The Power of the AWR Warehouse and Beyond

Long Term Database Performance Analysis for Oracle Databases Using AWR Warehouse

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Strategic Customer Program
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Safe Harbor Statement

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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
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Why a Warehouse?

1. Centralized location offers space savings to retain AWR data in source database and it’s SYSAUX tablespace.

2. Centralizing the data, identified by Database identifier, host, allows analysis on more than one database/host without database links.

3. Ease of management of AWR snapshots, redundant location of AWR performance data.
AWR Warehouse in EM12c

- 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 demands on critical production systems.
Requirements

• Preferred Credentials set up for all targets involved.
• Discover the database you will use for your repository in the EM12c or EM CLI commands.
• 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.
AWR Warehouse Repository database must be 11.2.0.4 with patch, but recommended version is database 12.1.0.2.
Requirements, Cont.

• Will support source databases, (targets) 10.2.0.4 → 12.1.0+

• Version 12.1.0.4.3 (OMS System Patch 19391521)

• AWR Warehouse Master Note 1907335.1

• Requires diagnostic pack. With this, limited EE license for use of AWR Warehouse Repository database, (Not to be confused with OMR.)

• As long as no additional, (RAC, Dataguard, etc.) on AWR Warehouse repository database, the limited EE license will support.

• Plan out on separate hardware from the Oracle Management Repository and Oracle Management Service for Enterprise Manager 12c!
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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 indefinite retention (default)
How Do I Size My AWR Warehouse?

• Use the $ORACLE_HOME/rdbms/admin/awrinfo.sql to gather information about current SOURCE database AWR data size.

• Decide how much data you want to retain— indefinite? 2 years? 1 year? 6 months?

• Outside of default retention, you can set retention per database— consider different retention for dev or test vs. production in the repository.

• Size out with retention padding included. Different database versions will require different sizing demands, 10g=smaller, (around 4-18Mb per day) vs. 12c=larger, (about 24-48Mb per day).
Why Use the General AWR Information Report?

• Break down of not just size, but components making up the AWR.

*****************************************************************
(3a) Space usage by AWR components (per database)
*****************************************************************

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>MB</th>
<th>% AWR</th>
<th>KB_PER_SNAP</th>
<th>MB_PER_DAY</th>
<th>MB_PER_WEEK</th>
<th>TABLE%</th>
<th>INDEX%</th>
</tr>
</thead>
<tbody>
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<td>ASH</td>
<td>2410.3</td>
<td>42.5</td>
<td>1494</td>
<td>70.0</td>
<td>490.2</td>
<td>89%</td>
<td>11%</td>
</tr>
<tr>
<td>FIXED</td>
<td>2149.7</td>
<td>37.9</td>
<td>1332</td>
<td>62.5</td>
<td>437.2</td>
<td>48%</td>
<td>52%</td>
</tr>
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<td>8.6</td>
<td>304</td>
<td>14.2</td>
<td>99.6</td>
<td>43%</td>
<td>57%</td>
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<td>4.0</td>
<td>139</td>
<td>6.5</td>
<td>45.6</td>
<td>58%</td>
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<td>2.8</td>
<td>100</td>
<td>4.7</td>
<td>32.7</td>
<td>55%</td>
<td>45%</td>
</tr>
<tr>
<td>SQLPLAN</td>
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<td>1.4</td>
<td>51</td>
<td>2.4</td>
<td>16.7</td>
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<td>33%</td>
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<tr>
<td>RAC</td>
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<td>1.0</td>
<td>36</td>
<td>1.7</td>
<td>11.8</td>
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<td>0.2</td>
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<td>4%</td>
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<td>0.1</td>
<td>4</td>
<td>0.2</td>
<td>1.2</td>
<td>33%</td>
<td>67%</td>
</tr>
</tbody>
</table>
Program Agenda with Highlight

1. Why Have an AWR Warehouse
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AWR ETL Jobs

DBMS Scheduler Job on Source Database to directory

Job in EM Job Service that pulls file from Source Target and then pushes to AWR Warehouse Target Directory

All data identified by OLD/NEW DBID and with the EM_ID, (CAW_DBID_MAPPING in AWR WAREHOUSE)

Final DBMS Scheduler Job Inserts data into AWR Warehouse
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

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

**CAW Naming Convention- Centralized AWR Warehouse**
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 to check for file, once every 24hrs to match extract file transfer when checking run times.

