Autonomous University of Zacatecas

Academic Unit of Electrical Engineering

Academic Program of Software Engineering

Database Systems Laboratory II Practice 9 - Data selection and projection: single row functions

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1 Introduction

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

In the theory class we saw the topics of chapter 3, about functions, date queries, strings, and different statements. In this practice we will apply the knowledge acquired from Chapter 3 to solve a series of problems.

2 Development

Activity 1

Write the section that describes the Work developed in the following activities 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 VARIOUS TYPES OF FUNCTIONS AVAILABLE IN SQL

1. Which statements regarding single-row functions are true? (Choose all that apply.)

A. They may return more than one result.
B. They execute once for each record processed.
C. They may have zero or more input parameters.
D. They must have at least one mandatory parameter.

Answer: B and C

The single-row functions returns one result per row, and there are functions that can have 0 or more parameters it depends of which function you are using and the result that you want.

2. Which of these are single-row character-case conversion functions? (Choose all that apply.)

A. LOWER
B. SMALLER
C. INITCASE
D. INITCAP

Answer: A , D

In the theory class we learned about the single-row character-case functions and there are 3 functions, LOWER, UPPER, and INITCASE.

USE CHARACTER, NUMBER, AND DATE FUNCTIONS IN SELECT STATEMENTS

3. What value is returned after executing the following statement: SELECT LENGTH('Howlongisapieceofstring?') FROM DUAL; (Choose the best answer.)

A. 29
B. 30
C. 24
D. None of the above

Answer: B
The LENGTH function returns a number that represents the number of characters in the string, if you count the characters, there are 30, the function returns 30.

4. What value is returned after executing the following statement: SELECT SUBSTR('Howlongisapieceofstring?', 5,4) FROM DUAL; (Choose the best answer.)

A. long
B. *long*
C. string?
D. None of the above

Answer: A
The SUBSTR function returns a sub-string from a string and you specify it how to do that, in the question the sub-string will start from the position number 5 from the original string, and will take 4 characters, the sub-string returned is "long".

5. What value is returned after executing the following statement? SELECT INSTR('Howlongisapieceofstring?','guionbajo',5,3) FROM DUAL; (Choose the best answer.

A. 4
B. 14
C. 12
D. None of the above

Answer: B
To explain my answer we need to explain the statement, the function INSTR will find the position of the character that you specify, i will start from the position 5 of the string (that means that the first " " will be avoided), and will find the third " ", if you count it is in the position 14.

6. What value is returned after executing the following statement? SELECT REPLACE('Howlongisapieceofstring?',",") FROM DUAL; (Choose the best answer.)

A. How long is a piece of string?
B. Howlongisapieceofstring?
C. Howlongisapieceofstring?
D. None of the above

Answer:C
Replacing " " for "" it is like eliminate all the characters " " from the string.

7. What value is returned after executing the following statement? SELECT MOD(14,3) FROM DUAL; (Choose the best answer.)

A. 3
B. 42
C. 2
D. None of the above

Answer: C
The MOD calculates the remaining value of the first argument divided by the second argument, it means that if you divide 14 by 3 the result is 4, 4 x 3 = 12, the remaining value is 2 because 14-12=2

8. Assuming SYSDATE=07-JUN-1996 12:05pm, what value is returned after executing the following statement? SELECT ADDMONTHS(SYSDATE,-1) FROM DUAL; (Choose the best answer.)

A. 07-MAY-1996 12:05pm
B. 06-JUN-1996 12:05pm
C. 07-JUL-1996 12:05pm
D. None of the above

Answer: A
The ADD MONTHS function will add the number of month that you specify, if you want to add -1 months that means that you want to subtract a month, if you are at JUNE the month-1 is MAY

9. What value is returned after executing the following statement? Take note that 01-JAN-2009 occurs on a Thursday. (Choose the best answer.)

SELECT NEXT$_DAY('01-JAN-2009','wed')FROMDUAL$;
A. 07-JAN-2009
B. 31-JAN-2009
C. Wednesday
D. None of the above

Answer: D
You need to specify the day that you are looking for, if you want to know the next Friday you need to write the complete name of the day in the parameter, the function will work if you write WEDNESDAY instead of wed.

10. Assuming SYSDATE=30-DEC-2007, what value is returned after executing the following statement? SELECT TRUNC(SYSDATE,'YEAR') FROM DUAL; (Choose the best answer.)

A. 31-DEC-2007
B. 01-JAN-2008
C. 01-JAN-2007
D. None of the above

Answer: C
Using TRUNK with YEAR is like restart the year, it returns the date of the first day of the current year.

Activity 2:

Propose an answer to the following issues:

• You would like to search for a character string stored in the database. The case in which it is stored is unknown and there are potentially leading and trailing spaces surrounding the string. Can such a search be performed?

