Practice 11

Practice name	Reporting Aggregated Data Using the Group Functions
Academic Program	Software Engineering
Subject name	Laboratory of Database Systems II
Unit	I. SQL.
Professor	Aldonso Becerra Sánchez
Due date	**October 28, 2021**
Due date with penalty	**October 29, 2021**
Elaboration date	**October 26, 2021**

Practice objective	Use SQL SELECT statements for retrieving data from database by means of different contexts using different Oracle functions.
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.

DESCRIBE THE GROUP FUNCTIONS

1. What result is returned by the following statement?

SELECT COUNT(*)

FROM DUAL;

(Choose the best answer.)

A. NULL

B. 0

C. 1

D. None of the above

2. Choose one correct statement regarding group functions.

A. Group functions may only be used when a GROUP BY clause is present.

B. Group functions can operate on multiple rows at a time.

C. Group functions only operate on a single row at a time.

D. Group functions can execute multiple times within a single group.

IDENTIFY THE AVAILABLE GROUP FUNCTIONS

3. What value is returned after executing the following statement?

SELECT SUM(SALARY)

FROM EMPLOYEES;

Assume there are 10 employee records and each contains a SALARY value of 100, except for 1, which has a null value in the SALARY field. (Choose the best answer.)

A. 900

B. 1000

C. NULL

D. None of the above

4. Which values are returned after executing the following statement?

SELECT COUNT(*), COUNT(SALARY)

FROM EMPLOYEES;

Assume there are 10 employee records and each contains a SALARY value of 100, except for 1, which has a null value in their SALARY field. (Choose all that apply.)

A. 10 and 10

B. 10 and NULL

C. 10 and 9

D. None of the above

5. What value is returned after executing the following statement?

SELECT AVG(NVL(SALARY,100))

FROM EMPLOYEES;

Assume there are ten employee records and each contains a SALARY value of 100, except for one employee, who has a null value in the SALARY field. (Choose the best answer.)

A. NULL

B. 90

C. 100

D. None of the above

GROUP DATA USING THE GROUP BY CLAUSE

6. What value is returned after executing the following statement?

SELECT SUM((AVG(LENGTH(NVL(SALARY,0)))))

FROM EMPLOYEES

GROUP BY SALARY;

Assume there are ten employee records and each contains a SALARY value of 100, except for one, which has a null value in the SALARY field. (Choose the best answer.)

A. An error is returned

B. 3

C. 4

D. None of the above

7. How many records are returned by the following query?

SELECT SUM(SALARY), DEPARTMENT_ID

FROM EMPLOYEES

GROUP BY DEPARTMENT_ID;

Assume there are 11 nonnull and 1 null unique DEPARTMENT_ID values. All records have a nonnull SALARY value. (Choose the best answer.)

A. 12

B. 11

C. NULL

D. None of the above

8. What values are returned after executing the following statement?

SELECT JOB_ID, MAX_SALARY

FROM JOBS

GROUP BY MAX_SALARY;

Assume that the JOBS table has ten records with the same JOB_ID value of DBA and the same MAX_SALARY value of 100. (Choose the best answer.)

A. One row of output with the values DBA, 100

B. Ten rows of output with the values DBA, 100

C. An error is returned

D. None of the above

INCLUDE OR EXCLUDE GROUPED ROWS USING THE HAVING CLAUSE

9. How many rows of data are returned after executing the following statement?

```
SELECT DEPT_ID, SUM(NVL(SALARY,100))
FROM EMP
GROUP BY DEPT_ID
HAVING SUM(SALARY) > 400;
```

Assume the EMP table has ten rows and each contains a SALARY value of 100, except for one, which has a null value in the SALARY field. The first and second five rows have DEPT_ID values of 10 and 20, respectively. (Choose the best answer.)

A. Two rows

B. One row

C. Zero rows

D. None of the above

10. How many rows of data are returned after executing the following statement?

```
SELECT DEPT_ID, SUM(SALARY)
FROM EMP
GROUP BY DEPT_ID
HAVING SUM(NVL(SALARY,100)) > 400;
```

Assume the EMP table has ten rows and each contains a SALARY value of 100, except for one, which has a null value in the SALARY field. The first and second five rows have DEPT_ID values of 10 and 20, respectively. (Choose the best answer.)

A. Two rows

B. One row

C. Zero rows

D. None of the above

Activity 2:

Propose an answer to the following issues:

- You would like to retrieve the earliest date from a column that stores DATE information. Can a group function be utilized to retrieve this value?

- Summary statistics are required by senior management. This includes details like number of employees, total staff salary cost, lowest salary, and highest salary values. Can such a report be drawn using one query?

- You are asked to list the number of unique jobs performed by employees in the organization. Counting the JOB_ID records will give you all the jobs. Is it possible to count the unique jobs?

- You wish to print name badges for the staff who work as sales representatives. Can the length of the shortest and longest LAST_NAME values be determined for these employees?

- Is it possible to count the records in each group, first by dividing the employee records by year of employment, then by job, and finally by salary?

- Is there a limit to the number of groups within groups that can be formed?

Activity 3:

Connect to the OE schema and complete the following tasks.

Using SQL Developer, connect to the OE schema and complete the following tasks. The PRODUCT_INFORMATION table lists items that are orderable and others that are planned, obsolete, or under development. You are required to prepare a report that groups the non-orderable products by their PRODUCT_STATUS and shows the number of products in each group and the sum of the LIST_PRICE of the products per group. Further, only the group-level rows, where the sum of the LIST_PRICE is greater than 4000, must be displayed. A product is non-orderable if the PRODUCT_STATUS value is not equal to the string 'orderable'.

