



Integrated Cloud Applications & Platform Services

# Oracle Database 12c R2: PL/SQL Fundamentals

Additional Practices

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# **Additional Practices and Solutions for Lesson 1**

## **Chapter 1**

## Practices for Lesson 1

---

### Practices Overview

There are no practices for this lesson.

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## **Additional Practices and Solutions for Lesson 2**

### **Chapter 2**

## Additional Practices for Lesson 2

---

### Overview

These additional practices are provided as a supplement to the *Oracle Database: PL/SQL Fundamentals* course. In these practices, you apply the concepts that you learned in the course.

These additional practices provide supplemental practice in declaring variables, writing executable statements, interacting with the Oracle Server, writing control structures, and working with composite data types, cursors, and handle exceptions. The tables used in this portion of the additional practices include `employees`, `jobs`, `job_history`, and `departments`.



## Practice 2: Evaluating Declarations

---

### Overview

These paper-based exercises are used for extra practice in declaring variables and writing executable statements.

Evaluate each of the following declarations. Determine which of them are not legal and explain why.

1. DECLARE  
   name,dept        VARCHAR2 (14) ;
2. DECLARE  
   test            NUMBER (5) ;
3. DECLARE  
   MAXSALARY       NUMBER (7,2) = 5000 ;
4. DECLARE  
   JOINDATE        BOOLEAN := SYSDATE ;

## Solution 2: Evaluating Declarations

---

Evaluate each of the following declarations. Determine which of them are not legal and explain why.

1. DECLARE  
name,dept VARCHAR2(14);

**This is illegal because only one identifier per declaration is allowed.**

2. DECLARE  
test NUMBER(5);

**This is legal.**

3. DECLARE  
MAXSALARY NUMBER(7,2) = 5000;

**This is illegal because the assignment operator is wrong. It should be :=.**

4. DECLARE  
JOINDATE BOOLEAN := SYSDATE;

**This is illegal because there is a mismatch in the data types. A Boolean data type cannot be assigned a date value. The data type should be date.**

## **Additional Practices and Solutions for Lesson 3**

### **Chapter 3**

## Practice 3: Evaluating Expressions

---

In each of the following assignments, determine the data type of the resulting expression.

1. `email := firstname || to_char(empno);`
2. `confirm := to_date('20-JAN-1999', 'DD-MON-YYYY');`
3. `sal := (1000*12) + 500`
4. `test := FALSE;`
5. `temp := temp1 < (temp2/ 3);`
6. `var := sysdate;`

## Solution 3: Evaluating Expressions

---

In each of the following assignments, determine the data type of the resulting expression.

1. `email := firstname || to_char(empno);`

**Character string**

2. `confirm := to_date('20-JAN-1999', 'DD-MON-YYYY');`

**Date**

3. `sal := (1000*12) + 500`

**Number**

4. `test := FALSE;`

**Boolean**

5. `temp := temp1 < (temp2/ 3);`

**Boolean**

6. `var := sysdate;`

**Date**

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## **Additional Practices and Solutions for Lesson 4**

### **Chapter 4**

## Practice 4: Evaluating Executable Statements

In this paper-based exercise, you evaluate the PL/SQL block, and then answer the questions that follow by determining the data type and value of each variable, according to the rules of scoping.

```
DECLARE
    v_custid    NUMBER(4) := 1600;
    v_custname  VARCHAR2(300) := 'Women Sports Club';
    v_new_custid NUMBER(3) := 500;
BEGIN
    DECLARE
        v_custid    NUMBER(4) := 0;
        v_custname  VARCHAR2(300) := 'Shape up Sports Club';
        v_new_custid NUMBER(3) := 300;
        v_new_custname VARCHAR2(300) := 'Jansports Club';
    BEGIN
        v_custid := v_new_custid;
        v_custname := v_custname || ' ' || v_new_custname;
1  →
        END;
        v_custid := (v_custid *12) / 10;
2  →
        END;
```

Evaluate the preceding PL/SQL block and determine the *value* and *data type* of each of the following variables, according to the rules of scoping:

