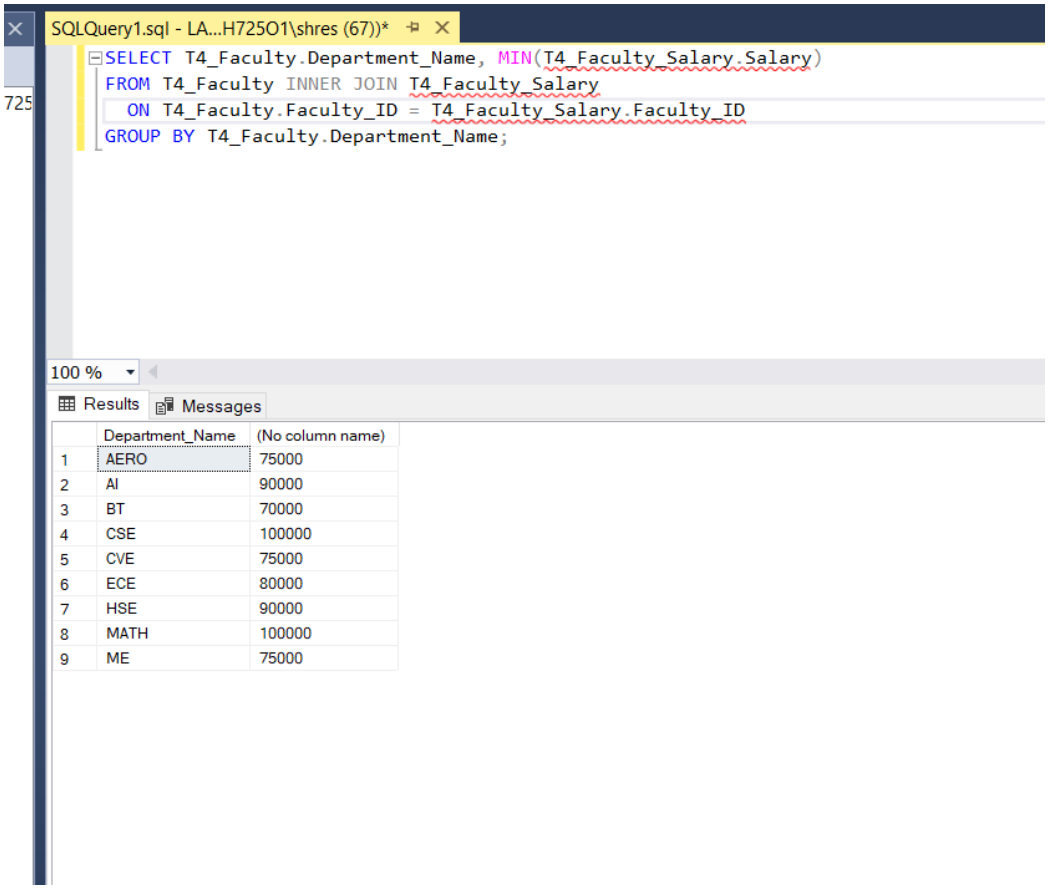
**8. Use all the above condition in JOIN as well.**

**INNER JOIN**

**Query:**

```
SELECT T4_Faculty.Department_Name, MIN(T4_Faculty_Salary.Salary)
FROM T4_Faculty INNER JOIN T4_Faculty_Salary
  ON T4_Faculty.Faculty_ID = T4_Faculty_Salary.Faculty_ID
GROUP BY T4_Faculty.Department_Name;
```

