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PL/SQL 11g New Features

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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

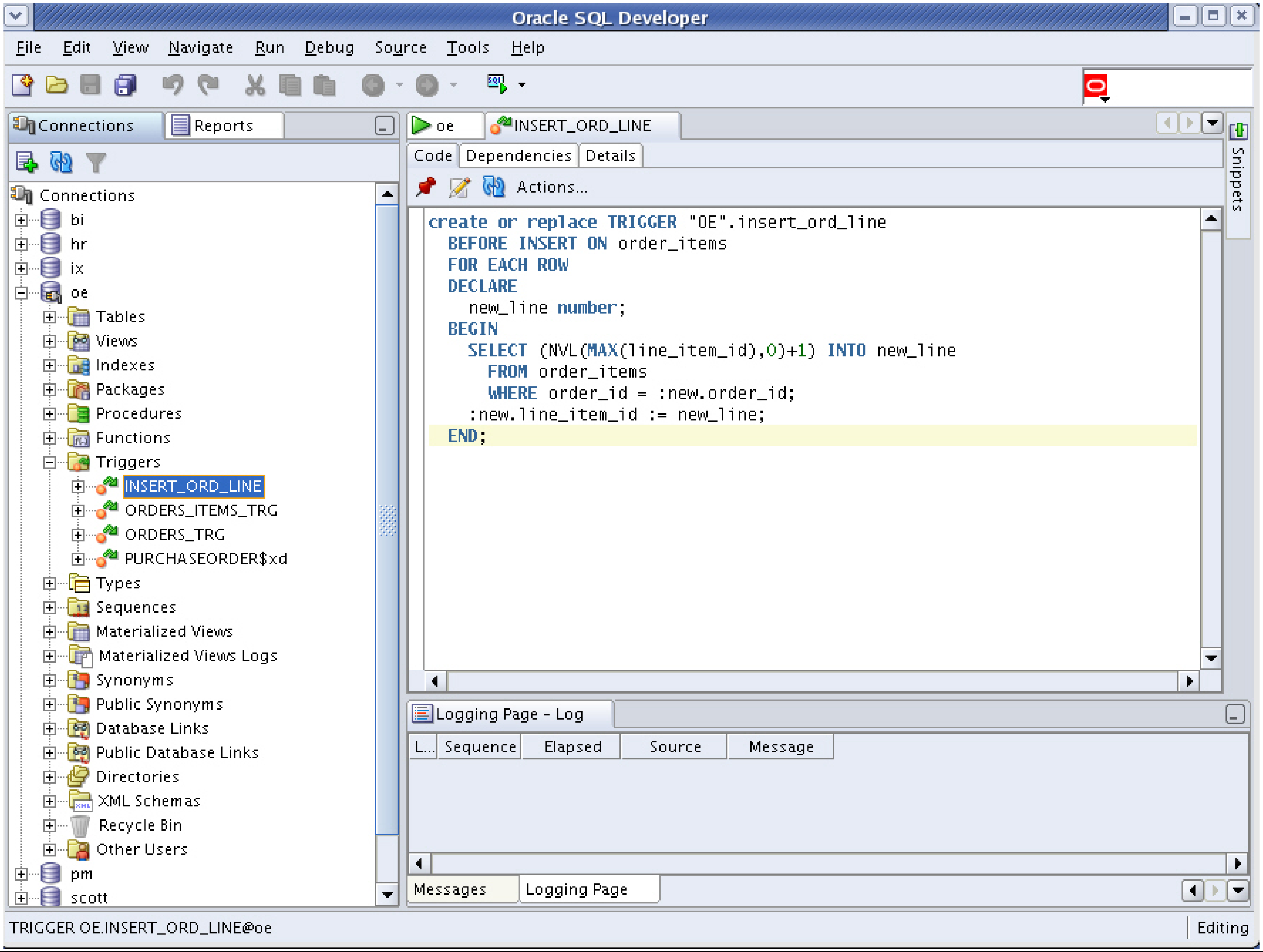
- Oracle SQL Developer: SQL Worksheet
- Oracle SQL Developer: PLSQL Editing and Debugging
- PLSQL_CODE_TYPE=Native

