



## EXPERIMENT - 07

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**Section/Group:** Krg -1B

**Semester:** 5th

**Subject Code:** 23CSP-333

**Subject Name:** ADBMS

### 1. AIM:

#### **i) Triggers: Student Data Change Monitoring (Medium)**

EduSmart Institute wants to monitor all insertions and deletions in the student database. Whenever a new student record is inserted or deleted from the student table, the details of that record should be displayed on the PostgreSQL console window.

#### **Objective:**

Design a PostgreSQL trigger that:

1. Prints the complete details of the inserted or deleted student record using RAISE NOTICE.
2. Activates automatically after every INSERT or DELETE operation on the student table.

#### **ii) Triggers: Employee Activity Logging (Hard)**

TechSphere Solutions wants to maintain an automatic audit trail for all employee additions and deletions in the company database.

Whenever a new employee is added or removed from the tbl\_employee table, an entry should be recorded in the tbl\_employee\_audit table for tracking purposes.

#### **Objective:**

Design a PostgreSQL trigger that:

1. Inserts a message in tbl\_employee\_audit whenever a new employee is added or deleted.
2. The message should include the employee's name and the current timestamp.
3. Activates automatically after every INSERT or DELETE operation on tbl\_employee.

### 2. Tools Used : PostGres

#### **Solutions:**

Q1)

--CREATING A TABLE

```
CREATE TABLE student (  
    id SERIAL PRIMARY KEY,  
    name VARCHAR(100),  
    age INT,  
    class VARCHAR(50)  
);
```

--TRIGGER FUNCTION

```
CREATE OR REPLACE FUNCTION fn_student_audit()  
RETURNS TRIGGER  
LANGUAGE plpgsql  
AS  
$$  
BEGIN  
    IF TG_OP = 'INSERT' THEN  
        RAISE NOTICE 'Inserted Row -> ID: %, Name: %, Age: %, Class: %',  
            NEW.id, NEW.name, NEW.age, NEW.class;  
        RETURN NEW;  
  
    ELSIF TG_OP = 'DELETE' THEN  
        RAISE NOTICE 'Deleted Row -> ID: %, Name: %, Age: %, Class: %',  
            OLD.id, OLD.name, OLD.age, OLD.class;  
        RETURN OLD;  
    END IF;  
  
    RETURN NULL;  
END;  
$$;
```

```
--CREATING A TRIGGER  
CREATE TRIGGER trg_student_audit  
AFTER INSERT OR DELETE  
ON student  
FOR EACH ROW  
EXECUTE FUNCTION fn_student_audit();
```

Q2)

```
CREATE TABLE tbl_employee (  
    emp_id SERIAL PRIMARY KEY,  
    emp_name VARCHAR(100),  
    designation VARCHAR(50),  
    salary NUMERIC(10,2)  
);
```

```
CREATE TABLE tbl_employee_audit (  
    audit_id SERIAL PRIMARY KEY,  
    message TEXT,  
    created_at TIMESTAMP DEFAULT CURRENT_TIMESTAMP  
);
```

```
CREATE OR REPLACE FUNCTION audit_employee_changes()  
RETURNS TRIGGER  
LANGUAGE plpgsql  
AS  
$$  
BEGIN  
    IF TG_OP = 'INSERT' THEN  
        INSERT INTO tbl_employee_audit(message)  
        VALUES ('Employee name ' || NEW.emp_name || ' has been added at ' || NOW());  
        RETURN NEW;  
  
    ELSIF TG_OP = 'DELETE' THEN  
        INSERT INTO tbl_employee_audit(message)  
        VALUES ('Employee name ' || OLD.emp_name || ' has been deleted at ' || NOW());  
        RETURN OLD;  
    END IF;  
  
    RETURN NULL;  
END;  
$$;
```

```
CREATE TRIGGER trg_employee_audit  
AFTER INSERT OR DELETE  
ON tbl_employee  
FOR EACH ROW  
EXECUTE FUNCTION audit_employee_changes();
```

```
INSERT INTO tbl_employee (emp_name, designation, salary)  
VALUES ('Arpit Anand', 'Software Engineer', 55000);
```

```
SELECT * FROM tbl_employee_audit;
```

```
DELETE FROM tbl_employee WHERE emp_name = 'Arpit Anand';
```

```
SELECT * FROM tbl_employee_audit;
```

### 3. Output:



```
39 END;
40 >S;
41
42
43 ---CREATING A TRIGGER
44 CREATE TRIGGER trg_student_audit
45 AFTER INSERT OR DELETE
46 ON student
47 FOR EACH ROW
48 EXECUTE FUNCTION fn_student_audit();
49
50 INSERT INTO student (name, age, class)
51 VALUES ('Arpit Anand', 21, 'CS101');
52
```



NOTICE: Inserted Row -> ID: 1, Name: Arpit Anand, Age: 21, Class: CS101  
INSERT 0 1

Query returned successfully in 42 msec.



```
54 FOR EACH ROW
55 EXECUTE FUNCTION audit_employee_changes();
56
58 INSERT INTO tbl_employee (emp_name, designation, salary)
59 VALUES ('Arpit Anand', 'Software Engineer', 55000);
60
61 SELECT * FROM tbl_employee_audit;
62
63 DELETE FROM tbl_employee WHERE emp_name = 'Arpit Anand';
64
65 SELECT * FROM tbl_employee_audit;
66
```



SQL

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| audit_id<br>[PK] integer | message<br>text  | created_at<br>timestamp without time zone |
|--------------------------|--|---|
| 1                        | Employee name Arpit Anand has been added at 2025-10-21 21:02:59.425952+00:30 | 2025-10-21 21:02:59.425952                |



```
54 FOR EACH ROW
55 EXECUTE FUNCTION audit_employee_changes();
56
58 INSERT INTO tbl_employee (emp_name, designation, salary)
59 VALUES ('Arpit Anand', 'Software Engineer', 55000);
60
61 SELECT * FROM tbl_employee_audit;
62
63 DELETE FROM tbl_employee WHERE emp_name = 'Arpit Anand';
64
65 SELECT * FROM tbl_employee_audit;
```



SQL

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| audit_id<br>[PK] integer | message<br>text  | created_at<br>timestamp without time zone |
|--------------------------|--|---|
| 1                        | Employee name Arpit Anand has been added at 2025-10-21 21:02:59.425952+05:30   | 2025-10-21 21:02:59.425952                |
| 2                        | Employee name Arpit Anand has been deleted at 2025-10-21 21:03:19.998826+05:30 | 2025-10-21 21:03:19.998826                |

#### **4. Learning Outcomes:**

1. Understand the concept and purpose of database triggers in PostgreSQL.
2. Learn how to automate data tracking using AFTER INSERT and AFTER DELETE triggers.
3. Gain hands-on experience with trigger functions written in PL/pgSQL.
4. Develop the ability to implement audit logging for real-time database monitoring.
5. Enhance skills in maintaining data integrity and traceability in relational databases.