Mining Automatic Workload Repository: Alternative Methods for Identification of the Top SQLs

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ORACLE OPENWORLD 2015

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Oracle [Apps] DBA since 2005

Speaker at conferences since 2007

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http://bit.ly/getMOSPatch

```
[oracle@mel1 patches]$ ./getMOSPatch.sh patch=6880880 regexp=".*121.*"
Oracle Support Userid: elsins@pythian.com
Oracle Support Password:

Getting list of files for patch 6880880 for "Linux x86-64"

Downloading the patches:
Downloading file p6880880_121010_Linux-x86-64.zip ...
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
 85 47.5M   85 40.5M    0     0  1863k      0  0:00:26  0:00:22  0:00:04 1775k
```

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ABOUT PYTHIAN

Pythian is a global IT services company that specializes in designing, implementing, and managing systems that directly contribute to revenue and business success. We help companies adopt disruptive technologies to advance innovation and increase agility. Our highly skilled technical teams work as an integrated extension of our clients' organizations to deliver continuous transformation and uninterrupted operational excellence.

- Top 5% talent worldwide
- 9 Oracle ACEs
- 4 Oracle ACE Directors
- 18 years in business
- 400+ employees
- 270+ customers worldwide

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ORACLE Platinum Partner
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Oracle Database 11*g*

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Oracle Enterprise Linux

Agenda

A Serious Wash Plant

Agenda

Panning

Demo

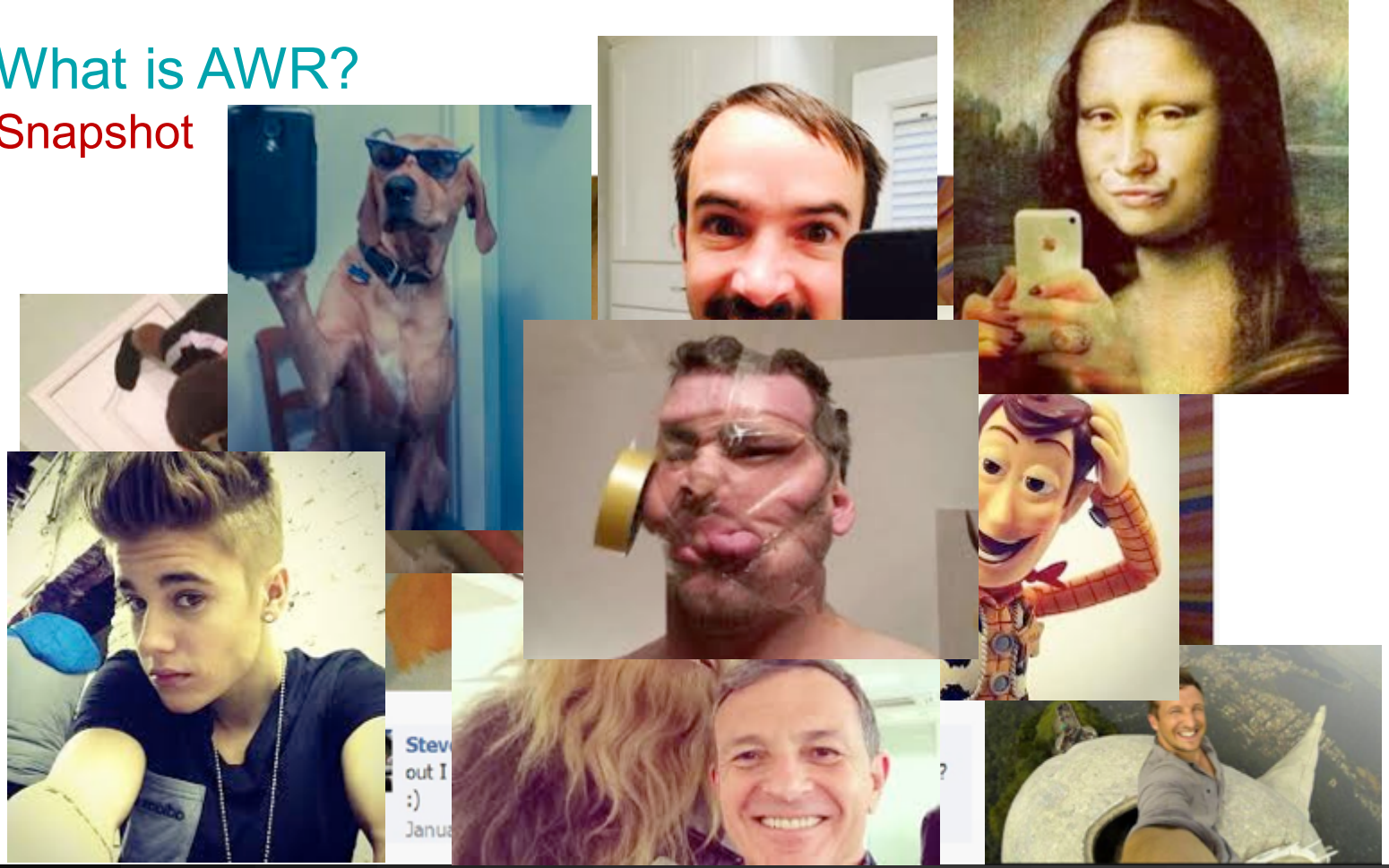
DEMO

What is AWR?

Workload

What is AWR?

Snapshot



What is AWR?

Repository

What is AWR?

AWR Report

AWR

Automatic Workload Repository

Let’s try again …

Workload

768 V$ (12.1.0.2)

AWR Snapshot

62+ V$ & X$

Workload

Captured by AWR

- **Object statistics** that determine both access and usage statistics of database segments
- **Time model statistics** based on time usage for activities, displayed in the V$SYS_TIME_MODEL and V$SESS_TIME_MODEL views
- Some of the **system and session statistics** collected in the V$SYSSTAT and V$SESSTAT views
- **SQL statements** that are producing the highest load on the system, based on criteria such as elapsed time and CPU time
- **Active Session History (ASH) statistics**, representing the history of recent sessions activity

AWR Snapshot

"The Selfie"

- MMON or dbms_workload_repository.create_snapshot()
- DBA_HIST_WR_CONTROL

```
SQL> select * from dba_hist_wr_control;

      DBID SNAP_INTERVAL        RETENTION           TOPNSQL        CON_ID
---------- -------------------- ------------------- ---------- ----------
1388947913 +00000 01:00:00.0    +00008 00:00:00.0   DEFAULT             1
```

- TOPNSQL "DEFAULT" depends on the STATISTICS_LEVEL
  - TYPICAL => 30 (is this enough?)
  - ALL => 100
- DBMS_WORKLOAD_REPOSITORY
  - Modify settings: MODIFY_SNAPSHOT_SETTINGS
  - Colored SQL: ADD_COLORED_SQL

SNAPSHOT

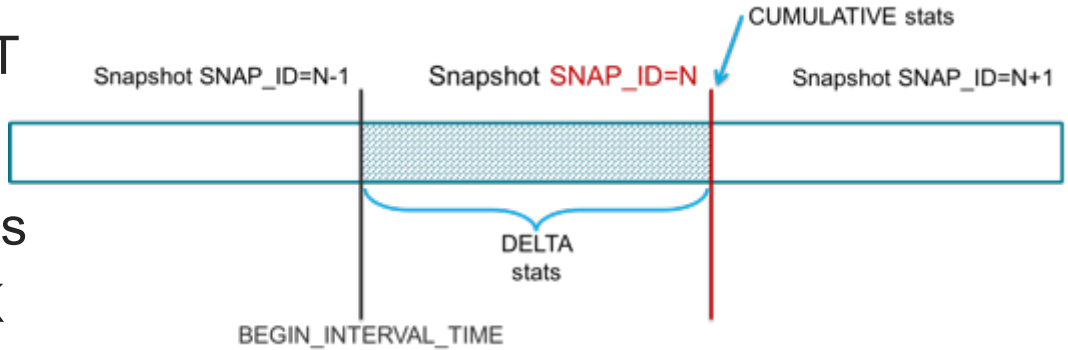
2 WAYS OF COLLECTING STATISTICS

- DELTAs & TOTALs
  - Captures current values
  - Pre-calculates Δvalues
  - DBA_HIST_SQLSTAT
  - DBA_HIST_SEG_STAT
- TOTALs
  - Captures current values
  - Similar to STATSPACK
  - DBA_HIST_IOSTAT_DETAIL and others

```
Listing the last day's Completed Snapshots

                                                        Snap
Instance     DB Name        Snap Id    Snap Started     Level
------------ ------------ --------- ------------------ -----
orcl         ORCL              200 03 Mar 2015 07:18      1
                               201 03 Mar 2015 07:30      1
                               202 03 Mar 2015 07:40      1
                               203 03 Mar 2015 07:50      1


Specify the Begin and End Snapshot Ids
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Enter value for begin_snap:
```



REPOSITORY

SNAP_ID - BASED INFORMATION (105)

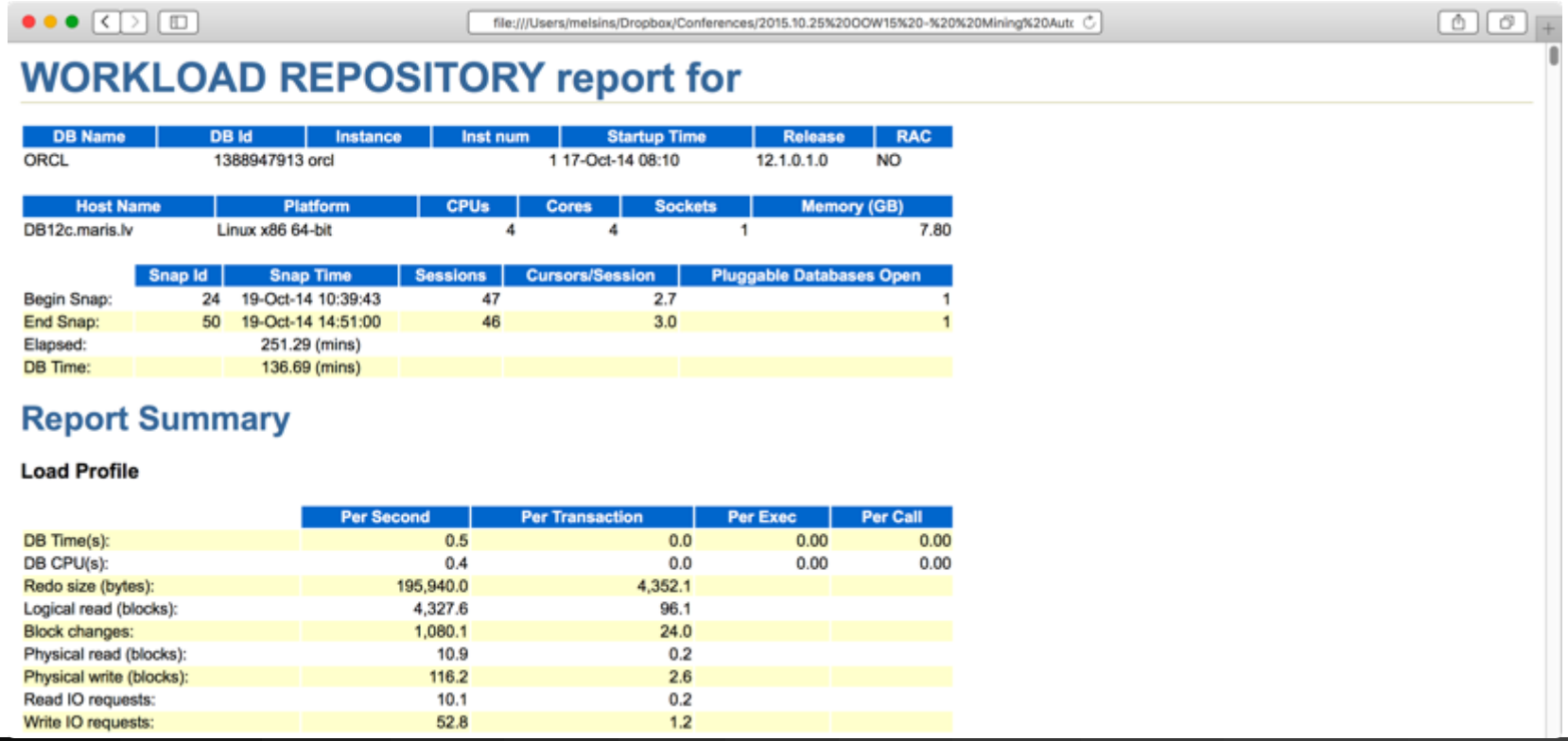
- DBA_HIST_ACTIVE_SESS_HISTORY
- DBA_HIST_APPLY_SUMMARY
- DBA_HIST_ASH_SNAPSH
- DBA_HIST_ASM_BAD_DI
- DBA_HIST_ASM_DISKGR
- DBA_HIST_BG_EVENT_S
- DBA_HIST_BUFFERED_
- DBA_HIST_BUFFERED_S
- DBA_HIST_BUFFER_PO
- DBA_HIST_CAPTURE
- DBA_HIST_CELL_CONFI
- DBA_HIST_CELL_DB
- DBA_HIST_CELL_DISKT
- DBA_HIST_CELL_DISK_
- DBA_HIST_CELL_DISK_S
- DBA_HIST_CELL_GLOBA
- DBA_HIST_CELL_GLOBA
- DBA_HIST_CELL_IOREA
- DBA_HIST_CELL_NAME
- DBA_HIST_CELL_OPEN_
- DBA_HIST_CLUSTER_IN
- DBA_HIST_COMP_IOSTA
- DBA_HIST_CR_BLOCK_S
- DBA_HIST_CURRENT_B
- DBA_HIST_DB_CACHE_A
- DBA_HIST_DISPATCHER
- DBA_HIST_DLM_MISC
- DBA_HIST_DYN_REMAS
- DBA_HIST_ENQUEUE_S
- DBA_HIST_EVENT_HIST
- DBA_HIST_FILEMETRIC
- DBA_HIST_FILESTATXS
- DBA_HIST_IC_CLIENT_S
- DBA_HIST_IC_DEVICE_STATS
- DBA_HIST_IM_SEG_STAT
- DBA_HIST_INSTANCE_RECOVERY
- DBA_HIST_INST_CACHE_TRANSFER
- DBA_HIST_RESOURCE_LIMIT
- DBA_HIST_ROWCACHE_SUMMARY
- DBA_HIST_RSRC_CONSUMER_GROUP
- DBA_HIST_RSRC_PLAN
- _SET
- STAT
- ICE_STAT
- ICE_WAIT_CLASS
- METRIC_HISTORY
- _SGA_STATS
- _TIME_STATS
- TAT
- TARGET_ADVICE
- ED_POOL_ADVICE
- ED_SERVER_SUMMARY
- SHOT
- _ERROR
- ND
- TAT
- SUMMARY
- WORKAREA_HSTGRM
- AMS_APPLY_SUM
- AMS_CAPTURE
- AMS_POOL_ADVICE
- ETRIC_HISTORY
- ETRIC_SUMMARY
- TAT
- EM_EVENT
- TIME_MODEL
- ESPACE_STAT
- C_SPACE_USAGE
- STATXS
- AD
- STAT
- CLASSMET_HISTORY
- DBA_HIST_WAITSTAT

Repository
Metadata

- DBA_HIST_ASM_DISKGROUP
- DBA_HIST_BASELINE
- DBA_HIST_BASELINE_DETAILS
- DBA_HIST_BASELINE_METADATA
- DBA_HIST_BASELINE_TEMPLATE
- DBA_HIST_CELL_CONFIG
- DBA_HIST_CELL_IOREASON_NAME
- DBA_HIST_CELL_METRIC_DESC
- DBA_HIST_COLORED_SQL
- DBA_HIST_DATABASE_INSTANCE
- DBA_HIST_DATAFILE
- DBA_HIST_EVENT_NAME
- DBA_HIST_IM_SEG_STAT_OBJ
- DBA_HIST_IOSTAT_FILETYPE_NAME
- DBA_HIST_IOSTAT_FUNCTION_NAME
- DBA_HIST_LATCH_NAME
- DBA_HIST_METRIC_NAME
- DBA_HIST_OPTIMIZER_ENV
- DBA_HIST_OSSTAT_NAME
- DBA_HIST_PARAMETER_NAME
- DBA_HIST_PDB_INSTANCE
- DBA_HIST_PLAN_OPERATION_NAME
- DBA_HIST_PLAN_OPTION_NAME
- DBA_HIST_REPORTS_CONTROL
- DBA_HIST_SEG_STAT_OBJ
- DBA_HIST_SERVICE_NAME
- DBA_HIST_SQLCOMMAND_NAME
- DBA_HIST_SQLTEXT
- DBA_HIST_SQL_BIND_METADATA
- DBA_HIST_SQL_PLAN
- DBA_HIST_STAT_NAME
- DBA_HIST_TABLESPACE
- DBA_HIST_TEMPFILE
- DBA_HIST_TOPLEVELCALL_NAME
- DBA_HIST_WR_CONTROL

DEMO

THANK YOU LARRY FOR AWR REPORTS!



