New Performance Diagnostics Features Every DBA Must Know

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Agenda

1. Recommended performance management methodology
2. New features
   - AWR Explorer
   - AWR for Active Data Guard workloads
3. Enhancements
   - Performance Hub – SQL History and ADDM
   - ADDM Spotlight – Swim lanes

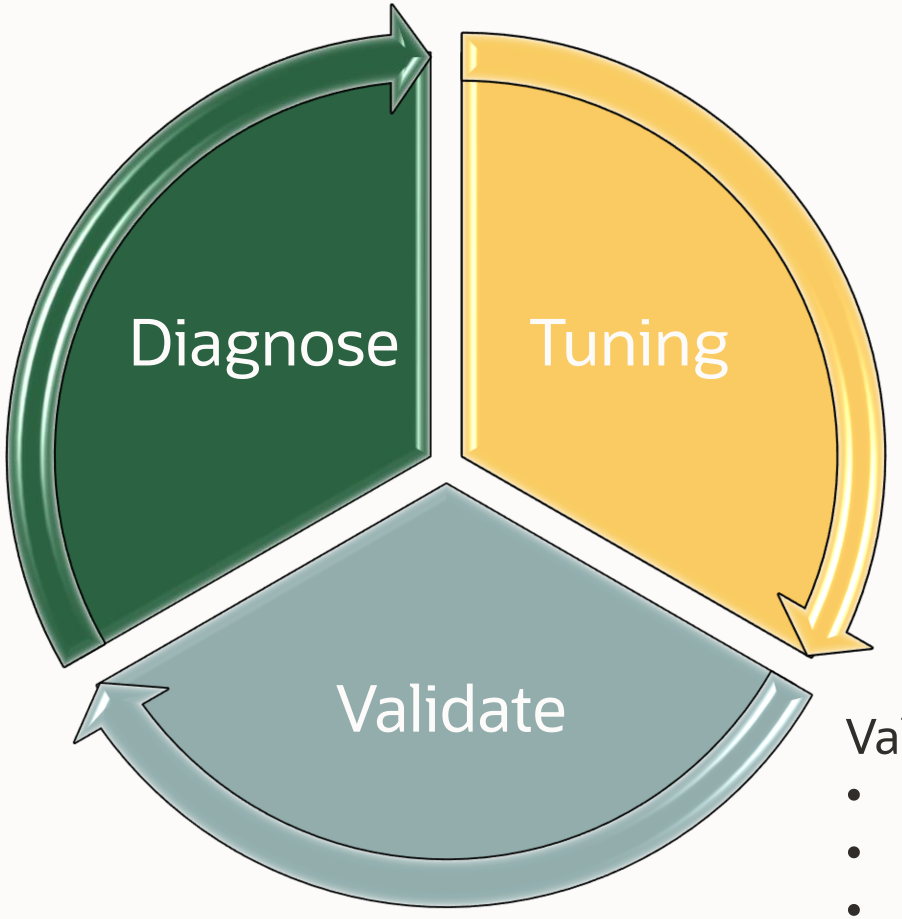
Introduction

Recommended Database Performance Management Methodology

Find, fix, validate cycle

Find issues with

- AWR
- ADDM
- ASH
- ADDM Spotlight
- Performance Hub



Fix issues with

- SQL Tuning Advisor
- SQL Profiles
- Real-time SQL Monitoring

Validate fixes with

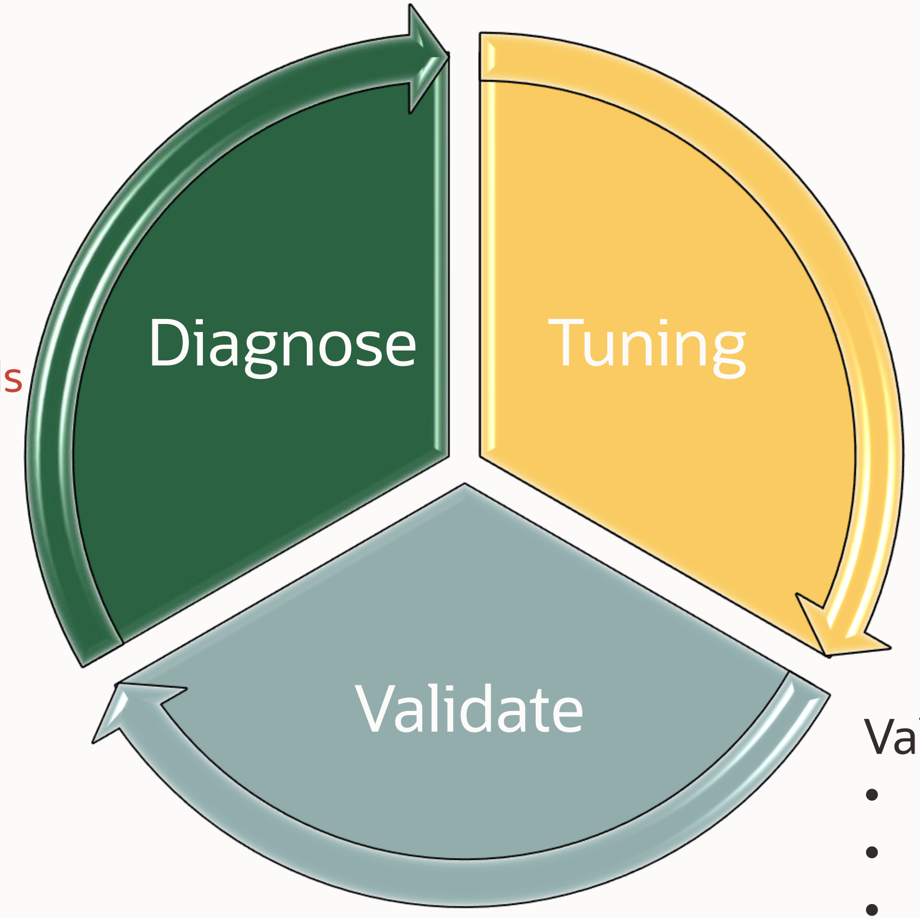
- Workload Analysis (WLA)
- SQL Performance Analyzer (SPA)
- Database Replay

Recommended Database Performance Management Methodology

Find, fix, validate cycle

Find issues with

- AWR
    - AWR Explorer
    - AWR for ADG workloads
- ADDM
- ASH
- Performance Hub
    - SQL History
    - ADDM tab
- ADDM Spotlight
    - Swim lanes



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**New features are highlighted*

AWR Explorer

AWR Explorer

Challenges

- Easily perform deep-dive analysis on AWR data to detect performance trends and outliers
- Offline AWR analysis of a remote database not possible

Solution

- AWR Explorer
  - Single interface for deep-dive analysis by integrating performance and data visualization tools
  - Supports online/offline analysis of AWR data

