

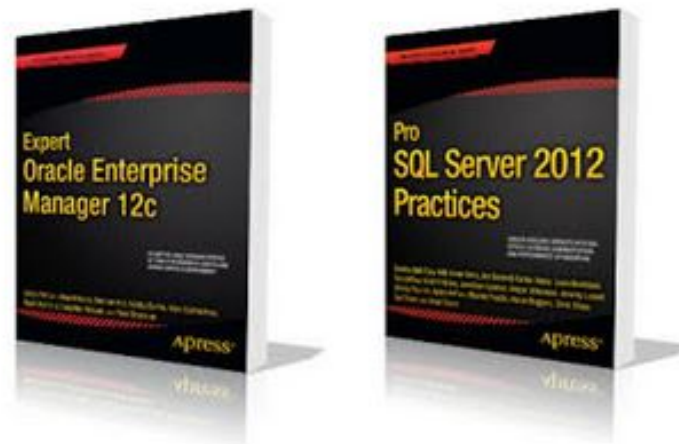
ORACLE®

Power of the AWR Warehouse

Enterprise Manager 12c, Release 4

Kellyn Pot'Vin-Gorman
Consulting Member of Enterprise Manager Technical Team
Strategic Customer Program
Fall 2014

About



(Former)



ORACLE
ACE Director

(Current)



about.me



Kellyn Pot'Vin

EM12c Goth Cowgirl



Safe Harbor Statement

The following is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, and timing of any features or functionality described for Oracle's products remains at the sole discretion of Oracle.

Program Agenda

- 1 ➤ Why Have an AWR Warehouse
- 2 ➤ Architecture
- 3 ➤ ETL
- 4 ➤ EM Interface Features
- 5 ➤ Advanced Usage of the AWR Warehouse

Program Agenda with Highlight

- 1 Why Have an AWR Warehouse
- 2 Architecture
- 3 ETL
- 4 EM Interface Features
- 5 Advanced Usage of the AWR Warehouse

Why a Warehouse?

1. Centralized location offers space savings to retain AWR data in local SYSAUX tablespace.
2. Ability to offload resource demands when doing deep analysis and historical trending of AWR data on source database.
3. Centralizing the data, identified by Database identifier, host, allows analysis on more than one database without database links.

AWR Warehouse in EM12c



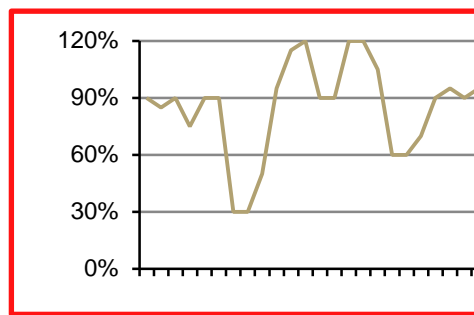
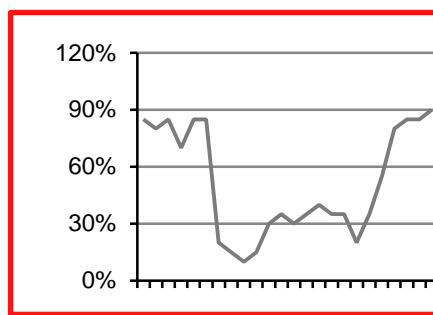
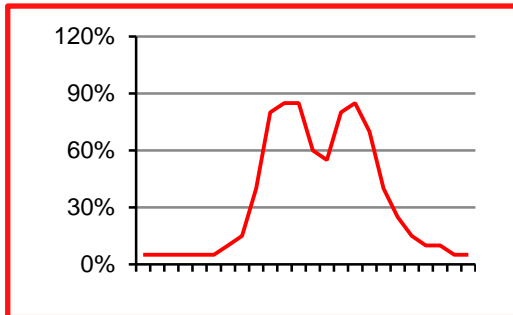
Finance



CRM



Supply Chain



- Automatic Workload Repository (AWR) is the *de facto* performance repository for Oracle databases since 10g
- Default retention period of 8 days prevents diagnosis of long term performance problems (“Compare performance during this quarter’s books close with last quarter’s”)
- Increasing AWR retention period increases overhead and cost in critical production environments

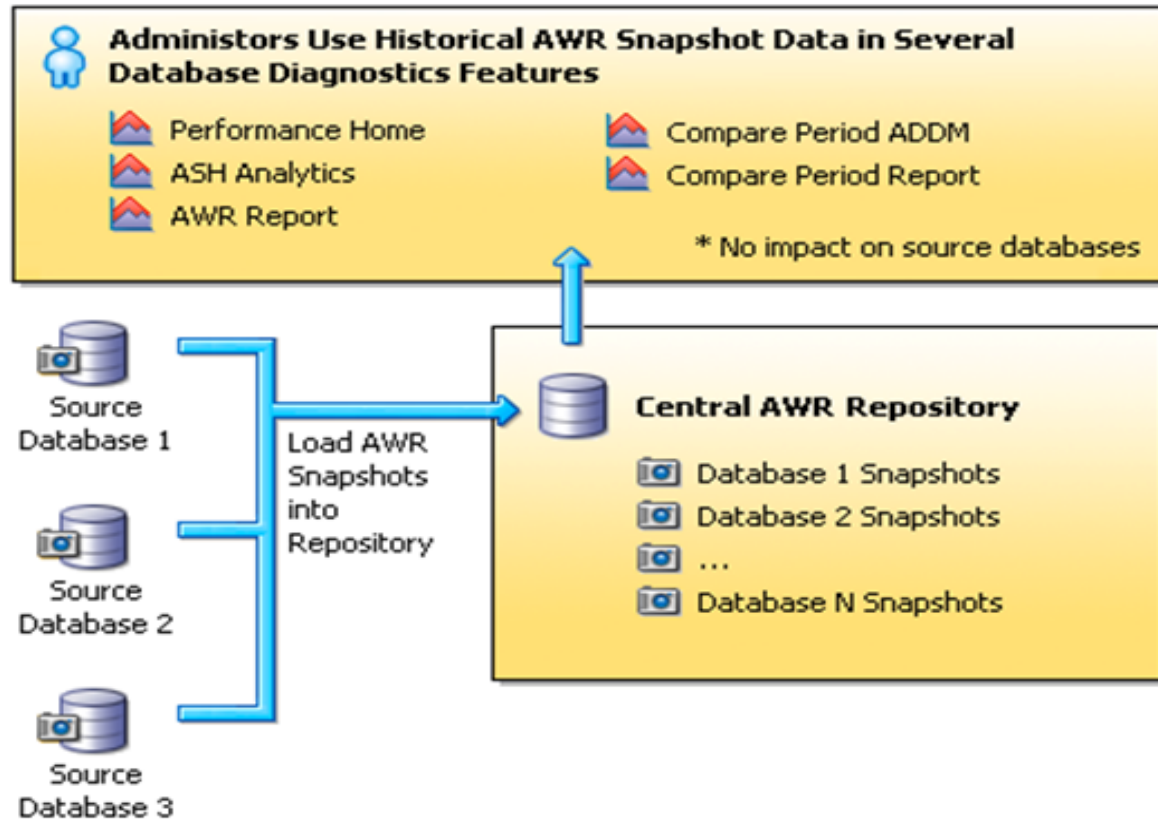
Requirements

- AWR Warehouse Repository -11.2.0.4 or higher.
- Preferred Credentials set up for all targets involved.
- Discover the database you will use for your repository in the EM12c
- Pre-discover any source database before able to add.
- For a RAC target or AWR Warehouse, ensure you've set up a shared location for the ETL load files.

