Oracle 11g - SQL

Using Sub queries & Set Operator

Objectives

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

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

Using a Subquery to Solve a Problem

Who has a salary greater than Abel's?

Main query:

Which employees have salaries greater than Abel's salary?

Subquery:

What is Abel's salary?

Subquery Syntax

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

- The subquery (inner query) executes once before the main query (outer 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 = 'Abel');
```

11000

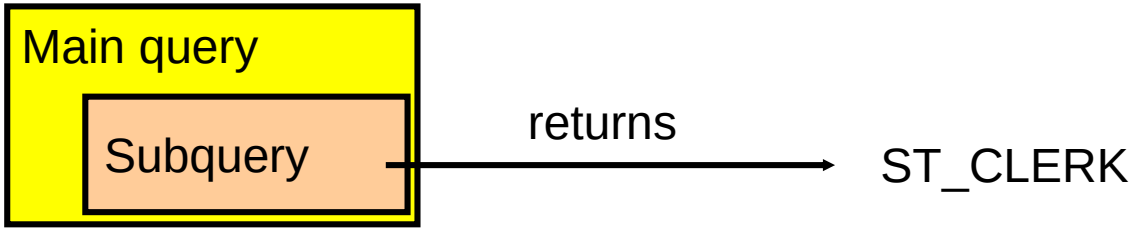
	LAST_NAME	SALARY
1	Hartstein	13000
2	Higgins	12000
3	King	24000
4	Kochhar	17000
5	De Haan	17000

Guidelines for Using Subqueries

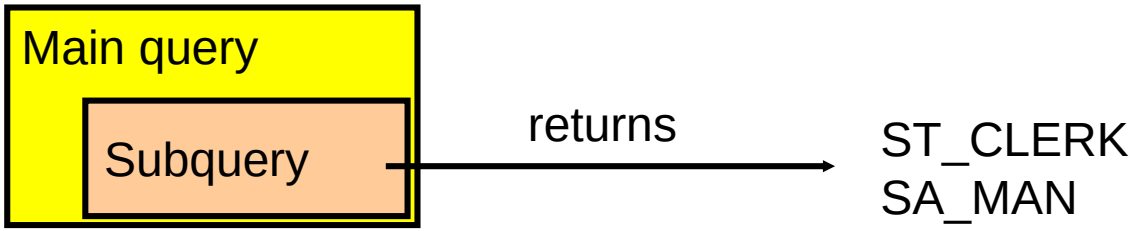
- Enclose subqueries in parentheses.
- Place subqueries on the right side of the comparison condition.
- The `ORDER BY` clause in the subquery is not needed unless you are performing Top-N analysis.
- Use single-row operators with single-row subqueries, and use multiple-row operators with multiple-row subqueries.

Types of Subqueries

- Single-row subquery



- Multiple-row subquery



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

Executing Single-Row Subqueries

```
SELECT last_name, job_id, salary
FROM   employees
WHERE  job_id =
               (SELECT job_id
                FROM   employees
                WHERE  employee_id = 141)
AND    salary >
               (SELECT salary
                FROM   employees
                WHERE  employee_id = 143);
```

ST_CLERK

2600

	LAST_NAME	JOB_ID	SALARY
1	Rajs	ST_CLERK	3500
2	Davies	ST_CLERK	3100

Using Group Functions in a Subquery

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

2500

	LAST_NAME	JOB_ID	SALARY
1	Vargas	ST_CLERK	2500

The HAVING Clause with Subqueries

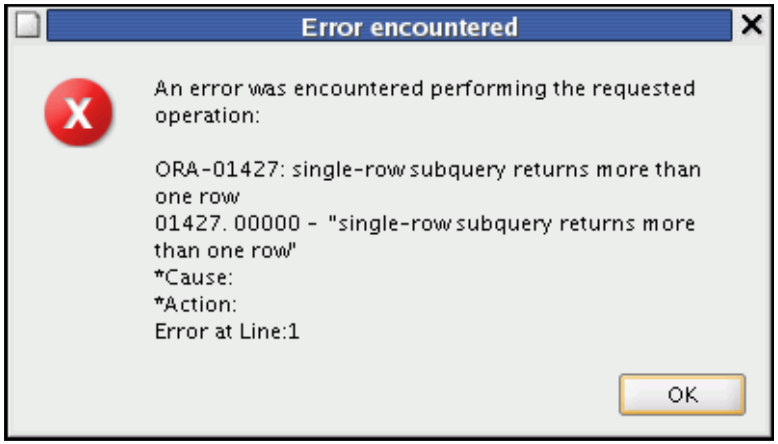
- The Oracle server executes subqueries first.
- The Oracle server returns results into the HAVING clause of the main query.

