



**IBM** Information Management software

## Using Subqueries



# Unit Objectives

After completing this unit, you should be able to:

- Use subqueries in WHERE and HAVING clauses
- Code subqueries using basic predicates
- Code subqueries using IN

# Result Using Separate Selects

Whose salary is higher than the average salary?



First Select:

```
SELECT  
FROM
```

```
AVG(SALARY)  
EMPLOYEE
```



27303

Second Select:


```
SELECT  
FROM  
WHERE
```

```
EMPNO, LASTNAME  
EMPLOYEE  
SALARY > 27303
```

# Same Result Using a Subquery

```
SELECT  EMPNO, LASTNAME
FROM    EMPLOYEE
WHERE   SALARY > (SELECT AVG(SALARY)
                  FROM    EMPLOYEE)
```

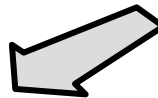
# Subquery with Basic Predicates



Who earned the lowest bonus?

| EMPNO  | LASTNAME | BONUS |
|--------|----------|-------|
| 000010 | HAAS     | 1000  |
| 000070 | PULASKI  | 700   |
| 000290 | PARKER   | 300   |

```
SELECT EMPNO, LASTNAME, BONUS
FROM EMPLOYEE
WHERE BONUS = (SELECT MIN (BONUS)
               FROM EMPLOYEE)
```



| EMPNO  | LASTNAME | BONUS |
|--------|----------|-------|
| 000290 | PARKER   | 300   |

# Subquery Using IN

List the names and employee numbers of employees who are managers of a department



```
SELECT FIRSTNME, LASTNAME, EMPNO
FROM EMPLOYEE
WHERE EMPNO IN (SELECT MGRNO
                FROM DEPARTMENT)
```

Final result

| FIRSTNME  | LASTNAME      | EMPNO  |
|-----------|---------------|--------|
| CHRISTINE | HAAS          | 000010 |
| MICHAEL   | THOMPSON      | 000020 |
| SALLY     | KWAN          | 000030 |
| JOHN      | GEYER         | 000050 |
| IRVING    | STERN         | 000060 |
| EVA       | PULASKI       | 000070 |
| EILEEN    | HENDERSE<br>N | 000090 |
| THEODORE  | SPENSER       | 000100 |

Result of subquery

|        |
|--------|
| 000010 |
| 000020 |
| 000030 |
| 000050 |
| 000060 |
| 000070 |
| 000090 |
| 000100 |
| -      |

# Variations on Predicates

```
SELECT  EMPNO, LASTNAME, WORKDEPT, JOB
FROM    EMPLOYEE
WHERE   (WORKDEPT, JOB) = ('D21', 'CLERK')
```

| <u>EMPNO</u> | <u>LASTNAME</u> | <u>WORKDEPT</u> | <u>JOB</u> |
|--------------|-----------------|-----------------|------------|
| 000230       | JEFFERSON       | D21             | CLERK      |
| 000240       | MARINO          | D21             | CLERK      |
| 000250       | SMITH           | D21             | CLERK      |
| 000260       | JOHNSON         | D21             | CLERK      |
| 000270       | PEREZ           | D21             | CLERK      |

# Subquery Using IN

List the people in Smith's department that have the same job as Smith



```
SELECT FIRSTNAME, LASTNAME,  
       WORKDEPT, JOB  
FROM EMPLOYEE  
WHERE (WORKDEPT, JOB) IN  
      (SELECT WORKDEPT, JOB  
       FROM EMPLOYEE  
       WHERE LASTNAME = 'SMITH')
```

| <u>FIRSTNAME</u> | <u>LASTNAME</u> | <u>WORKDEPT</u> | <u>JOB</u> |
|------------------|-----------------|-----------------|------------|
| JAMES            | JEFFERSON       | D21             | CLERK      |
| SALVATORE        | MARINO          | D21             | CLERK      |
| DANIEL           | SMITH           | D21             | CLERK      |
| SYBIL            | JOHNSON         | D21             | CLERK      |
| MARIA            | PEREZ           | D21             | CLERK      |
| ETHEL            | SCHNEIDER       | E11             | OPERATOR   |
| JOHN             | PARKER          | E11             | OPERATOR   |
| PHILIP           | SMITH           | E11             | OPERATOR   |
| MAUDE            | SETRIGHT        | E11             | OPERATOR   |



# Subquery Using NOT IN

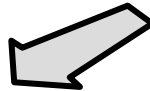
Which departments do not have projects assigned to them?



DEPARTMENT Table

| <u>DEPTNO</u> | <u>DEPTNAME</u>         |
|---------------|-------------------------|
| A00           | SPIFFY COMPUTER SERVICE |
| B01           | PLANNING                |
| C01           | INFORMATION CENTER      |
| ...           | ...                     |

```
SELECT DEPTNO, DEPTNAME
FROM DEPARTMENT
WHERE DEPTNO NOT IN (SELECT DEPTNO
FROM PROJECT
WHERE DEPTNO IS NOT NULL)
```



Final Result

| DEPTNO | DEPTNAME                |
|--------|-------------------------|
| A00    | SPIFFY COMPUTER SERVICE |

Result of Subquery

B01  
C01  
D01  
D11  
D21  
E01  
E11  
E21

# Subquery within HAVING Clause

I need a list of the departments whose average salary for non-managers is higher than the company-wide average for non-managers. The department with the highest average should be listed first.



```
SELECT  WORKDEPT, AVG(SALARY) AS AVG_WORKDEPT
FROM    EMPLOYEE
WHERE   JOB <> 'MANAGER'
GROUP BY WORKDEPT
HAVING  AVG(SALARY) > (SELECT AVG(SALARY)
                        FROM EMPLOYEE
                        WHERE JOB <> 'MANAGER')
ORDER BY AVG_WORKDEPT DESC
```

Final Result

| WORKDEPT | AVG_WORKDEPT   |
|----------|----------------|
| A00      | 42833.33333333 |
| C01      | 26110.00000000 |

Result of Subquery

25188.80000000

# Restrictions/Reminders



## Subqueries

- Must be on right side of search condition when used
- in WHERE clause or in HAVING clause
- Must be enclosed in parentheses
- Can return single or multiple values
- Number of values subquery can return must be compatible with operator in outer SELECT
- The subquery must return the same number of items as in the list to which it is compared

# Checkpoint



1. True or False? Subqueries can be used in WHERE or HAVING clauses of a SELECT.
2. If you want to list the employees whose salary is the highest, the outer query's WHERE clause may be coded:
  - a. `WHERE SALARY > (SELECT SALARY FROM EMPLOYEE..)`
  - b. `WHERE SALARY = (SELECT MAX(SALARY) FROM EMPLOYEE..)`
  - c. `WHERE SALARY > ALL (SELECT SALARY FROM EMPLOYEE..)`
3. What is the keyword taught in this topic that compares a single value to a set of values returned by a subquery, looking for a match?

# Checkpoint Solutions



1. True

2. b

3. IN

# Unit Summary



Having completed this unit, you should be able to:

- Use subqueries in WHERE and HAVING clauses
- Code subqueries using basic predicates
- Code subqueries using IN