

SQL DML. Part 2.

Aggregate Functions

SELECT Statement - Aggregates



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ISO SQL standard defines five aggregate functions:

- COUNT returns number of values in specified column
- SUM returns sum of values in specified column
- AVG returns average of values in specified column
- MIN returns smallest value in specified column
- MAX returns largest value in specified column



SELECT Statement - Aggregates

- Each operates on a single column of a table and returns a single value.
- COUNT, MIN, and MAX apply to numeric and non-numeric fields, but SUM and AVG may be used on numeric fields only.
- Apart from COUNT(*), each function eliminates nulls first and operates only on remaining non-null values.



SELECT Statement - Aggregates

- COUNT(*) counts all rows of a table, regardless of whether nulls or duplicate values occur.
- Can use DISTINCT before column name to eliminate duplicates.
- DISTINCT has no effect with MIN/MAX, but may have with SUM/AVG.

```
SELECT COUNT(name)
FROM mccPlayer
WHERE p_town = 'Alnwick';
```



SELECT Statement - Aggregates

Aggregate functions can be used only in **SELECT** list and in **HAVING** clause.

If **SELECT** list includes an aggregate function and there is no **GROUP BY** (in part 5) clause, **SELECT** list cannot reference a column without an aggregate function. For example, the result of the following is either indeterminate, or the query is illegal:

```
SELECT age, COUNT(name)
FROM mccPlayer
WHERE p_town = 'Alnwick';
```



Non-full Aggregates Error

For MariaDB (a free, open-source fork of MySQL):

“If you select a non-grouped column or a value computed from a non grouped column, it is undefined which row the returned value is taken from. This is not permitted if the ONLY_FULL_GROUP_BY SQL_MODE is used.”,

<https://mariadb.com/kb/en/group-by/>

City MySQL/MariaDB server has not got this parameter (ONLY_FULL_GROUP_BY) enabled.

Examples



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How many matches have been played?

```
SELECT COUNT(*) FROM mccMatches;
```

How many players are over 50?

```
SELECT COUNT(age) FROM mccPlayer  
WHERE age >= 50;
```

Examples



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How many grounds are there?

```
SELECT COUNT(g_town) FROM mccGround;
```

Is that really right?

```
SELECT COUNT(DISTINCT g_town) FROM mccGround;
```




Examples. Other functions.

What is the highest batting score in any match?

```
SELECT MAX(batting_score) FROM mccMatch_performance;
```

What is the lowest batting score in any match?

```
SELECT MIN(batting_score) FROM mccMatch_performance;
```

What is the average batting score across all matches?

```
SELECT AVG(batting_score) FROM mccMatch_performance;
```

How many runs have been scored by all players in all matches?

```
SELECT SUM(batting_score) FROM mccMatch_performance;
```



Examples. Other functions.

What is the highest batting score made since 2012?

```
SELECT MAX(batting_score) FROM mccMatch_performance  
WHERE match_date > 120100;
```

What is the total batting score of the match on 100615?

```
SELECT SUM(batting_score) FROM mccMatch_performance  
WHERE match_date = 100615;
```

Arithmetic Operations



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OPERATORS	OPERATION	EXAMPLE
+	Addition Operator	SELECT 10 + 2; (output = 12)
-	Subtraction Operator	SELECT 10 - 2; (output = 8)
*	Multiplication Operator	SELECT 10 * 2; (output = 20)
/	Division Operator	SELECT 10 / 2; (output = 5.0000)
DIV	Integer Division	SELECT 10 DIV 2; (output = 5)
% or MOD	Modulus Operator	SELECT 10 % 2 (output = 0) SELECT 10 % 3 (output = 1)

Example



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```
SELECT AVG(batting_score),  
       SUM(batting_score) / COUNT(batting_score) as Average,  
       SUM(batting_score * batting_score) as "Sum of Squares",  
       SUM(batting_score) * SUM(batting_score) as "Squared Sum",  
       COUNT(DISTINCT (batting_score % 10)) as "Distinct modulus"  
FROM mccMatch_performance;
```