```
SELECT   department_id, MIN(salary)
FROM     employees
GROUP BY department_id
HAVING   MIN(salary) >
                        (SELECT MIN(salary)
                         FROM   employees
                         WHERE  department_id = 50);
```

2500

What Is Wrong with This Statement?

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



Single-row operator with multiple-row subquery

Will This Statement Return Rows?

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

0 rows selected
```

Subquery returns no values.

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

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';
```

9000, 6000, 4200

	EMPLOYEE_ID	LAST_NAME	JOB_ID	SALARY
1	144	Vargas	ST_CLERK	2500
2	143	Matos	ST_CLERK	2600

...

9	206	Gietz	AC_ACCOUNT	8300
10	176	Taylor	SA_REP	8600

Using the ALL Operator in Multiple-Row Subqueries

```
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';
```

9000, 6000, 4200

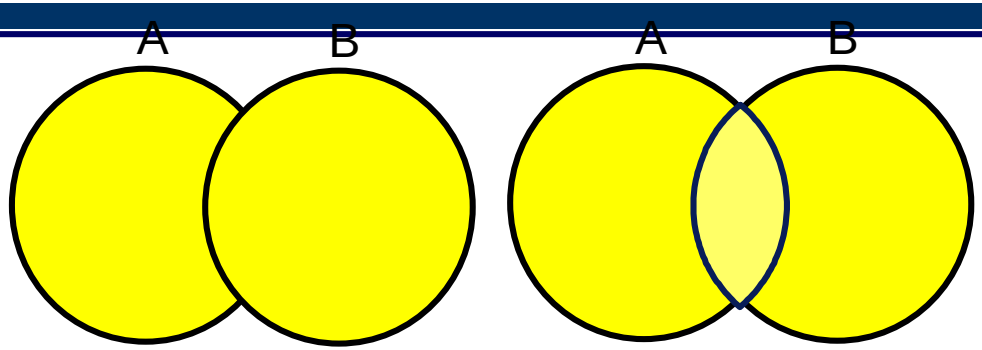
	EMPLOYEE_ID	LAST_NAME	JOB_ID	SALARY
1	141	Rajs	ST_CLERK	3500
