Practical 06 Part II

Introduction to Loops in PL/SQL

Loops allow repeated execution of a block of statements. PL/SQL supports three types of loops:
BASIC LOOP (Infinite Loop)
WHILE LOOP (Condition-based)
FOR LOOP (Counter-based)

BASIC LOOP (Must use EXIT condition)

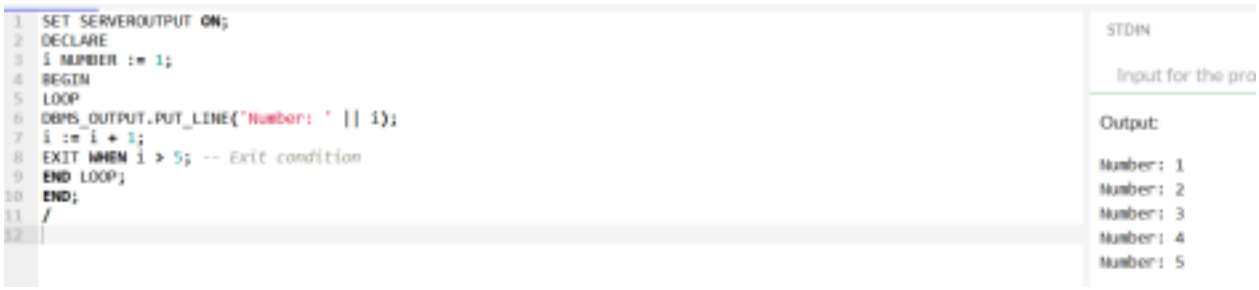
A `LOOP` executes repeatedly until an `EXIT` condition is met.

Example: Print numbers from 1 to 5 using LOOP

```
SET SERVEROUTPUT ON;

DECLARE
    i NUMBER := 1;
BEGIN
    LOOP
        DBMS_OUTPUT.PUT_LINE('Number: ' || i);
        i := i + 1;

        EXIT WHEN i > 5; -- Exit condition
    END LOOP;
END;
/
```



Explanation: The loop runs indefinitely until `i` becomes greater than 5.

WHILE LOOP (Executes as long as condition is TRUE)

A `WHILE` loop checks a condition before executing the block.

Example: Print numbers from 1 to 5 using WHILE LOOP

```
SET SERVEROUTPUT ON;

DECLARE
    i NUMBER := 1;
BEGIN
    WHILE i <= 5 LOOP
        DBMS_OUTPUT.PUT_LINE('Number: ' || i);
        i := i + 1;
    END LOOP;
END;
/
```

Explanation: The loop runs as long as `i <= 5`. When `i` becomes 6, it stops.

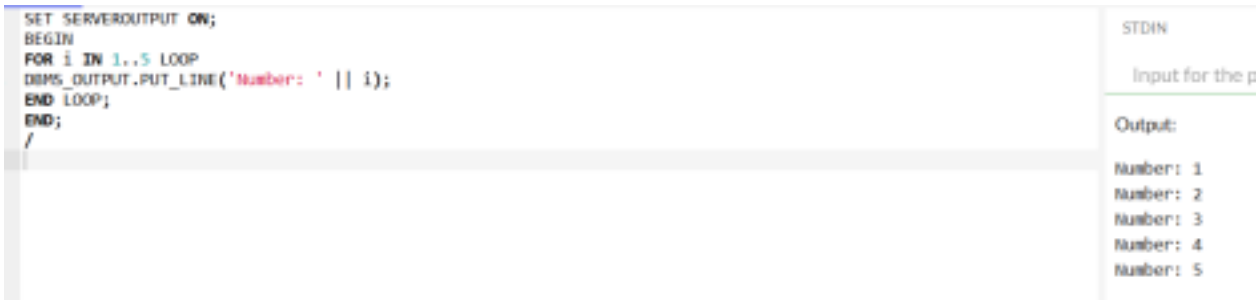
FOR LOOP (Counter-based)

A `FOR` loop runs a fixed number of times.

Example: Print numbers from 1 to 5 using FOR LOOP

```
SET SERVEROUTPUT ON;

BEGIN
    FOR i IN 1..5 LOOP
        DBMS_OUTPUT.PUT_LINE('Number: ' || i);
    END LOOP;
END;
/
```



Explanation: The loop runs automatically from `1 to 5`, eliminating the need for a manual counter.

REVERSE FOR LOOP

A `FOR` loop can count **backward** using `REVERSE`.

