

Assignment No.: 9

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Batch: SY COMPS

AIM:

Study of Triggers & Ranking Functions in SQL

TOOL: MariaDB

PROGRAMMING LANGUAGE: Structured Query language (SQL)

INDEX:

1. Triggers
2. Ranking Functions

THEORY:

A trigger is a stored procedure in a database that automatically invokes whenever a special event in the database occurs. For example, a trigger can be invoked when a row is inserted into a specified table or when specific table columns are updated. In simple words, a trigger is a collection of SQL statements with particular names that are stored in system memory. It belongs to a specific class of stored procedures that are automatically invoked in response to database server events. Every trigger has a table attached to it.

Because a trigger cannot be called directly, unlike a stored procedure, it is referred to as a special procedure. A trigger is automatically called

whenever a data modification event against a table takes place, which is the main distinction between a trigger and a procedure. On the other hand, a stored procedure must be called directly.

The following are the key differences between triggers and stored procedures:

1. Triggers cannot be manually invoked or executed.
2. There is no chance that triggers will receive parameters.
3. A transaction cannot be committed or rolled back inside a trigger.

Different Trigger Types in SQL Server

Two categories of triggers exist:

1. DDL Trigger
2. DML Trigger

DDL Triggers

The Data Definition Language (DDL) command events such as Create_table, Create_view, drop_table, Drop_view, and Alter_table cause the DDL triggers to be activated.

DML Triggers

The Data uses manipulation Language (DML) command events that begin with Insert, Update, and Delete set off the DML triggers. corresponding to insert_table, update_view, and delete_table.

The RANK Function in SQL Server is a kind of Ranking Function. This function will assign the number to each row within the partition of an output. It assigns the rank to each row as one plus the previous row rank. When the RANK function finds two values that are identical within the same partition, it assigns them with the same rank number. In addition, the next number in the ranking will be the previous rank plus duplicate numbers.

Therefore, this function does not always assign the ranking of rows in consecutive order.

The RANK function is also a sub-part of window functions. The following points should be remembered while using this function:

- It always works with the OVER() clause.
- It assigns a rank to each row based on the ORDER BY clause.
- It assigns a rank to each row in consecutive order.
- It always assigns a rank to rows, starting with one for each new partition.

Rank assigns temporary values for rows within the partition when the query is executed.

SQL Server provides the following rank functions:

- RANK()
- ROW_NUMBER()
- DENSE_RANK()
- NTILE()

COMMANDS:

Microsoft Windows [Version 10.0.19045.4046]
(c) Microsoft Corporation. All rights reserved.

```
C:\Users\siddhi>mysql -u root -p
```

```
Enter password: ****
```

```
Welcome to the MariaDB monitor.  Commands end with ; or \g.
```

```
Your MariaDB connection id is 10
```

```
Server version: 11.2.2-MariaDB mariadb.org binary distribution
```

```
Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.
```

```
Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.
```

```
MariaDB [(none)]> show databases
```

```

-> ;
+-----+
| Database |
+-----+
| db0      |
| db1      |
| db2      |
| db3      |
| db4      |
| db5      |
| information_schema |
| mysql     |
| performance_schema |
| sys       |
| vjti      |
+-----+
11 rows in set (0.002 sec)

```

```

MariaDB [(none)]> use db6;
ERROR 1049 (42000): Unknown database 'db6'
MariaDB [(none)]> create database db6;
Query OK, 1 row affected (0.002 sec)

```

```

MariaDB [(none)]> use db6;
Database changed
MariaDB [db6]> create table teacher (id int, name char(50), salary float);
Query OK, 0 rows affected (0.014 sec)

```

```

MariaDB [db6]> create trigger T1
-> after insert on teacher
-> for each row
-> set @sum = @sum + new.salary;
Query OK, 0 rows affected (0.017 sec)

```

```

MariaDB [db6]> set @sum1 = 0;
Query OK, 0 rows affected (0.000 sec)

```

```

MariaDB [db6]> set @sum=0;
Query OK, 0 rows affected (0.000 sec)

```

```

MariaDB [db6]> insert into teacher values(1, "Dr. Ho", 70000);
Query OK, 1 row affected (0.013 sec)

```

```

MariaDB [db6]> select @sum as Total_salary;

```

```

+-----+
| Total_salary |
+-----+
|      70000 |
+-----+
1 row in set (0.002 sec)

```

MariaDB [db6]> insert into teacher values(1, "Dr. Ho", 100000);
Query OK, 1 row affected (0.002 sec)

```

MariaDB [db6]> select @sum as Total_salary;
+-----+
| Total_salary |
+-----+
|      170000 |
+-----+
1 row in set (0.000 sec)