2	142	Davies	ST_CLERK	3100
3	143	Matos	ST_CLERK	2600
4	144	Vargas	ST_CLERK	2500

Objectives

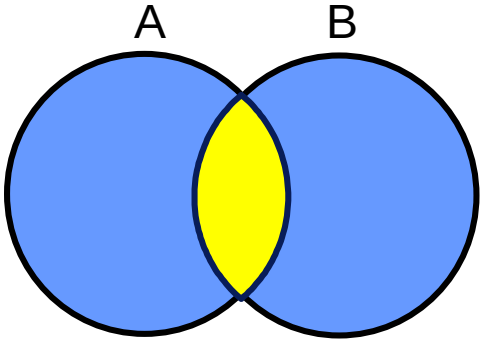
After completing this lesson, you should be able to do the following:

- Describe set operators
- Use a set operator to combine multiple queries into a single query
- Control the order of rows returned

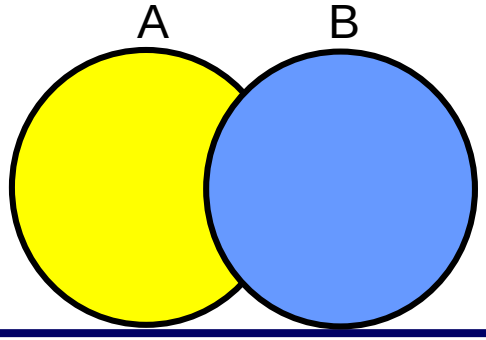
Set Operators



UNION/UNION ALL



INTERSECT



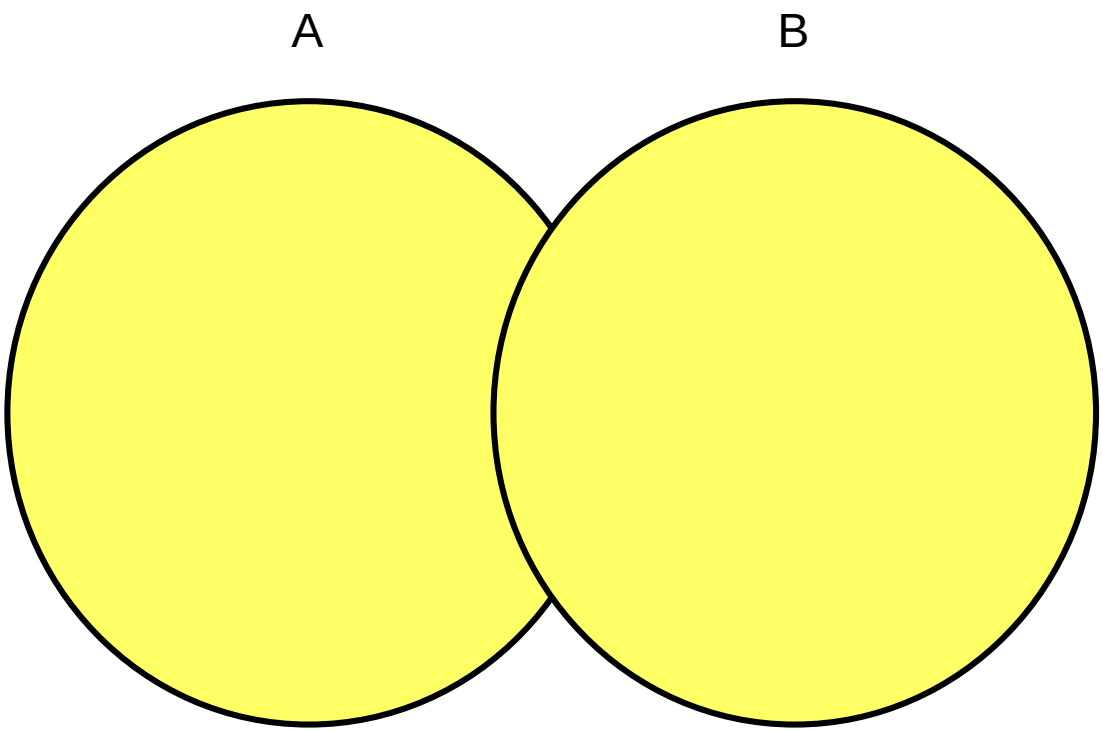
MINUS

Tables Used in This Lesson

The tables used in this lesson are:

- `EMPLOYEES`: Provides details regarding all current employees
- `JOB_HISTORY`: Records the details of the start date and end date of the former job, and the job identification number and department when an employee switches jobs

UNION Operator



The UNION operator returns results from both queries after eliminating duplications.

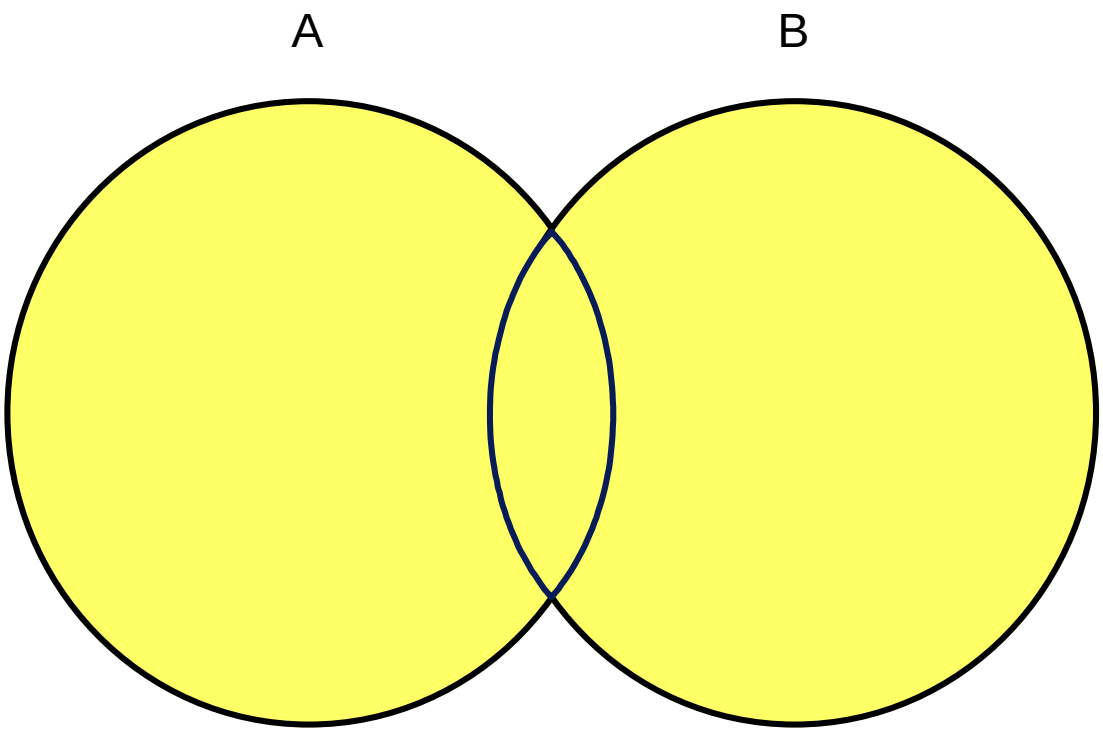
Using the UNION Operator

Display the current and previous job details of all employees. Display each combination only once.

