What is a Subquery

A subquery is a SELECT statement embedded in a clause of another SQL statement.

```
Main  ─────→   SELECT  ...
query          FROM    ...
               WHERE   ...
                       (SELECT  ...   ←──── Subquery
                        FROM    ...
                        WHERE   ...)
```
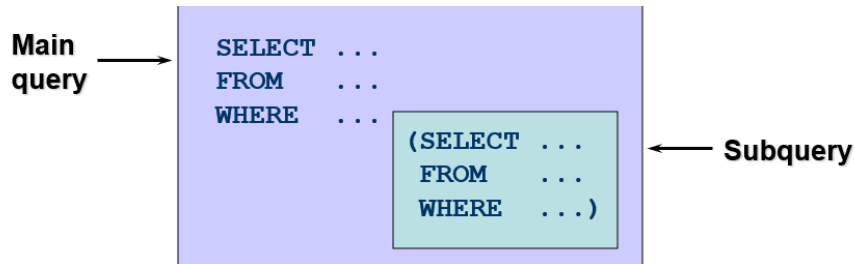
Types of Subquery

1. **SINGLE ROW**
   Inner Query returns a single row which in turn can be used to return multiple rows as per the where clause.

```
OUTER          SELECT  ename,sal
QUERY          FROM    emp
               WHERE   sal   >
```

```
SUB            (SELECT  sal
QUERY           FROM    emp
                WHERE   ename='JONES')
```