Program Agenda with Highlight

- 1 Why Have an AWR Warehouse
- 2 Architecture**
- 3 ETL
- 4 EM Interface Features
- 5 Advanced Usage of the AWR Warehouse

AWR Warehouse - Architecture



- Central warehouse configured for long term AWR data retention
- Historical and ongoing AWR snapshots collected from databases enabled for AWR warehouse
- ETL jobs moves snapshots from source databases into AWR warehouse
- Retention period configurable for weeks, months, years or forever (default)

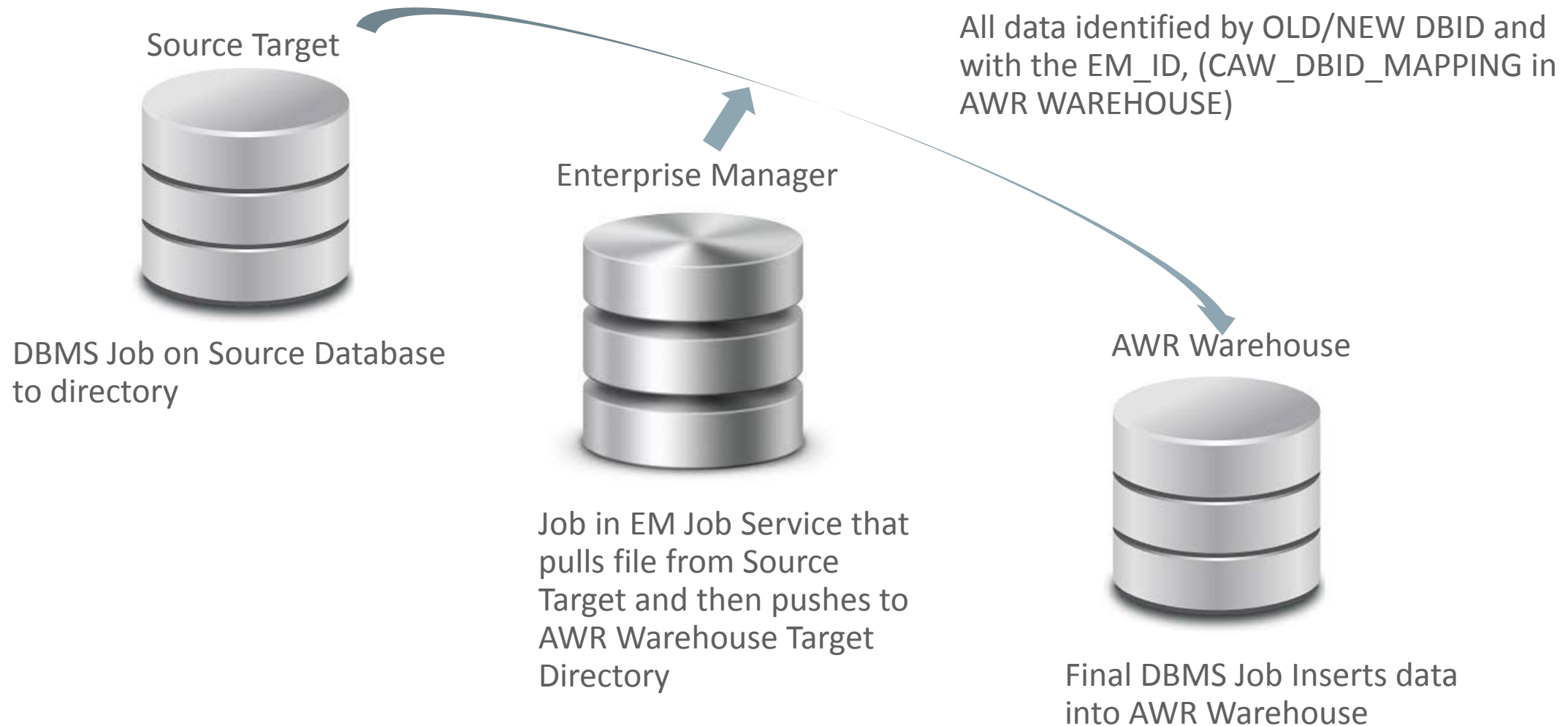
Requirements

- AWR Warehouse Repository database must be 11.2.0.4 with patch or 12.1.0.2 with patch.
- Will support source databases 10.2.0.4 → 12.1.0.x
- EM12c 12.1.0.4 with AWR Warehouse Patch, Master Note -1907335.1
- Requires diagnostic and tuning pack. With these, limited EE license for use of AWR Warehouse Repository database.
- As long as no additional, (RAC, Dataguard, etc.) on AWR Warehouse repository database, the limited EE license will support.

Program Agenda with Highlight

- 1 Why Have an AWR Warehouse
- 2 Architecture
- 3 ETL**
- 4 EM Interface Features
- 5 Advanced Usage of the AWR Warehouse

AWR ETL Jobs



Source Database ETL Job

DBMS Scheduler Job Name: **MGMT_CAW_EXTRACT**

Exec Call: *begin dbsnmp.mgmt_caw_extract.run_extract; end;*

How Often: 3 Hour Intervals if “playing catch up”, otherwise, 24 hr interval.

EM12c EM Job

Job Run: CAW_TRANSFER_1404855021494

Summary

Status	Scheduled
Scheduled	Jul 16, 2014 10:30:21 AM GMT-07:00
Repeating	Every 12 Hours beginning Jul 8, 2014 10:30:21 PM Repository

- Agent to agent push.
- No other interaction with EM12c outside of interface.

AWR Warehouse ETL Load Job

DBMS Scheduler Job Name: **MGMT_CAW_LOAD**

Exec Call: *begin dbsnmp.mgmt_caw_load.run_master;*

How Often: 5 Minute Intervals

Biggest Resource Demand from the “run_master”:

```
begin dbms_swrf_internal.move_to_awr(schname => :1); end;
```

New DBSNMP Objects

OBJECT_TYPE	COUNT (OBJECT_NAME)
SEQUENCE	1
PACKAGE	1
PACKAGE BODY	1
TABLE	2
INDEX	2

CAW_EXTRACT_PROPERTIES : Information on ETL job, dump location and intervals.

CAW_EXTRACT_METADATA : All data about extracts- times, failures, details.

Program Agenda with Highlight

- 1 Why Have an AWR Warehouse
- 2 Architecture
- 3 ETL
- 4 EM Interface Features**
- 5 Advanced Usage of the AWR Warehouse

Accessing

Databases

Performance ▾ Availability ▾ Security ▾ Schema ▾

SQL Performance Analyzer

Run SQL...