NOTE: Capture an image for each statement output.

Activity 4:

This exercise must be performed using HR schema.

- The COUNTRIES table stores a list of COUNTRY_NAME values. You are required to calculate the average length of all the country names. Any fractional components must be rounded to the nearest whole number.

Query Result

SQL | All Rows Fetched: 1 in 0.09 seconds

	AVERAGE_COUNTRY_NAME_LENGTH
1	8

- Analysis of staff turnover is a common reporting requirement. You are required to create a report containing the number of employees who left their jobs, grouped by the year in which they left. The jobs they performed are also required. The results must be sorted in descending order based on the number of employees in each group. The report must list the year, the JOB_ID, and the number of employees who left a particular job in that year.

Query Result

SQL | All Rows Fetched: 9 in 0.02 seconds

	Quitting Year	JOB_ID	Number of Employees
1	2007	ST_CLERK	2
2	2001	AC_ACCOUNT	1
3	2005	AC_MGR	1
4	2006	AC_ACCOUNT	1
5	2006	SA_REP	1
6	2001	AD_ASST	1
7	2006	IT_PROG	1
8	2007	MK_REP	1
9	2007	SA_MAN	1

- The company is planning a recruitment drive and wants to identify the days of the week on which 15 or more staff members were hired. Your report must list the days and the number of employees hired on each of them.

Query Result

SQL | All Rows Fetched: 5 in 0.005 seconds

	TO_CHAR(HIRE_DATE,'DAY')	COUNT(*)
1	SATURDAY	19
2	THURSDAY	16
3	WEDNESDAY	15
4	SUNDAY	15
5	FRIDAY	19

NOTE: Capture an image for each statement output.

Activity 5:

At the end of this practice, you should be familiar with using group functions and selecting groups of data.

Determine the validity of the following three statements. Circle either True or False and explain the reason.

1. Group functions work across many rows to produce one result per group.
   True/False

2. Group functions include nulls in calculations.
   True/False

3. The `WHERE` clause restricts rows before inclusion in a group calculation.
   True/False

The HR department needs the following reports:

4. Find the highest, lowest, sum, and average salary of all employees. Label the columns as `Maximum`, `Minimum`, `Sum`, and `Average`, respectively. Round your results to the nearest whole number. Save your SQL statement as `lab_11_04.sql`. Run the query.

	Maximum	Minimum	Sum	Average
1	24000	2500	175500	8775

5. Modify the query in `lab_11_04.sql` to display the minimum, maximum, sum, and average salary for each job type. Resave `lab_11_04.sql` as `lab_11_05.sql`. Run the statement in `lab_11_05.sql`.

	JOB_ID	Maximum	Minimum	Sum	Average
1	IT_PROG	9000	4200	19200	6400
2	AC_MGR	12000	12000	12000	12000
3	AC_ACCOUNT	8300	8300	8300	8300
4	ST_MAN	5800	5800	5800	5800
5	AD_ASST	4400	4400	4400	4400
6	AD_VP	17000	17000	34000	17000
7	SA_MAN	10500	10500	10500	10500
8	MK_MAN	13000	13000	13000	13000
9	AD_PRES	24000	24000	24000	24000
10	SA_REP	11000	7000	26600	8867
11	MK_REP	6000	6000	6000	6000
12	ST_CLERK	3500	2500	11700	2925

6. Write a query to display the number of people with the same job.

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

Generalize the query so that the user in the HR department is prompted for a job title. Save the script to a file named `lab_11_06.sql`. Run the query. Enter `IT_PROG` when prompted.

	JOB_ID	COUNT(*)
1	IT_PROG	3

7. Determine the number of managers without listing them. Label the column as `Number of Managers`. *Hint: Use the `MANAGER_ID` column to determine the number of managers.*

	Number of Managers
1	8

8. Find the difference between the highest and lowest salaries. Label the column `DIFFERENCE`.

	DIFFERENCE
1	21500

9. Create a report to display the manager number and the salary of the lowest-paid employee for that manager. Exclude anyone whose manager is not known. Exclude any groups where the minimum salary is $6,000 or less. Sort the output in descending order of salary.

	MANAGER_ID	MIN(SALARY)
1	102	9000
2	205	8300
3	149	7000

10. Create a query to display the total number of employees and, of that total, the number of employees hired in 1995, 1996, 1997, and 1998. Create appropriate column headings.

	TOTAL	1995	1996	1997	1998
1	20	1	2	2	3

11. Create a matrix query to display the job, the salary for that job based on department number, and the total salary for that job, for departments 20, 50, 80, and 90, giving each column an appropriate heading.

	Job	Dept 20	Dept 50	Dept 80	Dept 90	Total
1	IT_PROG	(null)	(null)	(null)	(null)	19200
2	AC_MGR	(null)	(null)	(null)	(null)	12000
3	AC_ACCOUNT	(null)	(null)	(null)	(null)	8300
4	ST_MAN	(null)	5800	(null)	(null)	5800
5	AD_ASST	(null)	(null)	(null)	(null)	4400
6	AD_VP	(null)	(null)	(null)	34000	34000
7	SA_MAN	(null)	(null)	10500	(null)	10500
8	MK_MAN	13000	(null)	(null)	(null)	13000
9	AD_PRES	(null)	(null)	(null)	24000	24000
10	SA_REP	(null)	(null)	19600	(null)	26600
11	MK_REP	6000	(null)	(null)	(null)	6000
12	ST_CLERK	(null)	11700	(null)	(null)	11700

Activity 6:

Write the **Pre-assessment** section.

Final activity:

Write the **Conclusion** section.

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

e-mail: a7donso@gmail.com