Four Types of Subqueries
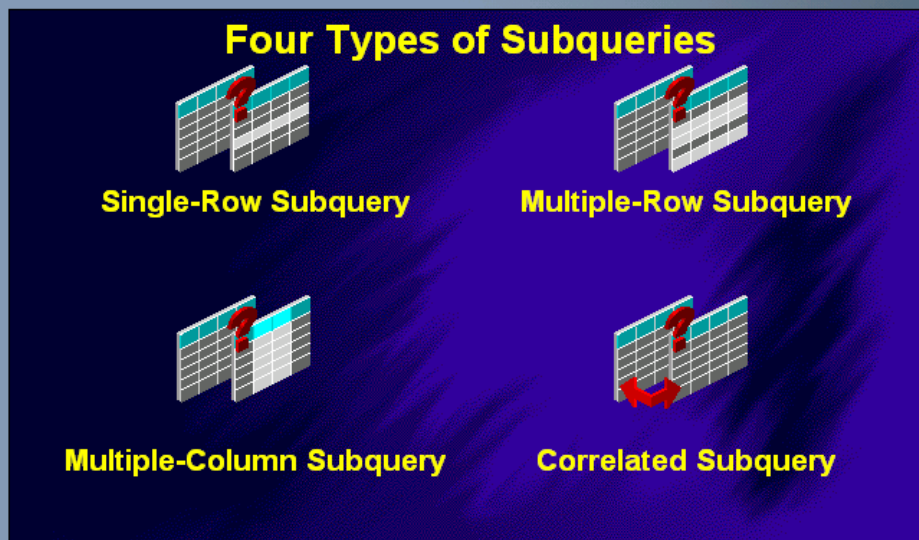
A subquery is a SELECT statement that appears inside another SQL statement. A subquery is very useful for writing statements that need a column value that is not known. You can use a subquery to determine the unknown column value.

Four Types of Subqueries

A subquery may return one or more values from a table. The values returned by a subquery are used by the parent SQL statement, which encloses the subquery.

Four Types of Subqueries

Single-Row Subquery

Multiple-Row Subquery

Multiple-Column Subquery

Correlated Subquery

Four Types of Subqueries

There are four types of subqueries: single-row, multiple-row, multiple-column and correlated subquery. This topic describes the different types of subqueries.

Four Types of Subqueries

Before you learn about the different types of subqueries, you will be made familiar with the general properties of subqueries. A subquery can be used in the SELECT, CREATE, INSERT, UPDATE and DELETE statements.

Four Types of Subqueries

A subquery can be used as a part of a condition in the WHERE clause of a statement. It can also be used in the FROM clause of a SELECT statement.

Four Types of Subqueries

A subquery is enclosed in parentheses and the subquery must appear on the right of the comparison operator in a condition in a WHERE clause.

Four Types of Subqueries

A subquery may or may not retrieve data from a table that is used in the main SQL statement in which the subquery is embedded.

Four Types of Subqueries

In addition, a subquery can also be used in multiple AND or OR predicates of the same statement.

Four Types of Subqueries

A restriction placed while writing subqueries is that the ORDER BY clause cannot be included in a subquery.

Properties of a Subquery

Can be used in the SELECT, CREATE, INSERT, UPDATE and DELETE statements

Can be used as a part of a condition in the WHERE clause of a statement and also in the FROM clause of a SELECT statement

Is enclosed in parentheses and must appear on the right in a condition in a WHERE clause

May or may not retrieve data from a table that is used in the main SQL statement in which it is embedded

Can be used in multiple AND or OR predicates of the same statement

Cannot include an ORDER BY clause

Four Types of Subqueries ✕

Next, you will learn about the different types of subqueries. A single-row subquery returns exactly one value from the specified table. An error is raised if zero or more than one value is returned.

Four Types of Subqueries ✕

A single-row subquery is executed only once regardless of the number of rows considered by the outer query.

