Subqueries

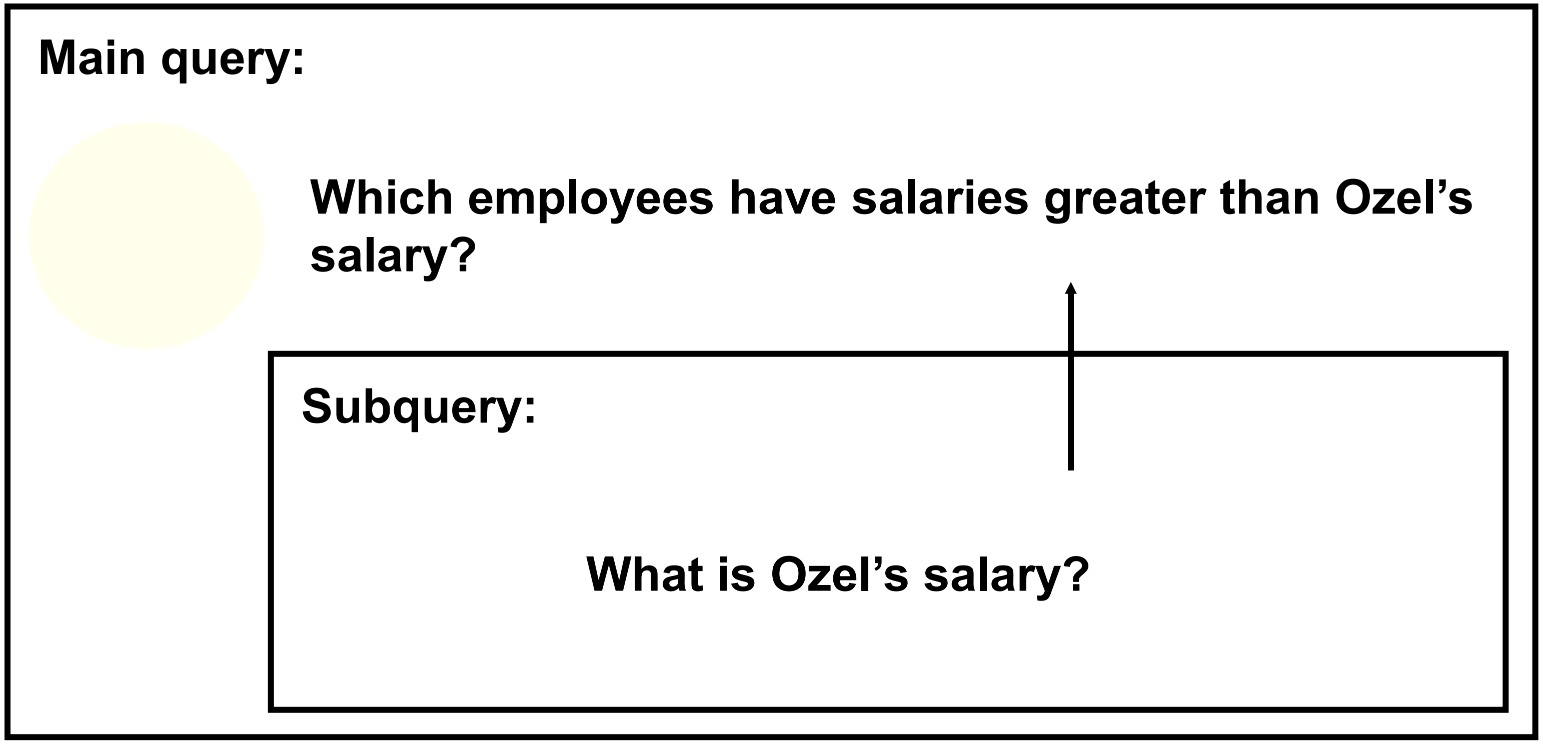
Objectives

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

- Define what subqueries are
- Describe the types of problems that subqueries can solve
- Identify and list the different types of subqueries
- Write both single-row and multiple-row subqueries

Using a Subquery to Solve a Problem

Who has a salary greater than Ozel’s?



Main query:

Which employees have salaries greater than Ozel’s salary?

Subquery:

