

SQL - Sub Queries

A Subquery or Inner query or a Nested query is a query within another SQL query and embedded within clauses, most commonly in the WHERE clause. It is used to return data from a table, and this data will be used in the main query as a condition to further restrict the data to be retrieved.

Subqueries can be used with the SELECT, INSERT, UPDATE, and DELETE statements along with the operators like =, <, >, >=, <=, IN, BETWEEN, etc.

There are a few rules that subqueries must follow –

- Subqueries must be enclosed within parentheses.
- A subquery can have only one column in the SELECT clause, unless multiple columns are in the main query for the subquery to compare its selected columns.
- An ORDER BY command cannot be used in a subquery, although the main query can use an ORDER BY. The GROUP BY command can be used to perform the same function as the ORDER BY in a subquery.
- Subqueries that return more than one row can only be used with multiple value operators such as the IN operator.
- The SELECT list cannot include any references to values that evaluate to a BLOB, ARRAY, CLOB, or NCLOB.
- A subquery cannot be immediately enclosed in a set function.
- The BETWEEN operator cannot be used with a subquery. However, the BETWEEN operator can be used within the subquery.

Subqueries with the SELECT Statement

Subqueries are most frequently used with the SELECT statement. The basic syntax is as follows –

```
SELECT column_name [, column_name ]
FROM   table1 [, table2 ]
WHERE  column_name OPERATOR
      (SELECT column_name [, column_name ]
      FROM table1 [, table2 ]
      [WHERE])
```

Example

Consider the CUSTOMERS table having the following records –

ID	NAME	AGE	ADDRESS	SALARY
1	John	30	123 Main St	50000
2	Jane	25	456 Oak St	45000
3	Mike	35	789 Pine St	60000
4	Sarah	28	101 Elm St	55000
5	David	32	202 Maple St	48000

	1	Ramesh		35	Ahmedabad		2000.00	
	2	Khilan		25	Delhi		1500.00	
	3	kaushik		23	Kota		2000.00	
	4	Chaitali		25	Mumbai		6500.00	
	5	Hardik		27	Bhopal		8500.00	
	6	Komal		22	MP		4500.00	
	7	Muffy		24	Indore		10000.00	

Now, let us check the following subquery with a SELECT statement.

```
SQL> SELECT *
      FROM CUSTOMERS
      WHERE ID IN (SELECT ID
                  FROM CUSTOMERS
                  WHERE SALARY > 4500) ;
```

This would produce the following result.

ID	NAME	AGE	ADDRESS	SALARY
4	Chaitali	25	Mumbai	6500.00
5	Hardik	27	Bhopal	8500.00
7	Muffy	24	Indore	10000.00

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Subqueries with the INSERT Statement

Subqueries also can be used with INSERT statements. The INSERT statement uses the data returned from the subquery to insert into another table. The selected data in the subquery can be modified with any of the character, date or number functions.

The basic syntax is as follows.

```
INSERT INTO table_name [ (column1 [, column2 ]) ]
  SELECT [ *|column1 [, column2 ]
  FROM table1 [, table2 ]
  [ WHERE VALUE OPERATOR ]
```

Example

Consider a table CUSTOMERS_BKP with similar structure as CUSTOMERS table. Now to copy the complete CUSTOMERS table into the CUSTOMERS_BKP table, you can use the following syntax.

```
SQL> INSERT INTO CUSTOMERS_BKP
      SELECT * FROM CUSTOMERS
      WHERE ID IN (SELECT ID
                  FROM CUSTOMERS) ;
```

Subqueries with the UPDATE Statement

The subquery can be used in conjunction with the UPDATE statement. Either single or multiple columns in a table can be updated when using a subquery with the UPDATE statement.

The basic syntax is as follows.

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

Example

Assuming, we have CUSTOMERS_BKP table available which is backup of CUSTOMERS table. The following example updates SALARY by 0.25 times in the CUSTOMERS table for all the customers whose AGE is greater than or equal to 27.

```
SQL> UPDATE CUSTOMERS
      SET SALARY = SALARY * 0.25
      WHERE AGE IN (SELECT AGE FROM CUSTOMERS_BKP
                   WHERE AGE >= 27 );
```

This would impact two rows and finally CUSTOMERS table would have the following records.

ID	NAME	AGE	ADDRESS	SALARY
1	Ramesh	35	Ahmedabad	125.00
2	Khilan	25	Delhi	1500.00
3	kaushik	23	Kota	2000.00
4	Chaitali	25	Mumbai	6500.00
5	Hardik	27	Bhopal	2125.00
6	Komal	22	MP	4500.00
7	Muffy	24	Indore	10000.00

Subqueries with the DELETE Statement

The subquery can be used in conjunction with the DELETE statement like with any other statements mentioned above.

The basic syntax is as follows.

```
DELETE FROM TABLE_NAME
[ WHERE OPERATOR [ VALUE ]
  (SELECT COLUMN_NAME
   FROM TABLE_NAME)
[ WHERE ) ]
```

Example

Assuming, we have a CUSTOMERS_BKP table available which is a backup of the CUSTOMERS table. The following example deletes the records from the CUSTOMERS table for all the customers whose AGE is greater than or equal to 27.

```
SQL> DELETE FROM CUSTOMERS
      WHERE AGE IN (SELECT AGE FROM CUSTOMERS_BKP
                  WHERE AGE >= 27 );
```

This would impact two rows and finally the CUSTOMERS table would have the following records.

ID	NAME	AGE	ADDRESS	SALARY
2	Khilan	25	Delhi	1500.00
3	kaushik	23	Kota	2000.00
4	Chaitali	25	Mumbai	6500.00
6	Komal	22	MP	4500.00
7	Muffy	24	Indore	10000.00