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# WORKSHEET 4

**AIM:** To understand and implement iterative control structures in PostgreSQL conceptually, including FOR loops, WHILE loops, and basic LOOP constructs, for repeated execution of database logic.

**S/W Requirement:** Oracle Database Express Edition and pgAdmin

## OBJECTIVES:

- To understand why iteration is required in database programming
- To learn the purpose and behavior of FOR, WHILE, and LOOP constructs
- To understand how repeated data processing is handled in databases
- To relate loop concepts to real-world batch processing scenarios
- To strengthen conceptual knowledge of procedural SQL used in enterprise systems

**Practical / Experiment Steps**

**Example 1: FOR Loop – Simple Iteration**

- The loop runs a fixed number of times
- Each iteration represents one execution cycle
- Useful for understanding basic loop behavior

**Application:** Counters, repeated tasks, batch execution

Querry:

```
DO $$
BEGIN
   FOR i IN 1..5 LOOP
      RAISE NOTICE 'Iteration Number: %', i;
   END LOOP;
END $$;
```

Output:

```
NOTICE:  Iteration Number: 1
NOTICE:  Iteration Number: 2
NOTICE:  Iteration Number: 3
NOTICE:  Iteration Number: 4
NOTICE:  Iteration Number: 5
DO

Query returned successfully in 68 msec.
```

**Example 2: FOR Loop with Query (Row-by-Row Processing)**

- The loop processes database records one at a time
- Each iteration handles a single row
- Simulates cursor-based processing

**Application:** Employee reports, audits, data verification

For table – Violations

| | id [PK] integer | entity_name character varying (100) | violation_count integer | approval_status character varying (30) |
|---|---|---|---|---|
| 1 | 1 | Finance_Department | 12 | Needs Review |
| 2 | 2 | HR_Department | 5 | Needs Review |
| 3 | 3 | IT_Department | 20 | Rejected |
| 4 | 4 | Sales_Department | 0 | Approved |
| 5 | 5 | Admin_Department | 0 | Approved |
| 6 | 6 | Security_Team | 15 | Needs Review |

Querry:

```
DO $$
DECLARE
   rec RECORD;
BEGIN
   FOR rec IN SELECT entity_name, violation_count FROM Violations LOOP
      RAISE NOTICE 'Entity: %, Violations: %',
            rec.entity_name, rec.violation_count;
   END LOOP;
END $$;
```

Output:

```
NOTICE:  Entity: Finance_Department, Violations: 12
NOTICE:  Entity: HR_Department, Violations: 5
NOTICE:  Entity: IT_Department, Violations: 20
NOTICE:  Entity: Sales_Department, Violations: 0
NOTICE:  Entity: Admin_Department, Violations: 0
NOTICE:  Entity: Security_Team, Violations: 15
DO

Query returned successfully in 68 msec.
```

**Example 3: WHILE Loop – Conditional Iteration**

- The loop runs until a condition becomes false
- Execution depends entirely on the condition
- The condition is checked before every iteration

**Application:** Retry mechanisms, validation loops

Querry:

```
DO $$
DECLARE
   counter INT := 1;
BEGIN
   WHILE counter <= 5 LOOP
      RAISE NOTICE 'Counter Value: %', counter;
      counter := counter + 1;
   END LOOP;
END $$;
```

Outcome:

```
NOTICE:  Counter Value: 1
NOTICE:  Counter Value: 2
NOTICE:  Counter Value: 3
NOTICE:  Counter Value: 4
NOTICE:  Counter Value: 5
DO

Query returned successfully in 47 msec.
```

**Example 4: LOOP with EXIT WHEN**

- The loop does not stop automatically
- An explicit exit condition controls termination
- Gives flexibility in complex logic

**Application:** Workflow engines, complex decision cycles

Querry:

```
DO $$
DECLARE
   counter INT := 1;
BEGIN
   LOOP
      RAISE NOTICE 'Loop Count: %', counter;
      counter := counter + 1;
      EXIT WHEN counter > 5;
   END LOOP;
END $$;
```

Output:

```
NOTICE:  Loop Count: 1
NOTICE:  Loop Count: 2
NOTICE:  Loop Count: 3
NOTICE:  Loop Count: 4
NOTICE:  Loop Count: 5
DO

Query returned successfully in 49 msec.
```

**Example 5: Salary Increment Using FOR Loop**

- Employee records are processed one by one
- Salary values are updated iteratively
- Represents real-world payroll processing

**Application:** Payroll systems, bulk updates

For table Employees

| | emp_id [PK] integer | fullname character varying (100) | salary numeric (10,2) | dept_id integer | role character varying (50) | email character varying (100) |
|---|---|---|---|---|---|---|
| 1 | 104 | Priya Singh | 60000.00 | 3 | Accountant | [null] |
| 2 | 101 | Amit Sharma | 50000.00 | 3 | HR Executive | [null] |

Querry:

```
DO $$
DECLARE
   rec RECORD;
BEGIN
   FOR rec IN SELECT emp_id, salary FROM Employees LOOP
      UPDATE Employees
      SET salary = salary - 1000
      WHERE emp_id = rec.emp_id;
   END LOOP;
END $$;
```

Output:

| | emp_id [PK] integer | fullname character varying (100) | salary numeric (10,2) | dept_id integer | role character varying (50) | email character varying (100) |
|---|---|---|---|---|---|---|
| 1 | 104 | Priya Singh | 61000.00 | 3 | Accountant | [null] |
| 2 | 101 | Amit Sharma | 51000.00 | 3 | HR Executive | [null] |

**Example 6: Combining LOOP with IF Condition**

- Loop processes each record
- Conditional logic classifies data during iteration
- Demonstrates decision-making inside loops

**Application:** Employee grading, alerts, categorization logic

For table StudentGrades

| | student_id [PK] integer | student_name character varying (50) | marks integer |
|---|---|---|---|
| 1 | 1 | Aarav | 95 |
| 2 | 2 | Neha | 82 |
| 3 | 3 | Rohit | 68 |
| 4 | 4 | Priya | 91 |
| 5 | 5 | Karan | 56 |
| 6 | 6 | Simran | 45 |
| 7 | 7 | Aman | 77 |
| 8 | 8 | Riya | 88 |
| 9 | 9 | Vikas | 35 |

Querry:

```
DO $$
DECLARE
   rec RECORD;
BEGIN
   FOR rec IN SELECT student_name, marks FROM StudentGrades LOOP
      IF rec.marks >= 75 THEN
         RAISE NOTICE '% : Distinction', rec.student_name;
      ELSE
         RAISE NOTICE '% : Needs Improvement', rec.student_name;
      END IF;
   END LOOP;
END $$;
```

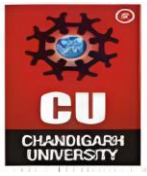
Output:

```
NOTICE:  Aarav : Distinction
NOTICE:  Neha : Distinction
NOTICE:  Rohit : Needs Improvement
NOTICE:  Priya : Distinction
NOTICE:  Karan : Needs Improvement
NOTICE:  Simran : Needs Improvement
NOTICE:  Aman : Distinction
NOTICE:  Riya : Distinction
NOTICE:  Vikas : Needs Improvement
DO

Query returned successfully in 72 msec.
```

**Result**

This experiment helps students understand how iterative control structures work in PostgreSQL at a conceptual level. Students learn where and why loops are used in database systems and gain foundational knowledge required for writing procedural logic in enterprise-grade applications.

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