

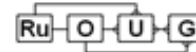
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# My Favorite Built-in Packages

and a few

# PL/SQL Tips & Tricks

presentation for:  
**OUG Harmony 2011**



# Disclaimer

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This room is an unsafe harbour

No one from **Oracle** has previewed this presentation

No one from **Oracle** knows what I'm going to say

No one from **Oracle** knows what I'm going to demo


No one from **Oracle** has supplied any of my materials

This presentation will include live in SQL\*Plus demos because the technology is currently available and works very very well

You may rely upon this presentation to make decisions for your enterprise

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# Daniel A. Morgan

- Oracle ACE Director 
- University of Washington Oracle Instructor for 10 years
- The Morgan of Morgan's Library on the web
- Board Member: Western Washington OUG
- Member UKOUG
- Conference Speaker
  - OpenWorld, Collaborate, Kaleidoscope, Brazil, Bulgaria, Canada, Chile, Costa Rica, Denmark, Estonia, Finland, Germany, Japan, New Zealand, Norway, Peru, Sweden, U.K., U.S., Uruguay
- 10g & 11g Beta Tester



# cd \$MORGAN\_HOME

---




cd \$MORGAN\_HOME

---



# Morgan's Library: [www.morganslibrary.org](http://www.morganslibrary.org)



## Morgan's Library


www library

### Morgan's 2010 - 2011 Calendar






May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr

#### EMEA Harmony Conference

Tallinn, Estonia  
May 20-21, 2010



A joint conference of the Estonian, Finnish, Latvian and Russian user groups  
EMEA Harmony will focus on Technology, Middleware and BI  
Featured speakers include Tom Kyte, Mogen Norgaard, Tanel Poder, and Dan Morgan



#### Community

- Events
- Training
- Evening Workshops


#### Resources

- Library
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#### Presentations Map



#### The Mad Dog ACE



#### Morgan




aboard USA-71

#### Training Events

- [EMEA Harmony](#) - May 20 - 21, Tallinn, Estonia
- [NoCOUG](#) - August 2010,
- [AIOUG](#) Sep 3 - 4, Hyderabad, India
- [OOW](#) - Sep 19 - 23, San Francisco CA
- [LAD Tour](#) - October
- [DOAG](#) - Nov 16 - 18, Nurnberg, Germany
- [UKOUG](#) - Nov 29 - Dec 1, Birmingham UK

#### Oracle Events



[EMEA Harmony - Tallinn Estonia - May 20-21](#)


#### Library News

- [Morgan's Notepad vi \(Blog\)](#) UPDATED
- [Join the Western Washington OUG](#)
- [Morgan's Oracle Podcast](#)
- [DBA Best Practice Guidelines](#)
- [Bryn Llewellyn's PL/SQL White Paper](#)
- [Bryn Llewellyn's Editioning White Paper](#)
- [Troubleshooting Performance](#)

#### ACE News

Would you like to become an Oracle ACE?

Learn more about becoming an ACE



- [ACE Directory](#)
- [ACE Google Map](#)
- [ACE Nomination Form](#)
- [Stanley's Blog](#)

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Edition Based Redefinition in Oracle Database 11gR2

# Morgan's Library Demos

<u>DDL Statements</u>	11gR2	20-Dec-2009	-
<u>Deadlocks</u>	11gR2	09-Sep-2010	UPDATED
<u>DECODE Function</u>	11gR2	21-Apr-2009	-
<u>Deferrable Constraints</u>	11gR2	09-Sep-2009	-
<u>Delete Statement</u>	11gR2	10-Sep-2009	-
<u>Descending Indexes</u>	11gR2	22-Aug-2010	UPDATED
<u>DICOM</u>	11gR1	17-Jun-2010	-
<u>Dimensions</u>	11gR2	10-Sep-2009	-
<u>Directories</u>	11gR2	01-Nov-2009	-
<u>Disassociate Statistics</u>	11gR2	10-Sep-2009	-
<u>DIUTIL</u>	11gR2	10-Sep-2009	-
<u>DML Statements</u>	11gR2	10-Sep-2009	-
<u>Dumping Oracle</u>	11gR2	20-Jul-2010	-
<u>Dynamic Performance Views</u>	11gR2	15-Jun-2010	-
<u>E-Business Suite</u>	11.5.10	29-Sep-2007	-
<u>Edition Based Redefinition</u>	11gR2	18-Sep-2010	UPDATED
<u>Editioning Demo 1: Editions</u>	11gR2	15-Apr-2010	-
<u>Editioning Demo 2: Editioning Views</u>	11gR2	21-Mar-2010	-
<u>Editioning Demo 3: Crossedition Triggers</u>	11gR2	02-Mar-2010	-
<u>Editioning Demo 4: Online Table Update</u>	11gR2	22-Mar-2010	-
<u>Editioning Demo 5: Invisible Indexes</u>	11gR2	09-May-2010	-
<u>Editioning Demo 6: Conversion Automation</u>	11gR2	22-Sep-2010	NEW
<u>Editioning Views</u>	11gR2	24-Feb-2010	-
<u>Editions</u>	11gR2	12-Mar-2010	-
<u>Encrypted Tablespaces</u>	11gR2	28-Sep-2009	-
<u>Environment Variables</u>	11gR2	11-Sep-2009	-
<u>Errors</u>	11gR2	11-Sep-2009	-
<u>Events</u>	11gR2	28-Aug-2010	UPDATED
<u>Exadata</u>	11gR2	24-Dec-2009	-
<u>Exception Handling</u>	11gR2	16-Mar-2010	-
<u>Excluded Nodes</u>	11gR2	27-Sep-2008	-
<u>Exists</u>	11gR2	11-Sep-2009	-
<u>Explain Plan</u>	11gR2	21-Jan-2010	-