1. v\_custid at position 1:
2. v\_custname at position 1:
3. v\_new\_custid at position 1:
4. v\_new\_custname at position 1:
5. v\_custid at position 2:
6. v\_custname at position 2:



## Solution 4: Evaluating Executable Statements

Evaluate the following PL/SQL block. Then, answer the questions that follow by determining the data type and value of each of the following variables, according to the rules of scoping.

```
DECLARE
    v_custid      NUMBER(4) := 1600;
    v_custname    VARCHAR2(300) := 'Women Sports Club';
    v_new_custid  NUMBER(3) := 500;
BEGIN
    DECLARE
        v_custid      NUMBER(4) := 0;
        v_custname    VARCHAR2(300) := 'Shape up Sports Club';
        v_new_custid  NUMBER(3) := 300;
        v_new_custname VARCHAR2(300) := 'Jansports Club';
    BEGIN
        v_custid := v_new_custid;
        v_custname := v_custname || ' ' || v_new_custname;
1  →
        END;
        v_custid := (v_custid *12) / 10;
2  →
        END;
```

Evaluate the preceding PL/SQL block and determine the *value* and *data type* of each of the following variables, according to the rules of scoping:

1. v\_custid at position 1:  
**500, and the data type is NUMBER.**
2. v\_custname at position 1:  
**Shape up Sports Club Jansports Club, and the data type is VARCHAR2.**
3. v\_new\_custid at position 1:  
**300, and the data type is NUMBER (or INTEGER).**
4. v\_new\_custname at position 1:  
**Jansports Club, and the data type is VARCHAR2.**
5. v\_custid at position 2:  
**1920, and the data type is NUMBER.**
6. v\_custname at position 2:  
**Women Sports Club, and the data type is VARCHAR2.**

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## **Additional Practices and Solutions for Lesson 5**

### **Chapter 5**

## Practice 5-1: Using SQL Statements Within a PL/SQL

For this exercise, a temporary table is required to store the results.

1. Run the `lab_ap_05.sql` script that creates the table described here:

Column Name	NUM_STORE	CHAR_STORE	DATE_STORE
Key Type			
Nulls/Unique			
FK Table			
FK Column			
Data Type	Number	VARCHAR2	Date
Length	7,2	35	

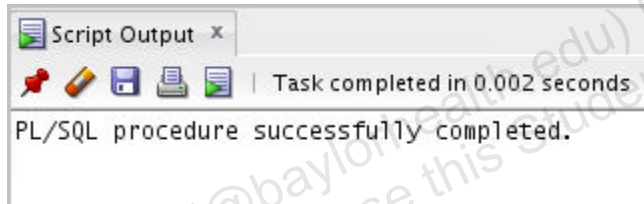
2. Write a PL/SQL block that performs the following:

- a. Declares two variables and assigns the following values to these variables:

Variable	Data type	Contents
V_MESSAGE	VARCHAR2 (35)	This is my first PLSQL program
V_DATE_WRITTEN	DATE	Current date

- b. Stores the values from these variables in the appropriate TEMP table columns

3. Verify your results by querying the TEMP table. The output results should appear as follows:

A screenshot of the 'Query Result' window in an IDE. It shows a status bar at the top with icons for pin, print, and a message icon, followed by the text 'All Rows Fetched: 1 in 0.002 seconds'. Below this, a table displays the query results. The table has three columns: NUM\_STORE, CHAR\_STORE, and DATE\_STORE. The first row contains the values 1, (null), and 21-OCT-16.

	NUM_STORE	CHAR_STORE	DATE_STORE
1	(null)	This is my first PLSQL Program	21-OCT-16

## Solution 5-1: Using SQL Statements Within a PL/SQL

For this exercise, a temporary table is required to store the results.