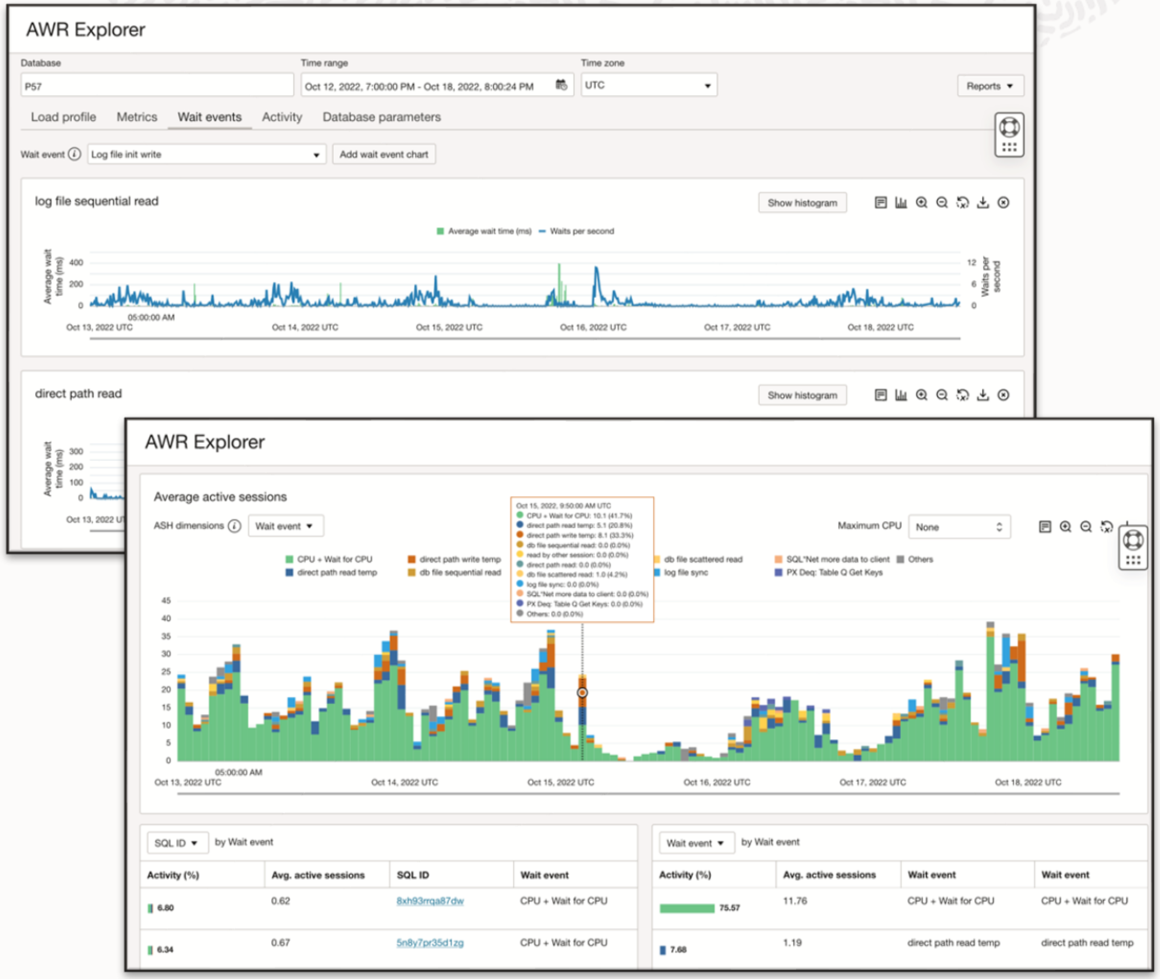
Benefit

- Enables DBAs to perform advanced performance analysis by visualizing trends easily without needing to toggle between multiple tools and AWR reports
- Analyzes the data of any database by importing AWR data

AWR Explorer

Visualize AWR data for advanced diagnostics

- Integration of performance and data visualization tools for deep-dive AWR analysis
- Single and easy to interpret interface for detecting performance trends and outliers
- Displays performance trends and ASH dimension filtering provides deeper investigation
- Top 10 wait events sorted by time with capability to customize metric charts
- Track parameter configuration during snapshots to correlate performance impact
- Generate reports: AWR, ASH, Performance Hub, SQL, etc.



DEMO - AWR Explorer

AWR for Active Data Guard workloads

AWR for Active Data Guard workloads

Challenges

- Need to diagnose performance of read-only workloads running on an Active Data Guard (ADG) database
- Oracle Database 23ai supports out-of-the-box AWR support on standby database workloads

Solution

- EM 24 supports AWR for ADG database workloads

Benefit

- Same performance diagnostics methodology used for primary databases now works with standby database workloads

AWR for Active Data Guard workloads

Background

Unified Management Framework (Database 12c) supports AWR for ADG. However, it is operationally challenging due to many reasons:

- Specify pairs of database links between any pair of standbys
- Requires use of SPFILEs
- Explicit registration of standby databases
- Does not work at PDB level (no support for cloud databases)
- Requires manual switch-over for snapshots after ADG switch-over
- Some customers use STATSPACK and remote snapshots to another database to accomplish the same
  - STATSPACK does not contain ASH and other rich data available in AWR

