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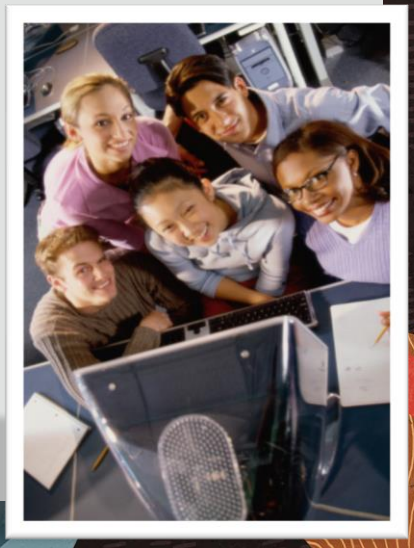
Database Programming with SQL

10-1

Fundamentals of Subqueries



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Objectives

- This lesson covers the following objectives:
  - Define and explain the purpose of subqueries for retrieving data
  - Construct and execute a single-row subquery in the WHERE clause
  - Distinguish between single-row and multiple-row subqueries

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Purpose

- Has a friend asked you to go to a movie, but before you could answer "yes" or "no", you first had to check with your parents?
- Has someone asked you the answer to a math problem, but before you can give the answer, you had to do the problem yourself?
- Asking parents, or doing the math problem, are examples of subqueries
- In SQL, subqueries enable us to find the information we need so that we can get the information we want

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Subquery Overview

- Throughout this course, you have written queries to extract data from a database
- What if you wanted to write a query, only to find out you didn't have all the information you needed to construct it?
- You can solve this problem by nesting queries—placing one query inside the other query
- The inner query is called a "subquery."

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Subquery Overview

- The subquery executes to find the information you don't know
- The outer query uses that information to find out what you need to know
- Being able to combine two queries into one can be very useful when you need to select rows from a table with a condition that depends on the data in the table itself

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Subquery Overview

- A subquery is a SELECT statement that is embedded in a clause of another SELECT statement
- A subquery executes once before the main query
- The result of the subquery is used by the main or outer query
- Subqueries can be placed in a number of SQL clauses, including the WHERE clause, the HAVING clause, and the FROM clause
- The subquery syntax is:

The SELECT statement in parentheses is the inner query or 'subquery'. It executes first, before the outer query.

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


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Guidelines for Using Subqueries

- Guidelines:
  - The subquery is enclosed in parentheses
  - The subquery is placed on the right side of the comparison condition
  - The outer and inner queries can get data from different tables
  - Only one ORDER BY clause can be used for a SELECT statement; if used, it must be the last clause in the outer query
  - A subquery cannot have its own ORDER BY clause
  - The only limit on the number of subqueries is the buffer size the query uses

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Two Types of Subqueries

- The two types of subqueries are:
  - Single-row subqueries that use single-row operators (>, =, >=, <, <>, <=) and return only one row from the inner query
  - Multiple-row subqueries that use multiple-row operators (IN, ANY, ALL) and return more than one row from the inner query

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Subquery Example

- What if you wanted to find out the names of the employees that were hired after Peter Vargas?
- The first thing you need to know is the answer to the question, "When was Peter Vargas hired?"
- Once you know his hire date, then you can select those employees whose hire dates are after his

```
SELECT first_name, last_name,
  hire_date
FROM employees
WHERE hire_date >
 (SELECT hire_date
  FROM employees
  WHERE last_name = 'Vargas');
```

FIRST_NAME	LAST_NAME	HIRE_DATE
Eleni	Zlotkey	29-Jan-2000
Kimberely	Grant	24-May-1999
Kevin	Mourgos	16-Nov-1999
Diana	Lorentz	07-Feb-1999

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Subquery and Null

- If a subquery returns a null value or no rows, the outer query takes the results of the subquery (null) and uses this result in its WHERE clause
- The outer query will then return no rows, because comparing any value with a null always yields a null

```
SELECT last_name
FROM employees
WHERE department_id =
  (SELECT department_id
   FROM employees
   WHERE last_name = 'Grant');
```

no data found

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Subquery and Null

- Who works in the same department as Grant?
- Grant's department_id is null, so the subquery returns NULL
- The outer query then substitutes this value in the WHERE clause (WHERE department_id = NULL)
- The outer query returns no rows, because comparing anything with a null returns a null

```
SELECT last_name
FROM employees
WHERE department_id =
  (SELECT department_id
   FROM employees
   WHERE last_name = 'Grant');
```

no data found

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Terminology

- Key terms used in this lesson included:
  - Subquery
  - Inner query
  - Outer query
  - Single-row subquery
  - Multiple-row subquery

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Summary

- In this lesson, you should have learned how to:
  - Define and explain the purpose of subqueries for retrieving data
  - Construct and execute a single-row subquery in the WHERE clause
  - Distinguish between single-row and multiple-row subqueries

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