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WORKLOAD REPOSITORY report for

DB Name	DB Id	Instance	Inst num	Startup Time	Release	RAC
ORCL	1388947913	orcl	1	17-Oct-14 08:10	12.1.0.1.0	NO

Host Name	Platform	CPUs	Cores	Sockets	Memory (GB)
DB12c.maris.lv	Linux x86 64-bit	4	4	1	7.80

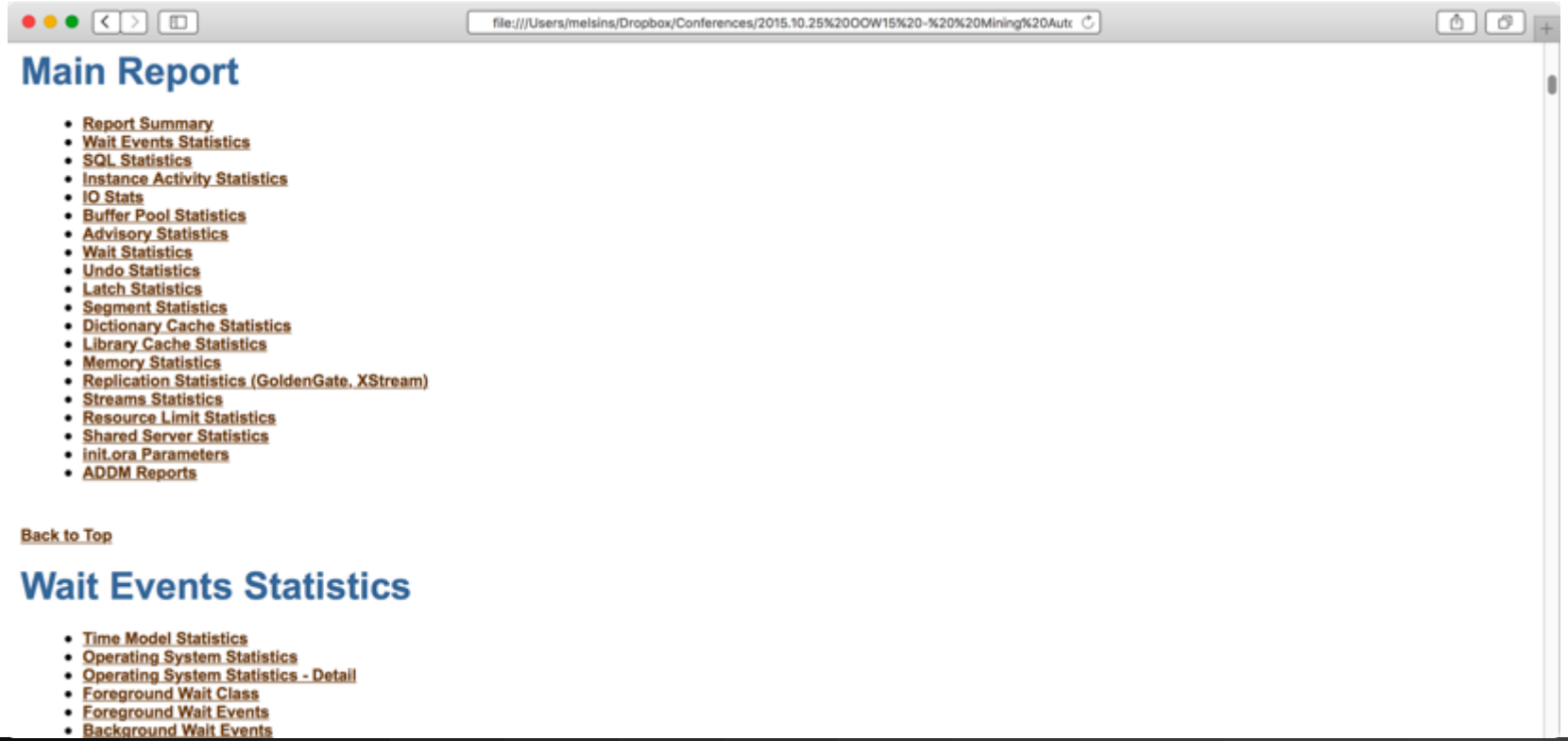
	Snap Id	Snap Time	Sessions	Cursors/Session	Pluggable Databases Open
Begin Snap:	24	19-Oct-14 10:39:43	47	2.7	1
End Snap:	50	19-Oct-14 14:51:00	46	3.0	1
Elapsed:		251.29 (mins)			
DB Time:		136.69 (mins)			

Report Summary

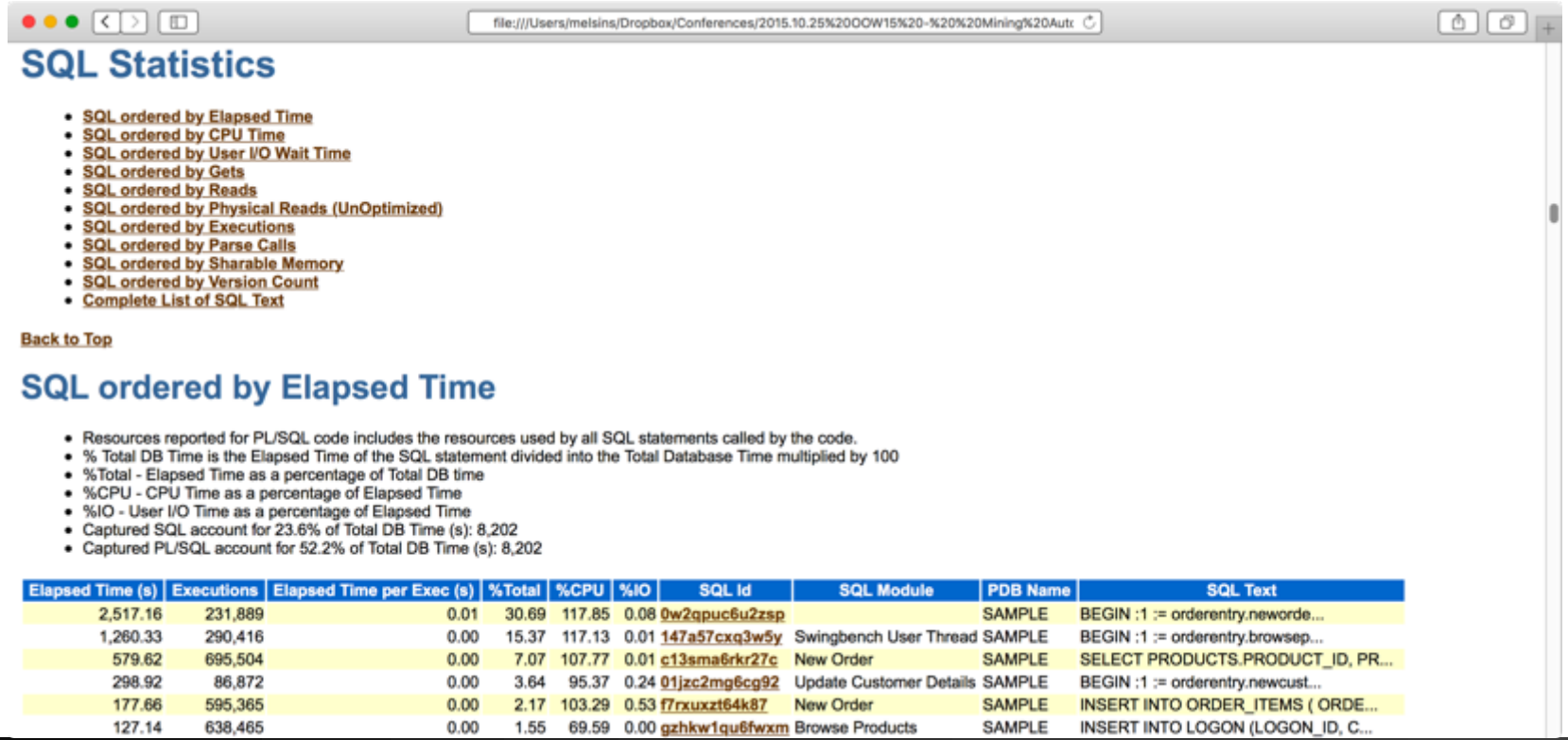
Load Profile

	Per Second	Per Transaction	Per Exec	Per Call
DB Time(s):	0.5	0.0	0.00	0.00
DB CPU(s):	0.4	0.0	0.00	0.00
Redo size (bytes):	195,940.0	4,352.1		
Logical read (blocks):	4,327.6	96.1		
Block changes:	1,080.1	24.0		
Physical read (blocks):	10.9	0.2		
Physical write (blocks):	116.2	2.6		
Read IO requests:	10.1	0.2		
Write IO requests:	52.8	1.2		

THANK YOU LARRY FOR AWR REPORTS!



THANK YOU LARRY FOR AWR REPORTS!



SQL Statistics

- SQL ordered by Elapsed Time
- SQL ordered by CPU Time
- SQL ordered by User I/O Wait Time
- SQL ordered by Gets
- SQL ordered by Reads
- SQL ordered by Physical Reads (UnOptimized)
- SQL ordered by Executions
- SQL ordered by Parse Calls
- SQL ordered by Sharable Memory
- SQL ordered by Version Count
- Complete List of SQL Text

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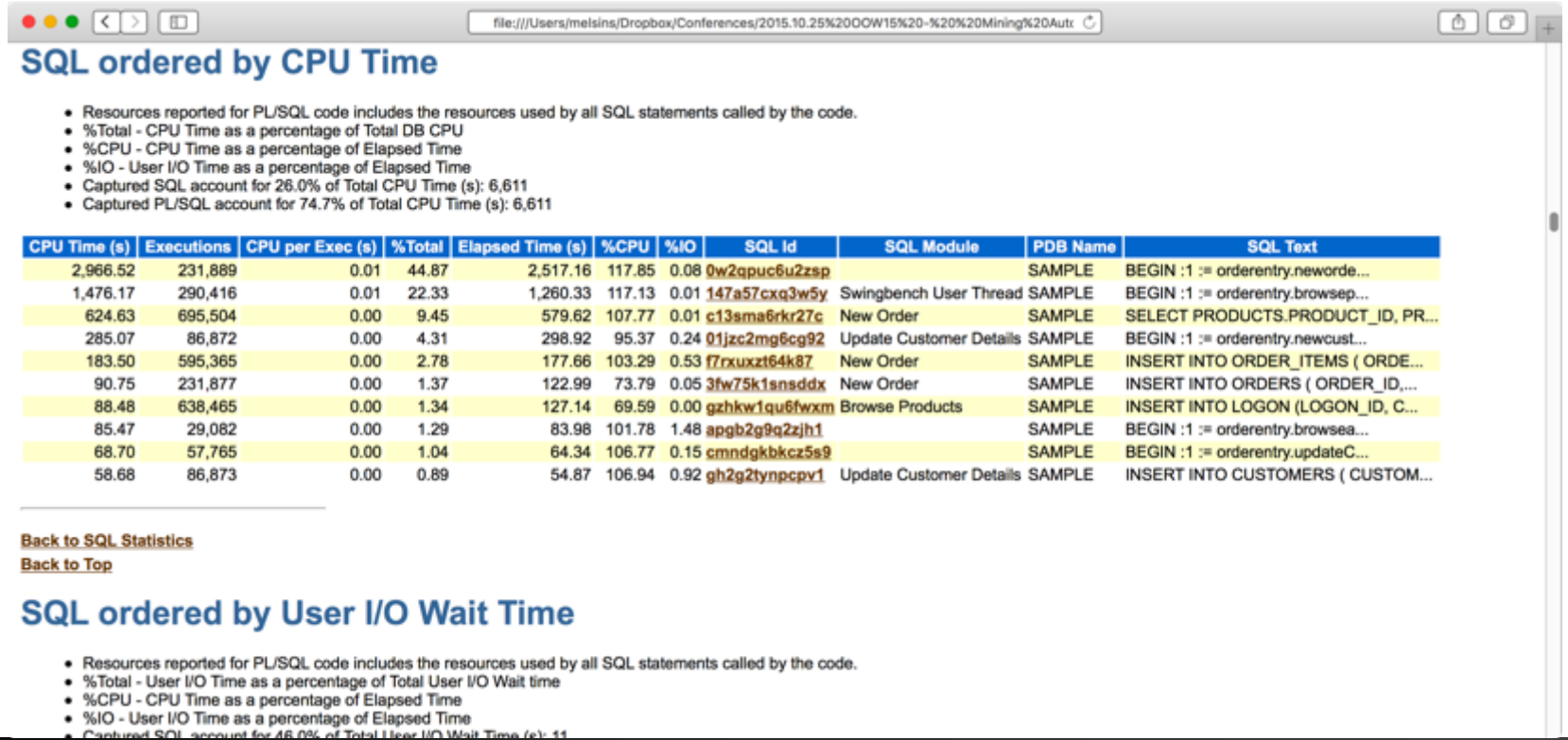
SQL ordered by Elapsed Time

- Resources reported for PL/SQL code includes the resources used by all SQL statements called by the code.
- % Total DB Time is the Elapsed Time of the SQL statement divided into the Total Database Time multiplied by 100
- %Total - Elapsed Time as a percentage of Total DB time
- %CPU - CPU Time as a percentage of Elapsed Time
- %IO - User I/O Time as a percentage of Elapsed Time
- Captured SQL account for 23.6% of Total DB Time (s): 8,202
- Captured PL/SQL account for 52.2% of Total DB Time (s): 8,202

Elapsed Time (s)	Executions	Elapsed Time per Exec (s)	%Total	%CPU	%IO	SQL Id	SQL Module	PDB Name	SQL Text
2,517.16	231,889	0.01	30.69	117.85	0.08	0w2qpuc6u2zsp		SAMPLE	BEGIN :1 := orderentry.neworde...
1,260.33	290,416	0.00	15.37	117.13	0.01	147a57cxq3w5y	Swingbench User Thread	SAMPLE	BEGIN :1 := orderentry.browsep...
579.62	695,504	0.00	7.07	107.77	0.01	c13sma6rkr27c	New Order	SAMPLE	SELECT PRODUCTS.PRODUCT_ID, PR...
298.92	86,872	0.00	3.64	95.37	0.24	01jzc2mg6cg92	Update Customer Details	SAMPLE	BEGIN :1 := orderentry.newcust...
177.66	595,365	0.00	2.17	103.29	0.53	f7rxuxzt64k87	New Order	SAMPLE	INSERT INTO ORDER_ITEMS (ORDE...
127.14	638,465	0.00	1.55	69.59	0.00	gzhkw1qu6fwxm	Browse Products	SAMPLE	INSERT INTO LOGON (LOGON_ID, C...

THANK YOU LARRY FOR AWR REPORTS!



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SQL ordered by CPU Time

- Resources reported for PL/SQL code includes the resources used by all SQL statements called by the code.
- %Total - CPU Time as a percentage of Total DB CPU
- %CPU - CPU Time as a percentage of Elapsed Time
- %IO - User I/O Time as a percentage of Elapsed Time
- Captured SQL account for 26.0% of Total CPU Time (s): 6,611
- Captured PL/SQL account for 74.7% of Total CPU Time (s): 6,611

CPU Time (s)	Executions	CPU per Exec (s)	%Total	Elapsed Time (s)	%CPU	%IO	SQL Id	SQL Module	PDB Name	SQL Text
2,966.52	231,889	0.01	44.87	2,517.16	117.85	0.08	0w2qpuc6u2zsp		SAMPLE	BEGIN :1 := orderentry.neworde...
1,476.17	290,416	0.01	22.33	1,260.33	117.13	0.01	147a57cxq3w5y	Swingbench User Thread	SAMPLE	BEGIN :1 := orderentry.browsep...
624.63	695,504	0.00	9.45	579.62	107.77	0.01	c13sma6rkr27c	New Order	SAMPLE	SELECT PRODUCTS.PRODUCT_ID, PR...
285.07	86,872	0.00	4.31	298.92	95.37	0.24	01jzc2mg6cg92	Update Customer Details	SAMPLE	BEGIN :1 := orderentry.newcust...
183.50	595,365	0.00	2.78	177.66	103.29	0.53	f7rxuxzt64k87	New Order	SAMPLE	INSERT INTO ORDER_ITEMS (ORDE...
90.75	231,877	0.00	1.37	122.99	73.79	0.05	3fw75k1snsddx	New Order	SAMPLE	INSERT INTO ORDERS (ORDER_ID,...
88.48	638,465	0.00	1.34	127.14	69.59	0.00	gzhkw1qu6fwxm	Browse Products	SAMPLE	INSERT INTO LOGON (LOGON_ID, C...
85.47	29,082	0.00	1.29	83.98	101.78	1.48	apgb2g9q2zjh1		SAMPLE	BEGIN :1 := orderentry.browsea...
68.70	57,765	0.00	1.04	64.34	106.77	0.15	cmndgkbkcz5s9		SAMPLE	BEGIN :1 := orderentry.updateC...
58.68	86,873	0.00	0.89	54.87	106.94	0.92	gh2g2tynpcpv1	Update Customer Details	SAMPLE	INSERT INTO CUSTOMERS (CUSTOM...

Back to SQL Statistics
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SQL ordered by User I/O Wait Time

- Resources reported for PL/SQL code includes the resources used by all SQL statements called by the code.
- %Total - User I/O Time as a percentage of Total User I/O Wait time
- %CPU - CPU Time as a percentage of Elapsed Time
- %IO - User I/O Time as a percentage of Elapsed Time
- Captured SQL account for 46.0% of Total User I/O Wait Time (s): 11

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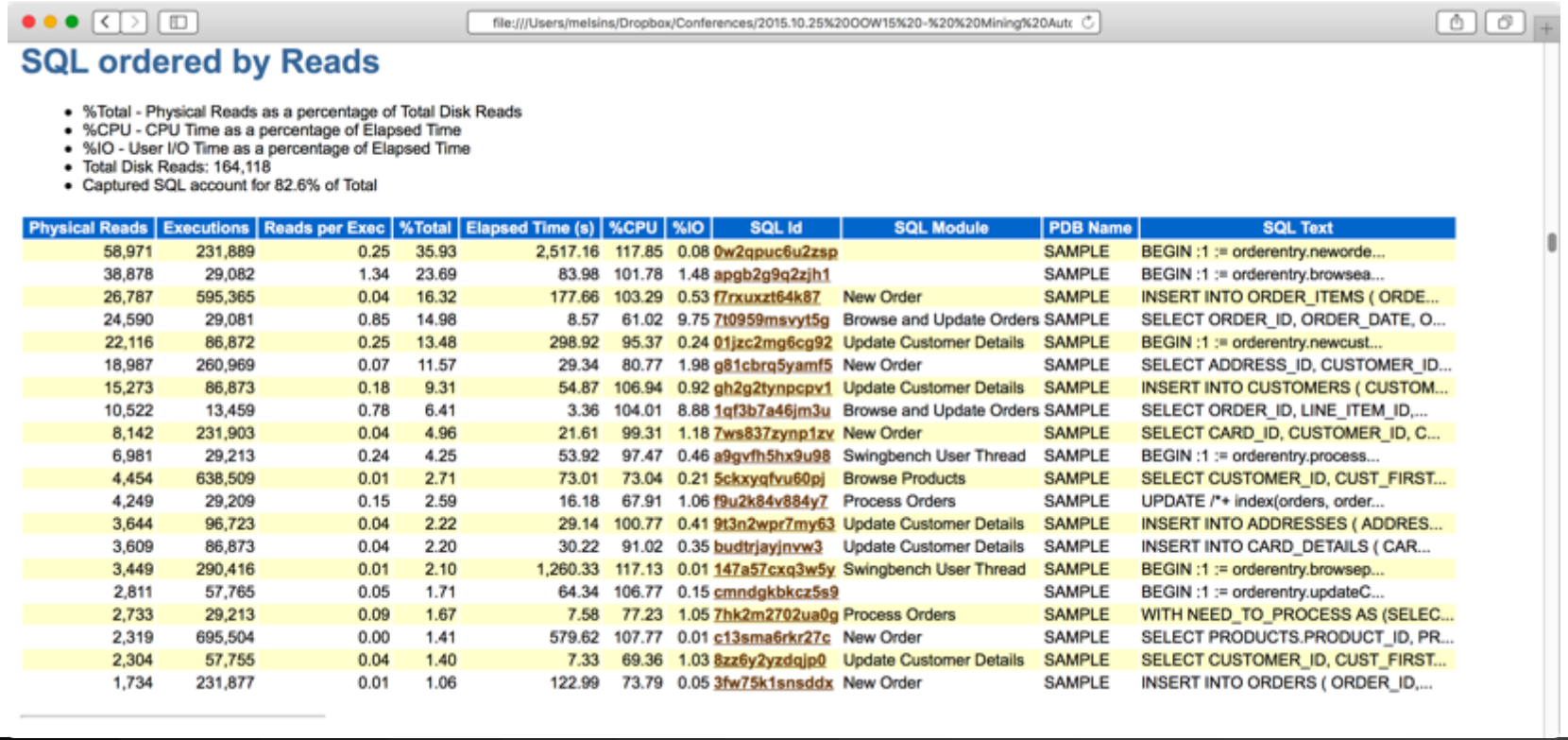

SQL ordered by Reads

- %Total - Physical Reads as a percentage of Total Disk Reads
- %CPU - CPU Time as a percentage of Elapsed Time
- %IO - User I/O Time as a percentage of Elapsed Time
- Total Disk Reads: 164,118
- Captured SQL account for 82.6% of Total

Physical Reads	Executions	Reads per Exec	%Total	Elapsed Time (s)	%CPU	%IO	SQL Id	SQL Module	PDB Name	SQL Text
58,971	231,889	0.25	35.93	2,517.16	117.85	0.08	0w2qpuc6u2zsp		SAMPLE	BEGIN :1 := orderentry.neworde...
38,878	29,082	1.34	23.69	83.98	101.78	1.48	apgb2g9q2zjh1		SAMPLE	BEGIN :1 := orderentry.browsea...
26,787	595,365	0.04	16.32	177.66	103.29	0.53	f7rxuxzt64k87	New Order	SAMPLE	INSERT INTO ORDER_ITEMS (ORDE...
24,590	29,081	0.85	14.98	8.57	61.02	9.75	7t0959msvyt5g	Browse and Update Orders	SAMPLE	SELECT ORDER_ID, ORDER_DATE, O...
22,116	86,872	0.25	13.48	298.92	95.37	0.24	01jzc2mg6cg92	Update Customer Details	SAMPLE	BEGIN :1 := orderentry.newcust...
18,987	260,969	0.07	11.57	29.34	80.77	1.98	g81cbrq5yamf5	New Order	SAMPLE	SELECT ADDRESS_ID, CUSTOMER_ID...
15,273	86,873	0.18	9.31	54.87	106.94	0.92	gh2g2tynpcpv1	Update Customer Details	SAMPLE	INSERT INTO CUSTOMERS (CUSTOM...
10,522	13,459	0.78	6.41	3.36	104.01	8.88	1qf3b7a46jm3u	Browse and Update Orders	SAMPLE	SELECT ORDER_ID, LINE_ITEM_ID,...
8,142	231,903	0.04	4.96	21.61	99.31	1.18	7ws837zynp1zv	New Order	SAMPLE	SELECT CARD_ID, CUSTOMER_ID, C...
6,981	29,213	0.24	4.25	53.92	97.47	0.46	a9gvfh5hx9u98	Swingbench User Thread	SAMPLE	BEGIN :1 := orderentry.process...
4,454	638,509	0.01	2.71	73.01	73.04	0.21	5ckxyqfvu60pj	Browse Products	SAMPLE	SELECT CUSTOMER_ID, CUST_FIRST...
4,249	29,209	0.15	2.59	16.18	67.91	1.06	f9u2k84v884y7	Process Orders	SAMPLE	UPDATE /*+ index(orders, order...
3,644	96,723	0.04	2.22	29.14	100.77	0.41	9t3n2wpr7my63	Update Customer Details	SAMPLE	INSERT INTO ADDRESSES (ADDRES...
3,609	86,873	0.04	2.20	30.22	91.02	0.35	budtrjayjnvw3	Update Customer Details	SAMPLE	INSERT INTO CARD_DETAILS (CAR...
3,449	290,416	0.01	2.10	1,260.33	117.13	0.01	147a57cxq3w5y	Swingbench User Thread	SAMPLE	BEGIN :1 := orderentry.browsep...
2,811	57,765	0.05	1.71	64.34	106.77	0.15	cmndgkbkcz5s9		SAMPLE	BEGIN :1 := orderentry.updateC...
2,733	29,213	0.09	1.67	7.58	77.23	1.05	7hk2m2702ua0g	Process Orders	SAMPLE	WITH NEED_TO_PROCESS AS (SELEC...
2,319	695,504	0.00	1.41	579.62	107.77	0.01	c13sma6rkr27c	New Order	SAMPLE	SELECT PRODUCTS.PRODUCT_ID, PR...
2,304	57,755	0.04	1.40	7.33	69.36	1.03	8zz6y2yzdqjp0	Update Customer Details	SAMPLE	SELECT CUSTOMER_ID, CUST_FIRST...
1,734	231,877	0.01	1.06	122.99	73.79	0.05	3fw75k1snsddx	New Order	SAMPLE	INSERT INTO ORDERS (ORDER_ID,...