Biggest Resource Demand from the “run_master”:

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

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

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

- First access, will be asked to set up AWR Warehouse to database.
- Have database for repository and default credentials setup beforehand.
- 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 Report
- Integrated seamlessly into EM UI
- Zero runtime overhead on source Production databases
How Do You Know You are Using it?

• 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**
Snapshots

View snapshot loads per day

High loads due to catch up, new source db’s.
Database Details

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

- Add
- Highlight, Remove
- Highlight, View Errors
- Privileges to Manage Snapshots
## Snapshot Information

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

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

**Automatic Workload Repository Warehouse**

### Databases Uploading AWR Snapshots

<table>
<thead>
<tr>
<th>Target Name</th>
<th>Target Type</th>
<th>DB Name</th>
<th>Version</th>
<th>Owner</th>
<th>Snapshot Upload Enabled</th>
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<tbody>
<tr>
<td>dbm02</td>
<td>Cluster Database</td>
<td>DBM02</td>
<td>11.2.0.4.0</td>
<td>TESTSUPERADMIN</td>
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<tr>
<td>ggrl1</td>
<td>Database Instance</td>
<td>GGRl1</td>
<td>11.2.0.3.0</td>
<td>TESTSUPERADMIN</td>
<td></td>
</tr>
</tbody>
</table>

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

Good!!
Managing Snapshot Privileges

- Viewing Access
- Manage Snapshots
- Retention Time
- Removal of Snapshots
AWR Performance Features

• ASH Analytics
• AWR Report
• Comparison Period, (aka ADDM Comparison)
• Database Performance Home
ASH Analytics
The Load Map
Advanced Load Map
### Ash Analytics Change Detail

<table>
<thead>
<tr>
<th>User Session</th>
<th>Activity (Average Active Sessions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,388,1</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>1,392,1</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>1,5,1</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>1,20,3</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>1,6,1</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>1,4,1</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>1,1,1</td>
<td>&lt;0.01</td>
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<tr>
<td>1,404,5</td>
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<tr>
<td>1,394,1</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>1,437,539</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Others</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Blocking Session</th>
<th>Activity (Average Active Sessions)</th>
</tr>
</thead>
<tbody>
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<td>1,392,1</td>
<td>&lt;0.01</td>
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<tr>
<td>1,40,113</td>
<td>&lt;0.01</td>
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<tr>
<td>1,59,1</td>
<td>&lt;0.01</td>
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<tr>
<td>1,67,187</td>
<td>&lt;0.01</td>
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<tr>
<td>1,25,459</td>
<td>&lt;0.01</td>
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<td>1,469,1</td>
<td>&lt;0.01</td>
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<tr>
<td>1,6,1</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>1,437,539</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>1,456,163</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

**Activity (Average Active Sessions)**

- 1,392,1: <0.01
AWR Report

Run AWR Report

Specify parameters for the report. You can either pick one baseline or a pair of snapshots.

- By Baseline
- By Snapshot

Begin Snapshot: 1684
End Snapshot: 1778

Show Instances

WORKLOAD REPOSITORY REPORT (RAC)

Database Summary

<table>
<thead>
<tr>
<th>Database</th>
<th>Snapshot Ids</th>
<th>Number of Instances</th>
<th>Number of Hosts</th>
<th>Report Total (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Id</td>
<td>Name</td>
<td>RAC</td>
<td>Block Size</td>
<td>Begin</td>
</tr>
<tr>
<td>----------</td>
<td>------</td>
<td>-----</td>
<td>------------</td>
<td>-------</td>
</tr>
<tr>
<td>2710603395 SH</td>
<td>YES</td>
<td>8192</td>
<td>1684</td>
<td>1778</td>
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## Combined and By Instance