Yes, a search can be performed, you can use REPLACE, to eliminate the spaces between the string, you can use LOWER to search and compare a lower-case string, and also you could use TRIM to eliminate the blanks in the begin and in the end of the string, you can use functions to search a more simple string.

• You have been asked to extract the last three characters from the LAST-NAME column in the EMPLOYEES table. Can such a query be performed without using the LENGTH function?

Yes, you can use SUBSTR, in the parameters you can specify that you want to start from the -3 position, it means you want to start from the third position beginning to count from the end of the string, and take all the character starting by that position (it will take the last 3 characters).

• You would like to extract a consistent 11-character string based on the SALARY column in the EMPLOYEES table. If the SALARY value is less than 11 characters long, zeros must be added to the left of the value to yield a 11-character string. Is this possible?

Yes, it is possible, you can use LPAD function, LPAD (salary, 11, '0'), you specify you want a 11-Characters string and if the string have lest than 11 characters the function will fill with 0s the remaining places at the left.

• You wish to retrieve the duration of employment in days for each employee. Is it possible to perform such a calculation?

Yes, it is possible, you can do a subtract, you can subtract the SYSDATE and the hire date, that operation returns the days of difference between that dates, it means the days that the employee has been work.

• You are tasked with identifying the date the end of year staff bonus will be paid. Bonuses are usually paid on the last Friday in December. Can the bonus date be computed using the $\mathrm{NEXT}_DAY function$?

Yes, you can querying the next Friday of December while the date is less than the 31 of December of that year.

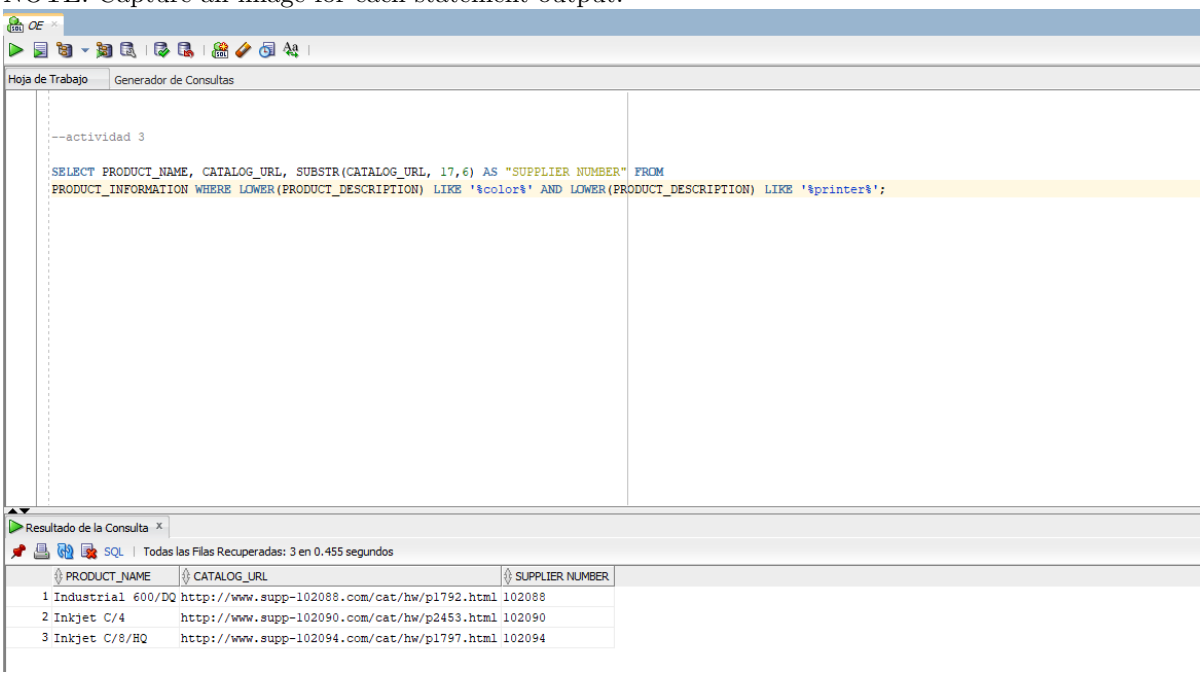
• Employees working in the IT department have moved to new offices and, although the last four digits of their phone numbers are the same, the set of the three digits 324 is changed to 326. A typical phone number of an IT staff member is 140-324-3489. You are required to provide a list of employees' names with their old and new phone numbers. Can this list be provided?

Yes, when you are retrieving the data you can use the REPLACE function to replace 326 to 324 and obtain the old number, or viceversa.

Activity 3:

Connect to the OE schema and complete the following tasks. Several quotations were requested for prices on color printers. The supplier information is not available from the usual source, but you know that the supplier identification number is embedded in the CATALOGURL column from the PRODUCTINFORMATION table. You are required to retrieve the PRODUCTNAME and CATALOGURL values and to extract the supplier number from the CATALOGURL column for all products which have both the words COLOR and PRINTER in the PRODUCTDESCRIPTION column stored in any case.

