Database Programming with SQL 10-3: Multiple-Row Subqueries

# Objectives

* Correctly use the comparison operators IN, ANY, and ALL in multiple-row subqueries
* Describe what happens if a multiple-row subquery returns a null value
* Construct and execute a multiple-row subquery in the WHERE clause or HAVING clause
* Understand when multiple-row subqueries should be used, and when it is safe to use a single- row subquery
* Distinguish between pair-wise and non-pair-wise subqueries
* Create a query using the EXISTS and NOT EXISTS operators to test for returned rows from the subquery

# Try It / Solve It

1. What will be returned by a query if it has a subquery that returns a null ?

Null

1. Write a query that returns jazz and pop songs. Write a multi-row subquery and use the d\_songs and d\_types tables. Include the id, title, duration, and the artist name.

select id, title, duration, artist

from d\_songs

where type\_code IN ( SELECT code FROM d\_types WHERE description IN ('Jazz', 'Pop'));

1. Find the last names of all employees whose salaries are the same as the minimum salary for any department.

select last\_name

from employees

where salary in (select min(salary) from employees group by department\_id)

1. Which Global Fast Foods employee earns the lowest salary? Hint: You can use either a single- row or a multiple-row subquery.

select last\_name

from employees

where salary in (select min(salary) from employees)

1. Place the correct multiple-row comparison operators in the outer query WHERE clause of each of the following:
   1. Which CDs in our d\_cds collection were produced before “Carpe Diem” was produced? WHERE year < (SELECT year ...
   2. Which employees have salaries lower than any one of the programmers in the IT department? WHERE salary <any(SELECT salary ...
   3. What CD titles were produced in the same year as “Party Music for All Occasions” or “Carpe Diem”?

WHERE year in(SELECT year ...

* 1. What song title has a duration longer than every type code 77 title? WHERE duration >All (SELECT duration …

1. If each WHERE clause is from the outer query, which of the following are true?
   1. WHERE size > ANY -- If the inner query returns sizes ranging from 8 to 12, the value 9 could be returned in the outer query. TRUE
   2. WHERE book\_number IN -- If the inner query returns books numbered 102, 105, 437, and 225 then 325 could be returned in the outer query. FALSE
   3. WHERE score <= ALL -- If the inner query returns the scores 89, 98, 65, and 72, then 82 could be returned in the outer query. FALSE
   4. WHERE color NOT IN -- If the inner query returns red, green, blue, black, and then the outer query could return white. TRUE
   5. WHERE game\_date = ANY -- If the inner query returns 05-Jun-1997, 10-Dec-2002, and 2-Jan-2004, then the outer query could return 10-Sep-2002. FALSE. WHY??
2. The goal of the following query is to display the minimum salary for each department whose minimum salary is less than the lowest salary of the employees in department 50. However, the subquery does not execute because it has five errors. Find them, correct them, and run the query.

SELECT department\_id FROM employees

WHERE MIN(salary) HAVING MIN(salary) > GROUP BY department\_id SELECT MIN(salary)

WHERE department\_id < 50;

SELECT department\_id

FROM employees

GROUP BY department\_id

HAVING MIN(salary) > (SELECT MIN(salary) FROM employees WHERE department\_id = 50)

1. Which statements are true about the subquery below?

SELECT employee\_id, last\_name FROM employees

WHERE salary = AICI AR FI TREBUIT “IN” (SELECT MIN(salary) FROM employees GROUP BY department\_id);

a. The inner query could be eliminated simply by changing the WHERE clause to WHERE MIN(salary).FALSE

b. The query wants the names of employees who make the same salary as the smallest salary in any department.TRUE

c. The query first selects the employee ID and last name, and then compares that to the salaries in every department.FALSE

d. This query will not execute.TRUE

1. Write a pair-wise subquery listing the last\_name, first\_name, department\_id, and manager\_id for all employees that have the same department\_ id and manager\_id as employee 141. Exclude employee 141 from the result set.

SELECT last\_name, first\_name, department\_id, manager\_id

* + - * FROM employees
      * WHERE (department\_id, manager\_id) = (SELECT department\_id, manager\_id FROM employees WHERE employee\_id = 141) AND employee\_id != 141

10. Write a non-pair-wise subquery listing the last\_name, first\_name, department\_id, and manager\_id for all employees that have the same department\_ id and manager\_id as employee

* + - * SELECT last\_name, first\_name, department\_id, manager\_id
      * FROM employees
      * WHERE Department\_id = (SELECT department\_id FROM employees WHERE employee\_id = 141)
      * AND manager\_id = (SELECT manager\_id FROM employees WHERE employee\_id = 141)
      * AND employee\_id != 141;