10-1: Fundamentals of Subqueries

1. What is the purpose of using a subquery?

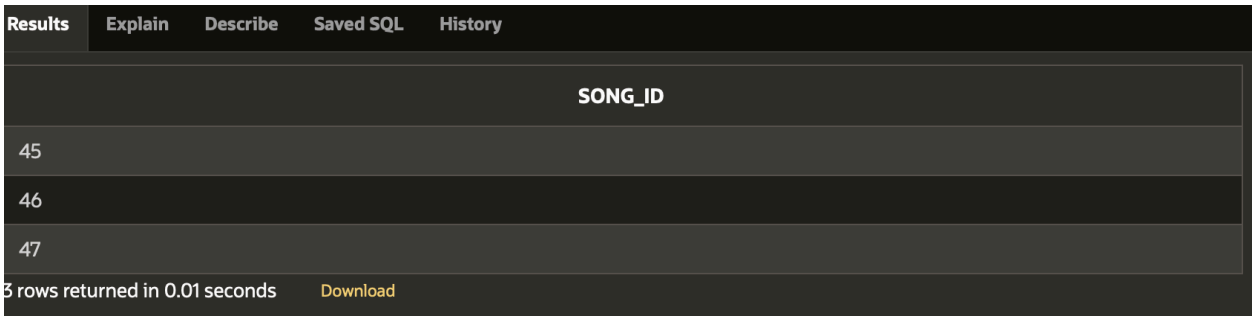
A subquery is used to retrieve data that will be used in the main query's condition, allowing you to filter or perform calculations based on another query. It helps you structure complex queries more easily by breaking down large problems into smaller, manageable ones.

2. What is a subquery?

A subquery is a query nested inside another query, typically in the WHERE, HAVING, or FROM clause. It allows for the extraction of results that can be used in the outer query's conditions or results.

3. What DJs on Demand d_play_list_items song_id's have the same event_id as song_id 45?

```
SELECT song_id
FROM d_play_list_items
WHERE event_id = (
   SELECT event_id
   FROM d_play_list_items
   WHERE song_id = 45);
```



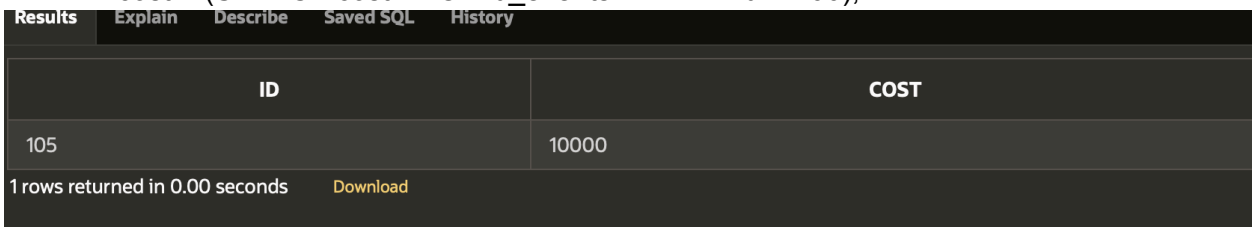
Results | Explain | Describe | Saved SQL | History

SONG_ID
45
46
47

3 rows returned in 0.01 seconds Download

4. Which events in the DJs on Demand database cost more than event_id = 100?

```
SELECT id, cost
FROM d_events
WHERE cost > (SELECT cost FROM d_events WHERE id = 100);
```



Results | Explain | Describe | Saved SQL | History

ID	COST
105	10000

1 rows returned in 0.00 seconds Download

5. Find the track number of the song that has the same CD number as "Party Music for All Occasions."

```
SELECT track
FROM d_track_listings
WHERE cd_number = (
   SELECT cd_number
   FROM d_cds
   WHERE title = 'Party Music for All Occasions'
);
```

Results | Explain | Describe | Saved SQL | History

TRACK
2
3

2 rows returned in 0.01 seconds Download

6. List the DJs on Demand events whose theme code is the same as the code for “Tropical.”

```
SELECT theme_code
FROM d_events
WHERE theme_code = (
    SELECT theme_code
    FROM d_themes
    WHERE description = 'Tropical'
);
```

