13. SQL Queries - Sub-queries

Sub-queries are query statements tucked inside of query statements. A sub-query may occur in:

- A SELECT clause;
- A FROM clause;
- A WHERE clause.

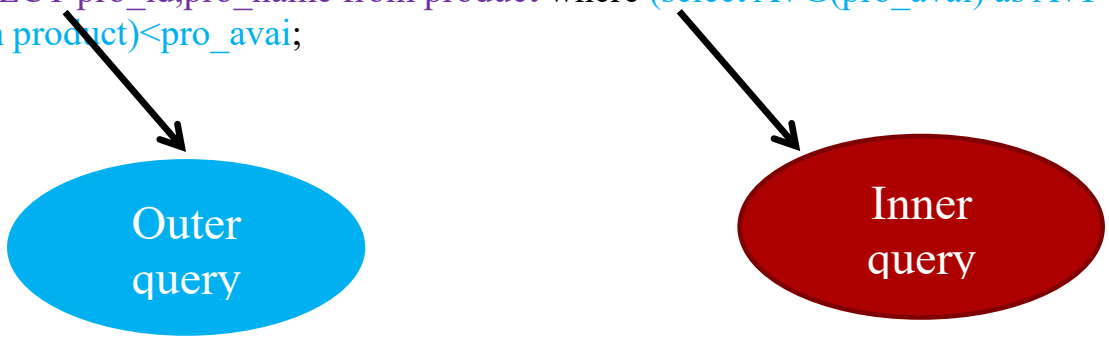
Typically a sub-query is usually added within the WHERE clause of another SQL SELECT statement. The syntax model is depicted in Figure below.

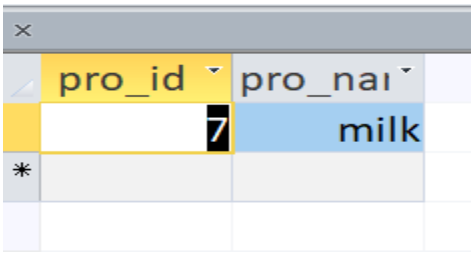
```
SELECT    select_list
FROM      table
WHERE     expr operator
                (SELECT    select_list
                FROM       table);
```

The sub-query (inner query) executes once before the main query (outer query) executes. Consequently, the main query (outer query) uses the sub-query result.

EX1:-

```
SELECT pro_id,pro_name from product where (select AVG(pro_avai) as AVI
from product)<pro_avai;
```

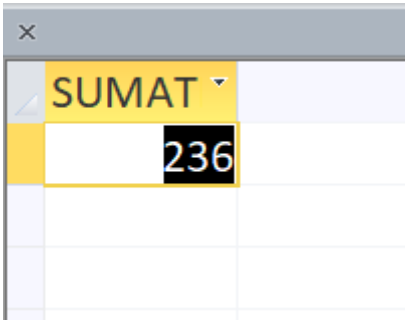




pro_id	pro_nai
7	milk

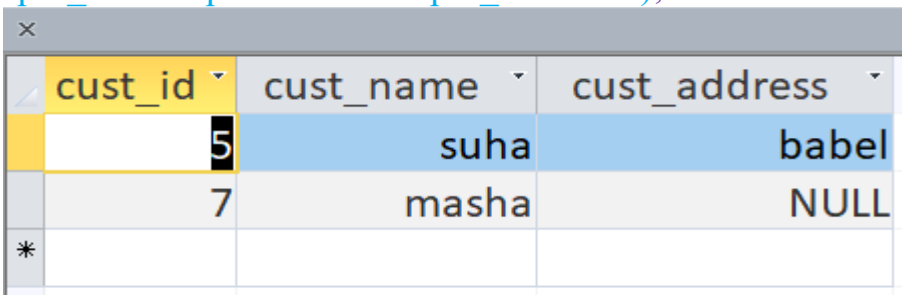
In the second example we use a sub-query that uses another table different from the outer statement.

EX2:-
SELECT sum(cust_age) as SUMATION from Customer where (select AVG(pro_avai) as AVI from product)>400;



SUMAT
236

EX3:-
SELECT cust_id,cust_name,cust_address from Customer where cust_id= any(select pro_id from product where pro_avai>=12);



cust_id	cust_name	cust_address
5	suha	babel
7	masha	NULL

14- SQL Queries - Operator "In" and "Exists“

The operator "in" and "exists" can be used in SQL to check the contents of a table. The operator "in" allows users to specify multiple values in a WHERE clause. In the first example we will use "IN" operator to check numeric values.

