



# What if Kramer was your DBA & Seinfeld Tuned your Database?

New York - 2011

*"Jerry, I can't find my backup"*

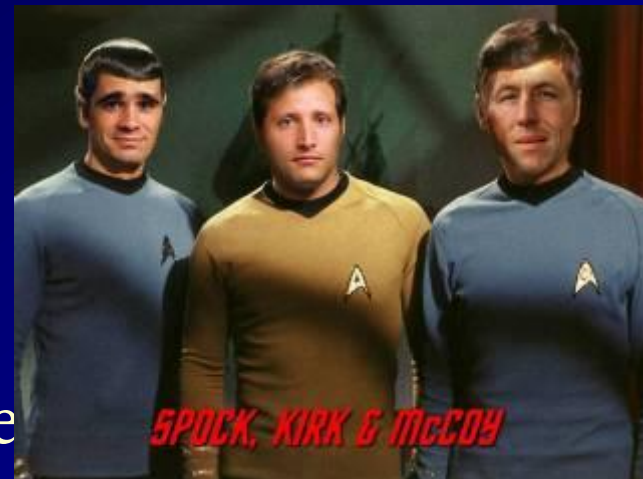


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# Audience Knowledge

- Oracle9i Experience ?
- Oracle9i RAC Experience?
- Oracle10g Experience?
- Oracle Database 11g Experience



- Goals
  - Tuning Tips & AWR / Grid Tuning
  - Focus on a few nice features of Oracle 10g & 11g
- Non-Goals
  - Learn ALL aspects of Tuning Oracle





# Overview

- Kramer's missing Backup
- George's Untuned System
- Elaine's Untouched System
- Jerry's Perfect Tuning Plan
- Statspack / AWR
  - Top Waits
  - Load Profile
  - Latch Waits
  - Top SQL
  - Instance Activity
  - File I/O
- The Future EM & ADDM
- Helpful V\$/X\$
- Summary







# Kramer doesn't have a Backup



*My Junior DBA is getting the backup right now!*



# What Kramer did...

- He was logged into production vs. test
- He deleted some production data
- His backup tape was at Jerry's apartment
- He taped a Lady Gaga song over the backup tape.
- He never actually tested the backup so the older backup tapes don't work either
- He doesn't have a DR site



# Jerry reminds Kramer what he could have done to prevent all of this...

- The **backup** should have been in a **secure location**
- With 10g or 11g **encrypt the backup** so it will always be protected
- Could have used **Oracle's Flashback** and get deleted data back
- **Data Guard** allows you to fail over to a new sight.
- **Test your recovery & DR** to ensure it will



# Jerry reminds Kramer what he could have done to prevent all of this...

- Just because a database may need to be recovered, **do not delete the "corrupted" database** *if possible*.
  - First, take a backup taken of the "corrupt" database.
  - If the restore does not work and you did not backup the "corrupt" database, you may have nothing to work with.
- When trouble shooting a problem query never let operations reboot the instance.
- Never startup a standby database in normal mode.





# George Doesn't Tune Anything

TUSC



*Instead of proactively tuning are you depending on other means to save you?*



# George doesn't Tune Anything...

- George doesn't believe in **backups**; It **slows down the system**.
- He **uses the "kill -9"** for anything slow
- George **doesn't patch** things especially security
- He **uses default passwords** for speed and so he doesn't have to change any application code.
- He tries not to do anything that requires actual work to be done
- He never tells anyone that he's going to bring down the system, he just does a "**oops, it crashed**" with a **Shutdown Abort** when he needs to bring it down



# Jerry's Advice to George...

- **Default passwords should be changed** at database creation time.
- Good design beats ad-hoc design.
  - Don't work in a black box when tuning.
  - Establish priorities and work on what is important to the business.
  - Set goals so that everyone knows if success is achieved.
- Setting production databases in noarchivelog mode and then relying on exports or cold backups.
  - No way to recover lost data if crash occurs after the backups.
  - Recommend **turning archivelog mode ON** and use RMAN or hot backups instead.
  - Need to **validate, test & regularly review backup & DR plans**
- Installing Oracle Enterprise Edition downloaded from [technet.oracle.com](http://technet.oracle.com) and not buying any Oracle Support can be a



# Jerry's Advice to George...

- In George's system you might find alert log, trace files, or reports from end users of errors that have been occurring for a long time but were not addressed. Then the problem either grew into something larger or due to changes in the business these issues grow into something much larger.
- Cleanup is not occurring on destination directories (bdump, cdump, udump, adump).
- Leaves temp to grow a ridiculously huge size. This just trains the developers to write un-optimized queries.
- **NEVER go without a development environment**
- **George also never tests anything.** How times have we been called in to fix in a production environment that would have been caught and corrected BEFORE they were a production problem if only some basic testing had been done?



# Elaine Doesn't Work past 5 PM

TUSC



*Are you available when they need you?  
When you are available, are you easy to deal with?*



# Elaine doesn't Work past 5 PM...

- Elaine doesn't understand the concept of the DBA.
- She doesn't understand the dedication needed
- If users have a problem after 5 PM, they wait until tomorrow for a solution.
- Elaine doesn't have the time each day to do the required maintenance tasks needed
- Elaine really wants to be (and should be) an Ad-hoc query user, but wants the salary of a DBA.
- She advises others to never accept a job as DBA, you can never escape!!! **She advises other DBAs to never give out home#/pager/cell number to developers...**



# Jerry's Advice to Elaine...

- Don't set the `max_dump_file_size` set to the default (unlimited). Can take over file system if trace generated is bigger than the destination.
- Don't use Oracle 8i/9i settings in a 10g or 11g instance. Take advantage of new features and get rid of backward compatibility kernel settings.
- She has RAC, but has no redundancy on the private interconnect. Having the private interconnect compete with other public network traffic is a bad thing.
- NEVER apply a patch without testing in development first
- NEVER move code into production without test in development



# Jerry's Advice to Elaine...

- ALWAYS document your environment, changes to the environment, and custom code – this makes life easier for those of us who have to support it
- Her datafiles are set to autoextend unlimited. Then you find out that the file systems they reside on are limited. An Oracle Error is triggered when Oracle tries to resize and can't find the space. Clients do this all the time because they rely on DBCA.
- Don't rely on the UNIX administrator's word that the filesystems underneath are I/O tuned. A good DBA should actually do the LUN recommendation, i.e. R1+0 for Oracle, R5 for backups, etc. Check File I/O<sub>16</sub> for issues





# Jerry is the Productive DBA



*Can you stay up 63 hours? You won't need to in the future!*



# Jerry's Secret to Tuning; AWR Report and Grid Control

- Jerry is the Master Tuning Expert
- He Knows The Oracle
- He Leverages what he learned in Statspack
- He Learned what's new in AWR Report
- He applies his tuning skills to Grid Control
- He **Pro-actively tunes** to head off problems
- He Re-actively tunes when needed
- He lets Grid Control Tune for him
- **He's put his knowledge into Grid Control so that he can be more productive.**



# Know the Oracle

***"I admire risk takers. I like leaders – people who do things before they become fashionable or popular. I find that kind of integrity inspirational."***

LAWRENCE J. ELLISON | *Chairman & Chief Executive Officer, 2003*





# Oracle Firsts – *Innovation!*

1979 First commercial SQL relational database management system

1983 **First 32-bit mode RDBMS**

1984 First database with read consistency

1987 **First client-server database**

1994 First commercial and multilevel secure database evaluations

1995 **First 64-bit mode RDBMS**

1996 First to break the 30,000 TPC-C barrier

1997 **First Web database**

1998 First Database - Native **Java** Support; Breaks 100,000 TPC-C

1998 First Commercial RDBMS ported to **Linux**

2000 First database with **XML**

2001 First middle-tier database cache

2001 First RDBMS with **Real Application Clusters**

2004 First **True Grid Database**

2005 First **FREE Oracle Database** (10g Express Edition)

2006 First **Oracle Support for LINUX Offering**

2007 **Oracle 11g Released!**

2008 **Oracle Exadata Server Announced (Oracle buys BEA)**

2009 **Oracle buys Sun – Java; MySQL; Solaris; Hardware; OpenOffice**

2010 **Oracle announces MySQL Cluster 7.1, Exadata, Exalogic**



# In 2007: Version 11g was Released



- The Focus has been Acquisitions and gaining **Market Share**
- Oracle 11g Database extends an already large lead
  - Easier to Manage the Database – Better Grid Control
  - Self Tuning through a variety of tools (Makes 1 person equal 10)
  - Better Security/Encryption & Recoverability via Flashback
  - Better Testing Tools (Real Application Testing)
- Andy Mendelsohn is still the database lead
- Releases of **Siebel, PeopleSoft, JDE** and Oracle12 Apps.
- New Oracle BI Suite & **Acquisition of Hyperion**

# Tuning - Leverage ALL of your Knowledge



No more Data for you!  
Now you go. Never come back. Next!



*Do Developers think of this when they think of their DBA?*



# Tuning in General

- Both an Art and a Science – You make miracles!
- Exceptions often rule the day...Not a “one size fits all”
- Hardware & Architecture must be right for your application or it will be difficult to succeed.
- Enterprise Manager (also 3<sup>rd</sup> party products) are best for simple tuning and ongoing maintenance.
- V\$/X\$ are best for drilling deep into problems
- **Enterprise Manager 11g radically makes you better!**



# Check Regularly

1. **Top 5 wait events**
2. **Load Profile**
3. Instance Efficiency Hit Ratios
4. **Wait Events**
5. Latch Waits
6. **Top SQL**
7. Instance Activity
8. **File I/O**
9. Memory Allocation
10. Undo





# AWR – Load Profile

## Report Summary

### Cache Sizes

	Begin	End		
Buffer Cache:	10,240M	10,240M	Std Block Size:	8K
Shared Pool Size:	1,264M	1,264M	Log Buffer:	36,744K

### Load Profile

	Per Second	Per Transaction
Redo size:	37,741,608.27	5,236,744.44
Logical reads:	239,964.89	33,295.74
Block changes:	137,275.83	19,047.37
Physical reads:	1.84	0.25
Physical writes:	4,708.71	653.35
User calls:	42.00	5.83
Parses:	24.05	3.34
Hard parses:	0.04	0.01
Sorts:	0.34	0.05
Logons:	0.71	0.10
Executes:	31.85	4.42
Transactions:	7.21	

% Blocks changed per Read:	57.21	Recursive Call %:	78.22
Rollback per transaction %:	25.00	Rows per Sort:	153.62

# AWR – Waits / Instance Efficiency



## Instance Efficiency Percentages (Target 100%)

Buffer Nowait %:	99.31	Redo NoWait %:	99.99
Buffer Hit %:	100.00	In-memory Sort %:	100.00
Library Hit %:	99.94	Soft Parse %:	99.82
Execute to Parse %:	24.50	Latch Hit %:	94.65
Parse CPU to Parse Elapsed %:	91.87	% Non-Parse CPU:	99.96

## Shared Pool Statistics

	Begin	End
Memory Usage %:	68.02	68.20
% SQL with executions>1:	81.94	81.36
% Memory for SQL w/exec>1:	77.24	74.72

## Top 5 Timed Events

Event	Waits	Time(s)	Avg Wait(ms)	% Total Call Time	Wait Class
log buffer space	52,521	8,851	169	35.8	Configuration
CPU time		7,636		30.9	
log file sync	7,362	5,122	696	20.7	Commit
buffer busy waits	1,564,508	2,145	1	8.7	Concurrency
log file sequential read	35,171	701	20	2.8	System I/O



Done

# Statspack (old/free way) – Top 5 Wait Events



## Top 5 Timed Events

~~~~~

| Event                                      | Waits       | Time (s)  | % Total<br>Ela Time |
|--------------------------------------------|-------------|-----------|---------------------|
| -----                                      | -----       | -----     | -----               |
| db file sequential read                    | 399,394,399 | 2,562,115 | 52.26               |
| CPU time                                   |             | 960,825   | 19.60               |
| buffer busy waits                          | 122,302,412 | 540,757   | 11.03               |
| PL/SQL lock timer                          | 4,077       | 243,056   | 4.96                |
| log file switch<br>(checkpoint incomplete) | 188,701     | 187,648   | 3.83                |

# Top Wait Events

## Things to look for...



### Wait Problem

Sequential Read

I/O; Don't  
indexes.

Scattered Read  
tune  
Faster I/O

Free Buffer  
to

Buffer Busy

### Potential Fix

Indicates many index reads – tune the  
code (especially joins); Faster  
over index or overuse

Indicates many full table scans–index,  
the code; cache small tables;

Increase the DB CACHE SIZE;  
shorten the checkpoint; tune the code  
get less dirty blocks, faster I/O,  
use multiple DBWR's.

Segment Header – Add freelists (if

# Statspack - Top Wait Events

## Things to look for...



### Wait Problem

Buffer Busy  
potentially

debatable)

Buffer Busy

undo)

Buffer Busy

### Potential Fix

Data Block – Separate ‘hot’ data;

use reverse key indexes; fix queries to reduce the blocks popularity, use smaller blocks, I/O, Increase initrans and/or maxtrans (this one’s

Reduce records per block.

Undo Header – Add segments or increase size of segment area (auto

Undo block – Commit more (not too



# Statspack - Top Wait Events

## Things to look for...



### Wait Problem

Enqueue - ST

Enqueue - HW

Enqueue - TX  
(TX4)  
index. Fix

### Potential Fix

Use LMT's or pre-allocate large extents

Pre-allocate extents above HW (high  
water mark.)

Increase initrans and/or maxtrans  
on (transaction) the table or

locking issues if TX6. Bitmap (TX4) &

Duplicates in Index (TX4).

Enqueue - TM

Index foreign keys: Check application

# Why INITRANS Matter!



## Transactions Moving through Oracle: *ITL* & *Undo Blocks*



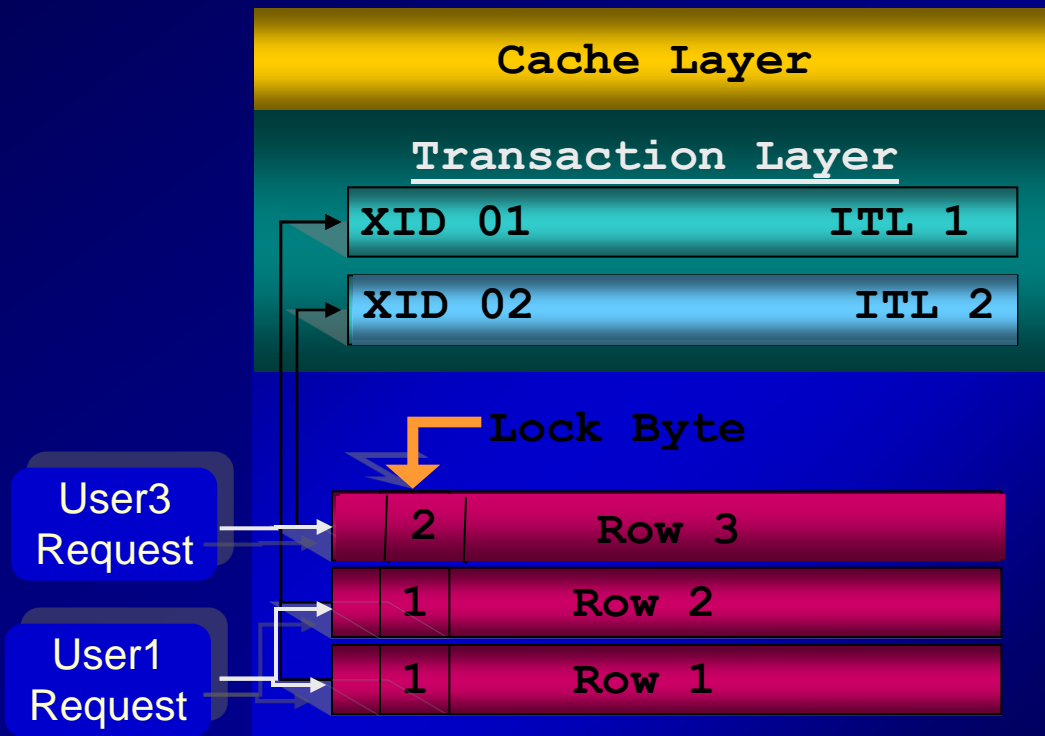


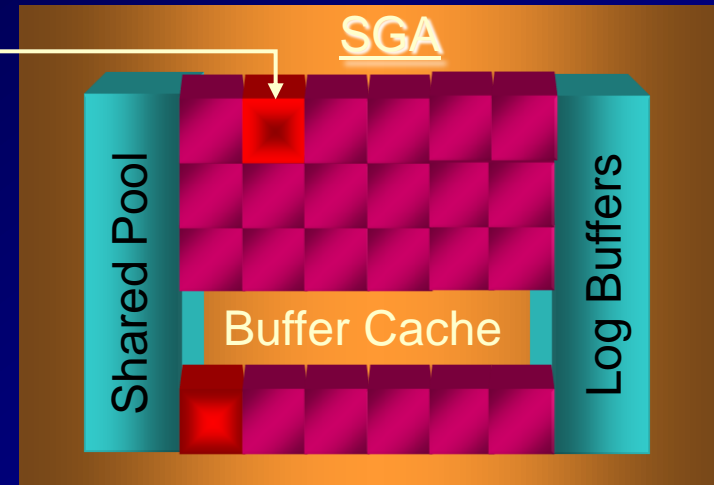
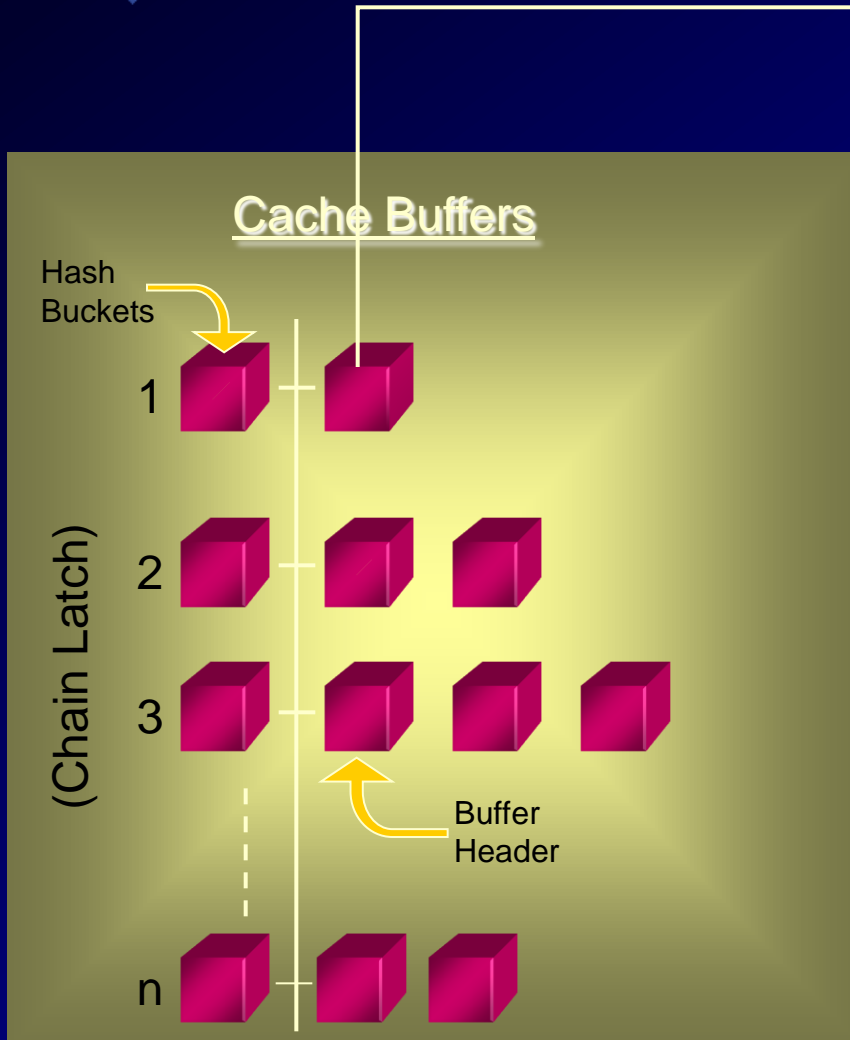
# User 1 – Updates Row# 1&2

## User 2 updates Row 3

(There are also *In Memory Updates (IMU)* in 11g)

- User1 updates a row with an insert/update/delete – an ITL is opened and xid tracks it in the data block.
- The xid ties to the UNDO header block which ties to the UNDO data block for undo.
- If user2 wants to query the row, they create a clone and rollback the transaction going to the undo header and undo block.
- If user3 wants to update same row (they wait). If user 3 wants to update different row then they open a second ITL.





*Only ONE  
block on the  
Hash Chain!*

# header

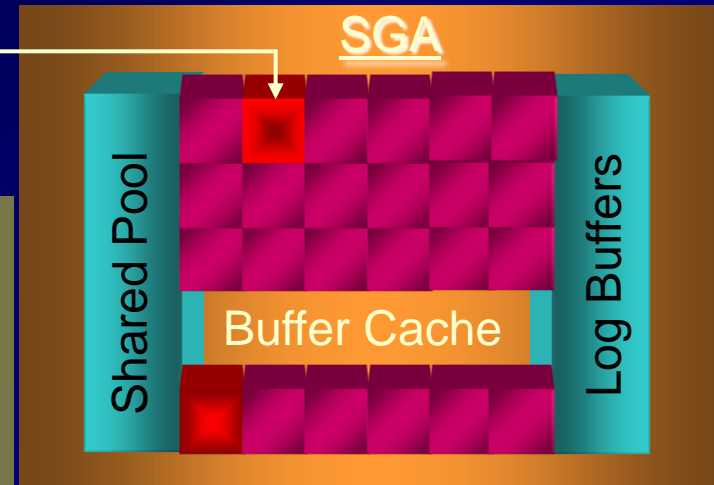
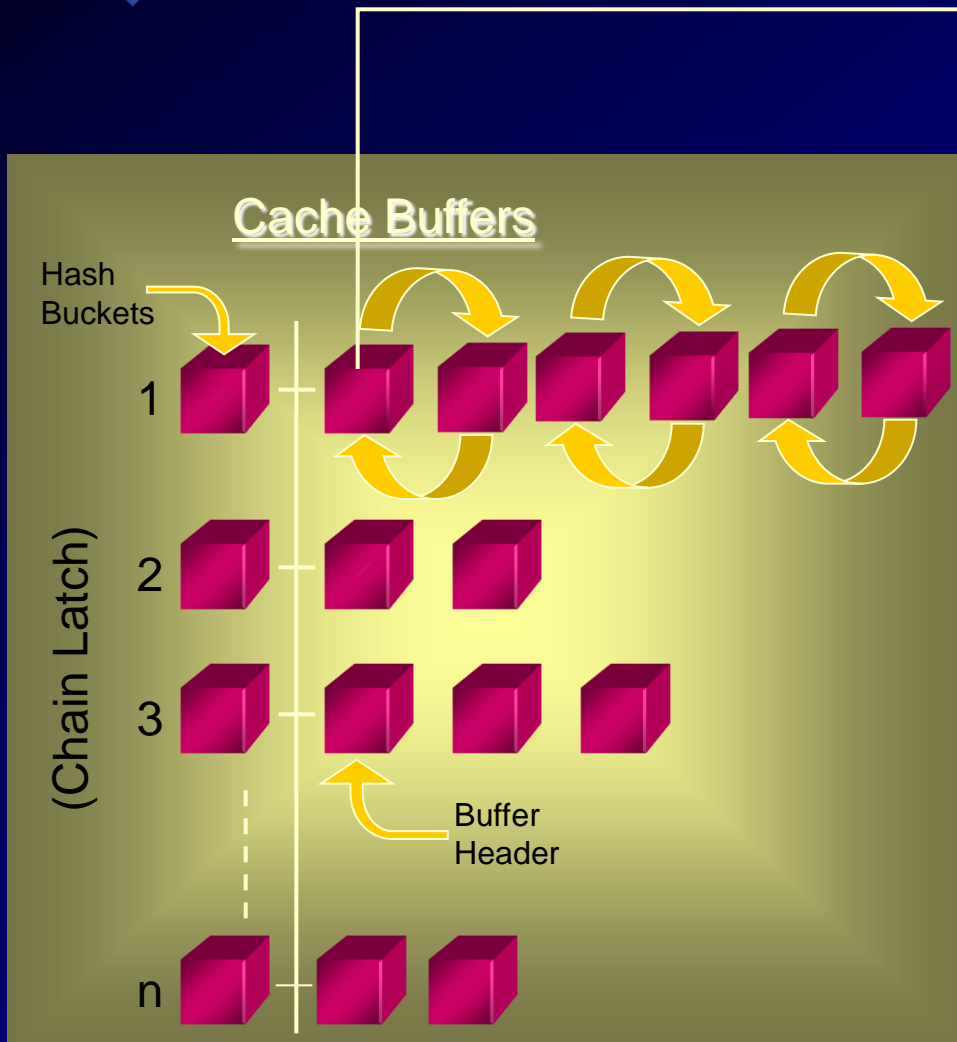
(So far it's clean and only 1 copy)



```
select  lrba_seq, state, dbarfil, dbablk, tch, flag, hscn_bas, cr_scn_bas,
        decode(bitand(flag,1), 0, 'N', 'Y') dirty, /* Dirty bit */
        decode(bitand(flag,16), 0, 'N', 'Y') temp,      /* temporary bit */
        decode(bitand(flag,1536), 0, 'N', 'Y') ping, /* ping (to shared or null) bit */
        decode(bitand(flag,16384), 0, 'N', 'Y') stale, /* stale bit */
        decode(bitand(flag,65536), 0, 'N', 'Y') direct, /* direct access bit */
        decode(bitand(flag,1048576), 0, 'N', 'Y') new /* new bit */
from    x$bh
where   dbablk = 56650
order by dbablk;
```

| LRBA_SEQ      | STATE       | DBARFIL | DBABLK | TCH   | FLAG     | HSCN_BAS   |
|---------------|-------------|---------|--------|-------|----------|------------|
| -----         | -----       | -----   | -----  | ----- | -----    | -----      |
| CR_SCN_BAS    | D T P S D N |         |        |       |          |            |
| -----         | - - - - -   |         |        |       |          |            |
| 0             |             | 1       | 56650  | 0     | 35659776 | 4294967295 |
| 0 N N N N N N |             |         |        |       |          |            |





*Hash Chain is  
now SIX long!  
Five CR and  
the one  
Current*



# x\$bh up to the max of 6 versions of block

| <i>LRBA_SEQ</i>   | <i>STATE</i> |          |          |          |          |          | <i>DBARFIL</i> | <i>DBABLK</i> | <i>TCH</i> | <i>FLAG</i> | <i>HSCN_BAS</i> |
|-------------------|--------------|----------|----------|----------|----------|----------|----------------|---------------|------------|-------------|-----------------|
| -----             | -----        |          |          |          |          |          | -----          | -----         | -----      | -----       | -----           |
| <i>CR_SCN_BAS</i> | <i>D</i>     | <i>T</i> | <i>P</i> | <i>S</i> | <i>D</i> | <i>N</i> |                |               |            |             |                 |
| -----             | -            | -        | -        | -        | -        | -        |                |               |            |             |                 |
| 0                 |              |          |          |          | 3        |          | 1              | 56650         | 1          | 524416      | 0               |
| 4350120           | N            | N        | N        | N        | N        | N        |                |               |            |             |                 |
| 0                 |              |          |          |          | 3        |          | 1              | 56650         | 1          | 524416      | 0               |
| 4350105           | N            | N        | N        | N        | N        | N        |                |               |            |             |                 |
| 365               |              |          |          |          | 1        |          | 1              | 56650         | 7          | 33562633    | 4350121         |
| 0                 | Y            | N        | N        | N        | N        | N        |                |               |            |             |                 |
| 0                 |              |          |          |          | 3        |          | 1              | 56650         | 1          | 524416      | 0               |
| 4350103           | N            | N        | N        | N        | N        | N        |                |               |            |             |                 |
| 0                 |              |          |          |          | 3        |          | 1              | 56650         | 1          | 524416      | 0               |
| 4350089           | N            | N        | N        | N        | N        | N        |                |               |            |             |                 |
| 0                 |              |          |          |          | 3        |          | 1              | 56650         | 1          | 524288      | 0               |
| 4350087           | N            | N        | N        | N        | N        | N        |                |               |            |             |                 |



# Why only 6 versions of a Block?

