Database Programming

Group Functions

ORACLE ACADEMY

Objectives

This lesson covers the following objectives:

- Define and give an example of the seven group functions: SUM, AVG, COUNT, MIN, MAX, STDDEV, VARIANCE
- Construct and execute a SQL query using group functions
- Construct and execute group functions that operate only with numeric data types

Purpose

What if you were writing an article for the school newspaper and, to make a point, you wanted to know the average age of the students at your school?

What would you have to do to get this information? You could ask each student his age in years, months, and days, add up all of these numbers, and then divide by the number of students in your school. That would be one way -- a very slow and difficult way -- to find this information.

Purpose (cont.)

What if you needed to know this immediately so that you could meet a 3:00 p.m. deadline? You might have a problem!

What if each student's date of birth was in a school database in the STUDENT table? It would be so easy then!

In this lesson, you are going to learn about the power of group functions in SQL.

GROUP Functions

In SQL, the following group functions can operate on a whole table or on a specific grouping of rows. Each function returns one result.

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

GROUP Functions List

- MIN: Used with columns that store any data type to return the minimum value.
- MAX: Used with columns that store any data type to return the maximum value.
- SUM: Used with columns that store numeric data to find the total or sum of values.
- AVG: Used with columns that store numeric data to compute the average.

SELECT MAX(salary)
FROM employees;

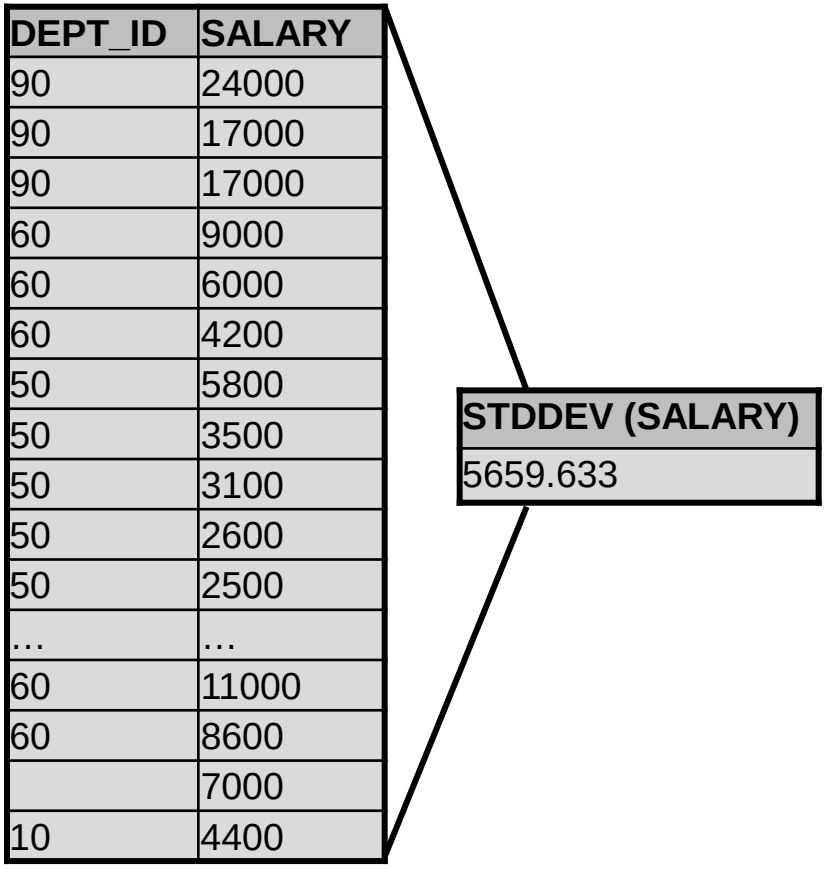
DEPT_ID	SALARY
90	24000
90	17000
90	17000
60	9000
60	6000
60	4200
50	5800
50	3500
50	3100
50	2600
50	2500
...	...
60	11000
60	8600
	7000
10	4400

MAX (SALARY)
24000

GROUP Functions List (cont.)

- COUNT: Returns the number of rows.
- VARIANCE: Used with columns that store numeric data to calculate the spread of data around the mean. For example, if the average grade for the class on the last test was 82% and the student's scores ranged from 40% to 100%, the variance of scores would be greater than if the student's scores ranged from 78% to 88%.

SELECT STDDEV(salary)
FROM employees;



DEPT_ID	SALARY
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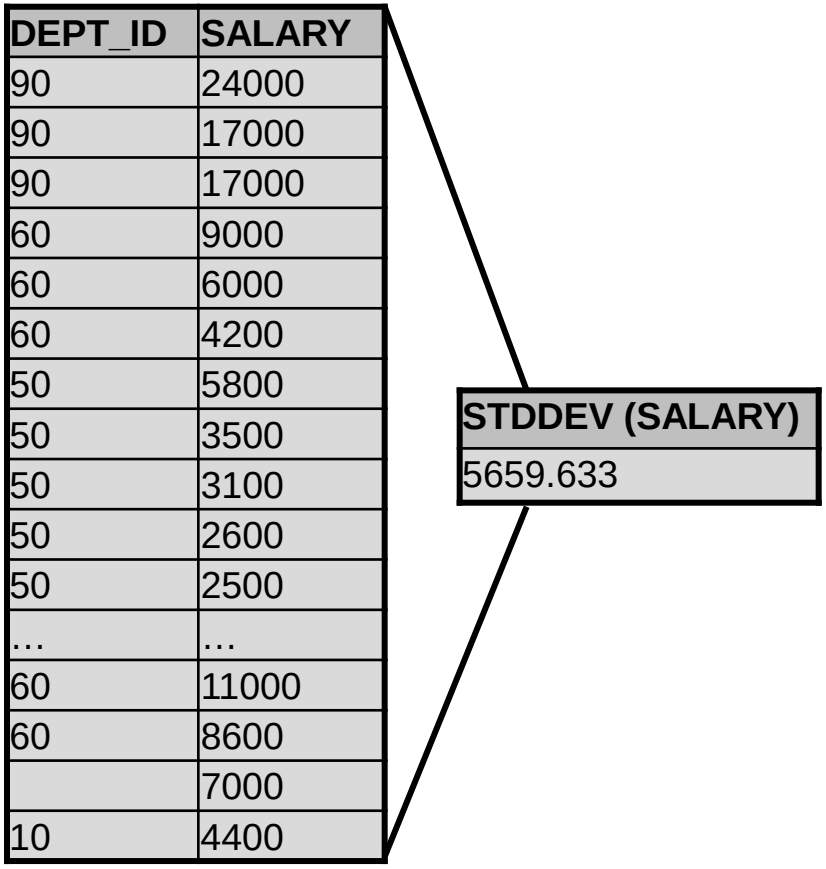
90	17000
60	9000
60	6000
60	4200
50	5800
50	3500
50	3100
50	2600
50	2500
…	…
60	11000
60	8600
	7000
10	4400