**Output:**

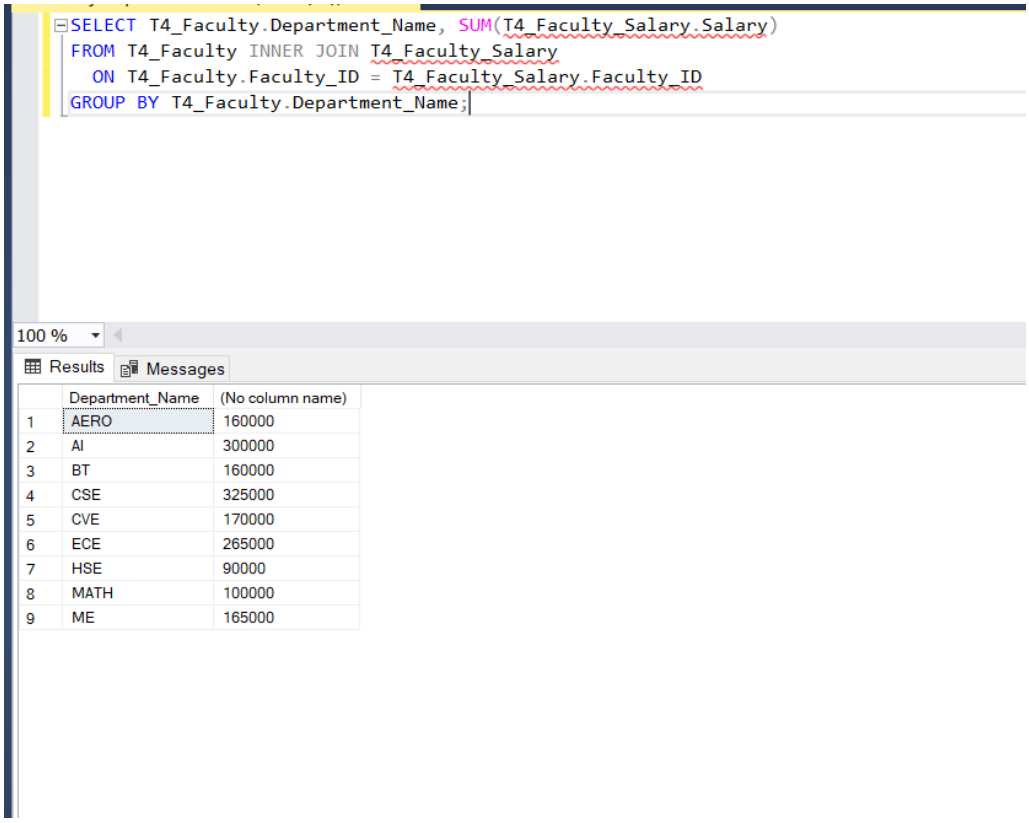



| | Department_Name | (No column name) |
|---|---|---|
| 1 | AERO | 75000 |
| 2 | AI | 90000 |
| 3 | BT | 70000 |
| 4 | CSE | 100000 |
| 5 | CVE | 75000 |
| 6 | ECE | 80000 |
| 7 | HSE | 90000 |
| 8 | MATH | 100000 |
| 9 | ME | 75000 |

**Query:**

```
SELECT T4_Faculty.Department_Name, SUM(T4_Faculty_Salary.Salary)
FROM T4_Faculty INNER JOIN T4_Faculty_Salary
  ON T4_Faculty.Faculty_ID = T4_Faculty_Salary.Faculty_ID
GROUP BY T4_Faculty.Department_Name;
```

**Output:**




| | Department_Name | (No column name) |
|---|---|---|
| 1 | AERO | 160000 |
| 2 | AI | 300000 |
| 3 | BT | 160000 |
| 4 | CSE | 325000 |
| 5 | CVE | 170000 |
| 6 | ECE | 265000 |
| 7 | HSE | 90000 |
| 8 | MATH | 100000 |
| 9 | ME | 165000 |