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

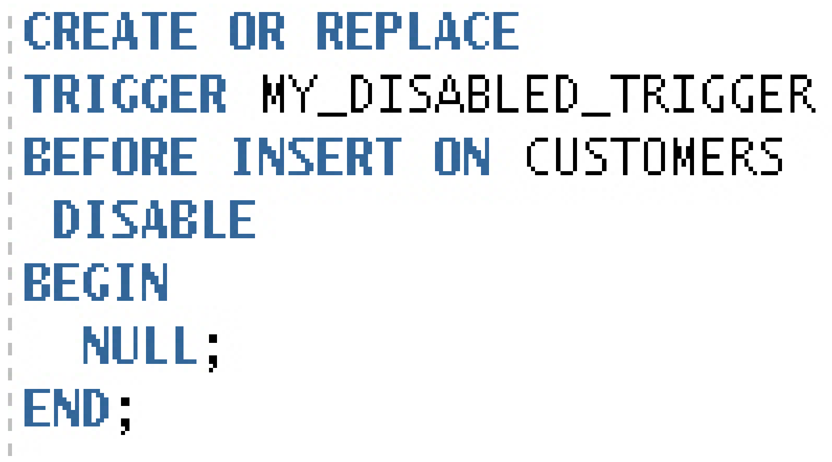
- Syntax PLSQL_CODE_TYPE = { INTERPRETED | NATIVE }
- Default value INTERPRETED
- Modifiable ALTER SESSION, ALTER SYSTEM
- C compiler no longer required
    - Compiles to native DLL
        - Windows .dll (dynamically linkable library)
        - Unix .so

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 11*g* new functionality in PL/SQL can help programmers write code more efficiently

