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, timing, and pricing of any features or functionality described for Oracle's products may change and remains at the sole discretion of Oracle Corporation.

ORACLE

Life Just Got Better with Oracle Enterprise Manager

Oracle Enterprise Manager 13.4

Product Management Team

Enterprise and Cloud Manageability

Shefali Bhargava

GP Gongloor

Martin Peña

Agenda

1. EM Overview & Introduction
2. EM Framework, Install/Upgrade
3. Lifecycle Management, Migration Workbench
4. Break
5. Database Performance Management
6. Autonomous Database Support
7. Exadata Management

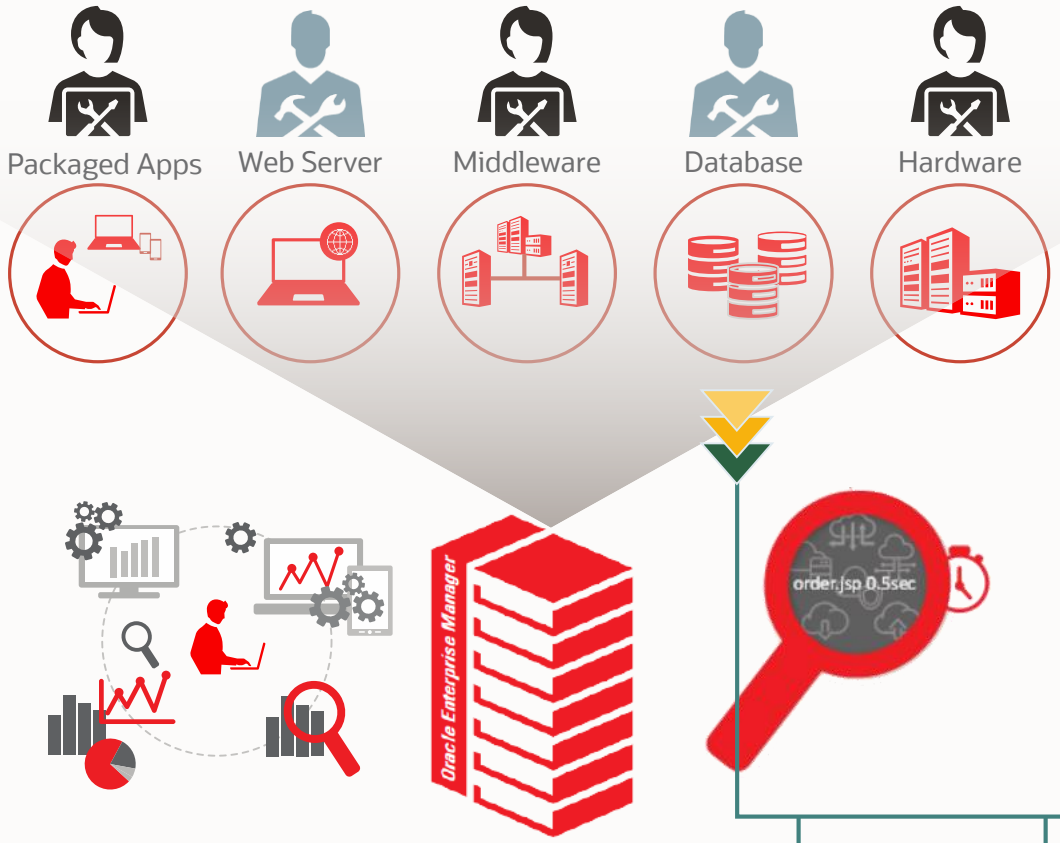
Announcing
Oracle Enterprise Manager 13.4

Manage the hybrid Oracle Database fleet at scale with less effort

- Increased Visibility and Intelligent Analytics
- Comprehensive Lifecycle Automation and Control
- Enterprise-Grade Management Platform: Secure, Accessible and Extensible

Oracle Enterprise Manager

ORACLE Enterprise Manager



- Single pane of glass for hardware and software management across cloud and on-premise
- Centralized control of integrated diagnostics, tuning and lifecycle activities
- Fleet-wide automation across Oracle Cloud and on-premises assets
- Integrated named credentials and auditing

Diagnostics
Tuning
Real Application Testing
Lifecycle Management
Cloud Management
Data Masking and Subsetting