```
select  a.ksppinm, b.ksppstvl, b.ksppstdf, a.ksppdesc
from    x$ksppi a, x$ksppcv b
where   a.indx = b.indx
and     substr(ksppinm,1,1) = '_'
and     ksppinm like '%&1%'
order by ksppinm;
```

**KSPPINM**

-----

**KSPPSTVL**

-----

**KSPPSTDF**

-----

**KSPDESC**

-----

**\_db\_block\_max\_cr\_dba**

**6**

**TRUE**

**Maximum Allowed Number of CR buffers per dba**



# AWR – ITL Issues

## Segments by ITL Waits

- % of Capture shows % of ITL waits for each top segment compared
- with total ITL waits for all segments captured by the Snapshot

| Owner | Tablespace Name | Object Name | Subobject Name | Obj. Type       | ITL Waits | % of Capture |
|-------|-----------------|-------------|----------------|-----------------|-----------|--------------|
|       |                 |             |                | INDEX PARTITION | 126       | 32.06        |
|       |                 |             |                | INDEX PARTITION | 112       | 28.50        |
|       |                 |             |                | INDEX PARTITION | 66        | 16.79        |
|       |                 |             |                | INDEX PARTITION | 65        | 16.54        |
|       |                 |             |                | INDEX PARTITION | 12        | 3.05         |



# What are you Waiting on?



*Is this your Ad-Hoc Query User or Network Administrator?*





## Statspack – Top 25

- Tuning the top 25 buffer get and top 25 physical get queries has yielded system performance gains of anywhere from 5 percent to 5000 percent.
- The SQL section of the statspack report tells you which queries to potentially tune first.
- **The top 10 of your SQL statements should usually not be more than 10 percent of your buffer gets or disk reads.**



# Statspack – Top SQL

## (Top 2 are 5T & 3T of reads!!)

| Buffer Gets<br>(s) Hash Value | Executions | Gets per Exec | %Total | Time(s) | Time |
|-------------------------------|------------|---------------|--------|---------|------|
|-------------------------------|------------|---------------|--------|---------|------|

|             |       |             |       |         |          |
|-------------|-------|-------------|-------|---------|----------|
| -----       | ----- | -----       | ----- | -----   | -----    |
| 627,226,570 | 117   | 5,360,910.9 | 4.7   | 9627.09 | 10367.04 |

Module: JDBC Thin Client

```
SELECT * FROM (select d1.tablespace_name, d1.owner, d1.segment_t  
ype, d1.segment_name, d1.header_file, d1.extents, d1.bytes, d1.b  
locks, d1.max_extents , d1.next_extent from sys.dba_segments d1  
where d1.segment_type != 'CACHE' and tablespace_name not in (s  
elect distinct tablespace_name from sys.dba_rollback_segs) orde
```

|             |         |         |     |       |          |
|-------------|---------|---------|-----|-------|----------|
| 409,240,446 | 175,418 | 2,332.9 | 3.1 | ##### | 59430.83 |
|-------------|---------|---------|-----|-------|----------|

Module: ? @sap10ci (TNS V1-V3)