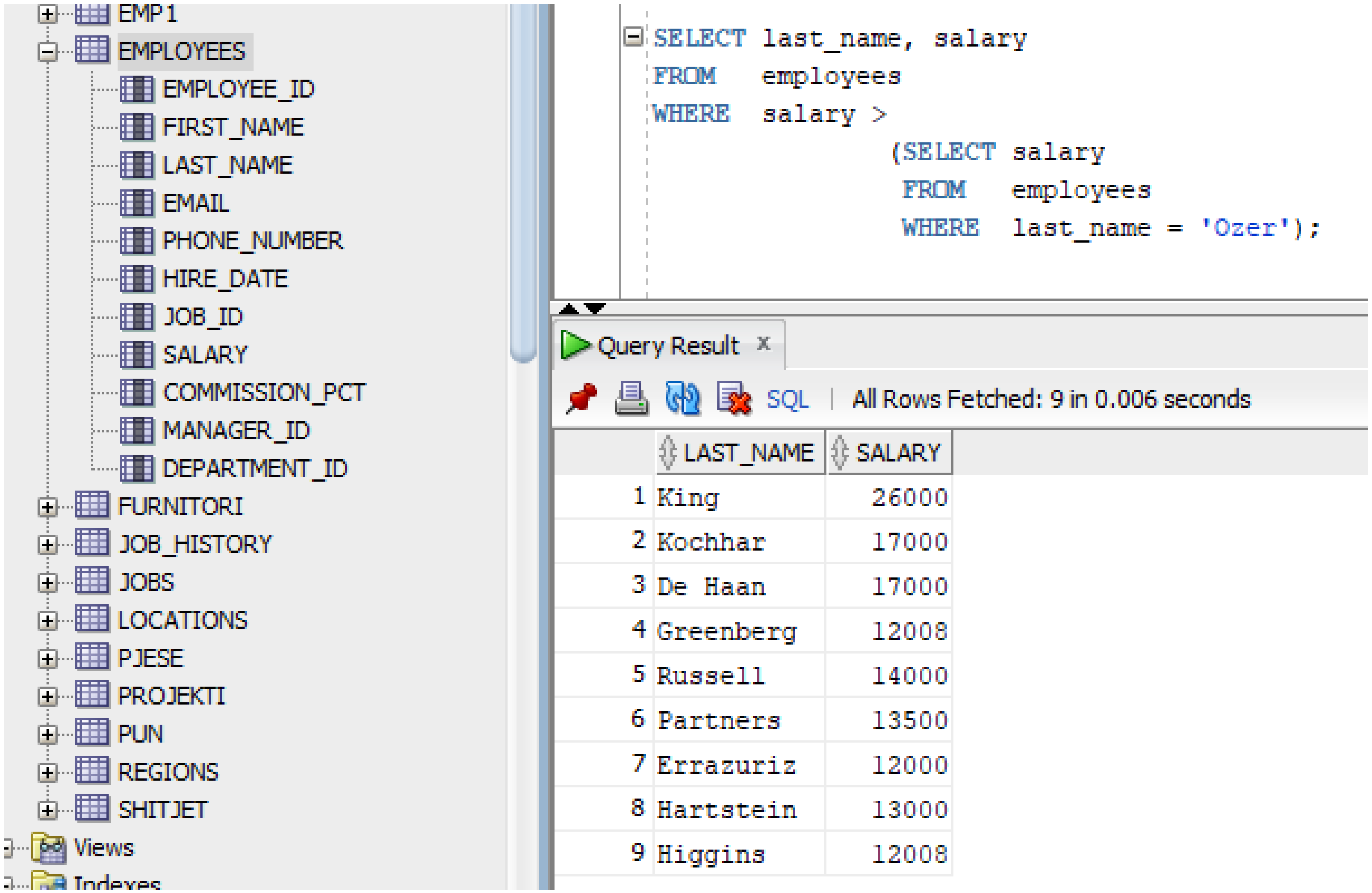
What is Ozel’s salary?

Subquery Syntax

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

- The subquery executes *before* the main query.
- The result of the subquery is used by the main query.

Using a Subquery



```
SELECT last_name, salary
FROM   employees
WHERE  salary >
                (SELECT salary
                 FROM   employees
                 WHERE  last_name = 'Ozer');
```

All Rows Fetched: 9 in 0.006 seconds

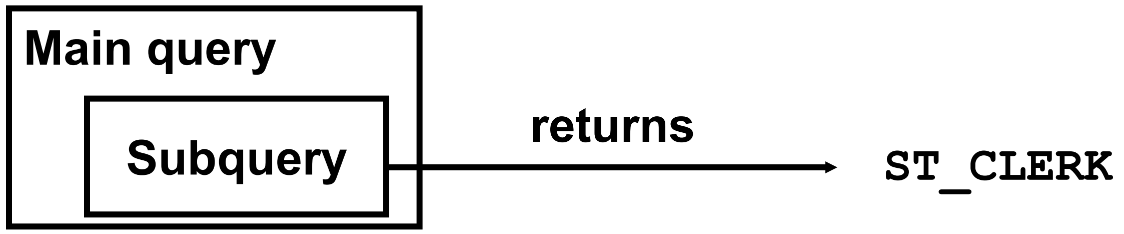
	LAST_NAME	SALARY
1	King	26000
2	Kochhar	17000
3	De Haan	17000
4	Greenberg	12008
5	Russell	14000
6	Partners	13500
7	Errazuriz	12000
8	Hartstein	13000
9	Higgins	12008

Guidelines for Using Subqueries

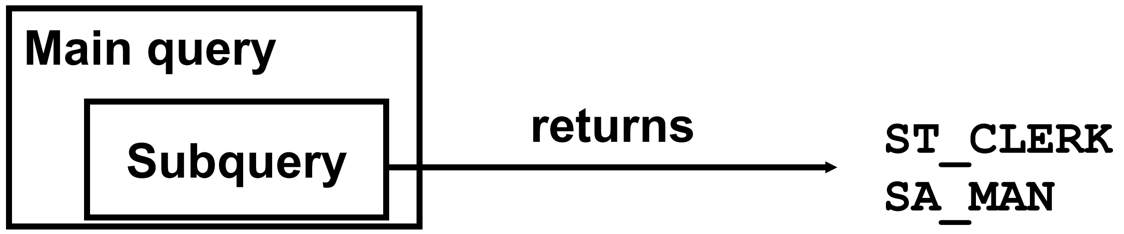
- Enclose subqueries in parentheses.
- Place subqueries on the right side of the comparison condition for better readability (although a subquery can appear on either side of the comparison operator).
- Use single-row operators with single-row subqueries, and multiple-row operators with multiple-row subqueries.