Four Types of Subqueries ✕

The syntax of the SELECT and UPDATE statements that use a single-row subquery is displayed on the screen. In the SELECT statement, a subquery is used as a part of the condition in the WHERE clause. The UPDATE statement has a subquery, which is a part of the SET clause.

```
SELECT col_name, col_name, ...          UPDATE table_name

FROM table_name                         SET col_name = (SELECT col_name

WHERE col_name = (SELECT col_name                       FROM table_name

                  FROM table_name                       WHERE condition)

                  WHERE condition);     WHERE condition;
```

Four Types of Subqueries

When a single-row subquery is used as a condition in the WHERE clause, you use the = operator to compare a column value with the return value of a subquery. Other operators such as >, >=, <, <=, <> can also be used.

Four Types of Subqueries

The second type of subquery, the multiple-row subquery, is the SELECT statement that returns values from one or more rows from the specified table.

Four Types of Subqueries

The multiple values returned by a multiple-row subquery are compared to a column in each row of the outer query.

Four Types of Subqueries

A multiple-row subquery is executed only once regardless of the number of rows considered by the outer query.

Four Types of Subqueries

The syntax of the SELECT and UPDATE statements that use a multiple-row subquery is displayed on the screen. Notice the use of the IN operator to link the outer statement to a multiple-row subquery. The other operators that can be used for a multiple-row subquery are the NOT IN, ANY and ALL operators.

```
SELECT col_name, col_name,...            UPDATE table_name

FROM table_name                          SET col_name = value, col_name2=
                                         value2

WHERE col_name IN (SELECT col_name       WHERE col_name IN (SELECT col_name

              FROM table_name                          FROM table_name

              WHERE condition);                        WHERE condition)


                                         AND col_name2 IN (SELECT col_name2

                                                       FROM table_name

                                                       WHERE condition);
```

Four Types of Subqueries

The third type of subquery, the multiple-column subquery returns one or more value pairs from a table.

Four Types of Subqueries

The multiple-column subquery returns a list of value pairs that are compared to value pairs in each row of the outer query. This subquery is executed only once regardless of the number of rows considered by the outer query.

Four Types of Subqueries

The syntax of the SELECT and UPDATE statements that use a multiple-column subquery is displayed on the screen.

```
SELECT col_name, col_name, ...        UPDATE table_name

FROM table_name                       SET (col_name, col_name, ...) =

WHERE (col_name, col_name, ...)            (SELECT col_name, col_name, ...

IN (SELECT col_name, col_name, ...          FROM table_name

    FROM table_name                         WHERE condition)

    WHERE condition);                 WHERE condition;
```

Four Types of Subqueries

A multiple-column subquery may return paired values from either a single row or multiple rows. A multiple-column subquery could, therefore, be a multiple-row subquery or a single-row subquery.

Four Types of Subqueries

The fourth subquery, correlated subquery, is a nested subquery that is executed once for each row considered by the outer query. The execution of a correlated subquery is different from all other subqueries that execute only once regardless of the number of rows considered by the outer query.

Four Types of Subqueries

When a correlated subquery is executed, it uses a column value from each row considered by the outer query. A correlated subquery is identified by the use of a column of the outer query in the WHERE clause of the inner query.

Four Types of Subqueries

The syntax of the SELECT and UPDATE statements that use a correlated subquery is displayed on the screen.

```
SELECT col, col, ...

FROM table_name outer

WHERE col IN (SELECT inner_col

        FROM table_name

        WHERE inner_col =
        outer.col);
```

```
UPDATE table_name outer

SET col = (SELECT inner_col

        FROM table_name

        WHERE inner_col =
        outer.col);
```

Four Types of Subqueries

It is also possible to nest different types of subqueries. When nested, they are always executed from the most deeply nested subquery to the least deeply nested subquery unless they are correlated subqueries.

Four Types of Subqueries

Having learned about the properties of the four types of subqueries in this topic, you will be able to use the appropriate subquery in different situations.

Execution of Single-Row Subqueries

A SQL statement with a single-row subquery embedded in it is executed in a specific manner. This topic details the steps in the execution of a single-row subquery in a SQL statement. You will first see how a single-row subquery is executed in a SELECT statement. This will be followed by an example of the INSERT statement.

Execution of Single-Row Subqueries

The SELECT statement with a single-row subquery is displayed on the screen. This statement will display the rows from the **emp** table in which the value of the **sal** column is greater than the salary of the employee with number 7521.The subquery that is enclosed in parentheses is called the inner query.

Execution of Single-Row Subqueries

The main query that contains a subquery nested in the WHERE clause is the outer query.

