
# Group Functions

Group Functions

# 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 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 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

Group Functions

**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.

| 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 |
| ... | ... |
| | 7000 |
| 10 | 4400 |

```
1 SELECT MAX(salary), MIN(salary) FROM employees;
```

Results | Explain | Describe | Saved SQL | History

| MAX(SALARY) | MIN(SALARY) |
|---|---|
| 24000 | 2500 |

# GROUP Functions List

Group Functions

**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.

| 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 |
| ... | ... |
| | 7000 |
| 10 | 4400 |

```
1 SELECT SUM(salary), AVG(salary) FROM employees;
```

Results | Explain | Describe | Saved SQL | History

| SUM(SALARY) | AVG(SALARY) |
|---|---|
| 175500 | 8775 |

# GROUP Functions List

Group Functions

**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

# GROUP Functions SELECT Clause

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

*Group functions cannot be used in the WHERE clause:*

```
SELECT last_name, first_name
FROM employees
WHERE salary = MIN(salary);
```

ORA-00934: group function is not allowed here

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



# GROUP Function examples

Group Functions

## MIN

- Used with columns that store any data type to return the minimum value.

```
1 SELECT MIN(life_expect_at_birth) AS "Lowest Life Exp"
2 FROM wf_countries;
```

Results | Explain | Describe | Saved SQL | History

| Lowest Life Exp |
| --- |
| 32.62 |

```
1 SELECT MIN(country_name)
2 FROM wf_countries;
```

Results | Explain | Describe | Saved SQL | History

| MIN(COUNTRY_NAME) |
| --- |
| Anguilla |

```
1 SELECT MIN(hire_date)
2 FROM employees;
```

Results | Explain | Describe | Saved SQL | History

| MIN(HIRE_DATE) |
| --- |
| 06/17/1987 |

# GROUP Function examples

Group Functions

## MAX

- Used with columns that store any data type to return the maximum value.

```
1 SELECT MAX(life_expect_at_birth) AS "Highest Life Exp"
2 FROM wf_countries;
```

Results | Explain | Describe | Saved SQL | History

| Highest Life Exp |
| --- |
| 83.51 |

```
1 SELECT MAX(country_name) FROM wf_countries
```

Results | Explain | Describe | Saved SQL | History

| MAX(COUNTRY_NAME) |
| --- |
| Western Sahara |

```
1 SELECT MAX(hire_date) FROM employees;
```

Results | Explain | Describe | Saved SQL | History

| MAX(HIRE_DATE) |
| --- |
| 01/29/2000 |

# GROUP Function examples

Group Functions

## SUM

- Used with columns that store numeric data to find the total or sum of values.

```
1 SELECT SUM(area)
2 FROM wf_countries
3 WHERE region_id = 29;
```

Results | Explain | Describe | Saved SQL | History

| SUM(AREA) |
| --- |
| 241424 |

```
1 SELECT SUM(salary)
2 FROM employees
3 WHERE department_id = 90;
```

Results | Explain | Describe | Saved SQL | History

| SUM(SALARY) |
| --- |
| 58000 |

# GROUP Function examples

Group Functions

## AVG

- Used with columns that store numeric data to compute the average.

```
1 SELECT AVG(area)
2 FROM wf_countries
3 WHERE region_id = 29;
```

Results | Explain | Describe | Saved SQL | History

| AVG(AREA) |
| --- |
| 9656.96 |

```
1 SELECT ROUND(AVG(salary), 2)
2 FROM employees
3 WHERE department_id = 90;
```

Results | Explain | Describe | Saved SQL | History

| ROUND(AVG(SALARY),2) |
| --- |
| 19333.33 |

# GROUP Function examples

Group Functions

**VARIANCE:**

- Used with columns that store numeric data to calculate the spread of data around the mean.

**STDDEV:**

- Similar to variance, standard deviation measures the spread of data.

```
1 SELECT ROUND(VARIANCE(life_expect_at_birth),4),
2        ROUND(STDDEV(life_expect_at_birth), 4)
3 FROM wf_countries;
```

Results | Explain | Describe | Saved SQL | History

| ROUND(VARIANCE(LIFE_EXPECT_AT_BIRTH),4) | ROUND(STDDEV(LIFE_EXPECT_AT_BIRTH),4) |
|---|---|
| 143.2394 | 11.9683 |

# GROUP Function and NULL

- Group functions ignore NULL values.
- In the example,
  - the null values were **not used** to find the **average** *commission_pct*.

```
1 SELECT AVG(commission_pct) FROM employees;
```

Results | Explain | Describe | Saved SQL | History

| AVG(COMMISSION_PCT) |
|---|
| .2125 |

| LAST_NAME | COMMISSION_PCT |
|---|---|
| King | - |
| Kochhar | - |
| De Haan | - |
| Whalen | - |
| Higgins | - |
| Gietz | - |
| Zlotkey | .2 |
| Abel | .3 |
| Taylor | .2 |
| Grant | .15 |
| Mourgos | - |
| … | … |



# More Than One Group Function



```
1  SELECT MAX(salary),
2         MIN(salary),
3         MIN(employee_id)
4  FROM employees
5  WHERE department_id = 60;
```

Results | Explain | Describe | Saved SQL | History

| MAX(SALARY) | MIN(SALARY) | MIN(EMPLOYEE_ID) |
|---|---|---|
| 9000 | 4200 | 103 |

# Rules for Group Functions