



Engineering, Operations & Technology
Information Technology

Information

Database Replay

A Powerful Oracle Performance and Load Test Tool
First-hand experience by Boeing

Andre Scharkowski

Andre.Scharkowski@Boeing.com

Introduction

- About myself
 - Oracle Database Administration
 - Performance & Scalability Testing
- About the Boeing Company
 - 200+ DBAs
 - Oracle, SQL Server, DB2, Teradata
- About my work group - DCAC/MRM
 - 16 Oracle DBAs
 - Applications for the design, configuration & manufacturing of airplanes
 - 30 production and about 400 non-production databases

Introduction (cont.)

- Database sizes & load
 - From 100s MB to 3TB
 - 20K sessions 15K active
- Architecture and equipment
 - Oracle 11.2.0.2 on AIX 6.1, IBM pSeries (Power 6)
 - RAC and HACMP / BCV
- Oracle features in use
 - RAC, DataGuard, EBR (Edition-Based Redefinition)
 - DB-links, Materialized Views
 - Triggers, PL/SQL, Synonyms, Complex Views & Grants,
 - EM-grid, OCM, rman
 - Partitioning, some Parallel Query

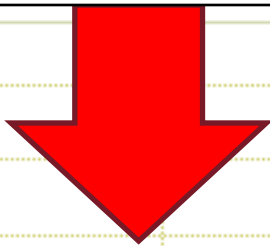
Why is Database Replay such a big deal?

- Tool is able to reproduce true production load in all its variety and complexity
- DBA has ability to test database changes without having to involve other, non-DBA groups
- Test tool of choice for Oracle patches, Oracle upgrades, parameter changes, architecture and hardware changes
- Tool has the potential of saving large amounts of resources normally spent on test script development
- Tool can reduce the size and complexity of test environments -- no need for application servers, web servers, client machines
- Tool can be used to generate a background database load that can supplement load generated by traditional test tools (save licenses)

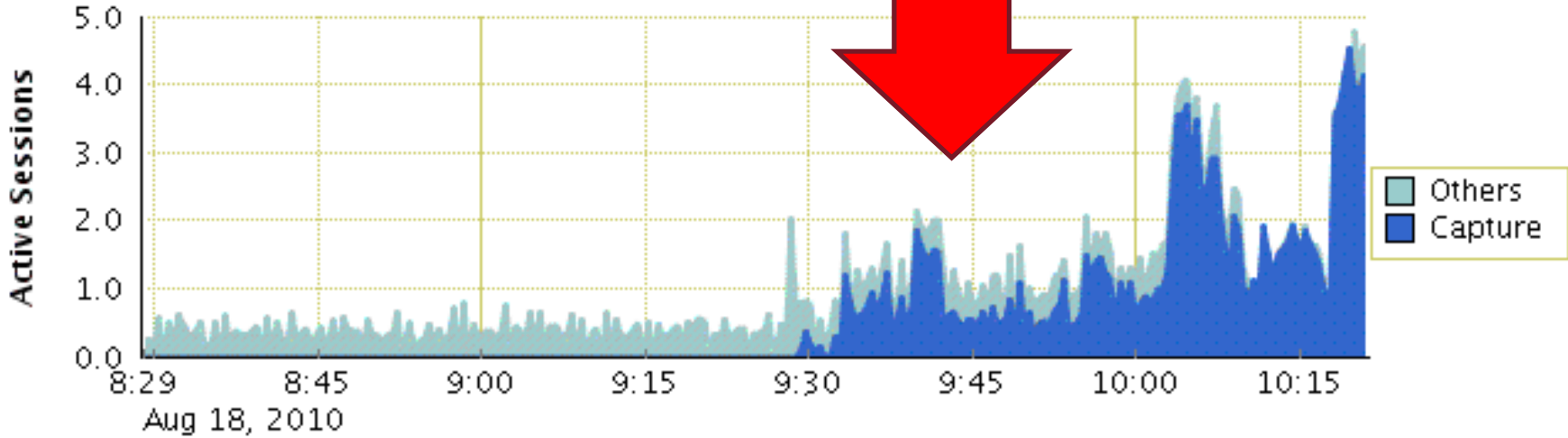
Deployment status of Database Replay at Boeing