Execution of Single-Row Subqueries

When the SELECT statement is executed, the control first goes to the inner query. The inner query is executed only once.

Execution of Single-Row Subqueries

The inner query, being a single-row subquery, returns only one value from the table specified in the FROM clause of the subquery. In the example displayed on the screen, the subquery returns the salary of the employee whose employee number is 7521.

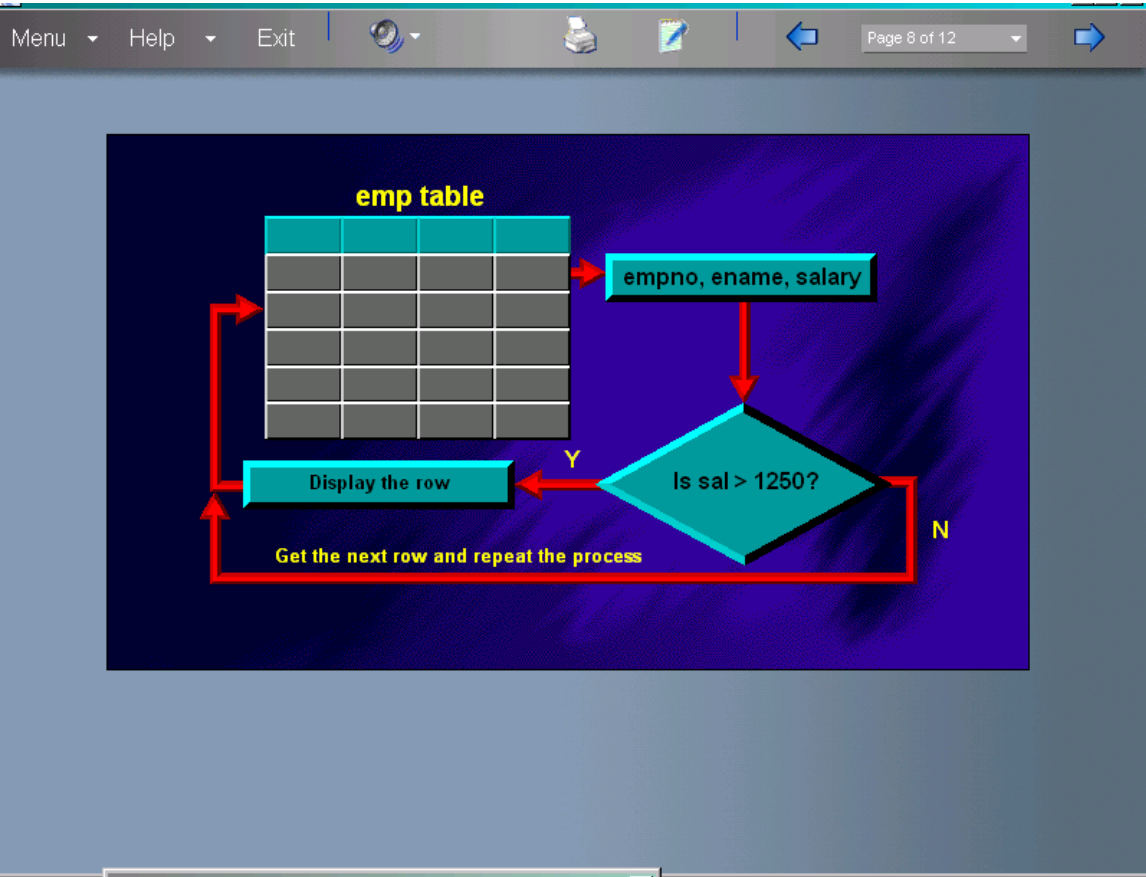**Execution of Single-Row Subqueries**

Next, the value returned by the subquery is plugged into the WHERE clause of the outer query. In the example being discussed, the salary of the employee with employee number 7521 is 1250. The value 1250 is returned by the subquery and is plugged into the outer query.

Execution of Single-Row Subqueries

When the subquery is substituted with its return value, the two sides of the comparison operator in the WHERE clause become comparable. The condition in the WHERE clause is then evaluated.