Ex1:- Display the contents of the product table where the product available column value is one of (2,4,6)?

Sol:- SELECT * FROM product where pro_avai IN(2,4,6);

pro_id	pro_name	cus_id	exp_date	pro_avai	pro_color	min_avai	pro_price
1	cup	9	2/5/2022	4	white	1	1000
6	MEAT	4	11/7/2023	6	red	2	10000

EX2:- SELECT * FROM Customer WHERE cust_id IN (select cus_id from product where cust_id=cus_id);

cust_id	cust_name	cust_age	cust_mobile	cust_address
4	rad	23	3342	basra
7	masha	34	2266	NULL

While, when use the Exists operator the results will be displayed as:

SELECT * FROM Customer WHERE cust_id IN (select cus_id from product where cust_id=cus_id);

cust_id	cust_name	cust_age	cust_mobile	cust_address
1	Morad	34	77345068	Hilla
2	Morad	23	77345	Hilla
3	Samer	56	7891	Takret
4	Moler	23	3457876	Basra
5	suha	43	3366	Babel
6	rasha	23	2466	babel
7	Moler	34	3677	Sulaimania
8	Morad	26	77345	Hilla
9	fahd	21	256	Baghdad

Comparing between In and Exists operators

IN	Exists
1- Minimize the multiple OR conditions	1- To check the Exists elements
2- Compare the values between the subquery(child query) and parent query	2- Does not compare.
3- Scans all records	3- Stops for further execution once the single positive condition is met.
4- Return True, False or Null.	4-Return True or False.
5- Can use it on Subqueries as well as with values.	5.Can use it only with Subqueries.
6-Excutes faster when the subquery results less or static list to pass.	6- Executes faster when the subquery results is large
7- Preferred if have small list.	7- Preferred if check for existence
8-check with single column.	8-check with multiple columns.

15- SQL Queries - Operator "Any" and "All"

There are two useful operators "ANY" and "ALL" that are typically used with sub-queries. The operator "ANY" compares a value to each value in a list or results from a query and evaluates to true if the result of an inner query contains at least one row. A simple example using the "ANY" operator is given below.

EX1:- Display customer address from customer table where the customer id is equal to any cus_id column in product table?

SELECT cust_address FROM Customer WHERE cust_id = ANY (SELECT cus_id FROM product)

cust_address
Basra
Sulaimania
Baghdad

EX2:- Display cus_name, cus_age from customer table where the cust_id less than any AVG of pro_avai column from product table

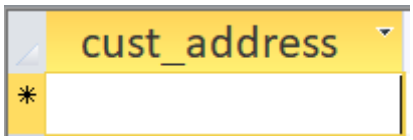
Sol:- SELECT cust_name,cust_age FROM Customer WHERE cust_id < ANY (select AVG(pro_avai) from product);

cust_name	cust_age
Morad	34
Morad	23
Samer	56
Moler	23

The ALL is used to select all records of a SELECT statement. It compares a value to every value in a list or results from a query. The ALL must be preceded by the comparison operators and evaluates to TRUE if the query returns no rows. Below it is a given an examples:

EX1:- Display customer address from customer table where the customer id is equal to All cus_id column in product table?

SELECT cust_address FROM Customer WHERE cust_id = All(SELECT cus_id FROM product);



EX2:- Display cus_name, cus_age from customer table where the cust_id less than ALL AVG of pro_avai column from product table

Sol:- SELECT cust_name,cust_age FROM Customer WHERE cust_id < ALL (select AVG(pro_avai) from product);

cust_name	cust_age
Morad	34
Morad	23
Samer	56
Moler	23

Comparison between Any and All.

ANY	ALL
1- **ANY** are logical operators in SQL. They return Boolean value as a result.	1-ALL are logical operators in SQL. They return Boolean value as a result.
2- Any is used when 1 or more records match the sub condition and the result is true for those records.	2- All is used when all the records match the sub condition thus we get the output to be true else false.
3- Can use it on Subqueries as well as with values.	3-Can use it only with Subqueries.