```

```

MariaDB [db6]> select * from teacher;
+-----+-----+-----+
| id | name | salary |
+-----+-----+-----+
|  1 | Dr. Ho | 70000 |
|  1 | Dr. Ho | 100000 |
+-----+-----+-----+
2 rows in set (0.001 sec)

```

```

MariaDB [db6]> create trigger T2
-> before insert on teacher
-> for each row
-> set @sum1 = @sum1 + new.salary;
Query OK, 0 rows affected (0.020 sec)

```

MariaDB [db6]> insert into teacher values(3, "Dr. mago", 5000);
Query OK, 1 row affected (0.012 sec)

```

MariaDB [db6]> select @sum1;
+-----+
| @sum1 |
+-----+
|  5000 |
+-----+
1 row in set (0.000 sec)

```

```
MariaDB [db6]> select @sum1 as Total_salary;
```

```
+-----+
| Total_salary |
+-----+
|      5000 |
+-----+
```

```
1 row in set (0.000 sec)
```

```
MariaDB [db6]> select @sum as Total_salary;
```

```
+-----+
| Total_salary |
+-----+
|     175000 |
+-----+
```

```
1 row in set (0.000 sec)
```

```
MariaDB [db6]> create trigger T3
```

```
-> ;
```

```
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MariaDB server version for the right syntax to use near " at line 1
```

```
MariaDB [db6]> delimiter //
```

```
MariaDB [db6]> create trigger T3
```

```
-> before insert on teacher
```

```
-> for each row
```

```
-> begin
```

```
-> set new.name = trim(new.name);
```

```
-> end;
```

```
-> //
```

```
Query OK, 0 rows affected (0.018 sec)
```

```
MariaDB [db6]> insert into teacher values(4, "Dr h", 10000) //
```

```
Query OK, 1 row affected (0.017 sec)
```

```
MariaDB [db6]> select * from teacher
```

```
-> //
```

```
+-----+-----+-----+
| id | name  | salary |
+-----+-----+-----+
|  1 | Dr. Ho | 70000 |
|  1 | Dr. Ho | 100000 |
|  3 | Dr. mago | 5000 |
|  4 | Dr h   | 10000 |
+-----+-----+-----+
```

```
4 rows in set (0.001 sec)
```

```
MariaDB [db6]> create table student (id int, name char(50), marks(float))//
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that
corresponds to your MariaDB server version for the right syntax to use near '(float))' at line 1
MariaDB [db6]> create table student (id int, name char(50), marks float) //
Query OK, 0 rows affected (0.009 sec)
```

```
MariaDB [db6]> insert into student values(111, "Ho", 98)//
Query OK, 1 row affected (0.003 sec)
```

```
MariaDB [db6]> create trigger T4
-> after update on student
-> for each row
-> set @diff = new.marks - old.marks//
Query OK, 0 rows affected (0.013 sec)
```

```
MariaDB [db6]> select * from student//
+-----+-----+-----+
| id  | name | marks |
+-----+-----+-----+
| 111 | Ho   | 98    |
+-----+-----+-----+
1 row in set (0.010 sec)
```

```
MariaDB [db6]> update student set marks = 100 where id =111//
Query OK, 1 row affected (0.005 sec)
Rows matched: 1  Changed: 1  Warnings: 0
```

```
MariaDB [db6]> select * from student//
+-----+-----+-----+
| id  | name | marks |
+-----+-----+-----+
| 111 | Ho   | 100    |
+-----+-----+-----+
1 row in set (0.001 sec)
```

```
MariaDB [db6]> select @diff as marks_diff//
+-----+
| marks_diff |
+-----+
|          2 |
+-----+
1 row in set (0.000 sec)
```

```
MariaDB [db6]> create trigger T5
-> after delete on student
-> for each row
-> set @diff1 = @diff1 - old.marks//
Query OK, 0 rows affected (0.020 sec)
```

```
MariaDB [db6]> set @diff1 = 0;
-> //
Query OK, 0 rows affected (0.000 sec)
```

```
MariaDB [db6]> delete from student where id=111//
Query OK, 1 row affected (0.016 sec)
```

```
MariaDB [db6]> select @diff1//
+-----+
| @diff1 |
+-----+
| -100 |
+-----+
1 row in set (0.000 sec)
```

```
MariaDB [db6]> select * from student//
Empty set (0.000 sec)
```

```
MariaDB [db6]> drop trigger T5//
Query OK, 0 rows affected (0.029 sec)
```

```
MariaDB [db6]> show triggers//
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Trigger | Event | Table | Statement | Timing | Created | sql_mode |
| Definer | character_set_client | collation_connection | Database Collation |
+-----+-----+-----+-----+-----+-----+-----+-----+
| T4 | UPDATE | student | set @diff = new.marks - old.marks | AFTER | 2024-04-18 09:35:49.89 |
STRICT_TRANS_TABLES,ERROR_FOR_DIVISION_BY_ZERO,NO_AUTO_CREATE_USER,NO_ENGINE_SUBSTITUTION | root@localhost | utf8mb4 | utf8mb4_general_ci | latin1_swedish_ci |
| T2 | INSERT | teacher | set @sum1 = @sum1 + new.salary | BEFORE | 2024-04-18 09:12:47.93 |
STRICT_TRANS_TABLES,ERROR_FOR_DIVISION_BY_ZERO,NO_AUTO_CREATE_USER,N
```



```

O_ENGINE_SUBSTITUTION | root@localhost | utf8mb4          | utf8mb4_general_ci |
latin1_swedish_ci |
| T3      | INSERT | teacher | begin
set new.name = trim(new.name);
end | BEFORE | 2024-04-18 09:17:12.84 |
STRICT_TRANS_TABLES,ERROR_FOR_DIVISION_BY_ZERO,NO_AUTO_CREATE_USER,N
O_ENGINE_SUBSTITUTION | root@localhost | utf8mb4          | utf8mb4_general_ci |
latin1_swedish_ci |
| T1      | INSERT | teacher | set @sum = @sum + new.salary          | AFTER | 2024-04-18
09:08:37.85 |
STRICT_TRANS_TABLES,ERROR_FOR_DIVISION_BY_ZERO,NO_AUTO_CREATE_USER,N
O_ENGINE_SUBSTITUTION | root@localhost | utf8mb4          | utf8mb4_general_ci |
latin1_swedish_ci |
+-----+-----+-----+-----+-----+-----+-----+-----+
-----+-----+-----+-----+-----+-----+-----+-----+
-----+-----+
4 rows in set (0.026 sec)