Execution of Single-Row Subqueries

Finally, the outer query is executed. All the rows in the table mentioned in the FROM clause of the outer query are considered for checking whether or not the WHERE clause condition is applicable to them. A row is selected only when it fulfills the selection criterion mentioned in the WHERE clause.
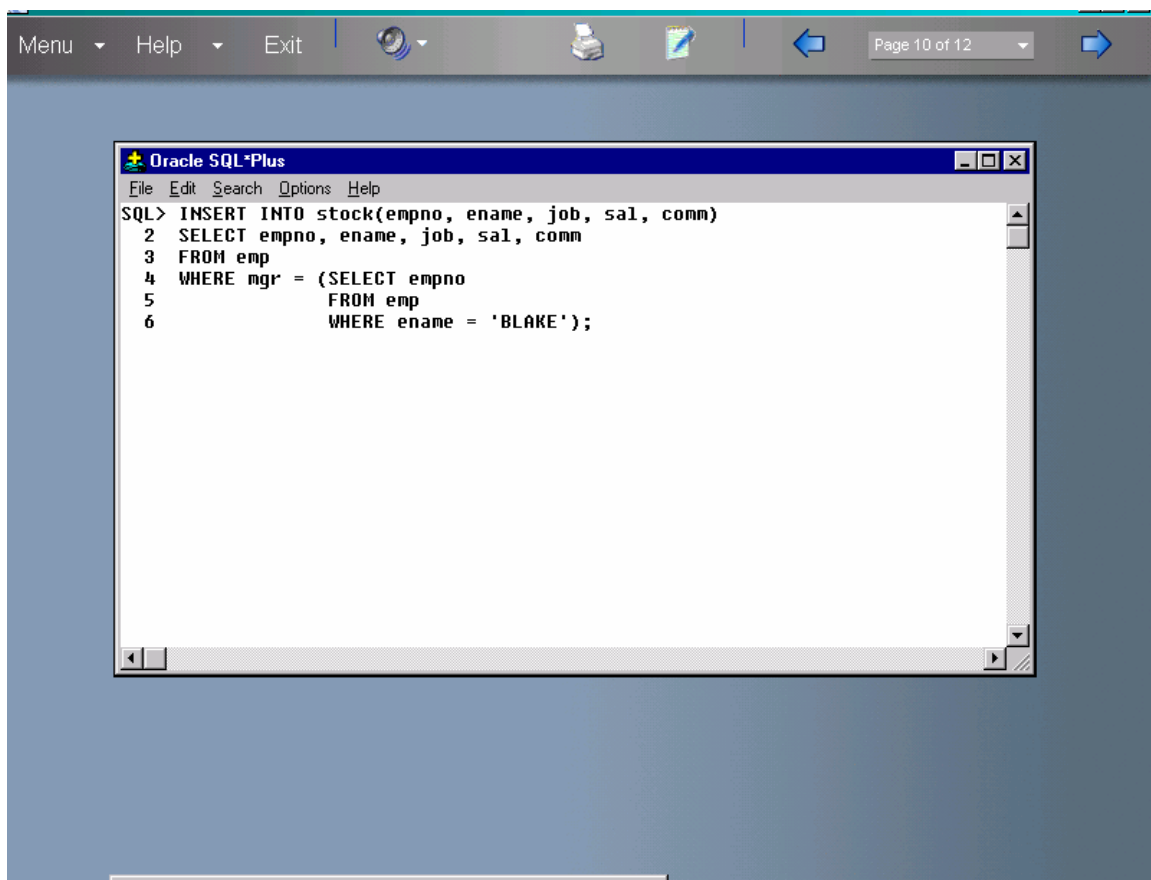
emp table

empno, ename, salary

Is sal > 1250?

