Experiment No. -5

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Aim - Write a Database Query for Joins, Nested queries, Sub-queries of Manufacturing industry / Hospital/ Company table**.**

Software Required - SQL Server 15.0 /16.0

Theory :-

- SQL stands for Structured Query Language. It is used for storing and managing data in relational database management system (RDMS).
- It is a standard language for Relational Database System. It enables a user to create, read, update and delete relational databases and tables.

1)SQL Joins :-

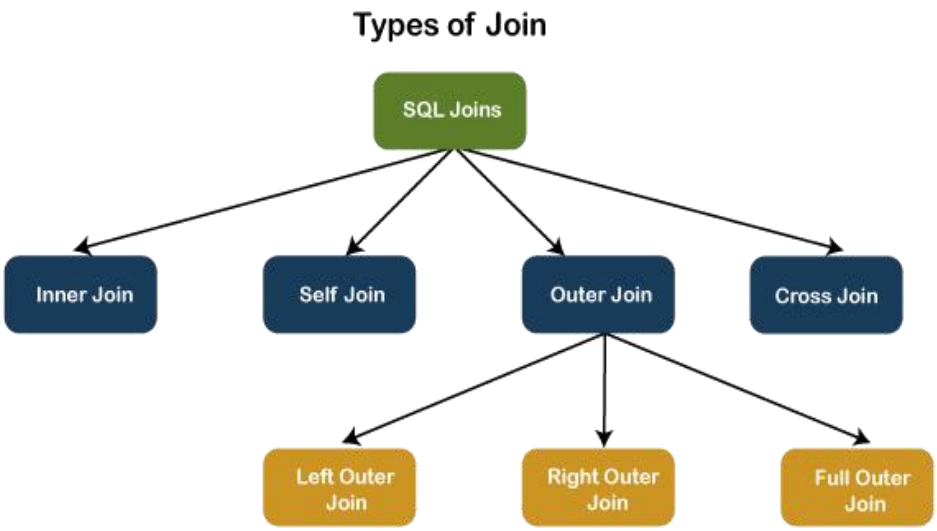
A SQL Join statement combines data or rows from two or more tables based on a common field between them. The join keyword merges two or more tables and creates a temporary image of the merged table. Then according to the conditions provided, it extracts the required data from the image table, and once data is fetched, the temporary image of the merged tables is dumped.

In a JOIN query, a condition indicates how two tables are related:

- Choose columns from each table that should be used in the join. A join condition indicates a foreign key from one table and its corresponding key in the other table.
- Specify the logical operator to compare values from the columns like =, <, or >.

Types of JOINS in SQL Server

SQL Server mainly supports **four types of JOINS**, and each join type defines how two tables are related in a query. The following are types of join supports in SQL Server:



a) **INNER JOIN**

This JOIN returns all records from multiple tables that satisfy the specified join condition. It is the simple and most popular form of join and assumes as a default join. If we omit the INNER keyword with the JOIN query, we will get the same output.

INNER JOIN Syntax

The following syntax illustrates the use of INNER JOIN in SQL Server:

SELECT columns

FROM table1

INNER JOIN table2 ON condition1

INNER JOIN table3 ON condition2

b) SELF JOIN

A table is joined to itself using the SELF JOIN. It means that each table row is combined with itself and with every other table row. The SELF JOIN can be thought of as a JOIN of two copies of the same tables. We can do this with the help of table name aliases to assign a specific name to each table's instance. The table aliases enable us to use the table's temporary name that we are going to use in the query.

SELF JOIN Syntax

SELECT T1.col_name, T2.col_name...

FROM table1 T1, table1 T2

WHERE join_condition;

c) CROSS JOIN

CROSS JOIN in SQL Server combines all of the possibilities of two or more tables and returns a result that includes every row from all contributing tables. It's also known as CARTESIAN JOIN because it produces the Cartesian product of all linked tables.

CROSS JOIN Syntax

SELECT column_lists

FROM table1

CROSS JOIN table2;

d) OUTER JOIN

OUTER JOIN in SQL Server returns all records from both tables that satisfy the join condition. In other words, this join will not return only the matching record but also return all unmatched rows from one or both tables.

- LEFT OUTER JOIN
- RIGHT OUTER JOIN
- FULL OUTER JOIN
-

3)Nested Queries :-

In nested queries, a query is written inside a query. The result of inner query is used in execution of outer query. We will use STUDENT, COURSE, STUDENT_COURSE tables for understanding nested queries.

STUDENT

S_ID	S_NAME	S_ADDRESS	S_PHONE	S_AGE
S1	RAM	DELHI	9455123451	18
S2	RAMESH	GURGAON	9652431543	18
S3	SUJIT	ROHTAK	9156253131	20
S4	SURESH	DELHI	9156768971	18

COURSE

C_ID	C_NAME
C1	DSA
C2	Programming
C3	DBMS

STUDENT_COURSE

S_ID	C_ID
S1	C1
S1	C3
S2	C1
S3	C2
S4	C2
S4	C3

In independent nested queries, query execution starts from innermost query to outermost queries. The execution of inner query is independent of outer query, but the result of inner query is used in execution of outer query. Various operators like IN, NOT IN, ANY, ALL etc are used in writing independent nested queries.