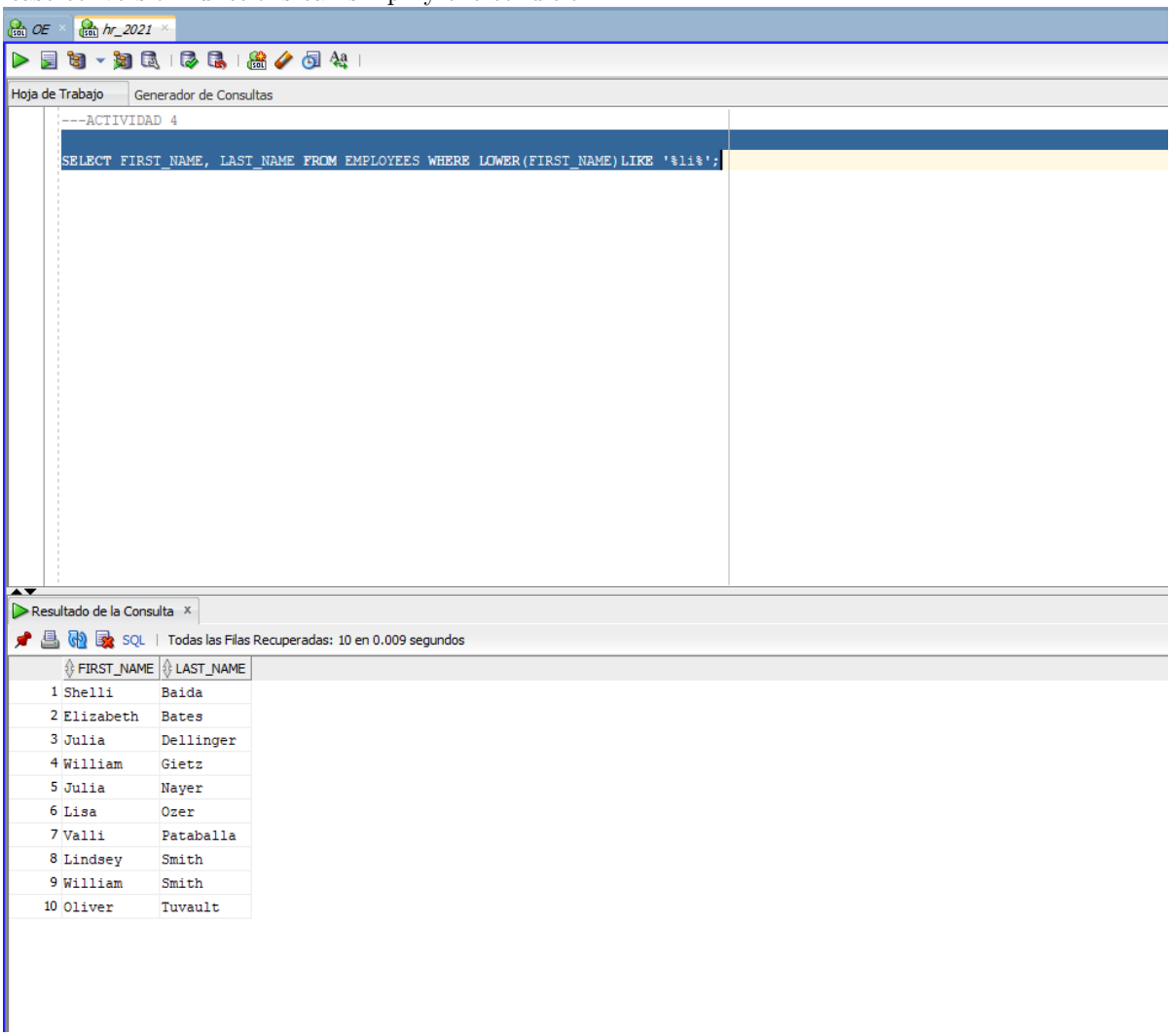
NOTE: Capture an image for each statement output.



Activity 4:

This exercise must be performed using HR schema.

• Retrieve a list of all FIRStNAME and LASTNAME values from the EMPLOYEES table where FIRSTNAME contains the character string “li.” 1. Start SQL Developer and connect to the HR schema. The data filter must compare the FIRSTNAME column values with a pattern of characters containing all possible case combinations of the string “li.” Therefore, if the FIRSTNAME contains the character strings “LI,” “Li,” “lI,” or “li,” that row must be retrieved. The LIKE operator is used for character matching, and four combinations can be extracted with four WHERE clauses separated by the OR keyword. However, the case conversion functions can simplify the condition.