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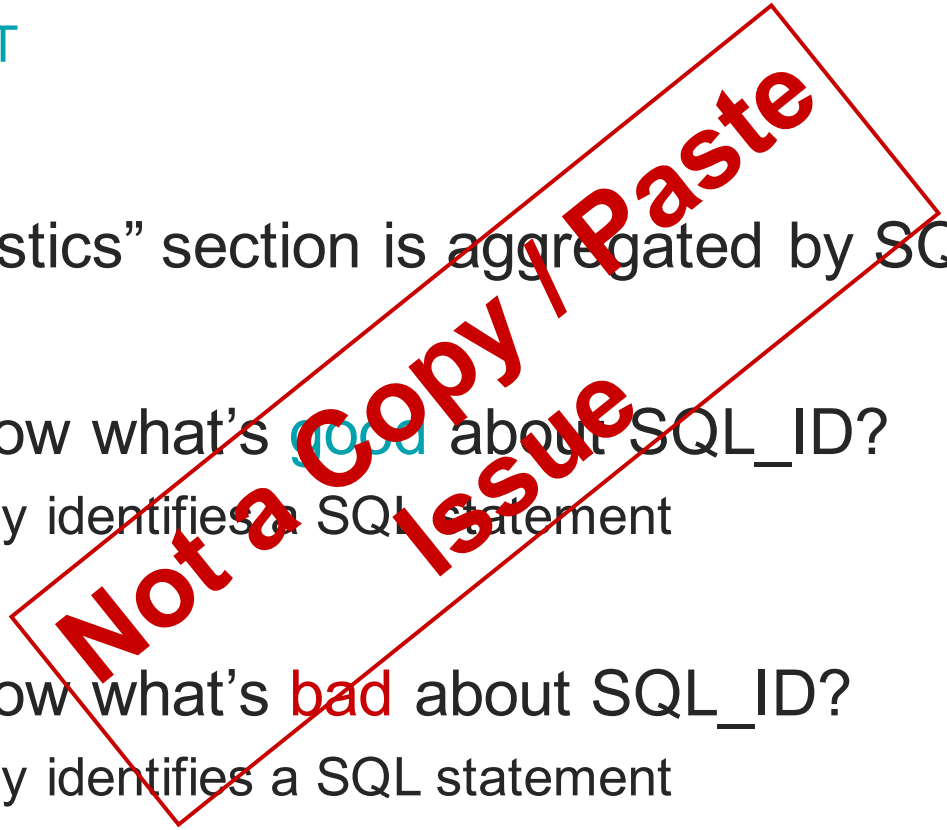
AWR Report

- "SQL Statistics" section is aggregated by SQL_ID
- Do you know what's good about SQL_ID?
  - It uniquely identifies a SQL statement
- Do you know what's bad about SQL_ID?
  - It uniquely identifies a SQL statement



SQL ID AND OTHER IDENTIFICATION METHODS

- DEMO - identification_demo.sql

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
[oracle@DB12c AWR_MINING3]$
[oracle@DB12c AWR_MINING3]$ sqlplus / as sysdba

SQL*Plus: Release 12.1.0.1.0 Production on Thu Oct 22 05:33:53 2015

Copyright (c) 1982, 2013, Oracle.  All rights reserved.


Connected to:
Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

SQL> @identification_demo.sql
SQL>
SQL>
SQL> alter system flush shared_pool;

System altered.

SQL> /

System altered.

SQL> /

System altered.

SQL> alter session set container = sample;

Session altered.

SQL>
SQL> -- Take a look at different SQL_IDs!
SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
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With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

SQL> @identification_demo.sql
SQL>
SQL>
SQL> alter system flush shared_pool;

System altered.

SQL> /

System altered.

SQL> /

System altered.

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Session altered.

SQL>
SQL> -- Take a look at different SQL_IDs!
SQL> pause

SQL>
SQL> select /*testquery*/ count(*) from oe.orders;

  COUNT(*)
----------
       105

SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
SQL> /

System altered.

SQL> /

System altered.

SQL> alter session set container = sample;

Session altered.

SQL>
SQL> -- Take a look at different SQL_IDs!
SQL> pause

SQL>
SQL> select /*testquery*/ count(*) from oe.orders;

  COUNT(*)
----------
       105

SQL> pause

SQL>
SQL> select sql_id, sql_text, length(sql_text) sql_length from v$sql where sql_text like '%/*test'||'query%*/%' order by LAST_LOAD_TIME;

SQL_ID        SQL_TEXT                                                                                                SQL_LENGTH
------------- ------------------------------------------------------------------------------------------------------- ----------
f3jjwdqz71dcy select /*testquery*/ count(*) from oe.orders                                                                    44

SQL> pause
```

```
melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35
SQL> alter session set container = sample;

Session altered.

SQL>
SQL> -- Take a look at different SQL_IDs!
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       105

SQL> pause

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SQL_ID        SQL_TEXT                                                                                                 SQL_LENGTH
------------- -------------------------------------------------------------------------------------------------------- ----------
f3jjwdqz71dcy select /*testquery*/ count(*) from oe.orders                                                                     44

SQL> pause

SQL>
SQL> SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS;

  COUNT(*)
----------
       105

SQL> pause
```

```
  COUNT(*)
----------
       105

SQL> pause

SQL>
SQL> select sql_id, sql_text, length(sql_text) sql_length from v$sql where sql_text like '%/*test'||'query%*/%' order by LAST_LOAD_TIME;

SQL_ID        SQL_TEXT                                                                                                SQL_LENGTH
------------- ------------------------------------------------------------------------------------------------------- ----------
f3jjwdqz71dcy select /*testquery*/ count(*) from oe.orders                                                                    44

SQL> pause

SQL>
SQL> SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS;

  COUNT(*)
----------
       105

SQL> pause

SQL>
SQL> select sql_id, sql_text, length(sql_text) sql_length from v$sql where sql_text like '%/*test'||'query%*/%' order by LAST_LOAD_TIME;

SQL_ID        SQL_TEXT                                                                                                SQL_LENGTH
------------- ------------------------------------------------------------------------------------------------------- ----------
f3jjwdqz71dcy select /*testquery*/ count(*) from oe.orders                                                                    44
fh24xkqaw0553 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                    44

SQL> pause
```

```
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SQL_ID        SQL_TEXT                                                                                                  SQL_LENGTH
------------- ------------------------------------------------------------------------------------------------------- ----------
f3jjwdqz71dcy select /*testquery*/ count(*) from oe.orders                                                                  44

SQL> pause

SQL>
SQL> SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS;

  COUNT(*)
----------
       105

SQL> pause

SQL>
SQL> select sql_id, sql_text, length(sql_text) sql_length from v$sql where sql_text like '%/*test'||'query%*/%' order by LAST_LOAD_TIME;

SQL_ID        SQL_TEXT                                                                                                  SQL_LENGTH
------------- ------------------------------------------------------------------------------------------------------- ----------
f3jjwdqz71dcy select /*testquery*/ count(*) from oe.orders                                                                  44
fh24xkqaw0553 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                  44

SQL> pause

SQL>
SQL> SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS          ;

  COUNT(*)
----------
       105

SQL> pause
```

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```
----------
       105

SQL> pause

SQL>
SQL> select sql_id, sql_text, length(sql_text) sql_length from v$sql where sql_text like '%/*test'||'query%*/%' order by LAST_LOAD_TIME;

SQL_ID        SQL_TEXT                                                                                                 SQL_LENGTH
------------- -------------------------------------------------------------------------------------------------------- ----------
f3jjwdqz71dcy select /*testquery*/ count(*) from oe.orders                                                                     44
fh24xkqaw0553 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                     44

SQL> pause

SQL>
SQL> SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS         ;

  COUNT(*)
----------
       105

SQL> pause

SQL>
SQL> select sql_id, sql_text, length(sql_text) sql_length from v$sql where sql_text like '%/*test'||'query%*/%' order by LAST_LOAD_TIME;

SQL_ID        SQL_TEXT                                                                                                 SQL_LENGTH
------------- -------------------------------------------------------------------------------------------------------- ----------
f3jjwdqz71dcy select /*testquery*/ count(*) from oe.orders                                                                     44
fh24xkqaw0553 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                     44
7ufgv9vacpz85 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                     54

SQL> pause
```

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```
------------- ------------------------------------------------------------------------------------------------------------ -----------
f3jjwdqz71dcy select /*testquery*/ count(*) from oe.orders                                                                        44
fh24xkqaw0553 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                        44

SQL> pause

SQL>
SQL> SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS          ;

  COUNT(*)
----------
       105

SQL> pause

SQL>
SQL> select sql_id, sql_text, length(sql_text) sql_length from v$sql where sql_text like '%/*test'||'query%*/%' order by LAST_LOAD_TIME;

SQL_ID        SQL_TEXT                                                                                                    SQL_LENGTH
------------- ------------------------------------------------------------------------------------------------------------ -----------
f3jjwdqz71dcy select /*testquery*/ count(*) from oe.orders                                                                        44
fh24xkqaw0553 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                        44
7ufgv9vacpz85 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                        54

SQL> pause

SQL>
SQL> SELECT /*testquery*/ COUNT(*) FROM    OE.ORDERS;

  COUNT(*)
----------
       105

SQL> pause
```

```
SQL> pause

SQL>
SQL> select sql_id, sql_text, length(sql_text) sql_length from v$sql where sql_text like '%/*test'||'query%*/%' order by LAST_LOAD_TIME;

SQL_ID        SQL_TEXT                                                                                                 SQL_LENGTH
------------- -------------------------------------------------------------------------------------------------------- ----------
f3jjwdqz71dcy select /*testquery*/ count(*) from oe.orders                                                                     44
fh24xkqaw0553 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                     44
7ufgv9vacpz85 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                     54

SQL> pause

SQL>
SQL> SELECT /*testquery*/ COUNT(*) FROM    OE.ORDERS;

  COUNT(*)
----------
       105

SQL> pause

SQL>
SQL> select sql_id, sql_text, length(sql_text) sql_length from v$sql where sql_text like '%/*test'||'query%*/%' order by LAST_LOAD_TIME;

SQL_ID        SQL_TEXT                                                                                                 SQL_LENGTH
------------- -------------------------------------------------------------------------------------------------------- ----------
f3jjwdqz71dcy select /*testquery*/ count(*) from oe.orders                                                                     44
fh24xkqaw0553 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                     44
7ufgv9vacpz85 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                     54
5r3bkn8z76sq5 SELECT /*testquery*/ COUNT(*) FROM    OE.ORDERS                                                                  47

SQL> pause
```

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```
fh24xkqaw0553 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                  44
7ufgv9vacpz85 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                  54

SQL> pause

SQL>
SQL> SELECT /*testquery*/ COUNT(*) FROM    OE.ORDERS;

  COUNT(*)
----------
       105

SQL> pause

SQL>
SQL> select sql_id, sql_text, length(sql_text) sql_length from v$sql where sql_text like '%/*test'||'query%*/%' order by LAST_LOAD_TIME;

SQL_ID        SQL_TEXT                                                                                                 SQL_LENGTH
------------- -------------------------------------------------------------------------------------------------------- ----------
f3jjwdqz71dcy select /*testquery*/ count(*) from oe.orders                                                                  44
fh24xkqaw0553 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                  44
7ufgv9vacpz85 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                  54
5r3bkn8z76sq5 SELECT /*testquery*/ COUNT(*) FROM    OE.ORDERS                                                               47

SQL> pause

SQL>
SQL> SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE 1=1;

  COUNT(*)
----------
       105

SQL> pause
```

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```
SQL>
SQL> select sql_id, sql_text, length(sql_text) sql_length from v$sql where sql_text like '%/*test'||'query%*/%' order by LAST_LOAD_TIME;

SQL_ID        SQL_TEXT                                                                                                 SQL_LENGTH
------------- -------------------------------------------------------------------------------------------------------- ----------
f3jjwdqz71dcy select /*testquery*/ count(*) from oe.orders                                                                     44
fh24xkqaw0553 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                     44
7ufgv9vacpz85 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                     54
5r3bkn8z76sq5 SELECT /*testquery*/ COUNT(*) FROM    OE.ORDERS                                                                  47

SQL> pause

SQL>
SQL> SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE 1=1;

  COUNT(*)
----------
       105

SQL> pause

SQL>
SQL> select sql_id, sql_text, length(sql_text) sql_length from v$sql where sql_text like '%/*test'||'query%*/%' order by LAST_LOAD_TIME;

SQL_ID        SQL_TEXT                                                                                                 SQL_LENGTH
------------- -------------------------------------------------------------------------------------------------------- ----------
f3jjwdqz71dcy select /*testquery*/ count(*) from oe.orders                                                                     44
fh24xkqaw0553 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                     44
7ufgv9vacpz85 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                     54
5r3bkn8z76sq5 SELECT /*testquery*/ COUNT(*) FROM    OE.ORDERS                                                                  47
bcr3qj4vmuzj1 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE 1=1                                                           54

SQL> pause
```

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```
5r3bkn8z76sq5 SELECT /*testquery*/ COUNT(*) FROM    OE.ORDERS                                                    47

SQL> pause

SQL>
SQL> SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE 1=1;

  COUNT(*)
----------
       105

SQL> pause

SQL>
SQL> select sql_id, sql_text, length(sql_text) sql_length from v$sql where sql_text like '%/*test'||'query%*/%' order by LAST_LOAD_TIME;

SQL_ID        SQL_TEXT                                                                                                 SQL_LENGTH
------------- -------------------------------------------------------------------------------------------------------- ----------
f3jjwdqz71dcy select /*testquery*/ count(*) from oe.orders                                                                 44
fh24xkqaw0553 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                 44
7ufgv9vacpz85 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                 54
5r3bkn8z76sq5 SELECT /*testquery*/ COUNT(*) FROM    OE.ORDERS                                                              47
bcr3qj4vmuzj1 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE 1=1                                                       54

SQL> pause

SQL>
SQL> SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1;

  COUNT(*)
----------
       105

SQL> pause
```

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```
SQL_ID        SQL_TEXT                                                                                                SQL_LENGTH
------------- ------------------------------------------------------------------------------------------------------- ----------
f3jjwdqz71dcy select /*testquery*/ count(*) from oe.orders                                                                    44
fh24xkqaw0553 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                    44
7ufgv9vacpz85 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                    54
5r3bkn8z76sq5 SELECT /*testquery*/ COUNT(*) FROM    OE.ORDERS                                                                 47
bcr3qj4vmuzj1 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE 1=1                                                          54

SQL> pause

SQL>
SQL> SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1;

  COUNT(*)
----------
       105

SQL> pause

SQL>
SQL> select sql_id, sql_text, length(sql_text) sql_length from v$sql where sql_text like '%/*test'||'query%*/%' order by LAST_LOAD_TIME;

SQL_ID        SQL_TEXT                                                                                                SQL_LENGTH
------------- ------------------------------------------------------------------------------------------------------- ----------
f3jjwdqz71dcy select /*testquery*/ count(*) from oe.orders                                                                    44
fh24xkqaw0553 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                    44
7ufgv9vacpz85 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                    54
5r3bkn8z76sq5 SELECT /*testquery*/ COUNT(*) FROM    OE.ORDERS                                                                 47
bcr3qj4vmuzj1 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE 1=1                                                          54
byypbc0t7q2br SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1                                                  62

6 rows selected.

SQL> pause
```

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```
SQL>
SQL> SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1;

  COUNT(*)
----------
       105

SQL> pause

SQL>
SQL> select sql_id, sql_text, length(sql_text) sql_length from v$sql where sql_text like '%/*test'||'query%*/%' order by LAST_LOAD_TIME;

SQL_ID        SQL_TEXT                                                                                                 SQL_LENGTH
------------- -------------------------------------------------------------------------------------------------------- ----------
f3jjwdqz71dcy select /*testquery*/ count(*) from oe.orders                                                                     44
fh24xkqaw0553 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                     44
7ufgv9vacpz85 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                     54
5r3bkn8z76sq5 SELECT /*testquery*/ COUNT(*) FROM    OE.ORDERS                                                                  47
bcr3qj4vmuzj1 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE 1=1                                                           54
byypbc0t7q2br SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1                                                   62

6 rows selected.

SQL> pause

SQL>
SQL> SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1000;

  COUNT(*)
----------
       105

SQL> pause
```

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```
7ufgv9vacpz85 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                    54
5r3bkn8z76sq5 SELECT /*testquery*/ COUNT(*) FROM    OE.ORDERS                                 47
bcr3qj4vmuzj1 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE 1=1                          54
byypbc0t7q2br SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1                  62

6 rows selected.

SQL> pause

SQL>
SQL> SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1000;

  COUNT(*)
----------
       105

SQL> pause

SQL>
SQL> select sql_id, sql_text, length(sql_text) sql_length from v$sql where sql_text like '%/*test'||'query%*/%' order by LAST_LOAD_TIME;

SQL_ID        SQL_TEXT                                                                                                  SQL_LENGTH
------------- ------------------------------------------------------------------------------------------------------- -----------
f3jjwdqz71dcy select /*testquery*/ count(*) from oe.orders                                                                    44
fh24xkqaw0553 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                    44
7ufgv9vacpz85 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                    54
5r3bkn8z76sq5 SELECT /*testquery*/ COUNT(*) FROM    OE.ORDERS                                                                 47
bcr3qj4vmuzj1 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE 1=1                                                          54
byypbc0t7q2br SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1                                                  62
9kj5umranz695 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1000                                               65

7 rows selected.