```

MariaDB [db6]> create trigger T6

```

-> before insert on student
-> for each row
-> begin
-> if(new.marks >50) then new.marks = 100;
-> end if;
-> end;
-> //

```

ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MariaDB server version for the right syntax to use near '.marks = 100; end if; end' at line 5

MariaDB [db6]> create trigger T6

```

-> before insert on student
-> for each row
-> begin
-> if(new.marks >50) then set new.marks = 100;
-> end if;
-> end;
-> //

```

Query OK, 0 rows affected (0.019 sec)

MariaDB [db6]> insert into student values (1,"John", 60)//

Query OK, 1 row affected (0.013 sec)

MariaDB [db6]> select * from student//

```

+-----+-----+-----+
| id | name | marks |
+-----+-----+-----+
| 1 | John | 100 |
+-----+-----+-----+
1 row in set (0.001 sec)

```

```

MariaDB [db6]> create trigger T7
-> before update on student
-> for each row
-> begin
-> if(new.marks<0) then set new.marks = 0;
-> elseif(new.marks>50) then set new.marks = 100;
-> end if;
-> end;
-> //

```

Query OK, 0 rows affected (0.016 sec)

```

MariaDB [db6]> update student set marks = -5 where id = 1//

```

Query OK, 1 row affected (0.016 sec)

Rows matched: 1 Changed: 1 Warnings: 0

```

MariaDB [db6]> show triggers;

```

```

+-----+-----+-----+-----+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Trigger | Event | Table | Statement
| Timing | Created | sql_mode
Definer | character_set_client | collation_connection | Database Collation |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| T6 | INSERT | student | begin
if(new.marks >50) then set new.marks = 100;
end if;
end | BEFORE | 2024-04-18 09:46:53.73 |
STRICT_TRANS_TABLES,ERROR_FOR_DIVISION_BY_ZERO,NO_AUTO_CREATE_USER,N
O_ENGINE_SUBSTITUTION | root@localhost | utf8mb4 | utf8mb4_general_ci |
latin1_swedish_ci |
| T7 | UPDATE | student | begin
if(new.marks<0) then set new.marks = 0;
elseif(new.marks>50) then set new.marks = 100;
end if;