• Envelope printing restricts the addressee field to 16 characters. Ideally, the addressee field contains employees' FIRSTNAME and LASTNAME values separated by a single space. When the combined length of an employee's FIRSTNAME and LASTNAME exceeds 15 characters, the addressee field should contain their formal name. An employee's formal name is made up of the first letter of their FIRSTNAME and the first 14 characters of their LASTNAME. You are required to retrieve a list of FIRSTNAME and LASTNAME values and formal names for employees where the combined length of $\mathrm{FIRST}_{N}AMEandLASTNAMEexceeds15characters$

```
--2
SELECT FIRST_NAME, LAST_NAME, CONCAT(SUBSTR(FIRST_NAME,1,1),SUBSTR(LAST_NAME,1,14)) AS "FORMAL NAME"
FROM EMPLOYEES WHERE(LENGTH(FIRST_NAME)+ LENGTH(LAST_NAME)) > 15;
```

Resultado de la Consulta

SQL | Todas las Filas Recuperadas: 6 en 0.004 segundos

	FIRST_NAME	LAST_NAME	FORMAL NAME
1	Nanette	Cambrault	NCambrault
2	Alberto	Errazuriz	AErrazuriz
3	Michael	Hartstein	MHartstein
4	Irene	Mikkilineni	IMikkilineni
5	Christopher	Olsen	COlsen
6	Jose Manuel	Urman	JUrman

• You are required to obtain a list of EMPLOYEEID, LASTNAME, and HIREDATE values (add the MONTHS WORKED by the employees) for the employees who have worked more than 90 months between the date they were hired and 01-JAN-2000.

```
--3
SELECT EMPLOYEE_ID, LAST_NAME, HIRE_DATE, MONTHS_BETWEEN(HIRE_DATE, '01-01-2000') AS "MONTHS WORKED"
FROM EMPLOYEES WHERE MONTHS_BETWEEN(HIRE_DATE, '01-01-2000') > 90;
```

Resultado de la Consulta | Resultado de la Consulta 1

SQL | Todas las Filas Recuperadas: 18 en 0.013 segundos

	EMPLOYEE_ID	LAST_NAME	HIRE_DATE	MONTHS WORKED
1	113	Popp	07/12/07	95.193548387096774193548387096774193548839
2	119	Colmenares	10/08/07	91.290322580645161290322580645161290322258
3	124	Mourgos	16/11/07	94.483870967741935483870967741935483870967
4	128	Markle	08/03/08	98.225806451612903225806451612903225806451
5	135	Gee	12/12/07	95.354838709677419354838709677419354838709
6	136	Philtanker	06/02/08	97.161290322580645161290322580645161290322
7	148	Cambrault	15/10/07	93.451612903225806451612903225806451612903
8	149	Zlotkey	29/01/08	96.903225806451612903225806451612903225806
9	155	Tuvault	23/11/07	94.709677419354838709677419354838709677419
10	164	Marvins	24/01/08	96.741935483870967741935483870967741935483
11	165	Lee	23/02/08	97.709677419354838709677419354838709677419
12	166	Ande	24/03/08	98.741935483870967741935483870967741935483
13	167	Banda	21/04/08	99.645161290322580645161290322580645161290
14	173	Kumar	21/04/08	99.645161290322580645161290322580645161290
15	179	Johnson	04/01/08	96.096774193548387096774193548387096774193
16	183	Geoni	03/02/08	97.064516129032258064516129032258064516129
17	191	Perkins	19/12/07	95.580645161290322580645161290322580645161
18	199	Grant	13/01/08	96.387096774193548387096774193548387096774

• You are required to display employee first names and last names joined together, the length of the employee last name, and the numeric position of the letter “a” in the employee last name for all employees whose last names end with the letter “n.” Use Oracle functions to perform the whole sentence.

```
--4
SELECT CONCAT(FIRST_NAME, LAST_NAME) AS "NAME AND LAST NAME", LENGTH(LAST_NAME) AS "LENGTH LAST NAME",
INSTR(LAST_NAME,'a') AS "POSITION OF LETTER A" FROM EMPLOYEES WHERE SUBSTR(LAST_NAME, -1,1) = 'n';
```

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

SQL | Todas las Filas Recuperadas: 19 en 0.003 segundos

	NAME AND LAST NAME	LENGTH LAST NAME	POSITION OF LETTER A
1	MozheAtkinson	8	0
2	DavidAustin	6	0
3	DavidBernstein	9	0
4	JohnChen	4	0
5	LexDe Haan	7	5
6	LouiseDoran	5	4
7	MichaelHartstein	9	2
8	AlyssaHutton	6	0
9	CharlesJohnson	7	0
10	JackLivingston	10	0
11	JasonMallin	6	2
12	SamuelMcCain	6	4
13	AllanMcEwen	6	0
14	ChristopherOlsen	5	0
15	TJOlson	5	0
16	MarthaSullivan	8	7
17	Jose ManuelUrman	5	4
18	ShantaVollman	7	6
19	JenniferWhalen	6	3

