



DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

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WORKSHEET 7

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Branch: CSE(3rd Year)

Section: 23AIT_Krg_G2

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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
$$ BE
GIN
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

```

56      RETURN NULL;
57
58  END;
59
60  $$;
61
62
63  --CREATING A TRIGGER
64  CREATE TRIGGER trg_student_audit
65  AFTER INSERT OR DELETE
66  ON student
67  FOR EACH ROW
68  EXECUTE FUNCTION fn_student_audit();
69
70
71  INSERT INTO student (name, age, class)
72  VALUES ('Supriya Dutta', 21, 'CS101');
73
74
75

```

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

```

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

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

```

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

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