Autonomous University of Zacatecas

Academic Unit of Electrical Engineering

Academic Program of Software Engineering

Database Systems Laboratory II
Practice 14 -Using Set Operators to Solve Problems

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1 Introduction

SQL language allows the realization of projection and selection of data from several tables to satisfy the needs of reports that may be required for a programmer, developer or end user.

Set operations combine the results of two or more "select" queries into a single result. They are used when the data to be obtained belongs to different tables and cannot be accessed with a single query. The referenced tables are required to have similar data types, the same number of fields, and the same order of fields in the select list for each query.

There are this set operators in Oracle: UNION,UNION ALL,INTERSECT,and MINUS

2 Development

Activity 1

Read all the choices carefully because there might be more than one correct answer. Choose all the correct answers for each question. Explain the reason for your answer.

DESCRIBE THE SET OPERATORS

1. Which of these set operators will not sort the rows? (Choose the best answer.)

A. INTERSECT
B. MINUS
C. UNION
D. UNION ALL

Answer: D
In all the set operators the output is sorted by the first column, except in the UNION ALL

2. Which of these operators will remove duplicate rows from the final result? (Choose all that apply.))

A. INTERSECT
B. MINUS
C. UNION
D. UNION ALL

Answer: A,B,C
UNION ALL is the only one that accept duplicates, all the other set operators will remove the duplicates

USE A SET OPERATOR TO COMBINE MULTIPLE QUERIES INTO A SINGLE QUERY

3. If a compound query contains both a MINUS and an INTERSECT operator, which will be applied first? (Choose the best answer.)

A. The INTERSECT, because INTERSECT has higher precedence than MINUS.

B. The MINUS, because MINUS has a higher precedence than INTERSECT.

C. The precedence is determined by the order in which they are specified.

D. It is not possible for a compound query to include both MINUS and INTERSECT.

Answer: C

The precedence is determined by the order of the set operators but also we can use parentheses to change the precedence.

4. There are four rows in the REGIONS table. Consider the following statements and choose how many rows will be returned for each: 0, 4, 8, or 16.

A. select * from regions union select * from regions 4

B. select * from regions union all select * from regions 8

C. select * from regions minus select * from regions 0

D. select * from regions intersect select * from regions 4

Answer: A,B,C,D

There is a number next to each sentence, this number is correct because represent the number of rows returned by the select statements, all are correct, the sentences will return 4, 8, 0 and 4 respectively.

5. Consider this compound query: select empno, hired from emp union all select empid,hired,fired from exemp; The columns EMP.EMPNO and EXEMP.EMPID are integer; the column EMP.HIRED is timestamp; the columns EXEMP.HIRED and EXEMP.FIRED are date. Why will the statement fail? (Choose the best answer.)

A. Because the columns EMPNO and EMP$_IDhavedifferentnames$

B. Because the columns EMP.HIRED and EX$_EMP.HIREDarediffer entdatatypes$

C. Because there are two columns in the first query and three columns in the second query

D. For all the reasons above

E. The query will succeed

Answer: C

In the set operator guideline is specified that both tables must have the same number of columns in the set operator, it means that if you specified two columns in the first table, the second table also must has two columns.

CONTROL THE ORDER OF ROWS RETURNED

6. Which line of this statement will cause it to fail? (Choose the best answer.)

A. select ename, hired from currentstaff

B. order by ename

C. minus

D. select ename, hired from current staff

E. where deptno=10

F. order by ename;

Answer: B

When you are using SET OPERATORS it is important to know that the ORDER BY clause can be used but only one time and it must be placed in the final of the sentence.

7. Study this statement: select ename from emp union all select ename from exemp; In what order will the rows be returned? (Choose the best answer.)

A. The rows from each table will be grouped and within each group will be sorted on ENAME.
B. The rows from each table will be grouped but not sorted.
C. The rows will not be grouped but will all be sorted on ENAME.
D. The rows will be neither grouped nor sorted.

