TUTORIAL ON PL/SQL

Till now we have worked on SQL Commands. All those SQL queries are expressed as single statement at SQL Prompt. Now there raises a question, is there any provision by which one can write a program i.e., set of statements grouped together, that works on the database and gets the required results from it. PL/SQL is the concept by which the user can do such a job.

1)Structure of PL/SQL Program: It is shown as below

```
declare                 // Declaration section  (Optional section)
.........
begin                   // Executable statements section (Mandatory section)
.........
.........SQL Statements (or/and) PL/SQL Statements
.........
exception               // Exception section (Optional Section)
end;
```

2)Types of PL/SQL programs: The following is the list of various types of PL/SQL programs.
2.1)Anonymous Blocks of PL/SQL: These are PL/SQL blocks with no names at all.
2.2)Procedures and Functions in PL/SQL: These are PL/SQL blocks with names and used to retrieve only one record from the database.

3)Important Points to be noted down in PL/SQL:

Point 1: A PL/SQL program is to be written at SQL prompt.

Point 2: In order to generate output of the PL/SQL program do the following at the beginning of the SQL session

```
SQL>  set serveroutput on;
```

Point3: To run the PL/SQL program do the following

```
SQL> /
```

Point4: Use **'dbms_output.put_line()'** statement to print the output of the PL/SQL program.

4)ANONYMOUS PL/SQL BLOCKS : These are PL/SQL blocks which do not have names and are written to perform either manipulations on the existing table data or some programs independent of tables.

4.1 ANONYMOUS PL/SQL BLOCKS PERFORMING OPERATIONS ON TABLES

These are blocks perform operations (retrieve, insert, modify, delete) on existing table.
Consider the following table with data

Table Name: **EMP**

ssn	ename	designation	salary	deptno
102	Sen	clerk	20000	2
107	Jai	accountant	35000	2
108	Rai	officer	48000	1
100	Renu	operator	18000	1
103	Riaz	clerk	21000	1
101	Venu	officer	46000	2
109	Prabu	accountant	36000	1
114	Paul	operator	19000	2

Q1) Write a PL/SQL block to retrieve name, salary of a particular employee identified by ssn from employee table by reading ssn value during runtime.

```
SQL>declare
        name  EMP.ename%type;
        sal  EMP.salary%type;
    begin
        select ename, salary into name, sal from EMP where ssn=&ssn;
        dbms_output.put_line('Name of employee is'||name);
        dbms_output.put_line('Salary is'||sal);
    end;
```

Q2) Write a PL/SQL block to change designation to 'clerk' for employee whose ssn is 100 interactively reading ssn during runtime.

```
SQL> begin
        update EMP set designation:='clerk' where ssn=&ssn;
        dbms_output.put_line('record got updated');
     end;
```

Q3) Write a PL/SQL block to delete a particular employee record by taking his ssn interactively.

```
SQL>begin
      delete from EMP where ssn=&ssn;
      dbms_output.put_line('record got deleted');
    end;
```

4.2 ANONYMOUS PL/SQL BLOCKS INDEPENDENT OF TABLES

4.2.1) Independent Anonymous PL/SQL blocks with only sequential statements: It is a PL/SQL block containing statements to be executed one after the other in sequential manner.

Example1: Write a PL/SQL block to display your regno and name

```
SQL> declare
       regno varchar2(10);
       name varchar2(20);
     begin
       regno:=&regno;
       name:=&name;
       dbms_output.put_line('Register Number is'||regno);
       dbms_output.put_line('Name is'||name);
     end;
SQL>/
```

Example 2: Write a PL/SQL block to calculate area of a circle given its radius

```
SQL>declare
       radius number(2);
       area  number(4,2);
     begin
       radius:=&radius;
       area:= 3.157 * radius *radius;
       dbms_output.put_line('Area of a circle is'||area);
    end;
SQL>/
```

Example 3: Write a PL/SQL block to find out Simple Interest given P=10000, N=2 and R=10%
(Hint: Simple Interest(SI)=(P*N*R)/100)

```
SQL> declare
       P number(5);
       N number(1);
       R number(2);
       SI number(4,2);
     begin
       P:=&P;
       N:=&N;
```

```
        R:=&R;
        SI:=(P*N*R)/100;
        dbms_output.put_line('Simple Interest is'||SI);
    end;
SQL> /
```

4.2.2)Anonymous PL/SQL blocks with conditional structures:

In PL/SQL there are two types of conditional statements available. They are shown as below.

i)if / nested if statement: It's syntax is as shown below

Syntax of 'if' statement:

```
If (condition) then
        statement(s) of true block;
else
        statement(s) of false block;
endif;
```

Syntax of nested if statement:

```
If(condition 1) then
        statement(s);
elsif (condtion 2) then
        statement(s);
else
        statement(s);
endif;
```

ii) case...when statement: It's syntax is as shown below

```
variable_name1:=
case value
when value 1 then statement;
when value 2 then statement;
.
.
when value n then statement;
end;
```

Examples on 'if' statement:

Example 1: Write a PL/SQL block to check whether entered character is either vowel or consonant

```
SQL> declare
        v_char  varchar2(1);
      begin
```

```
        v_char:=&v_char;
        if (v_char ='a') or(v_char='A') or (v_char='e') or(v_char='E') or(v_char='i') or(v_char='I')
        or (v_char='o') or(v_char='O') or(v_char='u') or (v_char=U') then
                dbms_output.put_line(v_char||'is a vowel');
        else
                dbms_output.put_line(v_char ||'is a consonant');
        endif;
      end;
SQL>/
```

Example 2: Write a PL/SQL block to check whether entered integer number is even or odd

```
SQL> declare
        num number;
begin
        num:=&num;
        if mod(num,2)=0 then
                dbms_output.put_line(num||' '||'Is Even Number');
        else
                dbms_output.put_line(num||' '||'Is Odd Number');
        end if;
end;
SQL> /
```

Q)Write PL/SQL programs for the following
Program 1) To check whether a person is male or female
Program 2)To check whether a person is major or not
Program 3) To check whether a student is attained 'S' grade or not
Program 4) To check whether a person is a senior citizen or not
Program 5) To check whether a student is passed or failed

Examples on 'if...elsif' statement:

Example 1: Write a PL/SQL program to find the smallest among three integer numbers

```
SQL> declare
        a number;
        b number;
        c number;
      begin
        a:=&a;
        b:=&b;
        c:=&c;
        if (a>b) and (a>c) then
                dbms_output.put_line('The greatest number is'||a);
        elsif (b>a) and (b>c) then
                dbms_output.put_line('The greatest number is'||b);
        else
                dbms_output.put_line('The greatest number is'||c);
        endif;
       end;
SQL> /
```

Q) Write PL/SQL programs for the following
Program 1) To display grade of student based on the CGPA
Program 2) To find the smallest of the three integer numbers
Program 3) To display cadre of an employee based on his basic pay

Basic Pay(Rs.)	Cadre
25000	Senior Prosser
20000	Professor
15000	Assistant Professor

Examples on 'case...when' statement:

Example 1: Write a PL/SQL program to display cadre of an employee based on his basic pay

Basic Pay(Rs.)	Cadre
25000	Senior Prosser
20000	Professor
15000	Assistant Professor

```
SQL>declare
        basicpay number(5);
        cadre varchar2(40);
      begin
        basicpay:=&basicpay;
        cadre:=
        case basicpay
          when 25000 then 'Senior Professor'
          when 20000 then 'Professor'
          when 15000 then 'Assistant Professor'
```

```
        end;
        dbms_output.put_line('Cadre of a person is'||cadre);
    end;
SQL>/
```

Q) Write a PL/SQL program to find the actual amount paid based on the following information using 'case… when' statement

Amount of purchase	Discount
10000	20%
8000	15%
5000	10%

Q) Write a PL/SQL program to display the grade of a student based on the following information using 'case…when' statement

CGPA	Grade
90	S
80	A
70	B
60	C
50	D

4.2.3) Anonymous PL/SQL blocks with iterative statements:

The following is the list of iterative statements available in PL/SQL.

i)for loops: It's syntax is as given below

a)
```
for variable in value1…valuen  loop
        statement(s);
end loop;
```

b)
```
for variable in reverse value1…valuen  loop
        statement(s);
end loop;
```

ii) while loops: It's syntax is as given below
```
while (condition) loop
        statement(s);
end loop;
```

Examples on 'for loops':

Example 1: Write PL/SQL program to display even numbers between 1 and 20.

```
SQL>declare
        i number;
      begin
       for i in 1..20 loop
         if mod(i,2)=0 then
              dbms_output.put_line('Even No. Is'||' '||i);
         end if;
       dbms_output.new_line;
       end loop;
end;
SQL>/
```

Example 2: Write PL/SQL block to display factorial of given number

```
SQL> declare
        num number:=&num;
        i  number;
        f  number:=1;
     begin
        for  i  in 1..num loop
              f := f * i;
        end loop;
        dbms_output.put_line(f||' is factorial of '||num);
        end;
SQL>/
```

Example 3: Write PL/SQL block to generate Fibonacci Series up to given number

```
SQL> declare
        num number;
        a number:= 0;
        b number:= 1;
        c number;
     begin
        num:=&num;
        dbms_output.put_line(a);
        dbms_output.put_line(b);
        for  i in 3..num  loop
        c := a + b;
        dbms_output.put_line(c);
        a:=b;
        b:=c;
        end loop;
    end;
SQL>/
```

Example 4: Write PL/SQL block to display reverse number of given number

```
SQL> declare
        num number;
        rev number:=0;
     begin
        num:=&num;
        while (num>0) loop
                rev:=rev*10+mod(num,10);
                num:=trunc(num/10);
        end loop;
                dbms_output.put_line('Reverse No. Is'||' : '||rev);
     end;
SQL>/
```

Q)Write PL/SQL program for the following

Program 1) To find the sum of the digits of given 'n' digit integer number

Program 2) To find the factorial of number between certain range

Program 3) To check when read integer number is palindrome or not