2975

ENAME	SAL
SCOTT	3000
KING	5000
FORD	3000
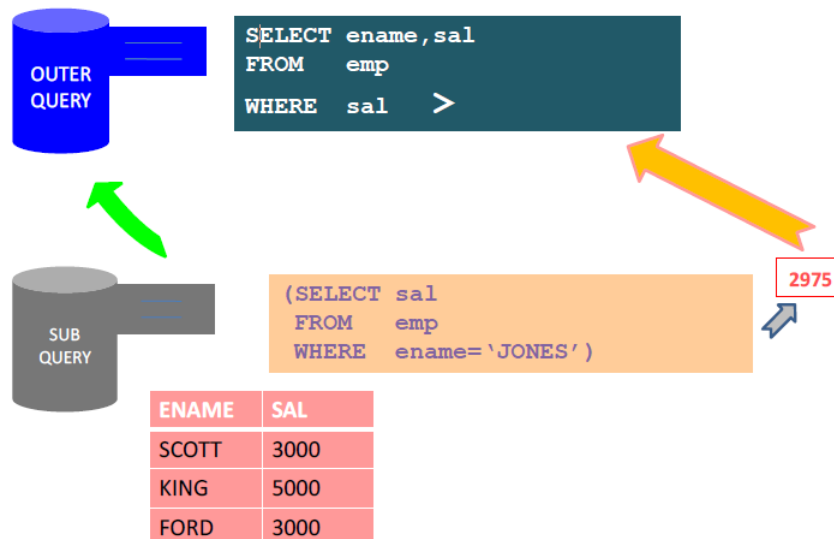
2. **MULTIPLE ROW**
   Inner Query returns multiple rows. We cannot use an equal operator in case of multiple rows being returned by the subquery.
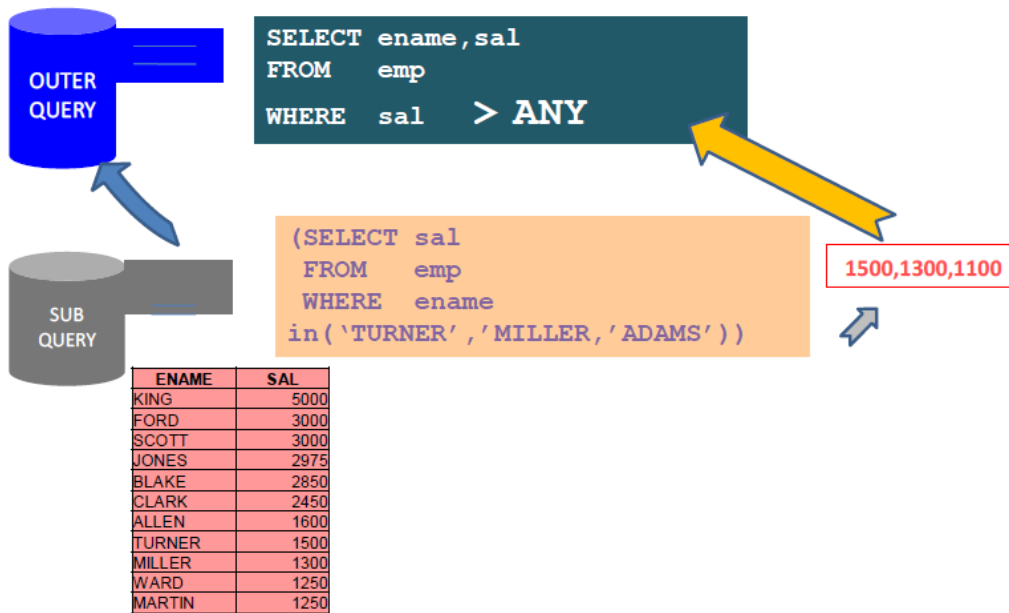   mysql> select ename,sal
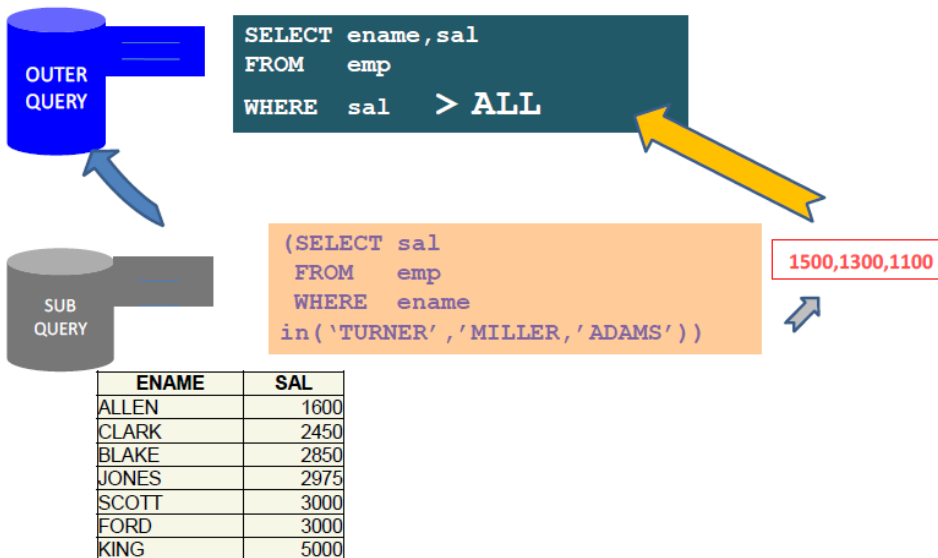   -> from emp
   -> where sal IN (select sal from emp
   -> where ename in('WARD','MARTIN'));

SUBQUERY	OPERATORS
SINGLE ROW	=,<,>,<=,>=,<>
MULTIPLE ROW	IN,NOT IN,ANY,ALL

Multiple row subquery using ANY

```
SELECT ename,sal
FROM    emp

WHERE   sal    > ANY
```

```
(SELECT sal
 FROM    emp
 WHERE   ename
in('TURNER','MILLER,'ADAMS'))
```

1500,1300,1100

OUTER QUERY

SUB QUERY

ENAME	SAL
KING	5000
FORD	3000
SCOTT	3000
JONES	2975
BLAKE	2850
CLARK	2450
ALLEN	1600
TURNER	1500
MILLER	1300
WARD	1250
MARTIN	1250

Multiple row subquery using ALL

```
SELECT ename,sal
FROM    emp

WHERE   sal    > ALL
```

```
(SELECT sal
 FROM    emp
 WHERE   ename
in('TURNER','MILLER,'ADAMS'))
```