Answer: D
UNION ALL is the only one SET OPERATOR that do not sort the results of the operation, the SET OPERATORS do not group, SET OPERATOR just show results of the operation with the tables.

Activity 2:

Propose an answer to the following issues:

• How can you present several tables with similar data as one table?

You can use SET OPERATORS, the kind of operator depends of the needs of the problem, but the set operators presents data from several tables in one table result, you only need to specify the columns and be sure that the number of columns is equal and the data types are equals.

• Are there performance issues with compound queries?

It will be some problems when we need to show columns that do not match with the other table, we need to do some tricks to make it match and this depends of the developer and the problems needs, for example, if we have a table with a salary column and another table without salary column but we need to show the salary, we need to use a number to show in those records that do not have salary.

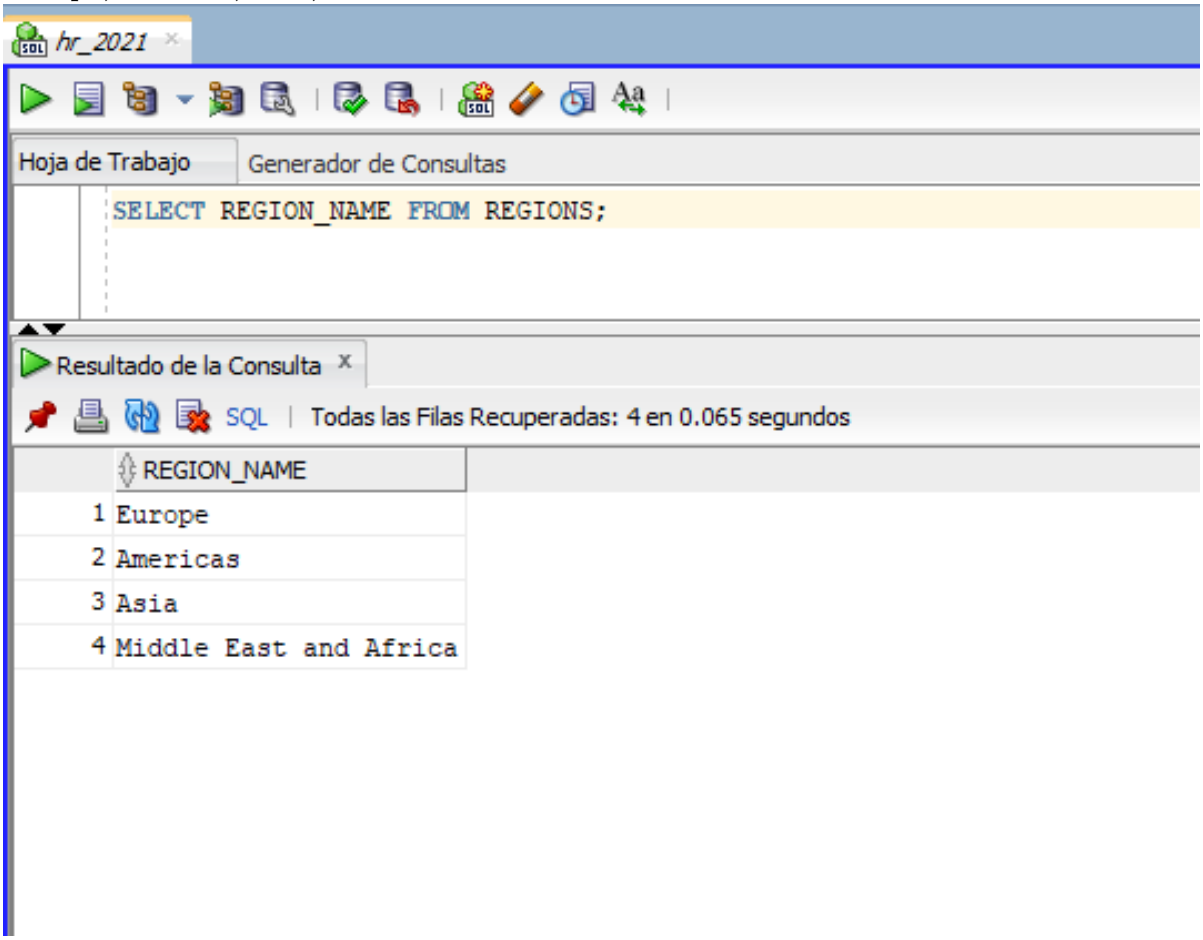
Activity 3:

This exercise must be performed using HR schema

a) In this exercise, you will see the effect of the set operators.

1. Connect to your database as user HR.

2. Run a query that consult the regions table (regionname): Note the result, in particular the order of the rows. If the table is as originally created, there will be four rows returned. The order will be Europe, America, Asia, Middle East.



3. Query the Regions table twice, using UNION: The rows returned will be as for step 1 but sorted alphabetically.

```
SELECT REGION_NAME FROM REGIONS
UNION SELECT REGION_NAME FROM REGIONS;
```

Resultado de la Consulta

SQL | Todas las Filas Recuperadas: 4 en 0.003 segundos

	REGION_NAME
1	Americas
2	Asia
3	Europe
4	Middle East and Africa

4. This time, use UNION ALL: There will be double the number of rows, and they will not be sorted.

```
SELECT REGION_NAME FROM REGIONS UNION ALL
SELECT REGION_NAME FROM REGIONS;
```

Resultado de la Consulta

SQL | Todas las Filas Recuperadas: 8 en 0.002 segundos

	REGION_NAME
1	Europe
2	Americas
3	Asia
4	Middle East and Africa
5	Europe
6	Americas
7	Asia
8	Middle East and Africa

5. An intersection will retrieve rows common to two queries: All four rows are common, and the result is sorted.

```
SELECT REGION_NAME FROM REGIONS INTERSECT SELECT REGION_NAME FROM REGIONS;
```

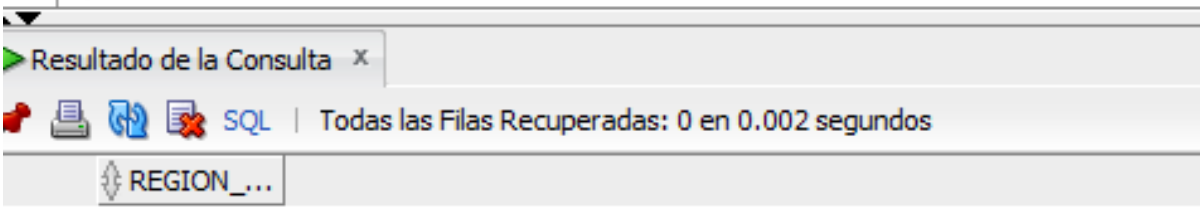
Resultado de la Consulta

SQL | Todas las Filas Recuperadas: 4 en 0.004 segundos

	REGION_NAME
1	Americas
2	Asia
3	Europe
4	Middle East and Africa

6. A MINUS will remove common rows:

```
SELECT REGION_NAME FROM REGIONS MINUS
SELECT REGION_NAME FROM REGIONS;
```



The second query will remove all the rows in the first query. Result: no rows left. 7. Execute these statements and show results.

b) In this exercise, you will run more complex compound queries

1. Connect to your database as user HR.

2. Run a simple query to count the employees in three departments (20,30,40), grouped by them:

```
SELECT DEPARTMENT_ID, COUNT(*)
FROM EMPLOYEES WHERE DEPARTMENT_ID IN(20,30,40)
GROUP BY DEPARTMENT_ID;
```