1. Run the lab\_ap\_05.sql script that creates the table described here:

Column Name	NUM_STORE	CHAR_STORE	DATE_STORE
Key Type			
Nulls/Unique			
FK Table			
FK Column			
Data Type	Number	VARCHAR2	Date
Length	7,2	35	

2. Write a PL/SQL block that performs the following:

- a. Declares two variables and assigns the following values to these variables:

Variable	Data type	Contents
V_MESSAGE	VARCHAR2 (35)	This is my first PLSQL program
V_DATE_WRITTEN	DATE	Current date

- b. Stores the values from these variables in the appropriate TEMP table columns

**DECLARE**

**V\_MESSAGE VARCHAR2 (35);**

**V\_DATE\_WRITTEN DATE;**

**BEGIN**

**V\_MESSAGE := 'This is my first PLSQL Program';**

**V\_DATE\_WRITTEN := SYSDATE;**

**INSERT INTO temp (CHAR\_STORE, DATE\_STORE)**

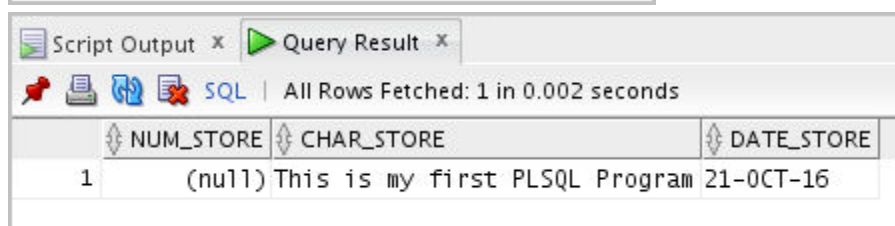
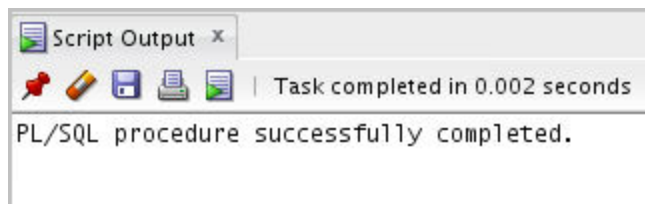
**VALUES (V\_MESSAGE, V\_DATE\_WRITTEN);**

**END;**

**/**

3. Verify your results by querying the TEMP table. The output results should look similar to the following:

**SELECT \* FROM TEMP;**

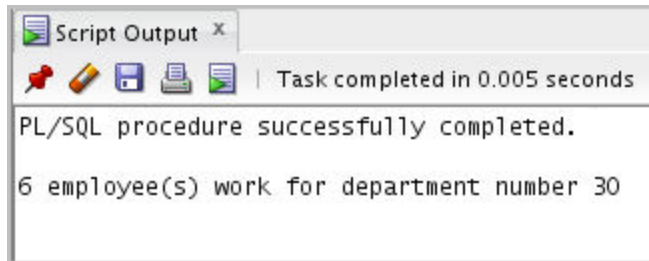


## Practice 5-2: Using SQL Statements Within a PL/SQL

---

In this exercise, you use data from the `employees` table.

1. Write a PL/SQL block to determine how many employees work for a specified department. The PL/SQL block should:
  - Use a substitution variable to store a department number
  - Print the number of people working in the specified department
2. When the block is run, a substitution variable window appears. Enter a valid department number and click OK. The output results should look similar to the following:



## Solution 5-2: Using SQL Statements Within a PL/SQL

In this exercise, you use data from the `employees` table.

1. Write a PL/SQL block to determine how many employees work for a specified department. The PL/SQL block should:

- Use a substitution variable to store a department number
- Print the number of people working in the specified department

```
SET SERVEROUTPUT ON;
```

```
SET VERIFY OFF;
```

```
DECLARE
```

```
    V_HOWMANY NUMBER(3);
```

```
    V_DEPTNO DEPARTMENTS.department_id%TYPE := &P_DEPTNO;
```

```
BEGIN
```

```
    SELECT COUNT(*) INTO V_HOWMANY FROM employees
```