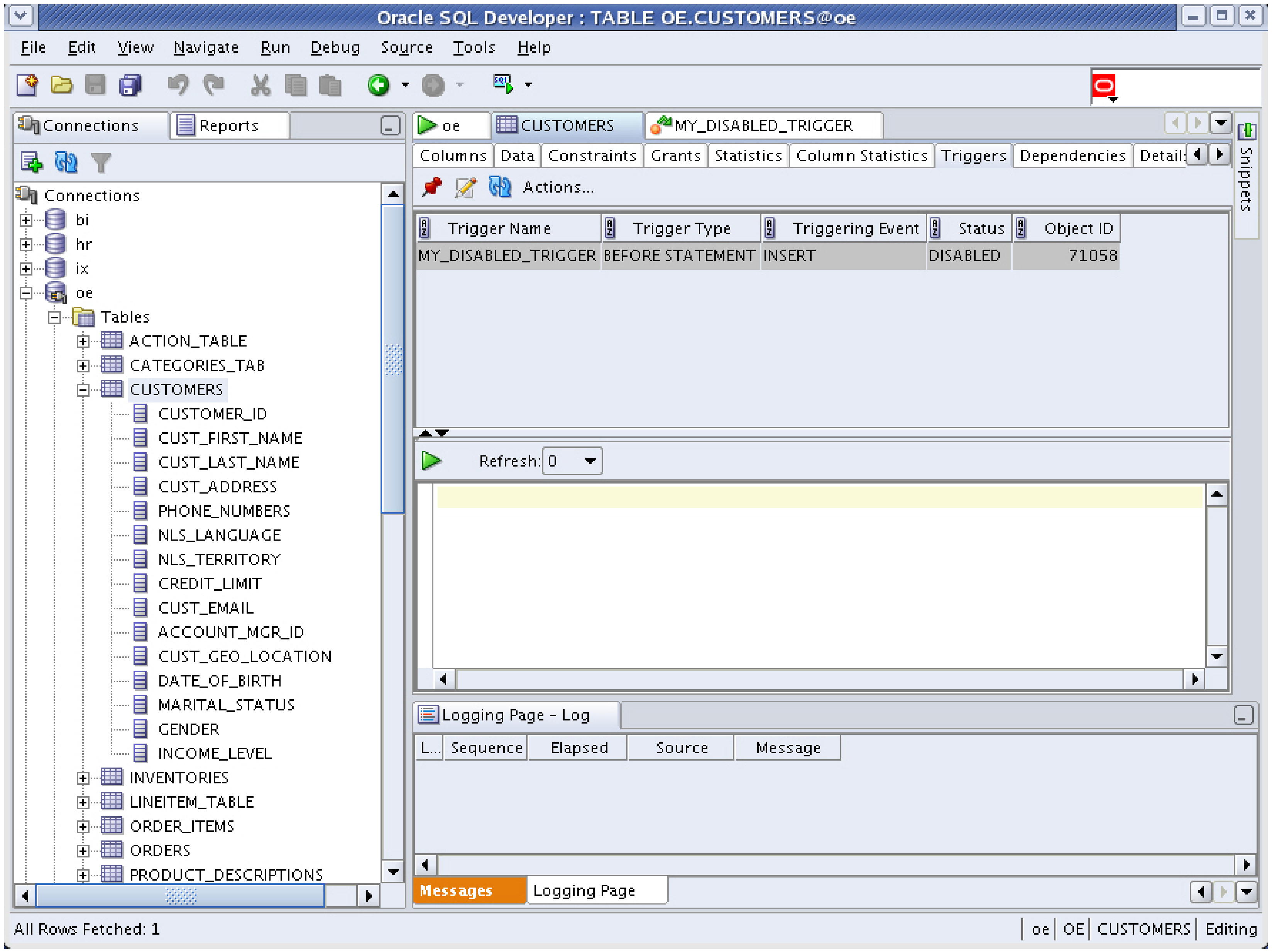
Disabled Triggers

- 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



Trigger Name	Trigger Type	Triggering Event	Status	Object ID
MY_DISABLED_TRIGGER	BEFORE STATEMENT	INSERT	DISABLED	71058

L...	Sequence	Elapsed	Source	Message

All Rows Fetched: 1

oe | OE | CUSTOMERS | Editing

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

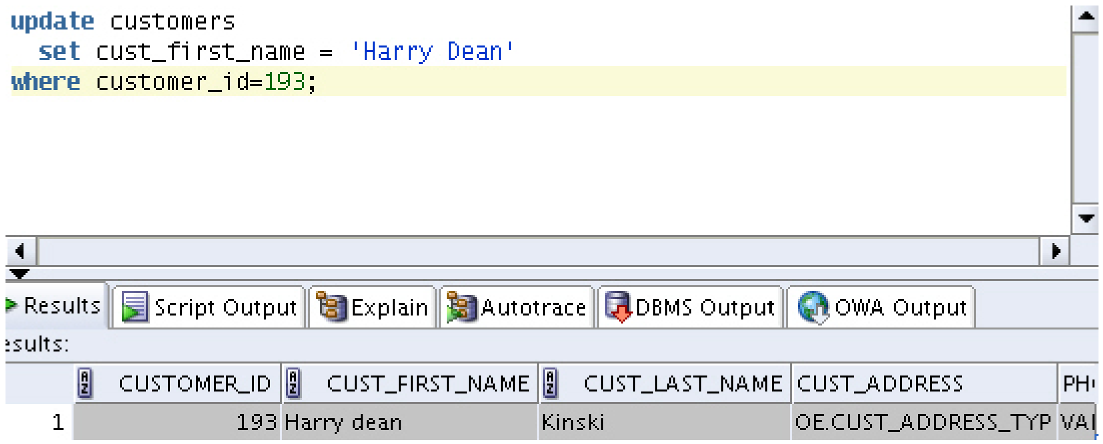
- Mutating table
- An example is creating an entry in an audit table
  - Create an audit record each time an employees salary changes
  - Could have many employee salary changes (bulk update)
  - 10.2 you would have to use the “ancillary package paradigm”
    - Initialize globals in a before statement
    - Batch and flush rows in before each row
    - Final flush in an after statement

Audit Table Example

```
create or replace
trigger audit_customer_changes_tgr
for insert or update on customers
compound trigger
threshhold 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 11g 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 >= threshhold 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
```

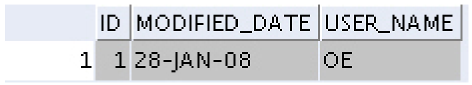
Let's Update the Customer Table



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

	CUSTOMER_ID	CUST_FIRST_NAME	CUST_LAST_NAME	CUST_ADDRESS	PH
1	193	Harry dean	Kinski	OE.CUST_ADDRESS_TYP	VA

Audit_Customer_Changes table



	ID	MODIFIED_DATE	USER_NAME
1	1	28-JAN-08	OE

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

```
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 I 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;
/
```