```

```

end | BEFORE | 2024-04-18 09:49:23.30 |
STRICT_TRANS_TABLES,ERROR_FOR_DIVISION_BY_ZERO,NO_AUTO_CREATE_USER,NO_ENGINE_SUBSTITUTION | root@localhost | utf8mb4 | utf8mb4_general_ci | latin1_swedish_ci |
| T4 | UPDATE | student | set @diff = new.marks - old.marks
| AFTER | 2024-04-18 09:35:49.89 |
STRICT_TRANS_TABLES,ERROR_FOR_DIVISION_BY_ZERO,NO_AUTO_CREATE_USER,NO_ENGINE_SUBSTITUTION | root@localhost | utf8mb4 | utf8mb4_general_ci | latin1_swedish_ci |
| T2 | INSERT | teacher | set @sum1 = @sum1 + new.salary
| BEFORE | 2024-04-18 09:12:47.93 |
STRICT_TRANS_TABLES,ERROR_FOR_DIVISION_BY_ZERO,NO_AUTO_CREATE_USER,NO_ENGINE_SUBSTITUTION | root@localhost | utf8mb4 | utf8mb4_general_ci | latin1_swedish_ci |
| T3 | INSERT | teacher | begin
set new.name = trim(new.name);
end | BEFORE | 2024-04-18 09:17:12.84 |
STRICT_TRANS_TABLES,ERROR_FOR_DIVISION_BY_ZERO,NO_AUTO_CREATE_USER,NO_ENGINE_SUBSTITUTION | root@localhost | utf8mb4 | utf8mb4_general_ci | latin1_swedish_ci |
| T1 | INSERT | teacher | set @sum = @sum + new.salary
| AFTER | 2024-04-18 09:08:37.85 |
STRICT_TRANS_TABLES,ERROR_FOR_DIVISION_BY_ZERO,NO_AUTO_CREATE_USER,NO_ENGINE_SUBSTITUTION | root@localhost | utf8mb4 | utf8mb4_general_ci | latin1_swedish_ci |
+-----+-----+-----+-----+-----+-----+
-----+-----+-----+-----+-----+-----+
-----+-----+-----+-----+-----+-----+
6 rows in set (0.047 sec)

```

```

MariaDB [db6]> select * from student//
-> ;
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MariaDB server version for the right syntax to use near '//' at line 1
MariaDB [db6]> delimiter //
MariaDB [db6]> select * from student//
+-----+-----+-----+
| id | name | marks |
+-----+-----+-----+
| 1 | John | 0 |
+-----+-----+-----+
1 row in set (0.001 sec)

MariaDB [db6]> -- Copy data from one able to another

```

```
MariaDB [db6]> create table student1 (studentID int NOT NULL auto_increment, fname
varchar(50), lname varchar(50), marks int, primary key(studentID) )//
Query OK, 0 rows affected (0.030 sec)
```

```
MariaDB [db6]> create table final_marks(marks int)//
Query OK, 0 rows affected (0.011 sec)
```

```
MariaDB [db6]> create trigger total_marks
-> after insert on student1
-> for each row
-> insert into final_marks values (new.marks)//
Query OK, 0 rows affected (0.016 sec)
```

```
MariaDB [db6]> insert into student1 values ("siddhi", "P", 98)//
ERROR 1136 (21S01): Column count doesn't match value count at row 1
MariaDB [db6]> insert into student1 (fname, lname, marks) values ("siddhi", "P", 98)//
Query OK, 1 row affected (0.002 sec)
```

```
MariaDB [db6]> select * from student1;
-> //
+-----+-----+-----+-----+
| studentID | fname | lname | marks |
+-----+-----+-----+-----+
|      1 | siddhi | P    | 98 |
+-----+-----+-----+-----+
1 row in set (0.000 sec)
```

```
MariaDB [db6]> select * from final_marks;
-> //
+-----+
| marks |
+-----+
| 98 |
+-----+
1 row in set (0.000 sec)
```

```
MariaDB [db6]> insert into student1 (fname, lname, marks) values ("druhi", "P", 98), ("Raya",
"C", 98), ("Richa", "S", 98)//
Query OK, 3 rows affected (0.003 sec)
Records: 3 Duplicates: 0 Warnings: 0
```

```
MariaDB [db6]> select * from final_marks//
+-----+
| marks |
```

```

+-----+
|  98  |
|  98  |
|  98  |
|  98  |
+-----+

```

4 rows in set (0.000 sec)

MariaDB [db6]> --verification of email-id using trigger

MariaDB [db6]> create table user(id int, fname varchar(50), lname varchar(50), email char(100))//

Query OK, 0 rows affected (0.011 sec)

