



WORKSHEET 7

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Semester: 5th

Date of Performance: 27-10-2025

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
$$ BE
GIN
    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 ('Supriya Dutta', 'Software Engineer', 55000);

SELECT * FROM tbl_employee_audit;

DELETE FROM tbl_employee WHERE emp_name = 'Supriya Dutta';

SELECT * FROM tbl_employee_audit;

```

3. Output:

```
Query Query History Scratch Pad x
38 RETURN NULL;
39 END;
40 $$;
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 ('Supriya Dutta', 21, 'CS101');
52
```

Data Output	Messages	Notifications
NOTICE: Inserted Row -> ID: 1, Name: Supriya Dutta, Age: 21, Class: CS101 INSERT 0 1 Query returned successfully in 42 msec.		

```
Query Query History Scratch Pad x
53 ON tbl_employee
54 FOR EACH ROW
55 EXECUTE FUNCTION audit_employee_changes();
56
57
58 INSERT INTO tbl_employee (emp_name, designation, salary)
59 VALUES ('Supriya Dutta', 'Software Engineer', 55000);
60
61 SELECT * FROM tbl_employee_audit;
62
63 DELETE FROM tbl_employee WHERE emp_name = 'Supriya Dutta';
64
65 SELECT * FROM tbl_employee_audit;
66
```

Data Output	Messages	Notifications
Showing rows: 1 to 1 Page No: 1 of 1		
audit_id [PK] integer	message text	created_at timestamp without time zone
1	Employee name Supriya Dutta 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
53 ON tbl_employee
54 FOR EACH ROW
55 EXECUTE FUNCTION audit_employee_changes();
56
57
58 INSERT INTO tbl_employee (emp_name, designation, salary)
59 VALUES ('Supriya Dutta', 'Software Engineer', 55000);
60
61 SELECT * FROM tbl_employee_audit;
62
63 DELETE FROM tbl_employee WHERE emp_name = 'Supriya Dutta';
64
65 SELECT * FROM tbl_employee_audit;
66
```

Data Output	Messages	Notifications
Showing rows: 1 to 2 Page No: 1 of 1		
audit_id [PK] integer	message text	created_at timestamp without time zone
1	Employee name Supriya Dutta has been added at 2025-10-21 21:02:59.425952+05:30	2025-10-21 21:02:59.425952
2	Employee name Supriya Dutta 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.