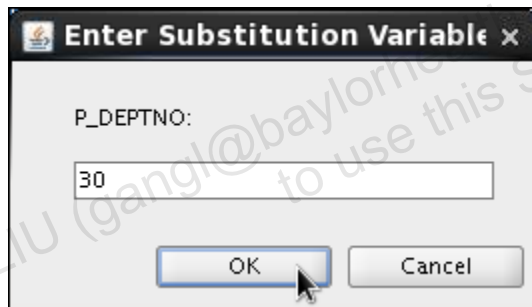
```
    WHERE department_id = V_DEPTNO;
```

```
    DBMS_OUTPUT.PUT_LINE (V_HOWMANY || ' employee(s)  
    work for department number ' || V_DEPTNO);
```

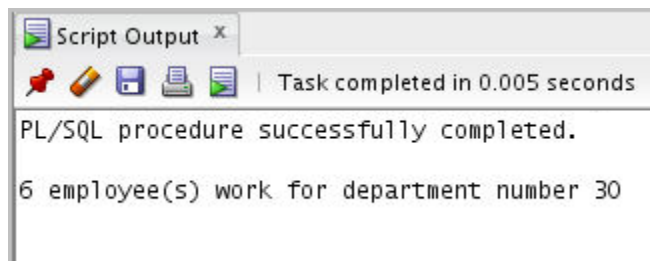
```
END;
```

```
/
```

2. When the block is run, a substitution variable window appears. Enter a valid department number and click OK.



The output results should look similar to the following:



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## **Additional Practices and Solutions for Lesson 6**

### **Chapter 6**

## Practice 6-1: Writing Control Structures

---

In these practices, you use control structures to direct the logic of program flow.

1. Write a PL/SQL block to accept a year input and check whether it is a leap year.  
**Hint:** The year should be exactly divisible by 4 but not divisible by 100, or it should be divisible by 400.
2. Test your solution by using the following table. For example, if the year entered is 1990, the output should be "1990 is not a leap year."

1990	Not a leap year
2000	Leap year
1996	Leap year
1886	Not a leap year
1992	Leap year
1824	Leap year

## Solution 6-1: Writing Control Structures

1. Write a PL/SQL block to accept a year input and check whether it is a leap year.  
**Hint:** The year should be exactly divisible by 4 but not divisible by 100, or it should be divisible by 400.

```
SET SERVEROUTPUT ON;
DECLARE
    v_YEAR NUMBER(4) := &P_YEAR;
    v_REMAINDER1 NUMBER(5,2);
    v_REMAINDER2 NUMBER(5,2);
    v_REMAINDER3 NUMBER(5,2);
BEGIN
    v_REMAINDER1 := MOD(v_YEAR,4);
    v_REMAINDER2 := MOD(v_YEAR,100);
    v_REMAINDER3 := MOD(v_YEAR,400);
    IF ((v_REMAINDER1 = 0 AND v_REMAINDER2 <> 0 ) OR
        v_REMAINDER3 = 0) THEN
        DBMS_OUTPUT.PUT_LINE(v_YEAR || ' is a leap year');
    ELSE
        DBMS_OUTPUT.PUT_LINE(v_YEAR || ' is not a leap
        year');
    END IF;
END;
/
```

2. Test your solution by using the following table. For example, if the year entered is 1990, the output should be "1990 is not a leap year."

1990	Not a leap year
2000	Leap year
1996	Leap year
1886	Not a leap year
1992	Leap year
1824	Leap year

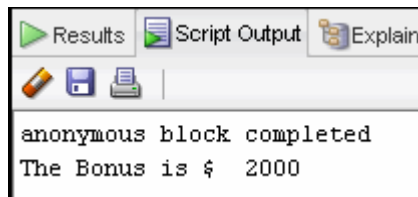
## Practice 6-2: Writing Control Structures

1. Write a PL/SQL block to store the monthly salary of an employee in a substitution variable. The PL/SQL block should:

- Calculate the annual salary as salary \* 12
- Calculate the bonus as indicated in the following table:

Annual Salary	Bonus
>= 20,000	2,000
19,999–10,000	1,000
<= 9,999	500

- Display the amount of the bonus in the Script Output window in the following format:



2. Test the PL/SQL for the following test cases:

Monthly Salary	Bonus
3000	2000
1200	1000
800	500

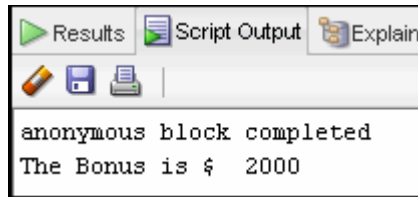
## Solution 6-2: Writing Control Structures

1. Write a PL/SQL block to store the monthly salary of an employee in a substitution variable. The PL/SQL block should:

- Calculate the annual salary as salary \* 12
- Calculate the bonus as indicated in the following table:

Annual Salary	Bonus
>= 20,000	2,000
19,999–10,000	1,000
<= 9,999	500

- Display the amount of the bonus in the Script Output window in the following format:



```
SET SERVEROUTPUT ON;
DECLARE
    V_SAL          NUMBER(7,2) := &B_SALARY;
    V_BONUS        NUMBER(7,2);
    V_ANN_SALARY   NUMBER(15,2);
BEGIN
    V_ANN_SALARY := V_SAL * 12;
    IF V_ANN_SALARY >= 20000 THEN
        V_BONUS := 2000;
    ELSIF V_ANN_SALARY <= 19999 AND V_ANN_SALARY >= 10000 THEN
        V_BONUS := 1000;
    ELSE
        V_BONUS := 500;
    END IF;
    DBMS_OUTPUT.PUT_LINE ('The Bonus is $ ' ||
        TO_CHAR(V_BONUS));
END;
```

2. Test the PL/SQL for the following test cases:

Monthly Salary	Bonus
3000	2000
1200	1000
800	500

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## **Additional Practices and Solutions for Lesson 7: Working with Composite Data Types**

### **Chapter 7**

## Additional Practices for Lessons Titled “Working with Composite Data Types” and “Using Explicit Cursors”

---

### Overview

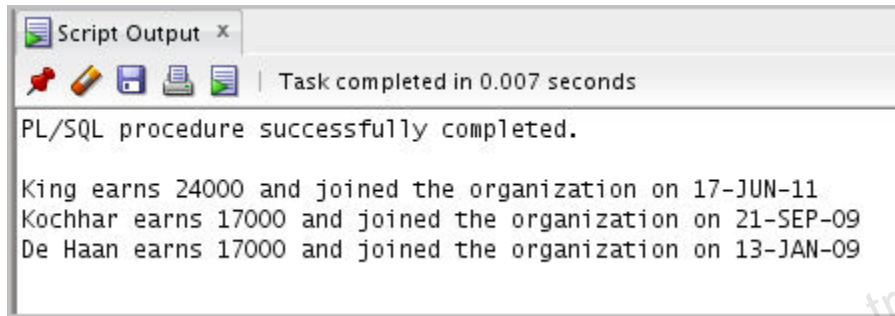
In the following exercises, you practice using associative arrays (this topic is covered in the lesson titled “Working with Composite Data Types”) and explicit cursors (this topic is covered in the lesson titled “Using Explicit Cursors”). In the first exercise, you define and use an explicit cursor to fetch data. In the second exercise, you combine the use of associative arrays with an explicit cursor to output data that meets a certain criteria.



## Practice 7/8-1: Fetching Data with an Explicit Cursor

In this practice, you create a PL/SQL block to perform the following:

1. Declare a cursor named `EMP_CUR` to select the employee's last name, salary, and hire date from the `EMPLOYEES` table.
2. Process each row from the cursor, and if the salary is greater than 15,000 and the hire date is later than 01-FEB-1988, display the employee name, salary, and hire date in the format shown in the following sample output:



```
Script Output x
Task completed in 0.007 seconds

PL/SQL procedure successfully completed.

King earns 24000 and joined the organization on 17-JUN-11
Kochhar earns 17000 and joined the organization on 21-SEP-09
De Haan earns 17000 and joined the organization on 13-JAN-09
```