Types of Subqueries

- Single-row subquery



- Multiple-row subquery

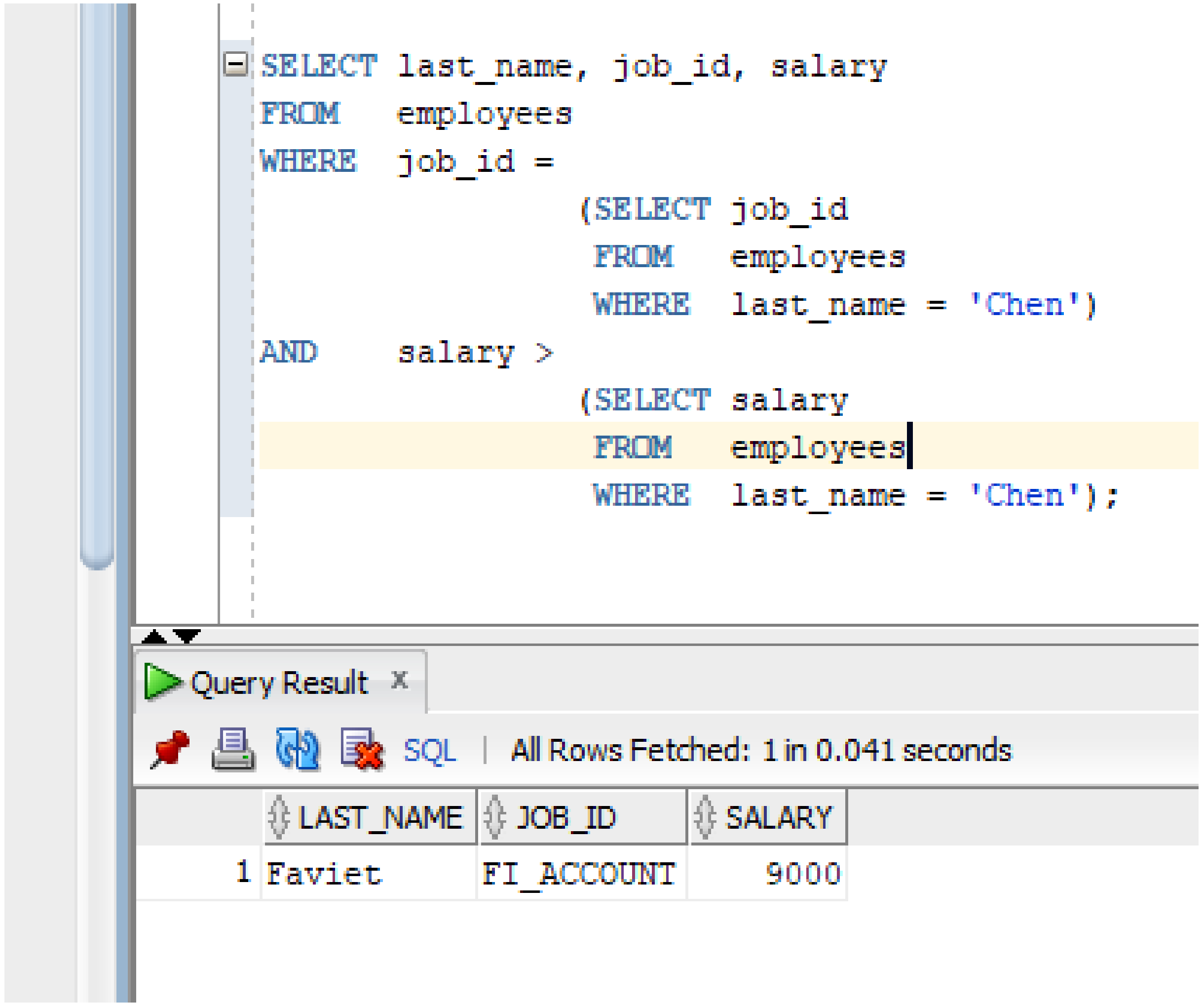


Single-Row Subqueries

- Return only one row and 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

Executing Single-Row Subqueries

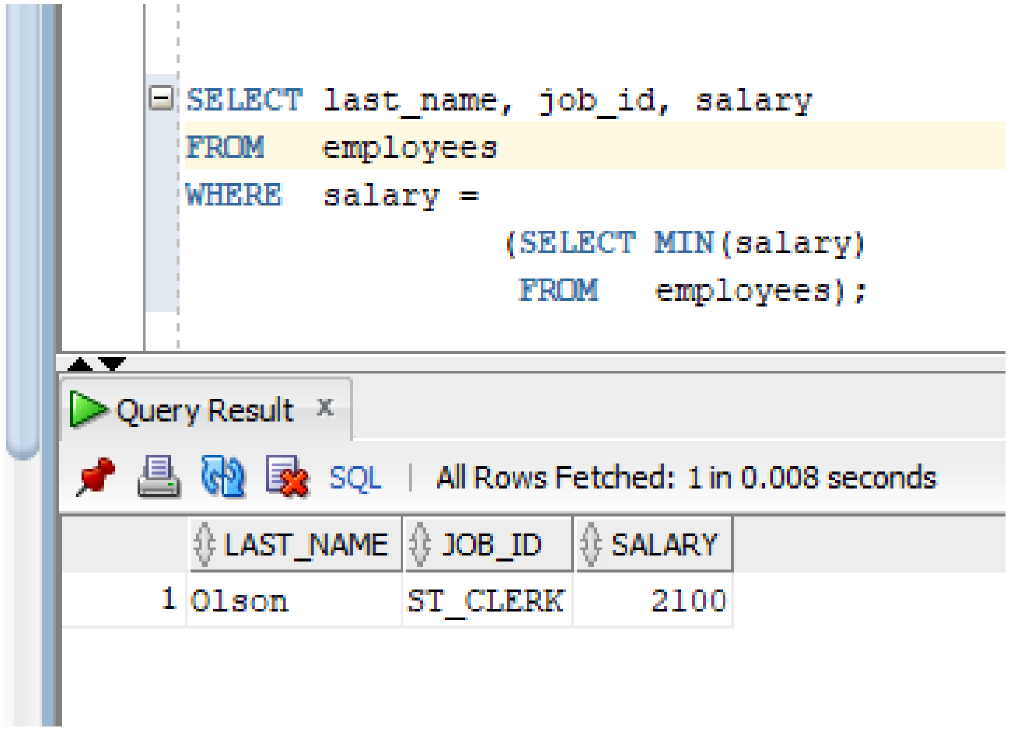


```
SELECT last_name, job_id, salary
FROM   employees
WHERE  job_id =
                (SELECT job_id
                 FROM   employees
                 WHERE  last_name = 'Chen')
AND    salary >
                (SELECT salary
                 FROM   employees
                 WHERE  last_name = 'Chen');
```

```
All Rows Fetched: 1 in 0.041 seconds

   LAST_NAME   JOB_ID       SALARY
1  Faviet      FI_ACCOUNT     9000
```