AWR for Active Data Guard workloads
Current implementation

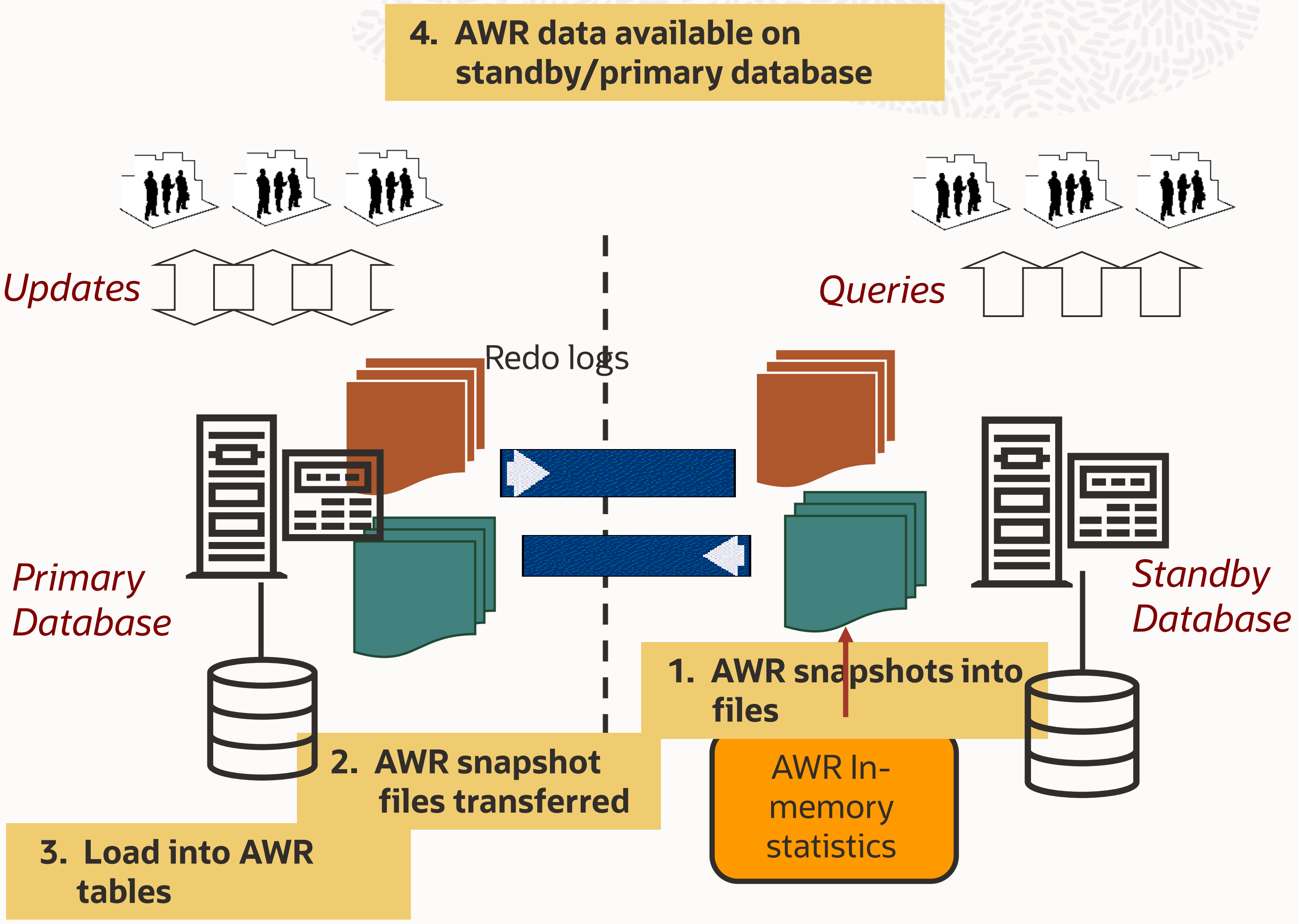
New implementation in Oracle Database 23ai for AWR support on standby databases

- Leverages existing redo log channel for shipping data
  - Robust and time-tested mechanism
- No need of dblinks
- No SPFILES
- No explicit registration of standby databases
- Works at PDB-level and all cloud databases
- Automatic switch-over for snapshots after ADG switch-over
- Out-of-the box automation (purging, transferring files) – no additional DBA setups

AWR for Active Data Guard workloads

Main steps

1. AWR snapshots captured to snapshot files on standby
2. Transfer AWR snapshot files from standby to primary
3. Load AWR snapshot files into AWR tables on primary
4. Existing tools work as is at the standby and primary



EM support: AWR for Active Data Guard workloads

Primary Database

db23_dgpri-target0-225113 / PDB Logged in as sys | dgpri-target0-225113.rg1.er

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

- Captured SQL account for 64.6% of Total DB Time (s): 17,751
- Captured PL/SQL account for 0.4% of Total DB Time (s): 17,751