SQL> pause
```

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```
----------
       105

SQL> pause

SQL>
SQL> select sql_id, sql_text, length(sql_text) sql_length from v$sql where sql_text like '%/*test'||'query%*/%' order by LAST_LOAD_TIME;

SQL_ID        SQL_TEXT                                                                                                 SQL_LENGTH
------------- -------------------------------------------------------------------------------------------------------- ----------
f3jjwdqz71dcy select /*testquery*/ count(*) from oe.orders                                                                     44
fh24xkqaw0553 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                     44
7ufgv9vacpz85 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                     54
5r3bkn8z76sq5 SELECT /*testquery*/ COUNT(*) FROM    OE.ORDERS                                                                  47
bcr3qj4vmuzj1 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE 1=1                                                           54
byypbc0t7q2br SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1                                                   62
9kj5umranz695 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1000                                                65

7 rows selected.

SQL> pause

SQL>
SQL> var a number
SQL> var b number
SQL> exec :a:=-1

PL/SQL procedure successfully completed.

SQL> exec :b:=-1

PL/SQL procedure successfully completed.

SQL> pause
```

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```
------------ ------------------------------------------------------------------------------------------------------------ -----------
f3jjwdqz71dcy select /*testquery*/ count(*) from oe.orders                                                                        44
fh24xkqaw0553 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                        44
7ufgv9vacpz85 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                        54
5r3bkn8z76sq5 SELECT /*testquery*/ COUNT(*) FROM    OE.ORDERS                                                                     47
bcr3qj4vmuzj1 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE 1=1                                                              54
byypbc0t7q2br SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1                                                      62
9kj5umranz695 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1000                                                   65

7 rows selected.

SQL> pause

SQL>
SQL> var a number
SQL> var b number
SQL> exec :a:=-1

PL/SQL procedure successfully completed.

SQL> exec :b:=-1

PL/SQL procedure successfully completed.

SQL> pause

SQL>
SQL> SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>:a;

  COUNT(*)
----------
       105

SQL> pause
```

```
PL/SQL procedure successfully completed.

SQL> exec :b:=-1

PL/SQL procedure successfully completed.

SQL> pause

SQL>
SQL> SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>:a;

  COUNT(*)
----------
       105

SQL> pause

SQL>
SQL> select sql_id, sql_text, length(sql_text) sql_length from v$sql where sql_text like '%/*test'||'query%*/%' order by LAST_LOAD_TIME;

SQL_ID        SQL_TEXT                                                                                                 SQL_LENGTH
------------- -------------------------------------------------------------------------------------------------------- ----------
f3jjwdqz71dcy select /*testquery*/ count(*) from oe.orders                                                                     44
fh24xkqaw0553 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                     44
7ufgv9vacpz85 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                     54
5r3bkn8z76sq5 SELECT /*testquery*/ COUNT(*) FROM    OE.ORDERS                                                                  47
bcr3qj4vmuzj1 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE 1=1                                                           54
byypbc0t7q2br SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1                                                   62
9kj5umranz695 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1000                                                65
2jxwr5vdfp1zv SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>:a                                                   62

8 rows selected.

SQL> pause
```

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```
SQL> SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>:a;

  COUNT(*)
----------
       105

SQL> pause

SQL>
SQL> select sql_id, sql_text, length(sql_text) sql_length from v$sql where sql_text like '%/*test'||'query%*/%' order by LAST_LOAD_TIME;

SQL_ID        SQL_TEXT                                                                                          SQL_LENGTH
------------- ------------------------------------------------------------------------------------------------ -----------
f3jjwdqz71dcy select /*testquery*/ count(*) from oe.orders                                                           44
fh24xkqaw0553 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                           44
7ufgv9vacpz85 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                           54
5r3bkn8z76sq5 SELECT /*testquery*/ COUNT(*) FROM    OE.ORDERS                                                        47
bcr3qj4vmuzj1 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE 1=1                                                 54
byypbc0t7q2br SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1                                         62
9kj5umranz695 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1000                                      65
2jxwr5vdfp1zv SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>:a                                         62

8 rows selected.

SQL> pause

SQL>
SQL> SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>:b;

  COUNT(*)
----------
       105

SQL> pause
```

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```
9kj5umranz695 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1000                    65
2jxwr5vdfp1zv SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>:a                       62

8 rows selected.

SQL> pause

SQL>
SQL> SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>:b;

  COUNT(*)
----------
       105

SQL> pause

SQL>
SQL> select sql_id, sql_text, length(sql_text) sql_length from v$sql where sql_text like '%/*test'||'query%*/%' order by LAST_LOAD_TIME;

SQL_ID        SQL_TEXT                                                                                  SQL_LENGTH
------------- ----------------------------------------------------------------------------------------- ----------
f3jjwdqz71dcy select /*testquery*/ count(*) from oe.orders                                                      44
fh24xkqaw0553 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                      44
7ufgv9vacpz85 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                      54
5r3bkn8z76sq5 SELECT /*testquery*/ COUNT(*) FROM    OE.ORDERS                                                   47
bcr3qj4vmuzj1 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE 1=1                                            54
byypbc0t7q2br SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1                                    62
9kj5umranz695 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1000                                 65
2jxwr5vdfp1zv SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>:a                                    62
f90ycm0wk1urp SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>:b                                    62

9 rows selected.

SQL> pause
```

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```
SQL> pause

SQL>
SQL> SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>:b;

  COUNT(*)
----------
       105

SQL> pause

SQL>
SQL> select sql_id, sql_text, length(sql_text) sql_length from v$sql where sql_text like '%/*test'||'query%*/%' order by LAST_LOAD_TIME;

SQL_ID        SQL_TEXT                                                                                                 SQL_LENGTH
------------- -------------------------------------------------------------------------------------------------------- ----------
f3jjwdqz71dcy select /*testquery*/ count(*) from oe.orders                                                                     44
fh24xkqaw0553 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                     44
7ufgv9vacpz85 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                     54
5r3bkn8z76sq5 SELECT /*testquery*/ COUNT(*) FROM    OE.ORDERS                                                                  47
bcr3qj4vmuzj1 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE 1=1                                                           54
byypbc0t7q2br SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1                                                   62
9kj5umranz695 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1000                                               65
2jxwr5vdfp1zv SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>:a                                                  62
f90ycm0wk1urp SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>:b                                                  62

9 rows selected.

SQL> pause

SQL>
SQL> -- Do you know of any other SQL identification methods?
SQL> pause
```

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```
SQL>
SQL> SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>:b;

  COUNT(*)
----------
       105

SQL> pause

SQL>
SQL> select sql_id, sql_text, length(sql_text) sql_length from v$sql where sql_text like '%/*test'||'query%*/%' order by LAST_LOAD_TIME;

SQL_ID        SQL_TEXT                                                                                                 SQL_LENGTH
------------- -------------------------------------------------------------------------------------------------------- ----------
f3jjwdqz71dcy select /*testquery*/ count(*) from oe.orders                                                                     44
fh24xkqaw0553 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                     44
7ufgv9vacpz85 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                     54
byypbc0t7q2br SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1                                                   62
5r3bkn8z76sq5 SELECT /*testquery*/ COUNT(*) FROM    OE.ORDERS                                                                  47
bcr3qj4vmuzj1 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE 1=1                                                           54
9kj5umranz695 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1000                                                65
2jxwr5vdfp1zv SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>:a                                                   62
f90ycm0wk1urp SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>:b                                                   62

9 rows selected.

SQL> pause

SQL>
SQL> -- Do you know of any other SQL identification methods?
SQL> pause

SQL> -- What about EXACT_MATCHING_SIGNATURE?
SQL> pause
```

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```
SQL> pause

SQL>
SQL> -- Do you know of any other SQL identification methods?
SQL> pause

SQL> -- What about EXACT_MATCHING_SIGNATURE?
SQL> pause

SQL>
SQL> break on EXACT_MATCHING_SIGNATURE duplicates skip 1
SQL> select sql_id, exact_matching_signature, sql_text, length(sql_text) sql_length from v$sql where sql_text like '%/*test'||'query%*/%' order by 2, LAST_LOAD_TIME;

SQL_ID         EXACT_MATCHING_SIGNATURE SQL_TEXT                                                                                                  SQL_LENGTH
------------- ------------------------ ---------------------------------------------------------------------------------------------------------- ----------
bcr3qj4vmuzj1       1917735050037348462 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE 1=1                                                             54

f90ycm0wk1urp       5642286950026349691 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>:b                                                     62

9kj5umranz695       6861089955825787148 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1000                                                  65

f3jjwdqz71dcy       7560235921535299854 select /*testquery*/ count(*) from oe.orders                                                                      44
fh24xkqaw0553       7560235921535299854 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                      44
7ufgv9vacpz85       7560235921535299854 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                      54
5r3bkn8z76sq5       7560235921535299854 SELECT /*testquery*/ COUNT(*) FROM    OE.ORDERS                                                                   47

2jxwr5vdfp1zv      13805308688061585668 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>:a                                                     62

byypbc0t7q2br      15411379419093560071 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1                                                      62


9 rows selected.

SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
SQL> pause

SQL> -- What about EXACT_MATCHING_SIGNATURE?
SQL> pause

SQL>
SQL> break on EXACT_MATCHING_SIGNATURE duplicates skip 1
SQL> select sql_id, exact_matching_signature, sql_text, length(sql_text) sql_length from v$sql where sql_text like '%/*test'||'query%*/%' order by 2, LAST_LOAD_TIME;

SQL_ID         EXACT_MATCHING_SIGNATURE SQL_TEXT                                                                                                  SQL_LENGTH
------------- ------------------------ ---------------------------------------------------------------------------------------------------------- -----------
bcr3qj4vmuzj1       1917735050037348462 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE 1=1                                                             54

f90ycm0wk1urp       5642286950026349691 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>:b                                                     62

9kj5umranz695       6861089955825787148 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1000                                                  65

f3jjwdqz71dcy       7560235921535299854 select /*testquery*/ count(*) from oe.orders                                                                      44
fh24xkqaw0553       7560235921535299854 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                      44
7ufgv9vacpz85       7560235921535299854 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                      54
5r3bkn8z76sq5       7560235921535299854 SELECT /*testquery*/ COUNT(*) FROM    OE.ORDERS                                                                   47

2jxwr5vdfp1zv      13805308688061585668 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>:a                                                     62

byypbc0t7q2br      15411379419093560071 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1                                                     62


9 rows selected.

SQL> pause

SQL>
SQL> -- You must have heard of FORCE_MATCHING_SIGNATURE too
SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
9 rows selected.

SQL> pause

SQL>
SQL> -- You must have heard of FORCE_MATCHING_SIGNATURE too
SQL> pause

SQL>
SQL> clear breaks
SQL> break on FORCE_MATCHING_SIGNATURE duplicates skip 1;
SQL> select sql_id, force_matching_signature, sql_text, length(sql_text) sql_length from v$sql where sql_text like '%/*test'||'query%*/%' order by 2, 3, LAST_LOAD_TIME;

SQL_ID         FORCE_MATCHING_SIGNATURE SQL_TEXT                                                                                                  SQL_LENGTH
------------- ------------------------ ---------------------------------------------------------------------------------------------------------- -----------
f90ycm0wk1urp       5642286950026349691 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>:b                                                     62

5r3bkn8z76sq5       7560235921535299854 SELECT /*testquery*/ COUNT(*) FROM    OE.ORDERS                                                                    47
fh24xkqaw0553       7560235921535299854 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                     44
7ufgv9vacpz85       7560235921535299854 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                     54
f3jjwdqz71dcy       7560235921535299854 select /*testquery*/ count(*) from oe.orders                                                                     44

byypbc0t7q2br       8639627088589992892 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1                                                   62
9kj5umranz695       8639627088589992892 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1000                                                65

2jxwr5vdfp1zv      13805308688061585668 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>:a                                                   62

bcr3qj4vmuzj1      15184701051591850165 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE 1=1                                                          54


9 rows selected.

SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
SQL>
SQL> -- You must have heard of FORCE_MATCHING_SIGNATURE too
SQL> pause

SQL>
SQL> clear breaks
SQL> break on FORCE_MATCHING_SIGNATURE duplicates skip 1;
SQL> select sql_id, force_matching_signature, sql_text, length(sql_text) sql_length from v$sql where sql_text like '%/*test'||'query%*/%' order by 2, 3, LAST_LOAD_TIME;

SQL_ID         FORCE_MATCHING_SIGNATURE SQL_TEXT                                                                                                  SQL_LENGTH
------------- ------------------------ ---------------------------------------------------------------------------------------------------------- -----------
f90ycm0wk1urp       5642286950026349691 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>:b                                                     62

5r3bkn8z76sq5       7560235921535299854 SELECT /*testquery*/ COUNT(*) FROM    OE.ORDERS                                                                    47
fh24xkqaw0553       7560235921535299854 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                     44
7ufgv9vacpz85       7560235921535299854 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                                     54
f3jjwdqz71dcy       7560235921535299854 select /*testquery*/ count(*) from oe.orders                                                                     44

byypbc0t7q2br       8639627088589992892 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1                                                   62
9kj5umranz695       8639627088589992892 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1000                                                65

2jxwr5vdfp1zv      13805308688061585668 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>:a                                                   62

bcr3qj4vmuzj1      15184701051591850165 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE 1=1                                                          54


9 rows selected.

SQL> pause

SQL>
SQL> -- This doesn't really identify the SQL statement, but take a look what happens if we group them by PLAN_HASH_VALUE
SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
bcr3qj4vmuzj1      15184701051591850165 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE 1=1                                  54


9 rows selected.

SQL> pause

SQL>
SQL> -- This doesn't really identify the SQL statement, but take a look what happens if we group them by PLAN_HASH_VALUE
SQL> pause

SQL>
SQL> clear breaks
SQL> break on PLAN_HASH_VALUE duplicates skip 1;
SQL> select sql_id, plan_hash_value, sql_text, length(sql_text) sql_length from v$sql where sql_text like '%/*test'||'query%*/%' order by 2, 4, LAST_LOAD_TIME;

SQL_ID        PLAN_HASH_VALUE SQL_TEXT                                                                                  SQL_LENGTH
------------- --------------- ------------------------------------------------------------------------------------------ ----------
f3jjwdqz71dcy      2738315105 select /*testquery*/ count(*) from oe.orders                                                       44
fh24xkqaw0553      2738315105 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                       44
5r3bkn8z76sq5      2738315105 SELECT /*testquery*/ COUNT(*) FROM    OE.ORDERS                                                   47
7ufgv9vacpz85      2738315105 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                       54
bcr3qj4vmuzj1      2738315105 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE 1=1                                             54

byypbc0t7q2br      4223739315 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1                                     62
2jxwr5vdfp1zv      4223739315 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>:a                                     62
f90ycm0wk1urp      4223739315 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>:b                                     62
9kj5umranz695      4223739315 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1000                                  65


9 rows selected.

SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
SQL> pause

SQL>
SQL> -- This doesn't really identify the SQL statement, but take a look what happens if we group them by PLAN_HASH_VALUE
SQL> pause

SQL>
SQL> clear breaks
SQL> break on PLAN_HASH_VALUE duplicates skip 1;
SQL> select sql_id, plan_hash_value, sql_text, length(sql_text) sql_length from v$sql where sql_text like '%/*test'||'query%*/%' order by 2, 4, LAST_LOAD_TIME;

SQL_ID        PLAN_HASH_VALUE SQL_TEXT                                                                                  SQL_LENGTH
------------- --------------- ------------------------------------------------------------------------------------------ ----------
f3jjwdqz71dcy      2738315105 select /*testquery*/ count(*) from oe.orders                                                       44
fh24xkqaw0553      2738315105 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                    44
5r3bkn8z76sq5      2738315105 SELECT /*testquery*/ COUNT(*) FROM    OE.ORDERS                                                 47
7ufgv9vacpz85      2738315105 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS                                                    54
bcr3qj4vmuzj1      2738315105 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE 1=1                                          54

byypbc0t7q2br      4223739315 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1                                   62
2jxwr5vdfp1zv      4223739315 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>:a                                   62
f90ycm0wk1urp      4223739315 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>:b                                   62
9kj5umranz695      4223739315 SELECT /*testquery*/ COUNT(*) FROM OE.ORDERS WHERE order_id>-1000                               65


9 rows selected.

SQL> pause

SQL>
SQL> exit
Disconnected from Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options
[oracle@DB12c AWR_MINING3]$
```

Challenges with Unique Identification

- Different formatting of a SQL statement
- Misuse of constants in SQL statements
- Use of constants in semantically equivalent statements (should these be separated?)
- Different names for bind variables in equivalent SQL statements

- Does EXACT_MATCHING_SIGNATURE help?
- Does FORCE_MATCHING_SIGNATURE help?
- Does PLAN_HASH_VALUE help?

LET'S MINE THE AWR!

- DEMO - awr_top_sqlid_demo.sql

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
[oracle@DB12c AWR_MINING3]$ sqlplus / as sysdba

SQL*Plus: Release 12.1.0.1.0 Production on Thu Oct 22 05:47:16 2015

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Connected to:
Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

SQL> @awr_top_sqlid_demo.sql
SQL> alter session set container = sample;

Session altered.

SQL>
SQL> -- if you want to stat digging into AWR you don't have to know all the tables - 2 is enough!
SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
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Connected to:
Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

SQL> @awr_top_sqlid_demo.sql
SQL> alter session set container = sample;

Session altered.

