Practice 7

Practice name	Data retrieval using the SQL SELECT statement
Academic Program	Software Engineering
Subject name	Laboratory of Database Systems II
Unit	I. SQL.
Professor	Aldonso Becerra Sánchez
Due date	**September 30, 2021**
Due date with penalty	**October 1st, 2021**
Elaboration date	**September 28, 2021**

Practice objective	Use SQL SELECT statements for retrieving data from database by means of different contexts.
Estimated time of completion	5 hours
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.

Reference 1:

1. Oracle Database 11g: SQL Fundamentals.

Reference 2:

2. Oracle Database SQL Language Reference 11g.

Reference 3:

Initial Activity:

Read the whole practice before start it.

Write the corresponding report, starting with the **Introduction** section.

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.

LIST THE CAPABILITIES OF SQL SELECT STATEMENTS

1. Which query creates a projection of the DEPARTMENT_NAME and LOCATION_ID columns from the DEPARTMENTS table? (Choose the best answer.)

A. SELECT DISTINCT DEPARTMENT_NAME, LOCATION_ID FROM DEPARTMENTS;

B. SELECT DEPARTMENT_NAME AS "LOCATION_ID" FROM DEPARTMENTS;

C. SELECT DEPT_NAME, LOC_ID FROM DEPT;

D. SELECT DEPARTMENT_NAME, LOCATION_ID
FROM DEPARTMENTS;

2. After describing the EMPLOYEES table, you discover that the SALARY column has a data type of NUMBER(8,2). Which SALARY value(s) will not be permitted in this column?

(Choose all that apply.)

A. SALARY=12345678

B. SALARY=12.34

C. SALARY=12345.678

D. SALARY=123456

E. SALARY=123456.78

3. After describing the JOB_HISTORY table, you discover that the START_DATE and END_DATE columns have a data type of DATE. Consider the expression END_DATE-START_DATE. (Choose two correct statements.)

A. A value of DATE data type is returned.

B. The expression represents the days between the END_DATE and START_DATE less one day.

C. A value of type VARCHAR2 is returned.

D. The expression is invalid since arithmetic cannot be performed on columns with DATE data types.

E. A value of type NUMBER is returned.

4. The DEPARTMENTS table contains a DEPARTMENT_NAME column with data type VARCHAR2(30). (Choose two true statements about this column.)

A. This column can store character data up to a maximum of 30 characters.

B. This column can store data in a column with data type VARCHAR2(50) provided that the contents are at most 30 characters long.

C. The VARCHAR2 data type is replaced by the CHAR data type.

D. This column must store character data that is at least 30 characters long.

EXECUTE A BASIC SELECT STATEMENT

5. Which statement reports on unique JOB_ID values from the EMPLOYEES table? (Choose all that apply.)

A. SELECT JOB_ID FROM EMPLOYEES;

B. SELECT DISTINCT JOB_ID FROM EMPLOYEES;

C. SELECT DISTINCT JOB_ID, EMPLOYEE_ID FROM EMPLOYEES;

D. SELECT UNIQUE JOB_ID FROM EMPLOYEES;

6. Choose the two illegal statements. The two correct statements produce identical results. The two illegal statements will cause an error to be raised:

A. select department_id || ' represents the '|| department_name || ' Department' "Department Info" from departments;

B. SELECT DEPARTMENT_ID|| ' represents the || DEPARTMENT_NAME || 'Department' as "Department Info" FROM DEPARTMENTS;

C. SELECT DEPARTMENT_ID|| ' represents the ' || DEPARTMENT_NAME || 'Department' as "Department Info" FROM DEPARTMENTS;

D. SELECT DEPARTMENT_ID represents the DEPARTMENT_NAME Department as "Department Info" FROM DEPARTMENTS;

7. Which expressions do not return NULL values? (Choose all that apply.)

A. select ((12 + 90) * 55) + null from dual;

B. select null||'test'||null as "Test" from dual;

C. select null/0 from dual;

D. select 'this is a '||null||'test with nulls' from dual;

8. Choose the correct syntax to return all columns and rows of data from the EMPLOYEES table.

A. select * from employees;

B. select employee_id, first_name, last_name, first_name, department_id

from employees;

C. select % from employees;

D. select all from employees;

E. select *.* from employees;

9. The following character literal expression is selected from the DUAL table:

SELECT 'Coda''s favorite fetch toy is his orange ring' FROM DUAL;

(Choose the result that is returned.)