**Query:**

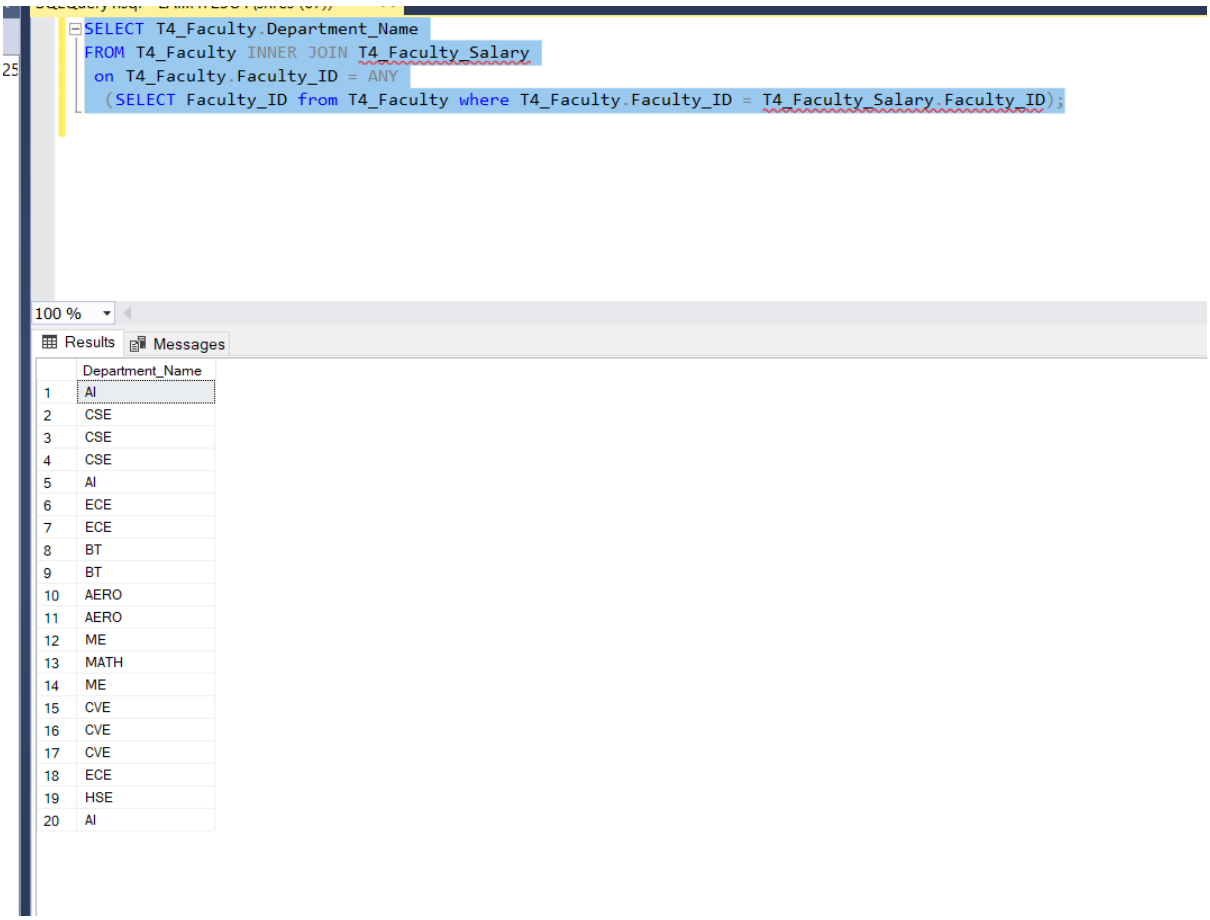
SELECT T4_Faculty.Department_Name

FROM T4_Faculty INNER JOIN T4_Faculty_Salary

on T4_Faculty.Faculty_ID = ANY

(SELECT Faculty_ID from T4_Faculty where T4_Faculty.Faculty_ID = T4_Faculty_Salary.Faculty_ID);

**OUTPUT:**




**Left Outer Join**

**Query:**

```
SELECT T4_Faculty.Department_Name, SUM(T4_Faculty_Salary.Salary)
FROM T4_Faculty LEFT OUTER JOIN T4_Faculty_Salary
  ON T4_Faculty.Faculty_ID = T4_Faculty_Salary.Faculty_ID
GROUP BY T4_Faculty.Department_Name;
```

**Output:**

```
SELECT T4_Faculty.Department_Name, SUM(T4_Faculty_Salary.Salary)
FROM T4_Faculty LEFT OUTER JOIN T4_Faculty_Salary
  ON T4_Faculty.Faculty_ID = T4_Faculty_Salary.Faculty_ID
GROUP BY T4_Faculty.Department_Name;
```

100 %

Results | Messages

| | Department_Name | (No column name) |
|---|---|---|
| 1 | AERO | 160000 |
| 2 | AI | 300000 |
| 3 | BT | 160000 |
| 4 | CSE | 325000 |
| 5 | CVE | 170000 |
| 6 | ECE | 265000 |
| 7 | HSE | 90000 |
| 8 | MATH | 100000 |
| 9 | ME | 165000 |

**Query:**

SELECT T4_Faculty.Department_Name

FROM T4_Faculty LEFT OUTER JOIN T4_Faculty_Salary

on T4_Faculty.Faculty_ID = ALL

(SELECT Faculty_ID from T4_Faculty where T4_Faculty.Faculty_ID = T4_Faculty_Salary.Faculty_ID);

**Output:**

SQLQuery1.sql - LA...H725O1\shres (67))*

```
SELECT T4_Faculty.Department_Name
FROM T4_Faculty LEFT OUTER JOIN T4_Faculty_Salary
 on T4_Faculty.Faculty_ID = ALL
  (SELECT Faculty_ID from T4_Faculty where T4_Faculty.Faculty_ID = T4_Faculty_Salary.Faculty_ID);
```