• Display the employee number, hire date, number of months employed, six-month review date, first Friday after hire date, and the last day of the hire month for all employees who have been employed for fewer than 150 months.
• Compare the hire dates for all employees who started in 1997. Display the employee number and hire date

```
--6
SELECT EMPLOYEE_ID, HIRE_DATE FROM EMPLOYEES WHERE SUBSTR(HIRE_DATE,-2,2)='03';
```

Resultado de la Consulta | Resultado de la Consulta 1 | Resultado de la Consulta 2 | Resultado de la Consulta 3 | Resultado de la Consulta 4

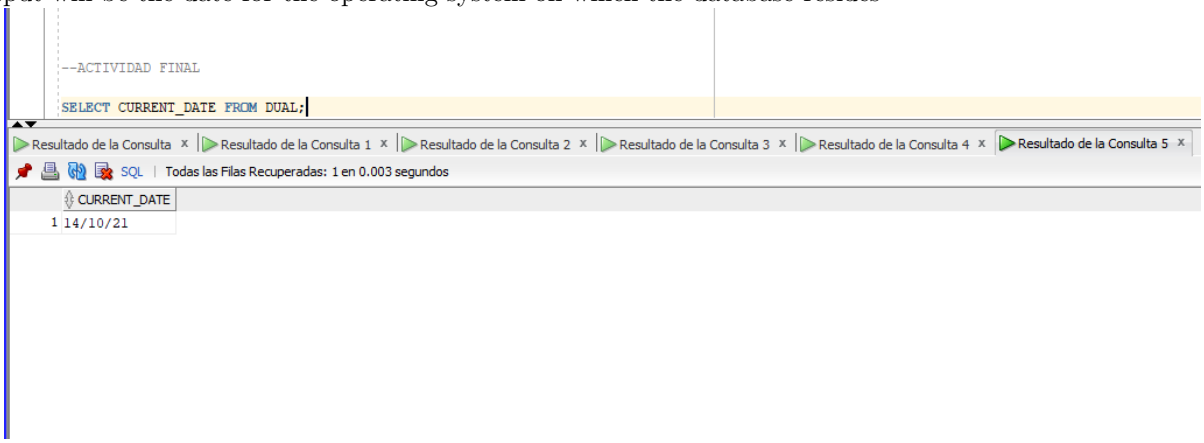
SQL | Todas las Filas Recuperadas: 6 en 0.002 segundos

	EMPLOYEE_ID	HIRE_DATE
1	100	17/06/03
2	115	18/05/03
3	122	01/05/03
4	137	14/07/03
5	141	17/10/03
6	200	17/09/03

Activity 5:

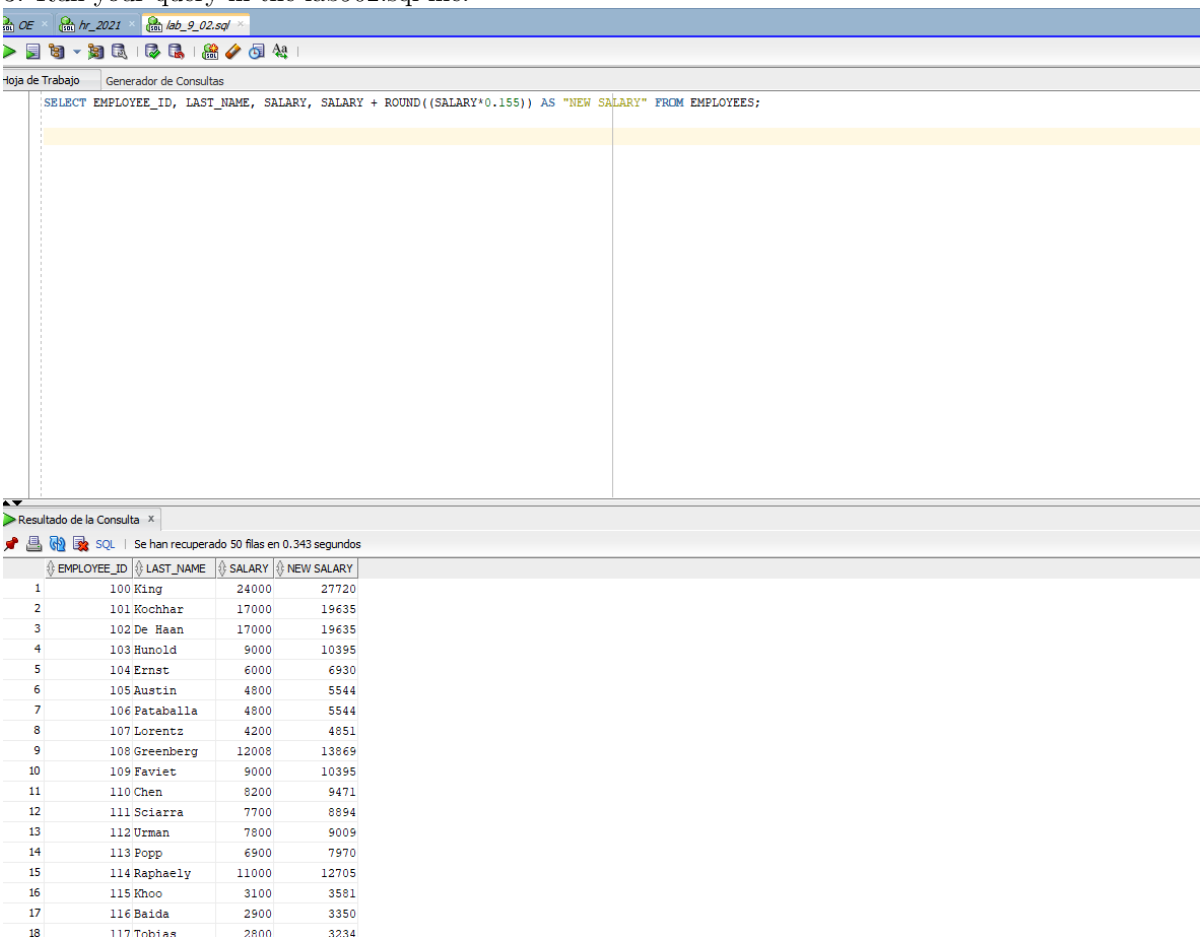
This activity provides a variety of exercises using different functions that are available for character, number, and date data types.