A. An error would be returned due to the presence of two adjacent quotes

B. 'Coda''s favorite fetch toy is his orange ring'

C. Coda''s favorite fetch toy is his orange ring

10. There are four rows of data in the REGIONS table. Consider the following SQL statement:

SELECT '6 * 6' "Area" FROM REGIONS;

How many rows of results are returned and what value is returned by the Area column? (Choose the best answer.)

A. 4 rows returned, Area column contains value 6 * 6 for all 4 rows

B. 4 rows returned, Area column contains value 36 for all 4 rows

C. 1 row returned, Area column contains value 6 * 6

D. 1 row returned, Area column contains value 36

E. A syntax error is returned

Activity 2:

Propose an answer to the following issues:

a) You want to construct and execute queries against tables stored in an Oracle database. Are you confined to using SQL Developer?

b) To explore your database environment further, you would like a list of tables, owned by your current schema, available for you to query. How do you interrogate the database dictionary to provide this metadata?

c) When querying the JOBS table for every row containing just the JOB_ID and MAX_SALARY columns, is a projection, selection, or join being performed?

d) An alias provides a mechanism to rename a column or an expression. Under what conditions should you enclose an alias in double quotes?

e) When working with character literal values that include single quotation marks, how should you specify these literals in the SELECT clause without raising an error?

Activity 3:

Connect to the OE schema and complete the following tasks.

1. Obtain structural information for the PRODUCT_INFORMATION and ORDERS tables.

2. Select the unique SALES_REP_ID values from the ORDERS table. How many different sales representatives have been assigned to orders in the ORDERS table?

3. Create a results set based on the ORDERS table that includes the ORDER_ID, ORDER_DATE, and ORDER_TOTAL columns. Notice how the ORDER_DATE output is formatted differently from the START_DATE and END_DATE columns in the HR.JOB_ID table.

4. The PRODUCT_INFORMATION table stores data regarding the products available for sale in a fictitious IT hardware store. Produce a set of results that will be useful for a sales person. Extract product information in the format <PRODUCT_NAME> with code: <PRODUCT_ID> has status of: <PRODUCT_STATUS>. Alias the expression as "Product." The results should provide the LIST_PRICE, the MIN_PRICE, the difference between LIST_PRICE, and MIN_PRICE aliased as "Max Actual Savings," along with

an additional expression that takes the difference between LIST_PRICE and MIN_PRICE and divides it by the LIST_PRICE and then multiplies the total by 100. This last expression should be aliased as "Max Discount %."

5. Calculate the surface area of the Earth using the DUAL table. Alias this expression as "Earth's Area." The formula for calculating the area of a sphere is: $4\pi r2$. Assume, for this example, that the earth is a simple sphere with a radius of 3,958.759 miles and that π is 22/7. This calculation approximates that planet Earth's surface area is 197016572.595304 square miles.

NOTE: Capture an image for each statement output.

Activity 4:

In this step-by-step activity a connection is made using SQL Developer as the HR user. Use expressions and operators to answer three questions related to the SELECT statement:

Using Select Statement.

Question 1: How many unique departments have employees currently working in them?

1. Start SQL*Plus and connect to the HR schema.

2. You may initially be tempted to find the answer in the DEPARTMENTS table. A careful examination reveals that the question asks for information about employees. This information is contained in the EMPLOYEES table.

3. The word "unique" should guide you to use the DISTINCT keyword.

4. Combining steps 2 and 3, you can construct the following SQL statement:

_____

5. As shown in the following illustration, this query returns 12 rows. Notice that the third row is empty. This is a null value in the DEPARTMENT_ID column.

