

# Real Application Testing: An Introduction

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# About Me

- **Senior Principal DBA Trainer – Oracle University**
- **25 years Unix Experience**
- **12 years Oracle DBA Experience**
- **Oracle8i, 9i, 10g and 11g OCP**
- **Oracle10g and Oracle11g OCM**
- **DBA Certification Exam Team Reviewer**
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- **Blog: [prutser.wordpress.com](http://prutser.wordpress.com)**
- **Visually Impaired (Legally Blind)**



# Agenda

- **Introduction**
- **What is Real Application Testing?**
- **SQL Performance Analyzer**
- **Database Replay**
- **Demos**
- **Questions & Answers**

# What is Real Application Testing?

- **An Enterprise Edition database option**
- **Goal is to assess impact of system changes**
- **Capture workload on production and analyze performance on test system**
- **Two components:**
  - **SQL Performance Analyzer**
  - **Database Replay**
- **Two interfaces:**
  - **Enterprise Manager**
  - **Command line**
    - PL/SQL API**
    - Database Views**
    - Workload Replay Client**

# SQL Performance Analyzer (SQLPA)

- **Goal is to forecast the potential impact of system changes on SQL statement performance**
- **Detects SQL statement regression**
- **Type of changes:**
  - **Schema objects**
  - **Oracle software**
  - **System and/or session parameters**
  - **Optimizer and/or system statistics**
- **Can use production or test system**
- **Enterprise Manager workflows:**
  - **Parameter change**
  - **Exadata simulation**
  - **Guided change**

# SQLPA - The Big Picture

- **Capture the SQL workload into an STS**
- **Prepare a test system and copy the STS to it**
- **Create an SQLPA task**
- **Build the pre-change SQL trial**
- **Implement the change**
- **Build the post-change SQL trial**
- **Compare and analyze**
- **Tune regressed SQL or create SQL Plan Baselines**
- **Verify the results after tuning**

# Database upgrades and SQLPA - 1

- **9i and 10gR1 to 10gR2 and up**
  - **Build STS from SQL trace file  
(== pre-change SQL trial)**
  - **Build and upgrade test system**
  - **Remotely execute SQLPA task on test system  
(== post-change SQL trial)**
  - **Compare, analyze and fix regressed SQL**

## Database upgrades and SQLPA - 2

- **10gR2 and up to 11gR1 and up**
  - Capture SQL on production system into STS
  - Build test system
  - Remotely execute SQLPA task on test system  
(== pre-change SQL trial)
  - Upgrade test system
- **Remotely execute SQLPA task on test system  
(== post-change SQL trial)**
  - Compare, analyze and fix regressed SQL



# DBMS\_SQLPA Package

- **This package contains:**
  - **CREATE\_ANALYSIS\_TASK**
  - **SET\_ANALYSIS\_TASK\_PARAMETER**
  - **SET\_ANALYSIS\_DEFAULT\_PARAMETER**
  - **EXECUTE\_ANALYSIS\_TASK**
  - **INTERRUPT\_ANALYSIS\_TASK**
  - **RESUME\_ANALYSIS\_TASK**
  - **CANCEL\_ANALYSIS\_TASK**
  - **RESET\_ANALYSIS\_TASK**
  - **DROP\_ANALYSIS\_TASK**
  - **REPORT\_ANALYSIS\_TASK**

# Database Replay

- **Goal is to replay a production workload on a test system with the same timing, concurrency and transaction characteristics of the captured workload**
- **Type of changes:**
  - Hardware and/or O/S upgrades
  - Storage sub-system replacement
  - Oracle software upgrades
  - Move to (or from) RAC
  - Cluster Interconnect upgrades
- **Two components:**
  - Database Capture
  - Database Replay

# Database Replay – The Big Picture

- **Prepare for Database Capture**
- **Capture a production workload**
- **Transfer the captured workload to a test system**
- **Pre-process the captured workload**
- **Replay the captured workload**
- **Analyze the results**
  - **Errors**
  - **Data Divergency**
  - **Timing**

# Workload Capture

- **Capture database calls and store them on disk**
- **Can capture on: 9iR2, 10gR2 and 11g**
- **Capture filters?**
- **Database restart?**
- **Capture filesystem size and speed?**
- **Strategy for the Replay system:**
  - **Data Guard Snapshot Standby database**
  - **RMAN**
  - **Datapump export and import**

# Workload Capture Restrictions

- **The following actions are not supported:**
  - **Direct path loads from external files**
  - **Non PL/SQL based Advanced Queueing**
  - **Flashback queries**
  - **OCI based object navigation**
  - **Non SQL based object access**
  - **Distributed transactions**

# DBMS\_WORKLOAD\_CAPTURE Package

- **This package contains:**
  - **START\_CAPTURE**
  - **FINISH\_CAPTURE**
  - **ADD\_FILTER**
  - **DELETE\_FILTER**
  - **EXPORT\_AWR**
  - **IMPORT\_AWR**
  - **GET\_WORKLOAD\_INFO**
  - **DELETE\_WORKLOAD\_INFO**
  - **PROCESS\_WORKLOAD**
  - **REPORT**

# Workload Replay

- **Can replay on 11g only!**
- **Captured workload must be pre-processed**
- **Prepare Replay system**
  - Data must be logically equivalent
  - System date&time
  - External references
- **Connection remapping**
- **Set Replay options:**
  - COMMIT order
  - Session connect rate
  - Request rate

## Workload Replay (cont)

- **Add filters (if needed)**
- **Start Workload Replay Client(s)**
- **Start actual Replay**
- **Report and analyze**



# DBMS\_WORKLOAD\_REPLAY Package - 1

- **This package contains:**
  - **PROCESS\_CAPTURE**
  - **INITIALIZE\_REPLAY**
  - **PREPARE\_REPLAY**
  - **REMAP\_CONNECTION**
  - **SET\_ADVANCED\_PARAMETER**
  - **START\_REPLAY**
  - **PAUSE\_REPLAY**
  - **IS\_REPLAY\_PAUSED**
  - **RESUME\_REPLAY**
  - **CANCEL\_REPLAY**
  - **CALIBRATE**

## **DBMS\_WORKLOAD\_REPLAY Package - 2**

- REPORT**
- POPULATE\_DIVERGENCE**
- GET\_DIVERGING\_STATEMENT**
- COMPARE\_PERIOD\_REPORT**
- ADD\_FILTER**
- DELETE\_FILTER**
- CREATE\_FILTER\_SET**
- USE\_FILTER\_SET**
- GET\_REPLAY\_INFO**
- DELETE\_REPLAY\_INFO**
- EXPORT\_AWR**
- IMPORT\_AWR**

# Demonstration

- **Capture a workload on Oracle 10gR2**
- **Replay the captured workload on Oracle 11gR2**

**Q U E S T I O N S**  
*&*  
**A N S W E R S**

**And Finally**

**Thank you for your kind attention!**

**For a copy of my demonstration scripts email me at:**

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