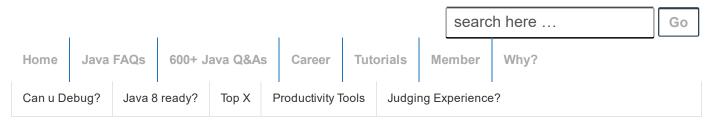
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Auditing database record changes in **Oracle**

Posted on April 9, 2015 by Arulkumaran Kumaraswamipillai



Q. What are some of the considerations in auditing database table data?

Α.

- Creating audit tables without any constraints to store record changes. Audit tables are heavily hit with inserts, hence needs to have fewer indices if at all required.
- · Decide on what combination of triggers are required like Create, Update, or Delete in the CRUD operations.
- Create the triggers.

Here is an example for a given table shown below

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```
CREATE TABLE bus_rule(
2
                                      NUMBER(30)
       id
3
                                      VARCHAR2(50)
       code
                                      NUMBER(30)
4
       rule_entry_id
5
                                      VARCHAR2(100)
       name
6
       effective
                                      date
7
                                      date
       expires
8
                                      VARCHAR2(30)
       created_by
9
                                      TIMESTAMP
       created_date
10
       updated_by
                                      VARCHAR2(30)
11
       updated_date
                                      TIMESTAMP
       CONSTRAINT bus_rule_pk PRIMARY KEY (id)
12
       CONSTRAINT fk_bus_rule_rule_entry_id FOREIGN
13
14);
15
```

Step 1: Create a corresponding audit table to store historical data. Note that this table does not have any constraints as it is historical table. It adds a new column called "**crud_operation**" to tag if the data stored was due to <u>Create</u>, <u>Update or <u>Delete</u>.</u>

```
CREATE TABLE bus_rule_audit(
2
                                                   NOT
    id
                                   NUMBER(30)
3
                                      VARCHAR2(50)
       code
4
                                      NUMBER(30)
       rule_entry_id
5
       name
                                      VARCHAR2(100)
6
                                      date
       effective
7
                                      date
       expires
8
       created_by
                                      VARCHAR2(30)
9
       created_date
                                      TIMESTAMP
10
       updated_by
                                      VARCHAR2(30)
11
       updated date
                                      TIMESTAMP
12
       crud_operation
                                      char(1)
                                                 NOT N
13);
14
```

Step 2: Create triggers in Oracle

```
CREATE OR REPLACE TRIGGER bus_rule_trig
3
   AFTER INSERT OR UPDATE OR DELETE
4
   ON bus_rule
5
6
   REFERENCING OLD AS OLD NEW AS NEW
   FOR EACH ROW
8
     DECLARE
9
       crud_operation CHAR(1);
10
11
     BEGIN
12
13
     IF INSERTING THEN
14
        crud_operation := 'C';
15
     ELSIF UPDATING THEN
        crud_operation := 'U';
16
```

```
Hadoop & BigData Integrated Figure 1. Hadoop & BigData Integrated Figu
```

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```
17
     ELSIF DELETING THEN
18
        crud_operation := 'D';
19
    END IF;
20
21
22
    IF INSERTING OR UPDATING THEN
23
         INSERT INTO bus_rule_audit (ID,CODE,RULE_E
24
25
           VALUES (:NEW.ID, :NEW.CODE,:NEW.RULE_ENT
26
27
       ELSE
28
29
         INSERT INTO bus_rule_audit (ID,CODE,RULE_E
30
           VALUES (:OLD.ID, :OLD.CODE,:OLD.RULE_ENT
31
32
       END IF;
33
34 END;
35
```

Now, if you perform any CUD operation table **bus_rule** the **bus_rule_trig** will fire to insert records into the audit table **bus_rule_audit**.

- **Q**. Why do you need to be careful as to where you use triggers?
- A. The main problems with triggers are
- a) they are **global** they apply no matter what the context of the table activity; and
- **b)** they are **candid**; it's easy to forget they are there until they hurt you with unintended consequences.

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