Resultado de la Consulta

SQL | Todas las Filas Recuperadas: 3 en 0.008 segundos

	DEPARTMENT_ID	COUNT(*)
1	20	2
2	30	6
3	40	1

3. Obtain the same result with a compound query:

```
SELECT DEPARTMENT_ID, COUNT(*)
FROM EMPLOYEES WHERE DEPARTMENT_ID IN(20,30,40)
GROUP BY DEPARTMENT_ID
UNION
SELECT DEPARTMENT_ID, COUNT(*)
FROM EMPLOYEES WHERE DEPARTMENT_ID IN(20,30,40)
GROUP BY DEPARTMENT_ID;
```

Resultado de la Consulta

SQL | Todas las Filas Recuperadas: 3 en 0.002 segundos

	DEPARTMENT_ID	COUNT(*)
1	20	2
2	30	6
3	40	1

4. Find out (using compound queries) if any managers manage staff in both departments 20 and 30, and exclude any managers with staff in department 40:

```
SELECT MANAGER_ID FROM EMPLOYEES
WHERE DEPARTMENT_ID <> 40
INTERSECT
SELECT MANAGER_ID FROM EMPLOYEES
WHERE DEPARTMENT_ID = 20
INTERSECT SELECT MANAGER_ID
FROM EMPLOYEES WHERE DEPARTMENT_ID = 30;
```

Resultado de la Consulta

SQL | Todas las Filas Recuperadas: 1 en 0.002 segundos

	MANAGER_ID
1	100

5. Use a compound query (3 sentences using two set operator) to report salaries (from employees) subtotaled by department (grouped by departmentid), by manager (grouped by managerid), and the overall total. Order the query: 6. Execute these statements and show results

```
SELECT DEPARTMENT_ID, NULL, SUM(SALARY)
FROM EMPLOYEES GROUP BY DEPARTMENT_ID
UNION
SELECT NULL, MANAGER_ID, SUM(SALARY)
FROM EMPLOYEES GROUP BY MANAGER_ID
UNION
SELECT NULL, NULL, SUM(SALARY)
FROM EMPLOYEES;
```

Resultado de la Consulta

SQL | Todas las Filas Recuperadas: 32 en 0.005 segundos

	DEPARTMENT_ID	NULL	SUM(SALARY)
1	10	(null)	4400
2	20	(null)	19000
3	30	(null)	24900
4	40	(null)	6500
5	50	(null)	156400
6	60	(null)	28800
7	70	(null)	10000
8	80	(null)	304500
9	90	(null)	58000
10	100	(null)	51608
11	110	(null)	20308
12	(null)	100	155400
13	(null)	101	44916
14	(null)	102	9000
15	(null)	103	19800
16	(null)	108	39600
17	(null)	114	13900
18	(null)	120	22100
19	(null)	121	25400
20	(null)	122	23600
21	(null)	123	25900
22	(null)	124	23000
23	(null)	145	51000
24	(null)	146	51000
25	(null)	147	46600
26	(null)	148	51900
27	(null)	149	50000
28	(null)	201	6000
29	(null)	205	8300

c) Working in the HR schema, design some queries that will generate reports using the set operators. The reports required are as follows:

1. Employees have their current job (identified by JOBID) recorded in their EMPLOYEES row. Jobs they have held previously (but not their current job) are recorded in JOBHISTORY. Which employees have never changed jobs? The listing should include the employees' EMPLOYEEID and LASTNAME.

```
SELECT EMPLOYEE_ID, LAST_NAME FROM EMPLOYEES
MINUS
SELECT JH.EMPLOYEE_ID, E.LAST_NAME
FROM JOB_HISTORY JH JOIN EMPLOYEES E
ON(JH.EMPLOYEE_ID = E.EMPLOYEE_ID);
```

Resultado de la Consulta

SQL | Se han recuperado 50 filas en 0.01 segundos

	EMPLOYEE_ID	LAST_NAME
1	100	King
2	103	Hunold
3	104	Ernst
4	105	Austin
5	106	Pataballa
6	107	Lorentz
7	108	Greenberg
8	109	Faviet
9	110	Chen
10	111	Sciarra
11	112	Urman
12	113	Popp
13	115	Khoo
14	116	Baida