```
SELECT "TABNAME" , "VARKEY" , "DATALN" , "VARDATA" FROM "KAPOL"  
WHERE "TABNAME" = :A0 AND "VARKEY" LIKE :A1 ORDER BY "TABNAME" ,  
"VARKEY"
```

# AWR – Top SQL

## (Top 1 is 2T – Second one only 250M)



### SQL ordered by Gets

- Resources reported for PL/SQL code includes the resources used by all SQL statements called by the code.
- Total Buffer Gets: 225,112,503
- Captured SQL account for 99.9% of Total

| Buffer Gets | Executions | Gets per Exec | % Total | CPU Time (s) | Elapsed Time (s) | SQL Id | SQL Module | SQL Text |
|-------------|------------|---------------|---------|--------------|------------------|--------|------------|----------|
| 224,907,873 | 1,680      | 133,873.73    | 99.91   | 7568.17      | 19515.02         |        |            |          |
| 31,779      | 6,881      | 4.62          | 0.01    | 2.61         | 2.61             |        |            |          |
| 21,515      | 1,688      | 12.75         | 0.01    | 6.18         | 14.19            |        |            |          |
| 19,827      | 1,688      | 11.75         | 0.01    | 2.71         | 10.71            |        |            |          |
| 15,186      | 1,685      | 9.01          | 0.01    | 4.94         | 11.82            |        |            |          |
| 13,501      | 1,685      | 8.01          | 0.01    | 2.84         | 9.72             |        |            |          |
| 7,867       | 1          | 7,867.00      | 0.00    | 7.56         | 23.36            |        |            |          |
| 4,783       | 1          | 4,783.00      | 0.00    | 0.76         | 1.09             |        |            |          |
| 3,906       | 651        | 6.00          | 0.00    | 0.53         | 0.53             |        |            |          |
| 2,640       | 646        | 4.09          | 0.00    | 0.62         | 1.21             |        |            |          |

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### SQL ordered by Reads



# Statspack - Latch Waits

Latch Free – Latches are low-level queueing mechanisms (they're accurately referred to as mutually exclusion mechanisms) used to protect shared memory structures in the System Global Area (SGA).

- Latches are like locks on memory that are very quickly obtained and released.
- Latches are used to prevent concurrent access to a shared memory structure.
- If the latch is not available, a latch free miss is recorded.



# Statspack - Latch Waits – fyi

## Much better in 11g!!

### Latch Free –

- Most latch problems are related to:
  - The failure to use bind variables (library cache latch)
  - Slow redo log disks or contention (log file sync)
  - Buffer cache contention issues (cache buffers lru chain)
  - Hot blocks in the buffer cache (cache buffers chains).
- There are also latch waits related to bugs; check Support for bug reports if you suspect this is the case ([oracle.com/support](http://oracle.com/support)).
- When latch miss ratios are greater than 0.5 percent, you should investigate the issue.
- **In memory updates have changed things for the better!**





# Statspack - Latch Waits - fyi

Latch Activity for DB: ORA9I Instance: ora9i Snaps: 1 -2

| Latch                   | Get<br>Requests | Pct<br>Get<br>Miss | Avg<br>Slps<br>/Miss | Wait<br>Time<br>(s) | NoWait<br>Requests | Pct<br>NoWait<br>Miss |
|-------------------------|-----------------|--------------------|----------------------|---------------------|--------------------|-----------------------|
| KCL freelist latch      | 4,924           | 0.0                |                      |                     | 0                  |                       |
| cache buffer handles    | 968,992         | 0.0                | 0.0                  |                     | 0                  |                       |
| cache buffers chains    | 761,708,539     | 0.0                | 0.4                  |                     | 21,519,841         | 0.0                   |
| cache buffers lru chain | 8,111,269       | 0.1                | 0.8                  |                     | 19,834,466         | 0.1                   |
| library cache           | 67,602,665      | 2.2                | 2.0                  |                     | 213,590            | 0.8                   |
| redo allocation         | 12,446,986      | 0.2                | 0.0                  |                     | 0                  |                       |
| redo copy               | 320             | 0.0                |                      |                     | 10,335,430         | 0.1                   |
| user lock               | 1,973           | 0.3                | 1.2                  |                     | 0                  |                       |



# Cursor Sharing - 8.1.6 +

If v\$sqlarea looks like this:

select empno from rich778 where empno =451572

select empno from rich778 where empno =451573

select empno from rich778 where empno =451574

select empno from rich778 where empno =451575

select empno from rich778 where empno =451576

Use **cursor sharing=force** <similar> (sqlarea goes to this):



# Instance Activity – AWR/Statspack

| Statistic                        | Total          | per Second | per Trans |
|----------------------------------|----------------|------------|-----------|
| branch node splits               | 7,162          | 0.1        | 0.0       |
| consistent gets                  | 12,931,850,777 | 152,858.8  | 3,969.5   |
| current blocks converted for CR  | 75,709         | 0.9        | 0.0       |
| db block changes                 | 343,632,442    | 4,061.9    | 105.5     |
| db block gets                    | 390,323,754    | 4,613.8    | 119.8     |
| hot buffers moved to head of LRU | 197,262,394    | 2,331.7    | 60.6      |
| leaf node 90-10 splits           | 26,429         | 0.3        | 0.0       |
| leaf node splits                 | 840,436        | 9.9        | 0.3       |
| logons cumulative                | 21,369         | 0.3        | 0.0       |
| physical reads                   | 504,643,275    | 5,965.1    | 154.9     |
| physical writes                  | 49,724,268     | 587.8      | 15.3      |
| session logical reads            | 13,322,170,917 | 157,472.5  | 4,089.4   |
| sorts (disk)                     | 4,132          | 0.1        | 0.0       |
| sorts (memory)                   | 7,938,085      | 93.8       | 2.4       |
| sorts (rows)                     | 906,207,041    | 10,711.7   | 278.2     |
| table fetch continued row        | 25,506,365     | 301.5      | 7.8       |
| table scans (long tables)        | 111            | 0.0        | 0.0       |
| table scans (short tables)       | 1,543,085      | 18.2       | 47<br>0.5 |

# Instance Activity Terminology... - fyi only



| <u>Statistic</u>                                                         | <u>Description</u>                                                                                                                                        |
|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Session Logical Reads<br>both<br>block gets.                             | <b>All reads cached in memory.</b> Includes consistent gets and also the db                                                                               |
| Consistent Gets<br><br>with<br>block in the<br>current version is read). | These are the <b>reads of a block that are in the cache.</b> They are NOT to be confused with consistent read (cr) version of a buffer cache (usually the |
| Db block gets<br><br>CR block.                                           | These are <b>block gotten to be changed.</b> MUST be the CURRENT block and not a                                                                          |
| Db block changes                                                         | These are the db block gets (above) that were <b>actually changed.</b>                                                                                    |
| Physical Reads<br>Either from                                            | <b>Blocks not read from the cache.</b> 48<br>disk, disk cache or O/S                                                                                      |



# File I/O

## Tablespace

|           | Av<br>Reads | Av<br>Reads/s | Av<br>Rd (ms) | Av<br>Blks/Rd | Writes    | Av<br>Writes/s | Buffer<br>Waits | Av Buf<br>Wt (ms) |
|-----------|-------------|---------------|---------------|---------------|-----------|----------------|-----------------|-------------------|
| PSAPSTABI | 14,441,749  | 171           | 7.9           | 1.0           | 521,275   | 6              | 1,234,608       | 6.2               |
| PSAPVBAPD | 13,639,443  | 161           | 6.2           | 1.7           | 10,057    | 0              | 2,672,470       | 4.2               |
| PSAPEDII  | 11,992,418  | 142           | 5.3           | 1.0           | 83,757    | 1              | 4,115,714       | 4.4               |
| PSAPEDID  | 10,617,042  | 125           | 8.1           | 1.0           | 64,866    | 1              | 3,728,009       | 6.4               |
| PSAPROLL  | 998,328     | 12            | 13.2          | 1.0           | 8,321,252 | 98             | 285,060         | 65.7              |

- Reads should be below 14ms



# AWR – File I/O

## File IO Stats

- ordered by Tablespace, File

| Tablespace | Filename | Reads | Av Reads/s | Av Rd (ms) | Av Blks/Rd | Writes | Av Writes/s | Buffer Waits | Av Buf Wt (ms) |
|------------|----------|-------|------------|------------|------------|--------|-------------|--------------|----------------|
|            |          | 7     | 0          | 1.43       | 1.00       | 480    | 1           | 93           | 19.68          |
|            |          | 6     | 0          | 0.00       | 1.00       | 34     | 0           | 34           | 16.76          |
|            |          | 3     | 0          | 0.00       | 1.00       | 3      | 0           | 0            | 0.00           |
|            | .dbf     | 7     | 0          | 5.71       | 1.00       | 4      | 0           | 0            | 0.00           |
|            | .dbf     | 7     | 0          | 0.00       | 1.00       | 4      | 0           | 0            | 0.00           |
|            | .dbf     | 7     | 0          | 0.00       | 1.00       | 4      | 0           | 0            | 0.00           |
|            | .dbf     | 7     | 0          | 0.00       | 1.00       | 4      | 0           | 0            | 0.00           |
|            | .dbf     | 7     | 0          | 0.00       | 1.00       | 4      | 0           | 0            | 0.00           |
|            | .dbf     | 7     | 0          | 2.86       | 1.00       | 4      | 0           | 0            | 0.00           |
|            | .dbf     | 7     | 0          | 0.00       | 1.00       | 4      | 0           | 0            | 0.00           |
|            | .dbf     | 7     | 0          | 1.43       | 1.00       | 4      | 0           | 0            | 0.00           |
|            | .dbf     | 7     | 0          | 2.86       | 1.00       | 4      | 0           | 0            | 0.00           |
|            | .dbf     | 7     | 0          | 0.00       | 1.00       | 4      | 0           | 0            | 0.00           |
|            | .dbf     | 7     | 0          | 0.00       | 1.00       | 4      | 0           | 0            | 0.00           |
|            | .dbf     | 7     | 0          | 0.00       | 1.00       | 4      | 0           | 0            | 0.00           |
|            | .dbf     | 8     | 0          | 0.00       | 1.00       | 3      | 0           | 0            | 0.00           |
|            | .dbf     | 8     | 0          | 0.00       | 1.00       | 3      | 0           | 0            | 0.00           |
|            | .dbf     | 8     | 0          | 0.00       | 1.00       | 3      | 0           | 0            | 0.00           |
|            | .dbf     | 8     | 0          | 0.00       | 1.00       | 3      | 0           | 0            | 0.00           |



## FAST



### \*\*\* TEST SCENARIO \*\*\*

Top Activity Shows Lots of Waiting  
Issues with Locking

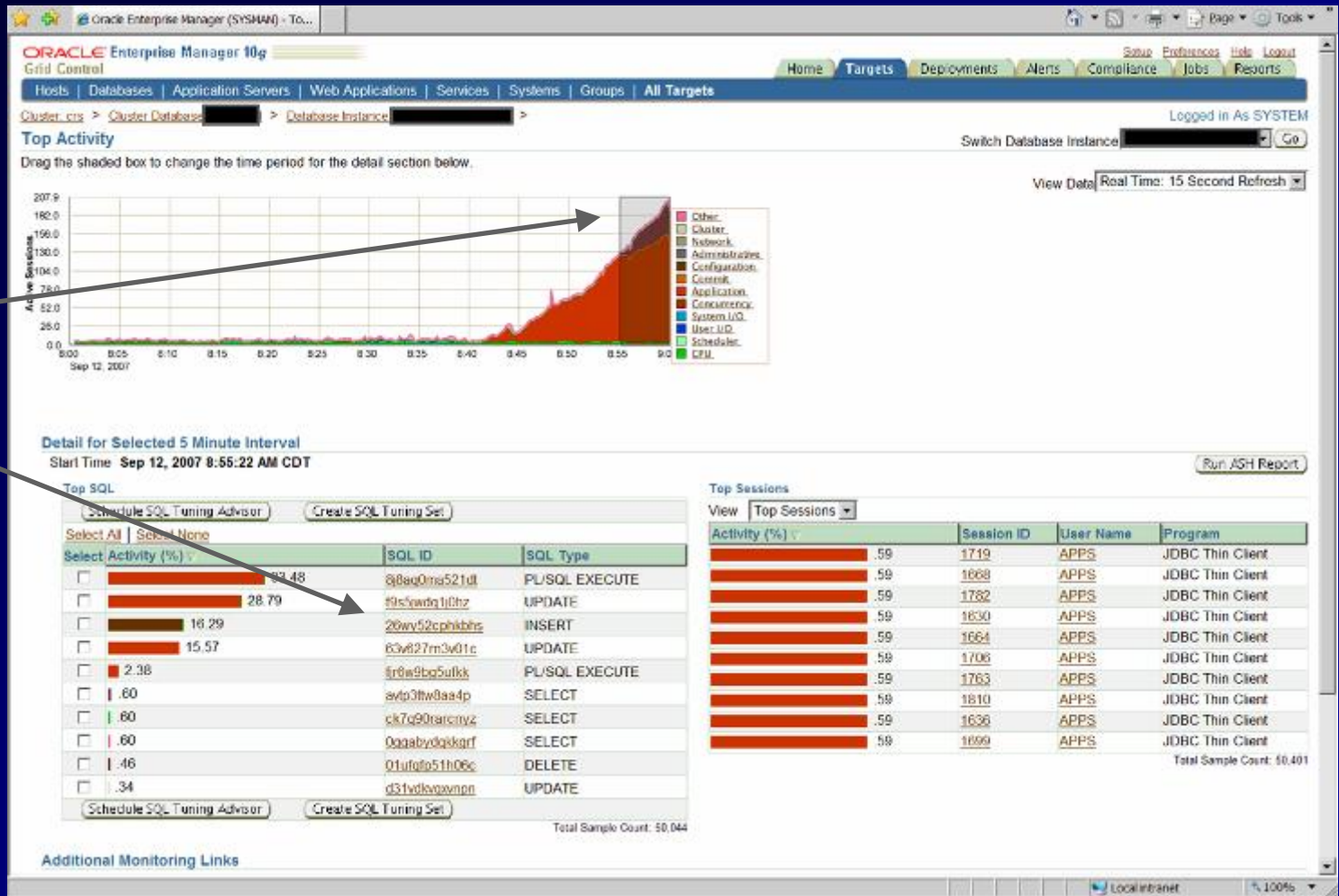




# Top Activity says BIG PROBLEMS

Almost 200  
users are  
Active

We have  
some DML  
Issues

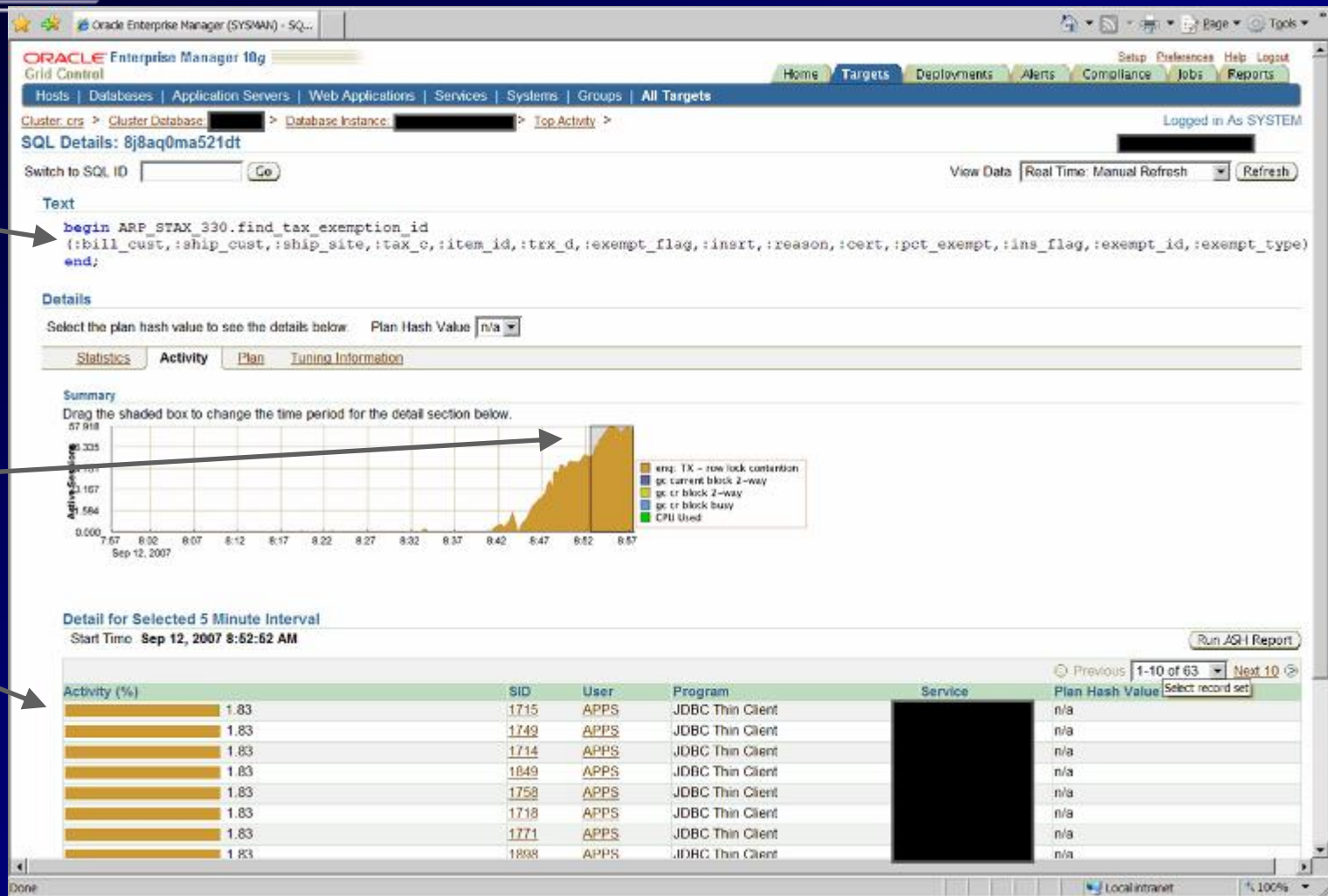




# Top SQL #1 Details – Locking Issue

Tax  
Package  
shows row  
lock  
enqueue  
issue

MANY  
users are  
dividing the  
activity





# Histogram for Enqueues – Long Waits

LONG  
waits for  
the TX row  
lock

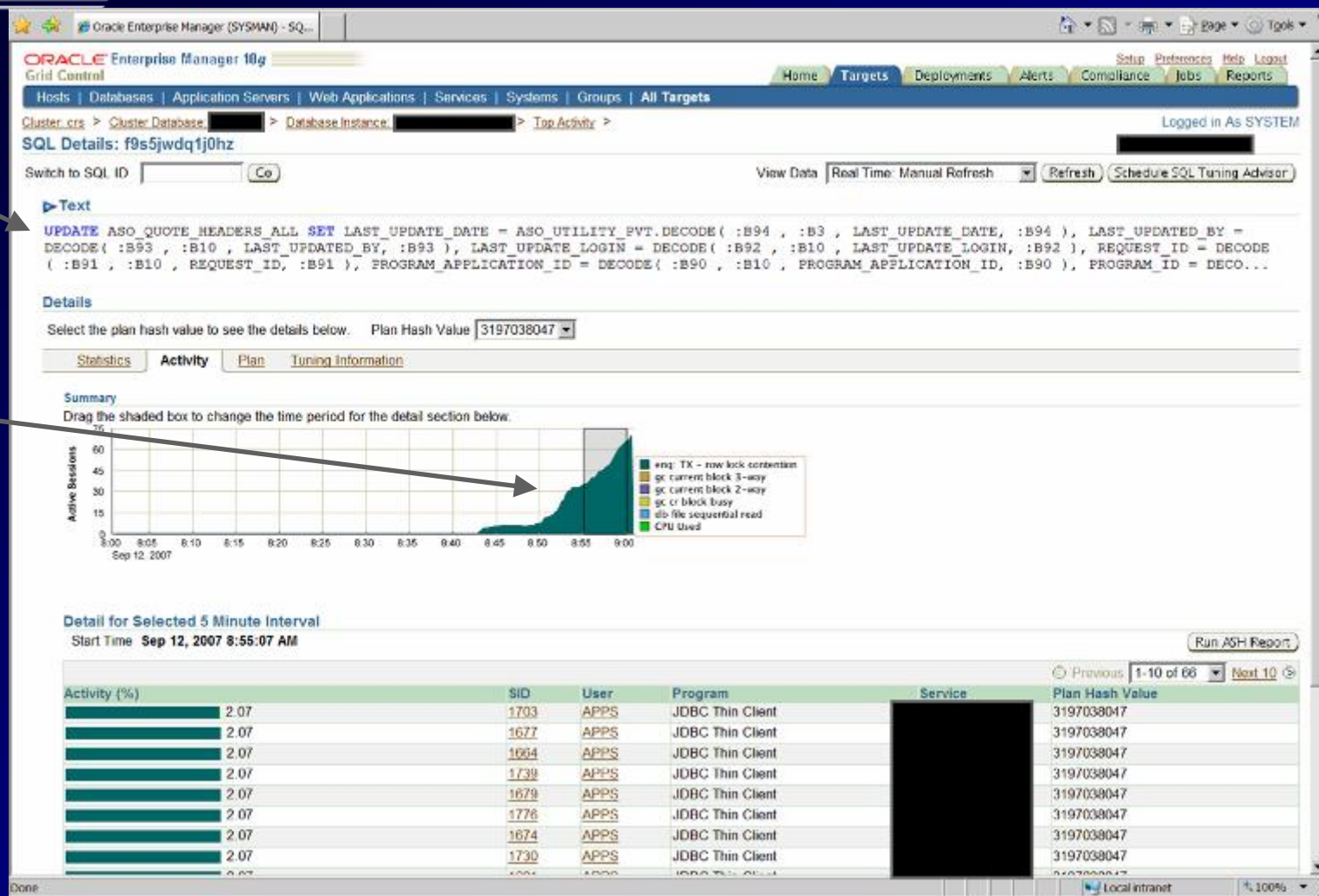






# Top SQL #2 – Update Statement

The query  
in the  
causing the  
locks

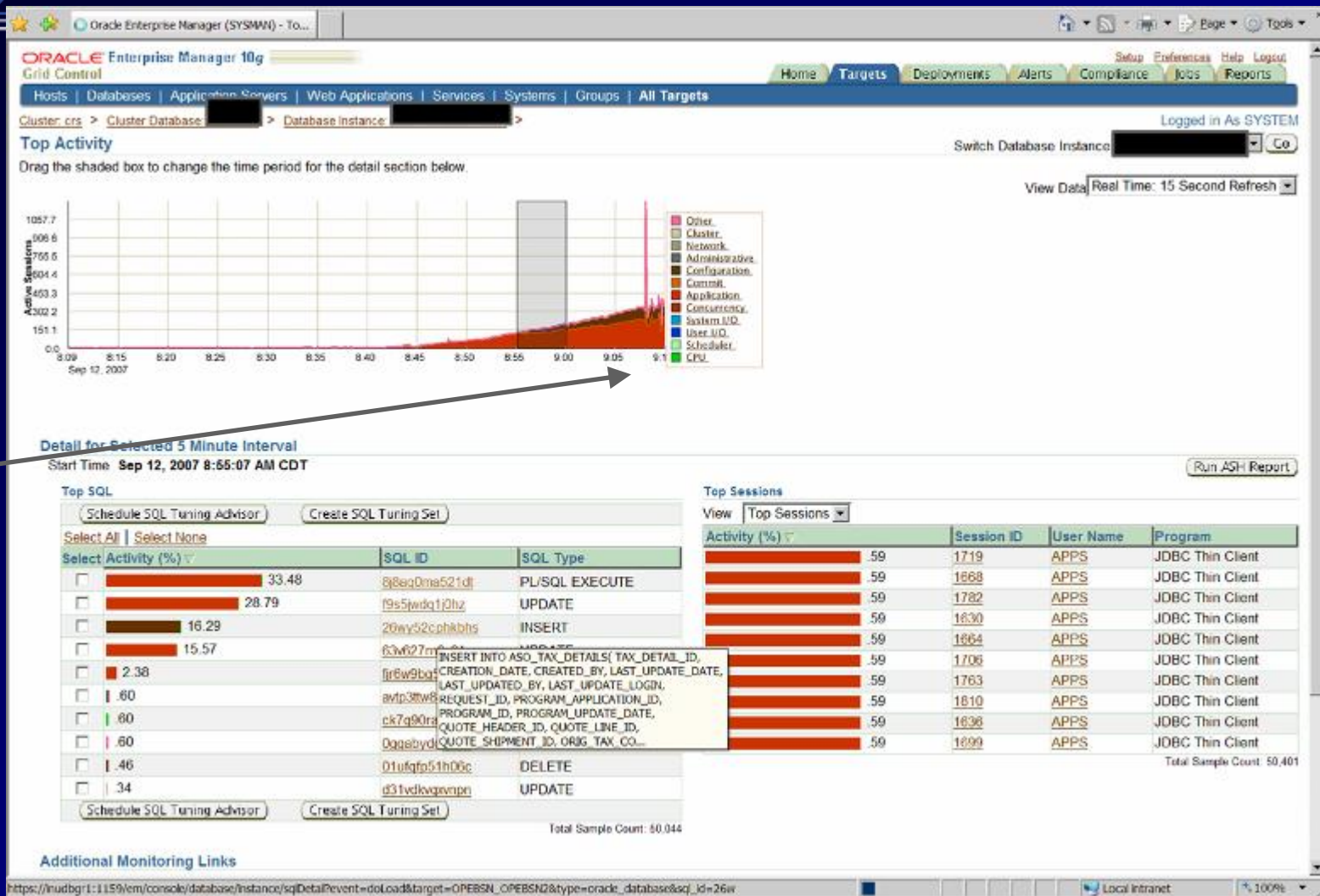




# Top SQL #3 – Insert Statement

The application is causing BIG problems

Now there are over 400 active users





# Top SQL #3 – Insert Statement

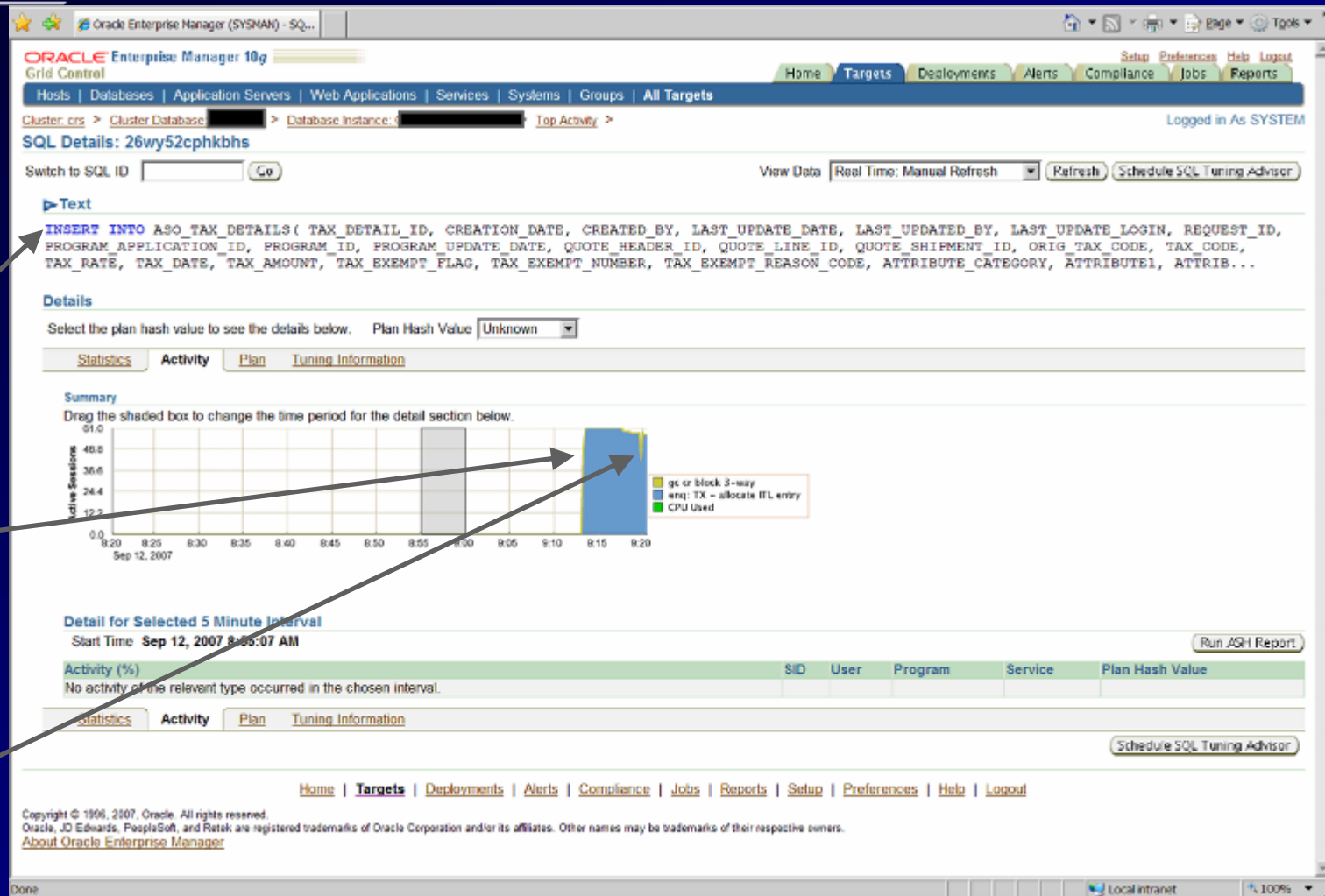
## Enqueue waits related to ITL allocations



The Insert  
into one of  
the TAX  
Tables

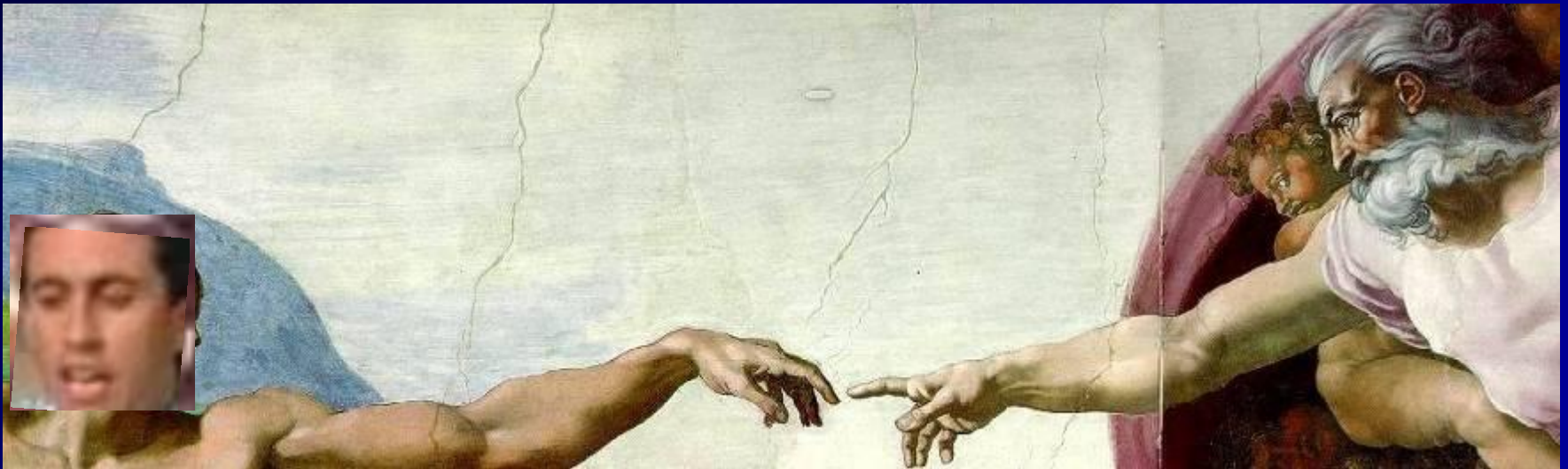
ITL issues

Some  
minor RAC  
gc issues





# ADDMM Enhancements (Automatic Database Diagnostic Monitor)





# ADDM enhancements

- Global ADDM so that Diagnostics are done across the entire cluster
- Emergency ADDM for use when database is hung
- On any granularity
  - Database Cluster
  - Database Instance
  - Specific Target (such as host, ASM...etc.)
- Over a specified time **NOT** tied to a pair of

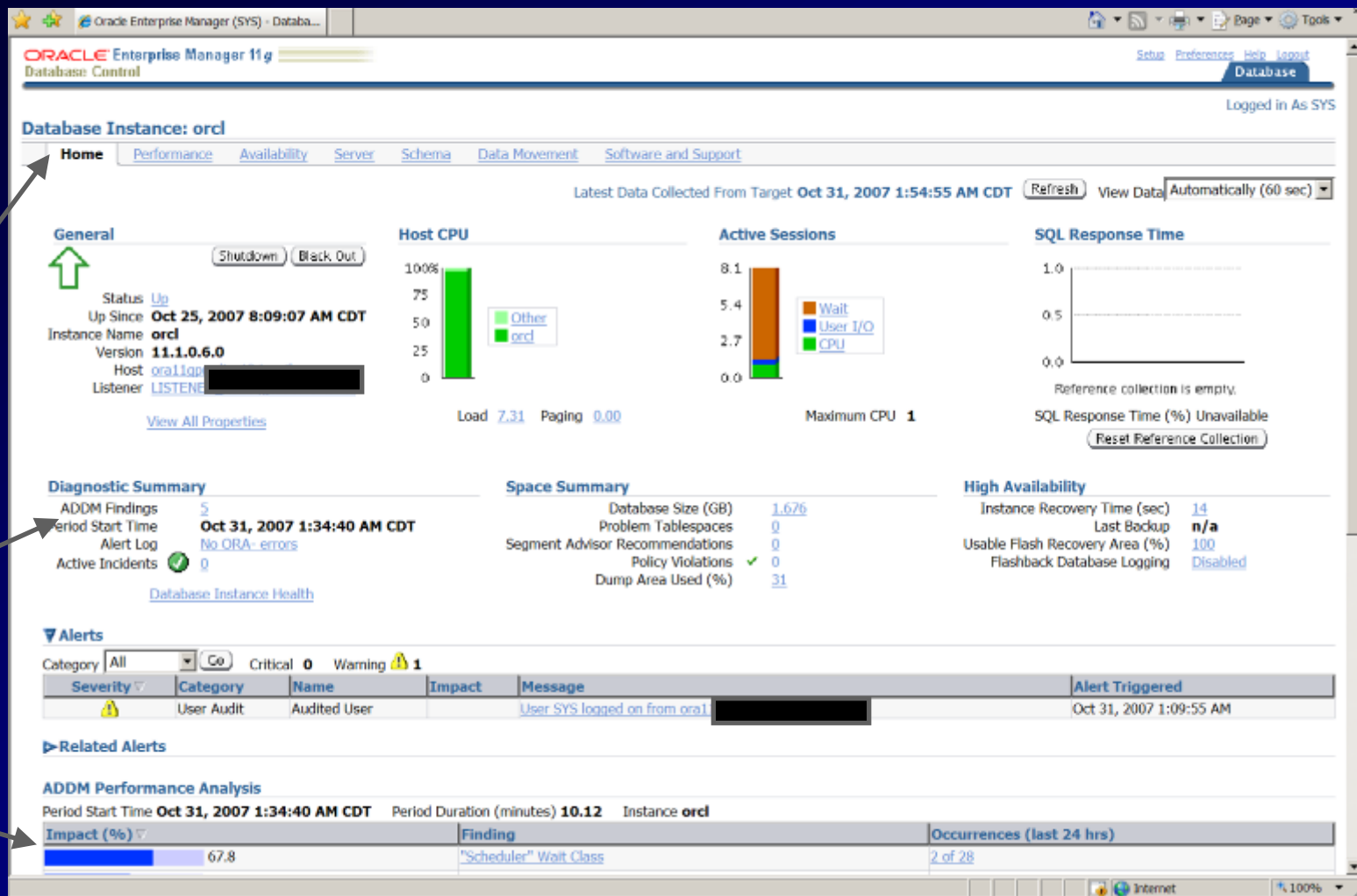


# ADDM Briefly

Specific  
Database  
Instance

We have 5  
ADDM  
Findings

Check them  
Here



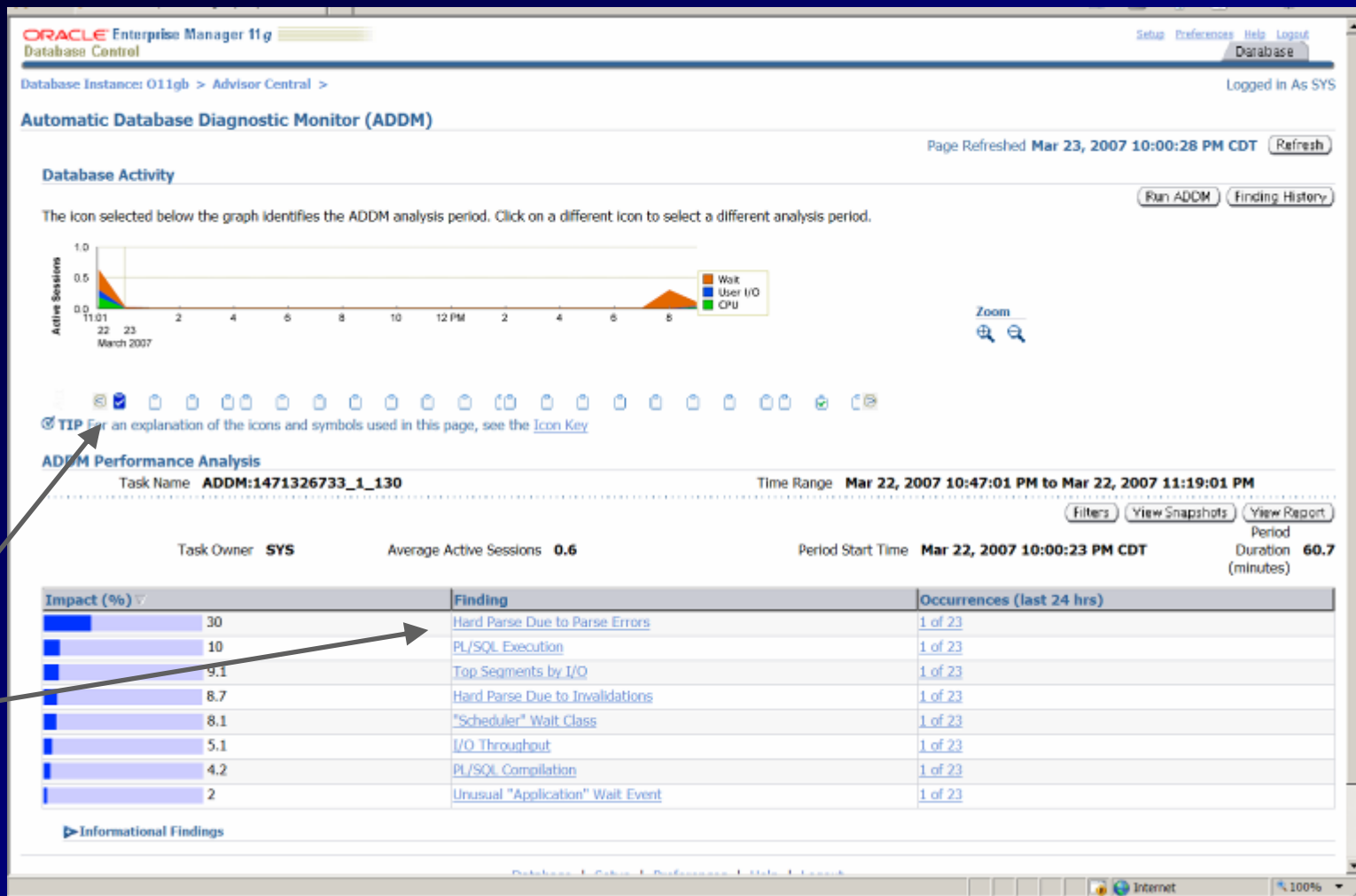


# ADDM Briefly

Top  
ADDM  
Findings

Click a  
Single  
Timeframe

Let's  
Check the  
Hard Parse  
Issue





# ADDM Briefly

Detailed  
Info  
&  
Findings

Add'l  
Info

ORACLE Enterprise Manager 11g Database Control

Database Instance: O11gb > Advisor Central > Automatic Database Diagnostic Monitor (ADDM):SYS.ADDM:1471326733\_1\_130 > Logged in As SYS

### Performance Finding Details: Hard Parse Due to Parse Errors

Finding **Hard parsing SQL statements that encountered parse errors was consuming significant database time.** [Finding History](#)

Impact (Active Sessions) **.19**  
Impact (%) **30**  
Period Start Time **Mar 22, 2007 10:00:23 PM CDT**  
Period Duration (minutes) **60.7**  
Filtered **No** [Filters](#)

#### Recommendations

[Show All Details](#) | [Hide All Details](#)

| Details              | Category             | Benefit (%) |
|----------------------|----------------------|-------------|
| <a href="#">Hide</a> | Application Analysis | 30          |

Action **Investigate application logic to eliminate parse errors.**

#### Findings Path

[Expand All](#) | [Collapse All](#)

| Findings                                                                                           | Impact (%) | Additional Information                 |
|----------------------------------------------------------------------------------------------------|------------|----------------------------------------|
| Hard parsing SQL statements that encountered parse errors was consuming significant database time. | 30         |                                        |
| Hard parsing of SQL statements was consuming significant database time.                            | 41.2       |                                        |
| Contention for latches related to the shared pool was consuming significant database time.         | 6.5        | <a href="#">Additional Information</a> |
| Wait class "Concurrency" was consuming significant database time.                                  | 6.5        |                                        |

[Database](#) | [Setup](#) | [Preferences](#) | [Help](#) | [Logout](#)

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### Additional Information

Waits for "library cache lock" amounted to 6% of database time.

Done

Internet 100%

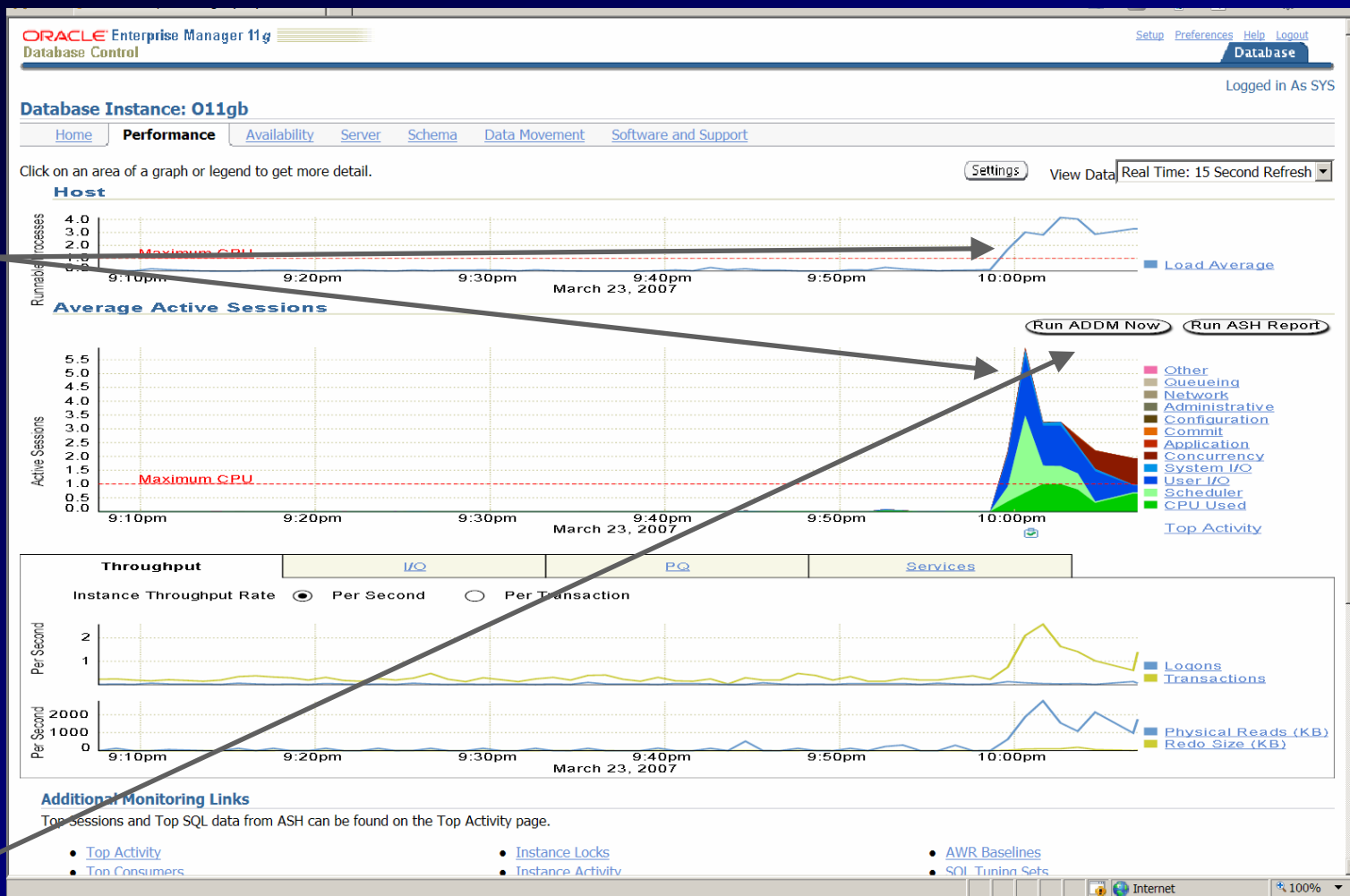




# ADDM - Run NOW!

A Big Problem Occurs

Run ADDM NOW!



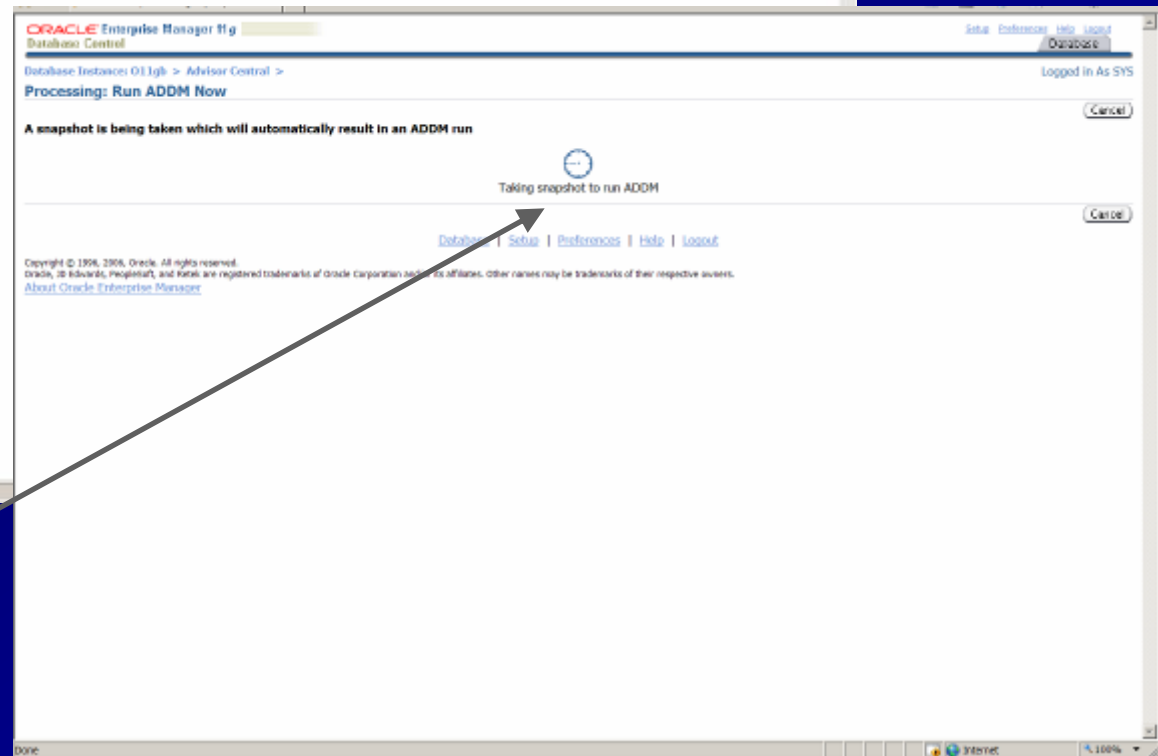


# ADDM - Run NOW!

Are you  
Sure?



Running





# ADDM – Run NOW!

ORACLE Enterprise Manager 11g  
Database Control

Database Instance: O11gb > Advisor Central > Logged in As SYS

**Confirmation**  
ADDM has been run successfully

**Automatic Database Diagnostic Monitor (ADDM)**  
Page Refreshed Mar 23, 2007 10:11:03 PM CDT [Refresh]

**Database Activity**  
The icon selected below the graph identifies the ADDM analysis period. Click on a different icon to select a different analysis period.

Active Sessions

Zoom

☒ For an explanation of the icons and symbols used in this page, see the [Icon Key](#)

**ADDM Performance Analysis**  
Task Name: ADDM:1471326733\_1\_154 (End Time: Mar 23, 2007 10:08:55 PM) Time Range: Mar 23, 2007 9:50:01 PM to Mar 23, 2007 10:22:01 PM

Task Owner: SYS Average Active Sessions: 3.5 Period Start Time: Mar 23, 2007 10:00:46 PM CDT Duration: 8.2 (minutes)

| Impact (%) | Finding                         | Occurrences (last 24 hrs) |
|------------|---------------------------------|---------------------------|
| 100        | CPU Usage                       | 1 of 25                   |
| 36.9       | Top SQL by DB Time              | 3 of 25                   |
| 25.6       | Hard Parse Due to Parse Errors  | 3 of 25                   |
| 22.9       | "User I/O" wait Class           | 3 of 25                   |
| 18.9       | PL/SQL Execution                | 2 of 25                   |
| 15.3       | "Scheduler" Wait Class          | 3 of 25                   |
| 8.6        | Hard Parse Due to Invalidations | 2 of 25                   |
| 7.4        | Top Segments by I/O             | 2 of 25                   |

Done.

CPU  
Issue



# ADDM – Run NOW!

Detail  
on CPU  
Issue?

Suggested  
Fixes

ORACLE Enterprise Manager 11g  
Database Control

Database Instance: O11gb > Advisor Central > Automatic Database Diagnostic Monitor (ADDM):SYS.ADDM:1471326733\_1\_154 > Logged in As SYS

### Performance Finding Details: CPU Usage

Finding **Host CPU was a bottleneck and the instance was consuming 80% of the host CPU. All wait times will be inflated by wait for CPU.** [Finding History](#)

Impact (Active Sessions) **3.52**  
Impact (%) **100**  
Period Start Time **Mar 23, 2007 10:00:46 PM CDT**  
Period Duration (minutes) **8.2**  
Filtered **No** [Filters](#)

#### Recommendations

[Show All Details](#) | [Hide All Details](#)

| Details              | Category                                                                                                                                                     | Benefit (%) |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| <a href="#">Hide</a> | Host Configuration                                                                                                                                           | 100         |
| Action               | <b>Consider adding more CPUs to the host or adding instances serving the database on other hosts.</b>                                                        |             |
| Action               | <b>Session CPU consumption was throttled by the Oracle Resource Manager. Consider revising the resource plan that was active during the analysis period.</b> |             |
| <a href="#">Show</a> | SQL Tuning                                                                                                                                                   | 27.8        |
| <a href="#">Show</a> | Application Analysis                                                                                                                                         | 4           |