100 %

Results | Messages

| | Department_Name |
|---|---|
| 1 | AI |
| 2 | CSE |
| 3 | CSE |
| 4 | CSE |
| 5 | AI |
| 6 | ECE |
| 7 | ECE |
| 8 | BT |
| 9 | BT |
| 10 | AERO |
| 11 | AERO |
| 12 | ME |
| 13 | MATH |
| 14 | ME |
| 15 | CVE |
| 16 | CVE |
| 17 | CVE |
| 18 | ECE |
| 19 | HSE |
| 20 | AI |

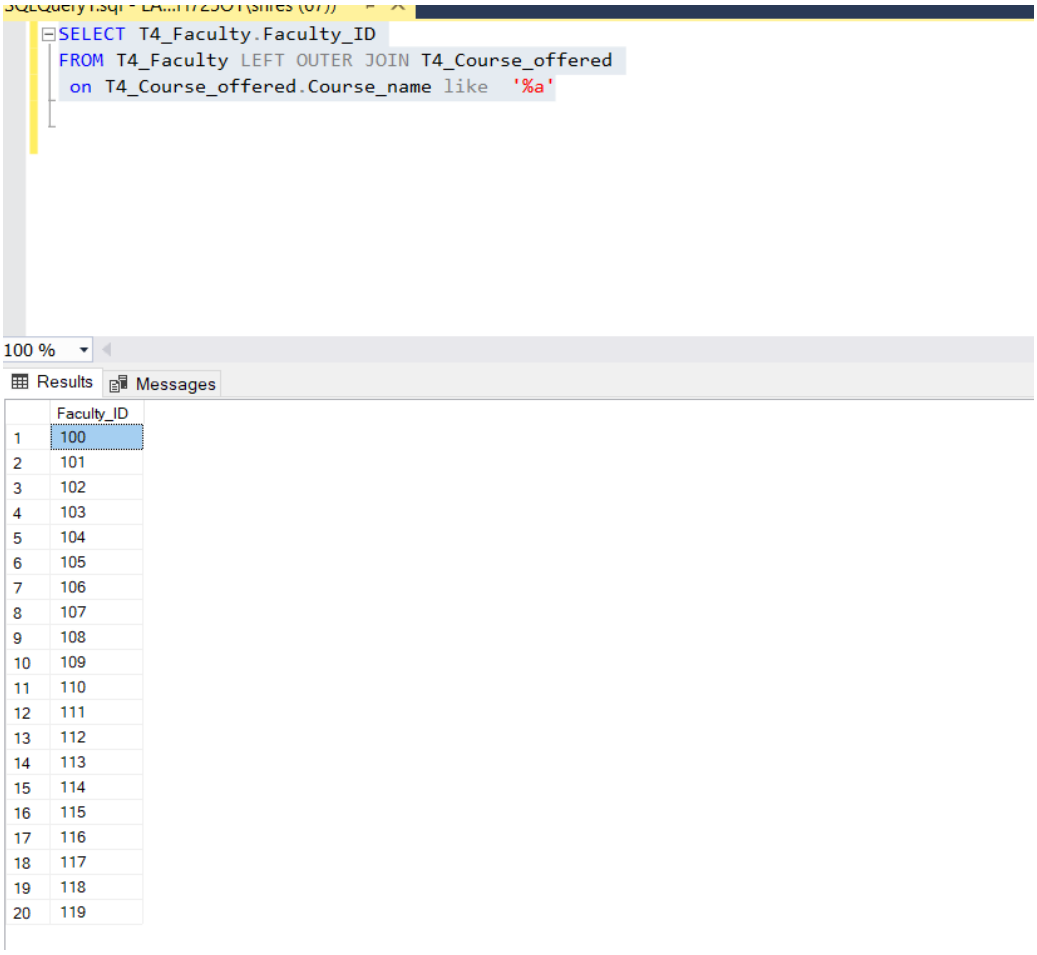
**Query:**

SELECT T4_Faculty.Faculty_ID

FROM T4_Faculty LEFT OUTER JOIN T4_Course_offered

on T4_Course_offered.Course_name like '%a'

