WORKSHEET 7

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Branch: CSE(3rd Year)	**Section/Group: Krg-1-A**
Semester: 5th	**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

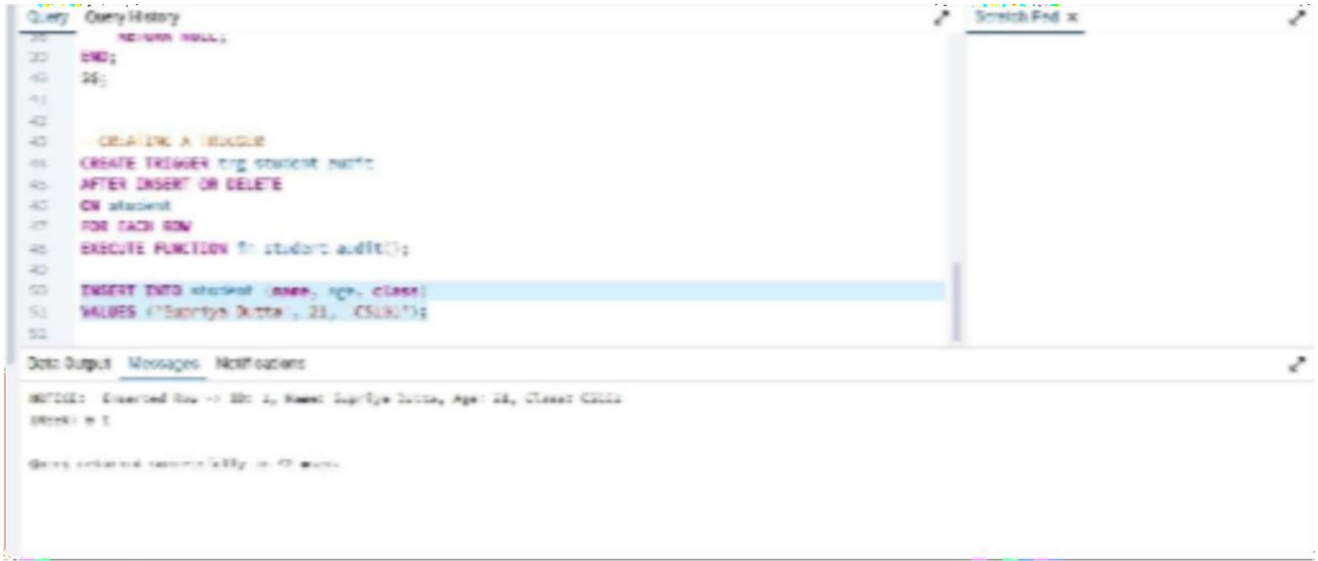
```
CREATE TABLE student (
    id SERIAL PRIMARY KEY,
    name VARCHAR(100),
    age INT,
    class VARCHAR(50)
);


--TRIGGER FUNCTION

CREATE OR REPLACE FUNCTION fn_student_audit()
RETURNS TRIGGER
LANGUAGE plpgsql
AS
$$ 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)
);
```