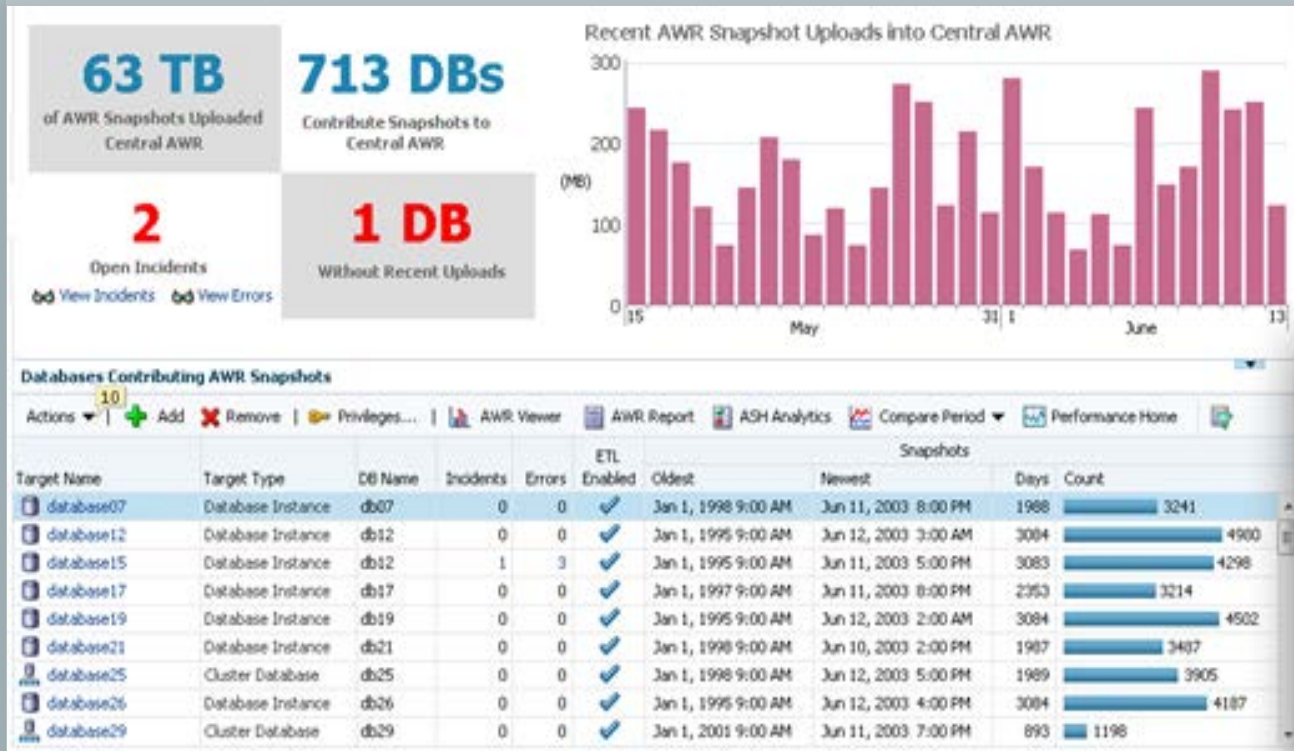
AWR Warehouse

Database Replay

Search List

- First access, will be asked to set up AWR Warehouse to database.
- Request to add first source database to repository.

AWR Warehouse Interface



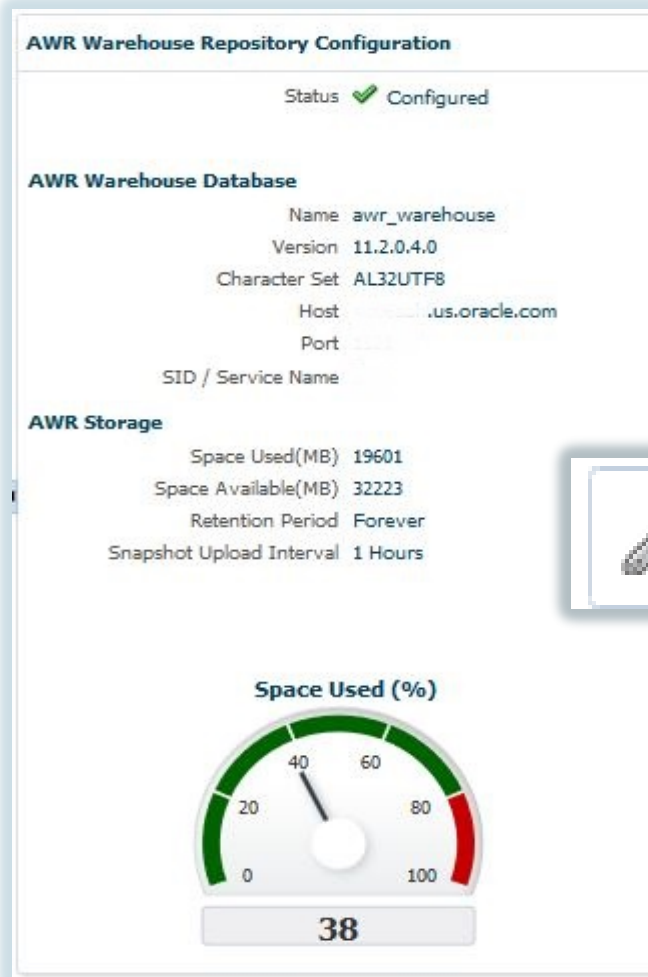
- Warehouse dashboard tracking ETL jobs
- All AWR features available on long term AWR data
 - Performance page
 - AWR report
 - ASH analytics
 - Compare Period ADDM
 - Compare Period Report
- Integrated seamlessly into EM UI
- Zero runtime overhead on source Production databases

How Do You Know You are Using it?

AWR Data Source **Historical - AWR Warehouse** (Jun 29, 2014 5:00:50 PM - Jul 14, 2014 5:00:05 AM) ▼

- Upper right hand corner drop down
- Can switch between and if non-existent, console will inform the user.

AWR Warehouse Configurations



Along with AWR Warehouse Basics-

- Configuration **Status**
- **Version** of Repository Database
- **Host** Information
- Connect Info, (**SID/Service Name, Port**)
- **Space Usage, Upload Interval** and **Retention**

Databases and Reports

Databases Contributing AWR Snapshots

Actions Add Remove | Privileges...

AWR Viewer AWR Report ASH Analytics Compare Period Performance Home

Target Name	Target Type	DB Name	Incidents	Errors	Enabled	Oldest	Newest	Days	Count
database07	Database Instance	db07	0	0	✓	Jan 1, 1998 9:00 AM	Jun 11, 2003 8:00 PM	1988	3241
database12	Database Instance	db12	0	0	✓	Jan 1, 1995 9:00 AM	Jun 12, 2003 3:00 AM	3084	4980
database15	Database Instance	db12	1	3	✓	Jan 1, 1995 9:00 AM	Jun 11, 2003 5:00 PM	3083	4298
database17	Database Instance	db17	0	0	✓	Jan 1, 1997 9:00 AM	Jun 11, 2003 8:00 PM	2353	3214
database19	Database Instance	db19	0	0	✓	Jan 1, 1995 9:00 AM	Jun 12, 2003 2:00 AM	3084	4502
database21	Database Instance	db21	0	0	✓	Jan 1, 1998 9:00 AM	Jun 10, 2003 2:00 PM	1987	3487
database25	Cluster Database	db25	0	0	✓	Jan 1, 1998 9:00 AM	Jun 12, 2003 5:00 PM	1989	3905
database26	Database Instance	db26	0	0	✓	Jan 1, 1995 9:00 AM	Jun 12, 2003 4:00 PM	3084	4187
database29	Cluster Database	db29	0	0	✓	Jan 1, 2001 9:00 AM	Jun 11, 2003 7:00 PM	893	1198

Considerable report options

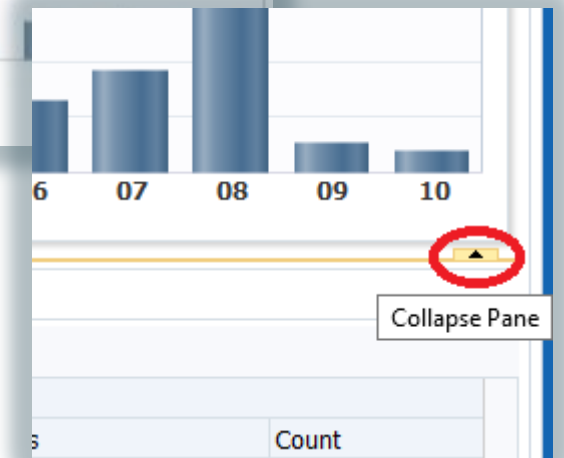
Add or remove source databases to the warehouse.

Snapshots



View snapshot loads per day

High loads due to catch up, new source db's.