- Performed about 50 production captures and over 100 replays
- Replays helped validate 10.2.0.4 → 11.2.0.1. upgrade
- Using the tool to validate new EMC V-Max tiered storage
- Plan on making Database Replay part of regular test cycle
 - issue: few outages → many types of changes happen at once
- Plan on working with Oracle to improve the product
 - timeout feature
 - explore Oracle's Application Testing Suite (ATS)
 - make use of Workload Analyzer

capture in progress



Average Active Sessions



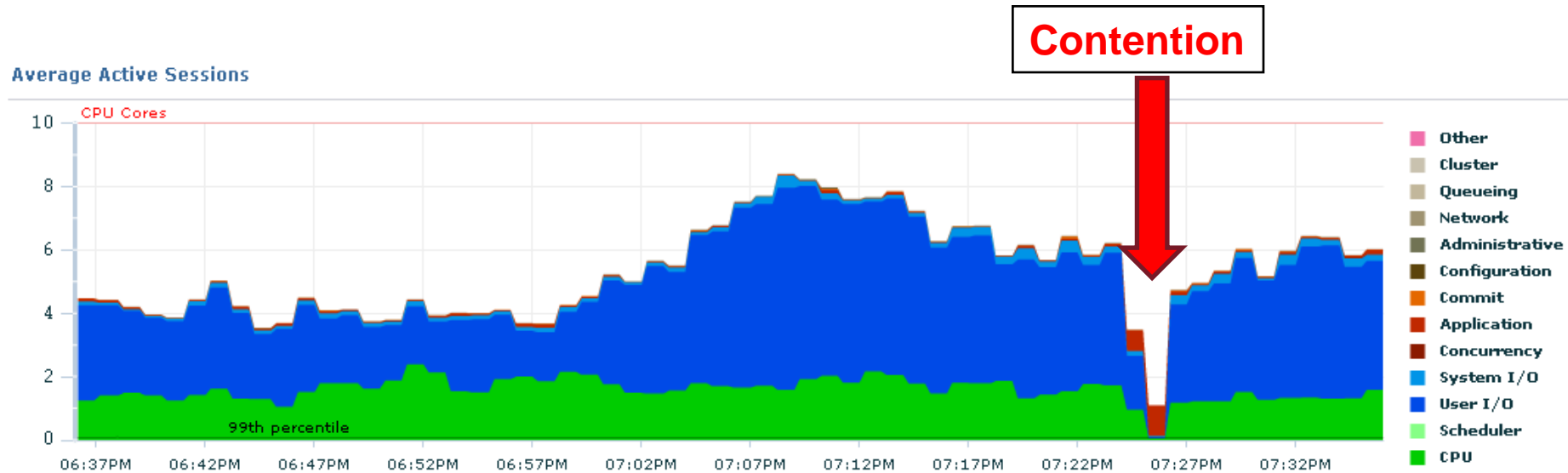
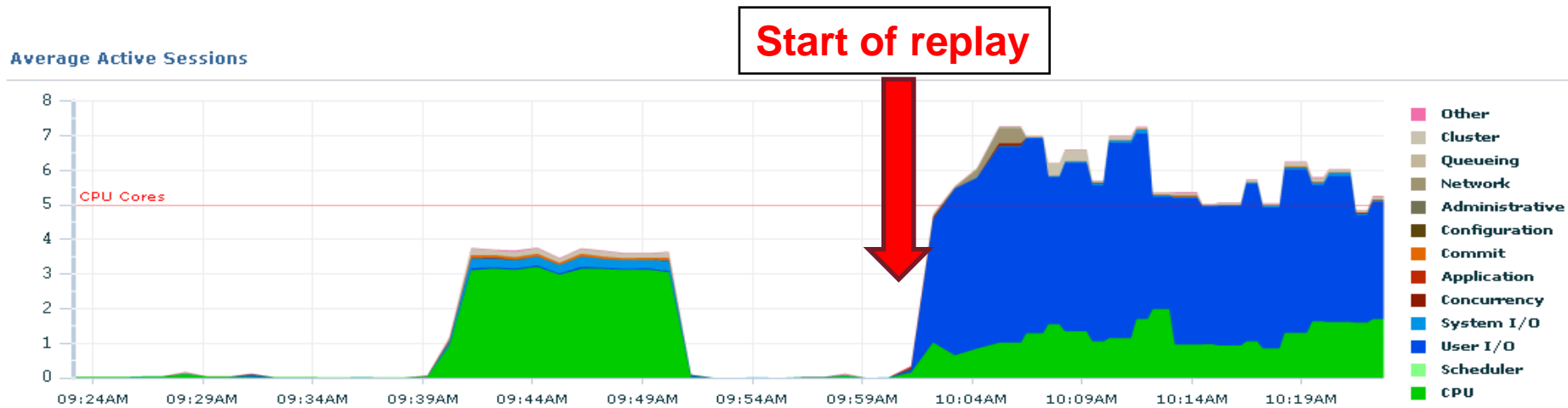
Comparison

