NATIONAL UNIVERSITY OF COMPUTER & EMERGING SCIENCES

CL 203-Database Systems

Lab Session 06

Subqueries

A subquery is a SELECT statement that is embedded in a clause of another SELECT statement. They can be very useful when we need to select rows from a table with a condition that depends on the data in the table itself. The subquery generally executes first and its output is used to complete the query condition for the main or outer query.
The subquery can be placed in a number of SQL clauses:

- WHERE clause
- HAVING clause
- FROM clause

Types of Subqueries

- **Single-row subquery:** Query that returns only one row from the inner SELECT statement.
- **Multiple-row subquery:** Query that returns more than one row form the inner SELECT statement.
- **Multiple-column subquery**: Query that returns more than one column from the inner SELECT statement.
- **Correlated Subqueries:**Used to affect row-by-row processing, each subquery is executed once for every row of the outer query.

The syntax of SELECT statement using subqueries is

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

Note: In the syntax, operator means comparison operator. Comparison operators fall into two clauses: single-row operators (>, =, >=, <, <>, <=) and multiple-row operators (IN, ANY, ALL).

For example, to display the names of all employees who earn more than employee with number 7566.

```
SELECT ename FROM emp
WHERE sal > (SELECT sal FROM emp WHERE empno = 7566);
```

Single-row subquery

- ✓ List all employees who are working in a department located in Boston.

```
SELECT * FROM emp

WHERE deptno in (SELECT deptno FROM dept WHERE dname = 'BOSTON');
```

We can use '=' instead of **in**, since single row is returned by subquery. Write this query without subquery. A subquery may again use a subquery.

In where clause conditions, subqueries can be combined arbitrarily by using the logical connectives (**AND,OR)**.

- ✓ List employees whose job title is the same as that of employee 7369 and whose salary is greater than that of employee 7876.

```
SELECT ename, job FROM emp

WHERE job = (SELECT job FROM emp WHERE empno = 7369)

AND   sal > (SELECT sal FROM emp WHERE empno = 7876);
```

Subqueries can refer to its surrounding (sub)query and the tables listed in the from clause.

- ✓ List all those employees who are working in the same department as their manager.

```
SELECT * FROM emp e1

WHERE deptno = (SELECT deptno FROM emp e2 WHERE e1.mgr = e2.empno);
```

One can think of the evaluation of this query as follows: For each tuple in the table **e1**, the subquery is evaluated individually.

Multiple-row subquery

- ✓ Retrieve all employees who are working in department 10 and who earn at least as much as any (i.e. at least one) employee working in department 30.

```
SELECT * FROM emp WHERE deptno = 10

AND sal >= any (SELECT sal FROM emp WHERE deptno = 30);
```

- ✓ List all employees who are not working in department 30 and who earn more than all employees working in department 30.

```
SELECT * FROM emp WHERE deptno <> 30

AND sal > all (SELECT sal FROM emp WHERE deptno = 30);
```

Sometimes query results depends on whether certain rows do exist in tables or not. In such queries we use **exists** operator

- ✓ List all department that have no employee.

SELECT * FROM dept d

WHERE not exist (SELECT * FROM emp e2 WHERE deptno = d.deptno);

Multiple column subqueries:

- ✓ Write a query to display the name, department number, and salary of any employee whose department number and salary match the department number and salary of any employee who earns a commission.

SELECT ename, deptno, sal FROM emp

WHERE (deptno, sal) in

(SELECT deptno, sal FROM emp WHERE comm is not null);

Correlated Subqueries

- ✓ Find all employees who make more than the average salary in their department.

SELECT empno, sal, deptno FROM emp outer

WHERE sal > (SELECT AVG(sal) FROM emp inner

WHERE outer.deptno = inner.deptno);

ACTIVITY

1. Display all employees names and hire dates along with their manager's name and hire date for all employees who were hired before their managers.

2. Display the manager number and the salary of the lowest paid employee for that manager. Exclude anyone whose manager is not known. Exclude any groups where the minimum salary is less than $1000. Sort the output in descending order of salary.

3. Write a query to display the employee name and hire date for all employees in the same department as Blake. Exclude Blake.

4. Create a query to display the employee number and name for all employees who earn more than the average salary. Sort the results in descending order of salary.

5. Write a query that will display the employee number and name for all employees who work in a department with any employee whose name contains a T.

6. Display the employee name and salary of all employees who report to King.

7. Create a query to display the name & sal for all employees who have same sal and comm as Scott.

8. Find the job with the lowest average salary.

9. Find the employees who earn the same salary as the minimum salary for each department.

10. Display employees whose salary is less than any clerk and who are not clerks.

BEST OF LUCK