6. The answer to the first question is therefore: Eleven unique departments have employees working in them, but at least one employee has not been assigned to a department.

Question 2: How many countries are there in the Europe region?

1. This question comprises two parts. Consider the REGIONS table, which contains four regions each uniquely identified by a REGION_ID value, and the COUNTRIES table, which has a REGION_ID column indicating which region a country belongs to.

2. The first query needs to identify the REGION_ID of the Europe region. This

is accomplished by the SQL statement:

_____

3. The following illustration shows that the Europe region has a REGION_ID value of 1:

4. To identify which countries have 1 as their REGION_ID, you need to execute the following SQL query

_____

5. Manually counting the country rows with a REGION_ID of 1 in the following illustration helps answer the second question:

6. The answer to the second question is therefore: There are eight countries in the Europe region as far as the HR data model is concerned.

Question3: The HR schema contains seven tables representing a data model of a fictitious Human Resources department. The EMPLOYEES table, which stores details of the staff, and the DEPARTMENTS table, which contains the details of the departments in the organization, have been described. In this step-by-step exercise, a connection is made using SQL Developer as the HR user and the remaining five sample tables are described. They are the JOBS table, which keeps track of the different job types available in the organization, and the JOB_HISTORY table, which keeps track of the job details of employees who changed jobs but remained in the organization. To understand the data model further, the LOCATIONS, COUNTRIES, and REGIONS tables, which keep track of the geographical information pertaining to departments in the organization, will be described.

1. Launch SQL Developer and choose New from the File menu. Choose Database Connection. If this is the first time you are connecting to the database from SQL Developer, you are required to create a connection. Provide a descriptive connection name and input HR as the username. The remaining connection details should be obtained from your database administrator. Once the connection is saved, choose the Connect button.

2. Navigate to the SQL Editor, which is the section titled Enter SQL Statement.

3. Type in the command: DESCRIBE JOBS. Terminating this command with a semicolon is optional.

4. Execute the DESCRIBE command, either by pressing the F5 key or by clicking the solid green triangular arrow icon located on the toolbar above the SQL Editor.

5. The JOBS table description appears in the Results frame as shown in the following illustration.

6. Steps 3 to 5 can be repeated to describe the remaining JOB_HISTORY, LOCATIONS, COUNTRIES, and REGIONS tables.

7. SQL Developer provides an alternative to the DESCRIBE command when it comes to obtaining the structural information of tables.

8. Navigate to the LOCATIONS table using the Tree navigator located on the left frame underneath the connection name.

9. SQL Developer describes the table automatically on the right side of the tool as shown in the following illustration.

Question 4: It was demonstrated earlier how the number of days for which staff were employed in a job could be calculated. For how many years were staff employed while fulfilling these job roles and what were their EMPLOYEE_ID, JOB_ID, START_DATE, and END_DATE values? Alias the expression column in your query with the alias Years Employed. Assume that a year consists of 365.25 days.

1. Start SQL Developer and connect to the HR schema.

2. The projection of columns required includes EMPLOYEE_ID, JOB_ID, START_DATE, END_DATE, and an expression called "Years Employed" from the JOB_HISTORY table.

3. The expression can be calculated by dividing one plus the difference between END_DATE and START_DATE by 365.25 days, as shown next:

_____

4. Execute the statement y show the results.

Question 5: Query the JOBS table and return a single expression of the form The Job Id for the <job_title's> job is: <job_id>. Take note that the job_title should have an apostrophe and an "s" appended to it to read more naturally. A sample of this output for the organization president is: "The Job Id for the President's job is: AD_PRES." Alias this column expression as "Job Description" using the AS keyword.

1. There are multiple solutions to this problem. The approach chosen here is to handle the naturally occurring single quotation marks with an additional single quote.