Example: Print numbers from 5 to 1 using FOR LOOP

```
SET SERVEROUTPUT ON;

BEGIN
    FOR i IN REVERSE 1..5 LOOP
        DBMS_OUTPUT.PUT_LINE('Number: ' || i);
```

```
    END LOOP;
END;
/
```

```
SET SERVEROUTPUT ON;
BEGIN
FOR i IN REVERSE 1..5 LOOP
DBMS_OUTPUT.PUT_LINE('Number: ' || i);
END LOOP;
END;
/
```

STDIN

Input for the pro

Output:

```
Number: 5
Number: 4
Number: 3
Number: 2
Number: 1
```

Explanation: The loop counts **down** from 5 to 1.

Simple Tasks for Practice

Write a **BASIC LOOP** to print numbers from 1 to 10.

```
DECLARE
  num NUMBER := 1;
  sum_result NUMBER := 0;
BEGIN
  -- BASIC LOOP to print numbers from 1 to 10
  DBMS_OUTPUT.PUT_LINE('Numbers from 1 to 10:');
  LOOP
    DBMS_OUTPUT.PUT_LINE(num);
    num := num + 1;
    EXIT WHEN num > 10;
  END LOOP;
  END;
  /
```

STDIN

Input for the program (Op

Output:

```
Numbers from 1 to 10:
1
2
3
4
5
6
7
8
9
10
```

Modify the **WHILE LOOP** to print **even numbers** from 2 to 10.

```
DECLARE
  num NUMBER := 1;
  sum_result NUMBER := 0;
BEGIN
num := 2;
  DBMS_OUTPUT.PUT_LINE('Even numbers from 2 to 10:');
  WHILE num <= 10 LOOP
    DBMS_OUTPUT.PUT_LINE(num);
    num := num + 2;
  END LOOP;
  END;
  /
```

STDIN

Input for the program (Opti

Output:

```
Even numbers from 2 to 10:
2
4
6
8
10
```

Write a **FOR LOOP** to print the **square of numbers** from 1 to 5.

```
DECLARE
  num NUMBER := 1;
  sum_result NUMBER := 0;
BEGIN
num := 2;
DBMS_OUTPUT.PUT_LINE('Squares of numbers from 1 to 5:');
  FOR i IN 1..5 LOOP
    DBMS_OUTPUT.PUT_LINE('Square of ' || i || ' is ' || i*i);
  END LOOP;
  END;
  /
```

```
STDIN
Input for the program (Optional)
Output:
Squares of numbers from 1 to 5:
Square of 1 is 1
Square of 2 is 4
Square of 3 is 9
Square of 4 is 16
Square of 5 is 25
```

Create a **REVERSE FOR LOOP** that prints numbers from 10 to 1.

```
DECLARE
  num NUMBER := 1;
  sum_result NUMBER := 0;
BEGIN
DBMS_OUTPUT.PUT_LINE('Numbers from 10 to 1:');
  FOR i IN REVERSE 1..10 LOOP
    DBMS_OUTPUT.PUT_LINE(i);
  END LOOP;

  END;
  /
```

```
STDIN
Input for the program (
Output:
Numbers from 10 to 1:
10
9
8
7
6
5
4
3
2
1
```

Write a loop that **calculates the sum of numbers from 1 to 5**.

```
DECLARE
  num NUMBER := 1;
  sum_result NUMBER := 0;
BEGIN
 FOR i IN 1..5 LOOP
    sum_result := sum_result + i;
  END LOOP;
  DBMS_OUTPUT.PUT_LINE('Sum of numbers from 1 to 5: ' || sum_result);

END;
/
```

```
STDIN
Input for the program (Optional)
Output:
Sum of numbers from 1 to 5: 15
```

LOOPS USECASES IN DBMS

BASIC LOOP (Must use EXIT condition) The `LOOP`

statement runs indefinitely unless explicitly stopped with an `EXIT` condition.

Example 1: Insert 5 Records into a Table Using LOOP

```
BEGIN

    FOR i IN 1..5 LOOP

        INSERT INTO employees (id, name, salary) VALUES (i,
'Employee_' || i, 5000 + (i * 500));

    END LOOP;
```

```
    COMMIT;
END;
/
```

Explanation: Inserts 5 employees with incrementing salaries.

Example 2: Fetch and Display Employee Names Using LOOP

```
DECLARE
    v_name employees.name%TYPE;
    CURSOR emp_cursor IS SELECT name FROM employees;
BEGIN
    OPEN emp_cursor;
    LOOP
        FETCH emp_cursor INTO v_name;
        EXIT WHEN emp_cursor%NOTFOUND;
        DBMS_OUTPUT.PUT_LINE('Employee: ' || v_name);
    END LOOP;
    CLOSE emp_cursor;
END;
/
```

Explanation: Uses a cursor to fetch and print employee names one by one.