#### Additional Information

Host CPU consumption was 86%. CPU runqueue statistics are not available from the host's OS. This disables ADDM's ability to estimate the impact of this finding.

#### Findings Path

[Expand All](#) | [Collapse All](#)

| Findings             | Impact (%)                                                                                                                     | Additional Information                     |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| <a href="#">Hide</a> | Host CPU was a bottleneck and the instance was consuming 80% of the host CPU. All wait times will be inflated by wait for CPU. | 100 <a href="#">Additional Information</a> |

[Database](#) | [Setup](#) | [Preferences](#) | [Help](#) | [Logout](#)

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# ADDM – Run NOW!

View  
The  
Report

ORACLE Enterprise Manager 11g  
Database Control

Database Instance: O11gb > Advisor Central > Automatic Database Diagnostic Monitor (ADDM):SYS.ADDM:1471326733\_1\_154 >

View Report

ADDM Report for Task 'ADDM:1471326733\_1\_154'

Analysis Period

AMR snapshot range from 153 to 154.  
Time period starts at 23-MAR-07 10.00.46 PM  
Time period ends at 23-MAR-07 10.08.55 PM

Analysis Target

Database 'O11GB' with DB ID 1471326733.  
Database version 11.1.0.3.0.  
ADDM performed an analysis of instance O11gb, numbered 1 and hosted at orallg [REDACTED]

Activity During the Analysis Period

Total database time was 1721 seconds.  
The average number of active sessions was 3.52.

Summary of Findings

| Description                       | Active Sessions<br>Percent of Activity | Recommendations |
|-----------------------------------|----------------------------------------|-----------------|
| 1 CPU Usage                       | 3.52   100                             | 3               |
| 2 Top SQL by DB Time              | 1.3   36.86                            | 2               |
| 3 Hard Parse Due to Parse Errors  | .9   25.56                             | 1               |
| 4 "User I/O" wait Class           | .81   22.89                            | 0               |
| 5 PL/SQL Execution                | .66   18.87                            | 2               |
| 6 "Scheduler" Wait Class          | .54   15.28                            | 0               |
| 7 Hard Parse Due to Invalidations | .3   8.6                               | 1               |
| 8 Top Segments by I/O             | .26   7.44                             | 1               |
| 9 Undersized instance memory      | .18   5                                | 1               |

Findings and Recommendations

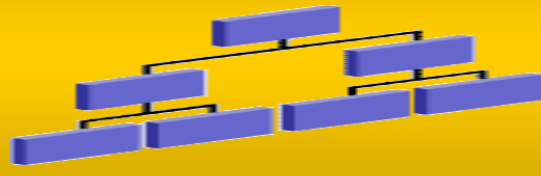


# ADDM for RAC

Database-Level  
ADDM  
11g



Self-Diagnostic Engine



Instance-Level  
ADDM



Inst 1

Inst 2

Inst 3



- Performance expert in a box
  - Now RAC specialist too!
- Identifies the most “Globally Significant” performance issues for the entire RAC database
- Database-wide and instance-level analysis
- Database-wide analysis of:
  - Global cache interconnect issues
  - Lock manager congestion issues
  - Global resource contention, e.g. IO bandwidth, hot blocks
  - Globally high-load SQL
  - Skew in instance response times
- Allows drill down to instances
- **Runs proactively** every hour when taking AWR Snapshots (default)





# ADDM Considerations:

- CPU Bottlenecks
- Undersized Memory Structures – SGA / PGA
- I/O Capacity Issues
- High Load SQL statements
- High Load PL/SQL
- RAC specific issues – Global hot block/interconnect
- Application issues such as parsing, locks...etc.
- Concurrency (buffer busy) or hot object issues
- Configuration issues – Redo Archive

## FAST



## \*\*\* TEST SCENARIO \*\*\*

Go to other Tools to Verify & Advise:

ADDM

Hang Analysis

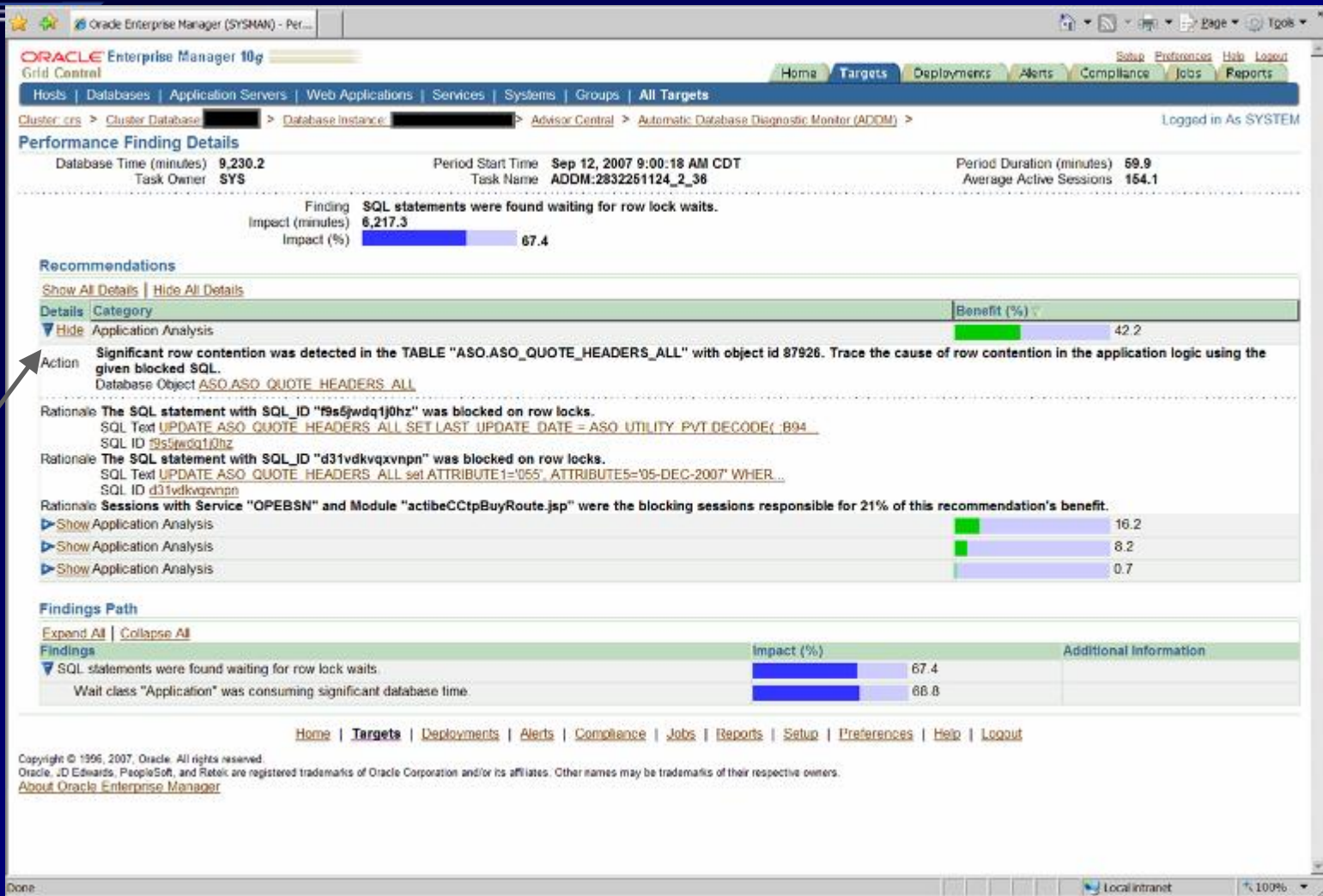
ASH





# Go to ADDM to get Verify & Advise < 5 minutes later >

ADDM  
sees the  
row  
contention  
for the  
Update





# Grid Control Lessons Learned

Specific  
Update  
Statement  
for Tuning  
Results

Suggests to  
gather  
statistics

Oracle Enterprise Manager 10g  
Grid Control

Home | Targets | Deployments | Alerts | Compliance | Jobs | Reports

Cluster: crs > Cluster Database: [REDACTED] > Database Instance: [REDACTED] > Advisor Central > SQL Tuning Results: SQL\_TUNING\_1189615926451 >

Logged in As SYSTEM

### Recommendations for SQL ID: f9s5jwdq1j0hz

Only one recommendation should be implemented.

**SQL Text**  
UPDATE ASO\_QUOTE\_HEADERS\_ALL SET LAST\_UPDATE\_DATE = ASO\_UTILITY\_PVT.DECODE( :B94, :B3, LAST\_UPDATE\_DATE, :B94 ), LAST\_UPDATED\_BY = DECODE( :B93, :B10, LAST\_UPDATED\_BY, :B93 ), LAST\_UPDATE\_LOGIN = ...

**Select Recommendation**

| Select Type                                 | Findings                                                                                | Recommendations                                          | Rationale                                                                                            | New Benefit Explain (%) Plan | Compare Explain Plans |
|---------------------------------------------|-----------------------------------------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------------------------|------------------------------|-----------------------|
| <input checked="" type="radio"/> Statistics | Optimizer statistics for table "ASO" "ASO_QUOTE_HEADERS_ALL" and its indices are stale. | Consider collecting optimizer statistics for this table. | The optimizer requires up-to-date statistics for the table in order to select a good execution plan. |                              |                       |

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# ASH Report – Points to same issues!

**ASH Report For (9:12 AM) ... <17 minutes later to verify>**  
(1 Report Target Specified)

| DB Name | DB Id         | Instance                 | Inst num       | Release        | RAC    |
|---------|---------------|--------------------------|----------------|----------------|--------|
| Host    |               |                          |                |                |        |
| DBRJN   | 277251124     | ORA10                    | 2              | 10.2.0.3.0 YES | linux2 |
| CPU's   | SGA Size      | Buffer Cache Shared Pool |                | ASH Buffer     |        |
| Size    |               |                          |                |                |        |
| 8       | 6,000M (100%) | 1,536M (25.6%)           | 1,025M (17.1%) | 29.0M (0.5%)   |        |

## Top User Events

| Event                         | Event Class | % Activity | Avg Active Sessions |
|-------------------------------|-------------|------------|---------------------|
| enq: TX - row lock contention | Application | 99.33      | 146.11              |

## Top SQL Statements

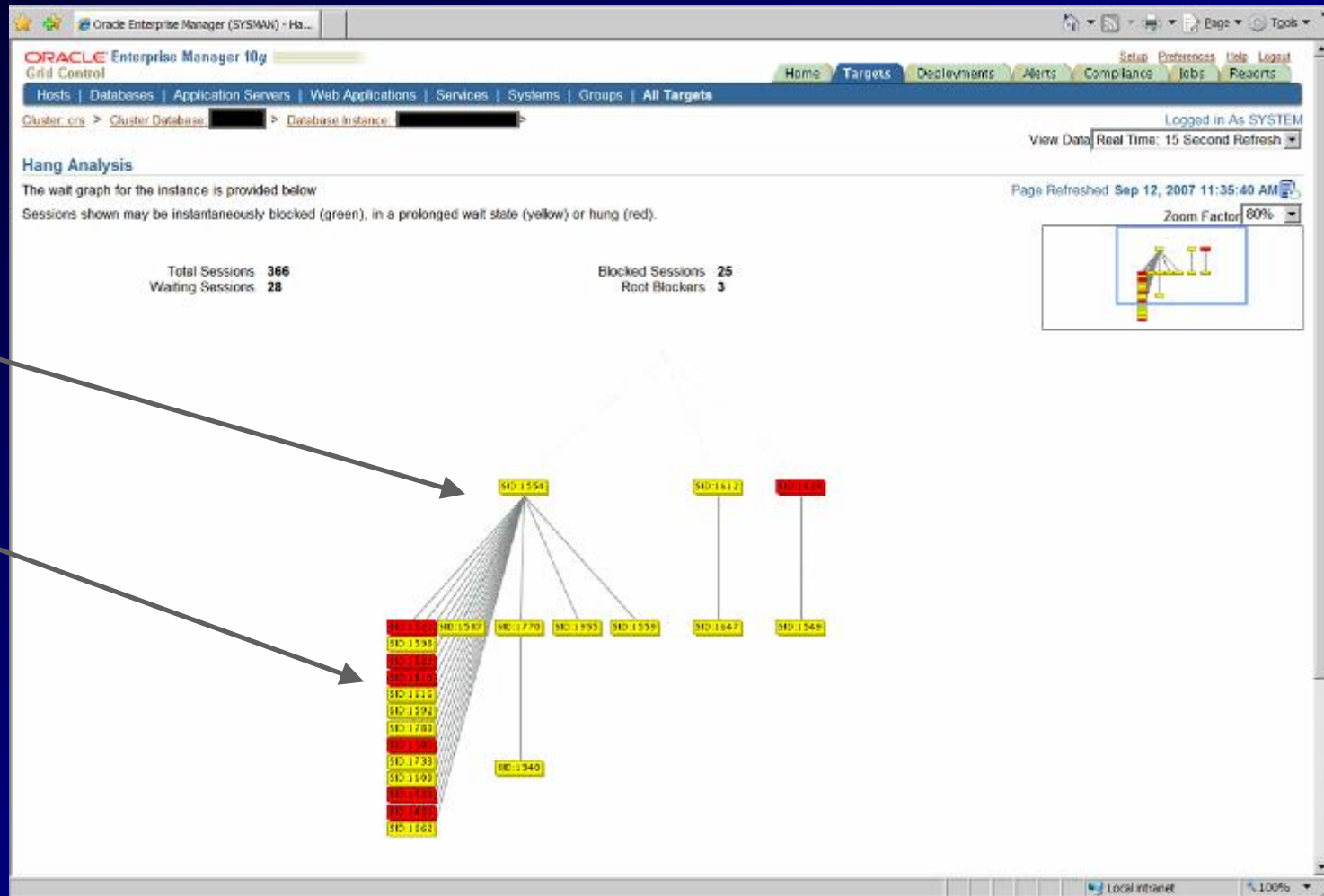
| SQL ID   | Planhash | % Activity | Event | % |
|----------|----------|------------|-------|---|
| Event    |          |            |       |   |
| SQL Text |          |            |       |   |





# Go to Hang Analysis & Verify the Pain! <stay ahead of the problem>

All these  
Red &  
Yellow  
Colors are  
NOT a  
good sign!





# Tuning Multiple Nodes

TUSC



*5 Nodes All Up!*



*2 Nodes Down 1 Starting up!*

*Are all the Nodes up in the Cluster?*



# Tuning the RAC Cluster Interconnect

- Guidelines for GES Statistics:
  - All times should be < 15ms
  - Ratio of global lock gets vs global lock releases should be near 1.0
- High values could indicate possible network or memory problems
- Could also be caused by application locking issues
- May need to review the enqueue section of STATSPACK report for further analysis.

Complete Presentation by Oracle's Rich Niemiec's at:  
<http://www.oracleracsig.org>



# Tuning the RAC Cluster Interconnect Using AWR Reports (FYI Only)

## Global Cache Load Profile

|                                | Per Second | Per Transaction |
|--------------------------------|------------|-----------------|
| Global Cache blocks received:  | 0.38       | 0.05            |
| Global Cache blocks served:    | 0.26       | 0.04            |
| GCS/GES messages received:     | 766.83     | 106.40          |
| GCS/GES messages sent:         | 1,278.25   | 177.36          |
| DBWR Fusion writes:            | 0.01       | 0.00            |
| Estd Interconnect traffic (KB) | 404.57     |                 |

## Global Cache Efficiency Percentages (Target local+remote 100%)

|                                 |        |
|---------------------------------|--------|
| Buffer access - local cache %:  | 100.00 |
| Buffer access - remote cache %: | 0.00   |
| Buffer access - disk %:         | 0.00   |

## Global Cache and Enqueue Services - Workload Characteristics

|                                                   |     |
|---------------------------------------------------|-----|
| Avg global enqueue get time (ms):                 | 1.9 |
| Avg global cache cr block receive time (ms):      | 1.8 |
| Avg global cache current block receive time (ms): | 1.9 |
| Avg global cache cr block build time (ms):        | 0.0 |
| Avg global cache cr block send time (ms):         | 0.2 |
| Global cache log flushes for cr blocks served %:  | 0.0 |
| Avg global cache cr block flush time (ms):        |     |
| Avg global cache current block pin time (ms):     | 0.1 |



Done



Internet



# Tuning the RAC Cluster Interconnect Using AWR Reports (FYI Only)

## SQL ordered by Cluster Wait Time

| Cluster Wait Time (s) | CWT % of Elapsed Time | Elapsed Time(s) | CPU Time (s) | Executions | SQL Id | SQL Module | SQL Text |
|-----------------------|-----------------------|-----------------|--------------|------------|--------|------------|----------|
| 75.00                 | 0.38                  | 19,515.02       | 7,568.17     | 1,680      |        |            |          |
| 0.85                  | 3.63                  | 23.36           | 7.56         | 1          |        |            |          |
| 0.15                  | 13.69                 | 1.09            | 0.76         | 1          |        |            |          |
| 0.09                  | 31.73                 | 0.27            | 0.08         | 46         |        |            |          |
| 0.06                  | 12.31                 | 0.46            | 0.30         | 1          |        |            |          |
| 0.03                  | 0.20                  | 14.19           | 6.18         | 1,688      |        |            |          |
| 0.03                  | 0.26                  | 10.71           | 2.71         | 1,688      |        |            |          |
| 0.03                  | 83.42                 | 0.03            | 0.00         | 1          |        |            |          |
| 0.02                  | 36.30                 | 0.07            | 0.06         | 4          |        |            |          |
| 0.02                  | 43.85                 | 0.06            | 0.01         | 1          |        |            |          |
| 0.02                  | 1.77                  | 1.12            | 0.54         | 10         |        |            |          |
| 0.02                  | 10.23                 | 0.15            | 0.13         | 1          |        |            |          |
| 0.02                  | 3.76                  | 0.40            | 0.02         | 1          |        |            |          |
| 0.01                  | 12.17                 | 0.11            | 0.09         | 1          |        |            |          |
| 0.01                  | 33.26                 | 0.03            | 0.02         | 1          |        |            |          |
| 0.01                  | 8.39                  | 0.09            | 0.09         | 177        |        |            |          |
| 0.01                  | 11.26                 | 0.02            | 0.00         | 1          |        |            |          |

Done

Internet



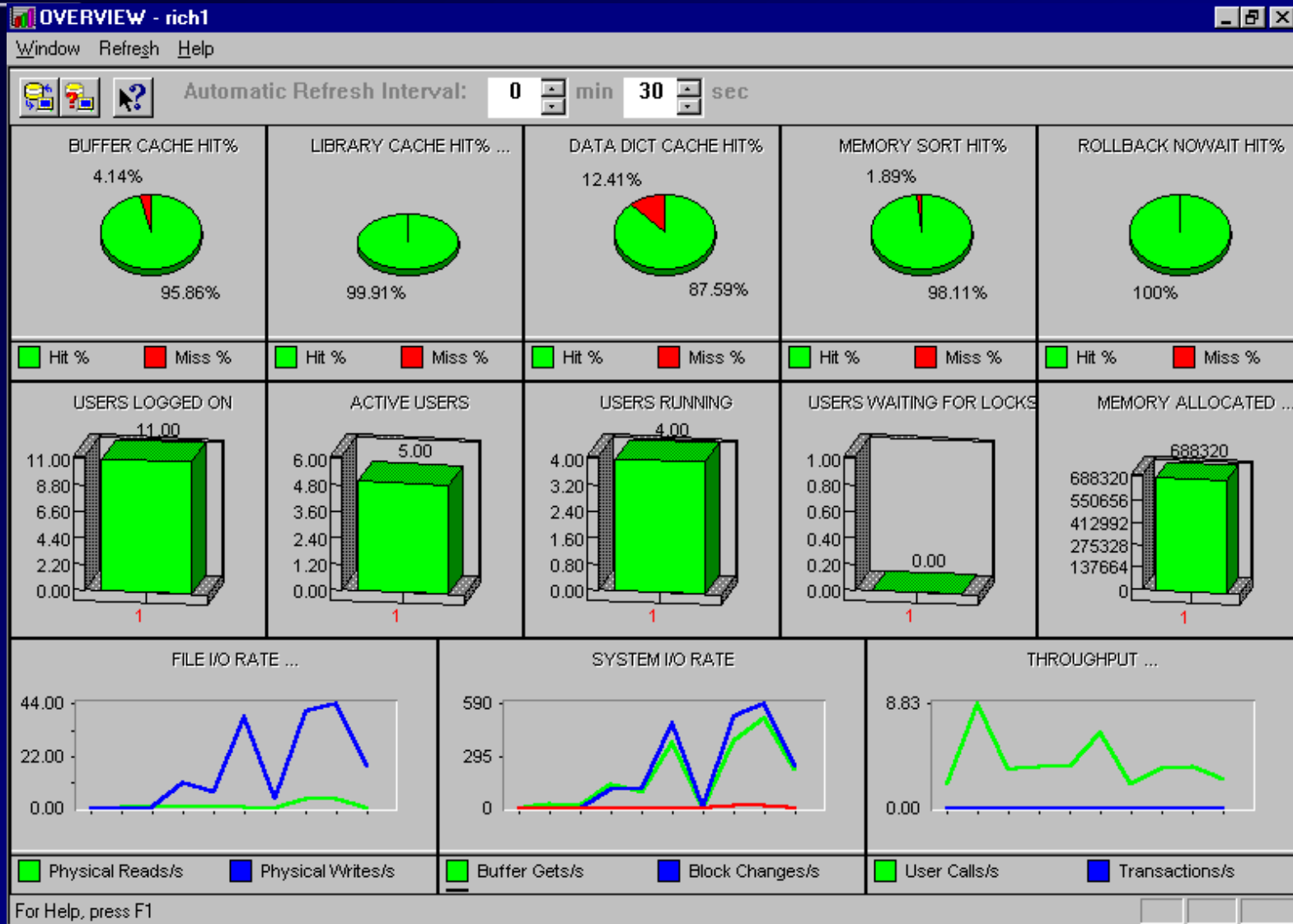
# Future Tuning – 11g FM







# Performance Manager : Back in Time!







# SQL Tuning Advisors & SQL Plan Management (**SPM**)



# SQL Plan Management

- **SQL Plan Management** is a mechanism that records/evaluates execution plan of SQL statements (good & bad) over time and builds SQL Plan baselines (replaces stored outlines) of existing plans known to be efficient.
- Events that cause the need for SQL Plan baselines:
  - New version of Oracle (New optimizer version – Use capture replay to test effect)
  - Changes to optimizer statistics or data changes
  - Schema, application or metadata changes (use SQL Advisor to get suggestions)
  - System settings changes (Use SQL Replay to find what works)
  - SQL Profile (statistics – data skews & correlated columns) creation
- **Stored outlines are deprecated (discouraged) in Oracle Database 11g.** Oracle highly recommends migrating existing stored outlines to SQL plan baselines. A **SQL Profile contains additional STATISTICS** for this SQL statement for the query optimizer to generate a better execution plan. **An outline/baseline contains 82 HINTS** for this SQL statement for query optimizer to generate a



# SQL Plan Management

- **SQL Profile stores STATISTICS** for a SQL statement for the query optimizer to generate a better execution plan.
- **A Stored Outline/SQL Plan Baseline contains HINTS** for this SQL statement for query optimizer to generate a better execution plan.
- A SQL Plan Baseline should evolve with changes in the system to analyze good/bad plans over time.
- View these in `DBA_PLAN_BASELINES`
- You can also export a SQL Tuning Set and import it to new system. **Capture baselines for Tuning Set with DBMS\_SPM** (see later slide on entire syntax). Can also use a `pack/unpack` function to pack/unpack all plans in a system for transporting.

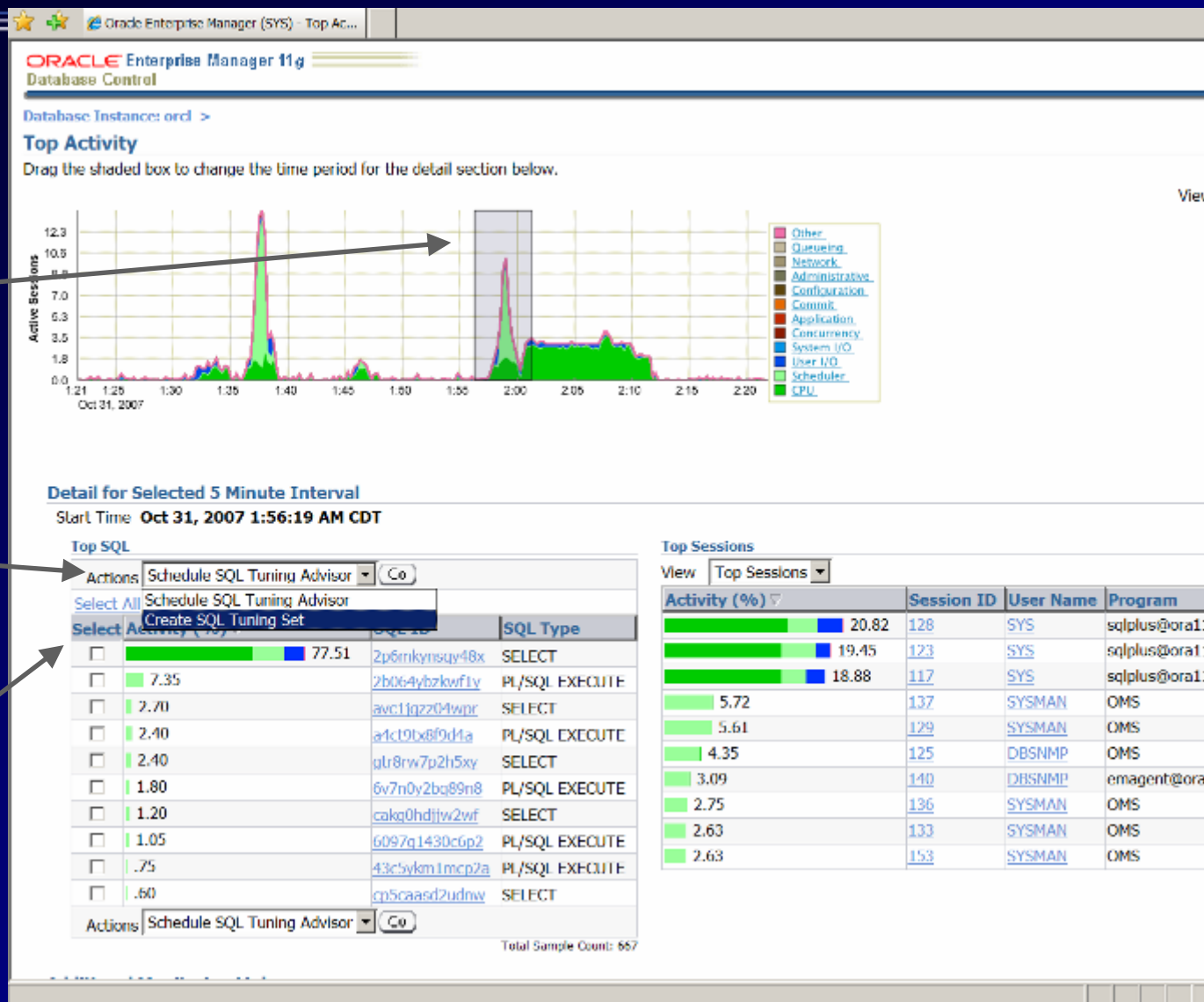


# SQL Plan Management

## Create a SQL Tuning Set

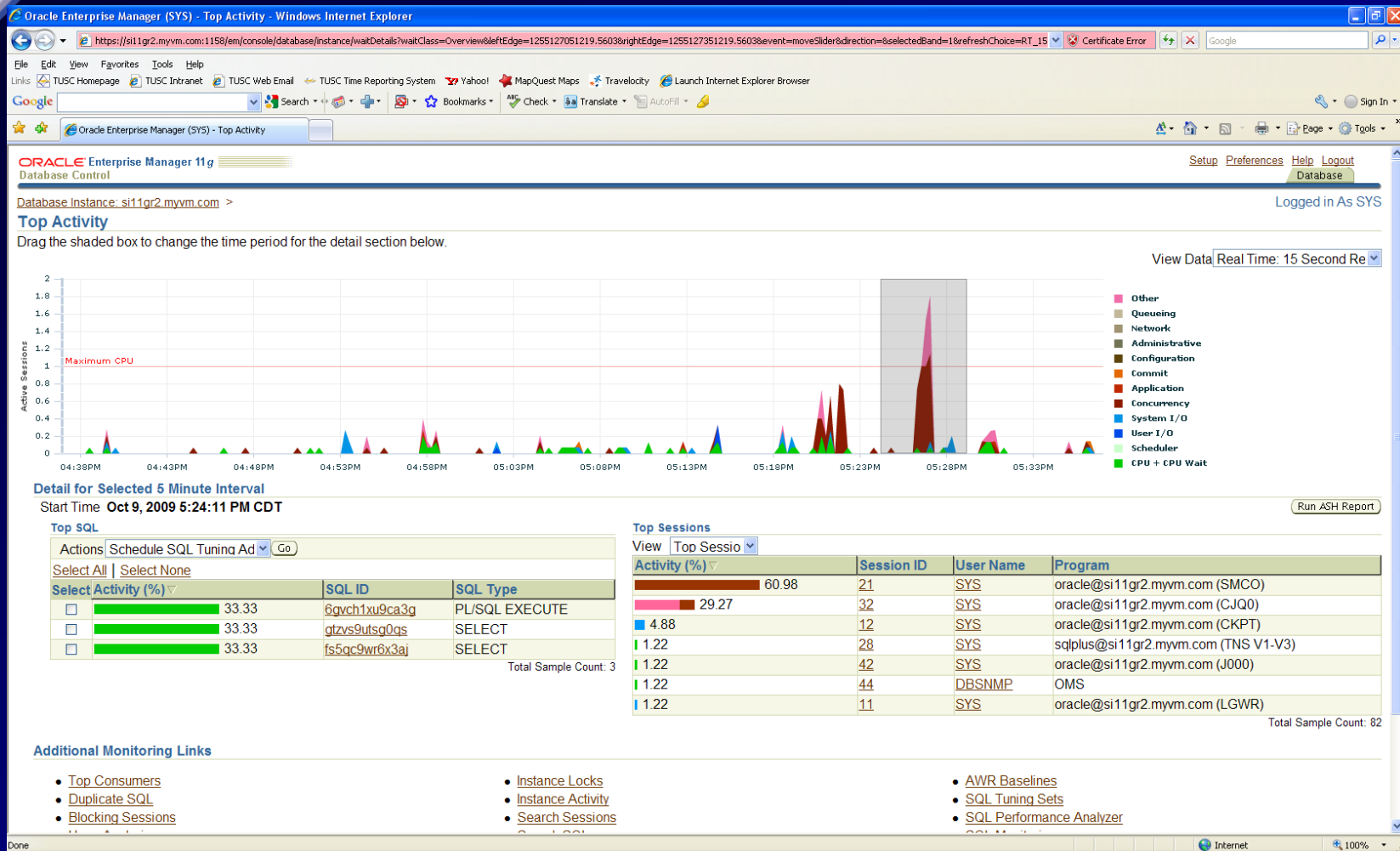
Tuning  
Issue

Create a  
Tuning  
Set from  
Top 10  
SQL





# Top Activity – 11gR2 (same look)





# SQL Plan Management

## Create a SQL Tuning Set

Tuning  
Set Name

Queries

Oracle Enterprise Manager (SYS) - SQL Tu...

ORACLE Enterprise Manager 11g  
Database Control

Database Instance: orcl > SQL Tuning Sets >  
**Create SQL Tuning Set**

Cancel OK

\* Name: TOP\_SQL\_1193815473707  
Description: Automatically generated by Top SQL

| SQL Text                                                                                                                                                                                                    | Parsing Schema |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| SELECT de.owner   ' '  de.segment_name segment_name, de.segment_type segment_type, de.extent_id extent#, bh.dbablk - de.block_id + 1 block#, bh.lru_flag, ...                                               | SYS            |
| BEGIN EMD_NOTIFICATION.QUEUE_READY(:1, :2, :3); END;                                                                                                                                                        | SYSMAN         |
| SELECT 'x' FROM DUAL                                                                                                                                                                                        | SYSMAN         |
| begin execute immediate 'alter session set NLS_NUMERIC_CHARACTERS = ".,"; end;                                                                                                                              | SYSMAN         |
| SELECT event#, sql_id, sql_plan_hash_value, sql_opcode, session_id, session_serial#, module, action, client_id, DECODE(wait_time, 0, 'W', 'C'), 1, time_waited, service_hash, user_id, program, sample_t... | DBSNMP         |
| BEGIN EMDW_LOG.set_context(MGMT_JOB_ENGINE.MODULE_NAME, :1); MGMT_JOB_ENGINE.get_scheduled_steps(:2, :3, :4, :5); EMDW_LOG.set_context; END;                                                                | SYSMAN         |
| select value from v\$sysmetric where group_id = 2 and metric_id = :1                                                                                                                                        | DBSNMP         |
| BEGIN MGMT_PAF_AQ.DEQUEUE_REQUEST(p_node_id => :1, p_wait => :2, x_xml_data => :3, x_request_id => :4, x_timestamp => :5, x_return_status => :6 ); END;                                                     | SYSMAN         |
| begin dbms_application_info.set_module(:1, :2); dbms_application_info.set_client_info(:3); dbms_session.set_identifier(:4); end;                                                                            | SYSMAN         |
| /* OracleOEM */ SELECT TO_CHAR(CAST(md.end_time AS TIMESTAMP) AT TIME ZONE 'GMT', 'YYYY-MM-DD HH24:MI:SS TZD') time, md.user_wait_time_pct, ...                                                             | DBSNMP         |

Previous 1-10 of 10 Next

Cancel OK

Database | Setup | Preferences | Help | Logout

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https://ora11gprodtest2.tuscl.com:1158/em/console/logon/logoff?event=load





# SQL Plan Management

## Viewing a SQL Tuning Set

Tuning  
Set Name

Queries  
& Stats

Oracle Enterprise Manager 11g  
Database Control

Database Instance: orcl > SQL Tuning Sets >  
**SQL Tuning Set: TOP\_SQL\_1193815473707**

Schema: SYS  
Created: 10/31/07 2:25 AM  
Number of Statements: 10

Description: Automatically generated by Top SQL  
Last Modified: 10/31/07 2:25 AM  
Total DB Time (H:M:S): 0:46:33

SQL Statements

[Delete](#) [Schedule SQL Advisor](#) [Search for SQL within tuning set](#) [Add More SQL](#)

| Select                              | SQL ID          | SQL Text                                                         | Plan Hash Value | Parsing Schema | Executions | Elapsed Time (seconds) | CPU Time (seconds) | Buffer Gets | Disk Reads | Module                   |
|-------------------------------------|-----------------|------------------------------------------------------------------|-----------------|----------------|------------|------------------------|--------------------|-------------|------------|--------------------------|
| <input type="checkbox"/>            | 5c9aasd2udjrw   | /* OracleOEM */ SELECT TO_CHAR(CAST (md.end_time AS ...          | 3838994914      | DBSNMP         | 252        | 12.24                  | 9.97               | 12          | 1.00       | emagent@orcl (TNS V1-V3) |
| <input checked="" type="checkbox"/> | qtr8rw7p2h5xy   | SELECT sql_id, sql_plan_hash_value, sql_text, sql_text ...       | 3098115615      | DBSNMP         | 260        | 18.03                  | 2.78               | 119         | 7.00       | Realtime Connection      |
| <input checked="" type="checkbox"/> | colkr0hdi1w2vrf | select value from v\$sysmetric where group_id = 2 and m...       | 1716221123      | DBSNMP         | 247        | 47.82                  | 4.19               | 4           | 0.00       | Realtime Connection      |
| <input checked="" type="checkbox"/> | 2p6mkynsqv48x   | SELECT de.owner    '.'    de.segment_name segment_name, ...      | 1668994723      | SYS            | 18         | 2298.80                | 784.59             | 9948946     | 1159982.00 | sqlplus@orcl (TNS V1-V3) |
| <input checked="" type="checkbox"/> | awc1jazzMwpr    | SELECT 'x' FROM DUAL                                             | 1388734953      | SYSMAN         | 4668       | 33.95                  | 2.51               | 0           | 0.00       | OMS                      |