IN: If we want to find out **S_ID** who are enrolled in **C_NAME** 'DSA' or 'DBMS', we can write it with the help of independent nested query and IN operator. From **COURSE** table, we can find out **C_ID** for **C_NAME** 'DSA' or DBMS' and we can use these **C_ID**s for finding **S_ID**s from **STUDENT_COURSE** TABLE.

STEP 1: Finding **C_ID** for **C_NAME** ='DSA' or 'DBMS'
Select **C_ID** from **COURSE** where **C_NAME** = 'DSA' or **C_NAME** = 'DBMS'

STEP 2: Using **C_ID** of step 1 for finding **S_ID**
Select **S_ID** from **STUDENT_COURSE** where **C_ID** IN
(SELECT **C_ID** from **COURSE** where **C_NAME** = 'DSA' or **C_NAME**='DBMS');

Output :- The inner query will return a set with members C1 and C3 and outer query will return those S_IDs for which C_ID is equal to any member of set (C1 and C3 in this case). So, it will return S1, S2 and S4.

4)SQL Sub Query

A Subquery is a query within another SQL query and embedded within the WHERE clause.

- A subquery can be placed in a number of SQL clauses like WHERE clause, FROM clause, HAVING clause.
- You can use Subquery with SELECT, UPDATE, INSERT, DELETE statements along with the operators like =, <, >, >=, <=, IN, BETWEEN, etc.
- A subquery is a query within another query. The outer query is known as the main query, and the inner query is known as a subquery.
- Subqueries are on the right side of the comparison operator.
- A subquery is enclosed in parentheses.
- In the Subquery, ORDER BY command cannot be used. But GROUP BY command can be used to perform the same function as ORDER BY command.

a). Subqueries with the Select Statement

- SQL subqueries are most frequently used with the Select statement.
- Syntax:-

```
SELECT column_name
FROM table_name
WHERE column_name expression operator
( SELECT column_name  from table_name WHERE ... );
```

b) Subqueries with the INSERT Statement

- SQL subquery can also be used with the Insert statement. In the insert statement, data returned from the subquery is used to insert into another table.
- In the subquery, the selected data can be modified with any of the character, date functions.

- Syntax:
  INSERT INTO table_name (column1, column2, column3....)
  SELECT *
  FROM table_name WHERE VALUE OPERATOR

c) Subqueries with the UPDATE Statement

The subquery of SQL can be used in conjunction with the Update statement. When a subquery is used with the Update statement, then either single or multiple columns in a table can be updated.

Syntax

```
UPDATE table
SET column_name = new_value
WHERE VALUE OPERATOR
    (SELECT COLUMN_NAME
    FROM TABLE_NAME
    WHERE condition);
```

d) Subqueries with the DELETE Statement

The subquery of SQL can be used in conjunction with the Delete statement just like any other statements mentioned above.

Syntax

```
DELETE FROM TABLE_NAME
WHERE VALUE OPERATOR
  (SELECT COLUMN_NAME
  FROM TABLE_NAME
  WHERE condition);
```

Exercise (Perform anyone in addition to assignment title)

1) **Write SQL nested, sub queries for Manufacturing Industry.**
2) **Write SQL nested, sub queries for Company databases.**
3) **Write SQL nested, sub queries for Library management system.**
4) **Write SQL nested, sub queries for Online Railway reservation system**
5) **Write SQL nested sub queries for any E-commerce website.**

SQL command:

```
SELECT Manufacturing.CompanyName, Hospital.HospitalName
FROM Manufacturing
INNER JOIN Hospital ON Manufacturing.HospitalID = Hospital.HospitalID;

SELECT CompanyName
FROM Manufacturing
WHERE NumberOfEmployees > (
    SELECT AVG(NumberOfEmployees)
    FROM Hospital
);

SELECT HospitalName
FROM Hospital
WHERE City = (
    SELECT City
    FROM Manufacturing
    WHERE CompanyName = 'YourManufacturingCompany'
);

SELECT CompanyName
FROM Manufacturing
WHERE EXISTS (
    SELECT 1
    FROM Hospital
    WHERE Hospital.Beds > 100
```

```
        AND Hospital.HospitalID = Manufacturing.HospitalID
);
```

FAQ

1) Which of the following is true about sub-queries?

A. They execute after the main query executes
B. They execute in parallel to the main query
C. The user can execute the main query and then, if wanted, execute the sub-query
D. They execute before the main query executes.

Ans-C. The user can execute the main query and then, if wanted, execute the sub-query

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3) **Which of the following clause is mandatorily used in a sub-query?**

A. SELECT
B. WHERE
C. ORDER BY
D. GROUP BY

Ans- B. WHERE

4) **Which of the following is a method for writing a sub-query in a main query?**

A. By using JOINS
B. By using WHERE clause
C. By using the GROUP BY clause
D. By writing a SELECT statement embedded in the clause of another SELECT statement

Ans- D. By writing a SELECT statement embedded in the clause of another SELECT statement

5) **Which of the following multi-row operators can be used with a sub-query?**

A. IN
B. ANY
C. ALL
D. All of the above

Ans- D. All of the above

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