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INFORMATION TECHNOLOGY FOR CLASS 12

(Study materials)

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CHAPTER-1-DATABASE MANAGEMENT SYSTEM

PREVIOUS CLASS 28.04.2020

REMAIN DATABASE QUERIES

1. **We can have another query in the where clause of SQL query if the condition is based on the result of another query as shown below**

Query: To retrieve the names of all the departments having female teachers

```
SELECT DISTINCT Dept_Name
FROM Department
WHERE Dept_ID IN (Select Dept_No
FROM Teacher
WHERE Gender = 'F');
```

Result:

Dept_Name
Chemistry
English
Hindi
Physics
Commerce
Biology
Economics

In above query is a nested query . The outer is called outer query and the inner one is called as inner query. The inner query will return those department ID's which have female teachers ans the outer query will retrieve the names of those departments respectively.

```
SELECT DISTINCT Dept_Name
FROM Department , Teacher
WHERE Dept_ID = Dept_No AND Gender='F';
```

2. Sometimes it is required to apply certain mathematics functions on group of values in a database. Such functions are called **Aggregate Functions**. For example retrieving the total number of teacher in all the Departments. Following are the commonly used built in aggregate functions

- **COUNT**- It counts the numbers of tuples in the result of the query.
- **SUM** – It finds the sum of all the values for a selected attribute which has numeric data type.
- **MAX** –It finds the maximum value out of all the values for a selected attribute which has numeric data type.

- **MIN** - It finds the minimum value out of all the values for a selected attribute which has numeric data type.
- **AVG** – It finds the average value of all the values for a selected attribute which has numeric data type.

  Query: To find total salary of all the teachers .

```
SELECT SUM(Salary) AS Total_Salary
FROM Teacher;
```

Result:

Total_Salary
203250.00

The above query finds the sum of all the values in the Salary column and the column is renamed via an alias as `Total_Salary` which is optional as it only enhances readability.

- **Query:** To find the maximum and minimum salary.

```
SELECT MAX(Salary) AS Max_Salary, MIN(Salary) AS
Min_Salary
FROM Teacher;
```

Result :

Max_Salary	Min_Salary
54000.00	34000.00

- **Query**: To count the number of teachers earning more than Rs 40000.

```
SELECT COUNT(Salary)
FROM Teacher
WHERE Salary > 40000;
```

Result :

Count(Salary)
9

The above query can also be written as follows:

```
SELECT COUNT(*)
FROM Teacher
WHERE Salary >40000;
```

The difference is in the use of asterisk (*). Asterisk symbol is used to count the number of rows in the result of the query

- **Query:** To retrieve the number of teachers in “Computer Science” Department.

```
SELECT COUNT(*) AS No_of_Computer_Science_Teachers
FROM Department, Teacher
WHERE Dept_Name = "Computer Science"AND Dept_No=Dept_ID;
```

Result:

No_of _Computer_Science_Teachers
2

3. We can also use arithmetic operators in the `SELECT` clause. For example, if we want to display Teacher name, current salary and a 10% increase in the salary for those teachers who belongs to Department number 4, the SELECT statement can be written as shown below:

```
SELECT First_Name, Last_Name, Salary, Salary*1.1 AS
New_Salary
FROM Teacher
WHERE Dept_No = 4;
```

First_Name	Last_Name	Salary	New_Salary
Surbhi	Bansal	34000.00	37400.00
Megha	Khana	38000.00	41800.00

4. Grouping based on an attribute can be done in SQL. For such grouping, `GROUP BY` clause is added in the SQL query. For example, we have to find the number of teachers teaching in each Department. Thus we have to group the result based on the Departments and for each Department we have to count number of teachers who teach in that Department. This query is written by using GROUP BY clause and aggregate function as shown below:

```
SELECT Dept_No, COUNT(*) AS No_of_Teachers
FROM Teacher
GROUP BY Dept_No;
```

Result:

Dept_No	No_of_Teachers
1	**2**
2	**2**
3	**2**
4	**2**
5	**1**
6	**1**
7	**1**
8	**1**
9	**2**

The above result can be enhanced if we display the name of Departments also as shown below:

```
SELECT Dept_No, Dept_Name, COUNT(*) AS No_of_Teachers
FROM Teacher, Department
WHERE Dept_ID = Dept_No
GROUP                                             BY Dept_No;
```

Result:

Dept_No	Dept_Name	No_of_Teachers
1	Chemistry	2
2	Computer Science	2
3	English	2
4	Hindi	2
5	Physics	1
6	Commerce	1
7	Biology	1
8	Mathematics	1
9	Economics	2

Also it is important to note that the attribute used for grouping (**`Dept_No` in the above query**)must be present in the **`SELECT`** clause.

It is also possible to apply some condition on the group. This condition will not come under the WHERE clause, but in a new clause HAVING

For example, we have to find those departments which have more than one teacher.

```
SELECT Dept_No, Dept_Name, COUNT(*) AS No_of_Teachers
FROM Teacher, Department
WHERE Dept_No=Dept_ID
GROUP BY Dept_No
HAVING COUNT(*) > 1;
```

Result:

Dept_No	Dept_Name	No_of_Teachers
1	Chemistry	2
2	Computer Science	2
3	English	2
4	Hindi	2
9	Economics	2

5. A Select command can also result in an empty set. For example, retrieve the name of Teacher with ID=115. Since there is no such teacher in the Teacher table, following query results in an empty set.

```
SELECT *
FROM Teacher
WHERE Teacher_ID = 115;
```

Result:

Empty set

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