MySQL

Triggers

Dr Stewart Blakeway
Lecturer in Computer Science

COMP23111
Fundamentals of Databases

Intro

MySQL Triggers

- A trigger is a stored program that is invoked automatically in response to an event.
- The events are: INSERT, UPDATE and DELETE
- Triggers are run BEFORE or AFTER the SQL query is executed
- Triggers provide another way to check the integrity of data
- Triggers can be used to run scheduled tasks
- Triggers are often used for auditing data changes in tables

Showing and Dropping Triggers

- To show a trigger

```
SHOW TRIGGERS;
```

- To drop a trigger

```
DROP TRIGGER trigger_name;
```

Creating a Trigger

```
CREATE TRIGGER trigger_name
BEFORE | AFTER
INSERT | UPDATE | DELETE
ON table_name
BEGIN
    trigger_body
END
```

NEW and OLD modifiers

- To distinguish between the old data and the new data we have NEW and OLD modifiers

Trigger Event	**OLD**	**NEW**
INSERT	No	Yes
UPDATE	Yes	Yes
DELETE	Yes	No

Create Trigger (An auditing example)

```
CREATE TRIGGER before_customer_update
    BEFORE UPDATE ON customers FOR EACH ROW
 INSERT INTO customers_audit
 SET action = 'update',
     customerNumber = OLD.customerNumber,
     lastname = OLD.lastname,
     changedat = NOW();
```

An Update

```
UPDATE customers
SET
    lastName = 'Phan'
WHERE
    customerNumber = 56;
```

BEFORE INSERT

```
CREATE TRIGGER
before_workcenters_insert
BEFORE INSERT
ON WorkCenters FOR EACH ROW
BEGIN
    DECLARE rowcount INT;

    SELECT COUNT(*)
    INTO rowcount
    FROM WorkCenterStats;

 IF rowcount > 0 THEN
        UPDATE WorkCenterStats
        SET totalCapacity =
totalCapacity + new.capacity;
    ELSE
        INSERT INTO
WorkCenterStats(totalCapacity)
        VALUES(new.capacity);
    END IF;

END
```

AFTER INSERT

```
CREATE TRIGGER after_members_insert
AFTER INSERT
ON members FOR EACH ROW
BEGIN
    IF NEW.birthDate IS NULL THEN
        INSERT INTO reminders(memberId, message)
        VALUES(new.id,CONCAT('Hi ', NEW.name, ',
please update your date of birth.'));
    END IF;
END
```

BEFORE vs AFTER

- Before triggers are useful to update or validate record values before they’re saved to the database.
  - You can prevent the update if validation fails
  - SIGNAL SQLSTATE '45000'
- After triggers are used to access field values that are set by the system (such as a record's Id or LastModifiedDate field), and to effect changes in other records.
  - Like in the auditing example

- Approximately 95% of triggers are before triggers

BEFORE AFTER DELETE

- The DELETE trigger works in the same fashion as the INSERT and UPDATE triggers
  - It should be clear that you do not have access to the NEW modifier

- BEFORE is useful to check the DELETE is valid
- AFTER is useful for auditing (you can copy the deleted record to an achieve table with the user id that deleted the record)

Multiple Triggers

- You can call multiple triggers by using the KEYWORDS FOLLOWS or PRECEDES
- FOLLOWS allows the new trigger to activate after an existing trigger.
- PRECEDES allows the new trigger to activate before an existing trigger.

- This way you can daisy chain triggers

AFTER INSERT

```
CREATE TRIGGER before_products_update_log_user
    BEFORE UPDATE ON products
    FOR EACH ROW
    FOLLOWS before_products_update
BEGIN
-- other code to handle this trigger
```

This trigger happens first

Multiple Triggers Daisy Chained

- When a trigger calls another trigger, and the other trigger calls another trigger things can quickly become quite confusing
- Often it is more useful to get the trigger to call a procedure(s)
- You just include the CALL procedure_name within the trigger

A Trigger Calling a Procedure

```
CREATE TRIGGER before_accounts_update
BEFORE UPDATE
ON accounts FOR EACH ROW
BEGIN
    CALL CheckWithdrawal (
        OLD.accountId,
        OLD.amount - NEW.amount
    );
END
```

Summary

- Triggers
  - Creating
  - The Events
  - When to run the trigger
  - NEW and OLD modifiers
  - Multiple Triggers
  - Calling a Stored Procedure

MySQL

Triggers

Dr Stewart Blakeway
Lecturer in Computer Science

COMP23111
Fundamentals of Databases