	Total	Capture	Percentage of Total
Database Time (hh:mm:ss)	05:45:07	04:59:39	86.83
Average Active Sessions	3.08	2.67	86.83
User Calls	23,887,290	23,679,257	99.13
Transactions	199,009	198,200	99.59
Session Logins	21,512	21,328	99.14
Application Errors	N/A	126	N/A

Active Session View in OEM during Replay

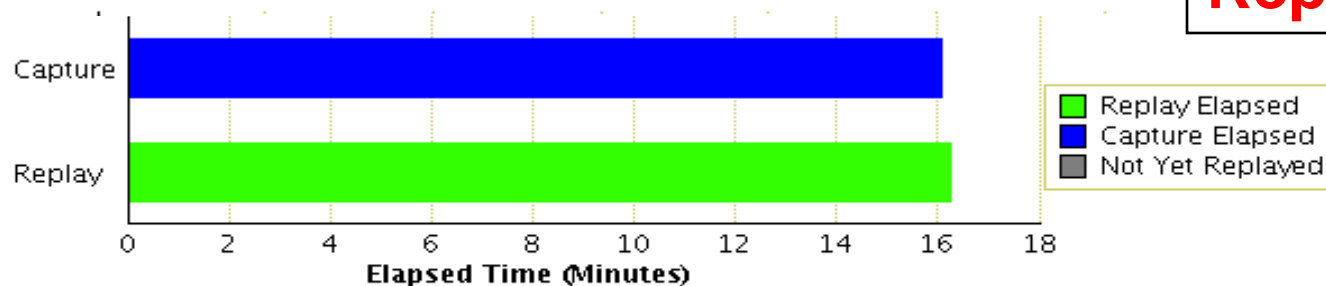
Engineering, Operations & Technology | Information Technology

Architecture & Information Management



Elapsed Time Comparison

Replay Finished



Detailed Comparison

	Capture	Replay	Percentage of Capture
Duration (hh:mm:ss)	16:04:28	16:16:59	101.30
Database Time (hh:mm:ss)	95:08:18	121:48:40	128.04
Average Active Sessions	5.92	7.48	126.40
User Calls	279,816,273	280,117,250	100.11

▼ Divergence

	Number of Calls	Percentage of Total Calls
Error Divergence:		
Session Failures Seen During Replay	0	0.00
Errors No Longer Seen During Replay	26379	0.01
Errors Mutated During Replay	0	0.00
New Errors Seen During Replay	37289	0.01
Data Divergence:		
DMLs with Different Number of Rows Modified	287264	0.10
SELECTs with Different Number of Rows Fetched	485426	0.17

Conclusion

- Exciting performance and load test tool
 - true production load at very low overhead
 - rapid testing possible
 - simple setup
 - resource savings (HW, scripting)

Acknowledgement

Engineering, Operations & Technology | Information Technology

Architecture & Information Management

Many Thanks To:

Ashish Agrawal (Oracle)

Prabhaker Gongloor (Oracle)

Yuri Grinshteyn (Oracle)

Oracle Support

The DCAC/MRM DBA team at Boeing

Oracle OpenWorld 2011 organizers