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Auditing database record changes in Oracle

Posted on [April 9, 2015](#) by [Arulkumaran Kumaraswamipillai](#)



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

A.

- 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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```

1 CREATE TABLE bus_rule(
2     id NUMBER(30)
3     code VARCHAR2(50)
4     rule_entry_id NUMBER(30)
5     name VARCHAR2(100)
6     effective date
7     expires date
8     created_by VARCHAR2(30)
9     created_date TIMESTAMP
10    updated_by VARCHAR2(30)
11    updated_date TIMESTAMP
12    CONSTRAINT bus_rule_pk PRIMARY KEY (id),
13    CONSTRAINT fk_bus_rule_rule_entry_id FOREIGN
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 Create, Uppdate or Delele.

```

1 CREATE TABLE bus_rule_audit(
2     id NUMBER(30) NOT
3     code VARCHAR2(50)
4     rule_entry_id NUMBER(30)
5     name VARCHAR2(100)
6     effective date
7     expires date
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

```

1 CREATE OR REPLACE TRIGGER bus_rule_trig
2
3 AFTER INSERT OR UPDATE OR DELETE
4 ON bus_rule
5
6 REFERENCING OLD AS OLD NEW AS NEW
7 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
16     crud_operation := 'U';

```

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```

17  ELSIF DELETING THEN
18      crud_operation := 'D';
19  END IF;
20
21
22  IF INSERTING OR UPDATING THEN
23
24      INSERT INTO bus_rule_audit (ID, CODE, RULE_E
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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