

EXERCISE-8

Aggregating Data Using Group Functions

Objectives

After the completion of this exercise, the students be will be able to do the following:

- Identify the available group functions
- Describe the use of group functions
- Group data by using the GROUP BY clause
- Include or exclude grouped rows by using the HAVING clause

What Are Group Functions?

Group functions operate on sets of rows to give one result per group

Types of Group Functions

- AVG
- COUNT
- MAX
- MIN
- STDDEV
- SUM
- VARIANCE

Each of the functions accepts an argument. The following table identifies the options that you can use in the syntax:

| Function | Description |
|---|--|
| AVG ([DISTINCT <u>ALL</u>] n) | Average value of n, ignoring null values |
| COUNT (({ * [DISTINCT <u>ALL</u>] expr })) | Number of rows, where <i>expr</i> evaluates to something other than null (count all selected rows using *, including duplicates and rows with nulls) |
| MAX ([DISTINCT <u>ALL</u>] expr) | Maximum value of <i>expr</i> , ignoring null values |
| MIN ([DISTINCT <u>ALL</u>] expr) | Minimum value of <i>expr</i> , ignoring null values |
| STDDEV ([DISTINCT <u>ALL</u>] x) | Standard deviation of n, ignoring null values |
| SUM ([DISTINCT <u>ALL</u>] n) | Sum values of n, ignoring null values |
| VARIANCE ([DISTINCT <u>ALL</u>] x) | Variance of n, ignoring null values |

Group Functions: Syntax

```
SELECT [column,] group_function(column), ...  
FROM table  
[WHERE condition]  
[GROUP BY column]  
[ORDER BY column];
```

Guidelines for Using Group Functions

- DISTINCT makes the function consider only nonduplicate values; ALL makes it consider every value, including duplicates. The default is ALL and therefore does not need to be specified.


```
SELECT department_id, AVG(salary) FROM employees GROUP BY department_id
HAVING max(salary)>10000;
```

Example displays the job ID and total monthly salary for each job that has a total payroll exceeding \$13,000. The example excludes sales representatives and sorts the list by the total monthly salary.

```
SELECT job_id, SUM(salary) PAYROLL FROM employees WHERE job_id NOT LIKE
'%REP%'
GROUP BY job_id HAVING SUM(salary) > 13000 ORDER BY SUM(salary);
```

Nesting Group Functions

Display the maximum average salary:

Group functions can be nested to a depth of two. The slide example displays the maximum average salary.

```
SELECT MAX(AVG(salary)) FROM employees GROUP BY department_id;
```

Summary

In this exercise, students should have learned how to:

- Use the group functions COUNT, MAX, MIN, and AVG
- Write queries that use the GROUP BY clause
- Write queries that use the HAVING clause

```
SELECT column, group_function
FROM table
[WHERE condition]
[GROUP BY group_by_expression]
[HAVING group_condition]
[ORDER BY column];
```

Find the Solution for the following:

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

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 prior to 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 Maximum, Minimum, Sum, and Average, respectively. Round your results to the nearest whole number

Selol
 Round (max(salary)) as maximum;
 Round (min(salary)) as minimum;
 Round (sum(salary)) as sum;
 Round (Avg(salary)) as Average;
 from employees;

5. Modify the above query to display the minimum, maximum, sum, and average salary for each job type. *From employees*

*Select job_id, MIN(salary) as min_sal, MAX(salary) as max_sal, SUM(salary) as total_sal, AVG(salary) as avg_sal
from employees*

6. Write a query to display the number of people with the same job. Generalize the query so that the user in the HR department is prompted for a job title.

Select count() as "Number of employees"
from employees
where job_id = ' <job title> ';*

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

*Select count(distinct manager_id) as "Number of managers"
from employees where manager_id is not null*

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

*Select max(salary) - min(salary) as Difference
from employees*

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.

*Select manager_id, min(salary) as "Lowest of salary"
from employees
where manager_id is not NULL
order by "Lowest of salary" desc*

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.

Select count() as "Total employees",
sum(case when hire_date <= 1995 then 1 else 0 end) as "Hired in 1995",
sum(case when hire_date <= 1996 then 1 else 0 end) as "Hired in 1996",
sum(case when hire_date <= 1997 then 1 else 0 end) as "Hired in 1997",
sum(case when hire_date <= 1998 then 1 else 0 end) as "Hired in 1998"*

Sum (cost which chn (thorndale 1444). 1907
 on "thorndale 1907";
 From employees

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.

select job_id
 sum (cost when department_id is then salary B/LR O/BND) as cost, 20;
 sum (cost when department_id is then salary B/LR O/BND) as cost, 50;
 sum (cost when department_id is then salary B/LR O/BND) as cost, 80;
 sum (cost when department_id is then salary B/LR O/BND) as cost, 90;
 sum (salary) as Total salary;

12. Write a query to display each department's name, location, number of employees, and the average salary for all the employees in that department. Label the column name-Location, Number of people, and salary respectively. Round the average salary to two decimal places.

select d.department_name || ' - ' || l.city as "Name Location",
 count (e.employee_id) as "Number of people",
 round (avg (e.salary), 2) as salary
 from department d
 join location l on d.location_id = l.location_id
 group by d.department_name, l.city;

| Evaluation Procedure | Marks awarded |
|----------------------|---------------|
| Query(5) | |
| Execution (5) | |
| Viva(5) | |
| Total (15) | |
| Faculty Signature | |