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<tr>
<th>#</th>
<th>Class</th>
<th>Event</th>
<th>Waits</th>
<th>%Timeouts</th>
<th>Total(s)</th>
<th>Avg(ms)</th>
<th>%Diff time</th>
<th>Avg</th>
<th>Min</th>
<th>Max</th>
<th>Std Dev</th>
<th>Cnt</th>
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<tbody>
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<td>DB CPU</td>
<td>PX Dsq Slave Session Stats</td>
<td>317.440</td>
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<td>1.559.45</td>
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<td>17.12</td>
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<td>1.55</td>
<td>10.27</td>
<td>6.16</td>
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<tr>
<td>1</td>
<td>Other</td>
<td>reliable message</td>
<td>37.977</td>
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<td>250.83</td>
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<td>2.75</td>
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<td>0.60</td>
<td>6.78</td>
<td>0.12</td>
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<tr>
<td>1</td>
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<td>cell single block physical read</td>
<td>218.408</td>
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<td>0.60</td>
<td>0.63</td>
<td>0.01</td>
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<tr>
<td>1</td>
<td>User I/O</td>
<td>Disk file Mirror Read</td>
<td>55.172</td>
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<td>133.00</td>
<td>2.41</td>
<td>1.46</td>
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<td>127.20</td>
<td>0.59</td>
<td>1.40</td>
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<td>0.61</td>
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<td>0.00</td>
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<td>70.97</td>
<td>1.12</td>
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<td>70.98</td>
<td>0.14</td>
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<td>231.488</td>
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<td>71.07</td>
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<td>0.78</td>
<td>0.31</td>
<td>0.30</td>
<td>0.31</td>
<td>0.01</td>
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<tr>
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<td>0.59</td>
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<td>0.10</td>
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<tr>
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<td>0.56</td>
<td>3.79</td>
<td>3.75</td>
<td>3.83</td>
<td>0.06</td>
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<td>122.201</td>
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<td>26.52</td>
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<td>Other</td>
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<td>55.35</td>
<td>70.78</td>
<td>1.17</td>
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<td>0.66</td>
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<td>0.65</td>
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<td>0.48</td>
<td>0.34</td>
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<td></td>
<td></td>
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<td>0.25</td>
<td></td>
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<td>2</td>
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<td>0.18</td>
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<td></td>
<td></td>
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</tr>
<tr>
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<td>Other</td>
<td>sqn PS - contention</td>
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<td>0.55</td>
<td>8.49</td>
<td>0.19</td>
<td>0.18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>DB CPU</td>
<td>PX Dsq Slave Session Stats</td>
<td>350.54</td>
<td>0.00</td>
<td>195.149</td>
<td>1.55</td>
<td>6.94</td>
<td>80.13</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Other</td>
<td>reliable message</td>
<td>37.605</td>
<td>0.00</td>
<td>248.30</td>
<td>6.60</td>
<td>5.68</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>User I/O</td>
<td>Disk file Mirror Read</td>
<td>46.010</td>
<td>0.00</td>
<td>125.29</td>
<td>2.72</td>
<td>2.87</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>System I/O</td>
<td>control file sequential read</td>
<td>183.528</td>
<td>0.00</td>
<td>111.05</td>
<td>0.61</td>
<td>2.54</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>User I/O</td>
<td>cell single block physical read</td>
<td>142.030</td>
<td>0.00</td>
<td>87.97</td>
<td>0.62</td>
<td>2.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Other</td>
<td>name-service call wait</td>
<td>653</td>
<td>0.00</td>
<td>48.35</td>
<td>70.98</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Other</td>
<td>sqn PS - contention</td>
<td>135.128</td>
<td>12.96</td>
<td>44.91</td>
<td>0.33</td>
<td>1.03</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Other</td>
<td>sqn IV - contention</td>
<td>127.338</td>
<td>8.59</td>
<td>39.83</td>
<td>0.31</td>
<td>0.91</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Other</td>
<td>ADR block file read</td>
<td>5.630</td>
<td>0.00</td>
<td>21.58</td>
<td>3.83</td>
<td>0.46</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Top SQL by Elapsed Time

### SQL ordered by Elapsed Time (Global)

- Captured SQL account for 95.6% of Total DB Time (s): 9,108
- Captured PL/SQL account for 27.4% of Total DB Time (s): 9,108