**Output**




| | Faculty_ID |
|---|---|
| 1 | 100 |
| 2 | 101 |
| 3 | 102 |
| 4 | 103 |
| 5 | 104 |
| 6 | 105 |
| 7 | 106 |
| 8 | 107 |
| 9 | 108 |
| 10 | 109 |
| 11 | 110 |
| 12 | 111 |
| 13 | 112 |
| 14 | 113 |
| 15 | 114 |
| 16 | 115 |
| 17 | 116 |
| 18 | 117 |
| 19 | 118 |
| 20 | 119 |

**RIght Outer Join**

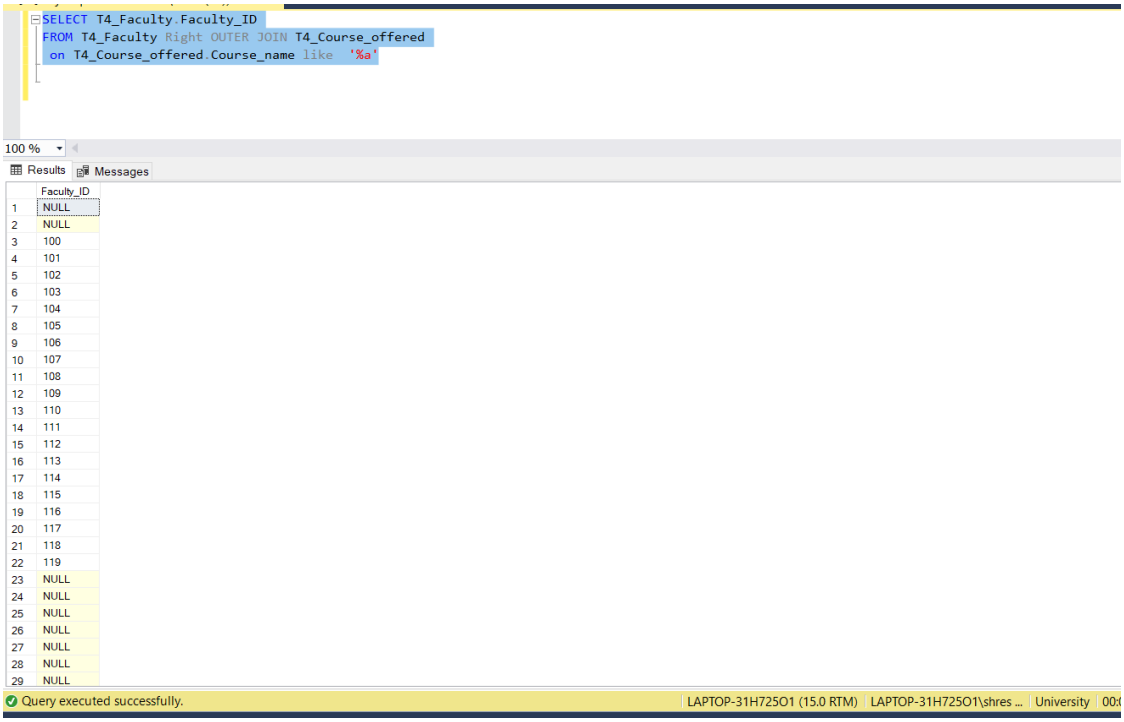
**Query:**

SELECT T4_Faculty.Faculty_ID

FROM T4_Faculty Right OUTER JOIN T4_Course_offered

on T4_Course_offered.Course_name like '%a'

