Summary: in this tutorial, you will learn about MySQL aggregate functions including AVG COUNT , SUM , MAX and MIN.

Introduction to MySQL aggregate functions

An aggregate function performs a calculation on multiple values and returns a single value.

For example, you can use the AVG() aggregate function that takes multiple numbers and returns the average value of the numbers.

The following illustrates the syntax of an aggregate function:

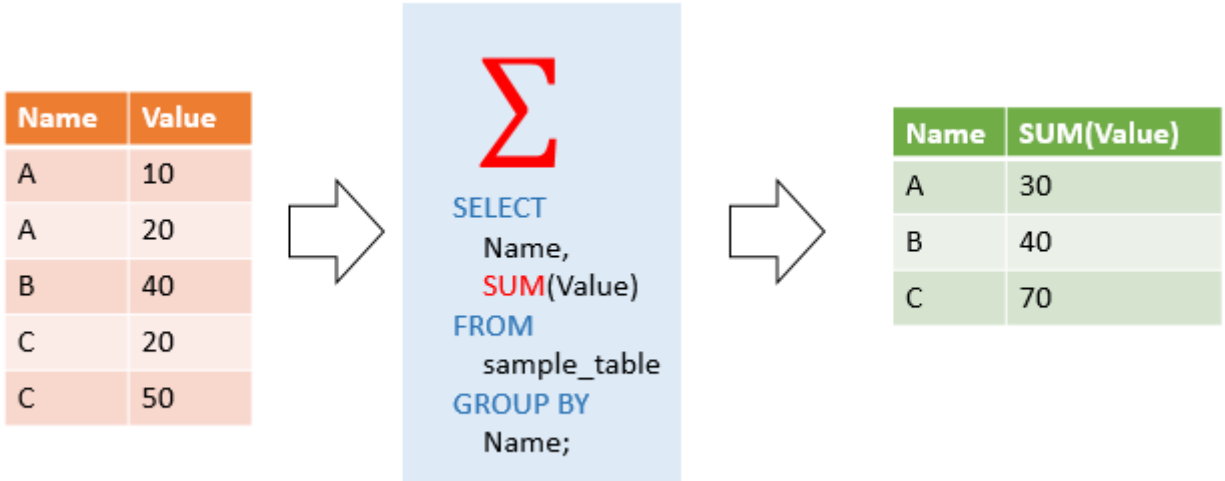
```
function_name(DISTINCT | ALL expression)
```

In this syntax:

- First, specify the name of the aggregate function e.g., AVG() . See the list of aggregate functions in the following section.
- Second, use DISTINCT if you want to calculate based on distinct values or ALL in case you want to calculate all values including duplicates. The default is ALL .
- Third, specify an expression that can be a column or expression which involves column and arithmetic operators.

The aggregate functions are often used with the GROUP BY clause to calculate an aggregate value for each group e.g., the average value by the group or the sum of values in each group.

The following picture illustrates the SUM() aggregate function is used in conjunction with a GROUP BY clause:



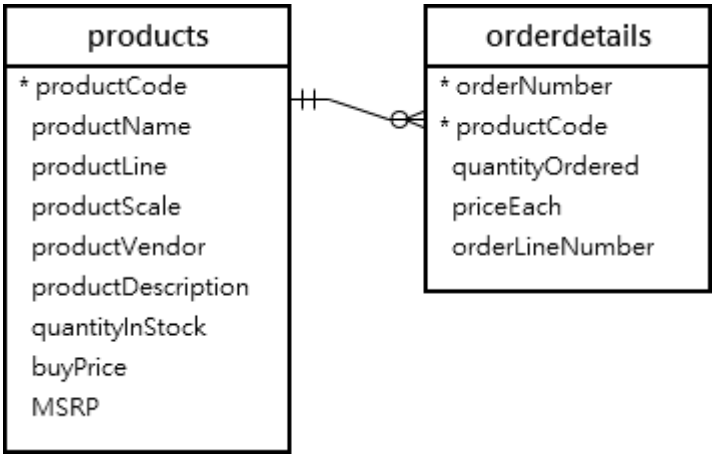
MySQL supports the following aggregate functions:

Aggregate function	Description
AVG()	Return the average of non-NULL values.

Aggregate function	Description
BIT_AND()	Return bitwise AND.
BIT_OR()	Return bitwise OR.
BIT_XOR()	Return bitwise XOR.
COUNT()	Return the number of rows in a group, including rows with NULL values.
GROUP_CONCAT()	Return a concatenated string.
JSON_ARRAYAGG()	Return result set as a single JSON array.
JSON_OBJECTAGG()	Return result set as a single JSON object.
MAX()	Return the highest value (maximum) in a set of non-NULL values.
MIN()	Return the lowest value (minimum) in a set of non-NULL values.
STDEV()	Return the population standard deviation.
STDDEV_POP()	Return the population standard deviation.
STDDEV_SAMP()	Return the sample standard deviation.
SUM()	Return the summation of all non-NULL values a set.
VAR_POP()	Return the population standard variance.
VARP_SAM()	Return the sample variance.
VARIANCE()	Return the population standard variance.