SQL>
SQL> -- if you want to stat digging into AWR you don't have to know all the tables - 2 is enough!
SQL> pause

SQL>
SQL> desc dba_hist_snapshot
 Name                                              Null?    Type
 ------------------------------------------------- -------- ---------------------------------
 SNAP_ID                                           NOT NULL NUMBER
 DBID                                              NOT NULL NUMBER
 INSTANCE_NUMBER                                   NOT NULL NUMBER
 STARTUP_TIME                                      NOT NULL TIMESTAMP(3)
 BEGIN_INTERVAL_TIME                               NOT NULL TIMESTAMP(3)
 END_INTERVAL_TIME                                 NOT NULL TIMESTAMP(3)
 FLUSH_ELAPSED                                              INTERVAL DAY(5) TO SECOND(1)
 SNAP_LEVEL                                                 NUMBER
 ERROR_COUNT                                                NUMBER
 SNAP_FLAG                                                  NUMBER
 SNAP_TIMEZONE                                              INTERVAL DAY(0) TO SECOND(0)
 CON_ID                                                     NUMBER

SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
SQL> desc dba_hist_sqlstat
 Name                                      Null?    Type
 ----------------------------------------- -------- ------------------------------------
 SNAP_ID                                   NOT NULL NUMBER
 DBID                                      NOT NULL NUMBER
 INSTANCE_NUMBER                           NOT NULL NUMBER
 SQL_ID                                    NOT NULL VARCHAR2(13)
 PLAN_HASH_VALUE                           NOT NULL NUMBER
 OPTIMIZER_COST                                     NUMBER
 OPTIMIZER_MODE                                     VARCHAR2(10)
 OPTIMIZER_ENV_HASH_VALUE                           NUMBER
 SHARABLE_MEM                                       NUMBER
 LOADED_VERSIONS                                    NUMBER
 VERSION_COUNT                                      NUMBER
 MODULE                                             VARCHAR2(64)
 ACTION                                             VARCHAR2(64)
 SQL_PROFILE                                        VARCHAR2(64)
 FORCE_MATCHING_SIGNATURE                           NUMBER
 PARSING_SCHEMA_ID                                  NUMBER
 PARSING_SCHEMA_NAME                                VARCHAR2(128)
 PARSING_USER_ID                                    NUMBER
 FETCHES_TOTAL                                      NUMBER
 FETCHES_DELTA                                      NUMBER
 END_OF_FETCH_COUNT_TOTAL                           NUMBER
 END_OF_FETCH_COUNT_DELTA                           NUMBER
 SORTS_TOTAL                                        NUMBER
 SORTS_DELTA                                        NUMBER
 EXECUTIONS_TOTAL                                   NUMBER
 EXECUTIONS_DELTA                                   NUMBER
 PX_SERVERS_EXECS_TOTAL                             NUMBER
 PX_SERVERS_EXECS_DELTA                             NUMBER
 LOADS_TOTAL                                        NUMBER
 LOADS_DELTA                                        NUMBER
 INVALIDATIONS_TOTAL                                NUMBER
 INVALIDATIONS_DELTA                                NUMBER
```

PARSE_CALLS_DELTA	NUMBER
DISK_READS_TOTAL	NUMBER
DISK_READS_DELTA	NUMBER
BUFFER_GETS_TOTAL	NUMBER
BUFFER_GETS_DELTA	NUMBER
ROWS_PROCESSED_TOTAL	NUMBER
ROWS_PROCESSED_DELTA	NUMBER
CPU_TIME_TOTAL	NUMBER
CPU_TIME_DELTA	NUMBER
ELAPSED_TIME_TOTAL	NUMBER
ELAPSED_TIME_DELTA	NUMBER
IOWAIT_TOTAL	NUMBER
IOWAIT_DELTA	NUMBER
CLWAIT_TOTAL	NUMBER
CLWAIT_DELTA	NUMBER
APWAIT_TOTAL	NUMBER
APWAIT_DELTA	NUMBER
CCWAIT_TOTAL	NUMBER
CCWAIT_DELTA	NUMBER
DIRECT_WRITES_TOTAL	NUMBER
DIRECT_WRITES_DELTA	NUMBER
PLSEXEC_TIME_TOTAL	NUMBER
PLSEXEC_TIME_DELTA	NUMBER
JAVEXEC_TIME_TOTAL	NUMBER
JAVEXEC_TIME_DELTA	NUMBER
IO_OFFLOAD_ELIG_BYTES_TOTAL	NUMBER
IO_OFFLOAD_ELIG_BYTES_DELTA	NUMBER
IO_INTERCONNECT_BYTES_TOTAL	NUMBER
IO_INTERCONNECT_BYTES_DELTA	NUMBER
PHYSICAL_READ_REQUESTS_TOTAL	NUMBER
PHYSICAL_READ_REQUESTS_DELTA	NUMBER
PHYSICAL_READ_BYTES_TOTAL	NUMBER
PHYSICAL_READ_BYTES_DELTA	NUMBER
PHYSICAL_WRITE_REQUESTS_TOTAL	NUMBER
PHYSICAL_WRITE_REQUESTS_DELTA	NUMBER

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
 APWAIT_TOTAL                                      NUMBER
 APWAIT_DELTA                                      NUMBER
 CCWAIT_TOTAL                                      NUMBER
 CCWAIT_DELTA                                      NUMBER
 DIRECT_WRITES_TOTAL                               NUMBER
 DIRECT_WRITES_DELTA                               NUMBER
 PLSEXEC_TIME_TOTAL                                NUMBER
 PLSEXEC_TIME_DELTA                                NUMBER
 JAVEXEC_TIME_TOTAL                                NUMBER
 JAVEXEC_TIME_DELTA                                NUMBER
 IO_OFFLOAD_ELIG_BYTES_TOTAL                       NUMBER
 IO_OFFLOAD_ELIG_BYTES_DELTA                       NUMBER
 IO_INTERCONNECT_BYTES_TOTAL                       NUMBER
 IO_INTERCONNECT_BYTES_DELTA                       NUMBER
 PHYSICAL_READ_REQUESTS_TOTAL                      NUMBER
 PHYSICAL_READ_REQUESTS_DELTA                      NUMBER
 PHYSICAL_READ_BYTES_TOTAL                         NUMBER
 PHYSICAL_READ_BYTES_DELTA                         NUMBER
 PHYSICAL_WRITE_REQUESTS_TOTAL                     NUMBER
 PHYSICAL_WRITE_REQUESTS_DELTA                     NUMBER
 PHYSICAL_WRITE_BYTES_TOTAL                        NUMBER
 PHYSICAL_WRITE_BYTES_DELTA                        NUMBER
 OPTIMIZED_PHYSICAL_READS_TOTAL                    NUMBER
 OPTIMIZED_PHYSICAL_READS_DELTA                    NUMBER
 CELL_UNCOMPRESSED_BYTES_TOTAL                     NUMBER
 CELL_UNCOMPRESSED_BYTES_DELTA                     NUMBER
 IO_OFFLOAD_RETURN_BYTES_TOTAL                     NUMBER
 IO_OFFLOAD_RETURN_BYTES_DELTA                     NUMBER
 BIND_DATA                                         RAW(2000)
 FLAG                                              NUMBER
 CON_DBID                                          NUMBER
 CON_ID                                            NUMBER

SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
col elapsed_time_s for 9999999.999
col cpu_time_s for 9999999.999
col iowait_s for 9999999.999
col clwait_s for 9999999.999
col apwait_s for 9999999.999
col ccwait_s for 9999999.999
col buffer_gets for 9999999999999999
col disk_reads for 9999999999999999
col direct_writes for 9999999999999999
col diff_plan for a10
col diff_fms for a20

select * from (
select
    hss.sql_id,
    decode(count(unique(plan_hash_value)),1,to_char(max(plan_hash_value)),'#'||count(unique(plan_hash_value))) diff_plan,
    decode(count(unique(force_matching_signature)),1,to_char(max(force_matching_signature)),'#'||count(unique(force_matching_signature))) diff_fms,
    sum(hss.executions_delta) executions,
    round(sum(hss.elapsed_time_delta)/1000000,3) elapsed_time_s,
    round(sum(hss.cpu_time_delta)/1000000,3) cpu_time_s,
    round(sum(hss.iowait_delta)/1000000,3) iowait_s,
--    round(sum(hss.clwait_delta)/1000000,3) clwait_s,
--    round(sum(hss.apwait_delta)/1000000,3) apwait_s,
--    round(sum(hss.ccwait_delta)/1000000,3) ccwait_s,
    round(sum(hss.rows_processed_delta),3) rows_processed,
    round(sum(hss.buffer_gets_delta),3) buffer_gets,
    round(sum(hss.disk_reads_delta),3) disk_reads,
    round(sum(hss.direct_writes_delta),3) direct_writes
from dba_hist_sqlstat hss, dba_hist_snapshot hs
where hss.snap_id=hs.snap_id and hs.snap_id between &snap_id_from and &snap_id_to
group by sql_id order by &sort_col_nr desc nulls last)
where rownum<=&top_n;

SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
--    round(sum(hss.clwait_delta)/1000000,3) clwait_s,
--    round(sum(hss.apwait_delta)/1000000,3) apwait_s,
--    round(sum(hss.ccwait_delta)/1000000,3) ccwait_s,
    round(sum(hss.rows_processed_delta),3) rows_processed,
    round(sum(hss.buffer_gets_delta),3) buffer_gets,
    round(sum(hss.disk_reads_delta),3) disk_reads,
    round(sum(hss.direct_writes_delta),3) direct_writes
from dba_hist_sqlstat hss, dba_hist_snapshot hs
where hss.snap_id=hs.snap_id and hs.snap_id between &snap_id_from and &snap_id_to
group by sql_id order by &sort_col_nr desc nulls last)
where rownum<=&top_n;

SQL> pause

SQL>
SQL> @awr_top_by_sqlid_snaps.sql 25 50 5 10
SQL> set ver off pages 50000 lines 260 tab off echo off

SQL_ID        DIFF_PLAN  DIFF_FMS             EXECUTIONS ELAPSED_TIME_S   CPU_TIME_S     IOWAIT_S    ROWS_PROCESSED       BUFFER_GETS        DISK_READS     DIRECT_WRITES
------------- ---------- -------------------- ---------- -------------- ------------ ------------ ---------------- ----------------- ----------------- -----------------
0w2qpuc6u2zsp 0          0                        231889       2517.160     2966.522        1.957       231889.000          45060626             58971                 0
147a57cxq3w5y 0          0                        290416       1260.332     1476.165         .119       290432.000          10062391              3449                 0
c13sma6rkr27c #3         18298161888330075667     695504        579.615      624.629         .068      3141269.000          19270840              2319                 0
01jzc2mg6cg92 0          0                         86872        298.917      285.065         .715        86872.000           3726085             22116                 0
f7rxuxzt64k87 0          0                        595365        177.662      183.504         .940       595368.000           9466095             26787                 0
gzhkw1qu6fwxm 3241608609 0                        638465        127.138       88.481         .006       638463.000           2052941                58                 0
3fw75k1snsddx 494735477  0                        231877        122.990       90.754         .065       231876.000           3933240              1734                 0
5mddt5kt45rg3 1628223527 14366533292145951164     231905         88.169       50.906         .030       231904.000           2234211               743                 0
apgb2g9q2zjh1 0          0                         29082         83.980       85.473        1.244        29082.000            644899             38878                 0
8z3542ffmp562 1655552467 17991828121679737456     666150         75.843       39.644         .009       602153.000           3805721               296                 0

10 rows selected.

SQL> pause
```

```
147a57cxq3w5y 0          0                    290416     1260.332     1476.165         .119     290432.000     10062391           3449           0
c13sma6rkr27c #3         1829816188833007566  695504      579.615      624.629         .068    3141269.000     19270840           2319           0
01jzc2mg6cg92 0          0                     86872      298.917      285.065         .715      86872.000      3726085          22116           0
f7rxuxzt64k87 0          0                    595365      177.662      183.504         .940     595368.000      9466095          26787           0
gzhkw1qu6fwxm 3241608609 0                    638465      127.138       88.481         .006     638463.000      2052941             58           0
3fw75k1snsddx 494735477  0                    231877      122.990       90.754         .065     231876.000      3933240           1734           0
5mddt5kt45rg3 1628223527 14366533292145951164 231905       88.169       50.906         .030     231904.000      2234211            743           0
apgb2g9q2zjh1 0          0                     29082       83.980       85.473        1.244      29082.000       644899          38878           0
8z3542ffmp562 1655552467 17991828121679737456 666150       75.843       39.644         .009     602153.000      3805721            296           0

10 rows selected.

SQL> pause

SQL>
SQL> @awr_top_by_sqlid_snaps.sql 25 50 7 10
SQL> set ver off pages 50000 lines 260 tab off echo off

SQL_ID        DIFF_PLAN  DIFF_FMS             EXECUTIONS ELAPSED_TIME_S   CPU_TIME_S     IOWAIT_S    ROWS_PROCESSED       BUFFER_GETS        DISK_READS     DIRECT_WRITES
------------- ---------- -------------------- ---------- -------------- ------------ ------------ ---------------- ----------------- ----------------- -----------------
0w2qpuc6u2zsp 0          0                    231889       2517.160     2966.522        1.957     231889.000         45060626             58971               0
apgb2g9q2zjh1 0          0                     29082         83.980       85.473        1.244      29082.000          644899             38878               0
f7rxuxzt64k87 0          0                    595365        177.662      183.504         .940     595368.000         9466095             26787               0
7t0959msvyt5g 856749079  4574318657274276452   29081          8.571        5.230         .836      45474.000          133222             24590               0
16bb7yq3ps4f9 0          0                        2          2.810        2.154         .763          2.000          121068               372             791
01jzc2mg6cg92 0          0                     86872        298.917      285.065         .715      86872.000         3726085             22116               0
g81cbrq5yamf5 2480532011 15722349611718065978 260969         29.337       23.695         .582     393409.000         1177450             18987               0
gh2g2tynpcpv1 0          0                     86873         54.870       58.681         .507      86873.000         1668076             15273               0
buw7nxuggu81s 1404293401 17230481863806651164     18         37.235       35.943         .407     507204.000          815703               384               0
1qf3b7a46jm3u 1322380957 17373762679661231169  13459          3.358        3.493         .298      39773.000           55391             10522               0

10 rows selected.

SQL> pause
```

```
apgb2g9q2zjh1 0          0                    29082       83.980       85.473        1.244       29082.000        644899        38878             0
f7rxuxzt64k87 0          0                   595365      177.662      183.504         .940      595368.000       9466095        26787             0
7t0959msvyt5g 856749079  4574318657274276452    29081        8.571        5.230         .836       45474.000        133222        24590             0
16bb7yq3ps4f9 0          0                        2        2.810        2.154         .763           2.000        121068          372           791
01jzc2mg6cg92 0          0                    86872      298.917      285.065         .715       86872.000       3726085        22116             0
g81cbrq5yamf5 2480532011 15722349611718065978   260969       29.337       23.695         .582      393409.000       1177450        18987             0
gh2g2tynpcpv1 0          0                    86873       54.870       58.681         .507       86873.000       1668076        15273             0
buw7nxuggu81s 1404293401 17230481863806651164       18       37.235       35.943         .407      507204.000        815703          384             0
1qf3b7a46jm3u 1322380957 17373762679661231169    13459        3.358        3.493         .298       39773.000         55391        10522             0

10 rows selected.

SQL> pause

SQL>
SQL> @awr_top_by_sqlid_snaps.sql 25 50 9 10
SQL> set ver off pages 50000 lines 260 tab off echo off

SQL_ID        DIFF_PLAN  DIFF_FMS             EXECUTIONS ELAPSED_TIME_S   CPU_TIME_S     IOWAIT_S    ROWS_PROCESSED       BUFFER_GETS        DISK_READS     DIRECT_WRITES
------------- ---------- -------------------- ---------- -------------- ------------ ------------ ---------------- ----------------- ----------------- -----------------
0w2qpuc6u2zsp 0          0                        231889       2517.160     2966.522        1.957       231889.000          45060626             58971                 0
c13sma6rkr27c #3         18298161888330075667     695504        579.615      624.629         .068      3141269.000          19270840              2319                 0
147a57cxq3w5y 0          0                        290416       1260.332     1476.165         .119       290432.000          10062391              3449                 0
f7rxuxzt64k87 0          0                        595365        177.662      183.504         .940       595368.000           9466095             26787                 0
3fw75k1snsddx 494735477  0                        231877        122.990       90.754         .065       231876.000           3933240              1734                 0
8z3542ffmp562 1655552467 17991828121679737456     666150         75.843       39.644         .009       602153.000           3805721               296                 0
01jzc2mg6cg92 0          0                         86872        298.917      285.065         .715        86872.000           3726085             22116                 0
5ckxyqfvu60pj 900611645  6486229150489758732       638509         73.013       53.327         .150       638514.000           2554314              4454                 0
7r7636982atn9 2141863993 8080224161820109919      220567         42.672       50.602         .001       602140.000           2421991                41                 0
5mddt5kt45rg3 1628223527 14366533292145951164     231905         88.169       50.906         .030       231904.000           2234211               743                 0

10 rows selected.

SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
01jzc2mg6cg92 0          0                          86872        298.917        285.065          .715        86872.000          3726085           22116                  0
g81cbrq5yamf5 2480532011 15722349611718065978      260969         29.337         23.695          .582       393409.000          1177450           18987                  0
gh2g2tynpcpv1 0          0                          86873         54.870         58.681          .507        86873.000          1668076           15273                  0
buw7nxuggu81s 1404293401 17230481863806651164          18         37.235         35.943          .407       507204.000           815703             384                  0
1qf3b7a46jm3u 1322380957 17373762679661231169       13459          3.358          3.493          .298        39773.000            55391           10522                  0

10 rows selected.

SQL> pause

SQL>
SQL> @awr_top_by_sqlid_snaps.sql 25 50 9 10
SQL> set ver off pages 50000 lines 260 tab off echo off

SQL_ID        DIFF_PLAN  DIFF_FMS                   EXECUTIONS ELAPSED_TIME_S    CPU_TIME_S     IOWAIT_S   ROWS_PROCESSED      BUFFER_GETS      DISK_READS      DIRECT_WRITES
------------- ---------- -------------------- ----------- -------------- ------------ ------------ ---------------- ---------------- ---------------- ----------------
0w2qpuc6u2zsp 0          0                         231889       2517.160       2966.522         1.957       231889.000         45060626           58971                  0
c13sma6rkr27c #3         18298161888330075667      695504        579.615        624.629          .068      3141269.000         19270840            2319                  0
147a57cxq3w5y 0          0                         290416       1260.332       1476.165          .119       290432.000         10062391            3449                  0
f7rxuxzt64k87 0          0                         595365        177.662        183.504          .940       595368.000          9466095           26787                  0
3fw75k1snsddx 494735477  0                         231877        122.990         90.754          .065       231876.000          3933240            1734                  0
8z3542ffmp562 1655552467 17991828121679737456      666150         75.843         39.644          .009       602153.000          3805721             296                  0
01jzc2mg6cg92 0          0                          86872        298.917        285.065          .715        86872.000          3726085           22116                  0
5ckxyqfvu60pj 900611645  6486229150489758732       638509         73.013         53.327          .150       638514.000          2554314            4454                  0
7r7636982atn9 2141863993 8080224161820109919       220567         42.672         50.602          .001       602140.000          2421991              41                  0
5mddt5kt45rg3 1628223527 14366533292145951164      231905         88.169         50.906          .030       231904.000          2234211             743                  0

10 rows selected.

SQL> pause

SQL>
SQL> -- Why is it good to see DIFF_PLANS?
SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
buw7nxuggu81s 1404293401 17230481863806651164          18          37.235          35.943          .407          507204.000          815703          384          0
1qf3b7a46jm3u 1322380957 17373762679661231169       13459           3.358           3.493          .298           39773.000           55391        10522          0

10 rows selected.

SQL> pause

SQL>
SQL> @awr_top_by_sqlid_snaps.sql 25 50 9 10
SQL> set ver off pages 50000 lines 260 tab off echo off

SQL_ID        DIFF_PLAN  DIFF_FMS              EXECUTIONS ELAPSED_TIME_S   CPU_TIME_S      IOWAIT_S     ROWS_PROCESSED       BUFFER_GETS        DISK_READS     DIRECT_WRITES
------------- ---------- -------------------- ---------- -------------- ------------ ------------ ---------------- ----------------- ----------------- -----------------
0w2qpuc6u2zsp 0          0                        231889        2517.160      2966.522        1.957     231889.000          45060626             58971                 0
c13sma6rkr27c #3         18298161888330075667     695504         579.615       624.629         .068    3141269.000          19270840              2319                 0
147a57cxq3w5y 0          0                        290416        1260.332      1476.165         .119     290432.000          10062391              3449                 0
f7rxuxzt64k87 0          0                        595365         177.662       183.504         .940     595368.000           9466095             26787                 0
3fw75k1snsddx 494735477  0                        231877         122.990        90.754         .065     231876.000           3933240              1734                 0
8z3542ffmp562 1655552467 17991828121679737456     666150          75.843        39.644         .009     602153.000           3805721               296                 0
01jzc2mg6cg92 0          0                         86872         298.917       285.065         .715      86872.000           3726085             22116                 0
5ckxyqfvu60pj 900611645  6486229150489758732       638509          73.013        53.327         .150     638514.000           2554314              4454                 0
7r7636982atn9 2141863993 8080224161820109919      220567          42.672        50.602         .001     602140.000           2421991                41                 0
5mddt5kt45rg3 1628223527 14366533292145951164     231905          88.169        50.906         .030     231904.000           2234211               743                 0

10 rows selected.

SQL> pause

SQL>
SQL> -- Why is it good to see DIFF_PLANS?
SQL> pause

SQL> -- Look at the row for sql_id = c13sma6rkr27c
SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
SQL> pause

SQL> @awr_sqlid_perf_trend_by_plan.sql 25 50 c13sma6rkr27c
SQL> set ver off pages 50000 lines 260 tab off echo off

TIME                PLAN_HASH_VALUE  EXECUTIONS ELAPSED_TIME_S_1E CPU_TIME_S_1E  IOWAIT_S_1E ROWS_PROCESSED_1E     BUFFER_GETS_1E      DISK_READS_1E   DIRECT_WRITES_1E
------------------- --------------- ---------- ----------------- ------------- ------------ ------------------ ------------------ ------------------ ------------------
19.10.2014 10:39:43       725271039      29559              .001          .001         .000              4.531             27.113               .075               .000
19.10.2014 10:50:11       725271039      30005              .001          .001         .000              4.521             27.124               .000               .000
19.10.2014 11:00:14       725271039      30097              .001          .001         .000              4.508             27.003               .000               .000
19.10.2014 11:10:16       725271039      29691              .001          .001         .000              4.531             27.139               .000               .000
19.10.2014 11:20:17       725271039      30228              .001          .001         .000              4.531             27.106               .000               .000
19.10.2014 11:30:19       725271039      30514              .001          .001         .000              4.505             27.069               .000               .000
19.10.2014 11:40:21       725271039      29676              .001          .001         .000              4.543             27.163               .000               .000
19.10.2014 11:50:23       725271039      29144              .001          .001         .000              4.511             27.081               .000               .000
19.10.2014 12:00:25       725271039      29151              .001          .001         .000              4.525             27.090               .000               .000
19.10.2014 12:10:26       725271039      29531              .001          .001         .000              4.513             27.012               .000               .000
19.10.2014 12:20:30       725271039      29266              .001          .001         .000              4.517             27.039               .000               .000
19.10.2014 12:30:31       725271039      29094              .001          .001         .000              4.521             27.107               .000               .000
19.10.2014 12:40:34       725271039      29233              .001          .001         .000              4.509             27.031               .000               .000
19.10.2014 12:50:35       725271039      29709              .001          .001         .000              4.503             27.008               .000               .000
19.10.2014 13:00:37       725271039      29428              .001          .001         .000              4.541             27.174               .000               .000
19.10.2014 13:10:38       725271039      29508              .001          .001         .000              4.517             27.058               .000               .000
19.10.2014 13:20:42       725271039      28915              .001          .001         .000              4.504             26.980               .000               .000
19.10.2014 13:30:43       725271039      29960              .001          .001         .000              4.518             27.088               .000               .000
19.10.2014 13:40:45       725271039      29613              .001          .001         .000              4.531             27.109               .000               .000
19.10.2014 13:50:46       725271039      29585              .001          .001         .000              4.497             27.028               .000               .000
19.10.2014 14:00:51       725271039      45763              .001          .001         .000              4.507             27.021               .000               .000
19.10.2014 14:10:54       214043693      49428              .001          .001         .000              4.505             27.426               .001               .000
19.10.2014 14:20:56      3004904301       8406              .001          .001         .000              4.485             77.567               .009               .000

23 rows selected.

SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
SQL> --let's look at two of the plans
SQL> select * from table(dbms_xplan.display_awr('c13sma6rkr27c',725271039));

PLAN_TABLE_OUTPUT
--------------------------------------------------------------------------------------------------------------------------------------------------------------------
--------------------------------------------------------------------------------
SQL_ID c13sma6rkr27c
--------------------
SELECT PRODUCTS.PRODUCT_ID, PRODUCT_NAME, PRODUCT_DESCRIPTION,
CATEGORY_ID, WEIGHT_CLASS, WARRANTY_PERIOD, SUPPLIER_ID,
PRODUCT_STATUS, LIST_PRICE, MIN_PRICE, CATALOG_URL, QUANTITY_ON_HAND
FROM PRODUCTS, INVENTORIES WHERE PRODUCTS.CATEGORY_ID = :B3 AND
INVENTORIES.PRODUCT_ID = PRODUCTS.PRODUCT_ID AND
INVENTORIES.WAREHOUSE_ID = :B2 AND ROWNUM < :B1

Plan hash value: 725271039

-----------------------------------------------------------------------------------------------------------
| Id  | Operation                             | Name                 | Rows  | Bytes | Cost (%CPU)| Time     |
-----------------------------------------------------------------------------------------------------------
|   0 | SELECT STATEMENT                      |                      |       |       |    33 (100)|          |
|   1 |  COUNT STOPKEY                        |                      |       |       |            |          |
|   2 |   NESTED LOOPS                        |                      |    14 |  5670 |    33   (0)| 00:00:01 |
|   3 |    HASH JOIN OUTER                    |                      |     9 |  3519 |    15   (0)| 00:00:01 |
|   4 |     TABLE ACCESS BY INDEX ROWID BATCHED| PRODUCT_INFORMATION  |     9 |  1584 |    10   (0)| 00:00:01 |
|   5 |      INDEX RANGE SCAN                 | PROD_CATEGORY_IX     |     9 |       |     1   (0)| 00:00:01 |
|   6 |     TABLE ACCESS BY INDEX ROWID BATCHED| PRODUCT_DESCRIPTIONS |     2 |   430 |     5   (0)| 00:00:01 |
|   7 |      INDEX SKIP SCAN                  | PRD_DESC_PK          |     2 |       |     4   (0)| 00:00:01 |
|   8 |    TABLE ACCESS BY INDEX ROWID        | INVENTORIES          |     2 |    28 |     2   (0)| 00:00:01 |
|   9 |     INDEX UNIQUE SCAN                 | INVENTORY_PK         |     1 |       |     1   (0)| 00:00:01 |
-----------------------------------------------------------------------------------------------------------

Note
-----
   - this is an adaptive plan
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
SQL> select * from table(dbms_xplan.display_awr('c13sma6rkr27c',3004904301));

PLAN_TABLE_OUTPUT
------------------------------------------------------------------------------------------------------------------------------------------------------------------------
------------------------------------------------------------------------------------
SQL_ID c13sma6rkr27c
--------------------
SELECT PRODUCTS.PRODUCT_ID, PRODUCT_NAME, PRODUCT_DESCRIPTION,
CATEGORY_ID, WEIGHT_CLASS, WARRANTY_PERIOD, SUPPLIER_ID,
PRODUCT_STATUS, LIST_PRICE, MIN_PRICE, CATALOG_URL, QUANTITY_ON_HAND
FROM PRODUCTS, INVENTORIES WHERE PRODUCTS.CATEGORY_ID = :B3 AND
INVENTORIES.PRODUCT_ID = PRODUCTS.PRODUCT_ID AND
INVENTORIES.WAREHOUSE_ID = :B2 AND ROWNUM < :B1

Plan hash value: 3004904301

-----------------------------------------------------------------------------------------------------------
| Id  | Operation                                | Name                | Rows  | Bytes | Cost (%CPU)| Time     |
-----------------------------------------------------------------------------------------------------------
|   0 | SELECT STATEMENT                         |                     |       |       |    33 (100)|          |
|   1 |  COUNT STOPKEY                           |                     |       |       |            |          |
|   2 |   NESTED LOOPS                           |                     |    14 |  5670 |    33   (0)| 00:00:01 |
|   3 |    NESTED LOOPS OUTER                    |                     |     9 |  3519 |    15   (0)| 00:00:01 |
|   4 |     TABLE ACCESS BY INDEX ROWID BATCHED| PRODUCT_INFORMATION |     9 |  1584 |    10   (0)| 00:00:01 |
|   5 |      INDEX RANGE SCAN                    | PROD_CATEGORY_IX    |     9 |       |     1   (0)| 00:00:01 |
|   6 |     TABLE ACCESS BY INDEX ROWID          | PRODUCT_DESCRIPTIONS|     1 |   215 |     5   (0)| 00:00:01 |
|   7 |      INDEX UNIQUE SCAN                   | PRD_DESC_PK         |     2 |       |     4   (0)| 00:00:01 |
|   8 |    TABLE ACCESS BY INDEX ROWID           | INVENTORIES         |     2 |    28 |     2   (0)| 00:00:01 |
|   9 |     INDEX UNIQUE SCAN                    | INVENTORY_PK        |     1 |       |     1   (0)| 00:00:01 |
-----------------------------------------------------------------------------------------------------------

Note
-----
   - this is an adaptive plan
```

```
INVENTORIES.PRODUCT_ID = PRODUCTS.PRODUCT_ID AND
INVENTORIES.WAREHOUSE_ID = :B2 AND ROWNUM < :B1

Plan hash value: 3004904301

-----------------------------------------------------------------------------------------------------
| Id  | Operation                             | Name                 | Rows  | Bytes | Cost (%CPU)| Time     |
-----------------------------------------------------------------------------------------------------
|   0 | SELECT STATEMENT                      |                      |       |       |    33 (100)|          |
|   1 |  COUNT STOPKEY                        |                      |       |       |            |          |
|   2 |   NESTED LOOPS                        |                      |    14 |  5670 |    33   (0)| 00:00:01 |
|   3 |    NESTED LOOPS OUTER                 |                      |     9 |  3519 |    15   (0)| 00:00:01 |
|   4 |     TABLE ACCESS BY INDEX ROWID BATCHED| PRODUCT_INFORMATION  |     9 |  1584 |    10   (0)| 00:00:01 |
|   5 |      INDEX RANGE SCAN                 | PROD_CATEGORY_IX     |     9 |       |     1   (0)| 00:00:01 |
|   6 |     TABLE ACCESS BY INDEX ROWID       | PRODUCT_DESCRIPTIONS |     1 |   215 |     5   (0)| 00:00:01 |
|   7 |      INDEX UNIQUE SCAN                | PRD_DESC_PK          |     2 |       |     4   (0)| 00:00:01 |
|   8 |    TABLE ACCESS BY INDEX ROWID        | INVENTORIES          |     2 |    28 |     2   (0)| 00:00:01 |
|   9 |     INDEX UNIQUE SCAN                 | INVENTORY_PK         |     1 |       |     1   (0)| 00:00:01 |
-----------------------------------------------------------------------------------------------------

Note
-----
   - this is an adaptive plan


30 rows selected.

SQL> pause

SQL>
SQL> -- Querying the AWR tables directy gives more flexibility, but provides basically the same results as THe AWR report.
SQL> exit
Disconnected from Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options
[oracle@DB12c AWR_MINING3]$
```

