Database Programming with PL/SQL

Using Cursors for Update

ACADEMY

Objectives

This lesson covers the following objectives:

- Create PL/SQL code to lock rows before an update using the appropriate clause
- Explain the effect of using `NOWAIT` in an update cursor declaration
- Create PL/SQL code to use the current row of the cursor in an `UPDATE` or `DELETE` statement

Purpose

If multiple users are connected to the database at the same time, the possibility exists that another user updated the rows of a particular table after you opened your cursor and fetched the rows.

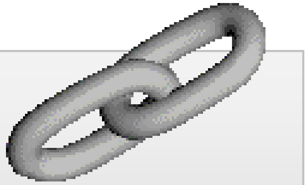
We can lock rows as we open the cursor in order to prevent other users from updating them.

It is important to do this if we want to update the same rows ourselves.

Declaring a Cursor with the FOR UPDATE Syntax

When we declare a cursor FOR UPDATE, each row is locked as we open the cursor. This prevents other users from modifying the rows while our cursor is open. It also allows us to modify the rows ourselves using a … WHERE CURRENT OF … clause.

```
CURSOR cursor_name IS
SELECT   ...  FROM ...
FOR UPDATE [OF column_reference][NOWAIT | WAIT n];
```



This does not prevent other users from reading the rows.

Declaring a Cursor with the **FOR UPDATE** Clause

column_reference is a column in the table whose rows we need to lock.

```
CURSOR cursor_name IS
SELECT   ... FROM ...
FOR UPDATE [OF column_reference][NOWAIT | WAIT n];
```

If the rows have already been locked by another session:

- NOWAIT returns an Oracle server error immediately
- WAIT n waits for n seconds, and returns an Oracle server error if the other session is still locking the rows at the end of that time.

NOWAIT Keyword in the FOR UPDATE Clause Example

The optional NOWAIT keyword tells the Oracle server not to wait if any of the requested rows have already been locked by another user. Control is immediately returned to your program so that it can do other work before trying again to acquire the lock. If you omit the NOWAIT keyword, then the Oracle server waits indefinitely until the rows are available.

```
DECLARE
  CURSOR emp_cursor IS
    SELECT employee_id, last_name FROM  employees
      WHERE department_id = 80 FOR UPDATE NOWAIT;
  ...
```

NOWAIT Keyword in the FOR UPDATE Clause

If the rows are already locked by another session and you have specified `NOWAIT`, then opening the cursor will result in an error. You can try to open the cursor later.

You can use `WAIT` *n* instead of `NOWAIT` and specify the number of seconds to wait and check whether the rows are unlocked. If the rows are still locked after *n* seconds, then an error is returned.

FOR UPDATE OF column-name Example

If the cursor is based on a join of two tables, we may want to lock the rows of one table but not the other. To do this, we specify any column of the table we want to lock.

```
DECLARE
  CURSOR emp_cursor IS
    SELECT e.employee_id, d.department_name
      FROM  employees e, departments d
      WHERE e.department_id = d.department_id
      AND department_id = 80 FOR UPDATE OF salary;
  ...
```

WHERE CURRENT OF Clause Syntax

The WHERE CURRENT OF clause is used in conjunction with the FOR UPDATE clause to refer to the current row (the most recently FETCHed row) in an explicit cursor. The WHERE CURRENT OF clause is used in the UPDATE or DELETE statement, whereas the FOR UPDATE clause is specified in the cursor declaration.

```
WHERE CURRENT OF cursor-name ;
```

cursor_name Is the name of a declared cursor (The cursor must have been declared with the FOR UPDATE clause.)

WHERE CURRENT OF Clause (cont.)

You can use `WHERE CURRENT OF` for updating or deleting the current row from the corresponding database table. This enables you to apply updates and deletes to the row currently being addressed, without the need to use a `WHERE` clause.

You must include the `FOR UPDATE` clause in the cursor query so that the rows are locked on `OPEN`.

```
WHERE CURRENT OF cursor_name ;
```

WHERE CURRENT OF Clause Example

Use cursors to update or delete the current row.

- Include the FOR UPDATE clause in the cursor query to lock the rows first.
- Use the WHERE CURRENT OF clause to reference the current row from an explicit cursor.

```
UPDATE employees
   SET    salary = ...
   WHERE CURRENT OF emp_cursor;
```

NOWAIT, FOR UPDATE, and WHERE CURRENT OF Clause

In this example, we don’t need a column-reference in the FOR UPDATE clause because the cursor is not based on a join.

```
DECLARE
  CURSOR empcur IS
    SELECT employee_id, salary FROM my_employees
      WHERE salary <= 20000 FOR UPDATE NOWAIT;
  v_emp_rec empcur%ROWTYPE;
BEGIN
 OPEN empcur;
 LOOP
   FETCH empcur INTO v_emp_rec;
   EXIT WHEN empcur%NOTFOUND;
   UPDATE my_employees
     SET salary = v_emp_rec.salary*1.1
     WHERE CURRENT OF empcur;
 END LOOP;
 CLOSE empcur;
 COMMIT;
END;
```

`FOR UPDATE` Second Example

`FOR UPDATE OF salary` locks only the `MY_EMPLOYEES` rows, not the `MY_DEPARTMENTS` rows. Note that we update the table-name, not the cursor-name!

```
DECLARE
  CURSOR ed_cur IS
    SELECT employee_id, salary, department_name
      FROM my_employees e, my_departments d
      WHERE e.department_id = d.department_id
      FOR UPDATE OF salary NOWAIT;
BEGIN
  FOR v_ed_rec IN ed_cur LOOP
    UPDATE my_employees
      SET salary = v_ed_rec.salary*1.1
      WHERE CURRENT OF ed_cur;
  END LOOP;
  COMMIT;
END;
```

Terminology

Key terms used in this lesson included:

- `FOR UPDATE`
- `NOWAIT`

Summary

In this lesson, you should have learned how to:

- Create PL/SQL code to lock rows before an update using the appropriate clause
- Explain the effect of using `NOWAIT` in an update cursor declaration
- Create PL/SQL code to use the current row of the cursor in an `UPDATE` or `DELETE` statement