Using Group Functions in a Subquery



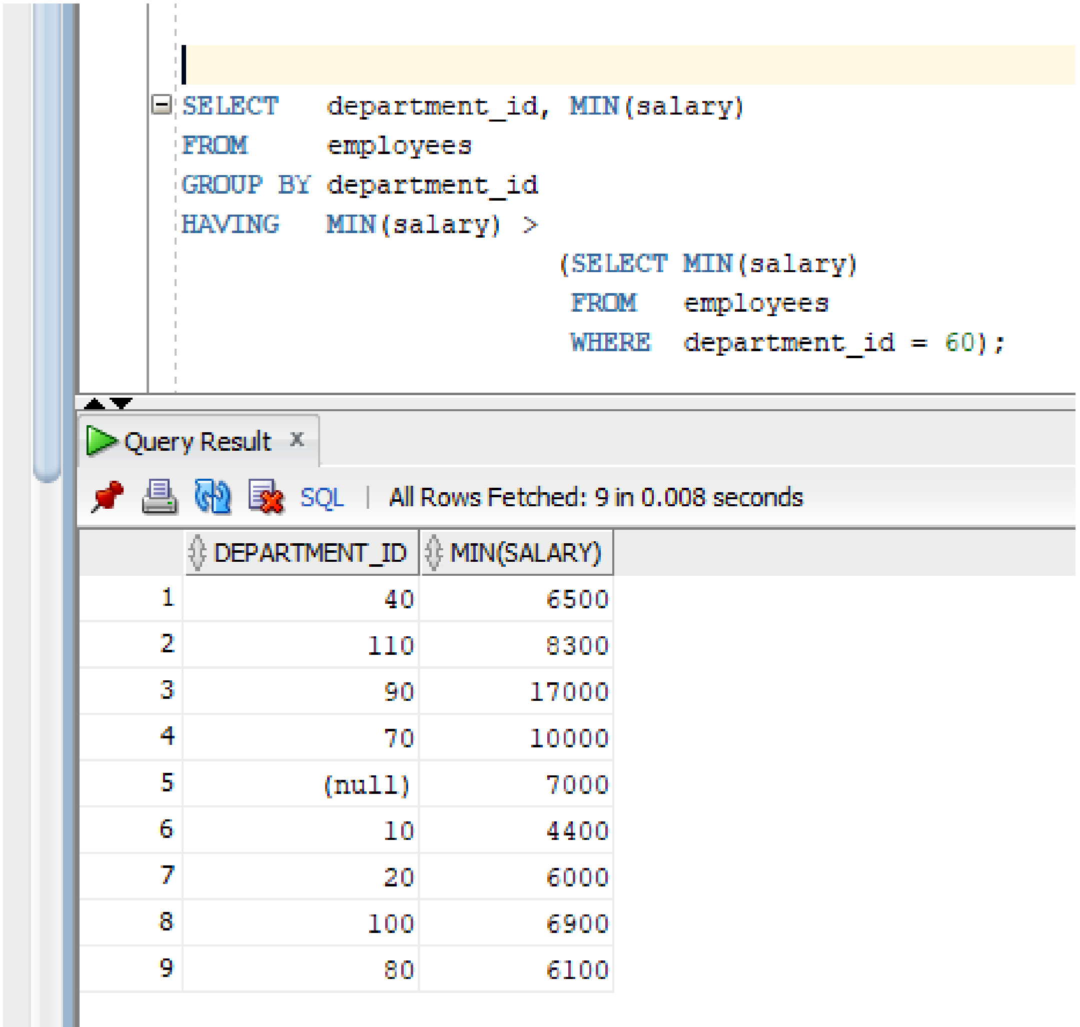
```
SELECT last_name, job_id, salary
FROM   employees
WHERE  salary =
                (SELECT MIN(salary)
                 FROM   employees);
```

```
All Rows Fetched: 1 in 0.008 seconds

  LAST_NAME  JOB_ID    SALARY
1 Olson      ST_CLERK    2100
```

The use of `HAVING` with Subqueries

- The Oracle executes the subqueries first.
- The Oracle returns results into the `HAVING` clause of the main query.