# Basic Principles

---

- Code as though every line will run on RAC
- Code as though performance issues are everywhere
- Code as though you will have production issues
- Process sets not single rows
- Do it in memory not on disk



# Topics

---

- Work with Records
- Multidimensional Collections
- PL/SQL Warnings
- Java Functions
- Columns in Weakly Typed REF CURSORS
- Write to V\$SESSION
- Audit Specific Column Updates

---

# PL/SQL Code

# Work with Records

---

- Not just BULK COLLECT and FORALL
- You can use BULK COLLECT and FORALL with Native Dynamic SQL
- You can use FORALL with UPDATE and DELETE
- Use the SAVE EXCEPTIONS clause

```
CREATE TABLE t AS
SELECT table_name, tablespace_name
FROM all_tables;

SELECT COUNT(*)
FROM t;

DECLARE
  trec t%ROWTYPE;
BEGIN
  trec.table_name := 'NEW';
  trec.tablespace_name := 'NEW_TBSP';

  INSERT INTO t
  VALUES trec;

  COMMIT;
END;
/

SELECT COUNT(*) FROM t;
```

```
DECLARE
  trec t%ROWTYPE;
BEGIN
  trec.table_name := 'DUAL';
  trec.tablespace_name := 'NEW_TBSP';

  UPDATE t
  SET ROW = trec
  WHERE table_name = 'DUAL';

  COMMIT;
END;
/
```

# Multi-dimensional Collections

---

- Collections have one dimension, but you can model a multidimensional collection with a collection whose elements are collections

```
CREATE OR REPLACE TYPE uw_varray AS VARRAY(5) OF NUMBER;
/

CREATE TABLE mdc_tab (
  rid          NUMBER,
  demo_varray uw_varray);

desc mdc_tab

INSERT INTO mdc_tab VALUES (1, uw_varray(1,2,3,4,5));
INSERT INTO mdc_tab VALUES (2, uw_varray(10,20,30,40,50));
INSERT INTO mdc_tab VALUES (3, uw_varray(100,200,300,400,500));

SELECT * FROM mdc_tab;
```

# Multi-dimensional Collections

```
set serveroutput on

DECLARE
  TYPE rid_t IS TABLE OF mdc_tab.rid%TYPE INDEX BY BINARY_INTEGER;
  rid_a    rid_t;

  TYPE uwv_t IS TABLE OF mdc_tab.demo_varray%TYPE INDEX BY BINARY_INTEGER;
  uwv_a    uwv_t;

  exStr    CLOB := 'SELECT rid, demo_varray FROM mdc_tab';
BEGIN
  EXECUTE IMMEDIATE exStr BULK COLLECT INTO rid_a, uwv_a;

  -- execute each row of the array
  FOR i IN rid_a.FIRST .. rid_a.LAST LOOP
    dbms_output.put_line('Accessing array row: ' || TO_CHAR(i));
    FOR j IN uwv_a(i).FIRST .. uwv_a(i).LAST LOOP
      dbms_output.put_line(uwv_a(i)(j));
    END LOOP;
  END LOOP;
END;
/
```

# PL/SQL Warnings

---

- Introduced in Database 10gR1
  - Informational
  - Performance
  - Severe
- ALTER SYSTEM
- ALTER SESSION
  - glogin.sql

```
set pagesize 45
set linesize 121
set long 1000000
col name format a30
col value format a30
col object_name format a30
col segment_name format a30
col file_name format a60
col data_type format a20
ALTER SESSION SET NLS_DATE_FORMAT = 'DD-MON-YYYY HH24:MI:SS';
ALTER SESSION SET PLSQL_WARNINGS='ENABLE:ALL';
```



