

Tema 5 – PL/SQL

1. What are triggers commonly used for in the database?

Triggers allow specified actions to be performed automatically within the database, without having to write extra application code.

2. List the types of events that cause a database trigger to fire?

- DML operations on a table
- DML operations on a view, with an INSTEAD OF trigger
- DDL statements such as create and alter
- Database system events, such as when a user logs on or the DBA shuts down the database

3. What is the most important thing to check before creating a database trigger?

The recursive and cascading effects.

4. When creating a DML statement trigger on a table, what are the components that you must define?

Timing; event; object_name and trigger_body

5. A business rule states that each time one or more employees are added to the employees table, an audit record must also be created. This rule could be enforced using application code, but we have decided to enforce it using a DML statement trigger.

A. Create an audit table by executing the following SQL statement:

```
CREATE TABLE audit_table
  (action VARCHAR2(15),
   user_name VARCHAR2(30) DEFAULT USER,
   last_change_date TIMESTAMP DEFAULT SYSTIMESTAMP);
```

B. Create a statement level trigger that inserts a row into the audit table immediately after one or more rows are added to the employees_dup table. The audit table row should contain value "Inserting" in the action column. The other two columns should have their default values.

```
CREATE OR REPLACE TRIGGER employees_dup_change
AFTER INSERT ON employees_dup
BEGIN
insert into audit_table (action, user_name, last_change_date)
values ("inserting",user, systimestamp );
end;
```

C. Test your trigger by inserting a row into employees, then querying the audit table to see that it contains a row.

```
Select * from audit_table;
```

D. Make sure the trigger does not fire with a DELETE by deleting the employee you just entered. Recheck the audit_table table to make sure that there is not another new row.

6. What is the difference between a statement trigger and a row trigger?

A statement trigger fires one time for the whole DML statement and a row trigger fires once for each row affected by the DML statement.

7. A row trigger fires at least once even if no rows are affected. True or false?
true.

8. Imagine that the following four DML triggers have been defined on the employees table: a BEFORE INSERT statement trigger, a BEFORE UPDATE statement trigger, an AFTER UPDATE row trigger, and an AFTER DELETE statement trigger. An UPDATE statement updates three employee rows. How many times will each trigger fire?

1 time the before update trigger, 3 times the after update row trigger, and 0 time the delete and insert statement trigger.