Database Details

Databases Uploading AWR Snapshots									
Actions ▾ View ▾		Add	Remove	View Errors	Privileges...	ASH Analytics	AWR Report	Compare Period ▾	Performance Home
Target Name	Target Type	DB Name	Version	Owner	Snapshot Upload Enabled	Snapshots			
						Oldest	Newest	Days	Count
dbm02	Cluster Database	DBM02	11.2.0.4.0	TESTSUPERADMIN	✓	2014-06-21 17:59:19.554 -7:00	2014-07-10 23:00:53.058 -7:00	19	
ggrl1	Database Instance	GGRL1	11.2.0.3.0	TESTSUPERADMIN	✓	2014-06-29 18:00:52.27 -7:00	2014-07-10 20:00:25.5 -7:00	11	

- Database, go to DB Details Page
- DB Type, DB Name, Version, Owner, Enabled
- Snapshot Information











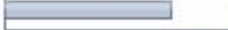

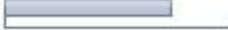



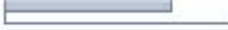







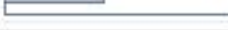

Upload Information

Databases Uploading AWR Snapshots					
Actions ▾	View ▾	 Add	 Remove	 View Errors	 Privileges...
					 ASH Analytics
Target Name	Target Type	DB Name	Version	Owner	Snapshot Upload Enabled
dbm02	Cluster Database	DBM02	11.2.0.4.0	TESTSUPERADMIN	✓
ggrl1	Database Instance	GGRL1	11.2.0.3.0	TESTSUPERADMIN	✓
sid.	Cluster Database	SID	11.2.0.4.0	TESTSUPERADMIN	✓
db314	Database Instance	DB314	11.2.0.3.0	TESTSUPERADMIN	✓
Oemrep_	Database Instance	SH3	11.2.0.3.0	TESTSUPERADMIN	✓
db307	Database Instance	DB307	11.2.0.3.0	TESTSUPERADMIN	✓
db305	Database Instance	DB305	11.2.0.3.0	TESTSUPERADMIN	✓
db304	Database Instance	DB304	11.2.0.3.0	TESTSUPERADMIN	✓
db301	Database Instance	DB301	11.2.0.3.0	TESTSUPERADMIN	✓
db308	Database Instance	DB308	11.2.0.3.0	TESTSUPERADMIN	✓
db306	Database Instance	DB306	11.2.0.3.0	TESTSUPERADMIN	✓
dbm01	Cluster Database	DBM01	11.2.0.4.0	TESTSUPERADMIN	✓
db303	Database Instance	DB303	11.2.0.3.0	TESTSUPERADMIN	✓

- Add
- Highlight, Remove
- Highlight, View Errors
- Privileges to Manage Snapshots



Snapshot Information

- Oldest timestamp
- Newest timestamp
- Days of Snapshots
- Count







Snapshots				
Oldest	Newest	Days		Count
2014-06-21 17:59:19.554 -7:00	2014-07-10 23:00:53.058 -7:00	 19		
2014-06-29 18:00:52.27 -7:00	2014-07-10 20:00:25.5 -7:00	 11		
2014-06-21 17:20:09.425 -7:00	2014-07-10 13:50:30.622 -7:00	 18		
2014-06-20 22:30:48.563 +0:00	2014-07-08 14:40:04.052 +0:00	 17		
2014-06-28 00:13:00.029 -7:00	2014-07-08 00:00:22.565 -7:00	 9		
2014-06-22 01:10:03.71 +0:00	2014-07-07 19:20:24.958 +0:00	 15		
2014-06-22 00:43:43.71 +0:00	2014-07-07 16:20:35.298 +0:00	 15		
2014-06-21 23:21:42.362 +0:00	2014-07-07 15:20:57.519 +0:00	 15		
2014-06-21 22:46:39.566 +0:00	2014-07-07 14:30:52.152 +0:00	 15		
2014-06-22 00:31:54.144 +0:00	2014-07-06 01:00:30.226 +0:00	 14		
2014-06-21 23:20:46.647 +0:00	2014-07-06 00:50:23.602 +0:00	 14		
2014-06-22 00:59:29.534 -7:00	2014-07-03 01:00:30.779 -7:00	 11		
2014-06-21 22:58:05.957 +0:00	2014-07-01 00:32:15.43 +0:00	 9		



Database List

Automatic Workload Repository Warehouse



Databases Uploading AWR Snapshots



Actions ▾ View ▾  Add  Remove  View Errors  Privileges...  ASH Analytics 

Target Name	Target Type	DB Name	Version	Owner	Snapshot Upload Enabled
dbm02	Cluster Database	DBM02	11.2.0.4.0	TESTSUPERADMIN	
ggrl1	Database Instance	GGRL1	11.2.0.3.0	TESTSUPERADMIN	

Clicking on Target Name will TAKE YOU TO DB Performance Home Page!

Menu

Automatic Workload Repository Warehouse





Databases Uploading AWR Snapshots

Actions View Add Remove View Errors

AddRemoveView ErrorsASH AnalyticsAWR ReportCompare PeriodPerformance HomeSnapshot PrivilegesEnable Snapshot UploadDisable Snapshot UploadUpload Snapshots Now

	DB Name
base	DBM02
instance	GGRL1

Automatic Workload Repository Warehouse



Databases Uploading AWR Snapshots

Actions View Add Remove View Errors Privileges

Target Name

dbm02

ggrl1

Database Instance

Columns

Reorder Columns...

Query By Example

Show All

✓ Target Name

✓ Target Type

✓ DB Name


✓ Version

✓ Owner


✓ Snapshot Upload Enabled

Snapshots

ETL Load Errors



Databases Uploading AWR

Actions ▾ View ▾ 

Target Name

Target Type

dbm02	Cluster
ggrl1	Database Instance
sid.us.oracle.com	Cluster
db314	Database Instance
Oemrep_Database	Database Instance
db307	Database Instance
db305	Database Instance
db304	Database Instance
db301	Database Instance
db308	Database Instance

View AWR Warehouse Errors

Target Name ggrl1
Target Type Database Instance

Time Attempted	Snapshots	Type	Error Message	Log File
No errors found				

OK

Managing Snapshot Privileges

Snapshot Privileges

Select the Enterprise Manager Administrators that will have access to the database's AWR snapshots stored in AWR Warehouse. The owner can remove the snapshots from AWR Warehouse and give other administrators view access.

Source Database db309

Owner TESTSUPERADMIN

Administrators with View Access

Available		Selected
TESTSUPERADMIN		
EMUSER_ADMIN		
OPER		
DESIGNER		
INFRA_ADMIN		
VIEWER		
PROV_OPERATOR	➤	
PROV_DESIGNER	➤➤	
PLUGIN_OMS_ADMIN	➤	
PLUGIN_AGENT_ADMIN	➤	
PLUGIN_USER	➤	
EMCLOUD_ADMIN	➤	
EMSSA_ADMIN	➤	
SYSMAN	➤	
CLOUD_SWLIB_USER	➤	

OK Cancel

- Viewing Access
- Manage Snapshots
- Retention Time
- Removal of Snapshots

How Often do We Ask, What Changed?

- It ran fine last week, now it isn't!
- ETL loads have changed, but no one has released any new code!
- The DBA says there hasn't been any parameter changes to this database, but I'm sure there have been.

Compare ADDM Resolution

What is Compare ADDM?

- Uses Two AWR snapshots
- Creates Report that-
- Compares SQL that is common and different.
- SGA changes
- IO/CPU bound issues
- Parameter Changes

A Comparison ADDM Report...

- Report Includes Following:
- Clear Demonstration of impact of change.
- Recommendations to address issue.
- Identifies causes behind change, (with limitations.)
- Lists Regressed SQL, too!