<table>
<thead>
<tr>
<th>SQL Id</th>
<th>Elapsed (s)</th>
<th>CPU (s)</th>
<th>IOWait (s)</th>
<th>Gets</th>
<th>Reads</th>
<th>Rows</th>
<th>Cluster (s)</th>
<th>Execs</th>
<th>Elapsed (s)</th>
<th>CPU (s)</th>
<th>IOWait (s)</th>
<th>Gets</th>
<th>Reads</th>
<th>Rows</th>
<th>Cluster (s)</th>
<th>Execs</th>
</tr>
</thead>
<tbody>
<tr>
<td>835b6bxa5vywq</td>
<td>3,250.32</td>
<td>3,223.76</td>
<td>0.00</td>
<td>0</td>
<td>0</td>
<td>5,640</td>
<td>0.00</td>
<td>5,640</td>
<td>0.58</td>
<td>0.57</td>
<td>0.00</td>
<td>1.00</td>
<td>0.00</td>
<td>1.00</td>
<td>0.00</td>
<td>1.00</td>
</tr>
<tr>
<td>a3vfsbf1vtr3s</td>
<td>1,331.28</td>
<td>176.04</td>
<td>0.00</td>
<td>0</td>
<td>0</td>
<td>71,838</td>
<td>0.02</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>dw4hwy68x7sw2</td>
<td>820.08</td>
<td>474.75</td>
<td>329.98</td>
<td>7,562.714</td>
<td>858,042</td>
<td>0</td>
<td>1.98</td>
<td>6</td>
<td>130.88</td>
<td>79.12</td>
<td>55.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>c3rvcbu8r3x8</td>
<td>776.65</td>
<td>718.04</td>
<td>0.00</td>
<td>0</td>
<td>0</td>
<td>2,256</td>
<td>0.34</td>
<td>0.32</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>4phvdax3a3mf</td>
<td>514.87</td>
<td>295.32</td>
<td>196.83</td>
<td>1,105,238</td>
<td>0</td>
<td>7.375</td>
<td>1.71</td>
<td>7.375</td>
<td>0.07</td>
<td>0.04</td>
<td>0.03</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>a6vpkr956xui</td>
<td>501.98</td>
<td>286.78</td>
<td>196.78</td>
<td>612,967</td>
<td>0</td>
<td>1.71</td>
<td>7.375</td>
<td>0.07</td>
<td>0.04</td>
<td>0.03</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>b6usrg82hwa3</td>
<td>319.43</td>
<td>328.85</td>
<td>16.87</td>
<td>9,065,046</td>
<td>80,972</td>
<td>0</td>
<td>10.45</td>
<td>18</td>
<td>48.93</td>
<td>41.23</td>
<td>2.11</td>
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<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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<tr>
<td>8uav5mp5kn4zu</td>
<td>278.04</td>
<td>260.96</td>
<td>0.00</td>
<td>0</td>
<td>0</td>
<td>846</td>
<td>0.00</td>
<td>470</td>
<td>0.59</td>
<td>0.56</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>avk8a677easd</td>
<td>217.30</td>
<td>220.43</td>
<td>0.00</td>
<td>0</td>
<td>0</td>
<td>469,560</td>
<td>0.00</td>
<td>22,300</td>
<td>0.01</td>
<td>0.01</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>czzfwnm49ayq</td>
<td>156.86</td>
<td>50.99</td>
<td>103.58</td>
<td>1,288,422</td>
<td>167,773</td>
<td>196</td>
<td>21.50</td>
<td>28</td>
<td>5.00</td>
<td>1.82</td>
<td>3.70</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