## Solution 7/8-1: Fetching Data with an Explicit Cursor

In this practice, you create a PL/SQL block to perform the following:

1. Declare a cursor named EMP\_CUR to select the employee's last name, salary, and hire date from the EMPLOYEES table.

```
SET SERVEROUTPUT ON;
```

```
DECLARE
```

```
    CURSOR C_EMP_CUR IS
```

```
        SELECT last_name,salary,hire_date FROM EMPLOYEES;
```

```
    V_ENAME VARCHAR2(25);
```

```
    v_SAL    NUMBER(7,2);
```

```
    V_HIREDATE DATE;
```

2. Process each row from the cursor, and if the salary is greater than 15,000 and the hire date is later than 01-FEB-1988, display the employee name, salary, and hire date in the format shown in the following sample output:

```
BEGIN
```

```
    OPEN C_EMP_CUR;
```

```
    FETCH C_EMP_CUR INTO V_ENAME,V_SAL,V_HIREDATE;
```

```
    WHILE C_EMP_CUR%FOUND
```

```
    LOOP
```

```
        IF V_SAL > 15000 AND V_HIREDATE >=
```

```
            TO_DATE('01-FEB-1988','DD-MON-YYYY') THEN
```

```
                DBMS_OUTPUT.PUT_LINE (V_ENAME || ' earns '
```

```
                    || TO_CHAR(V_SAL) || ' and joined the organization on '
```

```
                    || TO_DATE(V_HIREDATE,'DD-Mon-YYYY'));
```

```
            END IF;
```

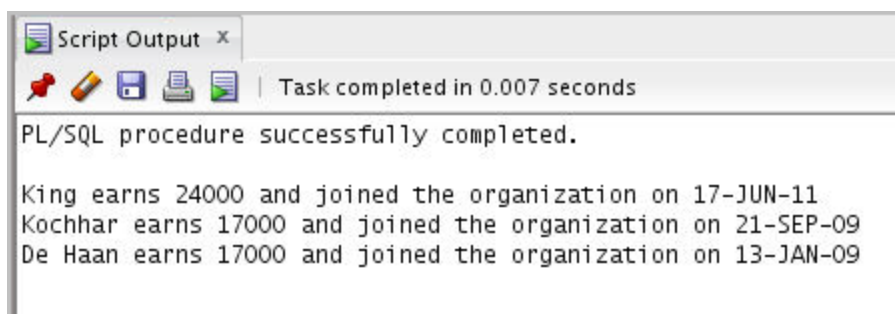
```
            FETCH C_EMP_CUR INTO V_ENAME,V_SAL,V_HIREDATE;
```

```
    END LOOP;
```

```
    CLOSE C_EMP_CUR;
```

```
END;
```

```
/
```



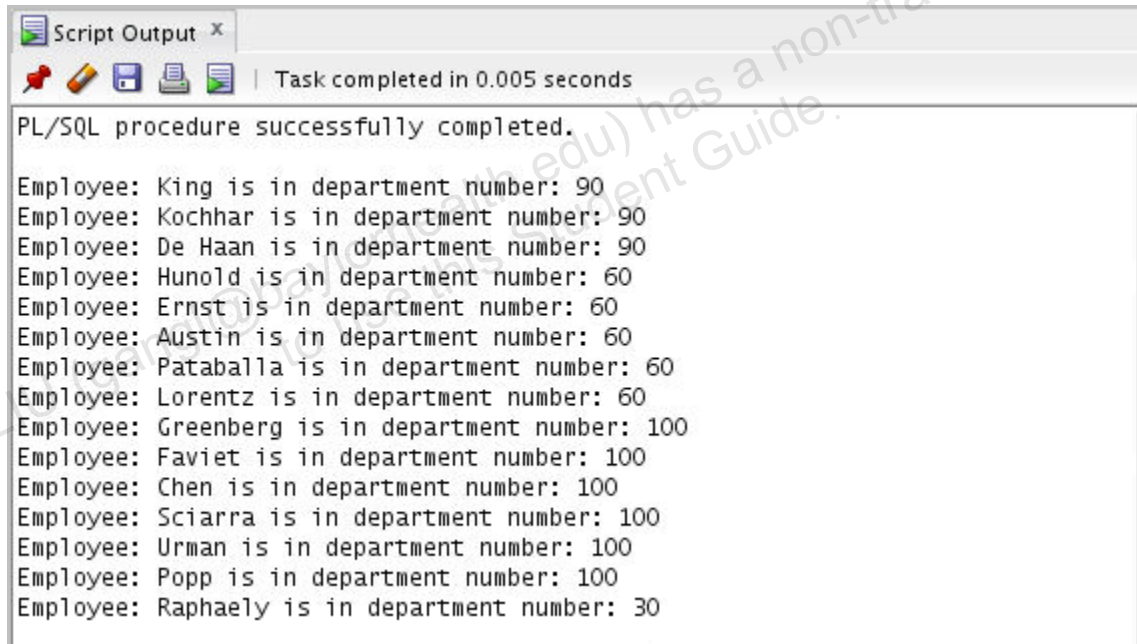
## Practice 7/8-2: Using Associative Arrays and Explicit Cursors