Tip: If Installing to database for first time, (simple installation, nothing to concern about, just pkg to fulfill views) you must have preferred credentials SET or install will fail!

Performing a Comparison

ggr11

Oracle Database ▾ Performance ▾ Availability ▾ Security ▾ Schema ▾ Administration ▾

Run Compare Period ADDM

Step 1: Select a Comparison Period

Time Zone GMT-07:00

Begin Time Jul 1, 2014 12:00:10 PM

End Time Jul 1, 2014 1:00:08 PM

TIP Time will be adjusted to the capture time of the closest snapshot

Step 2: Select a Base Period

Database 3373983684

Time Zone GMT-07:00

☐ Offset

Offset Preceding Period ▾

☐ Baseline

Baseline ▾

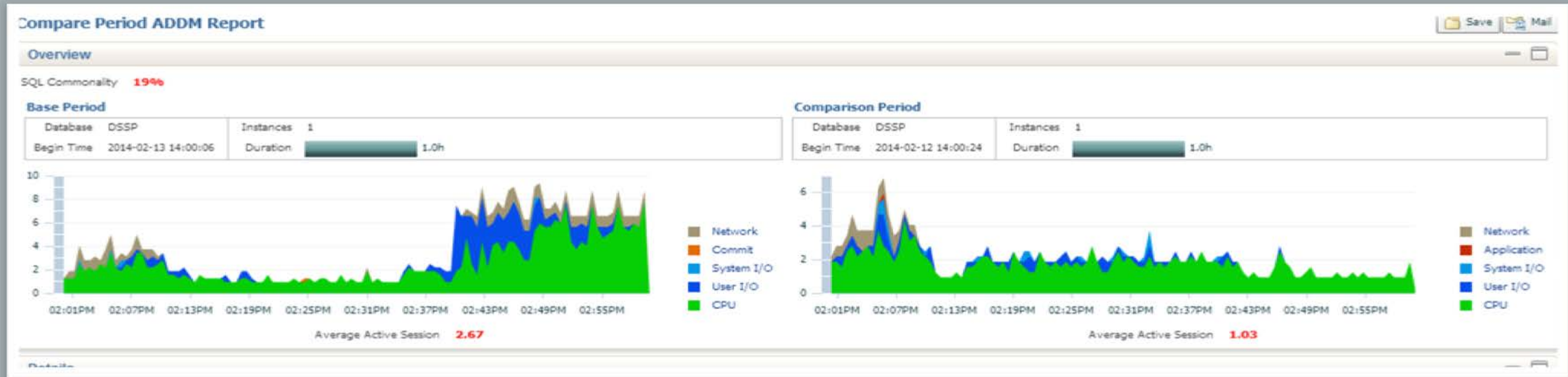
☒ Customize

Begin Time Jul 8, 2014 12:00:51 PM

End Time Jul 8, 2014 1:00:14 PM

Yes, you can compare one snapshot against another snapshot in DIFFERENT database! 😊

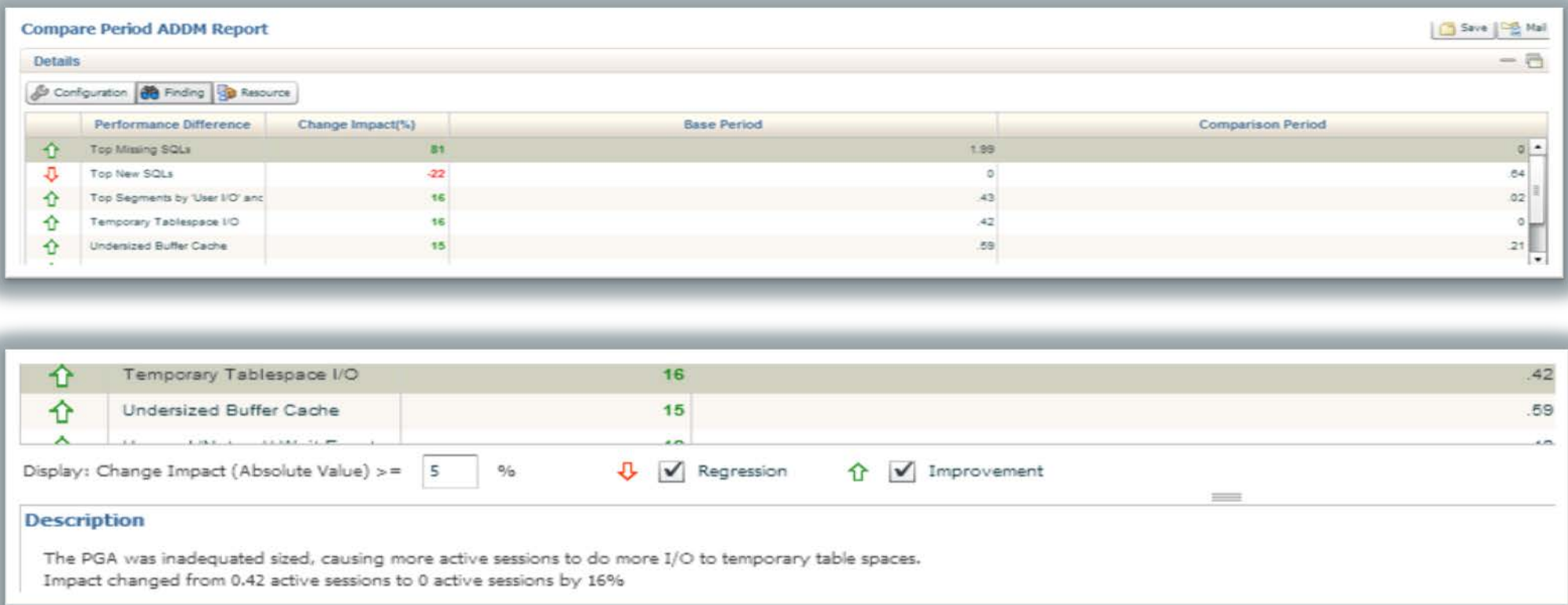
2-3pm, Compared on the 12th vs. the 13th



- Familiar interface with visual wait event comparisons.
- Average # of sessions during each period are displayed.

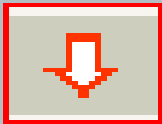
Detailed Report

High level data, highlight for analysis and recommendations



Regression SQL

Any performance degradation is noted with the down arrow icon:



Details		
<div>Configuration Finding Resource</div>		
	Performance Difference	Change Impact(%)
↑	Top Missing SQLs	81
↓	Top New SQLs	-22

Hide SQL Breakdown				
		SQL ID		Change Impact(%)
	↓	dnh23ddh0w9hb		-2
	↓	90q1dn708bvdq		-5
	↓	bx99v36sm6hwx		-2
	↓	32qkt6fb3u8fa		-2

Top Segments Causing IO Waits

- High Level data
- Click on “Show Hot Object Breakdown” to see more detail.

↑	Top Segments by 'User I/O' and	16	.43	.02
↑	Temporary Tablespace I/O	16	.42	0
↑	Undersized Buffer Cache	15	.59	.21
↑		15	.59	.21

Display: Change Impact (Absolute Value) >= 5 % ↓ Regression ↑ Improvement

Description

Individual database segments responsible for significant "User I/O" and "Cluster" waits were found.
Impact changed from 0.43 active sessions to 0.02 active sessions by 16%.