```
SELECT employee_id, job_id
FROM   employees
UNION
SELECT employee_id, job_id
FROM   job_history;
```

	EMPLOYEE_ID	JOB_ID
1	100	AD_PRES
2	101	AC_ACCOUNT
...		
22	200	AC_ACCOUNT
23	200	AD_ASST
...		
28	206	AC_ACCOUNT

UNION ALL Operator



The UNION ALL operator returns results from both queries, including all duplications.

Using the UNION ALL Operator

Display the current and previous departments of all employees.

```
SELECT employee_id, job_id, department_id
FROM   employees
UNION ALL
SELECT employee_id, job_id, department_id
FROM   job_history
ORDER BY  employee_id;
```

	EMPLOYEE_ID	JOB_ID	DEPARTMENT_ID
1	100	AD_PRES	90
2	101	AD_VP	90

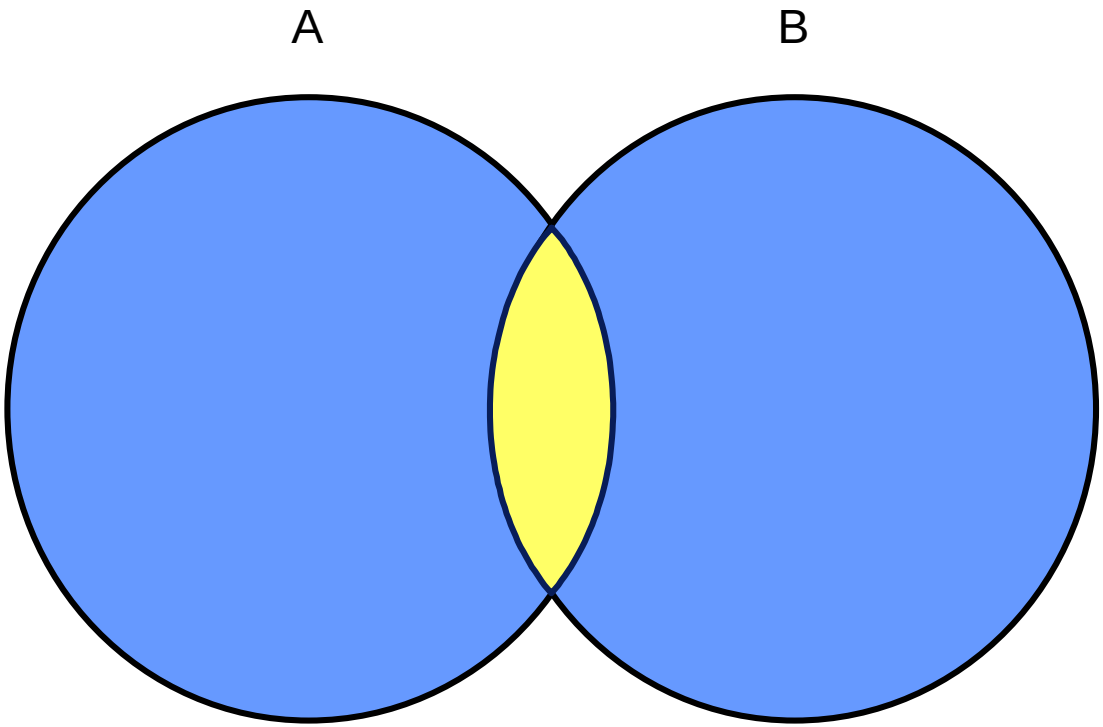
...

23	200	AD_ASST	10
24	200	AC_ACCOUNT	90
25	200	AD_ASST	90

...

30	206	AC_ACCOUNT	110

INTERSECT Operator



The INTERSECT operator returns rows that are common to both queries.

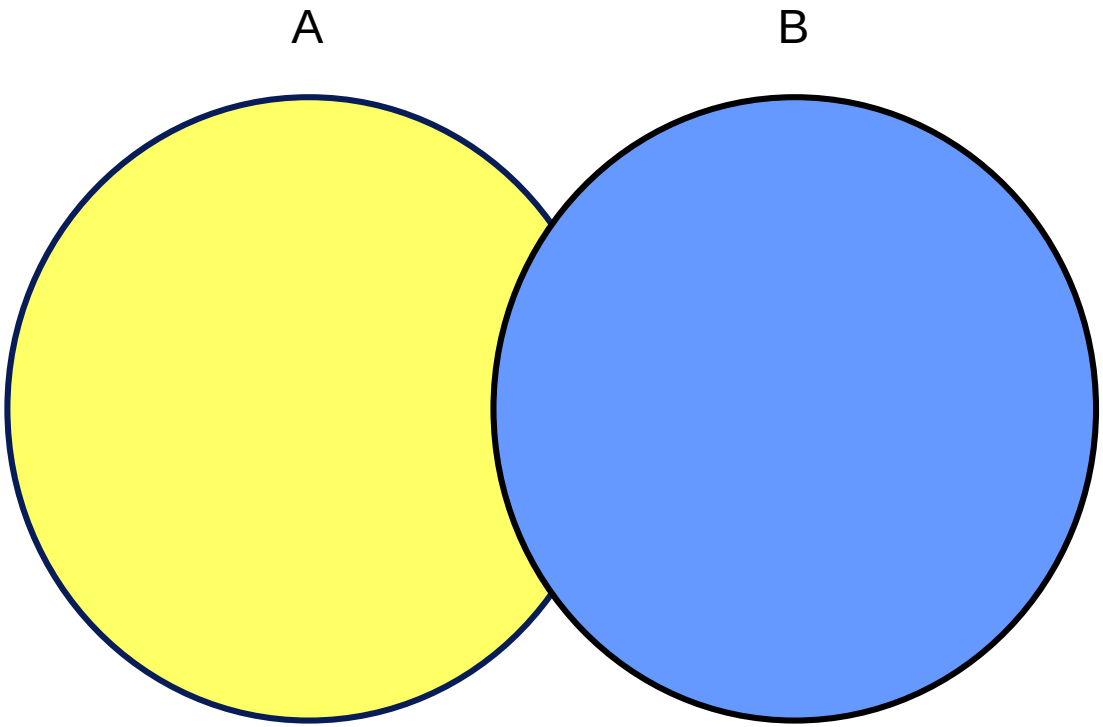
Using the INTERSECT Operator

Display the employee IDs and job IDs of those employees who currently have a job title that is the same as a previous job title.