| <input checked="" type="checkbox"/> | 2b064v0zkvfly   | BEGIN EMD_NOTIFICATION.QUEUE_READY(:1, :2, :3); END;             | 0               | SYSMAN         | 1659       | 135.19                 | 9.78               | 51685       | 57.00      | OEM.SystemPool           |
| <input checked="" type="checkbox"/> | 43c5ykm1mcp2a   | begin dbms_application_info.set_module (:1, :2); dbms_applica... | 0               | SYSMAN         | 5239       | 11.70                  | 4.76               | 336         | 26.00      | OMS                      |
| <input checked="" type="checkbox"/> | 6097q1430c6p2   | BEGIN MGMT_PAF_AQ.DEQUEUE_REQUEST (a_node_id => :1, p_wait =...  | 0               | SYSMAN         | 3328       | 53.77                  | 15.39              | 30876       | 25.00      | OEM.SystemPool           |
| <input checked="" type="checkbox"/> | 6v7n0y2bq89n8   | BEGIN EMDW_LOG.set_context (MGMT_JOB_ENGINE MODULE_NAME, :1);... | 0               | SYSMAN         | 39648      | 181.89                 | 153.30             | 369828      | 336.00     | OEM.SystemPool           |
| <input checked="" type="checkbox"/> | a4ct9b8f9d4a    | begin execute immediate 'alter session set NLS_NUMERIC_CHARA...  | 0               | SYSMAN         | 4668       | 5.45                   | 5.29               | 0           | 0.00       | OMS                      |

[Delete](#)

Database | Setup | Preferences | Help | Logout

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# SQL Plan Management

## Create a SQL Tuning Set

Run the  
Tuning  
Advisor  
on this  
SQL  
Tuning  
Set (STS)

Run it  
NOW

Oracle Enterprise Manager 11g  
Database Control

Database Instances: orcl > Advisor Central > SQL Advisors >

Schedule SQL Tuning Advisor

Specify the following parameters to schedule a job to run the SQL Tuning Advisor.

Name: **SQL\_TUNING\_1193815570422**

Description: rjn\_test

SQL Tuning Set: SYS.TOP\_SQL\_1193815473707

SQL Tuning Set Description: Automatically generated by Top SQL

SQL Statements Counts: 10

SQL Statements

Scope

Total Time Limit (minutes): 30

Scope of Analysis: ☐ Limited  
The analysis is done without SQL Profile recommendation and takes about 1 second per statement.

☒ Comprehensive  
This analysis includes SQL Profile recommendation, but may take a long time.

Time Limit per Statement (minutes): 5

Schedule

Time Zone: America/Chicago

☒ Immediately

☐ Later

Date: Oct 31, 2007  
(example: Oct 31, 2007)

Time: 2:26:10 AM PM

Cancel Submit

Database | Setup | Preferences | Help | Logout

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# SQL Plan Management

## Create a SQL Tuning Set

Results

Select  
One query  
And click  
View

Oracle Enterprise Manager (SYS) - SQL Tu...

ORACLE Enterprise Manager 11g  
Database Control

Database Instance: orcl > Advisor Central >  
SQL Tuning Results:SQL\_TUNING\_1193815570422

Page Refreshed Oct 31, 2007 2:27:55 AM CDT [Refresh]

Status **COMPLETED**  
Started Oct 31, 2007 2:26:32 AM  
Completed Oct 31, 2007 2:27:43 AM

Tuning Set Owner **SYS**  
Tuning Set Name **TOP\_SQL\_1193815473707**  
Time Limit (seconds) **1800**  
Running Time (seconds) **71**

**Recommendations**

View Implement All Profiles

| Select                           | SQL Text                                                                                                    | Parsing Schema | SQL ID                        | Statistics | SQL Profile | Index | Restructure SQL | Miscellaneous | Error |
|----------------------------------|-------------------------------------------------------------------------------------------------------------|----------------|-------------------------------|------------|-------------|-------|-----------------|---------------|-------|
| <input checked="" type="radio"/> | SELECT de.owner    '.'    de.segment_name segment_name, de.segment_type segment_type, ...                   | SYS            | <a href="#">2p6mkynsqy48x</a> | ✓          | ✓           |       |                 | ✓             |       |
| <input type="radio"/>            | BEGIN EMDW_LOG.set_context(MGMT_JOB_ENGINE.MODULE_NAME, :1);<br>MGMT_JOB_ENGINE.get_scheduled_steps(:2,...  | SYSMAN         | <a href="#">6v7n0y2bq89n8</a> |            |             |       |                 | ✓             |       |
| <input type="radio"/>            | BEGIN EMD_NOTIFICATION.QUEUE_READY(:1, :2, :3); END;                                                        | SYSMAN         | <a href="#">2b064ybzkwf1y</a> |            |             |       |                 | ✓             |       |
| <input type="radio"/>            | BEGIN MGMT_PAF_AQ.DEQUEUE_REQUEST(p_node_id => :1 , p_wait => :2 , x_xml_data<br>=> :3, x_request_id => ... | SYSMAN         | <a href="#">6097q1430c6p2</a> |            |             |       |                 | ✓             |       |
| <input type="radio"/>            | select value from v\$sysmetric where group_id = 2 and metric_id = :1                                        | DBSNMP         | <a href="#">cakq0hdjw2wf</a>  |            |             |       |                 |               |       |
| <input type="radio"/>            | SELECT 'x' FROM DUAL                                                                                        | SYSMAN         | <a href="#">avc1jqz04wpr</a>  |            |             |       |                 |               |       |
| <input type="radio"/>            | SELECT event#, sql_id, sql_plan_hash_value, sql_opcode, session_id, session_serial#, module,<br>action,...  | DBSNMP         | <a href="#">qtr8rv7p2h5xy</a> |            |             |       |                 | ✓             |       |
| <input type="radio"/>            | /* OracleOEM */ SELECT TO_CHAR(CAST(md.end_time AS TIMESTAMP) AT TIME ZONE<br>'GMT', ...                    | DBSNMP         | <a href="#">cp5caasd2udnw</a> |            |             |       |                 |               |       |
| <input type="radio"/>            | begin dbms_application_info.set_module(:1, :2); dbms_application_info.set_client_info(:3);<br>dbms_sess...  | SYSMAN         | <a href="#">43c5ykm1mcp2a</a> |            |             |       |                 | ✓             |       |
| <input type="radio"/>            | begin execute immediate 'alter session set NLS_NUMERIC_CHARACTERS = ",,,"; end;                             | SYSMAN         | <a href="#">a4ct9xb8f9d4a</a> |            |             |       |                 | ✓             |       |

View Implement All Profiles

Database | Setup | Preferences | Help | Logout

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Internet 100%

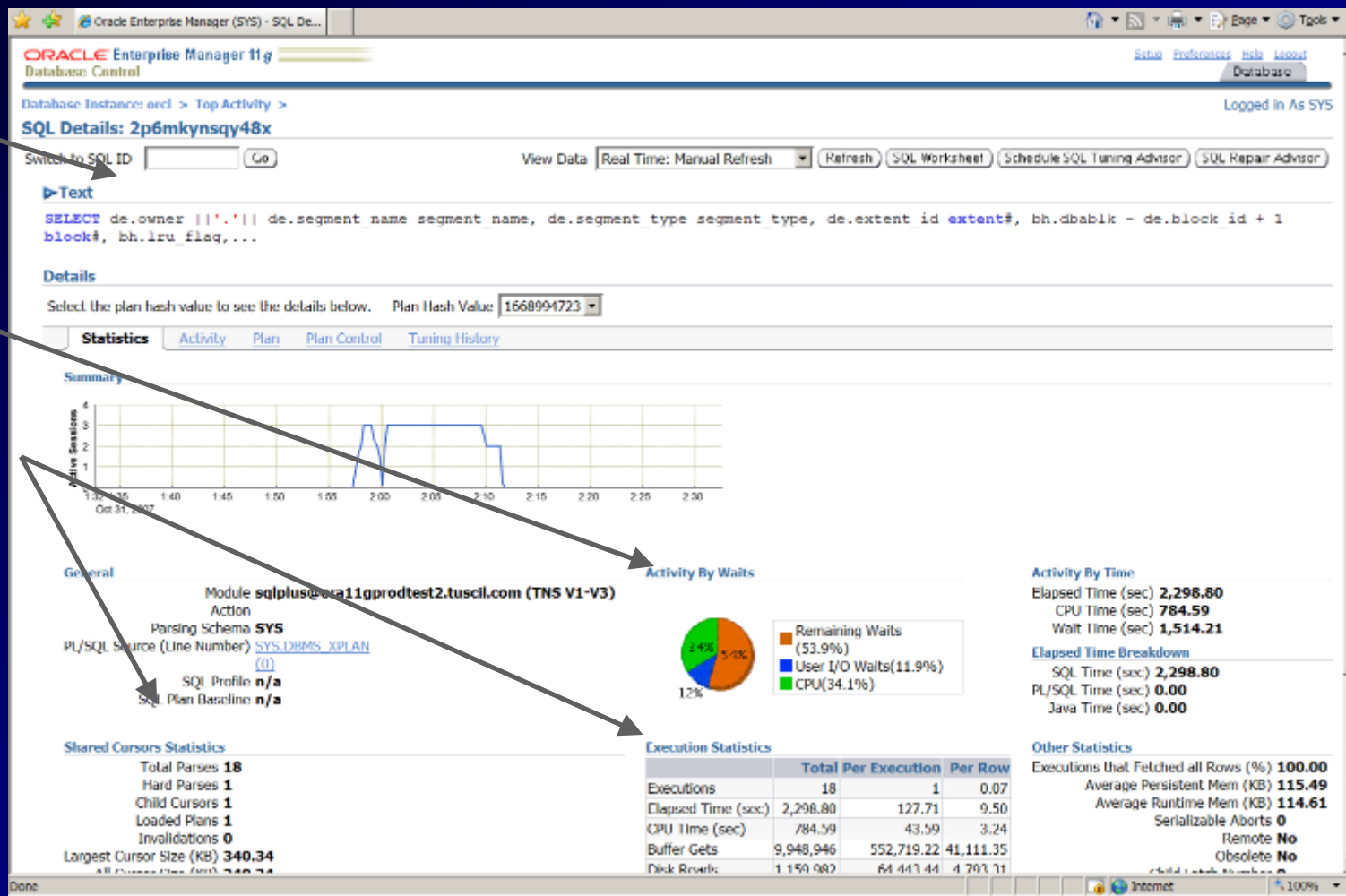


# SQL Plan Management

## Click on any SQL ID

SQL  
Text

Waits  
&  
Statistics





# SQL Plan Management

## Create a SQL Tuning Set

SQL  
Profile  
Will  
Help 99%

Oracle Enterprise Manager (SYS) - Recom...

ORACLE Enterprise Manager 11g  
Database Control

Database Instances: orcl > Advisor Central > SQL Tuning Results: TASK\_179 > Logged in As SYS

Recommendations for SQL ID: 1gf8p004gdjcq

Only one recommendation should be implemented.

**SQL Text**  
SELECT /\*+ ordered \*/ de.owner || '.' || de.segment\_name segment\_name, de.segment\_type segment\_type, de.extent\_id extent\_id, de.block\_id - de.block\_id + 1 block\_id, ...

**Select Recommendation**  
(Original Explain Plan (Annotated))

(Implement)

| Select Type                                  | Findings                                                                    | Recommendations                                          | Rationale                                                                                            | Benefit New Explain (%) Plan | Compare Explain Plans |
|----------------------------------------------|-----------------------------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------------------------|------------------------------|-----------------------|
| <input type="radio"/> Statistics             | Optimizer statistics for table "SYS"."LOBFRAG\$" and its indices are stale. | Consider collecting optimizer statistics for this table. | The optimizer requires up to date statistics for the table in order to select a good execution plan. |                              |                       |
| <input type="radio"/> Statistics             | Optimizer statistics for table "SYS"."UEI\$" and its indices are stale.     | Consider collecting optimizer statistics for this table. | The optimizer requires up to date statistics for the table in order to select a good execution plan. |                              |                       |
| <input checked="" type="radio"/> SQL Profile | A potentially better execution plan was found for this statement.           | Consider accepting the recommended SQL profile.          |                                                                                                      | 99.79                        | 100                   |

Database | Setup | Preferences | Help | Logout

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# SQL Plan Management

## Create a SQL Tuning Set

Compare  
Before  
&  
After

Oracle Enterprise Manager (SYS) - Explain ...

Database Instance: orcl > Advisor Central > SQL Tuning Results: TASK\_179 > Recommendations for SQL ID: 1gf8p004gdjcq > Logged in As SYS

### Compare Explain Plans

**Original Explain Plan (Annotated)**

Indicates an adjustment from the original plan by the SQL Tuning Advisor  
Plan Hash Value **2347322369**

[Expand All](#) | [Collapse All](#)

| Operation        | Line ID | Object                 | Object Type   | Order | Rows    | Bytes | Cost    | Time   | CPU Cost           | I/O Cost |
|------------------|---------|------------------------|---------------|-------|---------|-------|---------|--------|--------------------|----------|
| SELECT STATEMENT | 0       |                        |               | 121   |         | 0.270 | 983,655 | 11,804 | 12,350,714,281,984 | 168,630  |
| SORT ORDER BY    | 1       |                        |               | 120   |         | 0.270 | 983,655 | 11,804 | 12,350,714,281,984 | 168,630  |
| NESTED LOOPS     | 2       |                        |               | 119   |         | 0.270 | 983,654 | 11,804 | 12,350,698,553,344 | 168,630  |
| HASH JOIN        | 3       |                        |               | 7     |         | 1.708 | 1       | 1      | 8,647,788          | 0        |
| NESTED LOOPS     | 4       |                        |               | 5     |         | 0.176 | 0       | 1      | 710,600            | 0        |
| VIEW             | 5       |                        |               | 3     |         | 0.013 | 0       | 1      | 355,300            | 0        |
| SORT AGGREGATE   | 6       |                        |               | 2     |         | 0.059 |         |        |                    |          |
| FIXED TABLE FULL | 7       | SYS.X\$KSLLTR_CHILDREN | TABLE (FIXED) | 1     | 120,000 | 0     | 1       | 1      | 355,300            | 0        |
| FIXED TABLE FULL | 8       | SYS.X\$KSLLTR_CHILDREN | TABLE (FIXED) | 4     | 7,670   | 0     | 1       | 1      | 355,300            | 0        |
| FIXED TABLE FULL | 9       | SYS.X\$BH              | TABLE (FIXED) | 6     | 6,738   | 0     | 1       | 1      | 350,000            | 0        |
| VIEW             | 10      | SYS.DBA_EXTENTS        | VIEW          | 118   |         | 0.114 | 89,423  | 1,074  | 1,122,790,014,976  | 15,330   |

**New Explain Plan With SQL Profile**

Plan Hash Value **2138758942**

[Expand All](#) | [Collapse All](#)

| Operation        | Line ID | Object                 | Object Type   | Order | Rows    | Bytes  | Cost  | Time | CPU Cost    | I/O Cost |
|------------------|---------|------------------------|---------------|-------|---------|--------|-------|------|-------------|----------|
| SELECT STATEMENT | 0       |                        |               | 124   |         | 0.262  | 1,972 | 24   | 702,635,712 | 1,926    |
| SORT ORDER BY    | 1       |                        |               | 123   |         | 0.262  | 1,972 | 24   | 702,635,712 | 1,926    |
| HASH JOIN        | 2       |                        |               | 122   |         | 0.262  | 1,971 | 24   | 687,481,920 | 1,926    |
| HASH JOIN        | 3       |                        |               | 7     |         | 1.568  | 1     | 1    | 8,647,788   | 0        |
| NESTED LOOPS     | 4       |                        |               | 5     |         | 0.176  | 0     | 1    | 710,600     | 0        |
| VIEW             | 5       |                        |               | 3     |         | 0.013  | 0     | 1    | 355,300     | 0        |
| SORT AGGREGATE   | 6       |                        |               | 2     |         | 0.059  |       |      |             |          |
| FIXED TABLE FULL | 7       | SYS.X\$KSLLTR_CHILDREN | TABLE (FIXED) | 1     | 120,000 | 0      | 1     | 1    | 355,300     | 0        |
| FIXED TABLE FULL | 8       | SYS.X\$KSLLTR_CHILDREN | TABLE (FIXED) | 4     | 7,670   | 0      | 1     | 1    | 355,300     | 0        |
| FIXED TABLE FULL | 9       | SYS.X\$BH              | TABLE (FIXED) | 6     | 5,469   | 0      | 1     | 1    | 350,000     | 0        |
| VIEW             | 10      | SYS.DBA_EXTENTS        | VIEW          | 121   |         | 18.229 | 1,970 | 24   | 671,240,320 | 1,926    |
| UNION-ALL        | 11      |                        |               | 120   |         |        |       |      |             |          |
| NESTED LOOPS     | 12      |                        |               | 72    |         | 0.222  | 235   | 3    | 14,023,343  | 234      |





# SQL Plan Control

## SQL Profiles stored in the system

SQL  
Profiles

SQL  
Plan  
Baselines

Oracle Enterprise Manager 11g  
Database Control

Database Instances: orcl >

**SQL Plan Control**

[SQL Profile](#) [SQL Patch](#) [SQL Plan Baseline](#)

[Refresh](#)

A SQL Profile contains additional information(auxiliary statistics) that aids the optimizer to select the optimal execution plan of a particular SQL statement.

**Search**

SQL Text  [Go](#)

By default, the search returns all uppercase matches beginning with the string you entered. To run an exact or case-sensitive match, double quote the search string. You can use the wildcard symbol (%) in a double quoted string.

[Unpack](#)

[Enable](#) [Disable](#) [Drop](#) [Change Category](#) [Pack](#)

[Select All](#) [Select None](#)

| Select Name                                           | SQL Text                                     | Category | Status  | Created                 | Last Modified           |
|-------------------------------------------------------|----------------------------------------------|----------|---------|-------------------------|-------------------------|
| <input type="checkbox"/> SYS_SQLPROF_01457d34c0854000 | SELECT /*+ ordered */ de.owner    ','    ... | DEFAULT  | ENABLED | Oct 31, 2007 1:50:10 AM | Oct 31, 2007 1:50:10 AM |

☒ **TIP** The table will display maximum of 2000 rows. Use search criteria to get the desired results.

[SQL Profile](#) [SQL Patch](#) [SQL Plan Baseline](#)

[Database](#) | [Setup](#) | [Preferences](#) | [Help](#) | [Logout](#)

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# SQL Performance Analyzer



# SQL Performance Analyzer



- Measure and report on **performance before and after a change!** DBMS\_SQLTUNE package.

## Great for:

- Database Upgrades
- Application Upgrades
- Hardware Changes
- Database or Schema Changes
- Best for SQL Tuning – Especially Batches



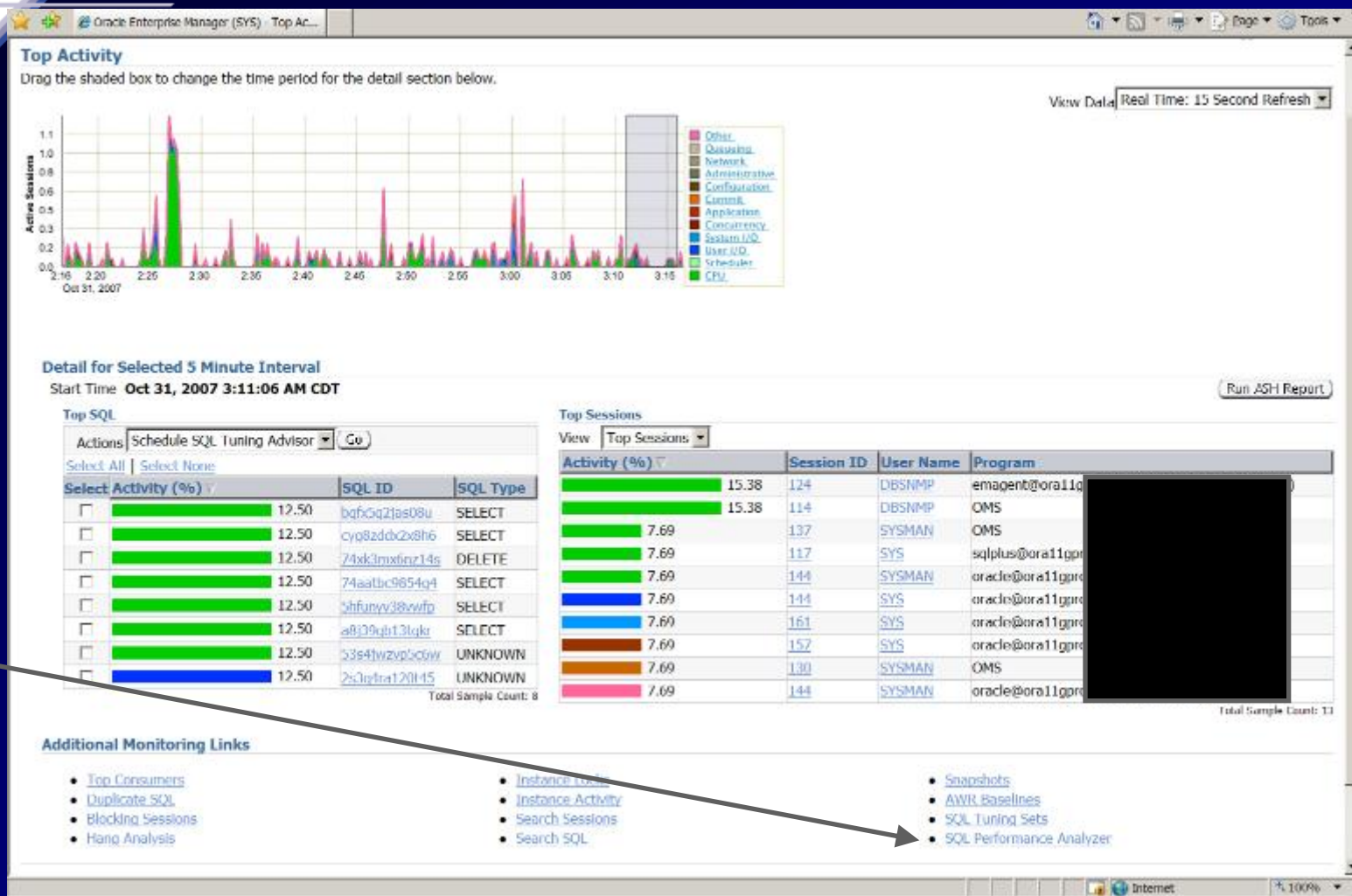
# SQL Performance Analyzer

Easy to run – SQL Focus (Test SGA settings):

- Capture SQL
- Transport SQL
- Create a Replay Task
- Set up the environment to Test
- Make any changes to Test (such as SGA/Optimizer)
- Compare before and after performance
- Tune the problems!

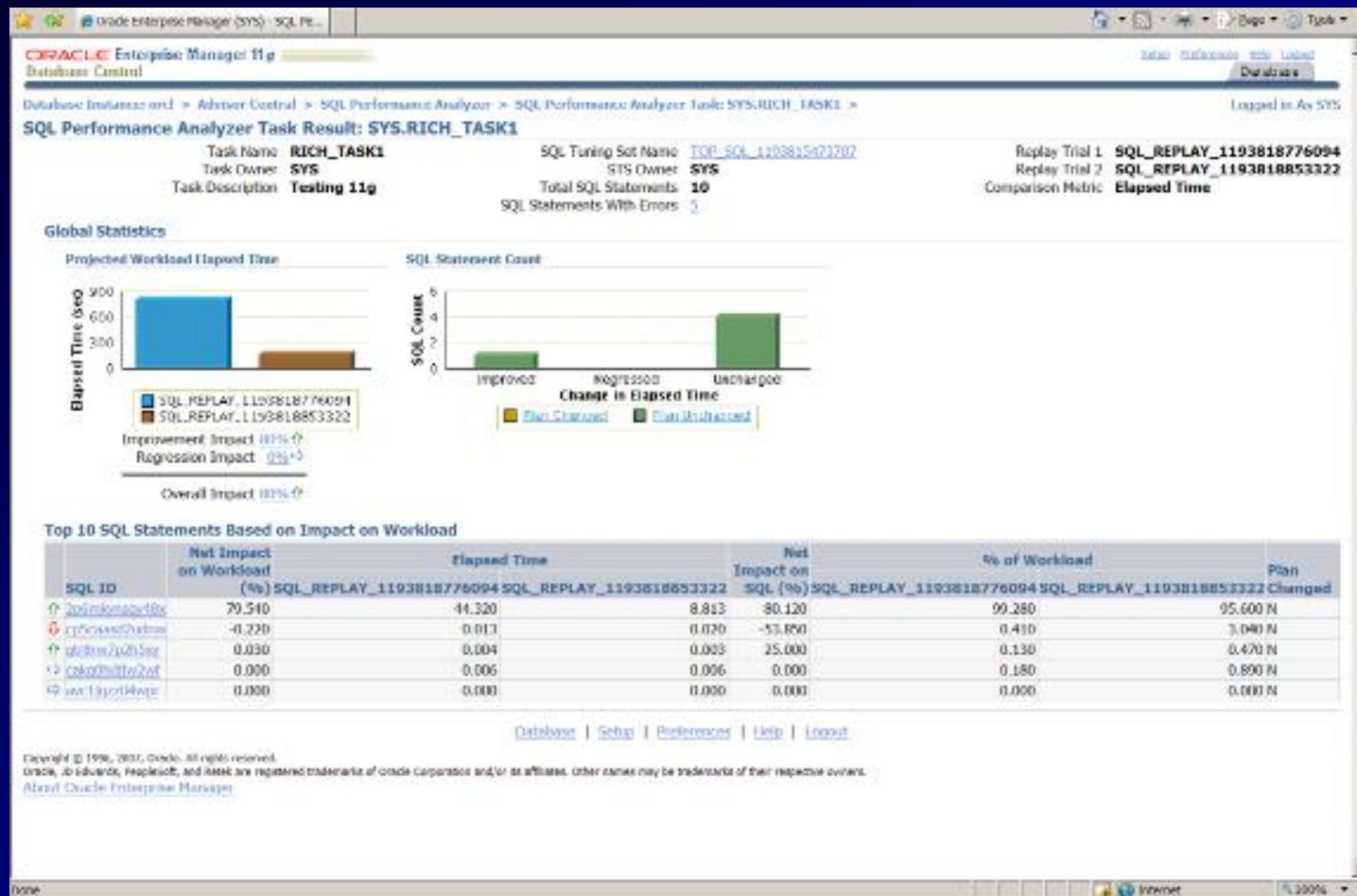


# SQL Performance Analyzer



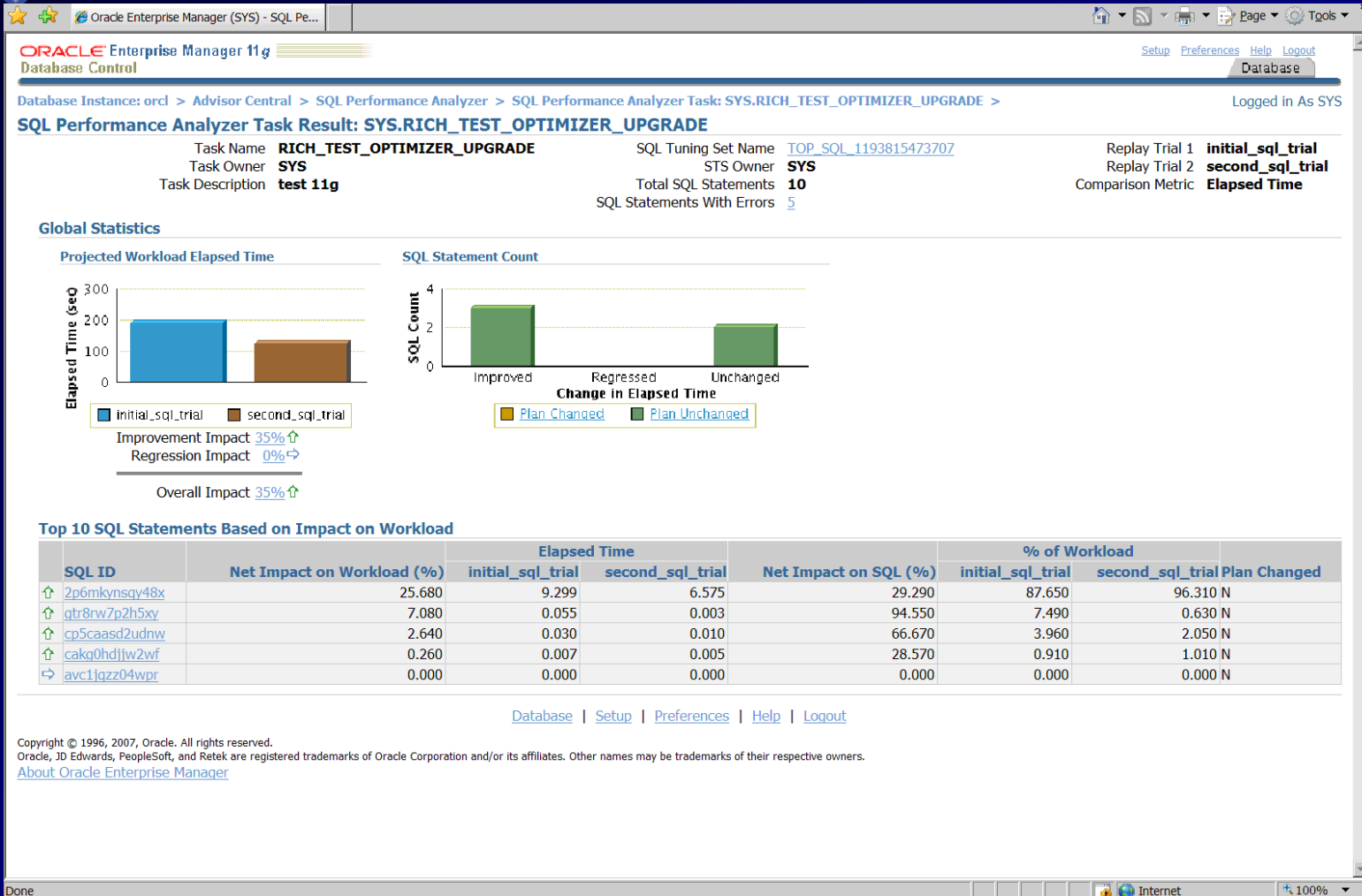


# SQL Performance Analyzer Guided Workflow





# SQL Performance Analyzer Optimizer Upgrade (10g vs. 11g)





# SQL Performance Analyzer 11gR2 - Options

Upgrade  
Options

Oracle Enterprise Manager (SYSMAN) - SQL Performance Analyzer - Windows Internet Explorer

Database Instance: si11gr2.myvm.com > Advisor Central > SQL Performance Analyzer

Page Refreshed Oct 9, 2009 12:20:51 PM CDT (Refresh) View Data Real Time: 15 Second Re

SQL Performance Analyzer allows you to test and to analyze the effects of changes on the execution performance of SQL contained in a SQL Tuning Set.

### SQL Performance Analyzer Workflows

Create and execute SQL Performance Analyzer Task experiments of different types using the following links.

- [Upgrade from 9i or 10.1](#) Test and analyze the effects of database upgrade from 9i or 10.1 on SQL Tuning Set performance.
- [Upgrade from 10.2 or 11g](#) Test and analyze the effects of database upgrade from 10.2 or 11g on SQL Tuning Set performance.
- [Parameter Change](#) Test and compare an initialization parameter change on SQL Tuning Set performance.
- [Exadata Simulation](#) Simulate the effects of a Exadata Storage Server installation on SQL Tuning Set performance.
- [Guided Workflow](#) Create a SQL Performance Analyzer Task and execute custom experiments using manually created SQL trials.

### SQL Performance Analyzer Tasks

| Select Name                                  | Owner | Last Modified | Current Step Name | Type | Status | SQLs Processed | Steps Completed |
|----------------------------------------------|-------|---------------|-------------------|------|--------|----------------|-----------------|
| No SQL Performance Analyzer Tasks available. |       |               |                   |      |        |                |                 |

**TIP** For an explanation of the icons and symbols used in the following table, see the [Icon Key](#)

### Related Links

[SQL Tuning Sets](#)

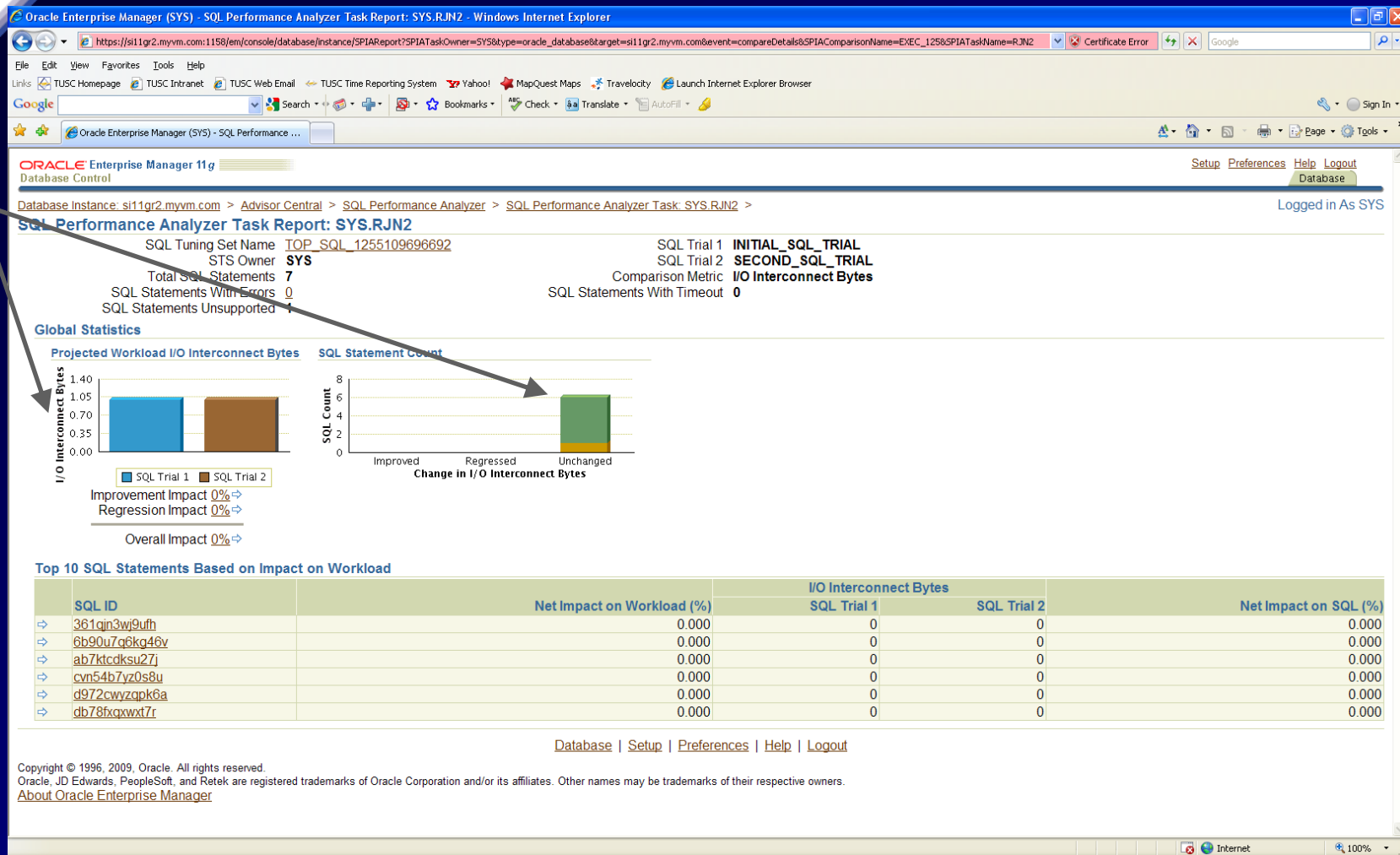
[Database](#) | [Setup](#) | [Preferences](#) | [Help](#) | [Logout](#)

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# SQL Performance Analyzer 11gR2 – Exadata Simulation

Simple  
Job so  
no  
benefit



# SQL Advisors



Tuning  
Advisors

Repair  
Advisor  
(next)

A screenshot of the Oracle Enterprise Manager 11g web interface. The browser window title is 'Oracle Enterprise Manager (SYS) - SQL Ad...'. The page header shows 'ORACLE Enterprise Manager 11g' and 'Database Control'. The breadcrumb trail is 'Database Instances: orcl &gt; Advisor Central &gt;'. The page is titled 'SQL Advisors' and includes a description: 'The SQL Advisors address several important use cases having to do with SQL: identify physical structures optimizing a SQL workload, tune individual statements with heavy execution plans, identify and correct result set divergence, build test cases for failed SQL.' There are three main sections: 'SQL Access Advisor' (with a link to 'SQL Access Advisor'), 'SQL Tuning Advisor' (with links to 'SQL Tuning Advisor' and 'Automatic SQL Tuning Results'), and 'SQL Repair Advisor' (with a description: 'The SQL Repair Advisor can analyze and potentially patch failing SQL statements.'). Under 'SQL Repair Advisor', there are two sub-sections: 'SQL Incident Analysis' (with a link to 'Click here to go to Support Workbench.') and 'SQL Failure Analysis' (with a link to 'Click here to go to SQL Worksheet.'). The footer includes 'Copyright © 1996, 2007, Oracle. All rights reserved.' and 'About Oracle Enterprise Manager'. The browser status bar shows 'Done' and 'Internet'.