☐ Hide Hot Object Breakdown

	Object	Change Impact(%)	Base Period	Comparison Period
↑	DSSMGR.FT_STORE_SKU_FORECAST_WK(TABLE PARTITI	5	.12	0
↑	DSSMGR.FT_STORE_SKU_SSALES_MONTH(TABLE PARTI	1	.02	0
↑	138076_UNKNOWN	2	.05	0
↑	GLDSS.FT_ACCOUNT_UNIT_BAL_PERIOD(TABLE)	0	0	.02

Resource Comparisons

- Comparisons of Memory, CPU, IO and Interconnect.
- Memory
 - Is there Virtual paging?
 - Memory Base Period
 - Memory Comparison Period

CPU | **Memory** | I/O | Interconnect

Base **No Virtual Memory Paging** Comparison **No Virtual Memory Paging**

Host Name	Total Physical Memory	Total Memory Paging Out		Memory Used by Oracle Database	
		Base Period	Comparison Period	Base Period	Comparison Period
dfwdsdb1.containe	258,430.8MByte	0MByte	0MByte	103,556.2MByte	102,904.3MByte

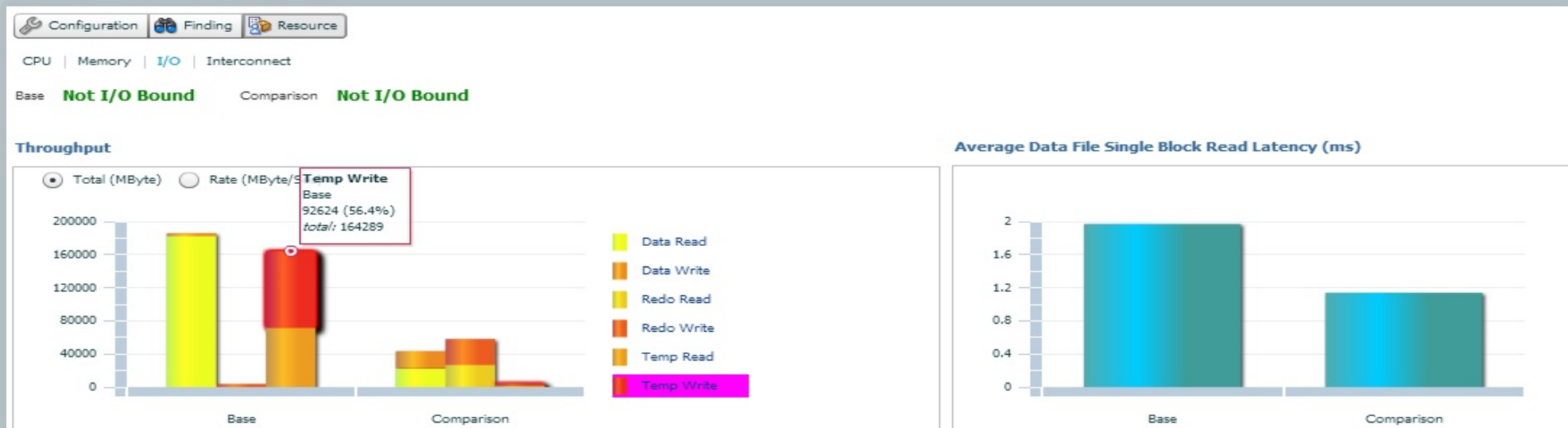
Dashboard Provided for CPU, Memory, IO and Interconnect

- Is something OTHER than Oracle the cause?



IO Bound Dashboard

- Base vs. comparison period
- Temp reads/writes specified
- Single block read latency



Program Agenda with Highlight

- 1 Why Have an AWR Warehouse
- 2 Architecture
- 3 ETL
- 4 EM Interface Features
- 5 Advanced Usage of the AWR Warehouse**

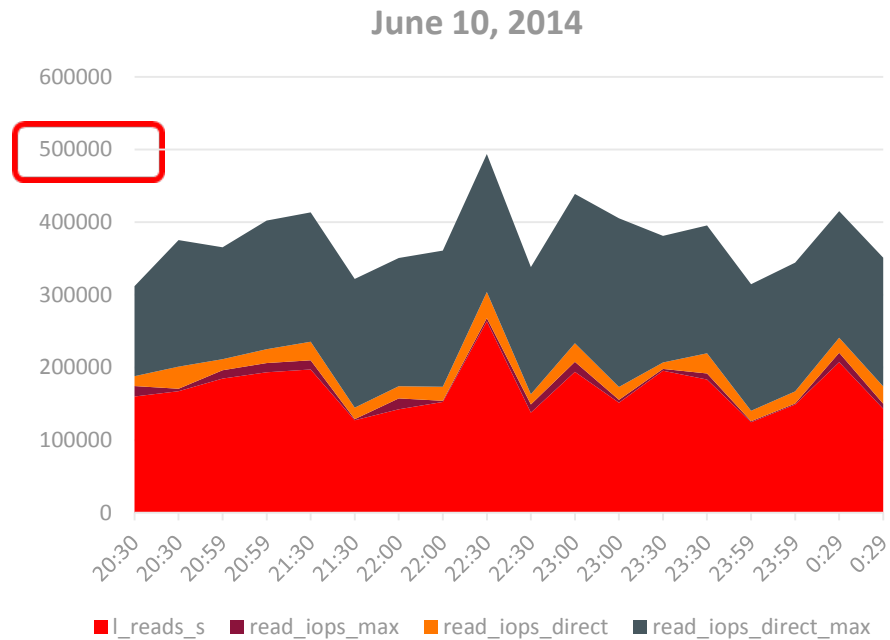
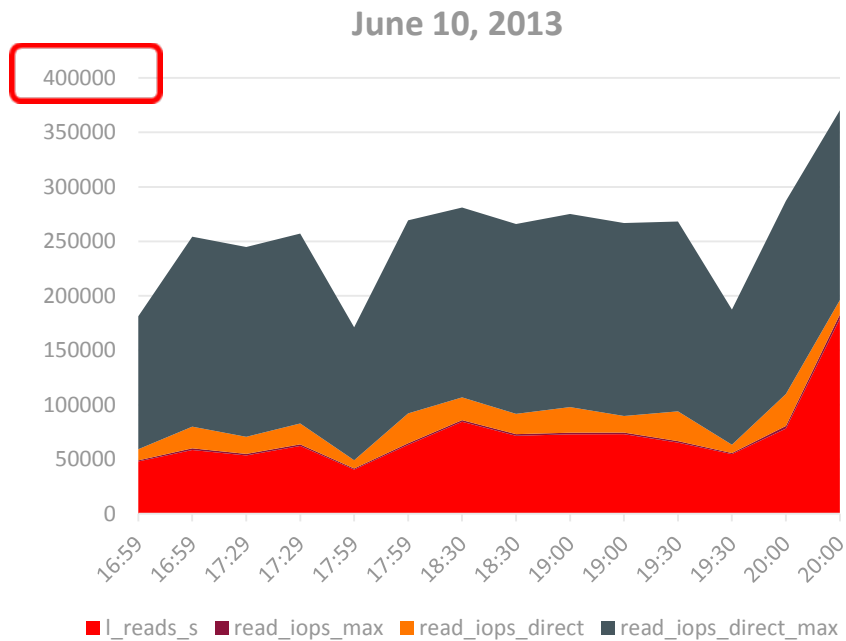
Centralized AWR Warehouse Objects

```
SQL> select object_type, count(object_name) from dba_objects
2   where object_name like '%CAW%'
3   and owner= 'DBSNMP'
4   group by object_type;
```