In this practice, you create a PL/SQL block to retrieve and output the last name and department ID of each employee from the `EMPLOYEES` table for those employees whose `EMPLOYEE_ID` is less than 115.

1. In the PL/SQL block, use a cursor `FOR` loop strategy instead of the `OPEN / FETCH / CLOSE` cursor methods used in the previous practice.

In the declarative section:

- Create two associative arrays. The unique key column for both arrays should be of the `BINARY_INTEGER` data type. One array holds the employee's last name and the other holds the department ID.
  - Declare a cursor that selects the last name and department ID for employees whose ID is less than 115
  - Declare the appropriate counter variable to be used in the executable section
2. In the executable section, use a cursor `FOR` loop (covered in the lesson titled "Using Explicit Cursors") to access the cursor values, assign them to the appropriate associative arrays, and output those values from the arrays. The correct output should return 15 rows, in the following format:



```
Script Output x
Task completed in 0.005 seconds

PL/SQL procedure successfully completed.

Employee: King is in department number: 90
Employee: Kochhar is in department number: 90
Employee: De Haan is in department number: 90
Employee: Hunold is in department number: 60
Employee: Ernst is in department number: 60
Employee: Austin is in department number: 60
Employee: Pataballa is in department number: 60
Employee: Lorentz is in department number: 60
Employee: Greenberg is in department number: 100
Employee: Faviet is in department number: 100
Employee: Chen is in department number: 100
Employee: Sciarra is in department number: 100
Employee: Urman is in department number: 100
Employee: Popp is in department number: 100
Employee: Raphaely is in department number: 30
```

## Solution 7/8-2: Using Associative Arrays and Explicit Cursors

In this practice, you create a PL/SQL block to retrieve and output the last name and department ID of each employee from the `EMPLOYEES` table for those employees whose `EMPLOYEE_ID` is less than 115.

In the PL/SQL block, use a cursor `FOR` loop strategy instead of the `OPEN / FETCH / CLOSE` cursor methods used in the previous practice.

1. In the declarative section:

- Create two associative arrays. The unique key column for both arrays should be of the `BINARY_INTEGER` data type. One array holds the employee's last name and the other holds the department ID.
- Declare a counter variable to be used in the executable section.
- Declare a cursor that selects the last name and department ID for employees whose ID is less than 115.

```
SET SERVEROUTPUT ON;
```

```
DECLARE
```

```
    TYPE Table_Ename IS table of employees.last_name%TYPE  
    INDEX BY BINARY_INTEGER;
```

```
    TYPE Table_dept IS table of employees.department_id%TYPE  
    INDEX BY BINARY_INTEGER;
```

```
Tename Table_Ename;
```

```
Tdept Table_dept;
```

```
i BINARY_INTEGER :=0;
```

```
CURSOR Namedept IS SELECT last_name,department_id  
FROM employees WHERE employee_id < 115;
```