# Tuning Advisors

# Repair Advisor (next)

103



# SQL Access Advisor NEW Partition Advisor







# SQL Access Advisor & NEW Partition Advisor

- The SQL Advisor now combines the functionality of the SQL Tuning Advisor, SQL Access Advisor and the new Partition Advisor.
  - Recommends Partitioning Needs
  - Utilize a previous SQL Tuning Set
  - Take SQL straight from what's currently in the CACHE.
  - Create a hypothetical workload
  - SQL Access Advisor checks Indexes, Partitions or Materialized Views (**schema related issues**)



# SQL Access Advisor & NEW Partition Advisor

Oracle Enterprise Manager (SYS) - SQL Access Advisor: Workload Source - Windows Internet Explorer

https://[redacted]/sole/database/sqlaccess?target=O11gb&type=oracle\_database&advisoryCentralURL=/em/console/database/instance/advis... Certificate Error

Google

Go 1327 blocked Check AutoLink AutoFill Send to Settings

Oracle Enterprise Manager (SYS) - SQL Ac...

ORACLE Enterprise Manager 11g Database Control Setup Preferences Help Logout Database

Logged in As SYS

**SQL Access Advisor: Workload Source**

Database **O11gb** Cancel Step 1 of 4 Next

Select the source of the workload that you want to use for the analysis. The best workload is one that fully represents all the SQL statements that access the underlying tables.

☐ Current and Recent SQL Activity  
SQL will be selected from the cache.

☒ Use an existing SQL Tuning Set.  
SQL Tuning Set  Add

Create a Hypothetical Workload from the Following Schemas and Tables  
The advisor can create a hypothetical workload if the tables contain dimension or primary/foreign key constraints.  
Schemas and Tables   
Comma-separated list

☒ TIP Enter a schema name to specify all the tables belonging to that schema.

Filter Options

☒ TIP For workloads containing a large number of SQL statements, Oracle recommends using filtering to reduce analysis time.

Cancel Step 1 of 4 Next

Database | Setup | Preferences | Help | Logout

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[About Oracle Enterprise Manager](#)

Internet 100%

Step One

Use a SQL  
Tuning Set



# SQL Access Advisor & NEW Partition Advisor

Look at  
Partitions

Quick  
Solution

Oracle Enterprise Manager (SYS) - SQL Access Advisor: Recommendation Options - Windows Internet Explorer

https://[redacted]ole/database/sqlaccess?target=O11gb&type=oracle\_database&advisoryCentralURL=/em/console/database/instance/advis... Certificate Error

Google

Oracle Enterprise Manager (SYS) - SQL AC...

ORACLE Enterprise Manager 11g  
Database Control

Setup Preferences Help Logout  
Database

Workload Source Recommendation Options Schedule Review

SQL Access Advisor: Recommendation Options

Database O11gb

Cancel Back Step 2 of 4 Next

**Recommendation Types**

Select the type of structures to be recommended by the advisor. The advisor performs a global analysis of the SQL workload to help improve schema design. If no recommendation types are selected the advisor will evaluate existing structures only.

- ☒ Indexes
- ☐ Materialized Views
- ☒ Partitioning

**Advisor Mode**

The advisor can run in one of two modes, Limited or Comprehensive. Limited Mode is meant to return quickly after processing the statements with the highest cost, potentially ignoring statements with a cost below a certain threshold. Comprehensive Mode will perform an exhaustive analysis.

- ☒ Limited Mode  
Analysis will focus on highest cost statements
- ☐ Comprehensive Mode  
Analysis will be exhaustive

**Advanced Options**

Cancel Back Step 2 of 4 Next

Database | Setup | Preferences | Help | Logout

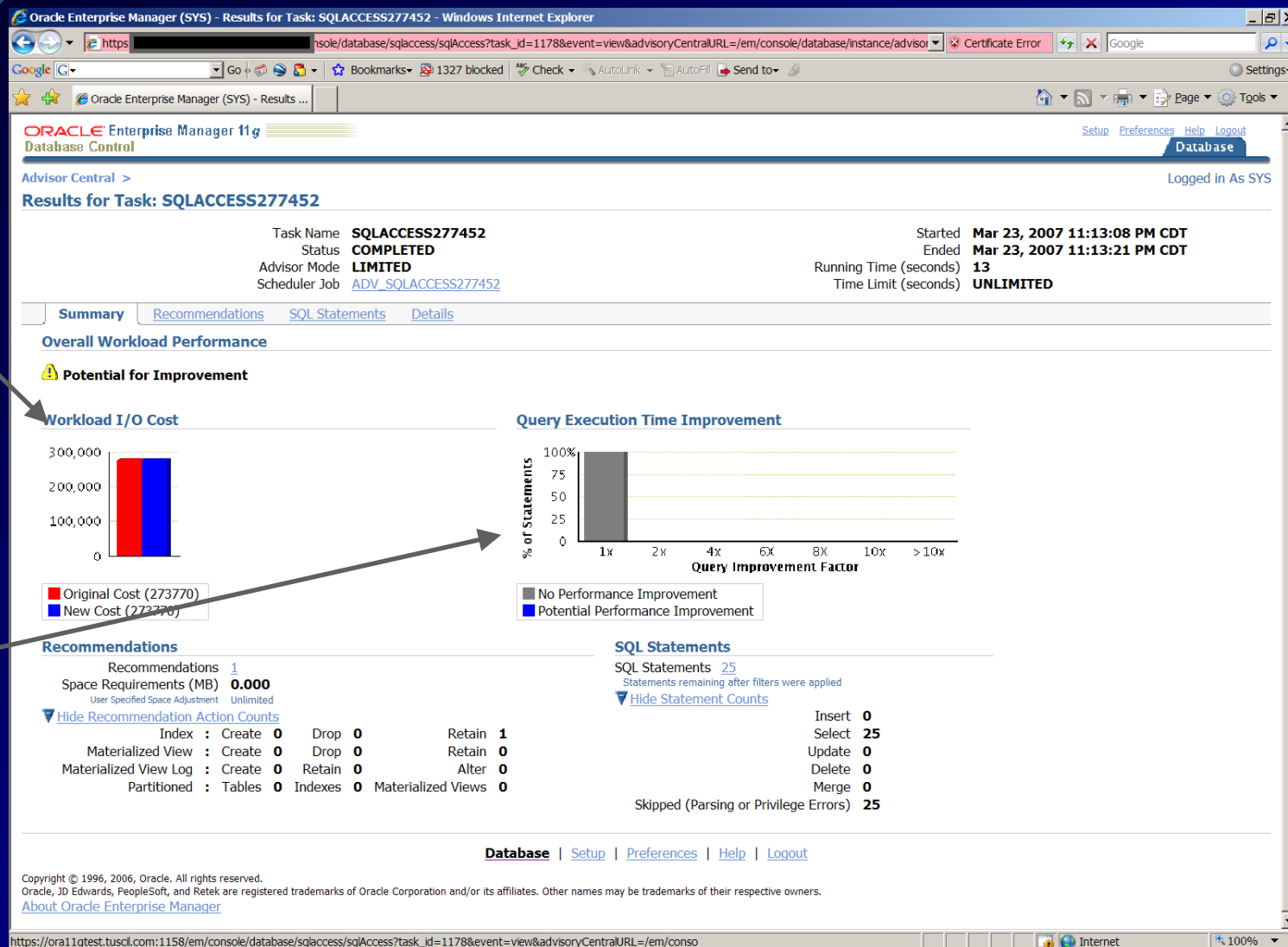
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[About Oracle Enterprise Manager](#)



# SQL Access Advisor & NEW Partition Advisor

Improve  
I/O

Improve  
Execution  
Time





# The SQL Repair Advisor

Repair the Problem *“on the fly”*



*The Business of IT is serving information...  
Not giving users ORA-600 errors...*



# SQL Repair Advisor

- Used to Repair Problem SQL – Oracle Errors
- Reloads and recompiles SQL statements to gather diagnostics information to fix.
- Uses the diagnostic information to repair the problem SQL statement (**DBMS\_SQLDIAG**)
- **Will fix error going through compilation, execution and trying different routes (could be a slower route for now) to come up with a temporary SQL Patch without error until fixed.**





# SQL Repair Advisor – Go straight from Alerts

Go to the  
Database  
Instance

Click Alert  
(ORA-600)  
message  
text to see  
details

ORACLE Enterprise Manager 11g Database Control

Database Instance: database

Home Performance Availability Server Schema Data Movement Software and Support

Latest Data Collected From Target Apr 9, 2007 1:46:42 PM PDT Refresh View Data Automatically (60 sec)

**General** Shutdown Black Out

Status Up  
Up Since Mar 26, 2007 9:53:59 AM PDT  
Instance Name demosa  
Version 11.1.0.4.0  
Host [REDACTED]  
Listener [REDACTED]

[View All Properties](#)

**Host CPU**

Load 5.04 Paging 0.11

**Active Sessions**

Maximum CPU 2

**SQL Response Time**

SQL Response Time (%) 101.04

[Edit Reference Collection](#)

**Diagnostic Summary**

ADDM Findings 4  
Period Start Time Apr 9, 2007 12:00:51 PM PDT  
Alert Log No ORA-errors  
Active Incidents 0

[Database Instance Health](#)

**Space Summary**

Database Size (GB) 1.405  
Problem Tablespace 0  
Segment Advisor Recommendations 0  
Policy Violations 6  
Dump Area Used (%) 55

**High Availability**

Instance Recovery Time (sec) 19  
Last Backup n/a  
Flashback Database Logging Disabled

**Alerts**

Category All Go Critical 2 Warning 1

| Severity | Category | Name                   | Impact                          | Message                                                                                                                                                                                        | Alert Triggered         |
|----------|----------|------------------------|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| ×        | Incident | Out of Memory          | POSSIBLE<br>INSTANCE<br>FAILURE | <a href="#">Out of memory detected in /ade/hsu_demosa/oracle/log/diag/rdbms/demosa/demosa/alert/log.xml at time/line number: Wed Mar 28 17:07:48 2007/75917.</a>                               | Mar 28, 2007 5:09:41 PM |
| ×        | Incident | Generic Internal Error |                                 | <a href="#">Internal error (ORA-600[dbgxtvHTTbParse:1]) detected in /ade/hsu_demosa/oracle/log/diag/rdbms/demosa/demosa/alert/log.xml at time/line number: Mon Mar 26 14:49:55 2007/62426.</a> | Mar 26, 2007 2:54:41 PM |
| !        | Response | User Logon Time (msec) |                                 | <a href="#">User logon time is 1485.76 msec.</a>                                                                                                                                               | Apr 9, 2007 12:36:35 PM |



# Support Workbench - Details

Database Instance: database > Support Workbench >  
Problem Details: ORA 600 [13011]

Logged in As SYSTEM

Page Refreshed March 20, 2007 9:05:15 PM PDT [Refresh](#)

## Summary

SR# -- [Edit](#)  
Bug# -- [Edit](#)  
Active **Yes**  
Packaged **No**  
Number of Incidents **1**

## Last Incident

Timestamp [March 20, 2007 8:18:05 PM PDT](#)  
Incident Source **System Generated**  
Impact  
Checkers Run **0**  
Checker Findings **0**

## Investigate and Resolve

[Go to Metalink](#) [Quick Package](#)

### Self Service

[Oracle Support](#)

### Assess Damage

[Run Checkers](#)  
[Database Instance Health](#)

### Diagnose

[Alert Log](#)  
[Related Problems Across Topology](#)  
[Diagnostic Dumps for Last Incident](#)  
[Go to Metalink and Research](#)

### Resolve

[SQL Repair Advisor](#)

[Incidents](#)

[Activity Log](#)

Click on  
SQL  
Repair  
Advisor



# Results from SQL Repair Advisor

Click on  
View to  
Get the  
Detail  
finding of  
the Advisor

SQL Repair Results: [SQL\\_DIAG\\_1174506262358](#)

Page Refreshed **Mar 21, 2007 12:45:50 PM PDT** [Refresh](#)

|                      |                     |                        |                                     |
|----------------------|---------------------|------------------------|-------------------------------------|
| Status               | <b>COMPLETED</b>    | Started                | <b>Mar 21, 2007 12:45:28 PM PDT</b> |
| SQL ID               | <b>9m7mvytc4d14</b> | Completed              | <b>Mar 21, 2007 12:45:46 PM PDT</b> |
| Time Limit (seconds) | <b>1800</b>         | Running Time (seconds) | <b>18</b>                           |

**Recommendations**

[View](#)

| Select                           | SQL Text                                                                                                | Parsing Schema | SQL ID       | SQL Patch |
|----------------------------------|---------------------------------------------------------------------------------------------------------|----------------|--------------|-----------|
| <input checked="" type="radio"/> | delete from t t1 where t1.a = 'a' and rowid <> (select max(rowid) from t t2 where t1.a= t2.a and t1.... |                | 9m7mvytc4d14 | ✓         |

Note a SQL  
Patch (FIX for  
the SQL) has  
been generated



# SQL Repair Advisor

## Recommendation / Confirmation

Click on  
Implement  
To accept  
the SQL  
Patch

### Repair Recommendations for SQL ID: 9m7mvytc4d14

[Return](#)

Page Refreshed Mar 21, 2007 12:48:42 PM PDT

Select the desired recommendation and then click on the Implement button to apply the SQL patch, which is a special type of SQL Profile that will repair the SQL statement.

#### SQL Text

[delete from t t1 where t1.a = 'a' and rowid <> \(select max\(rowid\) from t t2 where t1.a = t2.a and t1.b = t2.b and t1.d=t2.d\)](#)

#### Findings and Recommendations

### SQL Repair Results: SQL\_DIAG\_1174506262358

#### Confirmation

The recommended SQL Patch was implemented successfully. Verify results by executing SQL in SQL Worksheet.

[Verify using SQL Worksheet](#)

Page Refreshed Mar 21, 2007 12:52:29 PM PDT

[Refresh](#)

Status **COMPLETED**  
SQL ID **9m7mvytc4d14**  
Time Limit (seconds) **1800**

Started **Mar 21, 2007 12:45:28 PM PDT**  
Completed **Mar 21, 2007 12:45:46 PM PDT**  
Running Time (seconds) **18**

#### Recommendations

[View](#)

| Select                           | SQL Text                                                                                                 | Parsing Schema | SQL ID       | SQL Patch |
|----------------------------------|----------------------------------------------------------------------------------------------------------|----------------|--------------|-----------|
| <input checked="" type="radio"/> | delete from t t1 where t1.a = 'a' and rowid <> (select max(rowid) from t t2 where t1.a = t2.a and t1.... |                | 9m7mvytc4d14 | ✓         |



# Adding Nodes the Easy Way in 11gR2 (FYI look only)





# DB Instance – Software/Support 11gR2 - Deployment Procedures

Easy  
RAC  
Add  
Nodes  
(provisioning)

Oracle Enterprise Manager (SYS) - Database Instance: si11gr2.myvm.com - Windows Internet Explorer

https://si11gr2.myvm.com:1158/em/console/database/instance/sitemap?event=doLoad&target=si11gr2.myvm.com&type=oracle\_database&pageNum=8

File Edit View Favorites Tools Help

Links TUSC Homepage TUSC Intranet TUSC Web Email TUSC Time Reporting System Yahoo! MapQuest Maps Travelocity Launch Internet Explorer Browser

Google Search

Oracle Enterprise Manager (SYS) - Database Instance...

ORACLE Enterprise Manager 11g Database Control

Setup Preferences Help Logout Database

Logged in As SYS

Database Instance: si11gr2.myvm.com

Home Performance Availability Server Schema Data Movement Software and Support

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Real Application Testing

Database Replay

SQL Performance Analyzer

Database Software Patching

Patch Advisor

View Patch Cache

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Apply Patch

Deployment Procedure Manager

Getting Started with Deployment Procedure Manager

Deployment Procedures

RAC Provisioning Deployment Procedures

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Deployment and Provisioning Software Library

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Support Workbench

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Scheduler Central

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Monitor in Memory Access Mode

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Advisor Central

All Metrics

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Metric Collection Errors

Policy Groups

Target Properties

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About Oracle Enterprise Manager





# DB Instance – Software/Support 11gR2 - Deployment Procedures

One  
Click  
Extend  
Cluster

Oracle Enterprise Manager (SYS) - Provisioning Advisor - Windows Internet Explorer

https://sl11gr2.myvm.com:1158/em/console/paf/provisioningAdvisor?procType=default

File Edit View Favorites Tools Help

Links TUSC Homepage TUSC Intranet TUSC Web Email TUSC Time Reporting System Yahoo! MapQuest Maps Travelocity Launch Internet Explorer Browser

Google Search

Oracle Enterprise Manager (SYS) - Provisioning Advisor

ORACLE Enterprise Manager 11g Database Control

Setup Preferences Help Logout Database

### Deployment Procedure Manager

Procedures Procedure Completion Status Recycle Bin

Deployment procedures are best practices provided by Oracle for various Provisioning and Patching tasks. Procedures created by Oracle cannot be edited, but can be extended using 'Create Like', so that you can customize the procedure to fit your environment. For more details click Help.

Search Text Fields  Go Advanced Search

View Schedule Deployment... Edit Create Like Revert Delete Upload

| Select Procedure                                                                                | Type                                                | Description                                                                                                                                                                                                                                                                                                                                                           | Last Modified By | Version | Last Updated                |
|-------------------------------------------------------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---------|-----------------------------|
| <input type="radio"/> <a href="#">Oracle Patch Prerequisite Checker for Standalone Database</a> | Patch Prerequisites                                 | Runs standard prerequisite checks for the System, Oracle Home, OPatch and Patches along with the additional deployment specific checks. <a href="#">i</a>                                                                                                                                                                                                             | Oracle           | 3.0     | Aug 10, 2009 8:38:59 PM CDT |
| <input checked="" type="radio"/> <a href="#">One Click Extend Cluster Database</a>              | Oracle Real Application Clusters Database Provision | This procedure extends an existing cluster database to a set of new nodes. Grid Infrastructure and Oracle database are extended and configured by the procedure. <a href="#">i</a>                                                                                                                                                                                    | Oracle           | 1.0     | Aug 10, 2009 8:38:58 PM CDT |
| <input type="radio"/> <a href="#">Patch Oracle Clusterware - Rolling</a>                        | Patch Oracle Cluster Software                       | Procedure for patching an Oracle Clusterware in Rolling mode with Critical Patch Updates and interim patches. This procedure is not applicable for installations registered with different clusterware. This procedure does not support patching of shared Oracle Home Oracle Clusterware installations and single node clusters. <a href="#">i</a>                   | Oracle           | 1.0     | Aug 10, 2009 8:38:57 PM CDT |
| <input type="radio"/> <a href="#">Scale down Oracle Real Application Clusters</a>               | Oracle Real Application Clusters Database Provision | This procedure deletes nodes from Oracle Real Application Clusters in order to scale down the cluster. <a href="#">i</a>                                                                                                                                                                                                                                              | Oracle           | 1.0     | Aug 10, 2009 8:38:56 PM CDT |
| <input type="radio"/> <a href="#">Patch Oracle RAC Database (All Nodes Upgrade)</a>             | Patch Oracle Software                               | Procedure for patching an Oracle RAC Database in All Nodes upgrade mode. This procedure does not support patching of Oracle Clusterware Database installations with shared Oracle Home. To apply a Patch Set Update ensure that OPatch in the Oracle Home is latest. Else, upgrade it by downloading latest OPatch from My Oracle Support under patch number 6880880. | Oracle           | 1.0     | Aug 10, 2009 8:38:55 PM CDT |
| <input type="radio"/> <a href="#">Patch Oracle RAC Database (Rolling Upgrade)</a>               | Patch Oracle Software                               | Procedure for patching an Oracle RAC Database in Rolling upgrade mode. This procedure does not support patching of Oracle Clusterware Database installations with shared Oracle Home. To apply a Patch Set Update ensure that OPatch in the Oracle Home is latest. Else, upgrade it by downloading latest OPatch from My Oracle Support under patch number 6880880.   | Oracle           | 1.0     | Aug 10, 2009 8:38:54 PM CDT |
| <input type="radio"/> <a href="#">Patch Oracle Database</a>                                     | Patch Oracle Software                               | Procedure to patch Oracle Database from DB Console. To apply a Patch Set Update ensure that OPatch in the Oracle Home is latest. Else, upgrade it by downloading latest OPatch from My Oracle Support under patch number 6880880.                                                                                                                                     | Oracle           | 3.0     | Aug 10, 2009 8:38:53 PM CDT |

Database | Setup | Preferences | Help | Logout

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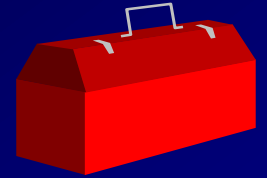


# Helpful V\$/X\$ Queries (FYI Only)





# V\$ Views over the years



| <u>Version</u>    | <u>V\$ Views</u>  | <u>X\$ Tables</u> |
|-------------------|-------------------|-------------------|
| 6                 | 23                | ? (35)            |
| 7                 | 72                | 126               |
| 8.0               | 132               | 200               |
| 8.1               | 185               | 271               |
| 9.0               | 227               | 352               |
| 9.2               | 259               | 394               |
| 10.1.0.2          | 340 (+31%)        | 543 (+38%)        |
| 10.2.0.1          | 396               | 613               |
| <b>11.1.0.6.0</b> | <b>484 (+23%)</b> | <b>798 (+30%)</b> |
| <b>11.2.0.1.0</b> | <b>496 (+25%)</b> | <b>945 (+54%)</b> |



# Listing of V\$ Views



