

Built-in Functions

Functions and Wildcards in MySQL Server



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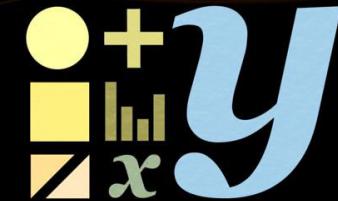
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sli.do

#JavaDB



Functions in MySQL Server

SQL Functions

- String Functions – for manipulating text, both from table values or user input
 - E.g. concatenate column values
- Math Functions – calculations and working with aggregate data
 - E.g. perform geometry and currency operations
- Date and Time Functions
 - E.g. find length of timespan
- Other





String Functions

String Functions

- **SUBSTRING()** – extracts part of a string

SUBSTRING(*String*, *Position*)

SUBSTRING(*String*, *Position*, *Length*)

SUBSTRING(*String* FROM *Position* FOR *Length*)

SUBSTRING - Example

- Get short summary of article

```
SELECT `article_id`, `author`, `content`,  
       SUBSTRING(`content`, 1, 200) AS 'Summary'  
FROM `articles`;
```

Problem: Find Book Titles

- Write a query to find all book titles that start with "The"
 - Query book_library database

title
The Mysterious Affair at Styles
The Big Four
The Murder at the Vicarage
The Mystery of the Blue Train
The Ring
The Alchemist
The Fifth Mountain
The Zahir
The Dead Zone
The Hobbit
The Adventures of Tom Bombadil

Solution: Find Book Titles

```
SELECT title FROM books WHERE  
SUBSTRING(title, 1, 3) = "The";
```



title
The Mysterious Affair at Styles
The Big Four
The Murder at the Vicarage
The Mystery of the Blue Train
The Ring
The Alchemist
The Fifth Mountain
The Zahir
The Dead Zone
The Hobbit
The Adventures of Tom Bombadil

String Functions (2)

- **REPLACE** – replaces specific string with another
 - Performs a case-sensitive match

String to replace

REPLACE(*String*, *Pattern*, *Replacement*)

Field from table

Replacement
pattern

REPLACE - Example

- Censor the word **blood** from album names

```
SELECT REPLACE(`title`, 'blood', '*****')
    AS 'Title'
  FROM `album`;
```

Problem: Replace Titles

- Write a query to find all book titles that start with "The" and replace the substring with "***"
- Query book_library database

title
*** Mysterious Affair at Styles
*** Big Four
*** Murder at the Vicarage
*** Mystery of the Blue Train
*** Ring
*** Alchemist
*** Fifth Mountain
*** Zahir
*** Dead Zone
*** Hobbit
*** Adventures of Tom Bombadil

Solution: Replace Titles

```
UPDATE books
SET title = REPLACE(title, "The", "***")
WHERE SUBSTRING(title, 1, 3) = "The";
SELECT title from books
WHERE SUBSTRING(title, 1, 3) = "***";
```



title
*** Mysterious Affair at Styles
*** Big Four
*** Murder at the Vicarage
*** Mystery of the Blue Train
*** Ring
*** Alchemist
*** Fifth Mountain
*** Zahir
*** Dead Zone
*** Hobbit
*** Adventures of Tom Bombadil

String Functions (3)

- **LTRIM & RTRIM** – remove spaces from either side of string

LTRIM(*String*)

RTRIM(*String*)

- **CHAR_LENGTH** – count number of characters

CHAR_LENGTH(*String*)

- **LENGTH** – get number of used bytes (double for Unicode)

LENGTH(*String*)

String Functions (4)

- **LEFT & RIGHT** – get characters from beginning or end of string

```
LEFT(String, Count)
```

```
RIGHT(String, Count)
```

- Example: name shorthand (first 3 letters)

```
SELECT `id`, `start`,  
       LEFT(`name`, 3) AS 'Shorthand'  
  FROM `games`;
```

String Functions (6)

- **LOWER & UPPER** – change letter casing

LOWER(*String*)

UPPER(*String*)

- **REVERSE** – reverse order of all characters in string

REVERSE(*String*)

- **REPEAT** – repeat string

REPEAT(*String, Count*)

String Functions (7)

- **LOCATE** – locate specific pattern (substring) in string

If omitted, begins at 1

```
LOCATE(Pattern, String, [Position])
```

- **INSERT** – insert substring at specific position

```
INSERT(String, Position, Length, Substring)
```

Number of characters
to delete



Arithmetical Operators and Numeric Functions

Arithmetical Operators

- Supported common arithmetic operators

Name	Description
DIV	Integer division
/	Division operator
-	Minus Operator
%, MOD	Modulo operator
+	Addition operator
*	Multiplication operator
- (arg)	Change sign of argument

Numeric Functions

- Used primarily for numeric manipulation and/or mathematical calculations
- **PI** – get the value of Pi (15 –digit precision)

```
SELECT PI() +0.000000000000000
```

- **ABS** – absolute value

```
ABS(Value)
```

Numeric Functions (2)

- **SQRT** – square root

SQRT(*Value*)

- **POW** – raise value to desired exponent

POW(*Value*, *Exponent*)

Math Functions (3)

- **CONV** – Converts numbers between different number bases

CONV(*Value, from_base, to_base*)

- **ROUND** – obtain desired precision

Can be negative

ROUND(*Value, Precision*)

- **FLOOR** & **CEILING** – return the nearest integer

FLOOR(*Value*)

CEILING(*Value*)

Math Functions (4)

- **SIGN** – returns +1, -1 or 0, depending on value sign

SIGN(*Value*)