MySQL aggregate function examples

We will use the products and orderdetails tables from the sample databasefor demonstration:



MySQL aggregate function – AVG() function examples

The AVG() function calculates the average value of a set of values. It ignores NULL in the calculation.

```
AVG(expression)
```

For example, you can use the AVG function to calculate the average buy price of all products in the products table by using the following query:

```
SELECT
    AVG(buyPrice) average_buy_price
FROM
    products;
```

Try It Out

	average_buy_price
▶	54.395182

The following example uses the AVG() function to calculate the average buy price for each product line:

```
SELECT
    productLine,
    AVG(buyPrice)
FROM
    products
GROUP BY productLine
ORDER BY productLine;
```

Try It Out

	productLine	AVG(buyPrice)
▶	Classic Cars	64.446316
	Motorcycles	50.685385
	Planes	49.629167
	Ships	47.007778
	Trains	43.923333
	Trucks and Buses	56.329091
	Vintage Cars	46.066250

MySQL aggregate function – COUNT() function examples

The COUNT() function returns the number of the value in a set.

For example, you can use the COUNT() function to get the number of products in the products table as shown in the following query:

```
SELECT
    COUNT(*) AS total
FROM
    products;
```

Try It Out

	total
▶	110

The following statement uses the `COUNT()` function with the `GROUP BY` clause to get the number of products for each product line:

```
SELECT
    productLine,
    COUNT(*)
FROM
    products
GROUP BY productLine
ORDER BY productLine;
```

Try It Out

	productLine	COUNT(*)
▶	Classic Cars	38
	Motorcycles	13
	Planes	12
	Ships	9
	Trains	3
	Trucks and Buses	11
	Vintage Cars	24

MySQL aggregate function – SUM() function examples

The `SUM()` function returns the sum of values in a set. The `SUM()` function ignores `NULL`. If no matching row found, the `SUM()` function returns NULL.

To get the total order value of each product, you can use the `SUM()` function in conjunction with the `GROUP BY` clause as follows:

```
SELECT
    productCode,
    SUM(priceEach * quantityOrdered) total
FROM
    orderDetails
GROUP BY productCode
ORDER BY total DESC;
```

Try It Out

productCode	total
S18_3232	276839.98
S12_1108	190755.86
S10_1949	190017.96
S10_4698	170686.00
S12_1099	161531.48
S12_3891	152543.02
S18_1662	144959.91
S18_2238	142530.63
S18_1749	140535.60
S12_2823	135767.03
S24_3856	134240.71
S12_3148	132363.79

To see the result in more detail, you can jointhe `orderdetails` table to the `products` table as shown in the following query:

```
SELECT
    productCode,
    productName,
    SUM(priceEach * quantityOrdered) total
FROM
    orderDetails
        INNER JOIN
    products USING (productCode)
GROUP BY productCode
ORDER BY total;
```

Try It Out

productCode	productName	total
S24_1937	1939 Chevrolet Deluxe Coupe	28052.94
S24_3969	1936 Mercedes Benz 500k Roadster	29763.39
S24_2972	1982 Lamborghini Diablo	30972.87
S24_2840	1958 Chevy Corvette Limited Edition	31627.96
S32_2206	1982 Ducati 996 R	33268.76
S24_2022	1938 Cadillac V-16 Presidential Limousine	38449.09
S50_1341	1930 Buick Marquette Phaeton	41599.24
S24_1628	1966 Shelby Cobra 427 S/C	42015.54
S72_1253	Boeing X-32A JSF	42692.53
S18_4668	1939 Cadillac Limousine	44037.84
S18_2248	1911 Ford Town Car	45306.77

MySQL aggregate function – MAX() function examples

The `MAX()` function returns the maximum value in a set.

```
MAX(expression)
```

For example, you can use the `MAX()` function to get the highest buy price from the `products` table as shown in the following query:

```
SELECT
     MAX(buyPrice) highest_price
FROM
     products;
```

Try It Out

	highest_price
▶	103.42

The following statement uses the MAX() function with the GROUP BY clause to get the highest price per product line:

```
SELECT
    productLine, MAX(buyPrice)
FROM
    products
GROUP BY productLine
ORDER BY MAX(buyPrice) DESC;
```

Try It Out

	productLine	MAX(buyPrice)
▶	Classic Cars	103.42
	Motorcycles	91.02
	Vintage Cars	86.70
	Trucks and Buses	84.76
	Ships	82.34
	Planes	77.27
	Trains	67.56

MySQL aggregate function – MIN() function examples

The MIN() function returns the minimum value in a set of values.

```
MIN(expression)
```