STDDEV (SALARY)
5659.633

GROUP Functions List (cont.)

- STDDEV: Similar to variance, standard deviation measures the spread of data. For two sets of data with approximately the same mean, the greater the spread, the greater the standard deviation.

SELECT STDDEV(salary)
FROM employees;



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…	…
60	11000
60	8600
	7000
10	4400

STDDEV (SALARY)
5659.633

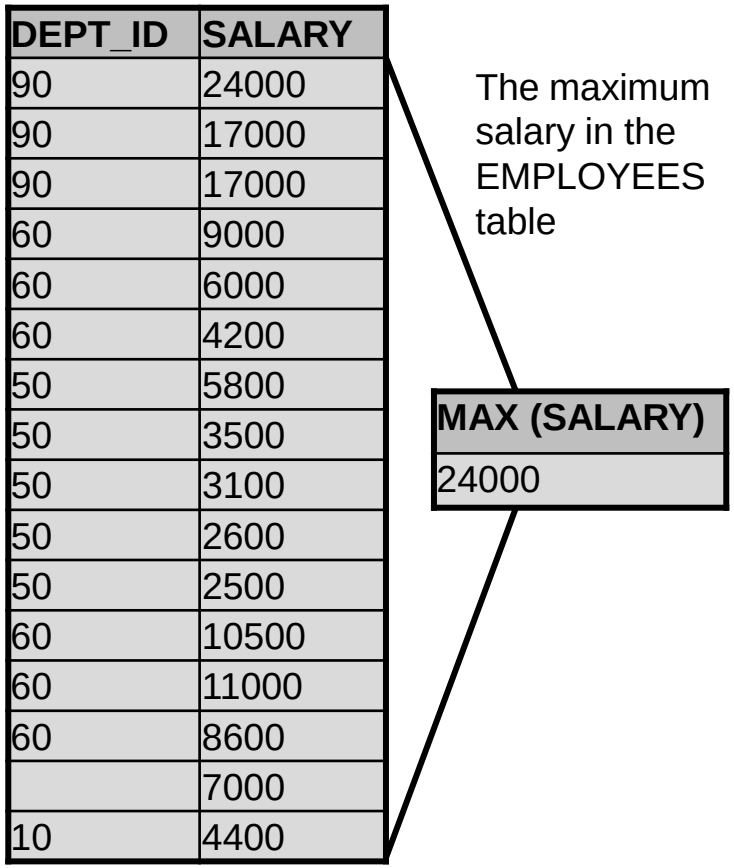
GROUP Functions SELECT Clause

Group functions are written in the SELECT clause:

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

What are Group Functions?

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



GROUP Function Cautions

Important things you should know about group functions:

- Group functions cannot be used in the WHERE clause:

```
SELECT type_code
FROM d_songs
WHERE SUM (duration) = 100;
```

ORA-00934: group function is not allowed here

GROUP Function and NULL

Group functions ignore NULL values. In the example below, the (null) values were not used to find the average overtime rate.

FIRST_NAME	OVERTIME_RATE
Sue	10.25
Bob	(null)
Monique	(null)

```
SELECT AVG(overtime_rate)
FROM f_staffs;
```

AVG(OVERTIME_RATE)
10.25

More Than One Group Function

You can have more than one group function in the SELECT clause, on the same or different columns.

You can also restrict the group function to a subset of the table using a WHERE clause.

```
SELECT MAX(salary), MIN(salary), MIN(employee_id)
FROM employees
WHERE department_id = 60;
```

MAX(salary)	MIN(salary)	MIN(employee_id
9000	4200	103

MIN and MAX Group Functions

Two group functions, MIN and MAX, can be used with any data type.

Using these functions, it is possible to find the name of the last person in a list, the smallest salary, or the earliest hire date.

For example, it is easy to find the person whose name is first in an alphabetical list of employees.

```
SELECT MIN(last_name)
FROM employees;
```

MIN(LAST_NAME)
Abel

Rules for Group Functions

- Group functions ignore null values.
- Group functions cannot be used in the WHERE clause.
- MIN and MAX can be used with any data type; SUM, AVG, STDDEV, and VARIANCE can be used only with numeric data types.

Terminology

Key terms used in this lesson included:

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

Summary

In this lesson, you should have learned how to:

- Define and give an example of the seven group functions: SUM, AVG, COUNT, MIN, MAX, STDDEV, VARIANCE
- Construct and execute a SQL query using group functions
- Construct and execute group functions that operate only with numeric data types