Part 1 1. Write a query to display the system date. Label the column as Date. Note: If your database is remotely located in a different time zone, the output will be the date for the operating system on which the database resides



2. The HR department needs a report to display the employee number, last name, salary, and salary increased by 15.5column New Salary. Save your SQL statement in a file named lab902.sql.

3. Run your query in the lab902.sql file.



	EMPLOYEE_ID	LAST_NAME	SALARY	NEW SALARY
1	100	King	24000	27720
2	101	Kochhar	17000	19635
3	102	De Haan	17000	19635
4	103	Hunold	9000	10395
5	104	Ernst	6000	6930
6	105	Austin	4800	5544
7	106	Pataballa	4800	5544
8	107	Lorentz	4200	4851
9	108	Greenberg	12008	13869
10	109	Faviet	9000	10395
11	110	Chen	8200	9471
12	111	Sciarra	7700	8894
13	112	Urman	7800	9009
14	113	Popp	6900	7970
15	114	Raphaely	11000	12705
16	115	Khoo	3100	3581
17	116	Baida	2900	3350
18	117	Tobias	2800	3234

4. Modify your query lab902.sql to add a column that subtracts the old salary from the new salary. Label the column Increase. Save the contents of the file as lab904.sql. Run the revised query.

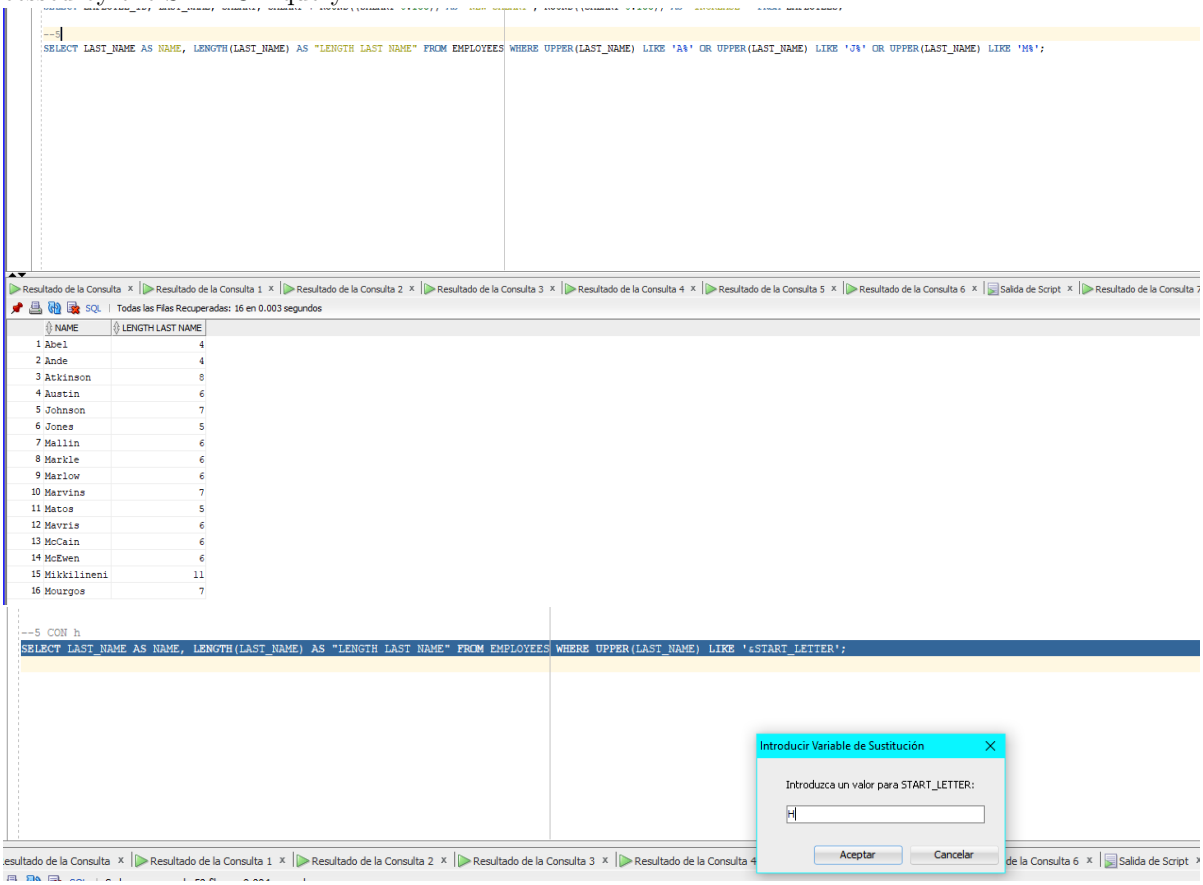
```
SELECT EMPLOYEE_ID, LAST_NAME, SALARY, SALARY + ROUND((SALARY*0.155)) AS "NEW SALARY" FROM EMPLOYEES;

--3,4
SELECT EMPLOYEE_ID, LAST_NAME, SALARY, SALARY + ROUND((SALARY*0.155)) AS "NEW SALARY", ROUND((SALARY*0.155)) AS "INCREASE"  FROM EMPLOYEES;

--5
SELECT LAST_NAME AS NAME, LENGTH(LAST_NAME) AS "LENGTH LAST NAME" FROM EMPLOYEES WHERE UPPER(LAST_NAME) LIKE 'A%' OR UPPER(LAST_NAME) LIKE 'J%' OR UPPER(LAST_NAME) LIKE 'M%';
```

