Oracle 11g – PL SQL

Writing Executable Statements

Objectives

- After completing this lesson, you should be able to do the following:
  - PL/SQL Block Syntax and Guidelines
  - Commenting the Code in PL/SQL
  - Use built-in SQL functions in PL/SQL
  - Describe when implicit conversions take place and when explicit conversions have to be dealt
  - Write nested blocks and qualify variables with labels
  - Write readable code with appropriate indentations

PL/SQL Block Syntax and Guidelines

Lexical Units in a PL/SQL Block

- Lexical units:
  - Are building blocks of any PL/SQL block
  - Are sequences of characters including letters, numerals, tabs, spaces, returns, and symbols
  - Can be classified as:
    - Identifiers
    - Delimiters
    - Literals
    - Comments

PL/SQL Block Syntax and Guidelines

Identifiers

- Can contain up to 30 characters
- Must begin with an alphabetic character
- Can contain numerals, dollar signs, underscores, and number signs
- Cannot contain characters such as hyphens, slashes, and spaces
- Should not have the same name as a database table column name
- Should not be reserved words

PL/SQL Block Syntax and Guidelines

Delimiters

Delimiters are simple or compound symbols that have special meaning to PL/SQL

Simple Symbols

Symbol	Meaning
+	Addition operator
-	Subtraction/negation operator
*	Multiplication operator
/	Division operator
=	Relational operator
@	Remote access indicator
;	Statement terminator

Compound Symbols

Symbol	Meaning
<>	Relational operator
!=	Relational operator
||	Concatenation operator
--	Single line comment indicator
/*	Beginning comment delimiter
*/	Ending comment delimiter
:=	Assignment operator

PL/SQL Block Syntax and Guidelines

- Literals:
  - Character and date literals must be enclosed in single quotation marks.

```
name := 'Henderson';
```

  - Numbers can be simple values or scientific notation.
- Statements can continue over several lines.

- **A slash (/) runs the PL/SQL block in a script file or in some tools such as *iSQL*PLUS.***

Commenting Code

- Prefix single-line comments with two hyphens (--).
- Place multiple-line comments between the symbols /* and */.

❑Example

```
DECLARE
...
annual_sal NUMBER (9,2);
BEGIN    -- Begin the executable section

/* Compute the annual salary based on the
   monthly salary input from the user */
annual_sal := monthly_sal * 12;
END;     -- This is the end of the block
/
```

SQL Functions in PL/SQL

- Available in procedural statements:
  - Single-row number
  - Single-row character
  - Data type conversion
  - Date
  - Timestamp
    - `GREATEST` and `LEAST`
  - Miscellaneous functions
- Not available in procedural statements:
  - `DECODE`
  - Group functions

SQL Functions in PL/SQL: Examples

- Get the length of a string:

```
desc_size INTEGER(5);
prod_description VARCHAR2(70):='You can use this
product with your radios for higher frequency';

-- get the length of the string in prod_description
desc_size:= LENGTH(prod_description);
```

Build the mailing list for a company.

```
v_mailing_address := v_name||CHR(10)||
v_address||CHR(10)||v_state||
CHR(10)||v_zip;
```

Convert the employee name to lowercase:

```
emp_name:= LOWER(emp_name);
```

Data Type Conversion

- Convert data to comparable data types
- Are of two types:
  - Implicit conversions
  - Explicit conversions
- Some conversion functions:
  - TO_CHAR
  - TO_DATE
  - TO_NUMBER
  - TO_TIMESTAMP

Data Type Conversion

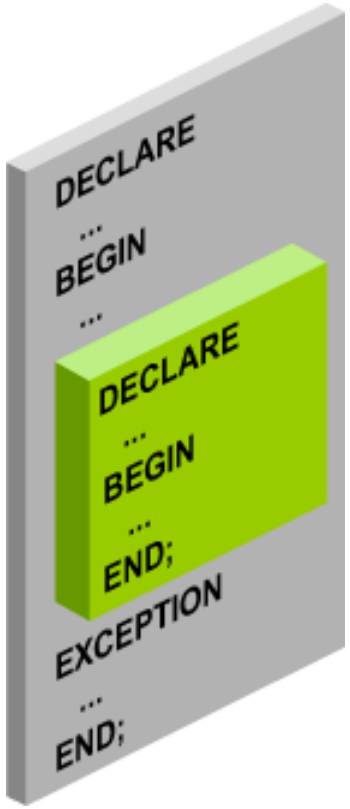
1.
```
date_of_joining DATE:= '02-Feb-2000';
```