### Percentage of Total

<table>
<thead>
<tr>
<th>Percentage of Total</th>
<th>DB Time</th>
<th>CPU</th>
<th>IO Wait</th>
<th>Gets</th>
<th>Reads</th>
<th>Cluster</th>
<th>Execs</th>
<th>SQL Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB time</td>
<td>35.69</td>
<td>46.38</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.17</td>
<td>select * from (select instance...</td>
</tr>
<tr>
<td>CPU</td>
<td>14.62</td>
<td>2.53</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>2.15</td>
<td>select queue_id, queue_schema...</td>
</tr>
<tr>
<td>IO Wait</td>
<td>9.00</td>
<td>6.83</td>
<td>0.20</td>
<td>10.61</td>
<td>73.57</td>
<td>0.32</td>
<td>0.00</td>
<td>BEGIN SYS.KUPW$WORKER MAIN(*S...</td>
</tr>
<tr>
<td>Gets</td>
<td>8.53</td>
<td>10.33</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.07</td>
<td>SELECT blocking_sid, numBloc...</td>
</tr>
<tr>
<td>Reads</td>
<td>5.65</td>
<td>4.25</td>
<td>0.12</td>
<td>1.68</td>
<td>0.00</td>
<td>0.27</td>
<td>0.22</td>
<td>begin prvImStopJobs(-1, tr...</td>
</tr>
<tr>
<td>Cluster</td>
<td>5.51</td>
<td>4.13</td>
<td>0.12</td>
<td>0.86</td>
<td>0.00</td>
<td>0.27</td>
<td>0.22</td>
<td>SELECT A_JOB_NAME, (CASE A...</td>
</tr>
<tr>
<td>Execs</td>
<td>4.30</td>
<td>4.75</td>
<td>0.01</td>
<td>12.72</td>
<td>6.94</td>
<td>1.67</td>
<td>0.00</td>
<td>call dbms_stats.gather_databas...</td>
</tr>
<tr>
<td></td>
<td>3.05</td>
<td>3.75</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.01</td>
<td>select l.instance_name , ROUN...</td>
</tr>
<tr>
<td></td>
<td>2.39</td>
<td>3.17</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.67</td>
<td>select size_for_estimate, size...</td>
</tr>
<tr>
<td></td>
<td>1.72</td>
<td>0.73</td>
<td>0.06</td>
<td>1.81</td>
<td>14.39</td>
<td>3.43</td>
<td>0.00</td>
<td>SELECT dtp.tablespace_name &quot;T...</td>
</tr>
</tbody>
</table>

---

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Run an AWR Report...

• For any time that data exists in the AWR Warehouse.
• Review execution performance from previous financial periods.
• Review execution performance from previous retail seasons.
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 Period 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 pre-db12c database for first time, (simple installation, nothing to concern about, just pkg to fulfill views) you must have preferred credentials SET of install will fail!
Performing a Comparison

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**

<table>
<thead>
<tr>
<th>Performance Difference</th>
<th>Change Impact(%)</th>
<th>Base Period</th>
<th>Comparison Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top Missing SQLs</td>
<td>-22</td>
<td>23</td>
<td>1.99</td>
</tr>
<tr>
<td>Top Segment's by User I/O and CPU</td>
<td>16</td>
<td>16</td>
<td>43</td>
</tr>
<tr>
<td>Temporary Tablespace I/O</td>
<td>16</td>
<td>16</td>
<td>42</td>
</tr>
<tr>
<td>Undersized Buffer Cache</td>
<td>15</td>
<td>15</td>
<td>59</td>
</tr>
</tbody>
</table>

**Temporary Tablespace I/O**

- 16

**Undersized Buffer Cache**

- 15

**Description**

The PGA was inadequately sized, causing more active sessions to do more I/O to temporary table spaces. Impact changed from 0.42 active sessions to 0 active sessions by 16%.
Regression SQL

Any performance degradation is noted with the down arrow icon.
Top Segments Causing IO Waits

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

• Comparisons of Memory, CPU, IO and Interconnect.

• Memory  Is there Virtual paging?
  - Memory Base Period
  - Memory Comparison Period
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
Historical ASH

Run ASH Report
Specify the time period for the report.

Start Date: 11/3/14
(Example: 12/15/03)
Start Time: 11 ▼ 52 ▼ AM ▼ PM

End Date: 11/3/14
(Example: 12/15/03)
End Time: 11 ▼ 57 ▼ AM ▼ PM

ASH Report For REPO/repo

<table>
<thead>
<tr>
<th>DB Name</th>
<th>DB Id</th>
<th>Instance</th>
<th>Inst num</th>
<th>Release</th>
<th>RAC</th>
<th>Host</th>
</tr>
</thead>
<tbody>
<tr>
<td>REPO</td>
<td>2973039624</td>
<td>repo</td>
<td>1</td>
<td>11.2.0.4.0</td>
<td>NO</td>
<td>sc04rei</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CPUs</th>
<th>SGA Size</th>
<th>Buffer Cache</th>
<th>Shared Pool</th>
<th>ASH Buffer Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1.010M (100%)</td>
<td>204M (25.0%)</td>
<td>731M (71.7%)</td>
<td>M (%)</td>
</tr>
</tbody>
</table>