Results | Explain | Describe | Saved SQL | History

THEME_CODE
200
200

2 rows returned in 0.01 seconds Download

7. What are the names of the Global Fast Foods staff members whose salaries are greater than the staff member whose ID is 12?

```
SELECT first_name,
       last_name
FROM f_staffs
WHERE salary > (
    SELECT salary
    FROM f_staffs
    WHERE id = 12
);
```

Results | Explain | Describe | Saved SQL | History

FIRST_NAME	LAST_NAME
Bob	Miller
Monique	Tuttle

2 rows returned in 0.01 seconds Download

8. What are the names of the Global Fast Foods staff members whose staff types are not the same as Bob Miller’s?

```sql
SELECT first_name,
       last_name
FROM f_staffs
WHERE staff_type != (
    SELECT staff_type
    FROM f_staffs
    WHERE first_name = 'Bob' AND last_name = 'Miller'
);
```

Results | Explain | Describe | Saved SQL | History

FIRST_NAME	LAST_NAME
Sue	Doe
Monique	Tuttle

2 rows returned in 0.01 seconds Download

9. Which Oracle employees have the same department ID as the IT department?

```sql
SELECT first_name,
       last_name
FROM employees
WHERE department_id = (
    SELECT department_id
    FROM departments
    WHERE department_name = 'IT'
);
```

Results | Explain | Describe | Saved SQL | History

FIRST_NAME	LAST_NAME
Alexander	Hunold
Bruce	Ernst
Diana	Lorentz
Chen	Li
Alain	Fontaine

5 rows returned in 0.00 seconds Download

10. What are the department names of the Oracle departments that have the same location ID as Seattle?

```sql
SELECT department_name
FROM departments
WHERE location_id = (
    SELECT location_id
    FROM locations
    WHERE city = 'Seattle'
);
```

Results | Explain | Describe | Saved SQL | History

DEPARTMENT_NAME
Administration
Executive
Accounting
Contracting

4 rows returned in 0.01 seconds Download

11. Indicate whether the statement regarding subqueries is True or False.

a. It is good programming practice to place a subquery on the right side of the comparison operator.
- TRUE

b. A subquery can reference a table that is not included in the outer query's FROM clause.
- FALSE

c. Single-row subqueries can return multiple values to the outer query.
- FALSE

10-2: Single-Row Subqueries

1. Write a query to return all those employees who have a salary greater than that of Lorentz and are in the same department as Abel.

```sql
SELECT first_name, last_name, salary, department_id
FROM employees
WHERE salary > (SELECT salary FROM employees WHERE last_name = 'Lorentz')
  AND department_id = (SELECT department_id FROM employees WHERE last_name = 'Abel');
```

Results | Explain | Describe | Saved SQL | History

FIRST_NAME	LAST_NAME	SALARY	DEPARTMENT_ID
Eleni	Zlotkey	10500	80
Ellen	Abel	11000	80
Jonathon	Taylor	8600	80
Nick	Hooper	9600	80

2. Write a query to return all those employees who have the same job id as Rajs and were hired after Davies.

```
SELECT first_name, last_name, job_id, hire_date
FROM employees
WHERE job_id = (SELECT job_id FROM employees WHERE last_name = 'Rajs')
  AND hire_date > (SELECT hire_date FROM employees WHERE last_name = 'Davies');
```

Results | Explain | Describe | Saved SQL | History

FIRST_NAME	LAST_NAME	JOB_ID	HIRE_DATE
Randall	Matos	ST_CLERK	15-Mar-2013
Peter	Vargas	ST_CLERK	09-Jul-2013
Tiffany	Heiden	ST_CLERK	06-Jul-2015

3. What DJs on Demand events have the same theme code as event ID = 100?

```
SELECT id, theme_code
FROM d_events
WHERE theme_code = (SELECT theme_code FROM d_events WHERE id = 100);
```

Results | Explain | Describe | Saved SQL | History

ID	THEME_CODE
100	200
105	200

4. What is the staff type for those Global Fast Foods jobs that have a salary less than those of any Cook staff-type jobs?

```
SELECT DISTINCT staff_type
FROM f_staffs
WHERE salary < (SELECT MIN(salary) FROM f_staffs WHERE staff_type = 'Cook');
```

