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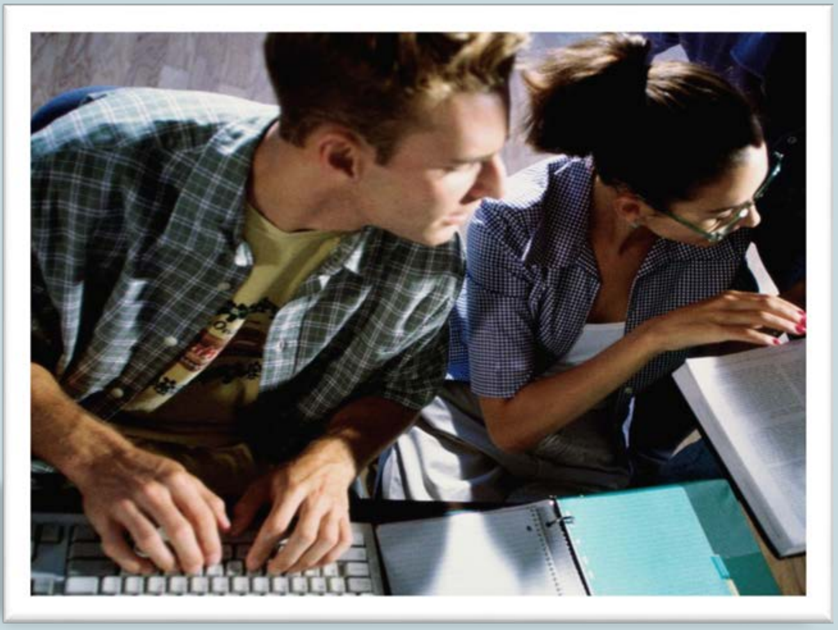
Database Programming with PL/SQL

2-1
Using Variables in PL/SQL



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Objectives

This lesson covers the following objectives:

- List the uses of variables in PL/SQL
- Identify the syntax for variables in PL/SQL
- Declare and initialize variables in PL/SQL
- Assign new values to variables in PL/SQL

Purpose

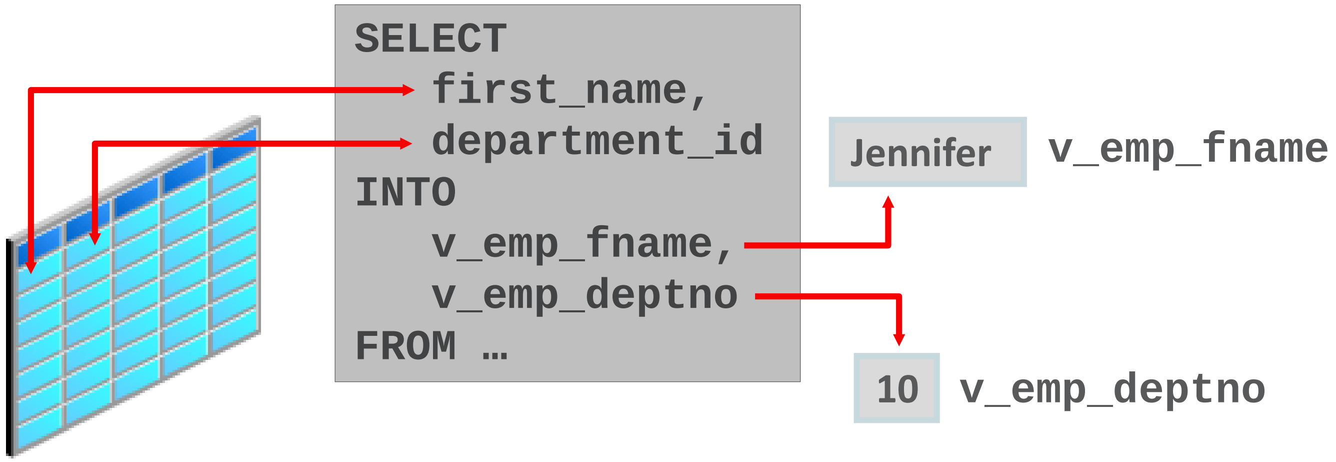
- You use variables to store and manipulate data.
- In this lesson, you learn how to declare and initialize variables in the declarative section of a PL/SQL block.
- With PL/SQL, you can declare variables and then use them in both SQL and procedural statements.
- Variables can be thought of as storage containers that hold something until it is needed.

Use of Variables

- Variables are expressions that stand for something of value (in the equation x + y = 45, x and y are variables that stand for two numbers that add up to 45).
- When defining a variable in a PL/SQL declaration section, you label a memory location, assign a datatype, and, if needed, assign a starting value for the variable.
- A variable can represent a number, character string, boolean (true/false value), or other datatypes.
- Throughout the PL/SQL code, variable values can be changed by the assignment operator (:=).

Use of Variables

- Use variables for:
- Temporary storage of data
- Manipulation of stored values
- Reusability



```
SELECT
    first_name,
    department_id
INTO
    v_emp_fname,
    v_emp_deptno
FROM …
```

Handling Variables in PL/SQL

- Variables are:
  - Declared and initialized in the declarative section
  - Used and assigned new values in the executable section
- Variables can be:
  - Passed as parameters to PL/SQL subprograms
  - Assigned to hold the output of a PL/SQL subprogram

Declaring Variables

- All PL/SQL variables must be declared in the declaration section before referencing them in the PL/SQL block.
- The purpose of a declaration is to allocate storage space for a value, specify its data type, and name the storage location so that you can reference it.
- You can declare variables in the declarative part of any PL/SQL block, subprogram, or package.

