Group Functions

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What Will I Learn?

In this lesson, you will learn 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

💡 Why Learn It?

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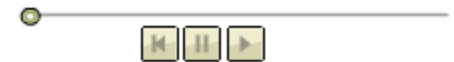
What if you needed to know this now so that you could meet a 3:00 p.m. deadline? You might have a problem!

Why Learn It?

What if all of the students' dates of birth were 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.

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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

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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

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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%.

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;

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

STDDEV (SALARY)
5659.633

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GROUP FUNCTIONS

Group functions are written in the SELECT clause:

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

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	10500
60	11000
60	8600
	7000
10	4400

The maximum salary in the EMPLOYEES table

MAX (SALARY)
24000

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

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There are a few 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;**

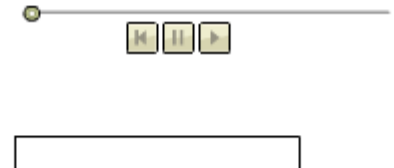**ORA-00934: group function is not allowed here**

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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

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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

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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

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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.

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Terminology

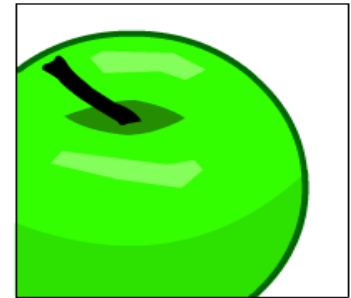Key terms used in this lesson include:

Aggregate

AVG

COUNT

Group functions

MAX

MIN

STDDEV

SUM

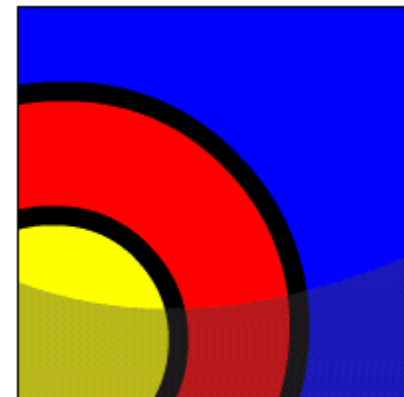VARIANCE

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Summary

In this lesson you have learned 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

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Summary

Practice Guide

The link for the lesson practice guide can be found in the course resources in Section 0.