1500,1300,1100

OUTER QUERY

SUB QUERY

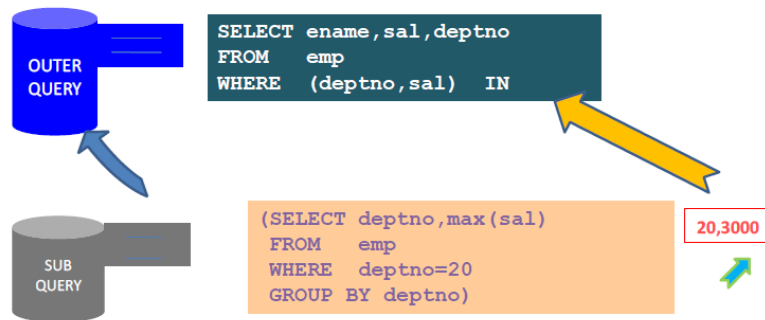| ENAME	SAL
ALLEN	1600
CLARK	2450
BLAKE	2850
JONES	2975
SCOTT	3000
FORD	3000
KING	5000

3. **MULTIPLE COLUMN**

Subqueries so far seen were returning single row/multiple row but ONLY ONE COLUMN.
Here is a subquery which gives 2 columns.
mysql> **select max(sal),deptno**
-> from emp
-> group by deptno;

```
SELECT ename,sal,deptno
FROM    emp
WHERE   (deptno,sal)  IN
```

OUTER QUERY

SUB QUERY

```
(SELECT deptno,max(sal)
 FROM    emp
 WHERE   deptno=20
 GROUP BY deptno)
```

20,3000

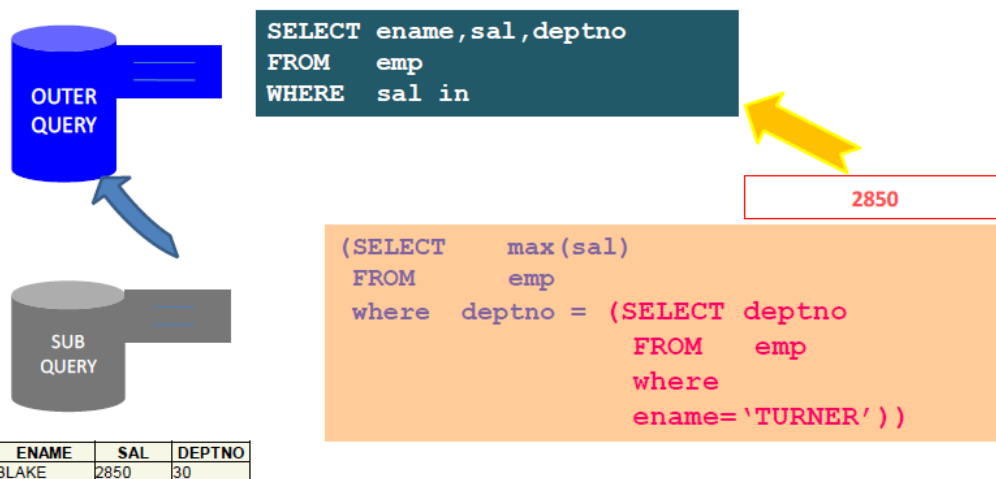| ENAME	SAL	DEPTNO
FORD	3000	20
SCOTT	3000	20

4. NESTED

Subquery can return a single row,multiple rows with a single column or multiple columns. It may be required that the subquery itself needs another subquery which we refer to as a nested query.

NESTED subquery

```
SELECT ename,sal,deptno
FROM    emp
WHERE   sal in
```

OUTER QUERY

SUB QUERY

2850

```
(SELECT     max(sal)
 FROM       emp
 where   deptno = (SELECT deptno
                    FROM    emp
                    where
                    ename='TURNER'))
```

ENAME	SAL	DEPTNO
BLAKE	2850	30

5. CORRELATED

The correlation comes from the fact that the subquery uses information from the outer query and the subquery executes once for every row in the outer query. We can easily write employees who are taking salaries more than the average salary of the entire table.

Correlated subquery

```
SELECT ename,sal,deptno
FROM    emp E
WHERE   sal >
```

Ename	Sal	deptno
Smith	800	20

```
(SELECT avg(sal)
 from    emp
 where   deptno=E.deptno)
```

OUTER QUERY

SUB QUERY

ENAME	SAL	DEPTNO
ALLEN	1600	30
JONES	2975	20
BLAKE	2850	30
SCOTT	3000	20
KING	5000	10
FORD	3000	20

DEPTNO	AVG(SAL)
10	2916.67
20	2175
30	1566.67