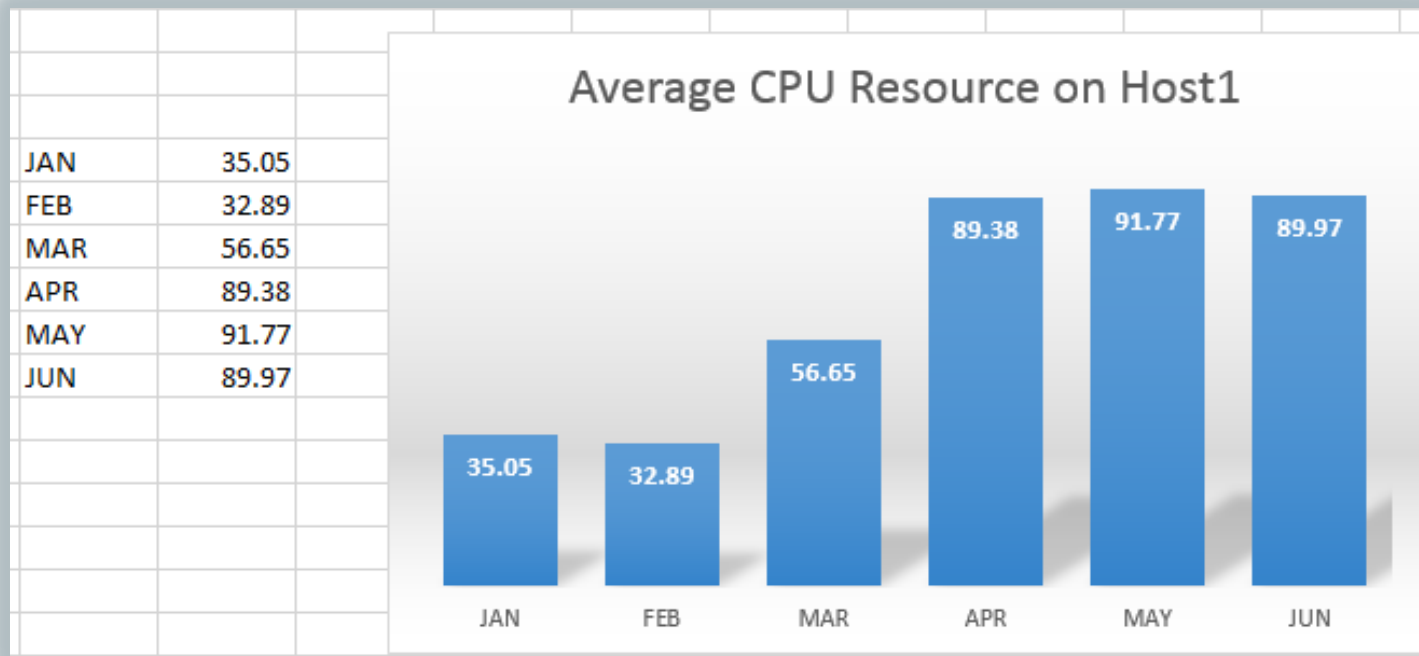
OBJECT_TYPE	COUNT(OBJECT_NAME)
SEQUENCE	6
PACKAGE	1
PACKAGE BODY	1
TABLE	9
INDEX	6

Simple and clean schema edition to the DBNSMP.

What Can I do with the AWR Warehouse?

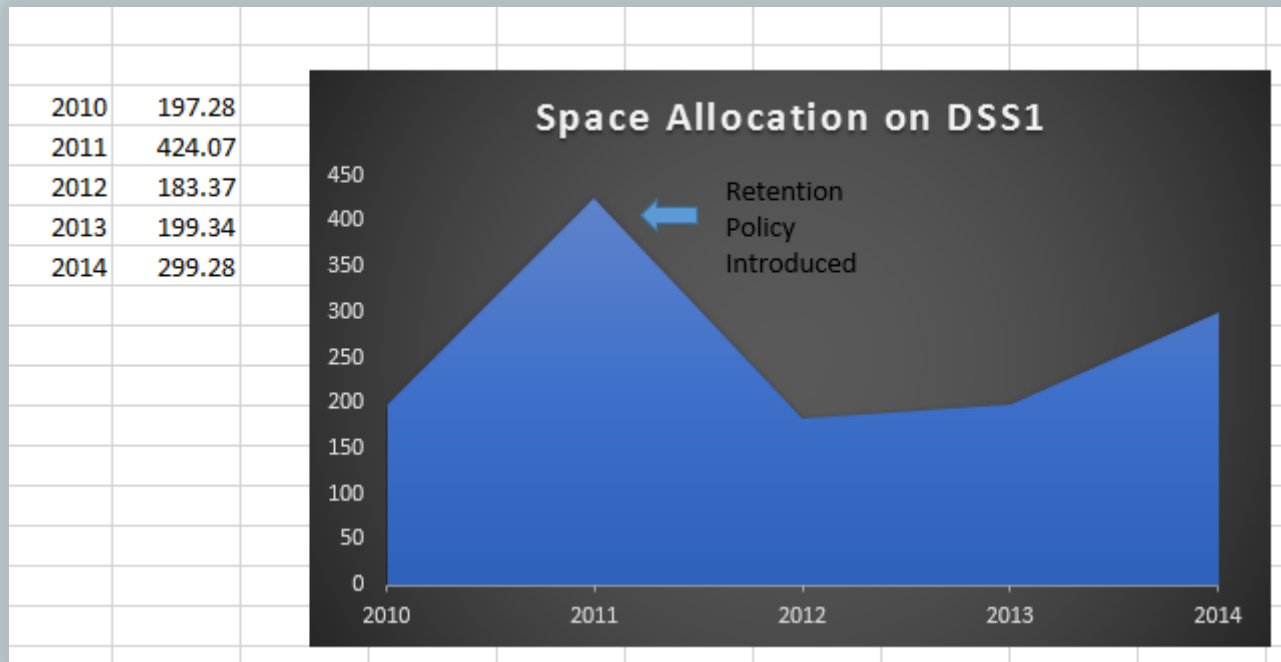


CPU Usage Issues



“Nothing’s changed in months...”

Using the AWR Warehouse for Capacity Planning



“Do we really need more partitioning and pruning? Our disk usage hasn’t increased this last year....”

CAW_DBID_MAPPING Table

```
SQL> desc dbsnmp.caw_dbid_mapping;
```

Name	Null?	Type
-----	-----	-----
MAPPING_ID		NUMBER (38)
EM_ID		NUMBER
TARGET_NAME		VARCHAR2 (266)
TARGET_TYPE		VARCHAR2 (64)
OLD_DBID		NUMBER
NEW_DBID		NUMBER

Most important table for anyone querying the AWR Warehouse!

Querying the AWR Warehouse Tips

Update Scripts with DBID identified to filter.

Join:

- CAW_DBID_MAPPING on OLD_DBID/NEW_DBID=DBID
- CAW_DBID_MAPPING on TARGET_NAME=TARGET_NAME

How Current AWR Queries Change

```
from dba_hist_sys_time_model stm, dba_hist_snapshot s, gv$parameter p, dbsnmp.caw_dbid_mapping m

where stm.stat_name in ('DB CPU','background cpu time')

and LOWER(m.target_name)= '&dbname'

and s.dbid= m.new_dbid and s.snap_id = stm.snap_id

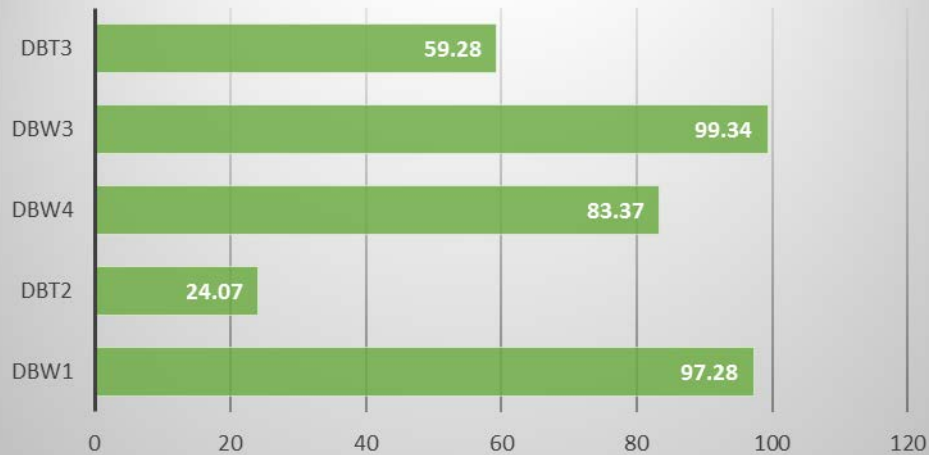
and s.dbid = stm.dbid and s.instance_number = stm.instance_number

and p.name = 'cpu_count' and p.inst_id = s.instance_number)
```