2. A single expression aliased as "Job Description" is required and may be constructed by dissecting the requirement into the literal "The Job Id for the" being concatenated to the JOB_TITLE column. This string is then concatenated to the literal "'s job is:," which is further concatenated to the JOB_ID column. An additional single quotation mark is added to yield the SELECT statement that follows:

_____

3. Execute the statement y show the results.

Question 6: Using the DUAL table, calculate the area of a circle with radius 6000 units, with pi being approximately 22/7. Use the formula: Area = pi × radius × radius. Alias the result as "Area."

1. Working with the DUAL table may initially seem curious. You get used to it as its functionality becomes more apparent. This question involves selecting a literal arithmetic expression from the DUAL table to yield a single row calculated answer that is not based on the column values in any table. Name the result column "Area".

2. The expression may be calculated using the following SQL statement:

_____

3. The results returned show the approximate area of the circle as 113142857.14 square units.

4. Show your own results.

NOTE: Capture an image for each statement output.

Activity 5:

In this practice, you write simple `SELECT` queries. The queries cover most of the `SELECT` clauses and operations that you learned in this lesson.

Part 1

Test your knowledge:

1. The following `SELECT` statement executes successfully:

```
SELECT last_name, job_id, salary AS Sal
FROM   employees;
```

   True/False   Explain the reason.

2. The following `SELECT` statement executes successfully:

```
SELECT *
FROM   job_grades;
```

   True/False   Explain the reason.

3. There are four coding errors in the following statement. Can you identify them? Explain the reason.

```
SELECT     employee_id, last_name
sal x 12   ANNUAL SALARY
FROM       employees;
```

Part 2

You have been hired as a SQL programmer for Antiguo Maestro Corporation.

Your first task is to create some reports based on data from the Human Resources tables.

4. Your first task is to determine the structure of the DEPARTMENTS table and its contents.

	DEPARTMENT_ID	DEPARTMENT_NAME	MANAGER_ID	LOCATION_ID
1	10	Administration	200	1700
2	20	Marketing	201	1800
3	50	Shipping	124	1500
4	60	IT	103	1400
5	80	Sales	149	2500
6	90	Executive	100	1700
7	110	Accounting	205	1700
8	190	Contracting	(null)	1700

5. Determine the structure of the EMPLOYEES table.

```
DESCRIBE employees
Name                            Null      Type

------------------------------- --------- --------------------
EMPLOYEE_ID                     NOT NULL  NUMBER(6)
FIRST_NAME                                VARCHAR2(20)
LAST_NAME                       NOT NULL  VARCHAR2(25)
EMAIL                           NOT NULL  VARCHAR2(25)
PHONE_NUMBER                              VARCHAR2(20)
HIRE_DATE                       NOT NULL  DATE
JOB_ID                          NOT NULL  VARCHAR2(10)
SALARY                                    NUMBER(8,2)
COMMISSION_PCT                            NUMBER(2,2)
MANAGER_ID                                NUMBER(6)
DEPARTMENT_ID                             NUMBER(4)

11 rows selected
```

The HR department wants a query to display the last name, job ID, hire date, and employee ID for each employee, with the employee ID appearing first. Provide an alias STARTDATE for the HIRE_DATE column. Save your SQL statement to a file named lab_7_05.sql so that you can dispatch this file to the HR department.

6. Test your query in the lab_7_05.sql file to ensure that it runs correctly.

Note: After you have executed the query, make sure that you do not enter your next query in the same worksheet. Open a new worksheet.

	EMPLOYEE_ID	LAST_NAME	JOB_ID	STARTDATE
1	100 King	AD_PRES	17-JUN-87
2	101 Kochhar	AD_VP	21-SEP-89
3	102 De Haan	AD_VP	13-JAN-93
4	103 Hunold	IT_PROG	03-JAN-90
5	104 Ernst	IT_PROG	21-MAY-91
6	107 Lorentz	IT_PROG	07-FEB-99
7	124 Mourgos	ST_MAN	16-NOV-99
8	141 Rajs	ST_CLERK	17-OCT-95
9	142 Davies	ST_CLERK	29-JAN-97
10	143 Matos	ST_CLERK	15-MAR-98