2. In the executable section, use a cursor `FOR` loop (covered in the lesson titled "Using Explicit Cursors") to access the cursor values, assign them to the appropriate associative arrays, and output those values from the arrays.

```
BEGIN
```

```
    FOR emprec in Namedept
```

```
    LOOP
```

```
        i := i +1;
```

```
Tename(i) := emprec.last_name;
```

```
Tdept(i) := emprec.department_id;
```

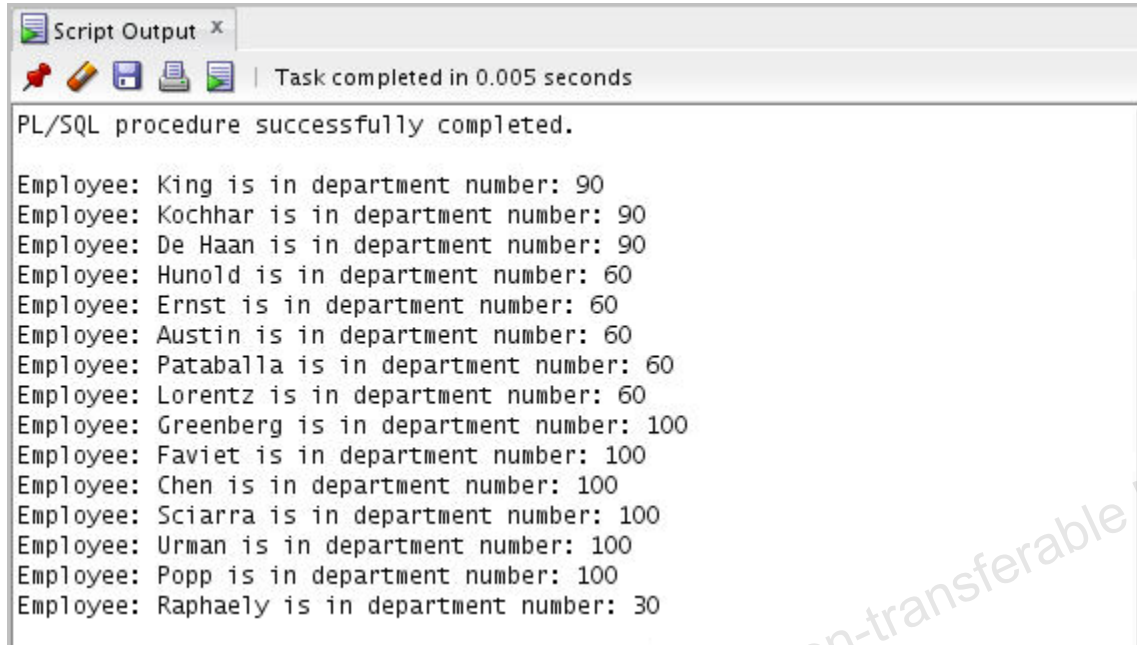
```
        DBMS_OUTPUT.PUT_LINE ('Employee: ' || Tename(i) ||  
' is in department number: ' || Tdept(i));
```

```
    END LOOP;
```

```
END;
```

```
/
```

The correct output should return 15 rows, similar to the following:



```
Script Output x
Task completed in 0.005 seconds

PL/SQL procedure successfully completed.

Employee: King is in department number: 90
Employee: Kochhar is in department number: 90
Employee: De Haan is in department number: 90
Employee: Hunold is in department number: 60
Employee: Ernst is in department number: 60
Employee: Austin is in department number: 60
Employee: Pataballa is in department number: 60
Employee: Lorentz is in department number: 60
Employee: Greenberg is in department number: 100
Employee: Favier is in department number: 100
Employee: Chen is in department number: 100
Employee: Sciarra is in department number: 100
Employee: Urman is in department number: 100
Employee: Popp is in department number: 100
Employee: Raphaely is in department number: 30
```

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## **Additional Practices and Solutions for Lesson 8: Using Explicit Cursors**

### **Chapter 8**

## Practices for Lesson 8

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### Practices Overview

Practices of this lesson are included in Practice 7.