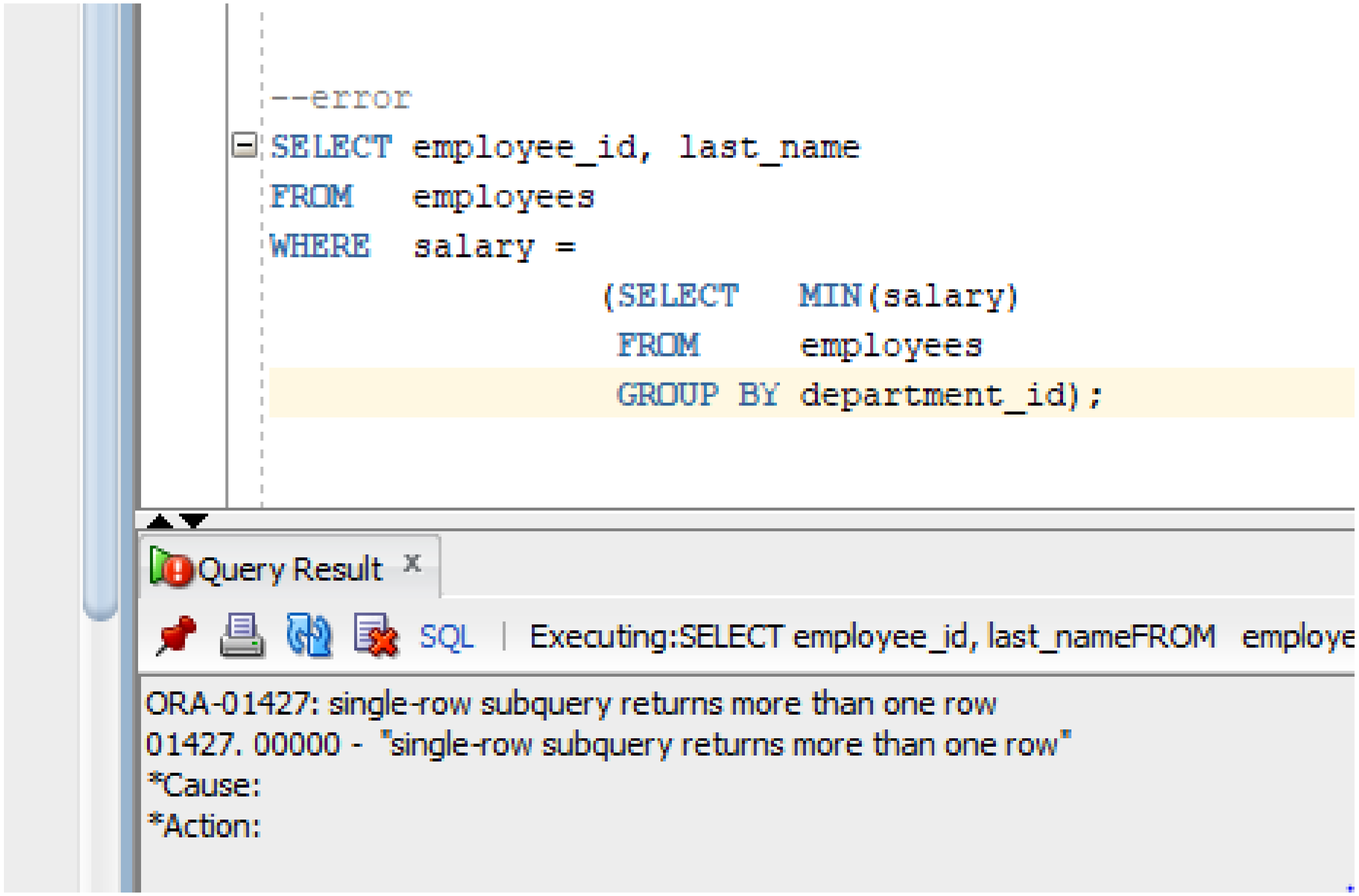
```
SELECT    department_id, MIN(salary)
FROM      employees
GROUP BY department_id
HAVING    MIN(salary) >
                         (SELECT MIN(salary)
                          FROM    employees
                          WHERE   department_id = 60);
```

Query Result

SQL | All Rows Fetched: 9 in 0.008 seconds

	DEPARTMENT_ID	MIN(SALARY)
1	40	6500
2	110	8300
3	90	17000
4	70	10000
5	(null)	7000
6	10	4400
7	20	6000
8	100	6900
9	80	6100

What Is Wrong with This Statement?

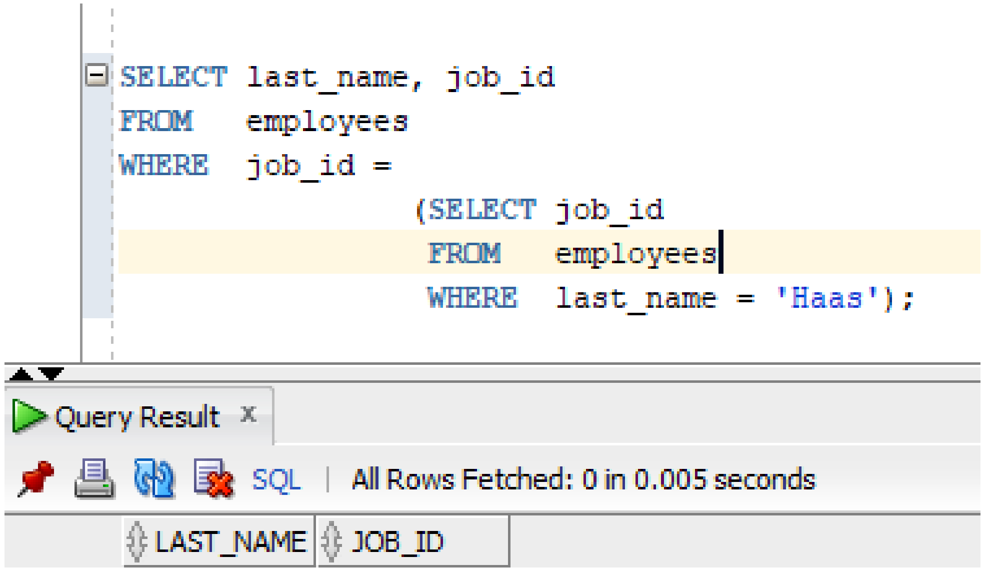


```
--error
SELECT employee_id, last_name
FROM   employees
WHERE  salary =
                 (SELECT   MIN(salary)
                  FROM     employees
                  GROUP BY department_id);
```

```
Executing:SELECT employee_id, last_nameFROM   employe
```

```
ORA-01427: single-row subquery returns more than one row
01427. 00000 -  "single-row subquery returns more than one row"
*Cause:
*Action:
```

No Rows Returned by the Inner Query



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

```
All Rows Fetched: 0 in 0.005 seconds

LAST_NAME  JOB_ID
```