MariaDB [db6]> create trigger check_email

-> before insert on user

-> for each row

-> begin

-> if new.email NOT LIKE '%%@%%.%%' then

-> SIGNAL SQLSTATE '45000' set MESSAGE_TEXT = 'Email field is not valid';

-> end if;

-> end;

-> //

Query OK, 0 rows affected (0.015 sec)

MariaDB [db6]> insert into user(1, "S", "P", "shpg.com.net")//

ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MariaDB server version for the right syntax to use near '1, "S", "P", "shpg.com.net")' at line 1

MariaDB [db6]> insert into user values(1, "S", "P", "shpg.com.net")//

ERROR 1644 (45000): Email field is not valid

MariaDB [db6]> select user()

-> //

```

+-----+
| user() |
+-----+
| root@localhost |
+-----+

```

1 row in set (0.002 sec)

MariaDB [db6]> Bye

Ctrl-C -- exit!

OUTPUT:

```
Command Prompt - mysql -u root -p
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MariaDB server version for the right syntax to use near '' at line 1
MariaDB [db6]> delimiter //
MariaDB [db6]> create trigger T3
    -> before insert on teacher
    -> for each row
    -> begin
    -> set new.name = trim(new.name);
    -> end;
    -> //
Query OK, 0 rows affected (0.018 sec)

MariaDB [db6]> insert into teacher values(4, "Dr h", 10000) //
Query OK, 1 row affected (0.017 sec)

MariaDB [db6]> select * from teacher
    -> //
+-----+
| id | name | salary |
+-----+
| 1 | Dr. Ho | 70000 |
| 1 | Dr. Ho | 100000 |
| 3 | Dr. mago | 5000 |
| 4 | Dr h | 10000 |
+-----+
4 rows in set (0.001 sec)

MariaDB [db6]> create table student (id int, name char(50), marks(float))//
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MariaDB server version for the right syntax to use near '(float))' at line 1
MariaDB [db6]> create table student (id int, name char(50), marks float) //
Query OK, 0 rows affected (0.009 sec)

MariaDB [db6]> insert into student values(111, "Ho", 98)//
Query OK, 1 row affected (0.003 sec)

MariaDB [db6]> create trigger T4
    -> after update on student
    -> for each row
    -> set @diff = new.marks - old.marks//
Query OK, 0 rows affected (0.013 sec)

MariaDB [db6]> select * from student//
+-----+
| id | name | marks |
+-----+
| 111 | Ho | 98 |
+-----+
1 row in set (0.010 sec)

MariaDB [db6]> update student set marks = 100 where id =111//
Query OK, 1 row affected (0.005 sec)
```

```
MariaDB [db6]> select * from student//
    -> ;
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MariaDB server version for the right syntax to use near '//' at line 1
MariaDB [db6]> delimiter //
MariaDB [db6]> select * from student//
+-----+
| id | name | marks |
+-----+
| 1 | John | 0 |
+-----+
1 row in set (0.001 sec)

MariaDB [db6]> -- Copy data from one able to another
MariaDB [db6]> create table student1 (studentID int NOT NULL auto_increment, fname varchar(50), lname varchar(50), marks int, primary key(studentID) )//
Query OK, 0 rows affected (0.030 sec)

MariaDB [db6]> create table final_marks(marks int)//
Query OK, 0 rows affected (0.011 sec)

MariaDB [db6]> create trigger total_marks
    -> after insert on student1
    -> for each row
    -> insert into final_marks values (new.marks)//
Query OK, 0 rows affected (0.016 sec)

MariaDB [db6]> Insert into student1 values ("siddhi", "P", 98)//
ERROR 1136 (21501): Column count doesn't match value count at row 1
MariaDB [db6]> insert into student1 (fname, lname, marks) values ("siddhi", "P", 98)//
Query OK, 1 row affected (0.002 sec)

MariaDB [db6]> select * from student1;
    -> //
+-----+
| studentID | fname | lname | marks |
+-----+
| 1 | siddhi | P | 98 |
+-----+
1 row in set (0.000 sec)

MariaDB [db6]> select * from final_marks;
    -> //
+-----+
| marks |
+-----+
| 98 |
+-----+
1 row in set (0.000 sec)

MariaDB [db6]> insert into student1 (fname, lname, marks) values ("druhi", "P", 98), ("Raya", "C", 98), ("Richa", "S", 98)//
Query OK, 3 rows affected (0.003 sec)
```

CONCLUSION:

Thus we learnt about the functionality of triggers and Ranking Functions in SQL.