MySQL Stored Procedures

A procedure (often called a stored procedure) is a subroutine like a subprogram in a regular computing language, stored in database. A procedure has a name, a parameter list, and SQL statement(s). All most all relational database system supports stored procedure. Stored procedures must be invoked using the CALL statement.

Why Stored Procedures?

Reduce network traffic

Stored procedures help reduce the network traffic between applications and MySQL Server. Because instead of sending multiple lengthy SQL statements, applications have to send only the name and parameters of stored procedures.

Centralize business logic in the database

You can use the stored procedures to implement business logic that is reusable by multiple applications. The stored procedures help reduce the efforts of duplicating the same logic in many applications and make your database more consistent.

Make database more secure

The database administrator can grant appropriate privileges to applications that only access specific stored procedures without giving any privileges on the underlying tables.

Syntax of procedure

```
DELIMITER //

CREATE PROCEDURE procedure_name (

    [IN | OUT | INOUT] parameter_name datatype[(length)]

)

BEGIN

   declaration_section

   executable_section

END;

DELIMITER ;
```

MySQL Delimiter

When you write SQL statements, you use the semicolon (;) to separate two statements

If you use a MySQL client program to define a stored procedure that contains semicolon characters, the MySQL client program will not treat the whole stored procedure as a single statement, but many statements.

Therefore, you must redefine the delimiter temporarily so that you can pass the whole stored procedure to the server as a single statement.

To redefine the default delimiter, you use the **DELIMITER** command:

```
DELIMITER delimiter_character
```

The delimiter_character may consist of a single character or multiple characters e.g., // or $$. However, you should avoid using the backslash (\) because this is the escape character in MySQL.

Once change the delimiter, you can use the new delimiter to end a statement as follows:

```
DELIMITER //

SELECT * FROM customers //

SELECT * FROM products //
```

Parameters of procedure

The most important part is parameters. Parameters are used to pass values to the Procedure. There are 3 different types of parameters, they are as follows:

1. **IN:**
   This is the Default Parameter for the procedure. It always receives the values from calling program(procedure). The value of the parameter cannot be overwritten by the procedure.

2. **OUT:**
   This parameter always sends the values to the calling program(procedure), but the value of the parameter can be overwritten by the procedure.

3. **IN OUT:**
   This parameter performs both the operations. It Receives value from as well as sends the values to the calling program.

MySQL stored procedure parameter examples

The IN-parameter example

The following example creates a stored procedure that finds all offices that locate in a country specified by the input parameter countryName:

```
DELIMITER //

CREATE PROCEDURE GetOfficeByCountry(
	IN countryName VARCHAR(255)
)
BEGIN
	SELECT *
	FROM offices
	WHERE country = countryName;
END //

DELIMITER ;
```

```
CALL GetOfficeByCountry('USA');
```

officeCode	city	phone	addressLine1	addressLine2	state	country	postalCode	territory
1	San Francisco	+1 650 219 4782	100 Market Street	Suite 300	CA	USA	94080	NA
2	Boston	+1 215 837 0825	1550 Court Place	Suite 102	MA	USA	02107	NA
3	NYC	+1 212 555 3000	523 East 53rd Street	apt. 5A	NY	USA	10022	NA

The OUT parameter example

The following stored procedure returns the number of orders by order status.

```
DELIMITER $$
```

```
CREATE PROCEDURE GetOrderCountByStatus (
	IN  orderStatus VARCHAR(25),
	OUT total INT
)
BEGIN
	SELECT COUNT(orderNumber)
	INTO total
	FROM orders
	WHERE status = orderStatus;
END$$

DELIMITER ;
```

The stored procedure **GetOrderCountByStatus()** has **two parameters**:

- **orderStatus** : is the **IN** parameter specifies the status of orders to return.
- **total** : is the **OUT** parameter that stores the number of orders in a specific status.

To find the number of orders that **already shipped**, you call **GetOrderCountByStatus** and pass the order status as of Shipped, and also pass a **session variable (@total)** to receive the return value.

```
CALL GetOrderCountByStatus('Shipped',@total);

SELECT @total;
```

	@total
▶	303

MySQL DROP PROCEDURE

The **DROP PROCEDURE** deletes a stored procedure from the database.

The following shows the syntax of the DROP PROCEDURE statement:

```
DROP PROCEDURE [IF EXISTS] stored_procedure_name;
```

Listing Stored Procedures

Here is the basic syntax of the **SHOW PROCEDURE STATUS** statement:

```
SHOW PROCEDURE STATUS [LIKE 'pattern' | WHERE search_condition]
```

The SHOW PROCEDURE STATUS statement shows all characteristic of stored procedures including stored procedure names. It returns stored procedures that you have a privilege to access.