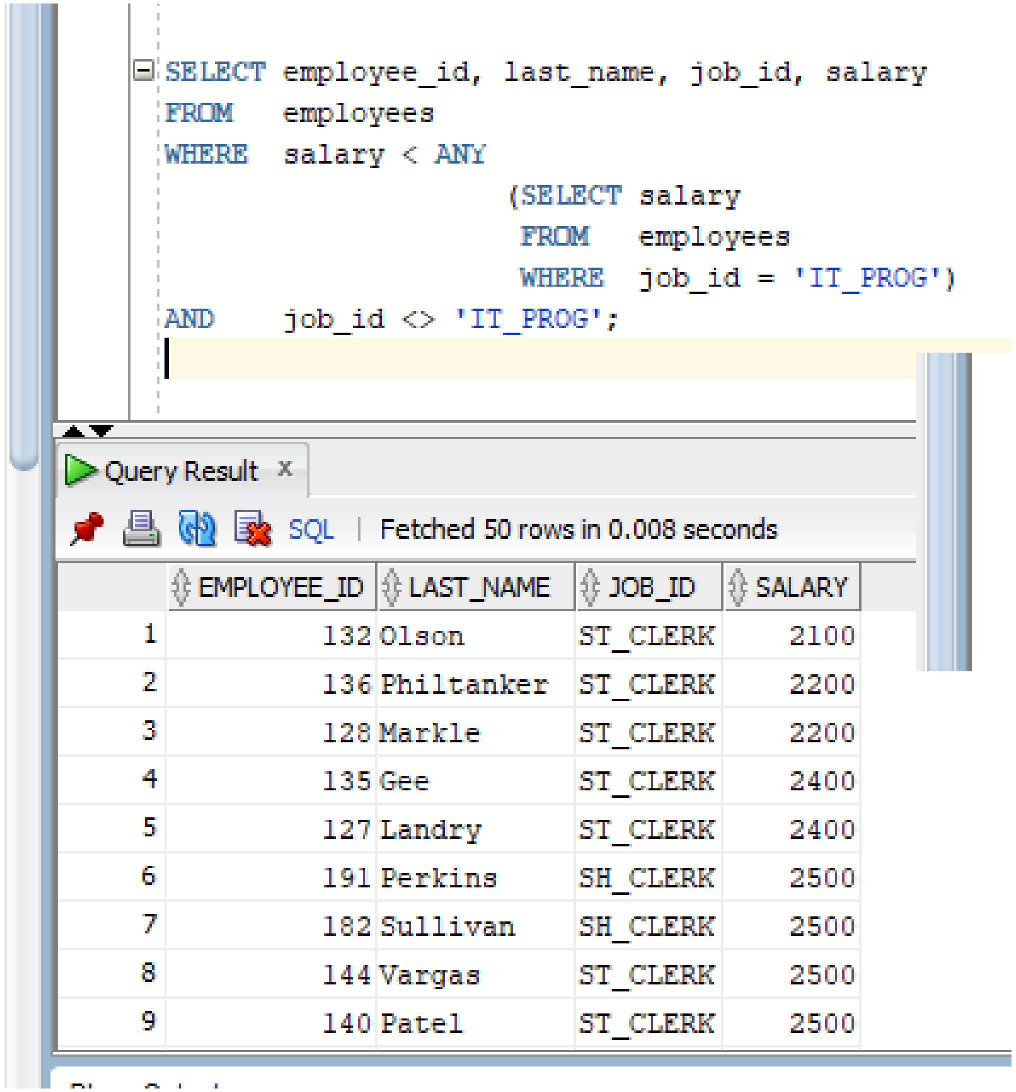
Subquery returns no rows because there is no employee named “Haas.”

Multiple-Row Subqueries

- Return more than one row and use multiple-row comparison operators

Operator	Meaning
`IN`	Equal to any member in the list
`ANY`	Must be preceded by `=`, `!=`, `>`, `<`, `<=`, `>=`. Compares a value to each value in a list or returned by a query. Evaluates to `FALSE` if the query returns no rows.
`ALL`	Must be preceded by `=`, `!=`, `>`, `<`, `<=`, `>=`. Compares a value to every value in a list or returned by a query. Evaluates to `TRUE` if the query returns no rows.

Using the ANY Operator in Multiple-Row Subqueries

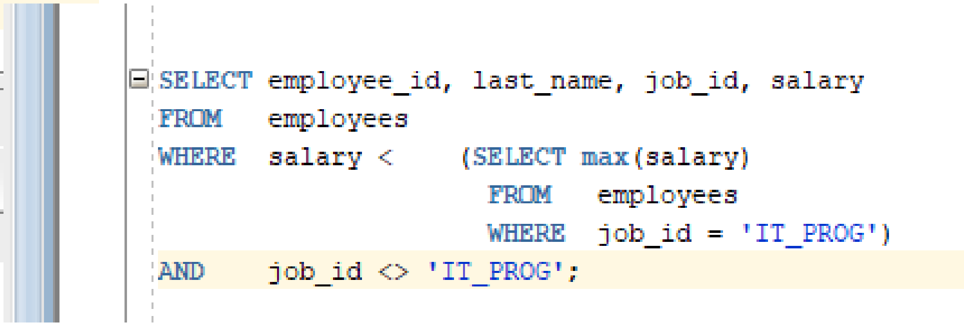


```
SELECT employee_id, last_name, job_id, salary
FROM   employees
WHERE  salary < ANY
                    (SELECT salary
                     FROM   employees
                     WHERE  job_id = 'IT_PROG')
AND    job_id <> 'IT_PROG';
```