LET'S MINE THE AWR!

- DEMO - awr_top_fms_demo.sql

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
[oracle@DB12c AWR_MINING3]$ sqlplus / as sysdba

SQL*Plus: Release 12.1.0.1.0 Production on Thu Oct 22 05:55:48 2015

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Connected to:
Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

SQL> @awr_top_fms_demo.sql
SQL> alter session set container = sample;

Session altered.

SQL>
SQL> -- Let's see how sorting by elapsed time looks when we aggregate by FORCE_MATCHING_SIGNATURE
SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
col iowait_s for 9999999.999
col clwait_s for 9999999.999
col apwait_s for 9999999.999
col ccwait_s for 9999999.999
col buffer_gets for 9999999999999999
col disk_reads for 9999999999999999
col direct_writes for 9999999999999999
col diff_sqlid for a13
col diff_plan for a10
col diff_fms for a20

select * from (
select to_char(force_matching_signature) diff_fms,
    decode(count(unique(plan_hash_value)),1,to_char(max(plan_hash_value)),'#'||count(unique(plan_hash_value))) diff_plan,
    decode(count(unique(sql_id)),1,max(sql_id),'#'||count(unique(sql_id))) diff_sqlid,
    sum(hss.executions_delta) executions,
    round(sum(hss.elapsed_time_delta)/1000000,3) elapsed_time_s,
    round(sum(hss.cpu_time_delta)/1000000,3) cpu_time_s,
    round(sum(hss.iowait_delta)/1000000,3) iowait_s,
--    round(sum(hss.clwait_delta)/1000000,3) clwait_s,
--    round(sum(hss.apwait_delta)/1000000,3) apwait_s,
--    round(sum(hss.ccwait_delta)/1000000,3) ccwait_s,
    round(sum(hss.rows_processed_delta),3) rows_processed,
    round(sum(hss.buffer_gets_delta),3) buffer_gets,
    round(sum(hss.disk_reads_delta),3) disk_reads,
    round(sum(hss.direct_writes_delta),3) direct_writes
from dba_hist_sqlstat hss, dba_hist_snapshot hs
where hss.snap_id=hs.snap_id
    and hs.snap_id between &snap_id_from and &snap_id_to
group by force_matching_signature
order by &sort_col_nr desc)
where rownum<=&top_n;

SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
--    round(sum(hss.ccwait_delta)/1000000,3) ccwait_s,
    round(sum(hss.rows_processed_delta),3) rows_processed,
    round(sum(hss.buffer_gets_delta),3) buffer_gets,
    round(sum(hss.disk_reads_delta),3) disk_reads,
    round(sum(hss.direct_writes_delta),3) direct_writes
from dba_hist_sqlstat hss, dba_hist_snapshot hs
where hss.snap_id=hs.snap_id
    and hs.snap_id between &snap_id_from and &snap_id_to
group by force_matching_signature
order by &sort_col_nr desc)
where rownum<=&top_n;

SQL> pause

SQL>
SQL> @awr_top_by_fms_snaps.sql 25 50 5 10
SQL> set ver off pages 50000 lines 260 tab off echo off

DIFF_FMS             DIFF_PLAN  DIFF_SQLID     EXECUTIONS ELAPSED_TIME_S   CPU_TIME_S     IOWAIT_S ROWS_PROCESSED       BUFFER_GETS        DISK_READS     DIRECT_WRITES
-------------------- ---------- ------------- ---------- -------------- ------------ ------------ -------------- ----------------- ----------------- -----------------
0                    #23        #57              2462768       4825.257     5416.525        6.905        2462955          79731662            185393               791
18298161888330075667 #3         c13sma6rkr27c     695504        579.615      624.629         .068        3141269          19270840              2319                 0
5985318870031566873  1081153563 #999              835562        306.699      253.610         .034       11697868           7571650              1029                 0
14366533292145951164 1628223527 5mddt5kt45rg3     231905         88.169       50.906         .030         231904           2234211               743                 0
17991828121679737456 1655552467 8z3542ffmp562     666150         75.843       39.644         .009         602153           3805721               296                 0
6486229150489758732  900611645  5ckxyqfvu60pj     638509         73.013       53.327         .150         638514           2554314              4454                 0
2672114946588399948  1388734953 c749bc43qqfz3     638186         47.942       16.981         .000         638465                 3                 0                 0
8080224161820109919  2141863993 7r7636982atn9     220567         42.672       50.602         .001         602140           2421991                41                 0
17230481863806651164 1404293401 buw7nxuggu81s         18         37.235       35.943         .407         507204            815703               384                 0
15722349611718065978 2480532011 g81cbrq5yamf5     260969         29.337       23.695         .582         393409           1177450             18987                 0

10 rows selected.

SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
    round(sum(hss.direct_writes_delta),3) direct_writes
from dba_hist_sqlstat hss, dba_hist_snapshot hs
where hss.snap_id=hs.snap_id
    and hs.snap_id between &snap_id_from and &snap_id_to
group by force_matching_signature
order by &sort_col_nr desc)
where rownum<=&top_n;

SQL> pause

SQL>
SQL> @awr_top_by_fms_snaps.sql 25 50 5 10
SQL> set ver off pages 50000 lines 260 tab off echo off

DIFF_FMS             DIFF_PLAN  DIFF_SQLID     EXECUTIONS ELAPSED_TIME_S   CPU_TIME_S      IOWAIT_S ROWS_PROCESSED        BUFFER_GETS        DISK_READS     DIRECT_WRITES
-------------------- ---------- ------------- ---------- -------------- ------------ ------------ -------------- ------------------ ---------------- ----------------
0                    #23        #57              2462768       4825.257      5416.525        6.905        2462955           79731662             185393              791
18298161888330075667 #3         c13sma6rkr27c     695504        579.615       624.629         .068        3141269           19270840               2319                0
5985318870031566873  1081153563 #999              835562        306.699       253.610         .034       11697868            7571650               1029                0
14366533292145951164 1628223527 5mddt5kt45rg3     231905         88.169        50.906         .030         231904            2234211                743                0
17991828121679737456 1655552467 8z3542ffmp562     666150         75.843        39.644         .009         602153            3805721                296                0
6486229150489758732  900611645  5ckxyqfvu60pj     638509         73.013        53.327         .150         638514            2554314               4454                0
2672114946588399948  1388734953 c749bc43qqfz3     638186         47.942        16.981         .000         638465                  3                  0                0
8080224161820109919  2141863993 7r7636982atn9     220567         42.672        50.602         .001         602140            2421991                 41                0
17230481863806651164 1404293401 buw7nxuggu81s         18         37.235        35.943         .407         507204             815703                384                0
15722349611718065978 2480532011 g81cbrq5yamf5     260969         29.337        23.695         .582         393409            1177450              18987                0

10 rows selected.

SQL> pause

SQL>
SQL> -- What is FMS=0?
SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
15722349611718065978 2480532011 g81cbrq5yamf5      260969         29.337         23.695          .582         393409        1177450          18987              0

10 rows selected.

SQL> pause

SQL>
SQL> -- What is FMS=0?
SQL> pause

SQL> @awr_top_by_fms_detail_snaps.sql 25 50 5 15 0
SQL> set ver off pages 50000 lines 260 tab off echo off

DIFF_FMS             DIFF_PLAN  SQL_ID         EXECUTIONS ELAPSED_TIME_S   CPU_TIME_S      IOWAIT_S ROWS_PROCESSED       BUFFER_GETS        DISK_READS     DIRECT_WRITES
-------------------- ---------- ------------- ---------- -------------- ------------ ------------ -------------- ----------------- ----------------- -----------------
0                    0          0w2qpuc6u2zsp     231889        2517.160     2966.522        1.957         231889          45060626             58971                 0
0                    0          147a57cxq3w5y     290416        1260.332     1476.165         .119         290432          10062391              3449                 0
0                    0          01jzc2mg6cg92      86872         298.917      285.065         .715          86872           3726085             22116                 0
0                    0          f7rxuxzt64k87     595365         177.662      183.504         .940         595368           9466095             26787                 0
0                    3241608609 gzhkw1qu6fwxm     638465         127.138       88.481         .006         638463           2052941                58                 0
0                    494735477  3fw75k1snsddx     231877         122.990       90.754         .065         231876           3933240              1734                 0
0                    0          apgb2g9q2zjh1      29082          83.980       85.473        1.244          29082            644899             38878                 0
0                    0          cmndgkbkcz5s9      57765          64.341       68.699         .096          57765            414169              2811                 0
0                    0          gh2g2tynpcpv1      86873          54.870       58.681         .507          86873           1668076             15273                 0
0                    0          a9gvfh5hx9u98      29213          53.916       52.549         .251          29213            847081              6981                 0
0                    0          budtrjayjnvw3      86873          30.219       27.506         .106          86873            658802              3609                 0
0                    0          9t3n2wpr7my63      96723          29.138       29.363         .119          96723           1057785              3644                 0
0                    0          16bb7yq3ps4f9          2           2.810        2.154         .763              2            121068               372               791
0                    0          39k4gf5t0831y         55            .370         .353         .002              0              1615                72                 0
0                    0          adzjh275fvvx4          8            .324         .309         .004              0              3237               160                 0

15 rows selected.

SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
SQL> pause

SQL>
SQL> -- What is FMS=0?
SQL> pause

SQL> @awr_top_by_fms_detail_snaps.sql 25 50 5 15 0
SQL> set ver off pages 50000 lines 260 tab off echo off

DIFF_FMS             DIFF_PLAN  SQL_ID         EXECUTIONS ELAPSED_TIME_S   CPU_TIME_S      IOWAIT_S ROWS_PROCESSED        BUFFER_GETS        DISK_READS     DIRECT_WRITES
-------------------- ---------- ------------- ---------- -------------- ------------ ------------ -------------- ------------------ ---------------- -----------------
0                    0          0w2qpuc6u2zsp     231889        2517.160     2966.522        1.957         231889           45060626            58971                 0
0                    0          147a57cxq3w5y     290416        1260.332     1476.165         .119         290432           10062391             3449                 0
0                    0          01jzc2mg6cg92      86872         298.917      285.065         .715          86872            3726085            22116                 0
0                    0          f7rxuxzt64k87     595365         177.662      183.504         .940         595368            9466095            26787                 0
0                    3241608609 gzhkw1qu6fwxm     638465         127.138       88.481         .006         638463            2052941               58                 0
0                    494735477  3fw75k1snsddx     231877         122.990       90.754         .065         231876            3933240             1734                 0
0                    0          apgb2g9q2zjh1      29082          83.980       85.473        1.244          29082             644899            38878                 0
0                    0          cmndgkbkcz5s9      57765          64.341       68.699         .096          57765             414169             2811                 0
0                    0          gh2g2tynpcpv1      86873          54.870       58.681         .507          86873            1668076            15273                 0
0                    0          a9gvfh5hx9u98      29213          53.916       52.549         .251          29213             847081             6981                 0
0                    0          budtrjayjnvw3      86873          30.219       27.506         .106          86873             658802             3609                 0
0                    0          9t3n2wpr7my63      96723          29.138       29.363         .119          96723            1057785             3644                 0
0                    0          16bb7yq3ps4f9          2           2.810        2.154         .763              2             121068              372               791
0                    0          39k4gf5t0831y         55            .370         .353         .002              0               1615               72                 0
0                    0          adzjh275fvvx4          8            .324         .309         .004              0               3237              160                 0

15 rows selected.

SQL> pause

SQL>
SQL> -- Let's look at some of these queries
SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
0                  0 a9gvfh5hx9u98      29213       53.916       52.549         .251      29213     847081       6981          0
0                  0 budtrjayjnvw3      86873       30.219       27.506         .106      86873     658802       3609          0
0                  0 9t3n2wpr7my63      96723       29.138       29.363         .119      96723    1057785       3644          0
0                  0 16bb7yq3ps4f9          2        2.810        2.154         .763          2     121068        372        791
0                  0 39k4gf5t0831y         55         .370         .353         .002          0       1615         72          0
0                  0 adzjh275fvvx4          8         .324         .309         .004          0       3237        160          0

15 rows selected.

SQL> pause

SQL>
SQL> -- Let's look at some of these queries
SQL> pause

SQL> @awr_show_sqlid.sql 0w2qpuc6u2zsp
SQL> set ver off pages 50000 lines 32000 tab off long 9999999 timing off echo off
### Occurrences in ASH (DBA_HIST_ACTIVE_SESS_HISTORY):

SQL_ID        PROGRAM                        MODULE                         ACTION                         CLIENT_ID                      COUNT(*)
------------- ------------------------------ ------------------------------ ------------------------------ ------------------------------ ----------
0w2qpuc6u2zsp JDBC Thin Client               New Order                                                     Swingbench                            220
0w2qpuc6u2zsp JDBC Thin Client               New Order                      getProductQuantity             Swingbench                             24
0w2qpuc6u2zsp JDBC Thin Client               New Order                      logon                          Swingbench                             19
0w2qpuc6u2zsp JDBC Thin Client               New Order                      getProductDetailsByCategory    Swingbench                             18
0w2qpuc6u2zsp JDBC Thin Client                                              getCardDetailsByCustomerID     Swingbench                              9
0w2qpuc6u2zsp JDBC Thin Client               New Order                                                     Swingbench                              1

6 rows selected.

### The Statement (DBA_HIST_SQLTEXT):
BEGIN :1 := orderentry.neworder(:2 ,:3 ,:4 ); END;

SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
SQL> set ver off pages 50000 lines 32000 tab off long 9999999 timing off echo off
### Occurrences in ASH (DBA_HIST_ACTIVE_SESS_HISTORY):

SQL_ID        PROGRAM                          MODULE                         ACTION                         CLIENT_ID                      COUNT(*)
------------- -------------------------------- ------------------------------ ------------------------------ ------------------------------ ----------
0w2qpuc6u2zsp JDBC Thin Client                 New Order                                                     Swingbench                            220
0w2qpuc6u2zsp JDBC Thin Client                 New Order                      getProductQuantity             Swingbench                             24
0w2qpuc6u2zsp JDBC Thin Client                 New Order                      logon                          Swingbench                             19
0w2qpuc6u2zsp JDBC Thin Client                 New Order                      getProductDetailsByCategory    Swingbench                             18
0w2qpuc6u2zsp JDBC Thin Client                                                                               Swingbench                              9
0w2qpuc6u2zsp JDBC Thin Client                 New Order                      getCardDetailsByCustomerID     Swingbench                              1

6 rows selected.

### The Statement (DBA_HIST_SQLTEXT):
BEGIN :1 := orderentry.neworder(:2 ,:3 ,:4 ); END;

SQL> pause

SQL> @awr_show_sqlid.sql gzhkw1qu6fwxm
SQL> set ver off pages 50000 lines 32000 tab off long 9999999 timing off echo off
### Occurrences in ASH (DBA_HIST_ACTIVE_SESS_HISTORY):

SQL_ID        PROGRAM                          MODULE                         ACTION                         CLIENT_ID                      COUNT(*)
------------- -------------------------------- ------------------------------ ------------------------------ ------------------------------ ----------
gzhkw1qu6fwxm JDBC Thin Client                 Update Customer Details        logon                          Swingbench                              4
gzhkw1qu6fwxm JDBC Thin Client                 Browse Products                logon                          Swingbench                              2
gzhkw1qu6fwxm JDBC Thin Client                 New Order                      logon                          Swingbench                              2
gzhkw1qu6fwxm JDBC Thin Client                 Browse and Update Orders       logon                          Swingbench                              2

### The Statement (DBA_HIST_SQLTEXT):
INSERT INTO LOGON (LOGON_ID,CUSTOMER_ID, LOGON_DATE) VALUES (LOGON_SEQ.NEXTVAL, :B2 , :B1 )

SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
------------- ------------------------------ ------------------------------ ------------------------------ ------------------------------ ----------
0w2qpuc6u2zsp JDBC Thin Client               New Order                                                     Swingbench                              220
0w2qpuc6u2zsp JDBC Thin Client               New Order                      getProductQuantity             Swingbench                               24
0w2qpuc6u2zsp JDBC Thin Client               New Order                      logon                          Swingbench                               19
0w2qpuc6u2zsp JDBC Thin Client               New Order                      getProductDetailsByCategory    Swingbench                               18
0w2qpuc6u2zsp JDBC Thin Client                                                                             Swingbench                                9
0w2qpuc6u2zsp JDBC Thin Client               New Order                      getCardDetailsByCustomerID     Swingbench                                1

6 rows selected.

### The Statement (DBA_HIST_SQLTEXT):
BEGIN :1 := orderentry.neworder(:2 ,:3 ,:4 ); END;

SQL> pause

SQL> @awr_show_sqlid.sql gzhkw1qu6fwxm
SQL> set ver off pages 50000 lines 32000 tab off long 9999999 timing off echo off
### Occurrences in ASH (DBA_HIST_ACTIVE_SESS_HISTORY):

SQL_ID        PROGRAM                        MODULE                         ACTION                         CLIENT_ID                      COUNT(*)
------------- ------------------------------ ------------------------------ ------------------------------ ------------------------------ ----------
gzhkw1qu6fwxm JDBC Thin Client               Update Customer Details        logon                          Swingbench                              4
gzhkw1qu6fwxm JDBC Thin Client               Browse Products                logon                          Swingbench                              2
gzhkw1qu6fwxm JDBC Thin Client               New Order                      logon                          Swingbench                              2
gzhkw1qu6fwxm JDBC Thin Client               Browse and Update Orders       logon                          Swingbench                              2

### The Statement (DBA_HIST_SQLTEXT):
INSERT INTO LOGON (LOGON_ID,CUSTOMER_ID, LOGON_DATE) VALUES (LOGON_SEQ.NEXTVAL, :B2 , :B1 )

SQL> pause

SQL>
SQL> -- Let's take a closer look at these 999 queries in the TOP 3rd place.
SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
### The Statement (DBA_HIST_SQLTEXT):
INSERT INTO LOGON (LOGON_ID,CUSTOMER_ID, LOGON_DATE) VALUES (LOGON_SEQ.NEXTVAL, :B2 , :B1 )

SQL> pause

SQL>
SQL> -- Let's take a closer look at these 999 queries in the TOP 3rd place.
SQL> pause

SQL> @awr_top_by_fms_detail_snaps.sql 25 50 5 15 5985318870031566873
SQL> set ver off pages 50000 lines 260 tab off echo off

DIFF_FMS            DIFF_PLAN  SQL_ID         EXECUTIONS ELAPSED_TIME_S   CPU_TIME_S      IOWAIT_S ROWS_PROCESSED       BUFFER_GETS        DISK_READS     DIRECT_WRITES
------------------- ---------- ------------- ---------- -------------- ------------ ------------ -------------- ----------------- ----------------- -----------------
5985318870031566873  1081153563 2y383xj04ztf6        812          4.587        4.544         .000          11368              7319                 1                 0
5985318870031566873  1081153563 dra5rjs03kmad        891           .447         .354         .000          12474              8461                 9                 0
5985318870031566873  1081153563 4v95sjusy6ba3        822           .394         .308         .000          11508              8465                 3                 0
5985318870031566873  1081153563 6j47tkwf6as3j        824           .365         .261         .000          11536              7509                 3                 0
5985318870031566873  1081153563 535x28j7nyrr2        940           .362         .315         .000          13160              8468                 1                 0
5985318870031566873  1081153563 0ab0gy4bczs5b        886           .362         .300         .000          12404              7982                 1                 0
5985318870031566873  1081153563 agb1t4y0yaqgn        983           .361         .306         .000          13762              8871                 1                 0
5985318870031566873  1081153563 fh5pm06vpmr94        816           .356         .275         .000          11424              7359                 1                 0
5985318870031566873  1081153563 80jvzncm78pvc        916           .353         .303         .000          12824              8252                 1                 0
5985318870031566873  1081153563 6hkpgmmcft2k1        899           .353         .291         .000          12586              9897                 2                 0
5985318870031566873  1081153563 57m0ndunjn7nr        912           .350         .296         .000          12768              8216                 1                 0
5985318870031566873  1081153563 6d2mtjqhduv5y        882           .350         .315         .000          12348              8831                 2                 0
5985318870031566873  1081153563 b3mnsjcwsa39x        830           .349         .321         .000          11620              8323                 2                 0
5985318870031566873  1081153563 7kd85hj9xp0vs        950           .348         .306         .000          13300              8558                 1                 0
5985318870031566873  1081153563 1wjyhzcswq737        931           .346         .273         .000          13034              8387                 1                 0

15 rows selected.

SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
SQL> pause

SQL>
SQL> -- Let's take a closer look at these 999 queries in the TOP 3rd place.
SQL> pause

SQL> @awr_top_by_fms_detail_snaps.sql 25 50 5 15 5985318870031566873
SQL> set ver off pages 50000 lines 260 tab off echo off

DIFF_FMS             DIFF_PLAN  SQL_ID         EXECUTIONS ELAPSED_TIME_S   CPU_TIME_S      IOWAIT_S ROWS_PROCESSED        BUFFER_GETS        DISK_READS     DIRECT_WRITES
-------------------- ---------- ------------- ---------- -------------- ------------ ------------ -------------- ------------------ ---------------- -----------------
5985318870031566873  1081153563 2y383xj04ztf6        812          4.587        4.544         .000          11368               7319                1                 0
5985318870031566873  1081153563 dra5rjs03kmad        891           .447         .354         .000          12474               8461                9                 0
5985318870031566873  1081153563 4v95sjusy6ba3        822           .394         .308         .000          11508               8465                3                 0
5985318870031566873  1081153563 6j47tkwf6as3j        824           .365         .261         .000          11536               7509                3                 0
5985318870031566873  1081153563 535x28j7nyrr2        940           .362         .315         .000          13160               8468                1                 0
5985318870031566873  1081153563 0ab0gy4bczs5b        886           .362         .300         .000          12404               7982                1                 0
5985318870031566873  1081153563 agb1t4y0yaqgn        983           .361         .306         .000          13762               8871                1                 0
5985318870031566873  1081153563 fh5pm06vpmr94        816           .356         .275         .000          11424               7359                1                 0
5985318870031566873  1081153563 80jvzncm78pvc        916           .353         .303         .000          12824               8252                1                 0
5985318870031566873  1081153563 6hkpgmmcft2k1        899           .353         .291         .000          12586               9897                2                 0
5985318870031566873  1081153563 57m0ndunjn7nr        912           .350         .296         .000          12768               8216                1                 0
5985318870031566873  1081153563 6d2mtjqhduv5y        882           .350         .315         .000          12348               8831                2                 0
5985318870031566873  1081153563 b3mnsjcwsa39x        830           .349         .321         .000          11620               8323                2                 0
5985318870031566873  1081153563 7kd85hj9xp0vs        950           .348         .306         .000          13300               8558                1                 0
5985318870031566873  1081153563 1wjyhzcswq737        931           .346         .273         .000          13034               8387                1                 0

15 rows selected.

SQL> pause

SQL>
SQL> -- Let's look at some of these queries
SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
SQL> pause

SQL>
SQL> -- Let's look at some of these queries
SQL> pause

SQL> @awr_show_sqlid.sql 2y383xj04ztf6
SQL> set ver off pages 50000 lines 32000 tab off long 9999999 timing off echo off
### Occurrences in ASH (DBA_HIST_ACTIVE_SESS_HISTORY):

no rows selected

### The Statement (DBA_HIST_SQLTEXT):
SELECT products.PRODUCT_ID,
PRODUCT_NAME,
PRODUCT_DESCRIPTION,
CATEGORY_ID,
WEIGHT_CLASS,
WARRANTY_PERIOD,
SUPPLIER_ID,
PRODUCT_STATUS,
LIST_PRICE,
MIN_PRICE,
CATALOG_URL,
QUANTITY_ON_HAND
FROM products,
inventories
WHERE products.product_id = 782
AND inventories.product_id = products.product_id
AND rownum < 15


SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
AND inventories.product_id = products.product_id
AND rownum < 15


SQL> pause

SQL>
SQL> @awr_show_sqlid.sql dra5rjs03kmad
SQL> set ver off pages 50000 lines 32000 tab off long 9999999 timing off echo off
### Occurrences in ASH (DBA_HIST_ACTIVE_SESS_HISTORY):

no rows selected

### The Statement (DBA_HIST_SQLTEXT):
SELECT products.PRODUCT_ID,
PRODUCT_NAME,
PRODUCT_DESCRIPTION,
CATEGORY_ID,
WEIGHT_CLASS,
WARRANTY_PERIOD,
SUPPLIER_ID,
PRODUCT_STATUS,
LIST_PRICE,
MIN_PRICE,
CATALOG_URL,
QUANTITY_ON_HAND
FROM products,
inventories
WHERE products.product_id = 195
AND inventories.product_id = products.product_id
AND rownum < 15


SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
SQL> @awr_show_sqlid.sql dra5rjs03kmad
SQL> set ver off pages 50000 lines 32000 tab off long 9999999 timing off echo off
### Occurrences in ASH (DBA_HIST_ACTIVE_SESS_HISTORY):

no rows selected

### The Statement (DBA_HIST_SQLTEXT):
SELECT products.PRODUCT_ID,
PRODUCT_NAME,
PRODUCT_DESCRIPTION,
CATEGORY_ID,
WEIGHT_CLASS,
WARRANTY_PERIOD,
SUPPLIER_ID,
PRODUCT_STATUS,
LIST_PRICE,
MIN_PRICE,
CATALOG_URL,
QUANTITY_ON_HAND
FROM products,
inventories
WHERE products.product_id = 195
AND inventories.product_id = products.product_id
AND rownum < 15