Resultado de la Consulta | Resultado de la Consulta 1 | Resultado de la Consulta 2 | Resultado de la Consulta 3 | Resultado de la Consulta 4 | Resultado de la Consulta 5 | Resultado de la Consulta 6 | Salida de Script | Resultado de

SQL | Se han recuperado 50 filas en 0.004 segundos

	EMPLOYEE_ID	LAST_NAME	SALARY	NEW SALARY	INCREASE
1	100	King	24000	27720	3720
2	101	Kochhar	17000	19635	2635
3	102	De Haan	17000	19635	2635
4	103	Hunold	9000	10395	1395
5	104	Ernst	6000	6930	930
6	105	Austin	4800	5544	744
7	106	Pataballa	4800	5544	744
8	107	Lorentz	4200	4851	651
9	108	Greenberg	12008	13869	1861
10	109	Faviet	9000	10395	1395
11	110	Chen	8200	9471	1271
12	111	Sciarra	7700	8894	1194
13	112	Urman	7800	9009	1209
14	113	Popp	6900	7970	1070
15	114	Raphaely	11000	12705	1705
16	115	Khoo	3100	3581	481
17	116	Baida	2900	3350	450
18	117	Tobias	2800	3234	434
19	118	Himuro	2600	3003	403

5. Write a query that displays the last name (with the first letter in uppercase and all the other letters in lowercase) and the length of the last name for all employees whose name starts with the letters “J,” “A,” or “M.” Give each column an appropriate label. Sort the results by the employees’ last names. Rewrite the query so that the user is prompted to enter a letter that the last name starts with. For example, if the user enters “H” (capitalized) when prompted for a letter, then the output should show all employees whose last name starts with the letter “H.” Modify the query such that the case of the entered letter does not affect the output. The entered letter must be capitalized before being processed by the SELECT query.



