Built-in Functions

Functions and Wildcards

in MySQL Server

Functions & Wildcards

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#Java-DB

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*)

■ 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`;
```

- 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

```sql
SELECT REPLACE(`title`, 'The', '***')
AS 'Title' FROM `books`
WHERE SUBSTRING(title, 1, 3) = 'The';
```

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*)

- **LENGHT** – 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)
```

- **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***)**

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

> **TIMESTAMPDIFF(***Part, FirstDate, SecondDate***)**

  - *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*)	

Date Functions – Example

- Show employee experience

```sql
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	31164
William Shakespeare	18990
Danielle Schuelein-Steel	NULL
Joanne Rowling	NULL
Lev Tolstoy	30021
Paulo Souza	NULL
Stephen King	NULL
John Tolkien	29827
Erika Mitchell	NULL

Solution: Days Lived

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

Full Name	Days Lived
Agatha Christie	31164
William Shakespeare	18990
Danielle Schuelein-Steel	NULL
Joanne Rowling	NULL
Lev Tolstoy	30021
Paulo Souza	NULL
Stephen King	NULL
John Tolkien	29827
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` REGEXP '[a-c]%';
```

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

■ Write a query to retrieve information about the titles of all Harry Potter books

- Use **Wildcards**

- Query book_library database

title
▶ Harry Potter and the Philosopher's S…
Harry Potter and the Chamber of Se…
Harry Potter and the Prisoner of Azk…
Harry Potter and the Goblet of Fire
Harry Potter and the Order of the P…
Harry Potter and the Half-Blood Prince
Harry Potter and the Deathly Hallows
Harry Potter and the Deathly Hallows

Solution: Harry Potter Books

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

title
Harry Potter and the Philosopher's Stone
Harry Potter and the Chamber of Secrets
Harry Potter and the Prisoner of Azkaban
Harry Potter and the Goblet of Fire
Harry Potter and the Order of the Phoenix
Harry Potter and the Half-Blood Prince
Harry Potter and the Deathly Hallows
Harry Potter and the Deathly Hallows

Using Regular Expression
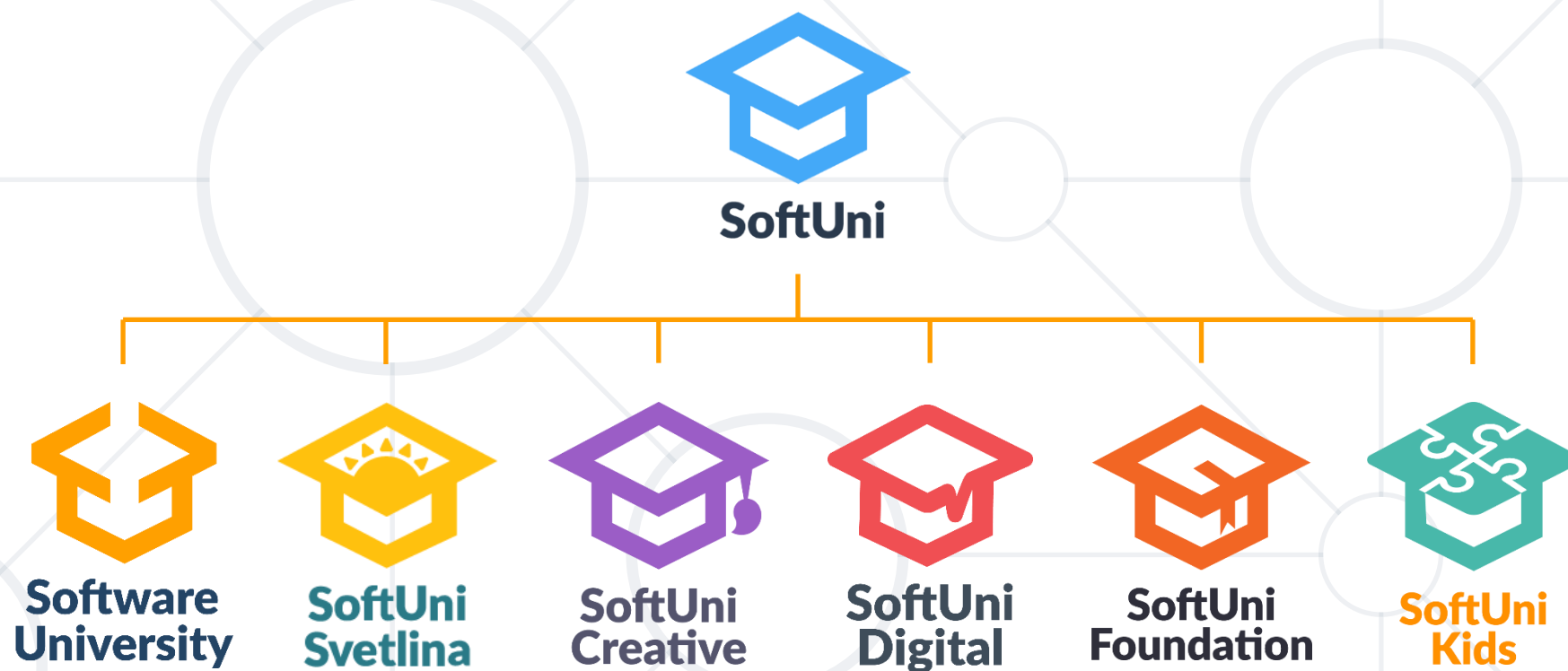
- **REGEXP** - pattern matching using regular expressions

```
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

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