SQL> pause

SQL>
SQL> -- Sorting by FORCE_MATCHING_SIGNATURE allowed me to identify a significant consumer query that doesn't utilize binds
SQL>
SQL> exit
Disconnected from Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options
[oracle@DB12c AWR_MINING3]$
```

LET'S MINE THE AWR!

- DEMO - awr_top_plan_demo.sql

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
[oracle@DB12c AWR_MINING3]$ sqlplus / as sysdba

SQL*Plus: Release 12.1.0.1.0 Production on Fri Oct 23 10:41:14 2015

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Connected to:
Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

SQL> @awr_top_plan_demo.sql
SQL> alter session set container = sample;

Session altered.

SQL>
SQL> -- Let's see how sorting by elapsed time looks when we aggregate by PLAN_HASH_VALUE
SQL> pause
```

```
col iowait_s for 9999999.999
col clwait_s for 9999999.999
col apwait_s for 9999999.999
col ccwait_s for 9999999.999
col buffer_gets for 9999999999999999
col disk_reads for 9999999999999999
col direct_writes for 9999999999999999
col diff_sqlid for a13
col diff_plan for a10
col diff_fms for a20

select * from (
select to_char(plan_hash_value) diff_plan,
    decode(count(unique(sql_id)),1,max(sql_id),'#'||count(unique(sql_id))) diff_sqlid,
    decode(count(unique(force_matching_signature)),1,to_char(max(force_matching_signature)),'#'||count(unique(force_matching_signature))) diff_fms,
    sum(hss.executions_delta) executions,
    round(sum(hss.elapsed_time_delta)/1000000,3) elapsed_time_s,
    round(sum(hss.cpu_time_delta)/1000000,3) cpu_time_s,
    round(sum(hss.iowait_delta)/1000000,3) iowait_s,
--    round(sum(hss.clwait_delta)/1000000,3) clwait_s,
--    round(sum(hss.apwait_delta)/1000000,3) apwait_s,
--    round(sum(hss.ccwait_delta)/1000000,3) ccwait_s,
    round(sum(hss.rows_processed_delta),3) rows_processed,
    round(sum(hss.buffer_gets_delta),3) buffer_gets,
    round(sum(hss.disk_reads_delta),3) disk_reads,
    round(sum(hss.direct_writes_delta),3) direct_writes
from dba_hist_sqlstat hss, dba_hist_snapshot hs
where hss.snap_id=hs.snap_id
    and hs.snap_id between &snap_id_from and &snap_id_to
group by plan_hash_value
order by &sort_col_nr desc)
where rownum<=&top_n;

SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
--    round(sum(hss.ccwait_delta)/1000000,3) ccwait_s,
    round(sum(hss.rows_processed_delta),3) rows_processed,
    round(sum(hss.buffer_gets_delta),3) buffer_gets,
    round(sum(hss.disk_reads_delta),3) disk_reads,
    round(sum(hss.direct_writes_delta),3) direct_writes
from dba_hist_sqlstat hss, dba_hist_snapshot hs
where hss.snap_id=hs.snap_id
    and hs.snap_id between &snap_id_from and &snap_id_to
group by plan_hash_value
order by &sort_col_nr desc)
where rownum<=&top_n;

SQL> pause

SQL>
SQL> @awr_top_by_plan_snaps.sql 25 50 5 10
SQL> set ver off pages 50000 lines 260 tab off echo off

DIFF_PLAN  DIFF_SQLID    DIFF_FMS              EXECUTIONS ELAPSED_TIME_S   CPU_TIME_S     IOWAIT_S ROWS_PROCESSED       BUFFER_GETS        DISK_READS     DIRECT_WRITES
---------- ------------- -------------------- ---------- -------------- ------------ ------------ -------------- ------------------ ------------------ -----------------
0          #32           0                       1591480       4574.840     5237.021        6.831        1591422           73737483             183290               791
725271039  c13sma6rkr27c 18298161888330075667      637670        521.987      571.116         .063        2880918           17263182               2209                 0
1081153563 #999          5985318870031566873      835562        306.699      253.610         .034       11697868            7571650               1029                 0
3241608609 gzhkw1qu6fwxm 0                        638465        127.138       88.481         .006         638463            2052941                 58                 0
494735477  3fw75k1snsddx 0                        231877        122.990       90.754         .065         231876            3933240               1734                 0
1628223527 #3            #3                      274516        106.226       63.743         .201         274515            2667630               4995                 0
1655552467 8z3542ffmp562 17991828121679737456    666150         75.843       39.644         .009         602153            3805721                296                 0
900611645  5ckxyqfvu60pj 6486229150489758732      638509         73.013       53.327         .150         638514            2554314               4454                 0
214043693  c13sma6rkr27c 18298161888330075667       49428         52.195       48.078         .003         222650            1355632                 36                 0
1388734953 #2            #2                      638196         47.943       16.982         .000         638475                  3                  0                 0

10 rows selected.

SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
    round(sum(hss.direct_writes_delta),3) direct_writes
from dba_hist_sqlstat hss, dba_hist_snapshot hs
where hss.snap_id=hs.snap_id
    and hs.snap_id between &snap_id_from and &snap_id_to
group by plan_hash_value
order by &sort_col_nr desc)
where rownum<=&top_n;

SQL> pause

SQL>
SQL> @awr_top_by_plan_snaps.sql 25 50 5 10
SQL> set ver off pages 50000 lines 260 tab off echo off

DIFF_PLAN  DIFF_SQLID    DIFF_FMS             EXECUTIONS ELAPSED_TIME_S   CPU_TIME_S      IOWAIT_S ROWS_PROCESSED       BUFFER_GETS        DISK_READS     DIRECT_WRITES
---------- ------------- -------------------- ---------- -------------- ------------ ------------ -------------- ----------------- ----------------- -----------------
0          #32           0                       1591480        4574.840     5237.021        6.831        1591422          73737483            183290               791
725271039  c13sma6rkr27c 18298161888330075667      637670         521.987      571.116         .063        2880918          17263182              2209                 0
1081153563 #999          5985318870031566873      835562         306.699      253.610         .034       11697868           7571650              1029                 0
3241608609 gzhkw1qu6fwxm 0                        638465         127.138       88.481         .006         638463           2052941                58                 0
494735477  3fw75k1snsddx 0                        231877         122.990       90.754         .065         231876           3933240              1734                 0
1628223527 #3            #3                      274516         106.226       63.743         .201         274515           2667630              4995                 0
1655552467 8z3542ffmp562 17991828121679737456    666150          75.843       39.644         .009         602153           3805721               296                 0
900611645  5ckxyqfvu60pj 6486229150489758732      638509          73.013       53.327         .150         638514           2554314              4454                 0
214043693  c13sma6rkr27c 18298161888330075667       49428          52.195       48.078         .003         222650           1355632                36                 0
1388734953 #2            #2                      638196          47.943       16.982         .000         638475                 3                 0                 0

10 rows selected.

SQL> pause

SQL>
SQL> -- What is plan 1628223527?
SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
SQL> @awr_top_by_plan_snaps.sql 25 50 5 10
SQL> set ver off pages 50000 lines 260 tab off echo off

DIFF_PLAN  DIFF_SQLID    DIFF_FMS             EXECUTIONS ELAPSED_TIME_S   CPU_TIME_S      IOWAIT_S ROWS_PROCESSED       BUFFER_GETS        DISK_READS     DIRECT_WRITES
---------- ------------- -------------------- ---------- -------------- ------------ ------------ -------------- ------------------ ----------------- -----------------
0          #32           0                       1591480       4574.840      5237.021        6.831        1591422           73737483            183290               791
725271039  c13sma6rkr27c 18298161888330075667      637670        521.987       571.116         .063        2880918           17263182              2209                 0
1081153563 #999          5985318870031566873      835562        306.699       253.610         .034       11697868            7571650              1029                 0
3241608609 gzhkw1qu6fwxm 0                        638465        127.138        88.481         .006         638463            2052941                58                 0
494735477  3fw75k1snsddx 0                        231877        122.990        90.754         .065         231876            3933240              1734                 0
1628223527 #3            #3                      274516        106.226        63.743         .201         274515            2667630              4995                 0
1655552467 8z3542ffmp562 17991828121679737456    666150         75.843        39.644         .009         602153            3805721               296                 0
900611645  5ckxyqfvu60pj 6486229150489758732      638509         73.013        53.327         .150         638514            2554314              4454                 0
214043693  c13sma6rkr27c 18298161888330075667       49428         52.195        48.078         .003         222650            1355632                36                 0
1388734953 #2            #2                      638196         47.943        16.982         .000         638475                  3                   0                 0

10 rows selected.

SQL> pause

SQL>
SQL> -- What is plan 1628223527?
SQL> pause

SQL> @awr_top_by_plan_detail_snaps.sql 25 50 5 15 1628223527
SQL> set ver off pages 50000 lines 260 tab off echo off

DIFF_PLAN  DIFF_SQLID    DIFF_FMS             EXECUTIONS ELAPSED_TIME_S   CPU_TIME_S      IOWAIT_S ROWS_PROCESSED       BUFFER_GETS        DISK_READS     DIRECT_WRITES
---------- ------------- -------------------- ---------- -------------- ------------ ------------ -------------- ------------------ ----------------- -----------------
1628223527 5mddt5kt45rg3 14366533292145951164    231905         88.169        50.906         .030         231904            2234211               743                 0
1628223527 f9u2k84v884y7 2971448457592404441      29209         16.175        10.984         .171          29209             379803              4249                 0
1628223527 3hatpjzrqvfn7 13119154137972506400     13402          1.882         1.853         .000          13402              53616                 3                 0

SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
---------- ------------- -------------------- ----------- ------------- ------------ ------------ -------------- ----------------- ----------------- -----------------
0          #32           0                      1591480       4574.840     5237.021        6.831        1591422          73737483            183290               791
725271039  c13sma6rkr27c 18298161888330075667     637670        521.987      571.116         .063        2880918          17263182              2209                 0
1081153563 #999          5985318870031566873     835562        306.699      253.610         .034       11697868           7571650              1029                 0
3241608609 gzhkw1qu6fwxm 0                       638465        127.138       88.481         .006         638463           2052941                58                 0
494735477  3fw75k1snsddx 0                       231877        122.990       90.754         .065         231876           3933240              1734                 0
1628223527 #3            #3                      274516        106.226       63.743         .201         274515           2667630              4995                 0
1655552467 8z3542ffmp562 17991828121679737456    666150         75.843       39.644         .009         602153           3805721               296                 0
900611645  5ckxyqfvu60pj 6486229150489758732      638509         73.013       53.327         .150         638514           2554314              4454                 0
214043693  c13sma6rkr27c 18298161888330075667      49428         52.195       48.078         .003         222650           1355632                36                 0
1388734953 #2            #2                      638196         47.943       16.982         .000         638475                 3                 0                 0

10 rows selected.

SQL> pause

SQL>
SQL> -- What is plan 1628223527?
SQL> pause

SQL> @awr_top_by_plan_detail_snaps.sql 25 50 5 15 1628223527
SQL> set ver off pages 50000 lines 260 tab off echo off

DIFF_PLAN  DIFF_SQLID    DIFF_FMS            EXECUTIONS ELAPSED_TIME_S   CPU_TIME_S     IOWAIT_S ROWS_PROCESSED       BUFFER_GETS        DISK_READS     DIRECT_WRITES
---------- ------------- ------------------- ---------- ------------- ------------ ------------ -------------- ----------------- ----------------- -----------------
1628223527 5mddt5kt45rg3 14366533292145951164     231905        88.169       50.906         .030         231904           2234211               743                 0
1628223527 f9u2k84v884y7 2971448457592404441       29209        16.175       10.984         .171          29209            379803              4249                 0
1628223527 3hatpjzrqvfn7 13119154137972506400      13402         1.882        1.853         .000          13402             53616                 3                 0

SQL> pause

SQL>
SQL> -- Let's look at some of these queries
SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
SQL> pause

SQL>
SQL> -- What is plan 1628223527?
SQL> pause

SQL> @awr_top_by_plan_detail_snaps.sql 25 50 5 15 1628223527
SQL> set ver off pages 50000 lines 260 tab off echo off

DIFF_PLAN  DIFF_SQLID    DIFF_FMS             EXECUTIONS ELAPSED_TIME_S   CPU_TIME_S      IOWAIT_S ROWS_PROCESSED       BUFFER_GETS        DISK_READS     DIRECT_WRITES
---------- ------------- -------------------- ---------- -------------- ------------ ------------ -------------- ------------------ ---------------- -----------------
1628223527 5mddt5kt45rg3 14366533292145951164      231905         88.169        50.906         .030         231904            2234211              743                 0
1628223527 f9u2k84v884y7 2971448457592404441        29209         16.175        10.984         .171          29209             379803             4249                 0
1628223527 3hatpjzrqvfn7 13119154137972506400       13402          1.882         1.853         .000          13402              53616                3                 0

SQL> pause

SQL>
SQL> -- Let's look at some of these queries
SQL> pause

SQL> @awr_show_sqlid.sql 5mddt5kt45rg3
SQL> set ver off pages 50000 lines 32000 tab off long 9999999 timing off echo off
### Occurrences in ASH (DBA_HIST_ACTIVE_SESS_HISTORY):

SQL_ID        PROGRAM                          MODULE                         ACTION                         CLIENT_ID                      COUNT(*)
------------- -------------------------------- ------------------------------ ------------------------------ ------------------------------ ----------
5mddt5kt45rg3 JDBC Thin Client                 New Order                                                     Swingbench                             18

### The Statement (DBA_HIST_SQLTEXT):
UPDATE ORDERS SET ORDER_MODE = 'online', ORDER_STATUS = FLOOR(DBMS_RANDOM.VALUE(0, :B3 )), ORDER_TOTAL = :B2 WHERE ORDER_ID = :B1

SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
1628223527 f9u2k84v884y7 2971448457592404441       29209          16.175          10.984            .171           29209           379803             4249                0
1628223527 3hatpjzrqvfn7 13119154137972506400      13402           1.882           1.853            .000           13402            53616                3                0

SQL> pause

SQL>
SQL> -- Let's look at some of these queries
SQL> pause

SQL> @awr_show_sqlid.sql 5mddt5kt45rg3
SQL> set ver off pages 50000 lines 32000 tab off long 9999999 timing off echo off
### Occurrences in ASH (DBA_HIST_ACTIVE_SESS_HISTORY):

SQL_ID        PROGRAM                          MODULE                           ACTION                           CLIENT_ID                        COUNT(*)
------------- -------------------------------- -------------------------------- -------------------------------- -------------------------------- ----------
5mddt5kt45rg3 JDBC Thin Client                 New Order                                                         Swingbench                             18

### The Statement (DBA_HIST_SQLTEXT):
UPDATE ORDERS SET ORDER_MODE = 'online', ORDER_STATUS = FLOOR(DBMS_RANDOM.VALUE(0, :B3 )), ORDER_TOTAL = :B2 WHERE ORDER_ID = :B1

SQL> pause

SQL> @awr_show_sqlid.sql f9u2k84v884y7
SQL> set ver off pages 50000 lines 32000 tab off long 9999999 timing off echo off
### Occurrences in ASH (DBA_HIST_ACTIVE_SESS_HISTORY):

SQL_ID        PROGRAM                          MODULE                           ACTION                           CLIENT_ID                        COUNT(*)
------------- -------------------------------- -------------------------------- -------------------------------- -------------------------------- ----------
f9u2k84v884y7 JDBC Thin Client                 Process Orders                                                    Swingbench                              3

### The Statement (DBA_HIST_SQLTEXT):
UPDATE /*+ index(orders, order_pk) */ ORDERS SET ORDER_STATUS = FLOOR(DBMS_RANDOM.VALUE(:B3 + 1, :B2 )) WHERE ORDER_ID = :B1

SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
SQL>
SQL> -- Let's look at some of these queries
SQL> pause

SQL> @awr_show_sqlid.sql 5mddt5kt45rg3
SQL> set ver off pages 50000 lines 32000 tab off long 9999999 timing off echo off
### Occurrences in ASH (DBA_HIST_ACTIVE_SESS_HISTORY):

SQL_ID        PROGRAM                        MODULE                         ACTION                         CLIENT_ID                      COUNT(*)
------------- ------------------------------ ------------------------------ ------------------------------ ------------------------------ ----------
5mddt5kt45rg3 JDBC Thin Client               New Order                                                     Swingbench                             18

### The Statement (DBA_HIST_SQLTEXT):
UPDATE ORDERS SET ORDER_MODE = 'online', ORDER_STATUS = FLOOR(DBMS_RANDOM.VALUE(0, :B3 )), ORDER_TOTAL = :B2 WHERE ORDER_ID = :B1

SQL> pause

SQL> @awr_show_sqlid.sql f9u2k84v884y7
SQL> set ver off pages 50000 lines 32000 tab off long 9999999 timing off echo off
### Occurrences in ASH (DBA_HIST_ACTIVE_SESS_HISTORY):

SQL_ID        PROGRAM                        MODULE                         ACTION                         CLIENT_ID                      COUNT(*)
------------- ------------------------------ ------------------------------ ------------------------------ ------------------------------ ----------
f9u2k84v884y7 JDBC Thin Client               Process Orders                                                Swingbench                              3

### The Statement (DBA_HIST_SQLTEXT):
UPDATE /*+ index(orders, order_pk) */ ORDERS SET ORDER_STATUS = FLOOR(DBMS_RANDOM.VALUE(:B3 + 1, :B2 )) WHERE ORDER_ID = :B1

SQL> pause

SQL>
SQL> -- Is the plan the same, really?
SQL> pause
```

```
melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35
SQL_ID        PROGRAM                          MODULE                          ACTION                          CLIENT_ID                       COUNT(*)
------------- -------------------------------- ------------------------------- ------------------------------- ------------------------------ ----------
f9u2k84v884y7 JDBC Thin Client                 Process Orders                                                  Swingbench                              3

### The Statement (DBA_HIST_SQLTEXT):
UPDATE /*+ index(orders, order_pk) */ ORDERS SET ORDER_STATUS = FLOOR(DBMS_RANDOM.VALUE(:B3 + 1, :B2 )) WHERE ORDER_ID = :B1

SQL> pause

SQL>
SQL> -- Is the plan the same, really?
SQL> pause

SQL> select * from table(dbms_xplan.display_awr('5mddt5kt45rg3',1628223527));
SQL_ID 5mddt5kt45rg3
--------------------
UPDATE ORDERS SET ORDER_MODE = 'online', ORDER_STATUS =
FLOOR(DBMS_RANDOM.VALUE(0, :B3 )), ORDER_TOTAL = :B2 WHERE ORDER_ID =
:B1

Plan hash value: 1628223527

-----------------------------------------------------------------------------
| Id  | Operation          | Name     | Rows  | Bytes | Cost (%CPU)| Time     |
-----------------------------------------------------------------------------
|   0 | UPDATE STATEMENT   |          |       |       |     3 (100)|          |
|   1 |  UPDATE            | ORDERS   |       |       |            |          |
|   2 |   INDEX UNIQUE SCAN| ORDER_PK |     1 |    58 |     2   (0)| 00:00:01 |
-----------------------------------------------------------------------------


16 rows selected.

SQL> pause
```

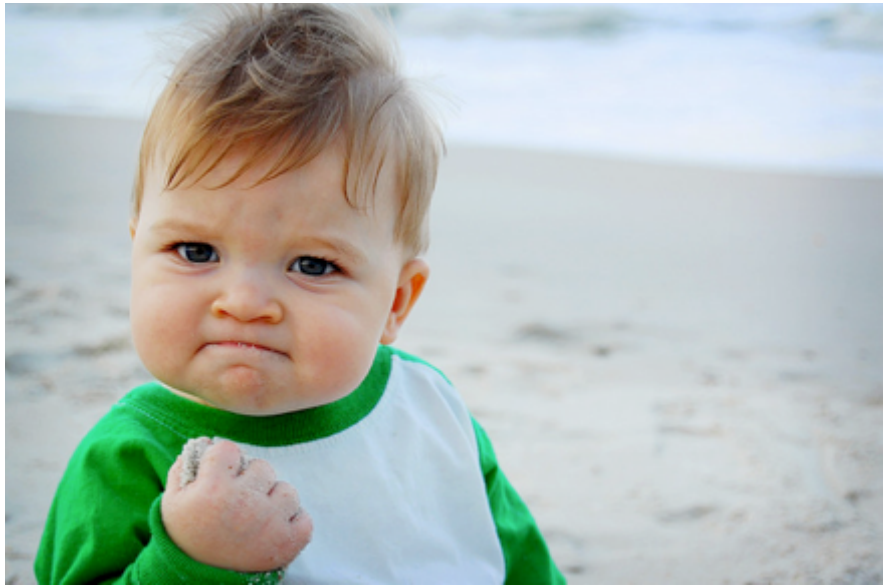
```
-------------------------------------------------------------------------------
| Id  | Operation          | Name     | Rows  | Bytes | Cost (%CPU)| Time     |
-------------------------------------------------------------------------------
|   0 | UPDATE STATEMENT   |          |       |       |     3 (100)|          |
|   1 |  UPDATE            | ORDERS   |       |       |            |          |
|   2 |   INDEX UNIQUE SCAN| ORDER_PK |     1 |    58 |     2   (0)| 00:00:01 |
-------------------------------------------------------------------------------


16 rows selected.

SQL> pause

SQL> select * from table(dbms_xplan.display_awr('f9u2k84v884y7',1628223527));
SQL_ID f9u2k84v884y7
--------------------
UPDATE /*+ index(orders, order_pk) */ ORDERS SET ORDER_STATUS =
FLOOR(DBMS_RANDOM.VALUE(:B3 + 1, :B2 )) WHERE ORDER_ID = :B1

Plan hash value: 1628223527

-------------------------------------------------------------------------------
| Id  | Operation          | Name     | Rows  | Bytes | Cost (%CPU)| Time     |
-------------------------------------------------------------------------------
|   0 | UPDATE STATEMENT   |          |       |       |     3 (100)|          |
|   1 |  UPDATE            | ORDERS   |       |       |            |          |
|   2 |   INDEX UNIQUE SCAN| ORDER_PK |     1 |    39 |     2   (0)| 00:00:01 |
-------------------------------------------------------------------------------


15 rows selected.

SQL> pause
```

melsins — oracle@DB12c:~/AWR_MINING3 — ssh oracle@199.199.56.111 — 170×35

```
|   2 |   INDEX UNIQUE SCAN| ORDER_PK |     1 |    58 |     2   (0)| 00:00:01 |
-------------------------------------------------------------------------------


16 rows selected.

SQL> pause

SQL> select * from table(dbms_xplan.display_awr('f9u2k84v884y7',1628223527));
SQL_ID f9u2k84v884y7
--------------------
UPDATE /*+ index(orders, order_pk) */ ORDERS SET ORDER_STATUS =
FLOOR(DBMS_RANDOM.VALUE(:B3 + 1, :B2 )) WHERE ORDER_ID = :B1

Plan hash value: 1628223527

-------------------------------------------------------------------------------
| Id  | Operation          | Name     | Rows  | Bytes | Cost (%CPU)| Time     |
-------------------------------------------------------------------------------
|   0 | UPDATE STATEMENT   |          |       |       |     3 (100)|          |
|   1 |  UPDATE            | ORDERS   |       |       |            |          |
|   2 |   INDEX UNIQUE SCAN| ORDER_PK |     1 |    39 |     2   (0)| 00:00:01 |
-------------------------------------------------------------------------------


15 rows selected.

SQL> pause

SQL> -- Looking at the top execution plans in the system can help finding inefficient access paths to the data
SQL>
SQL> exit
Disconnected from Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options
[oracle@DB12c AWR_MINING3]$
```

SUMMARY

- AWR report is sufficient, except when it's not
  - No clear top consumer
  - Dynamic SQL
  - Combined reporting intervals
- Overhead of creating an AWR report
- TOPNSQL
- FORCE_MATCHING_SIGNATURE
- PLAN_HASH_VALUE
- Don't stop ! You decide how to filter and aggregate the data
  - Module
  - Action
  - …



AWR is a complex beast, but it’s not necessary to know much to start mining

Be Brave!

But buy Diagnostics pack licenses first.

Contact Information

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Pythian.com

@pythian

Demo scripts available here: bit.ly/Maris_OOW15_AWR