The following statement shows all stored procedure in the current MySQL server:

```
SHOW PROCEDURE STATUS;
```

Here is the partial output:

Db	Name	Type	Definer
classicmodels	GetAllCustomers	PROCEDURE	root@localhost
classicmodels	GetAllProducts	PROCEDURE	root@localhost
classicmodels	GetOfficeByCountry	PROCEDURE	root@localhost
classicmodels	GetOrderAmount	PROCEDURE	root@localhost
classicmodels	GetOrderCountByStatus	PROCEDURE	root@localhost
classicmodels	GetTotalOrder	PROCEDURE	root@localhost
classicmodels	SetCounter	PROCEDURE	root@localhost

If you just want to show stored procedures in a particular database, you can use a WHERE clause in the SHOW PROCEDURE STATUS as shown in the following statement:

```
SHOW PROCEDURE STATUS WHERE search_condition;
```

For example, this statement lists all stored procedures in the sample database classicmodels:

```
SHOW PROCEDURE STATUS WHERE db = 'classicmodels';
```

In case you want to find stored procedures, whose names contain a specific word, you can use the LIKE clause as follows:

```
SHOW PROCEDURE STATUS LIKE '%pattern%'
```

The following statement shows all stored procedure whose names contain the wordOrder:

```
SHOW PROCEDURE STATUS LIKE '%Order%'
```

	Db	Name	Type	Definer
▶	classicmodels	GetOrderAmount	PROCEDURE	root@localhost
	classicmodels	GetOrderCountByStatus	PROCEDURE	root@localhost
	classicmodels	GetTotalOrder	PROCEDURE	root@localhost

MySQL Stored Function

A stored function is a special kind stored program that returns a single value. Typically, you use stored functions to encapsulate common formulas or business rules that are reusable among SQL statements or stored programs.

Different from a stored procedure, you can use a stored function in SQL statements wherever an expression is used.

MySQL CREATE FUNCTION syntax

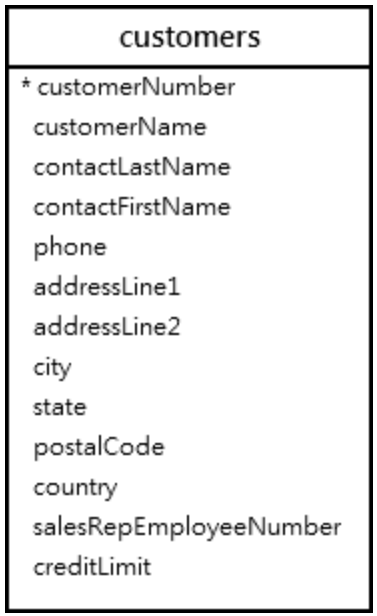
```
DELIMITER $$
```

```
CREATE FUNCTION function_name(
    param1,
    param2,…
)
RETURNS datatype
[NOT] DETERMINISTIC
BEGIN
 -- statements
END $$

DELIMITER ;
```

A deterministic function always returns the same result for the same input parameters whereas a non-deterministic function returns different results for the same input parameters.

Let’s take the example of creating a stored function. We will use the **customers** table in the sample database for the demonstration.



The following CREATE FUNCTION statement creates a function that returns the customer level based on credit:

```
DELIMITER $$
```

```
CREATE FUNCTION CustomerLevel(
     credit DECIMAL(10,2)
)
RETURNS VARCHAR(20)
DETERMINISTIC
BEGIN
    DECLARE customerLevel VARCHAR(20);

    IF credit > 50000 THEN
          SET customerLevel = 'PLATINUM';
    ELSEIF (credit <= 50000 AND
               credit >= 10000) THEN
        SET customerLevel = 'GOLD';
    ELSEIF credit < 10000 THEN
        SET customerLevel = 'SILVER';
    END IF;
     -- return the customer level
     RETURN (customerLevel);
END$$
DELIMITER ;
```

Calling a stored function in an SQL statement

The following statement uses the **CustomerLevel** stored function:

```
SELECT
```

```
    customerName,
    CustomerLevel(creditLimit)
FROM
    customers
ORDER BY
    customerName;
```

customerName	CustomerLevel(creditLimit)
Alpha Cognac	PLATINUM
American Souvenirs Inc	SILVER
Amica Models & Co.	PLATINUM
ANG Resellers	SILVER
Anna's Decorations, Ltd	PLATINUM
Anton Designs, Ltd.	SILVER
Asian Shopping Network, Co	SILVER
Asian Treasures, Inc.	SILVER
Atelier graphique	GOLD
Australian Collectables, Ltd	PLATINUM
Australian Collectors, Co.	PLATINUM