Database Design & Applications

The Database Language - SQL Sub-Queries

Objectives

After do the completing this lesson, you should be able to following:

- Describe the types of problem that subqueries can solve
- Define subqueries
- List the types of subqueries
- Write single-row and multiple-row subqueries

Using a Subquery

Who has a salary greater than Abel's?

Main Query:

Which employees have salaries greater than Abel's salary?

Subquery

What is Abel's salary?

Subquery Syntax

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

- The subquery (inner query) executes once before the main query.
- The result of the subquery is used by the main query (outer query).

Using a Subquery

```
SELECT last_name
FROM   employees
WHERE  salary >
```

11000

```
(SELECT salary
 FROM   employees
 WHERE  last_name = 'Abel');
```

LAST_NAME
King
Kochhar
De Haan
Hartstein
Higgins

Guidelines for Using Subqueries

- Enclose subqueries in parentheses.
- Place subqueries on the right side of the comparison condition.
- The ORDER BY clause in the subquery is not needed unless you are performing Top-N analysis.
- Use single-row operators with single-row subqueries and use multiple-row operators with multiple-row subqueries.

Types of Subqueries

- **Single-row subquery**

- **Multiple-row subquery**

Single-Row Subqueries

- Return only one row
- Use single-row comparison operators

Operator	Meaning
=	Equal to
>	Greater than
>=	Greater than or equal to
<	Less than
<=	Less than or equal to
<>	Not equal to

Single-Row Subqueries

```
SELECT last_name, job_id, salary
FROM   employee
WHERE  job_id =
       (SELECT job_id  FROM
        employees
        WHERE      employee_id = 141)
AND    salary >
       (SELECT salary  FROM
        employees
        WHERE      employee_id = 143);
```

ST_CLERK

2600

LAST_NAME	JOB_ID	SALARY
Rajs	ST_CLERK	3500
Davies	ST_CLERK	3100

Using Group Functions in a Subquery

```
SELECT last_name, job_id, salary
FROM   employee
WHERE  salary =
       (SELECT MIN(salary)  FROM
        employee);
```

2500

LAST_NAME	JOB_ID	SALARY
Vargas	ST_CLERK	2500

Using HAVING Clause with Subqueries

- The MySQL server executes subqueries first.
- The MySQL server returns results into the HAVING clause of the main query.

```
SELECT          department_id, MIN(salary)  employee
FROM
GROUP BY department_id
HAVING      MIN(salary)                      >
```

2500

```
(SELECT MIN(salary)  FROM
  employee
  WHERE      department_id =30);
```

What is Wrong with this Statement?

- Single-row operator with multiple - row subquery

```
SELECT employee_id, last_name
FROM     employee
WHERE   salary =
                    (SELECT          MIN(salary)
                     FROM            employee
                     GROUP BY department_id);
```

subquery returns more than one row

Multiple-Row Subqueries

- Return more than one row
- Use multiple-row comparison operators

Operator	Meaning
IN	Equal to any member in the list
ANY	Compare value to each value returned by the subquery
ALL	Compare value to every value returned by the subquery

Using the ANY Operator in Multiple-Row Subqueries

```
SELECT employee_id, last_name, job_id, salary
FROM   employees
WHERE  salary <  ANY
                 (SELECT salary
                  FROM   employees
                  WHERE job_id = 'IT_PROG')
AND    job_id <> 'IT_PROG';
```

9000, 6000, 4200

EMPLOYEE_ID	LAST_NAME	JOB_ID	SALARY
124	Mourgos	ST_MAN	5800
141	Rajs	ST_CLERK	3500
142	Davies	ST_CLERK	3100
143	Matos	ST_CLERK	2600
144	Vargas	ST_CLERK	2500

10 rows selected.

Using the ALL Operator in Multiple-Row Subqueries

```
SELECT employee_id, last_name, job_id, salary
FROM   employees  WHERE
    salary < ALL
                    (SELECT salary
                     FROM   employees
                     WHERE job_id = 'IT_PROG')
AND     job_id <> 'IT_PROG';
```

9000, 6000, 4200

EMPLOYEE_ID	LAST_NAME	JOB_ID	SALARY
141	Rajs	ST_CLERK	3500
142	Davies	ST_CLERK	3100
143	Matos	ST_CLERK	2600
144	Vargas	ST_CLERK	2500

Null Values Returned by Subquery

Subquery returns no values

```
SELECT last_name, job_id  FROM
employees
WHERE  job_id =
                (SELECT job_id
                        FROM      employees
                        WHERE     last_name = 'Haas');
```

```
0 row(s)returned
```

THANK YOU!