Elapsed Time (s)	Executions	Elapsed Time per Exec (s)	%Total	%CPU	%IO	SQL Id	SQL Module	PDB Name	SQL Text
6,123.72	44,767	0.14	34.50	31.32	0.48	34mt4skacwwwd	JDBC Thin Client		WITH need_to_process AS (SELEC...
667.32	665,637	0.00	3.76	27.71	66.86	09pzy8x10gjkg	JDBC Thin Client		insert into order_items(ORDER_...
631.45	5,375,806	0.00	3.56	37.63	0.00	bvcnjjrdz9aab	JDBC Thin Client		select products.product_id, pr...
610.80	343,768	0.00	3.44	18.93	68.22	a6hdpzrqqhc7d	JDBC Thin Client		insert into orders(ORDER_ID, O...
597.95	4,281,787	0.00	3.37	36.61	0.04	3gnwwgbk8h6au	JDBC Thin Client		select products.PRODUCT_ID, PR...
400.43	983,940	0.00	2.26	31.53	70.38	f3navkanm4s6k	JDBC Thin Client		SELECT CUSTOMER_ID, CUST_FIRST...
331.48	133,737	0.00	1.87	23.51	77.49	07d1xa9mbymgu	JDBC Thin Client		insert into customers (custome...
319.41	89,492	0.00	1.80	19.57	91.04	g9wsbkb2jag3j	JDBC Thin Client		SELECT CUSTOMER_ID, CUST_FIRST...
283.56	343,782	0.00	1.60	21.37	66.16	3vchknb232cwx	JDBC Thin Client		update orders set order_mode =...
280.79	402,130	0.00	1.58	33.51	80.11	9rxygtpuuk860	JDBC Thin Client		SELECT ADDRESS_ID, CUSTOMER_ID...
177.99	44,789	0.00	1.00	15.16	92.02	957vqnathc5wy	JDBC Thin Client		SELECT ORDER_ID, ORDER_DATE, O...

Standby Databases

db23_STANDBY1 / PDB Logged in as sys | dgstby-target0-225114.rg1.emdevinfraiad.oraclevcn.

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

- 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 61.3% of Total DB Time (s): 22,719
- Captured PL/SQL account for 0.0% of Total DB Time (s): 22,719

Elapsed Time (s)	Executions	Elapsed Time per Exec (s)	%Total	%CPU	%IO	SQL Id	SQL Module	PDB Name	SQL Text
4,993.67	60	83.23	21.98	6.66	10.78	ck3n402u2pjqp	JDBC Thin Client		select l_returnflag, l_linesta...
2,211.55	60	36.86	9.73	6.79	17.05	5dt6nqqrc41ds	JDBC Thin Client		SELECT l_orderkey, SUM(l_exten...
1,086.57	55	19.76	4.78	7.82	23.57	ffubzwbjn6pv3	JDBC Thin Client		SELECT o_year, SUM(CASE WHEN n...
393.45	22	17.88	1.73	8.81	25.47	46duk4b2hsbam	JDBC Thin Client		SELECT l_shipmode, SUM(CASE WH...
320.22	11	29.11	1.41	6.88	36.68	1nqkkuwjn7j7g	JDBC Thin Client		SELECT c_count, COUNT(*) AS cu...
318.49	19	16.76	1.40	9.46	26.91	8fapy3ba1r1mt	JDBC Thin Client		SELECT l_shipmode, SUM(CASE WH...
316.91	7	45.27	1.39	9.25	19.58	04bcrj6v948x1	JDBC Thin Client		select c_name, c_custkey, o_or...
283.96	9	31.55	1.25	6.99	23.71	85f16sfxburgr	JDBC Thin Client		SELECT c_nationkey, SUM(l_exte...
257.99	5	51.60	1.14	8.27	26.36	829254b6kwzff	JDBC Thin Client		select c_name, c_custkey, o_or...
248.38	8	31.05	1.09	6.19	31.18	7x8pt6dyrvjng	JDBC Thin Client		SELECT c_count, COUNT(*) AS cu...

Back to SQL Statistics
Back to Top

SQL ordered by CPU Time

- Resources reported for PL/SQL code includes the resources used by all SQL statements called by the code.