■ ■ ■

7. The HR department wants a query to display all unique job IDs from the EMPLOYEES table.

	JOB_ID
1	AC_ACCOUNT
2	AC_MGR
3	AD_ASST
4	AD_PRES
5	AD_VP
6	IT_PROG
7	MK_MAN
8	MK_REP
9	SA_MAN
10	SA_REP
11	ST_CLERK
12	ST_MAN

Part 3

8. The HR department wants more descriptive column headings for its report on employees. Copy the statement from `lab_7_05.sql` to a new SQL Worksheet. Name the column headings `Emp #`, `Employee`, `Job`, and `Hire Date`, respectively. Then run your query again.

	Emp #	Employee	Job	Hire Date
1	100	King	AD_PRES	17-JUN-87
2	101	Kochhar	AD_VP	21-SEP-89
3	102	De Haan	AD_VP	13-JAN-93
4	103	Hunold	IT_PROG	03-JAN-90
5	104	Ernst	IT_PROG	21-MAY-91
6	107	Lorentz	IT_PROG	07-FEB-99
7	124	Mourgos	ST_MAN	16-NOV-99
8	141	Rajs	ST_CLERK	17-OCT-95
9	142	Davies	ST_CLERK	29-JAN-97
10	143	Matos	ST_CLERK	15-MAR-98

. . .

19	205	Higgins	AC_MGR	07-JUN-94
20	206	Gietz	AC_ACCOUNT	07-JUN-94

9. The HR department has requested a report of all employees and their job IDs. Display the last name concatenated with the job ID (separated by a comma and space) and name the column `Employee and Title`.

	Employee and Title
1	Abel, SA_REP
2	Davies, ST_CLERK
3	De Haan, AD_VP
4	Ernst, IT_PROG
5	Fay, MK_REP
6	Gietz, AC_ACCOUNT
7	Grant, SA_REP
8	Hartstein, MK_MAN
9	Higgins, AC_MGR
10	Hunold, IT_PROG

. . .

19	Whalen, AD_ASST
20	Zlotkey, SA_MAN

10. To familiarize yourself with the data in the `EMPLOYEES` table, create a query to display all the data from that table. Separate each column output by a comma. Name the column title `THE_OUTPUT`.

	THE_OUTPUT
1	100,Steven,King,SKING,515.123.4567,AD_PRES,,17-JUN-87,24000,,90
2	101,Neena,Kochhar,NKOCHHAR,515.123.4568,AD_VP,100,21-SEP-89,17000,,90
3	102,Lex,De Haan,LDEHAAN,515.123.4569,AD_VP,100,13-JAN-93,17000,,90
4	103,Alexander,Hunold,AHUNOLD,590.423.4567,IT_PROG,102,03-JAN-90,9000,,60
5	104,Bruce,Ernst,BERNST,590.423.4568,IT_PROG,103,21-MAY-91,6000,,60
6	107,Diana,Lorentz,DLORENTZ,590.423.5567,IT_PROG,103,07-FEB-99,4200,,60
7	124,Kevin,Mourgos,KMOURGOS,650.123.5234,ST_MAN,100,16-NOV-99,5800,,50
8	141,Trenna,Rajs,TRAJS,650.121.8009,ST_CLERK,124,17-OCT-95,3500,,50
9	142,Curtis,Davies,CDAVIES,650.121.2994,ST_CLERK,124,29-JAN-97,3100,,50
10	143,Randall,Matos,RMATOS,650.121.2874,ST_CLERK,124,15-MAR-98,2600,,50

■ ■ |

19	205,Shelley,Higgins,SHIGGINS,515.123.8080,AC_MGR,101,07-JUN-94,12000,,110
20	206,William,Gietz,WGIETZ,515.123.8181,AC_ACCOUNT,205,07-JUN-94,8300,,110

Activity 6:

Pre-assessment section.

Final activity:

Write the **Conclusion** section.

Attached file that is required for this task (optional):

e-mail: a7donso@gmail.com