Declaring Variables: Syntax

- The identifier is the name of the variable.
- It and the datatype are the minimum elements required.

```
identifier [CONSTANT] datatype [NOT NULL]
   [:= expr | DEFAULT expr];
```

Initializing Variables

- Variables are assigned a memory location inside the DECLARE section.
- Variables can be assigned a value at the same time.
- This process is called initialization.
- The value in a variable also can be modified by reinitializing the variable in the executable section.

```
DECLARE
   v_counter  INTEGER := 0;
BEGIN
   v_counter  := v_counter + 1;
   DBMS_OUTPUT.PUT_LINE(v_counter);
END;
```

Declaring and Initializing Variables Example 1

- This example shows the declaration of several variables of various datatypes using syntax that sets constraints, defaults, and initial values.
- You will learn more about the different syntax as the course progresses.

```
DECLARE
    fam_birthdate     DATE;
    fam_size          NUMBER(2) NOT NULL := 10;
    fam_location      VARCHAR2(13) := 'Florida';
    fam_bank          CONSTANT NUMBER := 50000;
    fam_population    INTEGER;
    fam_name          VARCHAR2(20) DEFAULT 'Roberts';
    fam_party_size    CONSTANT PLS_INTEGER := 20;
```

Declaring and Initializing Variables Example 2

- This example shows the convention of beginning variables with v_ and variables that are configured as constants with c_.

```
DECLARE
   v_emp_hiredate     DATE;
   v_emp_deptno       NUMBER(2) NOT NULL := 10;
   v_location         VARCHAR2(13) := 'Atlanta';
   c_comm             CONSTANT NUMBER := 1400;
   v_population       INTEGER;
   v_book_type        VARCHAR2(20) DEFAULT 'fiction';
   v_artist_name      VARCHAR2(50);
   v_firstname        VARCHAR2(20):='Rajiv';
   v_lastname         VARCHAR2(20) DEFAULT 'Kumar';
   c_display_no       CONSTANT PLS_INTEGER := 20;
```

- The defining of data types and data structures using a standard in a programming language is a significant aid to readability.

Assigning Values in the Executable Section Example 1

- After a variable is declared, you can use it in the executable section of a PL/SQL block.
- For example, in the following block, the variable v_myname is declared in the declarative section of the block.

```
DECLARE
   v_myname   VARCHAR2(20);
BEGIN
   DBMS_OUTPUT.PUT_LINE('My name is: '||v_myname);
   v_myname := 'John';
   DBMS_OUTPUT.PUT_LINE('My name is: '||v_myname);
END;
```

Assigning Values in the Executable Section Example 1

- You can access this variable in the executable section of the same block.
- What do you think the block will print?

```
DECLARE
   v_myname   VARCHAR2(20);
BEGIN
   DBMS_OUTPUT.PUT_LINE('My name is: '||v_myname);
   v_myname := 'John';
   DBMS_OUTPUT.PUT_LINE('My name is: '||v_myname);
END;
```

Assigning Values in the Executable Section Example 1

- In this example, the variable has no value when the first PUT_LINE is executed, but then the value John is assigned to the variable before the second PUT_LINE.
- The value of the variable is then concatenated with the string My name is:
- The output is:

```
My name is:
My name is:  John

Statement process.
```

- A non-initialized variable contains a NULL value until a non-null value is explicitly assigned to it.

Assigning Values in the Executable Section Example 2

- In this block, the variable v_myname is declared and initialized.
- It begins with the value John, but the value is then manipulated in the executable section of the block.

```
DECLARE
   v_myname   VARCHAR2(20):= 'John';
BEGIN
   v_myname   := 'Steven';
   DBMS_OUTPUT.PUT_LINE('My name is: '|| v_myname);
END;
```

- The output is:

```
My name is:  Steven

Statement processed.
```

Passing Variables as Parameters to PL/SQL Subprograms

- Parameters are values passed to a subprogram by the user or by another program.
- The subprogram uses the value in the parameter when it runs.
- The subprogram may also return a parameter to the calling environment. In PL/SQL, subprograms are generally known as procedures or functions.
- You will learn more about procedures and functions as the course progresses.

Passing Variables as Parameters to PL/SQL Subprograms

- In the following example, the parameter v_date is being passed to the procedure PUT_LINE, which is part of the package DBMS_OUTPUT.

```
DECLARE
   v_date  VARCHAR2(30);
BEGIN
   SELECT TO_CHAR(SYSDATE) INTO v_date FROM DUAL;
   DBMS_OUTPUT.PUT_LINE(v_date);
END;
```

Assigning Variables to PL/SQL Subprogram Output

- You can use variables to hold values that are returned by a function (see function definition below and a call to this function on the following slide).

```
CREATE FUNCTION num_characters (p_string IN VARCHAR2)
RETURN INTEGER IS
   v_num_characters INTEGER;
BEGIN
   SELECT LENGTH(p_string) INTO v_num_characters
       FROM DUAL;
   RETURN v_num_characters;
END;
```

- The concept, creation, and use of functions will be covered later in this course.

Assigning Variables to PL/SQL Subprogram Output

- In the call to the function num_characters, the value returned by the function will be stored in the variable v_length_of_string.

```
DECLARE
    v_length_of_string INTEGER;
BEGIN
    v_length_of_string := num_characters('Oracle
Corporation');
    DBMS_OUTPUT.PUT_LINE(v_length_of_string);
END;
```

Terminology

Key terms used in this lesson included:

- Parameters
- Variables

Summary

In this lesson, you should have learned how to:

- List the uses of variables in PL/SQL
- Identify the syntax for variables in PL/SQL
- Declare and initialize variables in PL/SQL
- Assign new values to variables in PL/SQL

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