DEMO - AWR for ADG workloads – EM support

Performance Hub Enhancements

SQL History

Challenges

- Developers want ability to track all the recent SQL issued by their sessions for application development
- DBAs want visibility to all the SQLs for performance troubleshooting
- Real-time SQL Monitoring and AWR does not track all SQL executed

Solution

- SQL History
  - Provides the visibility into recent history of all the queries running on a database with their session and query execution details
  - Supports both Developers and DBA personas

Benefit

- Improved DevOps productivity – faster application development and troubleshooting

SQL History

Users need ability to track SQL issued by their sessions

- Real-SQL Monitoring tracks SQL consuming more than 5 secs of CPU/IO time or run in parallel

SQL History feature introduced in DB 23ai tracks last N SQL executions in each user session

Execution statistics tracked in SGA buffers (v$views) and presented via SQL Monitor-like reports

Advanced SQL tracking

- Queries, DML, DDL, alter session/system, PLSQL blocks regardless of run time
- User-issued SQL statements excluding internal statements (background or recursive)

Access restriction based on user privilege

- DBA user can access SQL History of all users
- Non-DBA user can only access SQL History of sessions they own

Modifiable at system and per session level

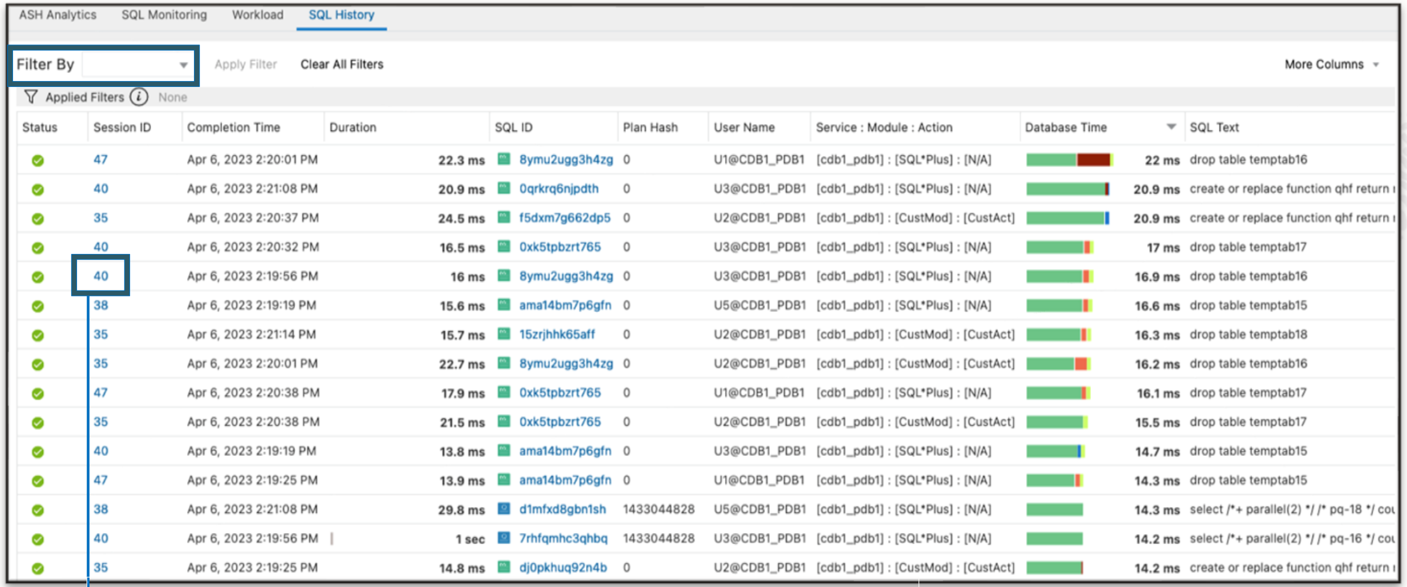
Limitations (current)

- Default tracking limited to 50 executions per session, new executions replace older ones
- In 23ai, it needs to be enabled with parameter sql_history_enabled=TRUE, default is FALSE
- In 23ai, SQL History data are not persisted to disk