Analysis Begin Time: 03-Nov-14 11:52:45
Analysis End Time: 03-Nov-14 11:57:45
Elapsed Time: 5.0 (mins)
Sample Count: 0
Average Active Sessions: 0.00
Avg Active Session per CPU: 0.00
Report Target: None specified

No Data! Future Release...
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

Simple and clean schema edition to the DBNSMP.

```
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;

<table>
<thead>
<tr>
<th>OBJECT_TYPE</th>
<th>COUNT(OBJECT_NAME)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEQUENCE</td>
<td>6</td>
</tr>
<tr>
<td>PACKAGE</td>
<td>1</td>
</tr>
<tr>
<td>PACKAGE BODY</td>
<td>1</td>
</tr>
<tr>
<td>TABLE</td>
<td>9</td>
</tr>
<tr>
<td>INDEX</td>
<td>6</td>
</tr>
</tbody>
</table>
```
What Can I do with the AWR Warehouse?

June 10, 2013

June 10, 2014
CPU Usage Issues

“Nothing’s changed in months...”

Average CPU Resource on Host1

<table>
<thead>
<tr>
<th>Month</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>JAN</td>
<td>35.05</td>
</tr>
<tr>
<td>FEB</td>
<td>32.89</td>
</tr>
<tr>
<td>MAR</td>
<td>56.65</td>
</tr>
<tr>
<td>APR</td>
<td>89.38</td>
</tr>
<tr>
<td>MAY</td>
<td>91.77</td>
</tr>
<tr>
<td>JUN</td>
<td>89.97</td>
</tr>
</tbody>
</table>
“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**

- DBT3: 59.28
- DBW3: 99.34
- DBW4: 83.37
- DBT2: 24.07
- DBW1: 97.28

**Wait for CPU % During High Session Count**

- 12-1am: DBNODE1, DBNODE2, DBNODE3, DBNODE4
- 1pm-2pm: DBNODE1, DBNODE2, DBNODE3, DBNODE4
- 2pm-3pm: DBNODE1, DBNODE2, DBNODE3, DBNODE4
- 3pm-4pm: DBNODE1, DBNODE2, DBNODE3, DBNODE4
- 4pm-5pm: DBNODE1, DBNODE2, DBNODE3, DBNODE4
Updating Existing AWR Queries to Go Across Hosts

```sql
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
SQLTXPLAIN and SQLd360 with the AWR Warehouse

• SQLd360 runs out of box, but host and db info is from AWR Repo.

• SQLT requires changes to package and executables before XPRECT and XTRACT will run successfully.

• SQLT will require installation change- When asked if has “tuning pack”, with option “T”, instead will state “A” for AWR Warehouse installation that will then install different SQLT$A package and executables for AWR calls.
SQLTXPLAIN and the SQLT$A Package

• Function get_database_id updates to pass in p_dbname and then call from DBA_HIST_DATABASE_INSTANCE.

• Same for other functions that pull the instance, host and other info in the package.

• Updated the executables to add parameter for the database name

• Recompiled the package and updated the SQL in the directories.
SQLd360

• No installation of the product, all code in directory

• Recommended to change the execution to include an “A” option for AWR Warehouse, which will then use a different “PRE” script.

• Pre script will use the database name to call the AWR objects instead of V$DATABASE/V$INSTANCE/GV$** and then run everything correctly.

• Easier to change than the SQLT product.
AWR Warehouse Scripts at DBAKevlar.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

Adding more scripts as time goes by...
Want to Learn More?

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

DBAKevlar Blog Posts:

Blog Search: http://dbakevlar.com/tag/awr-warehouse/

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

Oracle Documentation:
http://docs.oracle.com/cd/E24628_01/server.121/e55047/tdppt_awr_warehouse.htm#TDPP145
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