For example, the following query uses the MIN() function to find the lowest price from the products table:

```
SELECT
    MIN(buyPrice) lowest_price
FROM
    products;
```

Try It Out

	lowest_price
▶	15.91

The following example uses the `MIN()` function with the `GROUP BY` clause to get the lowest price per product line:

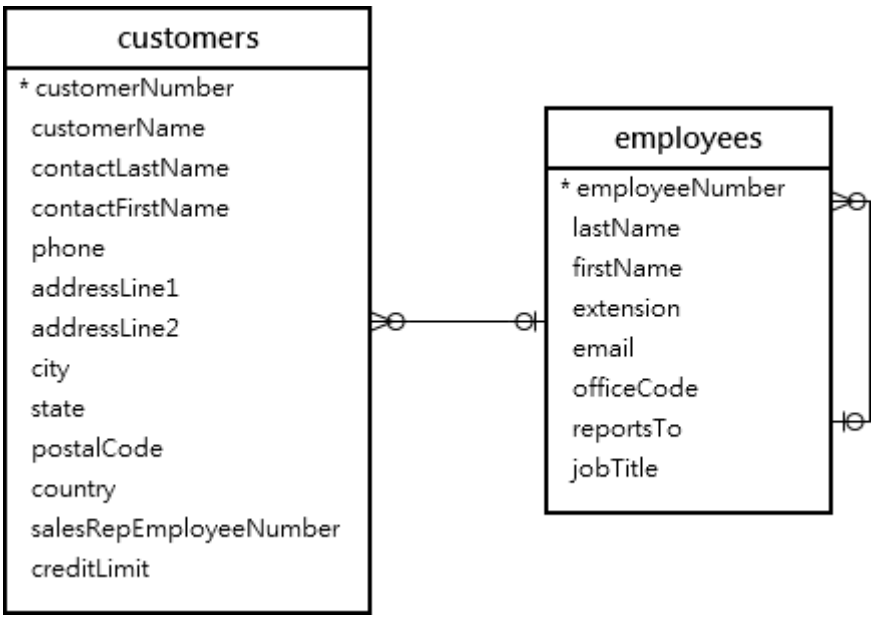
```
SELECT
    productLine,
    MIN(buyPrice)
FROM
    products
GROUP BY productLine
ORDER BY MIN(buyPrice);
```

Try It Out

	productLine	MIN(buyPrice)
▶	Classic Cars	15.91
	Vintage Cars	20.61
	Motorcycles	24.14
	Trucks and Buses	24.92
	Trains	26.72
	Planes	29.34
	Ships	33.30

MySQL aggregate function – GROUP_CONCAT() function example

The `GROUP_CONCAT()` concatenates a set of strings and returns the concatenated string. See the following `employees` and `customers` tables:



The following statement uses the `GROUP_CONCAT()` function to return the sales staffs and list of customers that each sales staff is in charge of:

```
SELECT
    firstName,
    lastName,
    GROUP_CONCAT(
        DISTINCT customername
        ORDER BY customerName) customers
```

```
FROM
    employees
INNER JOIN customers
        ON customers.salesRepEmployeeNumber = employeeNumber
GROUP BY employeeNumber
ORDER BY firstName , lastname;
```

Try It Out

firstName	lastName	customers
Andy	Fixter	Anna's Decorations, Ltd,Australian Collectables, Ltd,Australian Collectors, Co.,Australian Gift Network, Co,Souveniers And Things Co.
Barry	Jones	Baane Mini Imports,Bavarian Collectables Imports, Co.,Blauer See Auto, Co.,Clover Collections, Co.,Herkku Gifts,Norway Gifts By Mail, Co.,Scandinavian Gift Ideas,Toms Spezialitäten, Ltd,Volvo Model Replicas, Co
Foon Yue	Tseng	American Souvenirs Inc,Classic Legends Inc.,Microscale Inc.,Muscle Machine Inc,Québec Home Shopping Network,Super Scale Inc.,Vitachrome Inc.
George	Vanauf	Canadian Gift Exchange Network,Gift Depot Inc.,Gift Ideas Corp.,Land of Toys Inc.,Mini Classics,Motor Mint Distributors Inc.,Royal Canadian Collectables, Ltd.,Tekni Collectables Inc.
Gerard	Hernandez	Alpha Cognac,Atelier graphique,Auto Associés & Cie.,Daedalus Designs Imports,Euro+ Shopping Channel,La Rochelle Gifts,Mini Caravy
Julie	Firrelli	Cambridge Collectables Co.,Classic Gift Ideas, Inc,Collectables For Less Inc.,Diecast Collectables,Mini Creations Ltd.,Online Mini Collectables
Larry	Bott	AV Stores, Co.,Double Decker Gift Stores, Ltd,giftsbymail.co.uk,Oulu Toy Supplies, Inc.,Stylish Desk Decors, Co.,Suominen Souveniers,Toys of Finland, Co.,UK Collectables, Ltd.