```
select      name
from        v$fixed table
where       name like 'GV%'
order by    name;
```

*NAME*

-----

*GV\$ACCESS  
GV\$ACTIVE\_INSTANCES  
GV\$ACTIVE\_SESS\_POOL\_MTH  
GV\$AQ1  
GV\$ARCHIVE...*



# Need GV\$ - Instance ID



```
select (1 - (sum(decode(name, 'physical reads',value,0)) /  
            (sum(decode(name, 'db block gets',value,0)) +  
              sum(decode(name, 'consistent gets',value,0))))) * 100  
       "Hit Ratio"  
from   v$sysstat;
```

*Hit Ratio*

-----  
90.5817699



# Need GV\$ - Instance ID



```
select  inst_id, (1 - (sum(decode(name, 'physical
reads',value,0)) /
      (sum(decode(name, 'db block gets',value,0)) +
      sum(decode(name, 'consistent gets',value,0))))) * 100
      "Hit Ratio"
from    gv$sysstat
group by inst_id;
```

| INST_ID | Hit Ratio |
|---------|-----------|
|---------|-----------|

|   |            |
|---|------------|
| 1 | 90.5817699 |
|---|------------|





# X\$ used to create V\$



```
select *  
from v$fixed_view_definition  
where view_name = 'GV$INDEXED_FIXED_COLUMN';
```

## VIEW NAME

gv\$indexed\_fixed\_column  
kqftanam,  
kqfconam,kqfcoipo

## VIEW DEFINITION