# Java Functions

---

- There are things you can do in Java ... you can not do in pure PL/SQL

```
CREATE OR REPLACE FUNCTION get_java_system_property(prop IN VARCHAR2) RETURN VARCHAR2
AUTHID DEFINER IS
LANGUAGE JAVA
  name 'java.lang.System.getProperty(java.lang.String) return java.lang.String';
/

SELECT object_type
FROM user_objects
WHERE object_name = 'GET_JAVA_SYSTEM_PROPERTY';

CREATE OR REPLACE VIEW v$oracle_home AS
SELECT get_java_system_property('user.dir') AS oracle_home
FROM dual;

SELECT * FROM v$oracle_home;
```



# Columns in Weakly Typed REF CURSORS

---

- How Can I?
  - Read a list of operating system files into a PL/SQL array (without using C or Java)
  - Identify the columns and data types in a weakly typed ref cursor (How Can I #3)
  - Write a CLOB to a file
  - Track the parts of my application that are in use
  - Create a data type that will only hold the values 0 and 1
  - Audit Column Updates
  - Only report the rows from a query if the number of rows exceeds a limiting value
  - Work effectively with the deprecated LONG data type
  - Control services and scheduled jobs at startup
  - Perform string aggregation

# Write to V\$SESSION

---

- How Can I?

- Read a list of operating system files into a PL/SQL array (without using C or Java)
- Identify the columns and data types in a weakly typed ref cursor
- Write a CLOB to a file
- Track the parts of an application that are in use (How Can I #5)
- Create a data type that will only hold the values 0 and 1
- Audit Column Updates
- Only report the rows from a query if the number of rows exceeds a limiting value
- Work effectively with the deprecated LONG data type
- Control services and scheduled jobs at startup
- Perform string aggregation

# Audit Column Updates

---

- **How Can I?**

- Read a list of operating system files into a PL/SQL array (without using C or Java)
- Identify the columns and data types in a weakly typed ref cursor
- Write a CLOB to a file
- Track the parts of my application that are in use
- Create a data type that will only hold the values 0 and 1
- **Audit Specific Column Updates (How Can I #8)**
- Only report the rows from a query if the number of rows exceeds a limiting value
- Work effectively with the deprecated LONG data type
- Control services and scheduled jobs at startup
- Perform string aggregation

---

# Built-in Packages

# Topics

---

- DBMS\_ASSERT
- DBMS\_DB\_VERSION
- DBMS\_METADATA
- DBMS\_RESULT\_CACHE
- OWA\_UTIL

# DBMS\_ASSERT Stops SQL Injection

---



# DBMS\_ASSERT

---

- Provides functions which assert various properties of the input value. If the condition which determines the property asserted in a function is not met then a value error is raised. Otherwise the input value is returned via return value. Most functions return the value unchanged, however, several functions modify the value.

**This is not English as anyone I know speaks it**

# DBMS\_ASSERT

---

- Utilities to prevent SQL Injection in dynamic SQL
  - ENQUOTE\_LITERAL
  - ENQUOTE\_NAME
  - QUALIFIED\_SQL\_NAME
  - NOOP
  - SCHEMA\_NAME
  - SIMPLE\_SQL\_NAME
  - SQL\_OBJECT\_NAME



# DBMS\_DB\_VERSION

---

- Produce a single code base that performs version dependent compilation

```
set serveroutput on

BEGIN
  $IF dbms_db_version.ver_le_10 $THEN
    dbms_output.put_line('version 10 and earlier
code');
  $ELSIF dbms_db_version.ver_le_11 $THEN
    dbms_output.put_line('version 11 code');
  $ELSE
    dbms_output.put_line('version 12 and later
code');
  $END -- note that there is no semi-colon
END;
/
```

# DBMS\_METADATA

---

- Utilities for working with object metadata
  - GET\_DEPENDENT\_DDL
  - GET\_GRANTED\_DDL

# DBMS\_RESULT\_CACHE

---

- Utilities for managing the Result Cache
  - BYPASS
  - DELETE\_DEPENDENCY
  - FLUSH
  - INVALIDATE
  - INVALIDATE\_OBJECT
  - MEMORY\_REPORT
  - STATUS

# OWA\_UTIL

---

- Utilities for the now non-existent Oracle Web Application Server

```
set serveroutput on

CREATE OR REPLACE PROCEDURE child AUTHID DEFINER IS
  oname all_objects.owner%TYPE;
  pname all_objects.object_name%TYPE;
  lnumb all_source.line%TYPE;
  callr all_objects.object_type%TYPE;
  PRAGMA AUTONOMOUS_TRANSACTION;
BEGIN
  owa_util.who_called_me(oname, pname, lnumb, callr);
  dbms_output.put_line(oname);
  dbms_output.put_line(pname);
  dbms_output.put_line(lnumb);
  dbms_output.put_line(callr);
END;
/
```

# Questions

---

**ERROR at line 1:**

**ORA-00028: your session has been killed**



**All demos at [morganslibrary.org](http://morganslibrary.org)**

- **Click on: Library**
- **Click on: How Can I?**

**Thank you**