2. Which employees were recruited into one job, then changed to a different job, but are now back in a job they held before? Again, you will need to construct a query that compares EMPLOYEES with JOBHISTORY. The report should show the employees' names and the job titles. Job titles are stored in the table JOBS.

```
SELECT E.LAST_NAME,J.JOB_TITLE
FROM EMPLOYEES E JOIN JOBS J
ON(E.JOB_ID = J.JOB_ID)
JOIN JOB_HISTORY JH
ON(E.EMPLOYEE_ID = JH.EMPLOYEE_ID AND E.JOB_ID = JH.JOB_ID);
```

esultado de la Consulta x

SQL | Todas las Filas Recuperadas: 2 en 0.348 segundos

	LAST_NAME	JOB_TITLE
1	Whalen	Administration Assistant
2	Taylor	Sales Representative

3. What jobs has any one employee held? This will be the JOBID for the employee's current job (in EMPLOYEES) and all previous jobs (in JOBHISTORY). If the employee has held a job more than once, there is no need to list it more than once. Use a replacement variable to prompt for the EMPLOYEEID and display the job title(s). Employees 101 and 200 will be suitable employees for testing. Employee 101:

```
SELECT * FROM JOBS;
SELECT J.JOB_TITLE FROM EMPLOYEES
E JOIN JOBS J ON(E.JOB_ID = J.JOB_ID)
WHERE EMPLOYEE_ID = &&ID
UNION
SELECT J.JOB_TITLE
FROM JOB_HISTORY JH JOIN JOBS J
ON(JH.JOB_ID = J.JOB_ID)
WHERE JH.EMPLOYEE_ID = &ID;
```

Resultado de la Consulta | Resultado de la Consulta 1

SQL | Todas las Filas Recuperadas: 3 en 0.008 segundos

	JOB_TITLE
1	Accounting Manager
2	Administration Vice President
3	Public Accountant

The NOTE: Capture an image for each statement output.

Activity 4:

In this activity you will write several queries using the set operators

1. The HR department needs a list of department IDs for departments that do not contain the job ID STCLERK. Use the set operators to create this report.

```
SELECT DEPARTMENT_ID FROM DEPARTMENTS
MINUS
SELECT DEPARTMENT_ID
FROM EMPLOYEES
WHERE JOB_ID = 'ST_CLERK';
```

Resultado de la Consulta | Resultado de la Consulta 1 | Resultado de la Consulta 2

SQL | Todas las Filas Recuperadas: 26 en 0.003 segundos

	DEPARTMENT_ID
1	10
2	20
3	30
4	40
5	60
6	70
7	80
8	90
9	100
10	110
11	120
12	130
13	140
14	150

2. The HR department needs a list of countries that have no departments located in them. Display the country ID and the name of the countries. Use the set operators to create this report.

```
SELECT COUNTRY_ID,COUNTRY_NAME FROM COUNTRIES
MINUS
SELECT L.COUNTRY_ID,C.COUNTRY_NAME
FROM LOCATIONS L JOIN COUNTRIES C
ON (L.COUNTRY_ID = C.COUNTRY_ID)
JOIN DEPARTMENTS D
ON D.LOCATION_ID=L.LOCATION_ID;
```

Resultado de la Consulta | Resultado de la Consulta 1 | Resultado de la Consulta 2

SQL | Todas las Filas Recuperadas: 21 en 0.135 segundos

	COUNTRY_ID	COUNTRY_NAME
1	AR	Argentina
2	AU	Australia
3	BE	Belgium
4	BR	Brazil
5	CH	Switzerland
6	CN	China
7	DK	Denmark
8	EG	Egypt
9	FR	France
10	IL	Israel
11	IN	India
12	IT	Italy
13	JP	Japan
14	KW	Kuwait

