PL/SQL Tips and Techniques
Nick Donatone, Grid Sales Consultant
The following is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, and timing of any features or functionality described for Oracle’s products remains at the sole discretion of Oracle.
Agenda

- Discuss
  - PL/SQL tips and techniques
  - New 11g features
    - Efficient PL/SQL Coding,
    - Disabled Triggers,
    - SIMPLE_INTEGER Data Type,
    - Compound Triggers,
    - Trigger Ordered Executions,
    - CONTINUE command,
    - Sequences,
    - Compile-time warning
What is PL/SQL?

- **PL/SQL (Procedural Language/Structured Query Language)** is
  - Oracle Corporation's proprietary procedural extension to the SQL database language.
  - PL/SQL's syntax strongly resembles that of Ada.
  - The key strength of PL/SQL is its tight integration with the Oracle database.
  - PL/SQL is one of three languages embedded in the Oracle Database, the other two being SQL and Java.
Tips and Techniques

- Oracle SQL Developer: SQL Worksheet
- Oracle SQL Developer: PLSQL Editing and Debugging
- PLSQL_CODE_TYPE = Native
Oracle SQL Developer: SQL Worksheet

• The SQL Worksheet supports the creation of SQL, PL/SQL and SQL *Plus commands.
• These can be run individually or consecutively.
• A SQL History option makes recalling previous commands easy, while the Explain Plan option allows users to see the execution plan for selected statements.
Oracle SQL Developer: PLSQL Editing and Debugging

• Robust editing environment
  • users can create and edit PL/SQL
  • take advantage of the code formatting
  • add bookmarks and use code insight
• When it comes to debugging PL/SQL, breakpoints, smart data, a debugger stack and watches are all available.
  • These features allow the user to set a break point and run and test the code, supplying alternate data at runtime while debugging.
• Creating PL/SQL in the editor or using the SQL Worksheet is made easier by the availability of snippets
  • Snippets are code fragments, such as SQL functions, Optimizer hints or miscellaneous PL/SQL programming techniques, which users can drag onto the PL/SQL Editor or the SQL Worksheet
CREATE OR REPLACE TRIGGER "OE".insert_ord_line
BEFORE INSERT ON order_items
FOR EACH ROW
DECLARE
    new_line number;
BEGIN
    SELECT (NVL(MAX(line_item_id),0)+1) INTO new_line
    FROM order_items
    WHERE order_id = :new.order_id;
    :new.line_item_id := new_line;
END;
PLSQL_CODE_TYPE = Native

- Syntax PLSQL_CODE_TYPE = { INTERPRETED | NATIVE }
- Default value INTERPRETED
- Modifiable ALTER SESSION, ALTER SYSTEM
- C compiler no longer required
  - Compiles to native DLL
    - Windows .dll (dynamically linkable library)
    - Unix .so
Efficient PL/SQL Coding

- New features of 11g make PL/SQL programming easier:
  - Ability to force triggers of the same type to follow a sequence
  - New CONTINUE statement
  - Compound triggers
- PL/SQL is a comprehensive development platform
- It has more and more functionality and requires less coding
- Oracle Database 11g new functionality in PL/SQL can help programmers write code more efficiently
Disabled Triggers

- You can now create a Trigger as Disabled

```
CREATE OR REPLACE
TRIGGER MY_DISABLED_TRIGGER
BEFORE INSERT ON CUSTOMERS
DISABLE
BEGIN
    NULL;
END;
```

- The default is enabled
SIMPLE_INTEGER Data Type

- The SIMPLE_INTEGER Data Type has semantics that exactly match those of the hardware’s integer operations
  - It can not be NULL (has a not null constraint)
  - Rather than overflowing it wraps
  - Range is (-2147483648 to +2147483648)
  - It’s faster than pls_integer when using native PL/SQL compilation
Compound Triggers

• The Compound Trigger is a single database object that “feels” rather like a package body, allows you to create a “pseudo-procedure” for each of the four timing points below:

  • Before the firing statement
  • Before each row that the firing statement impacts
  • After each row that the firing statement impacts
  • After the firing statement

    after each row is
    begin
    ....
    end after each row

• Use it to eliminate the “mutating table” error; audit table
Compound Triggers

- Mutating table
- An example is creating an entry in an audit table
  - Create an audit record each time an employees salary changes
  - Could have many employee salary changes (bulk update)
  - 10.2 you would have to use the “ancillary package paradigm”
    - Initialize globals in a before statement
    - Batch and flush rows in before each row
    - Final flush in an after statement
create or replace
trigger audit_customer_changes_tgr
for insert or update on customers
compound trigger
threshold constant simple_integer := 5;
type audit_info_t is table of audit_customer_changes%rowtype
index by pls_integer;
v_audit_info audit_info_t;
idx simple_integer:=0;
-- subprog
PROCEDURE flush_audit_array IS
n constant simple_integer := v_audit_info.count();
BEGIN
FORALL j in 1..n
INSERT INTO audit_customer_changes VALUES v_audit_info (j);
v_audit_info.delete();
idx := 0;
END flush_audit_array;
-- Now the ILg code
BEFORE STATEMENT IS
BEGIN
  v_audit_info.delete();
  idx := 0;
END BEFORE STATEMENT:
AFTER EACH ROW IS
BEGIN
  idx := idx + 1;
v_audit_info(idx).id := :new.id;
v_audit_info(idx).modified_date := SYSDATE();
v_audit_info(idx).user_name := USER();
  IF idx >= threshold THEN
    flush_audit_array();
  END IF;
END AFTER EACH ROW;
AFTER STATEMENT IS
BEGIN
  flush_audit_array();
END AFTER STATEMENT;
END audit_customer_changes_tgr
ALTER TRIGGER "OE"."AUDIT_CUSTOMER_CHANGES_TGR" ENABLE
Let's Update the Customer Table

```sql
update customers
    set cust_first_name = 'Harry Dean'
where customer_id=193;
```

Audit_Customer_Changes table

<table>
<thead>
<tr>
<th>ID</th>
<th>MODIFIED_DATE</th>
<th>USER_NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>28-JAN-08</td>
<td>OE</td>
</tr>
</tbody>
</table>
Ordered Execution in Triggers

- Follows clause
- Use it to define the execution order of a like set of triggers
  - Before insert
  - After insert
  - Before update
  - After update

```sql
create or replace trigger my_second_before_insert_trigger
before insert on emp
follows my_first_before_insert_trigger
begin
    null;
end;
/
```
CONTINUE

- Continue can be used inside a looping structure to jump out of the loop before executing all the steps inside the loop

```
declare v_my_counter number:=0;
begin
  for count l in 1…20
    LOOP
      v_my_counter := v_my_counter+1
      dbms_output.put_line('Counter=' || v_my_counter);
      continue when v_my_counter>5;
      v_my_counter := v_counter+1
    END LOOP;
end;
/```
Straight Sequences

- You no longer have to select my_sequence.nextval into v_seq_no from dual
- Now just use
  - seq1:=my_sequence.nextval
  - or seq2:=my_sequence.currval
Compile-time Warning

- “when others then null” will now generate a warning
- PLW-06009

Alter session set plsql_warnings = ‘enable:all’;

```sql
create or replace
procedure my_null_warning
is
  v_my_val varchar2(30);
begin
  select cust_last_name into v_my_val
  from customers
  where customer_id=193;
exception
  when others
  then null;
end;
```

Warning(10,7): PLW-06009: procedure "MY_NULL_WARNING" OTHERS handler does not end in RAISE or RAISE_APPLICATION_ERROR
Others

- Inlining
- PL/SQL Function Result Cache
- Dynamic SQL
  - SQL statements can now exceed 32kb
  - dbms.parse is overloaded for CLOBS
  - dbms_sql now supports abstract data types
  - dbms_sql allows bulk binds
- Dynamic SQL and REF Cursors
  - A REF Cursor can now be converted into a dbms_sql cursor
  - And a dbms_sql cursor can be converted into a REF Cursor
For More Information

http://search.oracle.com

or