```
select c.inst_id,  
       kqfcoidx,  
  
from   X$kqfco c, X$kqfta t  
where  t.indx = c.kqfcotab  
and    kqfcoidx != 0
```



# Listing of X\$ Tables



```
select      name
from        v$fixed_table
where       name like 'X%'
order by    name;
```

*NAME*

-----

*X\$ACTIVECKPT  
X\$BH  
X\$BUFQM  
X\$CKPTBUF  
X\$CLASS\_STAT...*

# Listing of X\$ Indexes

(498 in 11.1.0.3.0, 419 in 10g; 326 in 9i)



```
select      table_name, index_number,
            column_name
from        gv$indexed_fixed_column
order by    table_name, index_number,
            column_name,          column_position;
```

| TABLE_NAME | INDEX_NUMBER | COLUMN_NAME |
|------------|--------------|-------------|
|------------|--------------|-------------|

|               |   |      |
|---------------|---|------|
| X\$CLASS_STAT | 1 | ADDR |
|---------------|---|------|

|               |   |      |
|---------------|---|------|
| X\$CLASS_STAT | 2 | INDX |
|---------------|---|------|

|         |   |      |
|---------|---|------|
| X\$DUAL | 1 | ADDR |
|---------|---|------|

|         |   |      |
|---------|---|------|
| X\$DUAL | 2 | INDX |
|---------|---|------|



# V\$ - System Information



*select \* from v\$version;*

*BANNER*

-----  
*Oracle Database 11g Enterprise Edition Release 11.1.0.3.0 -  
Beta*

*PL/SQL Release 11.1.0.3.0 - Beta*

*CORE 11.1.0.3.0 Beta*

*TNS for Linux: Version 11.1.0.3.0 - Beta*

*NLSRTL Version 11.1.0.3.0 - Beta*



# V\$ - System Information



```
select *  
from v$option;
```

*PARAMETER*

*VALUE*

-----  
*Partitioning*

*TRUE*

*Objects*

*TRUE*

*Real Application Clusters*

*FALSE*

*Advanced Replication*

*TRUE*

*Bit-Mapped Indexes*

*TRUE*



# V\$ - V\$SESSION\_WAIT (waiting right now)



```
select event, sum(decode(wait_time,0,1,0)) "Waiting Now",  
       sum(decode(wait_time,0,0,1)) "Previous Waits",  
       count(*) "Total"  
from v$session_wait  
group by event  
order by count(*);
```

*WAIT\_TIME = 0 means that it's waiting*

*WAIT\_TIME > 0 means that it previously waited this many  
ms*





# V\$ - V\$SESSION\_WAIT

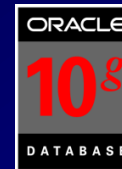


| <i>EVENT</i>                       | <i>Waiting Now</i> |       | <i>Previous Waits</i> |       |
|------------------------------------|--------------------|-------|-----------------------|-------|
| <i>Total</i>                       |                    |       |                       |       |
| -----                              | -----              | ----- | -----                 | ----- |
| <i>db file sequential read</i>     |                    | 0     | 1                     | 1     |
| <i>db file scattered read</i>      |                    | 2     |                       | 0 2   |
| <i>latch free</i>                  | 0                  |       | 1 1                   |       |
| <i>enqueue</i>                     | 2                  |       | 0 2                   |       |
| <i>SQL*Net message from client</i> |                    | 0     | 254                   | 480   |
| ...                                |                    |       |                       |       |



# V\$SESSION\_WAIT

## Current Specific waits



Buffer Busy Waits or Write Complete Waits Events:

```
SELECT      /* + ordered */ sid, event, owner,  
            segment_name,  
            segment_type,p1,p2,p3  
FROM        v$session_wait sw, dba_extents de  
WHERE       de.file_id = sw.p1  
AND         sw.p2 between de.block_id  
            and de.block_id+de.blocks - 1  
AND         (event = 'buffer busy waits'  
            OR event = 'write complete waits')  
AND         p1 IS NOT null  
ORDER BY   event,sid;
```



# V\$EVENT\_NAME

## Finding P1, P2, P3



col name for a20

col p1 for a10

col p2 for a10

col p3 for a10

```
select event#,name,parameter1 p1,parameter2 p2,parameter3
       p3
```

```
from v$event_name
```

```
where name in ('buffer busy waits', 'write complete waits')
```

| EVENT# | NAME | P1 | P2 | P3 |
|--------|------|----|----|----|
|--------|------|----|----|----|

-----

|    |                      |       |        |
|----|----------------------|-------|--------|
| 74 | write complete waits | file# | block# |
|----|----------------------|-------|--------|

V\$ -



# V\$SESSION\_WAIT\_HISTORY (Last 10 waits for session)



Buffer Busy Waits or Write Complete Waits Events:

```
SELECT      /* + ordered */ sid, event, owner,  
            segment_name,  
            segment_type,p1,p2,p3  
FROM        v$session_wait_history sw, dba_extents de  
WHERE       de.file_id = sw.p1  
AND         sw.p2 between de.block_id  
            and de.block_id+de.blocks - 1  
AND         (event = 'buffer busy waits'  
            OR event = 'write complete waits')  
AND         p1 IS NOT null  
ORDER BY   event,sid;
```



# Great V\$ - V\$SESSION\_EVENT (waiting since the session started)



```
select sid, event, total_waits, time_waited,  
       event_id  
from v$session_event  
where time_waited > 0  
order by time_waited;
```

| <i>SID</i> | <i>EVENT</i>              | <i>TOTAL_WAITS</i> | <i>TIME_WAITED</i> |
|------------|---------------------------|--------------------|--------------------|
| -----      | -----                     | -----              | -----              |
| 159        | process startup           | 2                  | 1                  |
| 167        | latch: redo allocation    | 4                  | 1                  |
| 168        | log buffer space          | 2                  | 3                  |
| 166        | control file single write | 5                  | 4                  |

...



# V\$ - V\$SESSION\_WAIT\_CLASS (session waits by WAIT CLASS)



```
select wait_class, total_waits  
from v$system_wait_class;
```

| <i>WAIT_CLASS</i>    | <i>TOTAL_WAITS</i> |
|----------------------|--------------------|
| -----                | -----              |
| <i>Other</i>         | <i>4180</i>        |
| <i>Application</i>   | <i>45269</i>       |
| <i>Configuration</i> | <i>297</i>         |
| <i>Concurrency</i>   | <i>25467</i>       |
| <i>Commit</i>        | <i>54805</i>       |
| <i>Idle</i>          | <i>6925277</i>     |
| <i>Network</i>       | <i>1859009</i>     |
| <i>User I/O</i>      | <i>809979</i>      |
| <i>System I/O</i>    | <i>1103539</i>     |
| <i>Scheduler</i>     | <i>10276</i>       |





# Great V\$ - V\$SYSTEM\_EVENT (waits since the instance started)

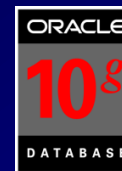


```
select event, total_waits, time_waited  
from v$system_event  
where time_waited > 0  
order by time_waited;
```

| <i>EVENT</i>                       | <i>TOTAL_WAITS</i> | <i>TIME_WAITED</i> |            |            |
|------------------------------------|--------------------|--------------------|------------|------------|
| -----                              | -----              | -----              |            |            |
| <i>latch: session allocation</i>   | <i>5644</i>        | <i>1</i>           |            |            |
| <i>latch: redo allocation</i>      | <i>4</i>           | <i>1</i>           |            |            |
| <i>latch: cache buffers chains</i> | <i>4</i>           | <i>3</i>           |            |            |
| <i>enq: TX - index contention</i>  | <i>1</i>           | <i>3</i>           |            |            |
| <i>direct path write temp</i>      | <i>57</i>          | <i>6</i>           |            |            |
| <i>row cache lock</i>              | <i>1</i>           | <i>7</i>           | <i>...</i> | <i>135</i> |



# V\$ - Top 10 as % of All



```
select sum(pct_bufgets) percent
from (select rank() over ( order by buffer_gets desc )      as
      rank_bufgets,
      to_char(100 * ratio_to_report(buffer_gets) over      (), '999.99')
      pct_bufgets
from v$sqlarea )
where rank_bufgets < 11;
```

*PERCENT*

-----  
97.07



# V\$ - What Users are doing...



```
select a.sid, a.username, s.sql_text
from v$session a, v$sqltext s
where a.sql_address = s.address
and a.sql_hash_value = s.hash_value
order by a.username, a.sid, s.piece;
```

| SID | USERNAME | SQL_TEXT |
|-----|----------|----------|
|-----|----------|----------|

|    |            |                                      |
|----|------------|--------------------------------------|
| 11 | PLSQL_USER | update s_employee set salary = 10000 |
| 9  | SYS        | select a.sid, a.username, s.sql_text |
| 9  | SYS        | from v\$session a, v\$sqltext        |
| 9  | SYS        | where a.sql_address = s.address      |

(...partial output listing)

# Great V\$ -

## V\$SEGMENT\_STATISTICS



```
select object_name, statistic_name, value  
from v$segment_statistics  
where value > 100000  
order by value;
```



| <i>OBJECT_NAME</i> | <i>STATISTIC_NAME</i>   | <i>VALUE</i>  |
|--------------------|-------------------------|---------------|
| -----              | -----                   | -----         |
| <i>ORDERS</i>      | <i>space allocated</i>  | <i>96551</i>  |
| <i>ORDERS</i>      | <i>space allocated</i>  | <i>134181</i> |
| <i>ORDERS</i>      | <i>logical reads</i>    | <i>140976</i> |
| <i>ORDER_LINES</i> | <i>db block changes</i> | <i>183600</i> |



# AWR – Segments by Buffer Busy Waits



## Segments by Buffer Busy Waits

- % of Capture shows % of Buffer Busy Waits for each top segment compared
- with total Buffer Busy Waits for all segments captured by the Snapshot

| Owner | Tablespace Name | Object Name | Subobject Name | Obj. Type       | Buffer Busy Waits | % of Capture |
|-------|-----------------|-------------|----------------|-----------------|-------------------|--------------|
|       |                 |             |                | TABLE PARTITION | 1,243,890         | 89.24        |
|       |                 |             |                | INDEX PARTITION | 39,258            | 2.82         |
|       |                 |             |                | INDEX PARTITION | 33,780            | 2.42         |
|       |                 |             |                | INDEX PARTITION | 28,563            | 2.05         |
|       |                 |             |                | INDEX PARTITION | 26,637            | 1.91         |

[Back to Segment Statistics](#)

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## Segments by Global Cache Buffer Busy

- % of Capture shows % of GC Buffer Busy for each top segment compared
- with GC Buffer Busy for all segments captured by the Snapshot

| Owner | Tablespace Name | Object Name | Subobject Name | Obj. Type | GC Buffer Busy | % of Capture |
|-------|-----------------|-------------|----------------|-----------|----------------|--------------|
| SYS   | SYSTEM          | UNDOS       |                | TABLE     | 21             | 100.00       |

[Back to Segment Statistics](#)

# AWR – Segments by Logical Reads



## Segments by Logical Reads

- Total Logical Reads: 225,112,503
- Captured Segments account for 90.9% of Total

| Owner | Tablespace Name | Object Name | Subobject Name | Obj. Type       | Logical Reads | %Total |
|-------|-----------------|-------------|----------------|-----------------|---------------|--------|
|       |                 |             |                | INDEX PARTITION | 59,714,336    | 26.53  |
|       |                 |             |                | INDEX PARTITION | 48,936,144    | 21.74  |
|       |                 |             |                | INDEX PARTITION | 40,319,312    | 17.91  |
|       |                 |             |                | INDEX PARTITION | 23,612,368    | 10.49  |
|       |                 |             |                | INDEX PARTITION | 20,381,072    | 9.05   |

[Back to Segment Statistics](#)

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## Segments by Physical Reads

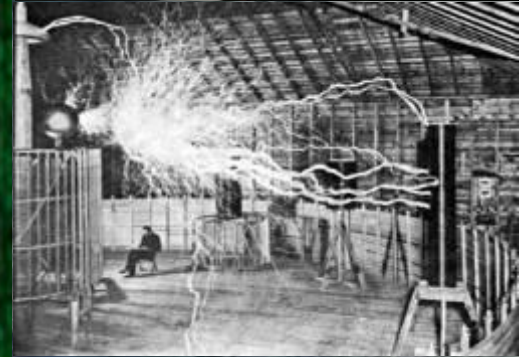
- Total Physical Reads: 1,722
- Captured Segments account for 41.1% of Total

| Owner | Tablespace Name | Object Name | Subobject Name | Obj. Type       | Physical Reads | %Total |
|-------|-----------------|-------------|----------------|-----------------|----------------|--------|
|       |                 |             |                | INDEX PARTITION | 275            | 15.97  |
|       |                 |             |                | INDEX PARTITION | 164            | 9.52   |
|       |                 |             |                | INDEX PARTITION | 97             | 5.63   |





# If Time Permits... the Future!





# 64-Bit advancement of Directly addressable memory

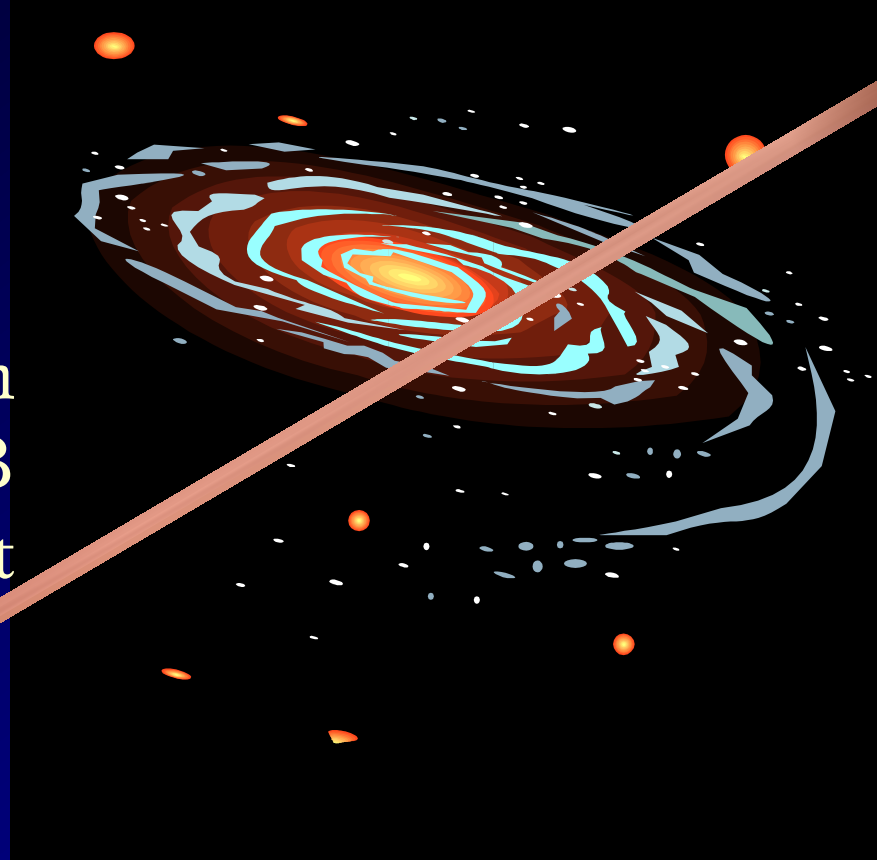
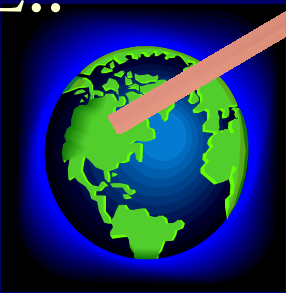
|                          | <u>Address Direct</u> |
|--------------------------|-----------------------|
| <u>Indirect/Extended</u> |                       |

- |                  |                            |             |
|------------------|----------------------------|-------------|
| • <u>4 Bit:</u>  | 16                         | (640)       |
| • <u>8 Bit:</u>  | 256                        | (65,536)    |
| • <u>16 Bit:</u> | 65,536                     | (1,048,576) |
| • <u>32 Bit:</u> | 4,294,967,296              |             |
| • <u>64 Bit:</u> | 18,446,744,073,709,551,616 |             |
- When the hardware physically implements the theoretical possibilities of 64-Bit, things will dramatically change....  
...moving from 32 bit to 64 bit will be like moving from 4 bit to 32 bit or like moving from 1971 to 2000 overnight.<sup>142</sup>



# 64bit allows Directly Addressing 16 Exabytes of Memory

Stack single  
sheets (2K  
worth of text on  
each) about 4.8B  
miles high to get  
16E!!



You could stack documents from the  
Earth so high they would pass Pluto!





# The Future: 8 Exabytes

## Look what fits in one 10g Database!



- 2K – A typewritten page
- 5M – The complete works of Shakespeare
- 10M – One minute of high fidelity sound
- 2T – Information generated on YouTube in one day
- 10T – 530,000,000 miles of bookshelves at the Library of Congress
- 20P – All hard-disk drives in 1995 (or your database in 2010)
- 700P – Data of 700,000 companies with Revenues less than \$200M
- 1E – Combined Fortune 1000 company databases (average 1P each)
- 1E – Next 9000 world company databases (average 100T each)
- 8E – Capacity of ONE Oracle10g Database (CURRENT)
- 12E to 16E – Info generated before 1999 (memory resident in 64-bit)
- 16E – Addressable memory with 64-bit (CURRENT)
- 161E – New information in 2006 (mostly images not stored in DB)
- 1Z – 1000E (Zettabyte - Grains of sand on beaches -125 Oracle DBs)
- 100TY - 100T-Yottabytes – Addressable memory 128-bit (FUTURE)<sup>144</sup>



# What we covered:

- Kramer's missing Backup
- George's Untuned System
- Elaine's Untouched System
- Jerry's Perfect Tuning Plan
- Statspack / AWR
  - Top Waits
  - Load Profile
  - Latch Waits
  - Top SQL
  - Instance Activity
  - File I/O
- The Future EM & ADDM
- Helpful V\$/X\$
- Summary





# *Questions??*







*“Perfection is achieved, not when there is nothing left to add, but when there is nothing left to take away.”*

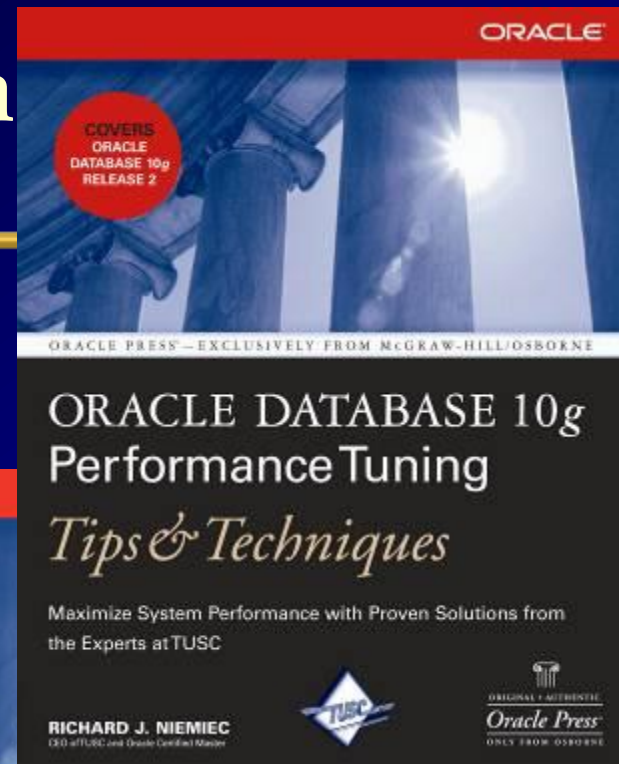
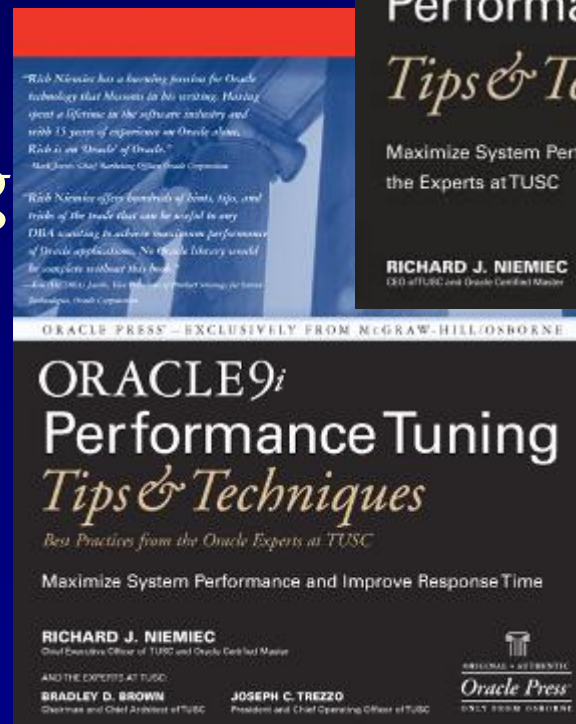
*--Antoine de St.*

*Exupery*



# For More Information

- [www.tusc.com](http://www.tusc.com)
  - *Oracle9i Performance Tuning Tips & Techniques; Richard J. Niemiec; Oracle Press (May 2003)*
  - *Oracle 10g Tuning (June 11, 2007)*
- "If you are going through hell, keep going" - Churchill*





# References

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- Oracle 9i, 10g, 11g documentation
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- *Oracle9i Web Development*, Bradley D. Brown; Oracle Press
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- *Oracle10g Performance Tuning Tips & Techniques*; Richard J. Niemiec; Oracle Press
- Database Secure Configuration Initiative: Enhancements with Oracle Database 11g, [www.oracle.com](http://www.oracle.com)
- All Oracle11g Documentation from Oracle Beta Site
- Introduction to Oracle Database 11g, Ken Jacobs
- Oracle Database 11g New Features, Linda Smith
- New Optimizer Features in 11g, Maria Colgan
- [www.ioug.org](http://www.ioug.org), [www.oracle.com](http://www.oracle.com), [en.wikipedia.org](http://en.wikipedia.org) & [technet.oracle.com](http://technet.oracle.com)
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  - Oracle Performing Tips & Techniques (Covers Oracle7 & 8i)
  - Oracle9i Performance Tips & Techniques
  - Oracle Database 10g Performance Tips & Techniques
- Former President of the International Oracle Users Group
- Current President of the Midwest Oracle Users Group
- Chicago Entrepreneur Hall of Fame - 1998
- E&Y Entrepreneur of the Year & National Hall of Fame - 2001
- IOUG Top Speaker in 1991, 1994, 1997, 2001, 2006, 2007
- MOUG Top Speaker Twelve Times
- National Trio Achiever award - 2006
- Oracle Certified Master & Oracle Ace Director