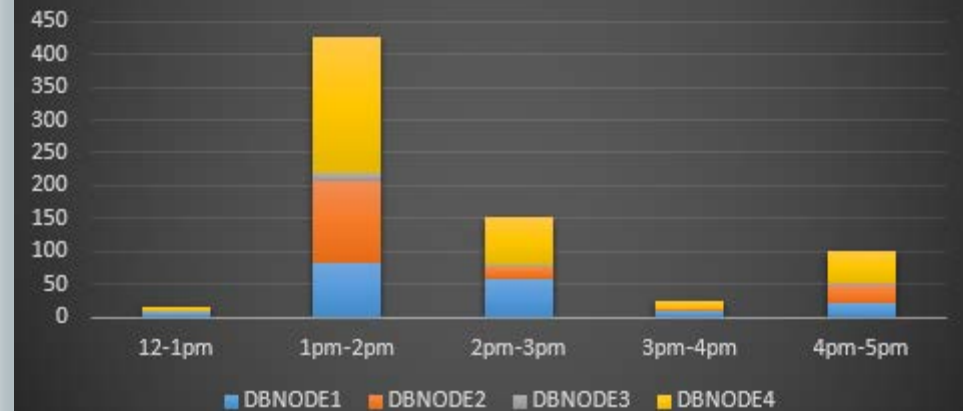
Answer Specific IT Questions



Average Weekly Offload Pct Efficiency



Wait for CPU % During High Session Count



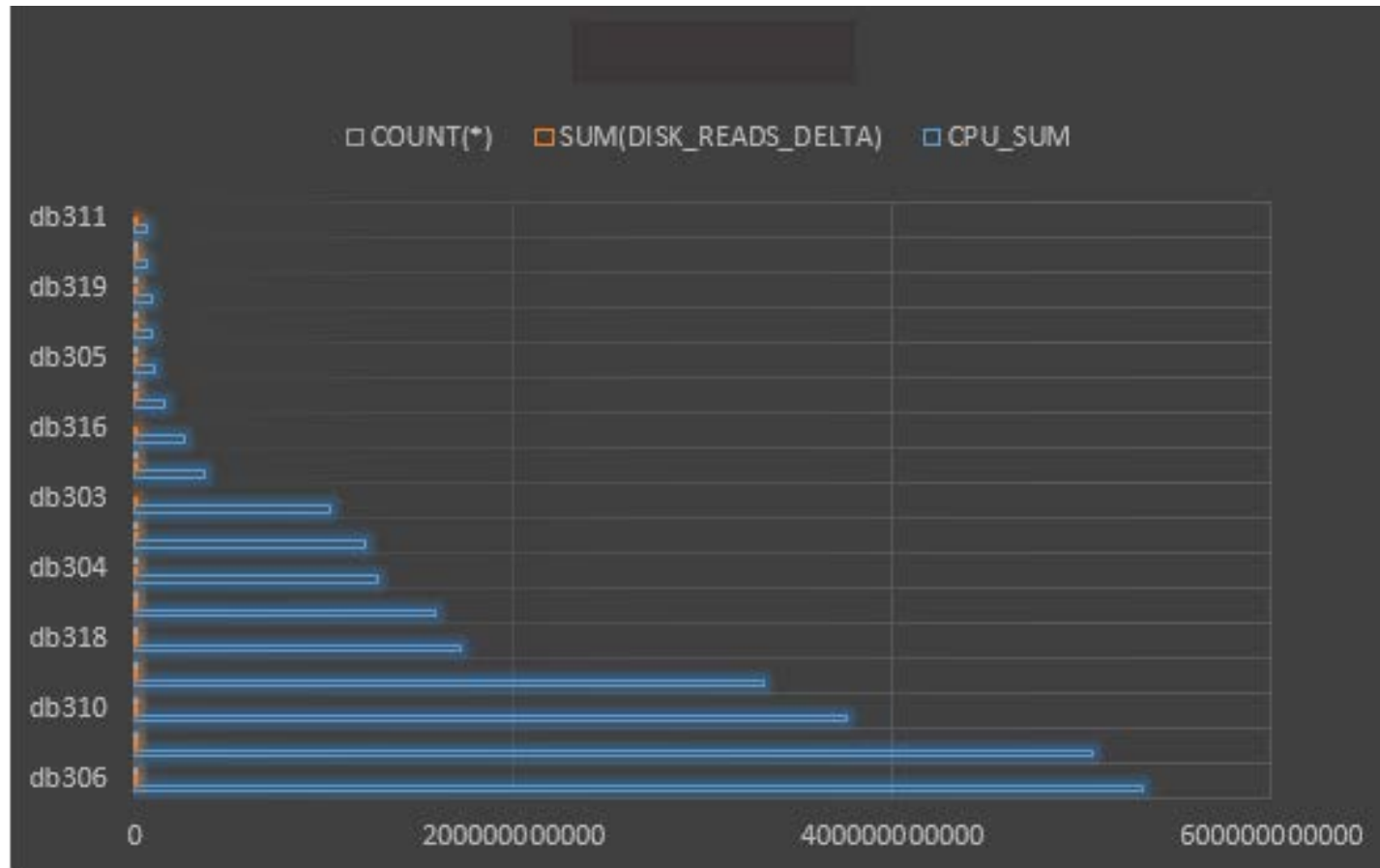


Updating Existing AWR Queries to Go Across Hosts

```
select * from (  
  select  
    m.target_name,  
    sum(CPU_TIME_DELTA),  
    sum(DISK_READS_DELTA),  
    count(*)  
  from  
    DBA_HIST_SQLSTAT a, dba_hist_snapshot s, dba_hist_database_instance di, dbsnmp.caw_dbid_mapping m  
  where di.host_name='&host'  
    and di.dbid in m.new_dbid  
    and m.new_dbid = a.dbid  
    and a.snap_id = s.snap_id  
    and s.begin_interval_time > sysdate -120  
  group by m.target_name  
  order by  
    sum(CPU_TIME_DELTA) desc)
```



Graphing CPU Usage Per DB for One Host



AWR Warehouse Scripts at DBAKeylar.com

AWR Warehouse Scripts, (NEW!!)

AWRW Top IO Waits

AWRW Top CPU

AWRW Analyze SQLID Data

AWRW Multiple Hash Plans for SQLID

CPU History by DBID

High Level AWR Data by DBID and Instance

More scripts added as time goes by...

Want to Learn More?

Oracle Screenwatch: <https://www.youtube.com/watch?v=StydMitHtuI>

DBAkevlar Blog Posts:

<http://dbakevlar.com/2014/06/awr-warehouse-in-em12c-rel-4/>

<http://dbakevlar.com/2014/06/awr-warehouse-in-em12c-rel-4-part-ii/>

Scripts: <http://dbakevlar.com/scripts/>

Connect with me via Social Media:



Twitter

<http://twitter.com/dbakevlar>



Linked In

<http://linkedin.com/in/kellynpotvin>



My blog

<http://dbakevlar.com>



About Me

<http://about.me/dbakevlar>



Email

dbakevlar@gmail.com

ORACLE®