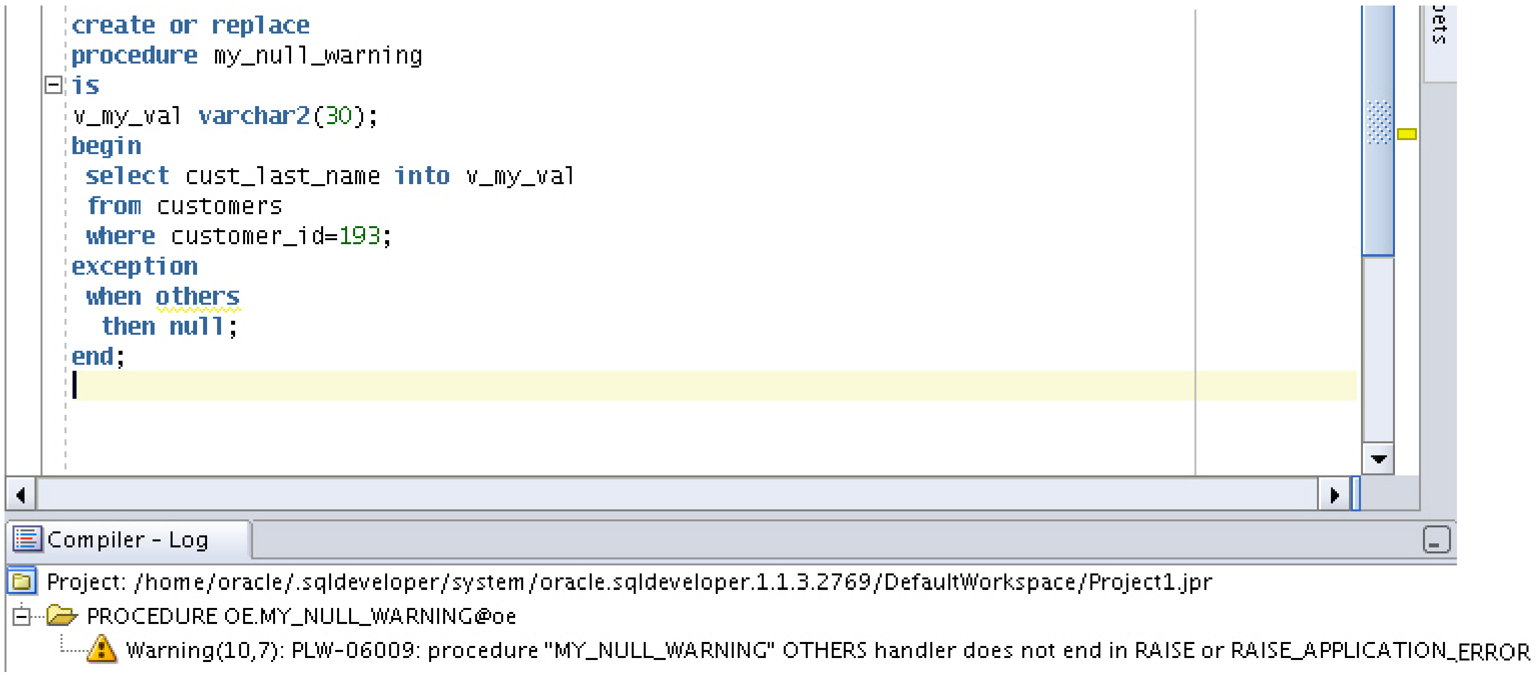
Straight Sequences

- You no longer have to select my_sequence.nextval into v_seq_no from dual
- Now just us 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’;



```
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;
```

```
Project: /home/oracle/.sqldeveloper/system/oracle.sqldeveloper.1.1.3.2769/DefaultWorkspace/Project1.jpr
PROCEDURE OE.MY_NULL_WARNING@oe
  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

Q&A

QUESTIONS
ANSWERS

http://otn.oracle.com/rac

For More Information

http://search.oracle.com

PL/SQL

or

http://www.oracle.com/technology/tech/pl_sql/pdf/plsql_new_in_11gr1.pdf

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