Query Result

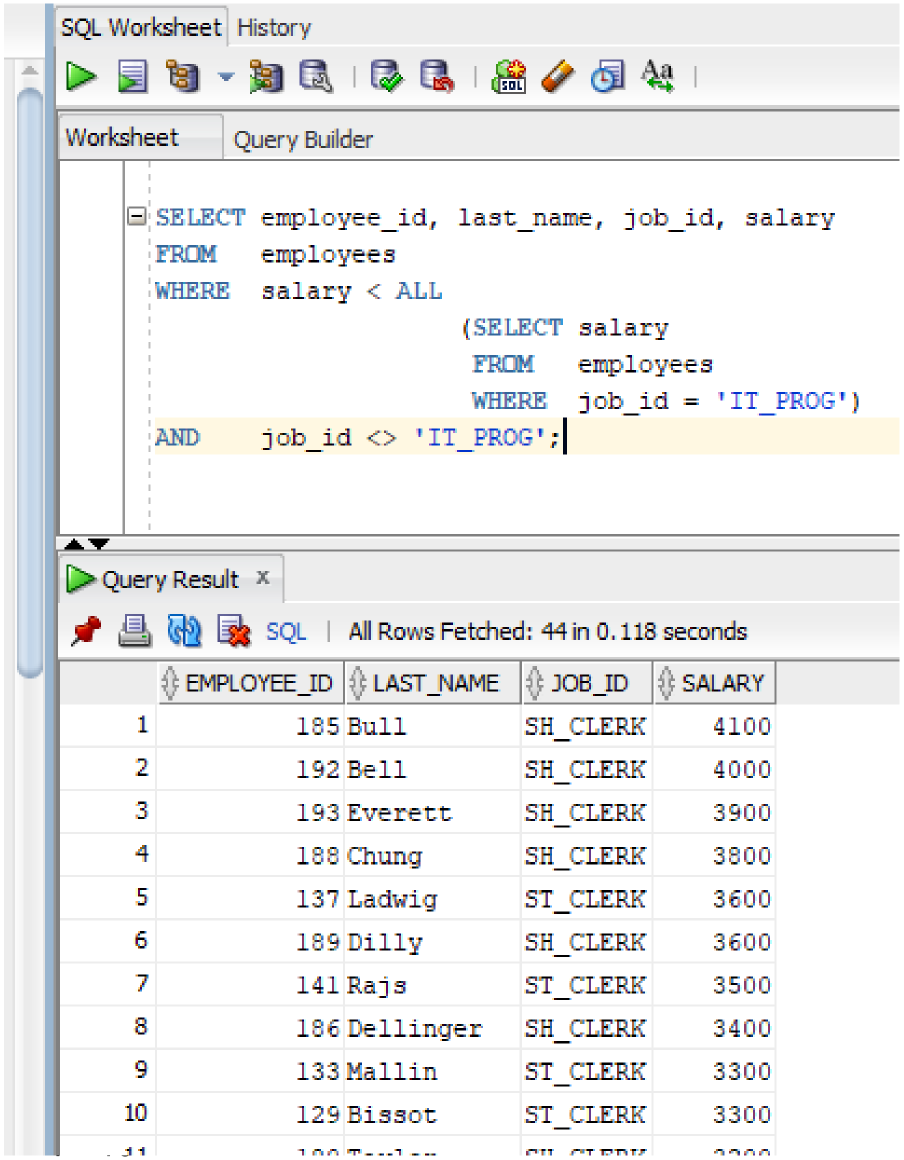
SQL | Fetched 50 rows in 0.008 seconds

	EMPLOYEE_ID	LAST_NAME	JOB_ID	SALARY
1	132	Olson	ST_CLERK	2100
2	136	Philtanker	ST_CLERK	2200
3	128	Markle	ST_CLERK	2200
4	135	Gee	ST_CLERK	2400
5	127	Landry	ST_CLERK	2400
6	191	Perkins	SH_CLERK	2500
7	182	Sullivan	SH_CLERK	2500
8	144	Vargas	ST_CLERK	2500
9	140	Patel	ST_CLERK	2500



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

Using the `ALL` Operator in Multiple-Row Subqueries



SQL Worksheet | History

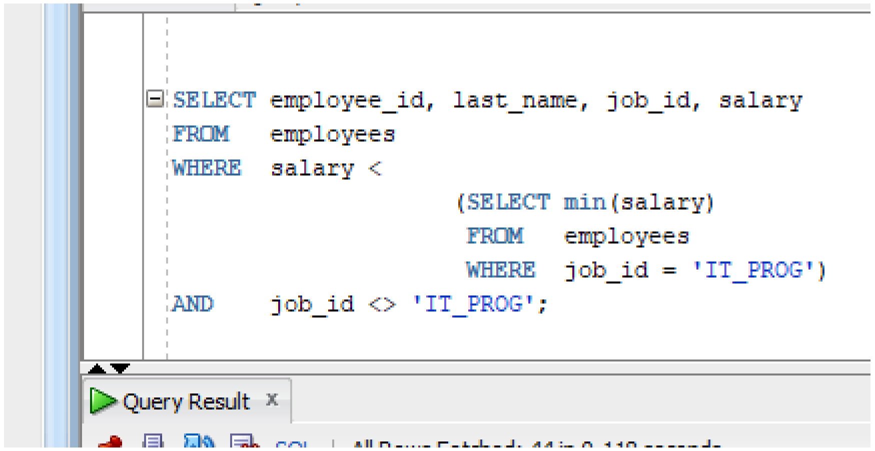
Worksheet | Query Builder

```sql
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';
```