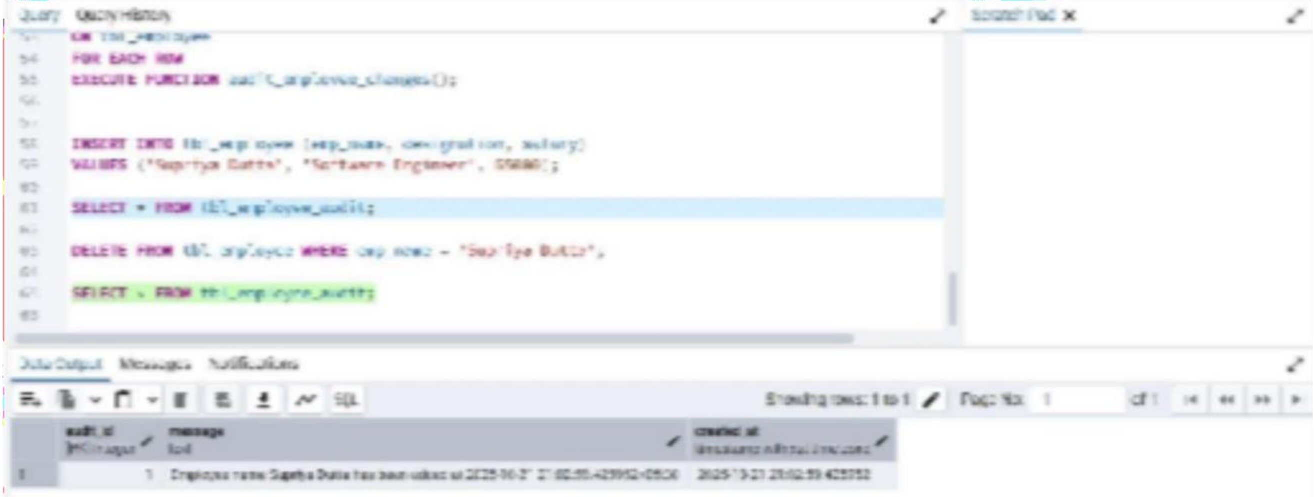
```
CREATE TABLE tbl_employee_audit
   ( audit_id SERIAL PRIMARY KEY,
   message TEXT,
   created_at TIMESTAMP DEFAULT CURRENT_TIMESTAMP
);

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:



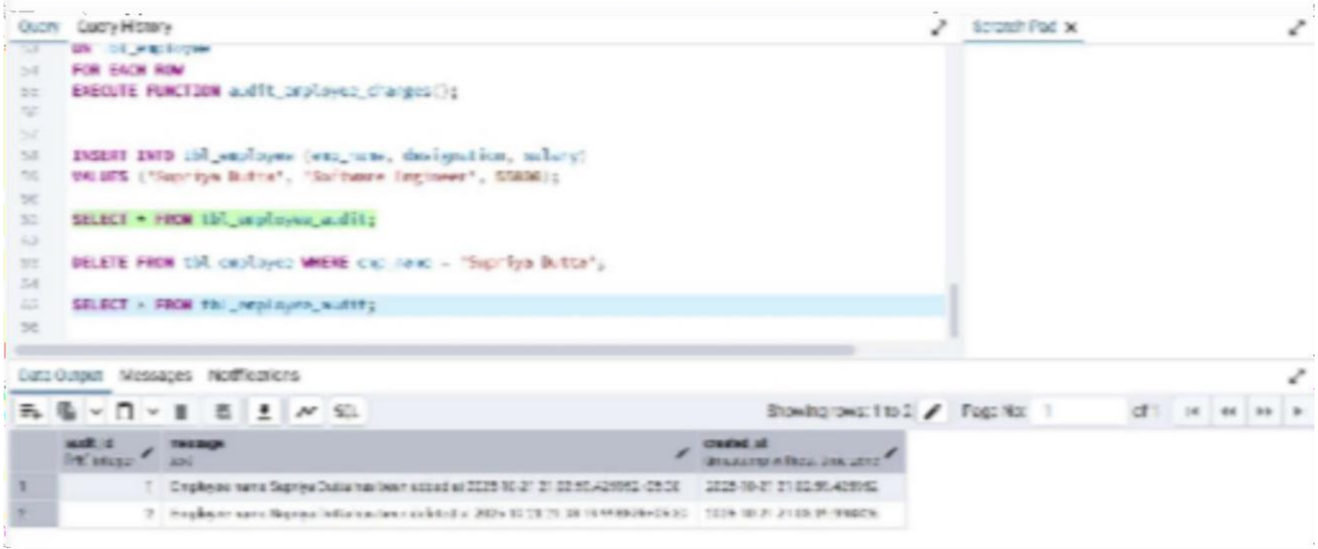
```sql
        RETURN NULL;
END;
$$;


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

INSERT INTO student (name, age, class)
VALUES ('Supriya Dutta', 21, 'CS101');
```

```
NOTICE:  Inserted Row -> ID: 1, Name: Supriya Dutta, Age: 21, Class: CS101
INSERT 0 1

Query returned successfully in 47 msec.
```



```sql
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;
```

	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 21:02:55.425952+05:30	2025-10-21 21:02:55.425952



```sql
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;
```

	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 21:02:55.425952+05:30	2025-10-21 21:02:55.425952
2	2	Employee name Supriya Dutta has been deleted at 2025-10-21 21:03:19.998026+05:30	2025-10-21 21:03:19.998026

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.