- **RAND** – get a random value in range [0,1)
 - If **Seed** is not specified, one is assigned at random

RAND()

RAND(*Seed*)



Date Functions

Date Functions

- **EXTRACT** – extract a segment from a date as an integer

EXTRACT(*Part FROM Date*)

- *Part* can be any part and format of date or time

year, %Y, %y

month, %M, %m

day, %w, %D

YEAR(*Date*)

MONTH(*Date*)

DAY(*Date*)

- For a full list, see the [official documentation](#)

Date Functions (2)

- **TIMESTAMPDIFF** – find difference between two dates

```
TIMESTAMPDIFF(Part, FirstDate, SecondDate)
```

- *Part* can be any part and format of date or time

Date Functions - Example

- Show employee experience

```
SELECT `employee_id` , `first_name` , `last_name` ,  
       TIMESTAMPDIFF(year, `hire_date` , '2017-05-31')  
             AS 'Years In Service'  
      FROM `employees` ;
```

Problem: Days Lived

- Write a query to calculate how many days have authors lived
 - Use **TIMESTAMPDIFF**
 - Query book_library database

Full Name	Days Lived
Agatha Christie	31,164
William Shakespeare	18,990
Danielle Schuelein-Steel	(NULL)
Joanne Rowling	(NULL)
Lev Tolstoy	30,021
Paulo Souza	(NULL)
Stephen King	(NULL)
John Tolkien	29,827
Erika Mitchell	(NULL)

Days Lived - Solution

```
SELECT concat(first_name, ' ', last_name) as 'Full Name',  
TIMESTAMPDIFF(DAY, born, died) as 'Days Lived'  
FROM authors;
```



Full Name	Days Lived
Agatha Christie	31,164
William Shakespeare	18,990
Danielle Schuelein-Steel	(NULL)
Joanne Rowling	(NULL)
Lev Tolstoy	30,021
Paulo Souza	(NULL)
Stephen King	(NULL)
John Tolkien	29,827
Erika Mitchell	(NULL)

Date Functions (3)

- **DATE_FORMAT** – formats the date value according to the format

```
SELECT DATE_FORMAT('2017/05/31', '%Y %b %D') AS 'Date';
```

- **NOW** – obtain current date and time

```
SELECT NOW();
```



Wildcards

Selecting results by partial match

Wildcards

- Used to substitute any other character(s) in a string
 - '%' - represents zero, one, or multiple characters
 - '_' - represents a single character
 - Can be used in combinations
- Used with **LIKE** operator in a **WHERE** clause
 - Similar to Regular Expressions

Wildcards - Examples

- Find any values that start with "a"

```
WHERE CustomerName LIKE 'a%';
```

- Find any values that have "r" in second position

```
WHERE CustomerName LIKE '_r%';
```

- Finds any values that starts with "a" and ends with "o"

```
WHERE ContactName LIKE 'a%o';
```

Wildcard Characters

- Supported characters also include:
 - \ – specify prefix to treat special characters as normal
 - [charlist] – specifying which characters to look for
 - [!charlist] – excluding characters

```
SELECT * FROM `customers`  
WHERE `city` LIKE '[a-c]%' ;
```

"a", "b", or "c"

Problem: Harry Potter Books

- Write a query to retrieve information about the titles of all Harry Potter books
 - Use **Wildcards**
 - Query book_library database

🔑 id	title	👤 author_id	year_of_release	cost
15	Harry Potter and the Philosopher's Stone	4	1997-00-00 00:00:00	19.99
16	Harry Potter and the Chamber of Secrets	4	1998-00-00 00:00:00	19.99
17	Harry Potter and the Prisoner of Azkaban	4	1999-00-00 00:00:00	19.99
18	Harry Potter and the Goblet of Fire	4	2000-00-00 00:00:00	19.99
19	Harry Potter and the Order of the Phoenix	4	2003-00-00 00:00:00	19.99
20	Harry Potter and the Half-Blood Prince	4	2005-00-00 00:00:00	19.99
21	Harry Potter and the Deathly Hallows	4	2007-00-00 00:00:00	19.99
22	Harry Potter and the Deathly Hallows	4	2007-00-00 00:00:00	15.99

Harry Potter Books - Solution

```
SELECT title FROM books  
WHERE title LIKE 'Harry Potter%';
```



👉 id	title	👉 author_id	year_of_release	cost
15	Harry Potter and the Philosopher's Stone	4	1997-00-00 00:00:00	19.99
16	Harry Potter and the Chamber of Secrets	4	1998-00-00 00:00:00	19.99
17	Harry Potter and the Prisoner of Azkaban	4	1999-00-00 00:00:00	19.99
18	Harry Potter and the Goblet of Fire	4	2000-00-00 00:00:00	19.99
19	Harry Potter and the Order of the Phoenix	4	2003-00-00 00:00:00	19.99
20	Harry Potter and the Half-Blood Prince	4	2005-00-00 00:00:00	19.99
21	Harry Potter and the Deathly Hallows	4	2007-00-00 00:00:00	19.99
22	Harry Potter and the Deathly Hallows	4	2007-00-00 00:00:00	15.99

Using Regular Expression

- **REGEXP** - pattern matching using regular expressions

```
SELECT `employee_id`, `first_name`, `last_name`  
FROM `employees`  
WHERE `first_name` REGEXP '^\\[^K\\]{3}\\$';
```



Regular expression

Summary

- MySQL Server provides various built-in functions
 - Numerical functions
 - String functions
- Using Wildcards, we can obtain results by partial string matches
 - Regular expressions



Built-in Functions



Questions?



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