Results | Explain | Describe | Saved SQL | History

STAFF_TYPE
Order Taker

5. Write a query to return a list of department id's and average salaries where the department's average salary is greater than Ernst's salary.

```
1  SELECT department_id, AVG(salary) AS average_salary
2  FROM employees
3  GROUP BY department_id
4  HAVING AVG(salary) > (SELECT salary FROM employees WHERE last_name = 'Ernst');
```

Results | Explain | Describe | Saved SQL | History

DEPARTMENT_ID	AVERAGE_SALARY
110	7800
85	7900
90	19333.333333333333333333333333333333333
-	7000
20	6157.142857142857142857142857142857142857
60	7000
80	9925

6. Return the department ID and minimum salary of all employees, grouped by department ID, having a minimum salary greater than the minimum salary of those employees whose department ID is not equal to 50.

```
1  SELECT department_id, MIN(salary) AS min_salary
2  FROM employees
3  GROUP BY department_id
4  HAVING MIN(salary) > (SELECT MIN(salary) FROM employees WHERE department_id != 50);
```

Results | Explain | Describe | Saved SQL | History

DEPARTMENT_ID	MIN_SALARY
110	5200
85	7300
90	17000
10	4100
-	7000
60	4200
80	8600

10-3: Multiple-Row Subqueries

1. Which Global Fast Foods employee earns the lowest salary? Hint: You can use either a single-row or a multiple-row subquery.

```
1  SELECT first_name, last_name, salary
2  FROM f_staffs
3  WHERE salary = (SELECT MIN(salary) FROM f_staffs);
```

Results | Explain | Describe | Saved SQL | History

FIRST_NAME	LAST_NAME	SALARY
Sue	Doe	6.75

2. Place the correct multiple-row comparison operators in the outer query WHERE clause of each of the following:

a. Which CDs in our d_cds collection were produced before “Carpe Diem” was produced? WHERE year _____<_____ (SELECT year ...

b. Which employees have salaries lower than any one of the programmers in the IT department?

WHERE salary _____< ANY____(SELECT salary ...

c. What CD titles were produced in the same year as “Party Music for All Occasions” or “Carpe Diem”?

WHERE year _____IN____(SELECT year ...

d. What song title has a duration longer than every type code 77 title?

WHERE duration ____ALL_____(SELECT duration ...

6. If each WHERE clause is from the outer query, which of the following are true?

_X___a. WHERE size > ANY -- If the inner query returns sizes ranging from 8 to 12, the value 9 could be returned in the outer query.

____b. WHERE book_number IN -- If the inner query returns books numbered 102, 105, 437, and 225 then 325 could be returned in the outer query.

__X__c. WHERE score <= ALL -- If the inner query returns the scores 89, 98, 65, and 72, then 82 could be returned in the outer query.

__X__d. WHERE color NOT IN -- If the inner query returns red, green, blue, black, and then the outer query could return white.

_X___e. WHERE game_date = ANY -- If the inner query returns 05-Jun-1997, 10-Dec-2002, and 2-Jan-2004, then the outer query could return 10-Sep-2002.

7. The goal of the following query is to display the minimum salary for each department whose minimum salary is less than the lowest salary of the employees in department 50. However, the subquery does not execute because it has five errors. Find them, correct them, and run the query.

SELECT department_id

FROM employees

WHERE MIN(salary)

HAVING MIN(salary) >

GROUP BY department_id

SELECT MIN(salary)

WHERE department_id < 50;

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

DEPARTMENT_ID
110
85
90
10
-
20
60
80

8 rows returned in 0.00 seconds Download

8. Which statements are true about the subquery below?

SELECT employee_id, last_name

FROM employees

WHERE salary =

(SELECT MIN(salary)

FROM employees

GROUP BY department_id);

_____ a. The inner query could be eliminated simply by changing the WHERE clause to

WHERE MIN(salary).

____X__ b. The query wants the names of employees who make the same salary as the smallest

salary in any department.