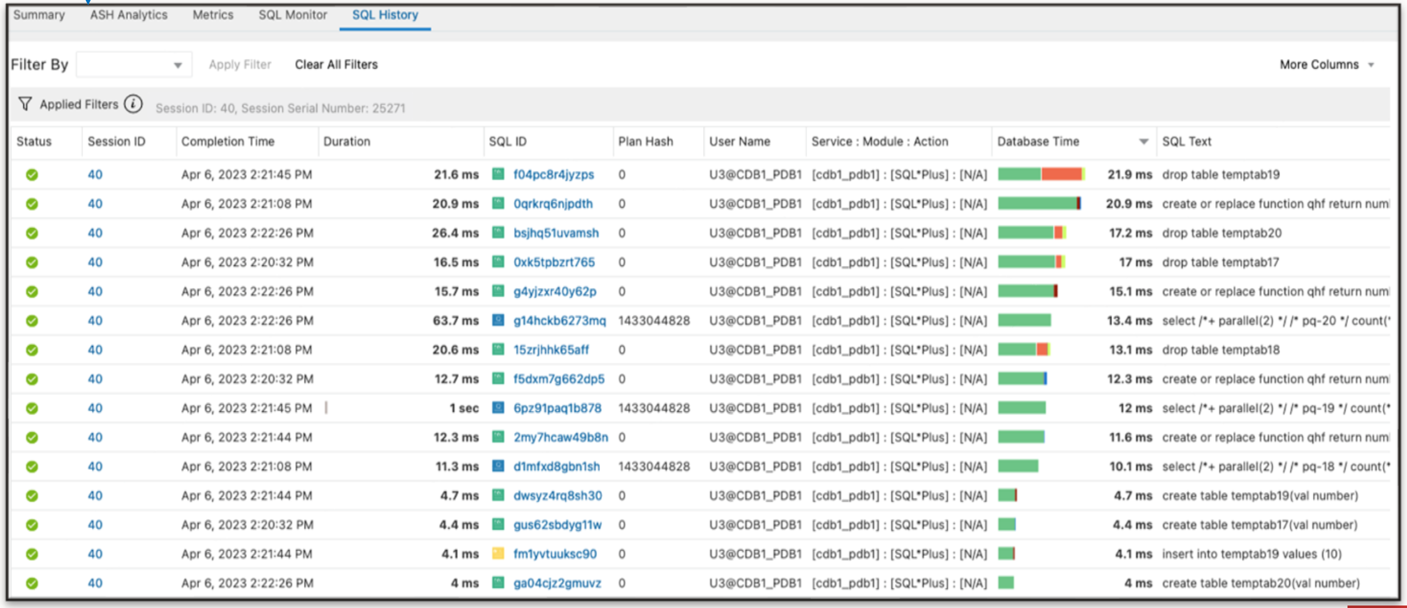
SQL History

Filter SQL History by the following dimensions

- Session ID
- User name
- Service
- Module
- Action
- Database time for query
- SQL ID and text
- Query status

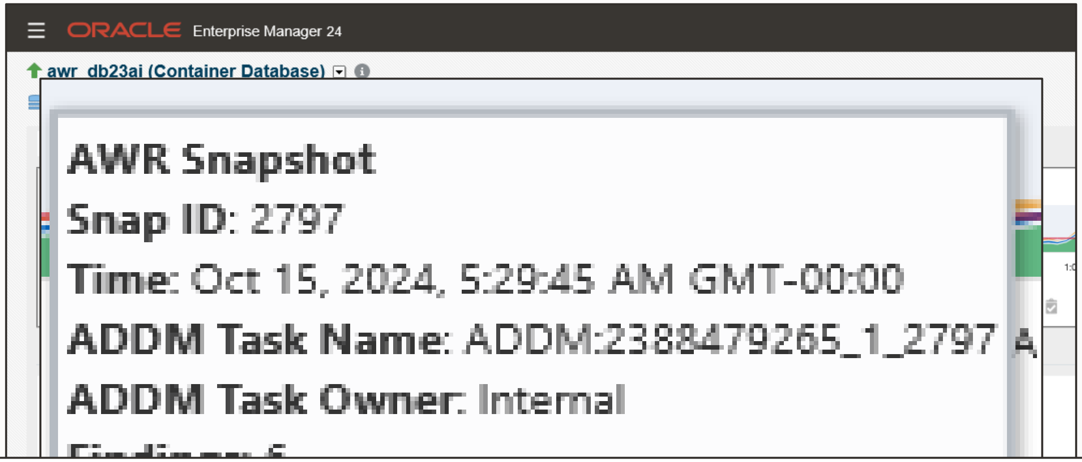


Drill down to session level view



Performance Hub: ADDM

- ADDM findings and recommendations are integrated with Performance Hub for the selected time period
- ADDM Active report supported for offline analysis