Y

N

Display the row

Get the next row and repeat the process

Execution of Single-Row Subqueries   ☒

You learned the steps in the execution of a SELECT statement with a single-row subquery. The execution of any other SQL statement that has a single-row subquery is similar. Next, you will learn about the steps in the execution of the INSERT statement with a single-row subquery.
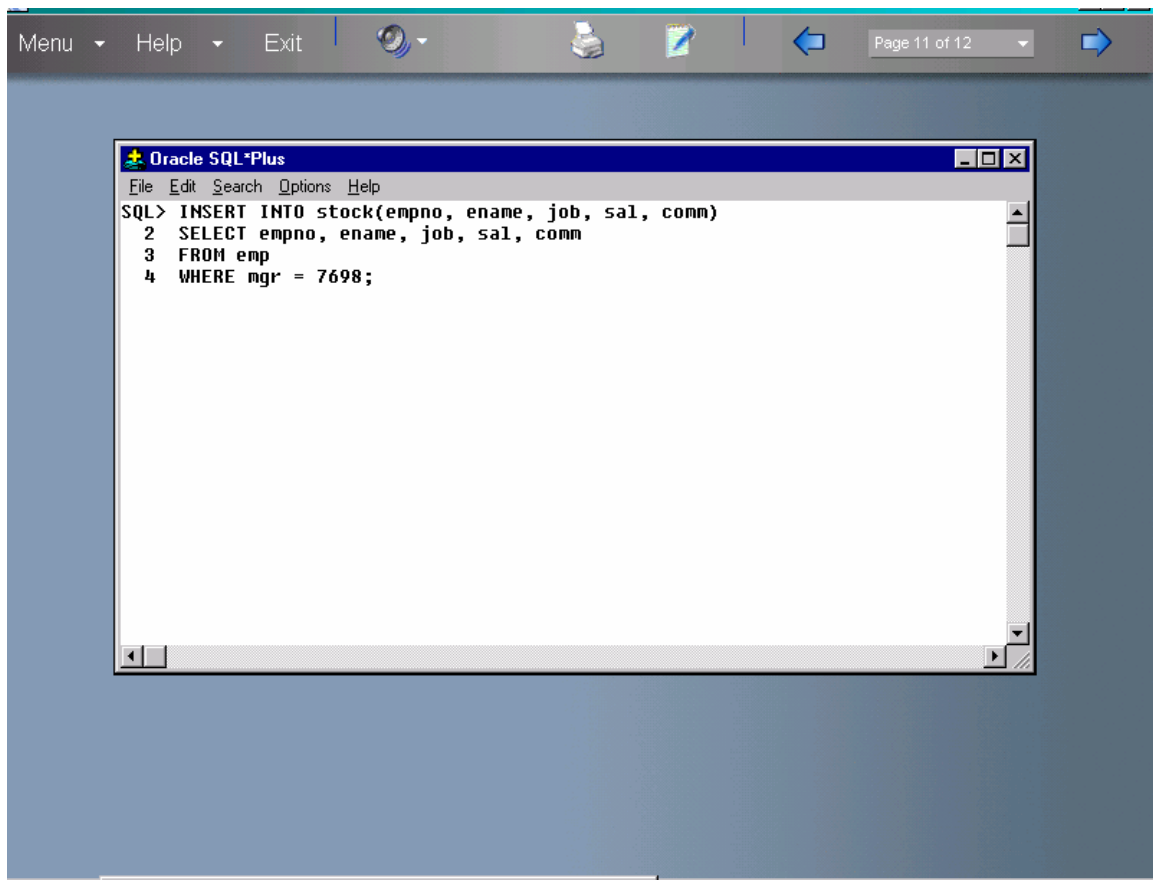
Execution of Single-Row Subqueries   ☒

The INSERT statement with a single-row subquery is displayed on the screen. This statement inserts the records of the employees working for Blake from the **emp** table into the **stock** table. When this statement is executed, the innermost query returns Blake's employee number.

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```
SQL> INSERT INTO stock(empno, ename, job, sal, comm)
  2   SELECT empno, ename, job, sal, comm
  3   FROM emp
  4   WHERE mgr = (SELECT empno
  5                FROM emp
  6                WHERE ename = 'BLAKE');
```

Execution of Single-Row Subqueries   ✕

Then, the SELECT statement returns the details from all the rows in the **emp** table in which the value of the **mgr** column is 7698. The rows returned by the SELECT statement are inserted into the **stock** table.

Oracle SQL*Plus   _ □ ✕

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```
SQL> INSERT INTO stock(empno, ename, job, sal, comm)
  2   SELECT empno, ename, job, sal, comm
  3   FROM emp
  4   WHERE mgr = 7698;
```

Execution of Single-Row Subqueries   ✕

This topic discussed the steps in the execution of a SQL statement with a single-row subquery. An understanding of the steps in the execution will help you to write SQL statements with embedded single-row subqueries that generate the appropriate response.