Database Programming with PL/SQL

12-2: Improving PL/SQL Performance

Practice Activities

Vocabulary

Identify the vocabulary word for each definition below:

NOCOPY HINT	passes arguments by reference rather than by value, and usually speeds up the execution of SQL statements.
FORALL	provides bulk processing for DML activity
BULK COLLECT CLAUSE	provides bulk processing for SELECT and FETCH statements
DETERMINISTIC CLAUSE	means that the same input value will always produce the same output value, and must be used to create a function-based index on your own functions.
RETURNING CLAUSE	allows the retrieval of data modified by a DML statement without triggering a separate context switch
BULK BINDING	fetches all the rows in a single call to the SQL Engine.

Try It / Solve It

1. Run this code to load 25,000 records into a local nested table and pass these values to two local procedures that do nothing. Notice the call to the subprogram using NOCOPY. What are the results?

```
CREATE OR REPLACE PACKAGE nocopy_test AS  TYPE
EmpTabTyp IS TABLE OF employees%ROWTYPE;
emp_tab  EmpTabTyp := EmpTabTyp(NULL);
PROCEDURE get_time (t OUT NUMBER);
PROCEDURE do_nothing1 (tab IN OUT EmpTabTyp);
PROCEDURE do_nothing2 (tab IN OUT NOCOPY EmpTabTyp);
```

```
END nocopy_test;

CREATE OR REPLACE PACKAGE BODY nocopy_test AS

PROCEDURE get_time (t OUT NUMBER) IS
BEGIN
t := DBMS_UTILITY.get_time;
END;
PROCEDURE do_nothing1 (tab IN OUT EmpTabTyp) IS
BEGIN  NULL;
END;
PROCEDURE do_nothing2 (tab IN OUT NOCOPY EmpTabTyp) IS
BEGIN
NULL;
END;
END nocopy_test;


DECLARE t1
NUMBER;
t2 NUMBER;
t3 NUMBER;
BEGIN
SELECT * INTO nocopy_test.emp_tab(1) FROM EMPLOYEES  WHERE
employee_id = 100;
nocopy_test.emp_tab.EXTEND(49999, 1); -- Copy element 1 into 2..50000
nocopy_test.get_time(t1);
nocopy_test.do_nothing1(nocopy_test.emp_tab); -- Pass IN OUT parameter
nocopy_test.get_time(t2);
nocopy_test.do_nothing2(nocopy_test.emp_tab); -- Pass IN OUT NOCOPY parameter
nocopy_test.get_time(t3);
DBMS_OUTPUT.PUT_LINE ('Call Duration (secs)');
DBMS_OUTPUT.PUT_LINE ('--------------------');
DBMS_OUTPUT.PUT_LINE ('Just IN OUT: ' || TO_CHAR((t2 - t1)/100.0));
DBMS_OUTPUT.PUT_LINE ('With NOCOPY: ' || TO_CHAR((t3 - t2))/100.0);
END;
```

```
 Call Duration (secs)
--------------------
Just IN OUT:
With NOCOPY:

Statement processed.
```

2. Run the following PL/SQL program which increases the salary for employees with IDs 100, 102, 104, or 110. The FORALL statement bulk-binds the collection. What are the results?

```
CREATE OR REPLACE PROCEDURE raise_salary (p_percent NUMBER) IS
  TYPE numlist_type IS TABLE OF NUMBER
INDEX  BY  BINARY_INTEGER;            v_id
numlist_type;  -- collection BEGIN
   v_id(1) := 100;  v_id(2)
    := 102;  v_id(3) := 104;
    v_id(4) := 110;
     -- bulk-bind the associative array
     FORALL i IN v_id.FIRST .. v_id.LAST
       UPDATE employees
         SET salary = (1 + p_percent / 100) * salary
         WHERE employee_id = v_id (i);
 END;
```

Execute the following SELECT statement to find out salaries before executing the raise_salary procedure:

```
SELECT salary
  FROM employees
  WHERE employee_id = 100 OR employee_id = 102
    OR employee_id = 104 OR employee_id = 100;
```

Execute the raise_salary procedure and verify the results.

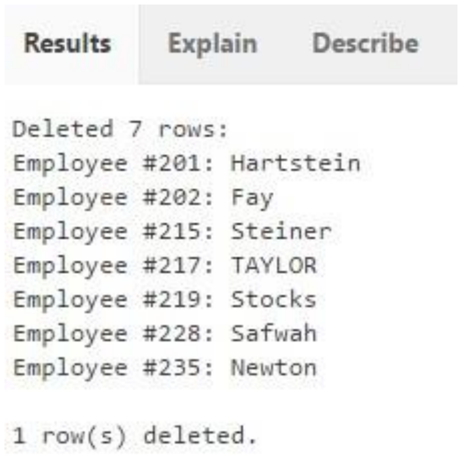
```
BEGIN
  raise_salary(10);
END;


SELECT salary
  FROM employees
  WHERE employee_id = 100 OR employee_id = 102
    OR employee_id = 104 OR employee_id = 100;
```

El código funciono

3. Create and execute a procedure called get_departments that obtains all rows from the DEPARTMENTS table for a specific location using the BULK COLLECT clause.

```
 CREATE OR REPLACE PROCEDURE get_departments IS

TYPE t_dep IS TABLE OF departments%ROWTYPE INDEX BY BINARY_INTEGER;

V_dep t_dep;

BEGIN

SELECT * BULK COLLECT INTO V_DEP FROM DEPARTMENTS;

FOR I IN V_DEP.FIRST..V_DEP.LAST LOOP

IF v_dep.EXISTS(i) THEN

DBMS_OUTPUT.PUT_LINE(V_DEP(i).department_name);

END IF;

END LOOP;

END;
```

4. Create and execute an anonymous block containing the BULK COLLECT and RETURNING clause that deletes all employees in department_id 20 from the EMP_TEMP table. Create the EMP_TEMP table from the EMPLOYEES table. Your anonymous block should produce results that look similar to this (your results may vary depending on previous changes you may have made to the EMPLOYEES table):



```
Deleted 7 rows:
Employee #201: Hartstein
Employee #202: Fay
Employee #215: Steiner
Employee #217: TAYLOR
Employee #219: Stocks
Employee #228: Safwah
Employee #235: Newton

1 row(s) deleted.
```

```
DECLARE
TYPE t_emp IS TABLE OF EMPLOYEES.first_name%TYPE INDEX BY
BINARY_INTEGER;
v_deleted t_emp;
BEGIN
delete from emp_temp where department_id=20
RETURNING first_name BULK COLLECT INTO v_deleted;
END;
```