2.
```
date_of_joining DATE:= 'February 02,2000';
```

3.
```
date_of_joining DATE:= TO_DATE('February
02,2000','Month DD, YYYY');
```

Nested Blocks

- PL/SQL blocks can be nested wherever an executable statement is allowed.
- A nested block becomes a statement.
- An exception section can contain nested blocks.
- The scope of an identifier is that region of a program unit (block, subprogram, or package) from which you can reference the identifier.



Nested Blocks

Example

```
DECLARE
 outer_variable VARCHAR2(20):='GLOBAL VARIABLE';
BEGIN
  DECLARE
   inner_variable VARCHAR2(20):='LOCAL VARIABLE';
  BEGIN
   DBMS_OUTPUT.PUT_LINE(inner_variable);
   DBMS_OUTPUT.PUT_LINE(outer_variable);
  END;
 DBMS_OUTPUT.PUT_LINE(outer_variable);
END;
/
```

Variable Scope and Visibility

```
DECLARE
 father_name VARCHAR2(20):='Patrick';
 date_of_birth DATE:='20-Apr-1972';
BEGIN
  DECLARE
   child_name VARCHAR2(20):='Mike';
   date_of_birth DATE:='12-Dec-2002';
  BEGIN
   DBMS_OUTPUT.PUT_LINE('Father''s Name: '||father_name);
   DBMS_OUTPUT.PUT_LINE('Date of Birth: '||date_of_birth);
   DBMS_OUTPUT.PUT_LINE('Child''s Name: '||child_name);
  END;
  DBMS_OUTPUT.PUT_LINE('Date of Birth: '||date_of_birth);
END;
/
```

① ②

Qualify an Identifier

```
<<outer>>
DECLARE
 father_name VARCHAR2(20):='Patrick';
 date_of_birth DATE:='20-Apr-1972';
BEGIN
  DECLARE
   child_name VARCHAR2(20):='Mike';
   date_of_birth DATE:='12-Dec-2002';
  BEGIN
   DBMS_OUTPUT.PUT_LINE('Father''s Name: '||father_name);
   DBMS_OUTPUT.PUT_LINE('Date of Birth: '
                        ||outer.date_of_birth);
   DBMS_OUTPUT.PUT_LINE('Child''s Name: '||child_name);
   DBMS_OUTPUT.PUT_LINE('Date of Birth: '||date_of_birth);
  END;
END;
/`
```

Determining Variable Scope

```
<<outer>>
DECLARE
  sal       NUMBER(7,2) := 60000;
  comm      NUMBER(7,2) := sal * 0.20;
  message   VARCHAR2(255) := ' eligible for commission';
BEGIN
  DECLARE
        sal          NUMBER(7,2) := 50000;
        comm         NUMBER(7,2) := 0;
        total_comp   NUMBER(7,2) := sal + comm;
  BEGIN
        message := 'CLERK not'||message;
        outer.comm := sal * 0.30;
  END;
 message := 'SALESMAN'||message;
END;
/
```

Operators in PL/SQL

- Logical
- Arithmetic
- Concatenation
- Parentheses to control order of operations

} Same as in SQL

- Exponential operator (**)

Operators in PL/SQL

- Examples
  - Increment the counter for a loop.

```
loop_count := loop_count + 1;
```

  - Set the value of a Boolean flag.

```
good_sal := sal BETWEEN 50000 AND 150000;
```

  - Validate whether an employee number contains a value.

```
valid  := (empno IS NOT NULL);
```

Programming Guidelines

- Make code maintenance easier by:
  - Documenting code with comments
  - Developing a case convention for the code
  - Developing naming conventions for identifiers and other objects
  - Enhancing readability by indenting

Indenting Code

- For clarity, indent each level of code.
- Example:

```
BEGIN
  IF x=0 THEN
     y:=1;
  END IF;
END;
/
```

```
DECLARE
  deptno       NUMBER(4);
  location_id  NUMBER(4);
BEGIN
  SELECT  department_id,
          location_id
  INTO    deptno,
          location_id
  FROM    departments
  WHERE   department_name
          = 'Sales';
...
END;
/
```