____X__ c. The query first selects the employee ID and last name, and then compares that to the

salaries in every department.

_____ d. This query will not execute.

9. Write a pair-wise subquery listing the last_name, first_name, department_id, and manager_id for all employees that have the same department_ id and manager_id as employee 141. Exclude employee 141 from the result set.

```
SELECT last_name, first_name, department_id, manager_id
FROM employees
WHERE (department_id, manager_id) = (SELECT department_id, manager_id FROM
employees WHERE employee_id = 141)
AND employee_id != 141;
```

10. Write a non-pair-wise subquery listing the last_name, first_name, department_id, and manager_id for all employees that have the same department_ id and manager_id as employee 141.

```
SELECT last_name, first_name, department_id, manager_id
FROM employees
WHERE department_id = (SELECT department_id FROM employees WHERE employee_id =
141)
AND manager_id = (SELECT manager_id FROM employees WHERE employee_id = 141);
```

10-4: Correlated Subqueries

1. Explain the main difference between correlated and non-correlated subqueries?

Non-correlated subquery is a subquery that can be executed independently of the outer query. It does not reference any columns from the outer query.
Correlated subquery is a subquery that references one or more columns from the outer query. For each row processed by the outer query, the correlated subquery is executed. This type of subquery depends on the outer query and cannot be executed independently.

2. Write a query that lists the highest earners for each department. Include the last_name, department_id, and the salary for each employee.

```sql
SELECT last_name, department_id, salary
FROM employees e1
WHERE salary = (
    SELECT MAX(salary)
    FROM employees e2
    WHERE e1.department_id = e2.department_id
);
```

Results | Explain | Describe | Saved SQL | History

LAST_NAME	DEPARTMENT_ID	SALARY
Higgins	110	12000
King	90	24000
Saikawa	10	4400
Whalen	10	4400
Abel	80	11000
Barbosa Souza	85	9500
Hartstein	20	13000

3. Examine the following select statement and finish it so that it will return the last_name, department_id, and salary of employees who have at least one person reporting to them. So we are effectively looking for managers only. In the partially written SELECT statement, the WHERE clause will work as it is. It is simply testing for the existence of a row in the subquery.

SELECT (enter columns here)
FROM
(enter table name here) outer
WHERE 'x' IN (SELECT 'x'
FROM
(enter table name here) inner
WHERE inner(enter column name here) = inner(enter column name here)
Finish off the statement by sorting the rows on the department_id column

```sql
SELECT outer.last_name, outer.department_id, outer.salary
FROM employees outer
WHERE 'x' IN (
    SELECT 'x'
    FROM employees inner
    WHERE inner.manager_id = outer.employee_id
)
ORDER BY outer.department_id;
```

Results | Explain | Describe | Saved SQL | History

LAST_NAME	DEPARTMENT_ID	SALARY
Hartstein	20	13000
Mourgos	50	5800
Hunold	60	9000
Zlotkey	80	10500
King	90	24000
Kochhar	90	17000
De Haan	90	17000

4. Using a WITH clause, write a SELECT statement to list the job_title of those jobs whose maximum salary is more than half the maximum salary of the entire company. Name your subquery MAX_CALC_SAL. Name the columns in the result JOB_TITLE and JOB_TOTAL, and sort the result on JOB_TOTAL in descending order. Hint: Examine the jobs table. You will need to join JOBS and EMPLOYEES to display the job_title.

```sql
WITH MAX_CALC_SAL AS (
    SELECT j.job_id, MAX(e.salary) AS max_salary
    FROM jobs j JOIN employees e ON j.job_id = e.job_idGROUP BY j.job_id)
SELECT j.job_title AS JOB_TITLE, m.max_salary AS JOB_TOTAL
FROM MAX_CALC_SAL m
JOIN jobs j ON m.job_id = j.job_id
WHERE m.max_salary > (SELECT MAX(salary) / 2 FROM employees)
ORDER BY JOB_TOTAL DESC;
```

Results | Explain | Describe | Saved SQL | History

JOB_TITLE	JOB_TOTAL
President	24000
Administration Vice President	17000
Marketing Manager	13000