Example 3: Delete Employees with Salary Below 3000 Using LOOP

```
DECLARE

    CURSOR emp_cursor IS SELECT id FROM employees WHERE salary < 3000;

    v_id employees.id%TYPE;

BEGIN

    OPEN emp_cursor;

    LOOP

        FETCH emp_cursor INTO v_id;

        EXIT WHEN emp_cursor%NOTFOUND;
        DELETE FROM employees WHERE id = v_id;

    END LOOP;

    CLOSE emp_cursor;

    COMMIT;

END;

/
```

Explanation: Deletes employees earning less than 3000.

Example 4: Update Salaries Using LOOP

```
DECLARE
```

```
    CURSOR emp_cursor IS SELECT id FROM employees;
    v_id employees.id%TYPE;
BEGIN
    OPEN emp_cursor;
    LOOP
        FETCH emp_cursor INTO v_id;
        EXIT WHEN emp_cursor%NOTFOUND;
        UPDATE employees SET salary = salary + 1000 WHERE id = v_id;
    END LOOP;
    CLOSE emp_cursor;
    COMMIT;
END;
/
```

Explanation: Increases salaries by 1000 for all employees.

WHILE LOOP (Executes as long as the condition is TRUE)

Example 1: Print Employee Names While ID ≤ 5

```
DECLARE
    v_id NUMBER := 1;
    v_name employees.name%TYPE;
BEGIN
    WHILE v_id <= 5 LOOP
```

```
        SELECT name INTO v_name FROM employees WHERE id = v_id;

        DBMS_OUTPUT.PUT_LINE('Employee: ' || v_name);

        v_id := v_id + 1;

    END LOOP;

END;

/
```

Explanation: Fetches and prints employee names for IDs 1 to 5.

Example 2: Insert Employees Until a Certain Count

```
DECLARE

    v_count NUMBER := 0;

BEGIN
    WHILE v_count < 5 LOOP

        INSERT INTO employees (id, name, salary) VALUES (v_count + 10,
 'New_Employee', 4000);

        v_count := v_count + 1;

    END LOOP;

    COMMIT;

END;

/
```

Explanation: Inserts 5 new employees.

Example 3: Fetch and Display Employees with Salary Above 6000

```
DECLARE

    CURSOR emp_cursor IS SELECT name FROM employees WHERE salary >
6000;

    v_name employees.name%TYPE;

BEGIN

    OPEN emp_cursor;

    FETCH emp_cursor INTO v_name;

    WHILE emp_cursor%FOUND LOOP

        DBMS_OUTPUT.PUT_LINE('Employee: ' || v_name);
        FETCH emp_cursor INTO v_name;

    END LOOP;

    CLOSE emp_cursor;
END;

/
```

Explanation: Fetches employees earning more than 6000.

Example 4: Deduct Salary Until Minimum Threshold

```
DECLARE

    v_salary NUMBER;

BEGIN
```

```
    SELECT salary INTO v_salary FROM employees WHERE id = 1;

    WHILE v_salary > 3000 LOOP

        UPDATE employees SET salary = salary - 500 WHERE id = 1;

        v_salary := v_salary - 500;

    END LOOP;

    COMMIT;

END;

/
```

Explanation: Deducts salary until it reaches 3000.

FOR LOOP (Counter-based loop, runs a fixed number of times)

Example 1: Insert 10 Employees Using FOR LOOP

```
BEGIN

    FOR i IN 1..10 LOOP

        INSERT INTO employees (id, name, salary) VALUES (i + 100,
 'Emp_' || i, 6000);

    END LOOP;

    COMMIT;

END;

/
```

Explanation: Inserts 10 employees with unique IDs.

Example 2: Display First 5 Employees

```
BEGIN

    FOR emp IN (SELECT name FROM employees WHERE ROWNUM <= 5) LOOP

            DBMS_OUTPUT.PUT_LINE('Employee: ' || emp.name);

    END LOOP;

END;

/
```

Explanation: Prints the first 5 employee names.

Example 3: Increase Salaries in a Range

```
BEGIN
    FOR i IN 1..10 LOOP

        UPDATE employees SET salary = salary + 500 WHERE id = i;

    END LOOP;

    COMMIT;

END;

/
```

Explanation: Increases salaries of employees with IDs 1 to 10.

Example 4: Delete Employees with ID Greater Than 50

```
BEGIN

    FOR i IN (SELECT id FROM employees WHERE id > 50) LOOP

        DELETE FROM employees WHERE id = i.id;

    END LOOP;

    COMMIT;

END;

/
```

Explanation: Deletes employees with IDs greater than 50.

Loops with database Simple Tasks for Practice

1. Write a **LOOP** to insert **5 new departments** into a `departments` table. 2. Modify the **WHILE LOOP** to **increase salaries** until they reach 10,000. 3. Write a **FOR LOOP** to display **employee details** for IDs 1 to 5. 4. Create a **cursor-based LOOP** that prints **employee names and salaries**. 5. Write a loop that **calculates the total salary** of all employees.