



# DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

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## EXPERIMENT - 07

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**Section/Group:** 23BCS-KRG2B

**Semester:** 5<sup>th</sup>

**Date of Performance:** 09/10/25

**Subject Name:** ADBMS

**Subject Code:** 23CSP-333

### 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:

query    Query History

Scratch Pad [x](#)

```

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();

50  INSERT INTO student (name, age, class)
51  VALUES ('Arpit Anand', 21, 'CS101');
52

```

Data Output    Messages    Notifications

NOTICE: Inserted Row -> ID: 1, Name: Arpit Anand, Age: 21, Class: CS101  
INNSFR7 0 i

Query returned successfully in 42 msec.

Query    Query History

Scratch Pad [x](#)

```

ou  on tbl_employee
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 tbt_employee_audit
66

```

Data Output    Messages    Notifications

Showing rows: 1 to 1 / Page No: 1 of 1 | < 44 FF FT

	audit_id [PK] integer	message text	created_at timestamp without time zone
1	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

Query    Query History

Scratch Pad [x](#)

```

»u Up to L_employee
s4 FOR EACH ROW
ss EXECUTE FUNCTION audit_employee_changes() ;
56
57
58  INSERT INTO tbl_employee (emp_name, designation, salary)
59  VALUES ('Arpit Anand', 'Software Engineer', 55000);
60
61  SELECT * FROM tbt_employee_audit;
62
63  DELETE FROM tbl_employee WHERE emp_name = 'Arpit Anand';
64
65  SELECT * FROM tbt_employee_audit;

```

Data Output    Messages    Notifications

Showing rows: 1 to 2 / Page No: 1 of 1 | < 44 >n F

	audit_id [PK] integer	message text	created_at timestamp without time zone
1	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	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.