Name	Impact	Number of Recommendations
Large number of database connections	100.0%	1
CPU Usage	45.8%	2
Top SQL Statements	41.9%	5
Commits and Rollbacks	17.7%	2
PL/SQL Execution	15.2%	3
"User I/O" wait Class	2.2%	0

DEMO - Performance Hub: ADDM

ADDM Spotlight Enhancements

Background: ADDM Spotlight

Challenge

- Production system changes have the potential to disrupt availability and performance SLAs.
- DBAs need to weigh the costs vs. benefits of making high-impact system changes

Solution

- Provide insights on what changes need to be implemented to improve performance
  - Synopsis of ADDM findings/recommendations, their impact and benefit over a longer period
  - Enables strategic tuning by identifying chronic issues

Benefit

- Gives you confidence to implement recommendations
- Up-level junior staff with expert advice
- Up-level system optimization from tactical to strategic

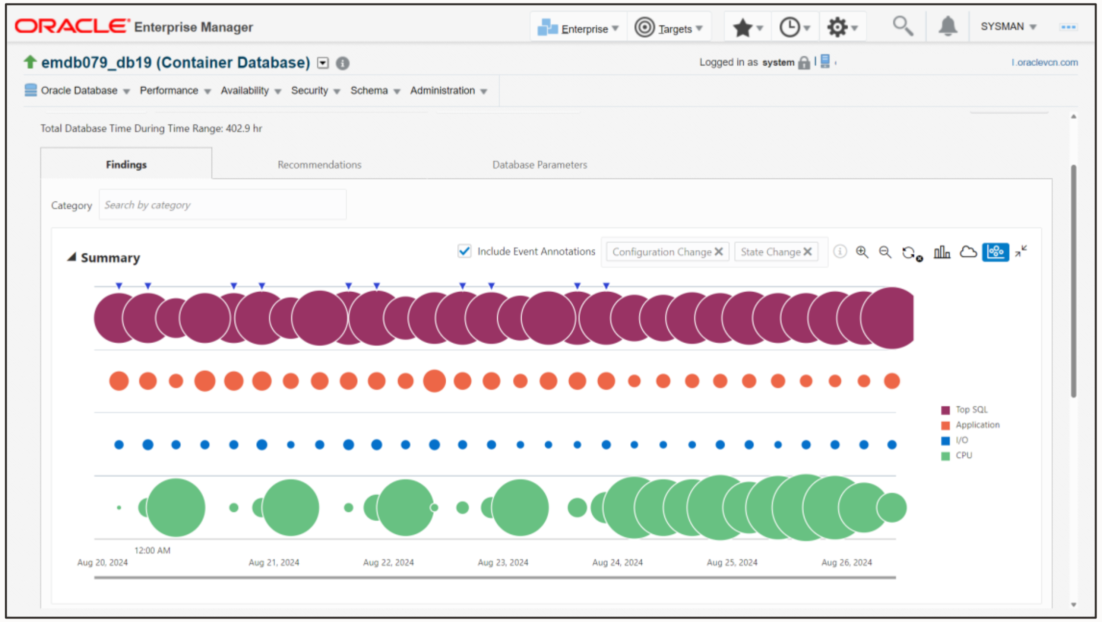
EM 24 enhancements

- Swim lanes
- Active reports

ADDM Spotlight enhancements

Swim lanes – Visualization and prioritization of strategic tuning by aggregating ADDM findings and recommendations over longer period

Active reports – Offline analysis of ADDM Spotlight findings and recommendations



DEMO - ADDM Spotlight Enhancements

Conclusion

- AWR Explorer allows users to compare and analyze database performance AWR data by visualizing trends, metrics, wait events etc.,.
- EM supports AWR for ADG with same performance diagnostics capabilities for both primary and standby databases
- SQL History provides advanced SQL tracking by providing visibility to all the recent executed SQLs
- Use Performance Hub to monitor database activity, diagnose issues, and tune queries to improve the performance of Oracle databases
- ADDM Spotlight provides strategic advice with over all impact of findings and recommendations

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