**OUTPUT:**




**Query:**

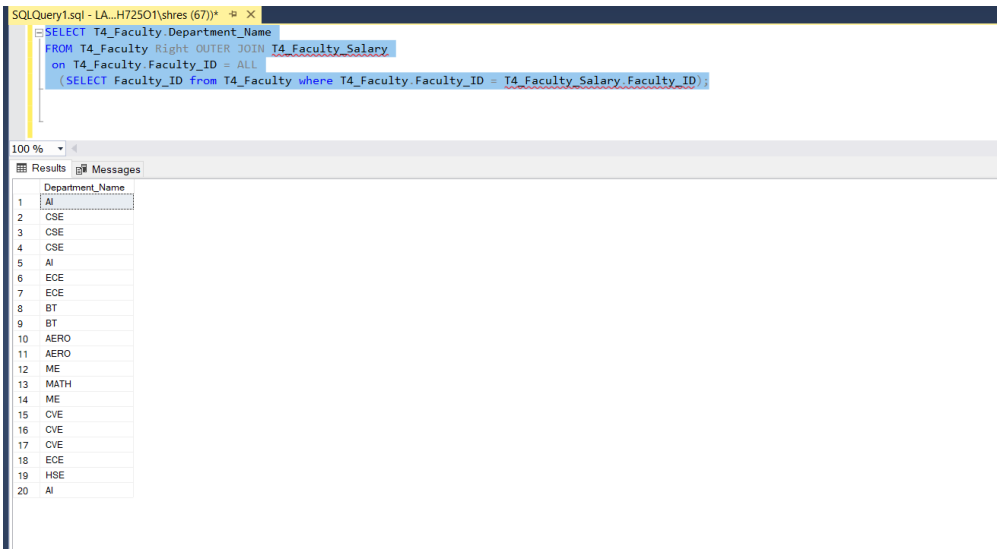
SELECT T4_Faculty.Department_Name

FROM T4_Faculty Right OUTER JOIN T4_Faculty_Salary

on T4_Faculty.Faculty_ID = ALL

(SELECT Faculty_ID from T4_Faculty where T4_Faculty.Faculty_ID = T4_Faculty_Salary.Faculty_ID);

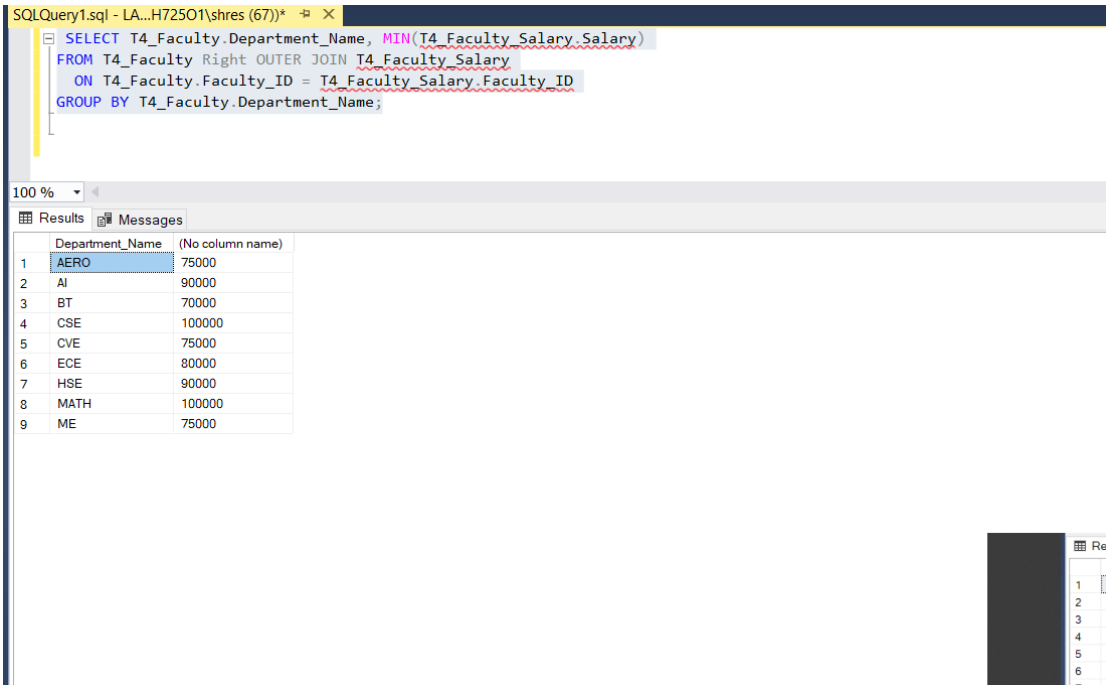
**OUTPUT :**



**Query :**

```
SELECT T4_Faculty.Department_Name, MIN(T4_Faculty_Salary.Salary)
FROM T4_Faculty Right OUTER JOIN T4_Faculty_Salary
 ON T4_Faculty.Faculty_ID = T4_Faculty_Salary.Faculty_ID
GROUP BY T4_Faculty.Department_Name;
```

**OUTPUT:**




| | Department_Name | (No column name) |
|---|---|---|
| 1 | AERO | 75000 |
| 2 | AI | 90000 |
| 3 | BT | 70000 |
| 4 | CSE | 100000 |
| 5 | CVE | 75000 |
| 6 | ECE | 80000 |
| 7 | HSE | 90000 |
| 8 | MATH | 100000 |
| 9 | ME | 75000 |

v