```
SELECT employee_id, job_id
FROM   employees
INTERSECT
SELECT employee_id, job_id
FROM   job_history;
```

	EMPLOYEE_ID	JOB_ID
1	176	SA_REP
2	200	AD_ASST

MINUS Operator



The MINUS operator returns rows in the first query that are not present in the second query.

MINUS Operator

Display the employee IDs of those employees who have not changed their jobs even once.

```
SELECT employee_id
FROM   employees
MINUS
SELECT employee_id
FROM   job_history;
```

	EMPLOYEE_ID
1	100
2	103
3	104

...

14	205
15	206

Set Operator Guidelines

- The expressions in the `SELECT` lists must match in number and data type.
- Parentheses can be used to alter the sequence of execution.
- The `ORDER BY` clause:
  - Can appear only at the very end of the statement
  - Will accept the column name, aliases from the first `SELECT` statement, or the positional notation

Oracle Server and Set Operators

- Duplicate rows are automatically eliminated except in `UNION ALL`.
- Column names from the first query appear in the result.
- The output is sorted in ascending order by default except in `UNION ALL`.

Matching the SELECT Statements

Using the UNION operator, display the department ID, location, and hire date for all employees.

```
SELECT department_id, TO_NUMBER(null)
       location, hire_date
FROM   employees
UNION
SELECT department_id, location_id,  TO_DATE(null)
FROM   departments;
```

	DEPARTMENT_ID	LOCATION	HIRE_DATE
1	10	1700	(null)
2	10	(null)	17-SEP-87
3	20	1800	(null)

...

26	190	1700	(null)
27	(null)	(null)	24-MAY-99

Matching the SELECT Statement: Example

Using the UNION operator, display the employee ID, job ID, and salary of all employees.

```
SELECT employee_id, job_id,salary
FROM   employees
UNION
SELECT employee_id, job_id,0
FROM   job_history;
```

	EMPLOYEE_ID	JOB_ID	SALARY
1	100	AD_PRES	24000
2	101	AC_ACCOUNT	0
3	101	AC_MGR	0

...

29	205	AC_MGR	12000
30	206	AC_ACCOUNT	8300