3. Produce a list of jobs for departments 10, 50, and 20, in that order. Display the job ID and department ID by using the set operators.

```
SELECT DISTINCT JOB_ID, DEPARTMENT_ID
FROM EMPLOYEES
WHERE DEPARTMENT_ID = 10
UNION ALL
SELECT DISTINCT JOB_ID, DEPARTMENT_ID
FROM EMPLOYEES
WHERE DEPARTMENT_ID = 50
UNION ALL
SELECT DISTINCT JOB_ID, DEPARTMENT_ID
FROM EMPLOYEES
WHERE DEPARTMENT_ID = 20
```

Resultado de la Consulta | Resultado de la Consulta 1 | Resultado de la Consulta 2

SQL | Todas las Filas Recuperadas: 6 en 0.004 segundos

	JOB_ID	DEPARTMENT_ID
1	AD_ASST	10
2	ST_MAN	50
3	SH_CLERK	50
4	ST_CLERK	50
5	MK_MAN	20
6	MK_REP	20

4. Create a report that lists the employee IDs and job IDs of those employees who currently have a job title that is the same as their job title when they were initially hired by the company (that is, they changed jobs but have now gone back to doing their original job).

```
SELECT EMPLOYEE_ID,JOB_ID
FROM EMPLOYEES
INTERSECT
SELECT EMPLOYEE_ID,JOB_ID
FROM JOB_HISTORY;
```

esultado de la Consulta x | Resultado de la Consulta 1 x | Resultado de la Consulta 2

SQL | Todas las Filas Recuperadas: 2 en 0.002 segundos

	EMPLOYEE_ID	JOB_ID
1	176	SA_REP
2	200	AD_ASST

5. The HR department needs a report with the following specifications: • Last name and department ID of all employees from the EMPLOYEES table, regardless of whether or not they belong to a department • Department ID and department name of all departments from the DEPARTMENTS table, regardless of whether or not they have employees working in them Write a compound query to accomplish this.

```
SELECT LAST_NAME,DEPARTMENT_ID,TO_CHAR(null)
FROM EMPLOYEES
UNION
SELECT TO_CHAR(null),DEPARTMENT_ID,DEPARTMENT_NAME
FROM DEPARTMENTS;
```

Resultado de la Consulta | Resultado de la Consulta 1 | Resultado de la Consulta 2

SQL | Se han recuperado 50 filas en 0.005 segundos

	LAST_NAME	DEPARTMENT_ID	TO_CHAR(NULL)
1	Abel	80	(null)
2	Ande	80	(null)
3	Atkinson	50	(null)
4	Austin	60	(null)
5	Baer	70	(null)
6	Baida	30	(null)
7	Banda	80	(null)
8	Bates	80	(null)
9	Bell	50	(null)
10	Bernstein	80	(null)
11	Bissot	50	(null)
12	Bloom	80	(null)
13	Bull	50	(null)
14	Cabrio	50	(null)

3 PRE-EVALUATION

Practices pre-Assessment for Database Systems Laboratory II Pre-Assessment PRACTICE 14 carried out by student

1 COMPLIES WITH THE REQUESTED FUNCTIONALITY
YES

4 HAS THE CORRECT INDENTATION
YES

6 HAS AN EASY WAY TO ACCESS THE PROVIDED FILES
YES

7 HAS A REPORT WITH IDC FORMAT
YES

8 REPORT INFORMATION IS FREE OF SPELLING ERRORS
YES

9 DELIVERED IN TIME AND FORM
YES

10 IS FULLY COMPLETED (SPECIFY THE PERCENTAGE COMPLETED)
YES,100 percent

4 Conclusion

This was a very complete practice, always it is important to review and practice

The practice seemed interesting to me, I think I could learn more since in the examples that come in the Oracle document they are very few and very simple or at least they only give you the idea, in this practice I was able to practice more with the operations of sets and apply them in different exercises