Query Result

SQL | All Rows Fetched: 44 in 0.118 seconds

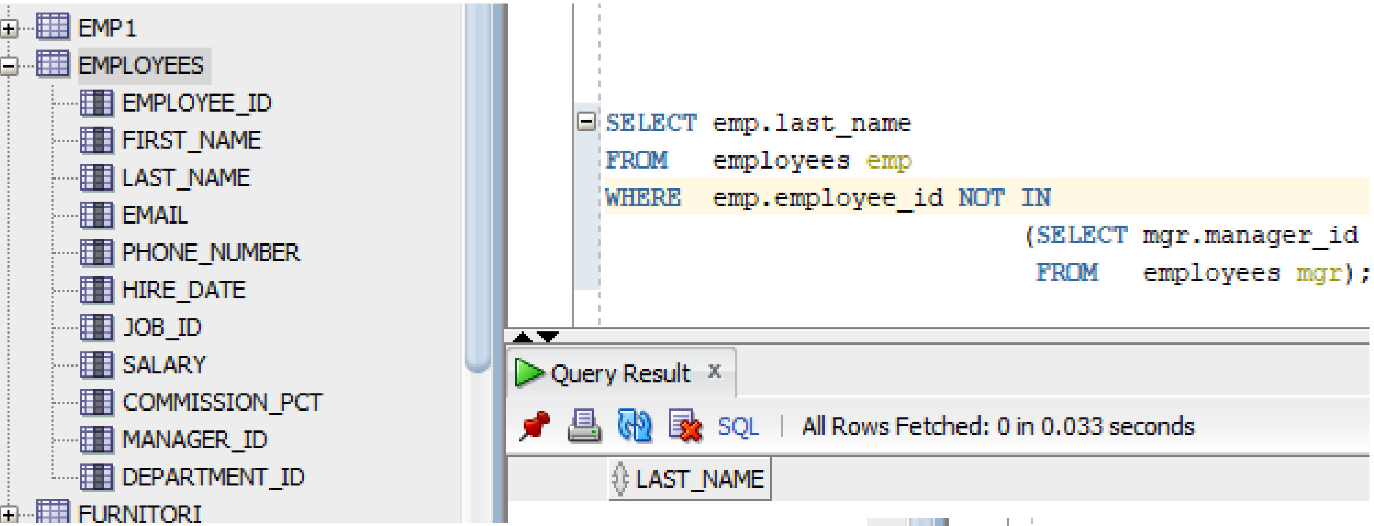
	EMPLOYEE_ID	LAST_NAME	JOB_ID	SALARY
1	185	Bull	SH_CLERK	4100
2	192	Bell	SH_CLERK	4000
3	193	Everett	SH_CLERK	3900
4	188	Chung	SH_CLERK	3800
5	137	Ladwig	ST_CLERK	3600
6	189	Dilly	SH_CLERK	3600
7	141	Rajs	ST_CLERK	3500
8	186	Dellinger	SH_CLERK	3400
9	133	Mallin	ST_CLERK	3300
10	129	Bissot	ST_CLERK	3300



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

Query Result

Null Values in a Subquery



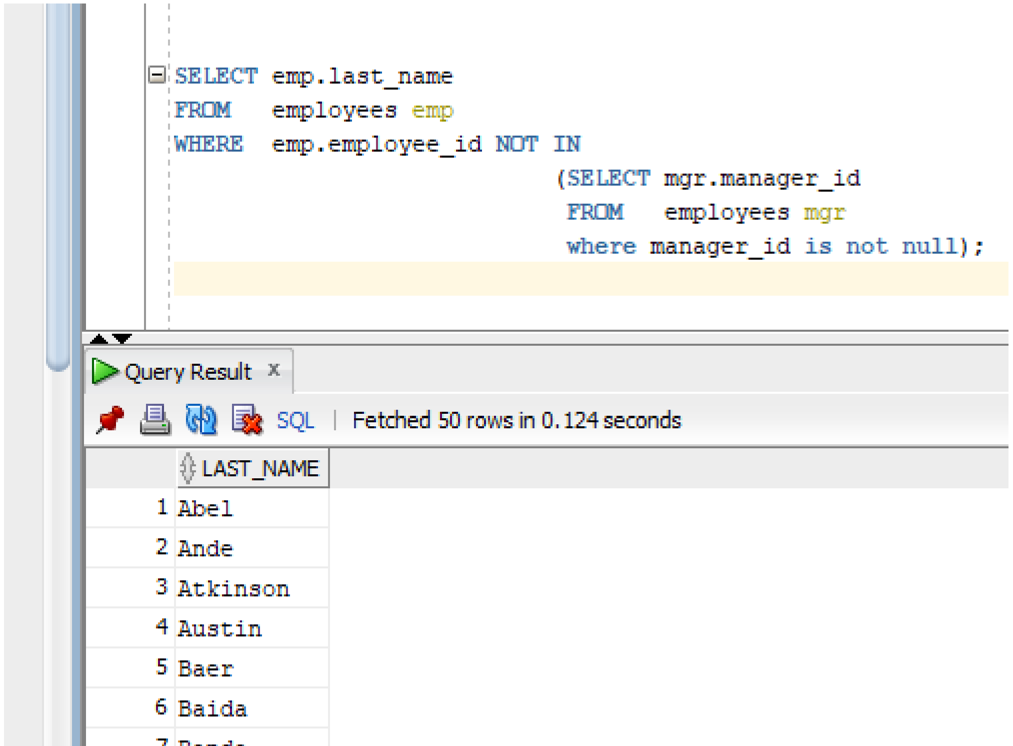
EMP1
EMPLOYEES
EMPLOYEE_ID
FIRST_NAME
LAST_NAME
EMAIL
PHONE_NUMBER
HIRE_DATE
JOB_ID
SALARY
COMMISSION_PCT
MANAGER_ID
DEPARTMENT_ID
FURNITORI

```
SELECT emp.last_name
FROM   employees emp
WHERE  emp.employee_id NOT IN
                             (SELECT mgr.manager_id
                              FROM   employees mgr);
```

Query Result

SQL | All Rows Fetched: 0 in 0.033 seconds

```
LAST_NAME
```



```
SELECT emp.last_name
FROM   employees emp
WHERE  emp.employee_id NOT IN
                             (SELECT mgr.manager_id
                              FROM   employees mgr
                              where manager_id is not null);
```

Query Result

SQL | Fetched 50 rows in 0.124 seconds

```
  LAST_NAME
1 Abel
2 Ande
3 Atkinson
4 Austin
5 Baer
6 Baida
```

Summary

In this lesson, you should have learned how to:

- Identify situations where a subquery is useful for solving a problem
- Understand how to write subqueries when query conditions depend on unknown values
- Apply subqueries to break complex queries into clearer, logical steps

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