# 6

# Subqueries

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# Objectives

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

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

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# Using a Subquery to Solve a Problem

**"Who has a salary greater than Jones'?"**

**Main Query**

**"Which employees have a salary greater than Jones' salary?"**

**Subquery**

**?**     **"What is Jones' salary?"**

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# Subqueries

```
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).**

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## Using a Subquery

```
SQL> SELECT ename
  2  FROM   emp
  3  WHERE  sal >          2975
  4             (SELECT sal
  5              FROM    emp
  6              WHERE   empno=7566);
```

```
ENAME
----------
KING
FORD
SCOTT
```

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## Guidelines for Using Subqueries

- **Enclose subqueries in parentheses.**
- **Place subqueries on the right side of the comparison operator.**
- **Do not add an ORDER BY clause to a subquery.**
- **Use single-row operators with single-row subqueries.**
- **Use multiple-row operators with multiple-row subqueries.**

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# Types of Subqueries

- **Single-row subquery**

| Main query | | returns | CLERK |
|---|---|---|---|
| | Subquery | → | |

- **Multiple-row subquery**

| Main query | | returns | CLERK |
|---|---|---|---|
| | Subquery | → | MANAGER |
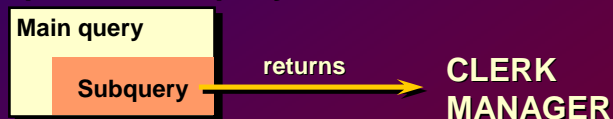
- **Multiple-column subquery**

| Main query | | returns | CLERK | 7900 |
|---|---|---|---|---|
| | Subquery | → | MANAGER | 7698 |
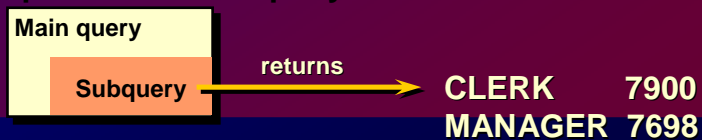
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# Single-Row Subqueries

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

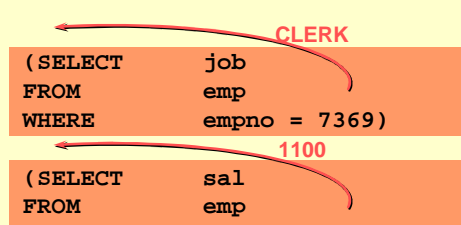| Operator | Meaning |
|---|---|
| = | Equal to |
| > | Greater than |
| >= | Greater than or equal to |
| < | Less than |
| <= | Less than or equal to |
| <> | Not equal to |

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# Executing Single-Row Subqueries

```
SQL> SELECT    ename, job
  2  FROM      emp
  3  WHERE     job =                        CLERK
  4                  (SELECT      job
  5                   FROM        emp
  6                   WHERE       empno = 7369)
  7  AND       sal >                        1100
  8                  (SELECT      sal
  9                   FROM        emp
 10                   WHERE       empno = 7876);
```
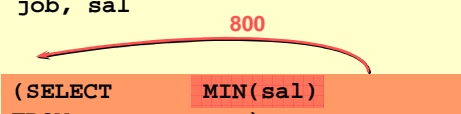
```
ENAME       JOB
----------  ----------
MILLER      CLERK
```

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# Using Group Functions in a Subquery

```
SQL> SELECT    ename, job, sal
  2  FROM      emp                          800
  3  WHERE     sal =
  4                  (SELECT      MIN(sal)
  5                   FROM        emp);
```
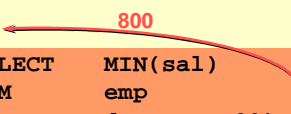
```
ENAME       JOB         SAL
----------  ----------  ----------
SMITH       CLERK          800
```

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## HAVING Clause with Subqueries

- **The Oracle Server executes subqueries first.**

- **The Oracle Server returns results into the HAVING clause of the main query.**

```
SQL> SELECT      deptno, MIN(sal)
  2  FROM        emp
  3  GROUP BY    deptno
  4  HAVING      MIN(sal) >          800
  5                        (SELECT    MIN(sal)
  6                         FROM      emp
  7                         WHERE     deptno = 20);
```
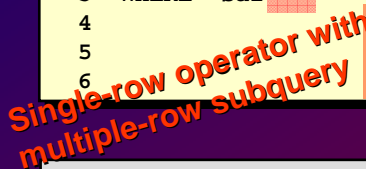
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## What Is Wrong
## with This Statement?

```
SQL> SELECT empno, ename
  2  FROM    emp
  3  WHERE   sal =
  4                   (SELECT    MIN(sal)
  5                    FROM      emp
  6                    GROUP BY  deptno);
```

*Single-row operator with multiple-row subquery*

```
ERROR:
ORA-01427: single-row subquery returns more than
one row

no rows selected
```

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**<Course name> <Lesson number>-6**

# Will This Statement Work?

```
SQL> SELECT ename, job
  2  FROM    emp
  3  WHERE   job =
  4                 (SELECT job
  5                 FROM    emp
  6                 WHERE   ename='SMYTHE');
```

```
no rows selected
```

*Subquery returns no values*

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# 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 |

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## Using ANY Operator in Multiple-Row Subqueries

```
SQL> SELECT   empno, ename, job     1300
  2  FROM     emp                    1100
  3  WHERE    sal < ANY               800
  4                   (SELECT    sal  950
  5                    FROM      emp
  6                    WHERE     job = 'CLERK')
  7  AND      job <> 'CLERK';

    EMPNO ENAME       JOB
--------- ----------  ---------
     7654 MARTIN      SALESMAN
     7521 WARD        SALESMAN
```

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## Using ALL Operator in Multiple-Row Subqueries

```
SQL> SELECT   empno, ename, job       1566.6667
  2  FROM     emp                        2175
  3  WHERE    sal > ALL                 2916.6667
  4                  (SELECT     avg(sal)
  5                   FROM       emp
  6                   GROUP BY   deptno);

    EMPNO ENAME       JOB
--------- ----------  ---------
     7839 KING        PRESIDENT
     7566 JONES       MANAGER
     7902 FORD        ANALYST
     7788 SCOTT       ANALYST
```

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**<Course name> <Lesson number>-8**

# Summary

**Subqueries are useful when a query is based on unknown values.**

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

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# Practice Overview

- **Creating subqueries to query values based on unknown criteria**

- **Using subqueries to find out what values exist in one set of data and not in another**

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