6. The HR department wants to find the duration of employment for each employee. For each employee, display the last name and calculate the number of months between today and the date on which the employee was hired. Label the column as MONTHSWORKED. Order your results by the number of months employed. Round the number of months up to the closest whole number. Note: Because this query depends on the date when it was executed, the values in the MONTHSWORKED column will differ for you.

```
--6
SELECT  LAST_NAME,MONTHS_BETWEEN(CURRENT_DATE, HIRE_DATE) AS "MONTHS WORKED"
FROM EMPLOYEES;

SELECT * FROM EMPLOYEES;

--7
SELECT LAST_NAME, LPAD(SALARY,15,'$') FROM EMPLOYEES;
```

Resultado de la Consulta | Resultado de la Consulta 1 | Resultado de la Consulta 2 | Resultado de la Consulta 3 | Resultado de

SQL | Todas las Filas Recuperadas: 107 en 0.007 segundos

	LAST_NAME	MONTHS WORKED
1	King	219.933667114695340501792114695340501792
2	Kochhar	192.804634856630824372759856630824372 76
3	De Haan	249.062699372759856630824372759856630824
4	Hunold	189.385280017921146953405017921146953405
5	Ernst	172.804634856630824372759856630824372 76
6	Austin	195.675602598566308243727598566308243728
7	Pataballa	188.320763888888888888888888888888888889
8	Lorentz	176.256247759856630824372759856630824373
9	Greenberg	229.933667114695340501792114695340501792
10	Faviet	229.965925179211469534050179211469534 05
11	Chen	192.578828405017921146953405017921146953
12	Sciarra	192.514312275985663082437275985663082437
13	Urman	187.256247759856630824372759856630824373
14	Popp	166.256247759856630824372759856630824373
15	Raphaely	226.256247759856630824372759856630824373
16	Khoo	220.901409050179211469534050179211469534
17	Baida	189.707860663082437275985663082437275986
18	Tobias	194.707860663082437275985663082437275986
19	Himuro	178.998183243727598566308243727598566308

7. Create a query to display the last name and salary for all employees. Format the salary to be 15 characters long, left-padded with the symbol. Label the column as SALARY.

```
--7
SELECT LAST_NAME, LPAD(SALARY,15,'$') FROM EMPLOYEES;
```

Resultado de la Consulta | Resultado de la Consulta 1 | Resultado de la Consulta 2 | Resultado de la Consulta 3 | Resultado de la Consu

SQL | Se han recuperado 50 filas en 0.002 segundos

	LAST_NAME	LPAD(SALARY,15,'$')
1	King	$$$$$$$$$$24000
2	Kochhar	$$$$$$$$$$17000
3	De Haan	$$$$$$$$$$17000
4	Hunold	$$$$$$$$$$9000
5	Ernst	$$$$$$$$$$6000
6	Austin	$$$$$$$$$$4800
7	Pataballa	$$$$$$$$$$4800
8	Lorentz	$$$$$$$$$$4200
9	Greenberg	$$$$$$$$$$12008
10	Faviet	$$$$$$$$$$9000
11	Chen	$$$$$$$$$$8200
12	Sciarra	$$$$$$$$$$7700
13	Urman	$$$$$$$$$$7800
14	Popp	$$$$$$$$$$6900
15	Raphaely	$$$$$$$$$$11000
16	Khoo	$$$$$$$$$$3100
17	Baida	$$$$$$$$$$2900
18	Tobias	$$$$$$$$$$2800
19	Himuro	$$$$$$$$$$2600

8. Create a query that displays the first eight characters of the employees' last names and indicates the amounts of their salaries with asterisks. Each asterisk signifies a thousand dollars. Sort the data in descending order of salary. Label the column as EMPLOYEESANDTHEIRSALARIES.

```
--8
SELECT CONCAT(LAST_NAME,SALARY) AS "EMPLOYEES_AND_THEIR_SALARYS" FROM EMPLOYEES;

--9
SELECT  LAST_NAME,WEEKS_BETWEEN(HIRE_DATE,SYSDATE) AS "TENURE"
FROM EMPLOYEES;
```

Resultado de la Consulta | Resultado de la Consulta 1 | Resultado de la Consulta 2 | Resultado de la Consulta 3 | Resultado de la Consulta 4 | Resulta

SQL | Se han recuperado 50 filas en 0.002 segundos

	EMPLOYEES_AND_THEIR_SALARYS
1	King24000
2	Kochhar17000
3	De Haan17000
4	Hunold9000
5	Ernst6000
6	Austin4800
7	Pataballa4800
8	Lorentz4200
9	Greenberg12008
10	Faviet9000
11	Chen8200
12	Sciarra7700
13	Urman7800
14	Popp6900
15	Raphaely11000
16	Khoo3100
17	Baida2900
18	Tobias2800
19	Himuro2600

9. Create a query to display the last name and the number of weeks employed for all employees in department 90. Label the number of weeks column as TENURE. Truncate the number of weeks value to 0 decimal places. Show the records in descending order of the employee's tenure. Note: The TENURE value will differ as it depends on the date on which you run the query.

3 PRE-EVALUATION

Practices pre-Assessment for Database Systems Laboratory II Pre-Assessment PRACTICE 8 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,90 percent

4 Conclusion

The practice was a bit long, the issue of the dates did not end and I like it because at times I do not get the queries, although I understand that it is important to know and learn these issues when creating a database and what we need to do queries of these types as we have the knowledge.

I have learned a lot from chapter 3, I was practically able to do most of the exercises proposed in this practice.