Today's Database Management Needs

Challenges

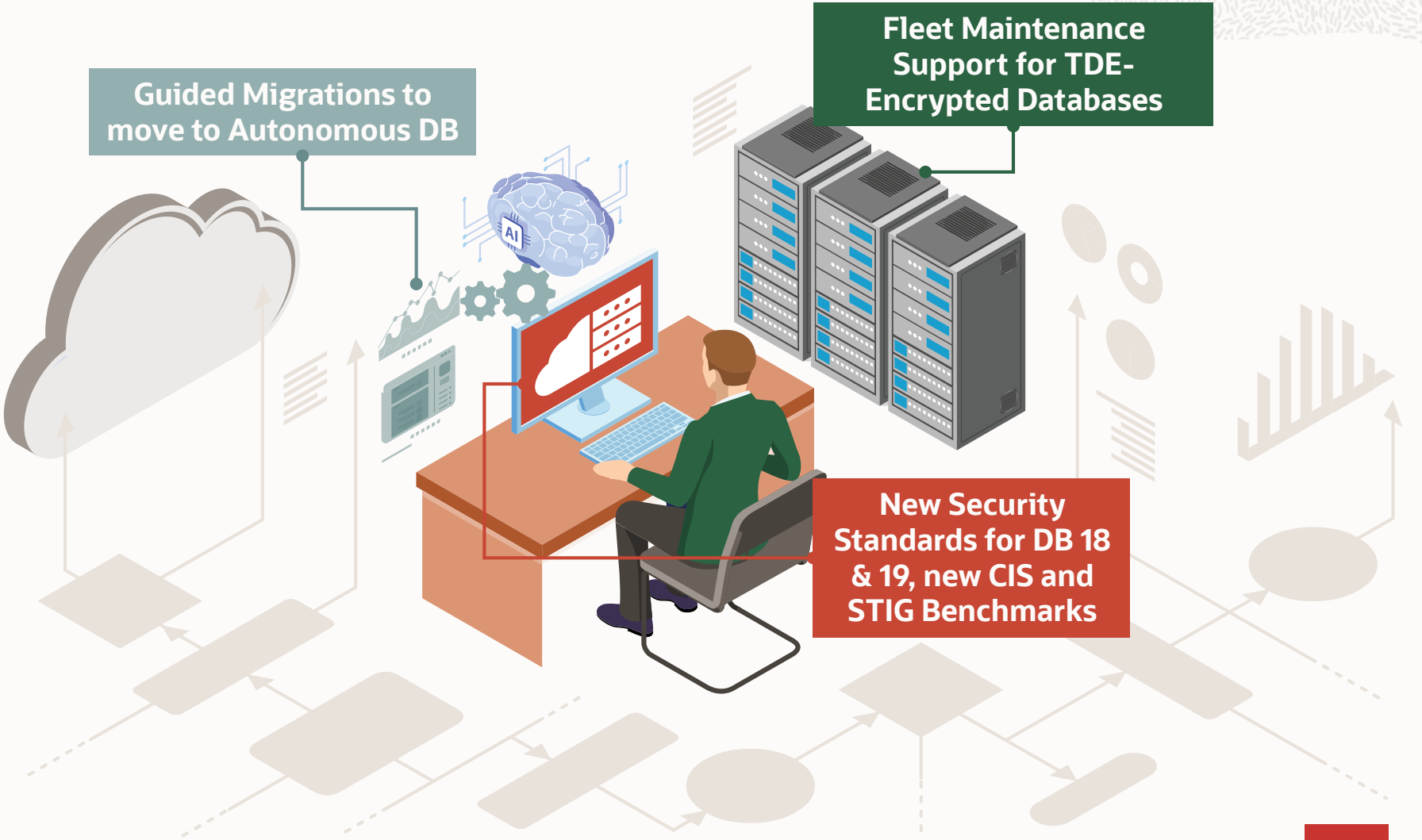
- Visibility and control for entire data management estate across hybrid cloud
- Support more databases and more frequent releases, with less effort and personnel1
- Reduce "firedrills" and reactive troubleshooting; focus on outage prevention
- Reduce overhead associated with maintaining management software

Requirements

- Uniform visibility for cloud and on-premises databases
- Deep management for entire Oracle Database fleet (traditional, Autonomous, Exadata, etc.)
- Pervasive automation for lifecycle activities (migrations, cloning, etc.)
- Complementary SaaS-based and cloud-hosted offerings

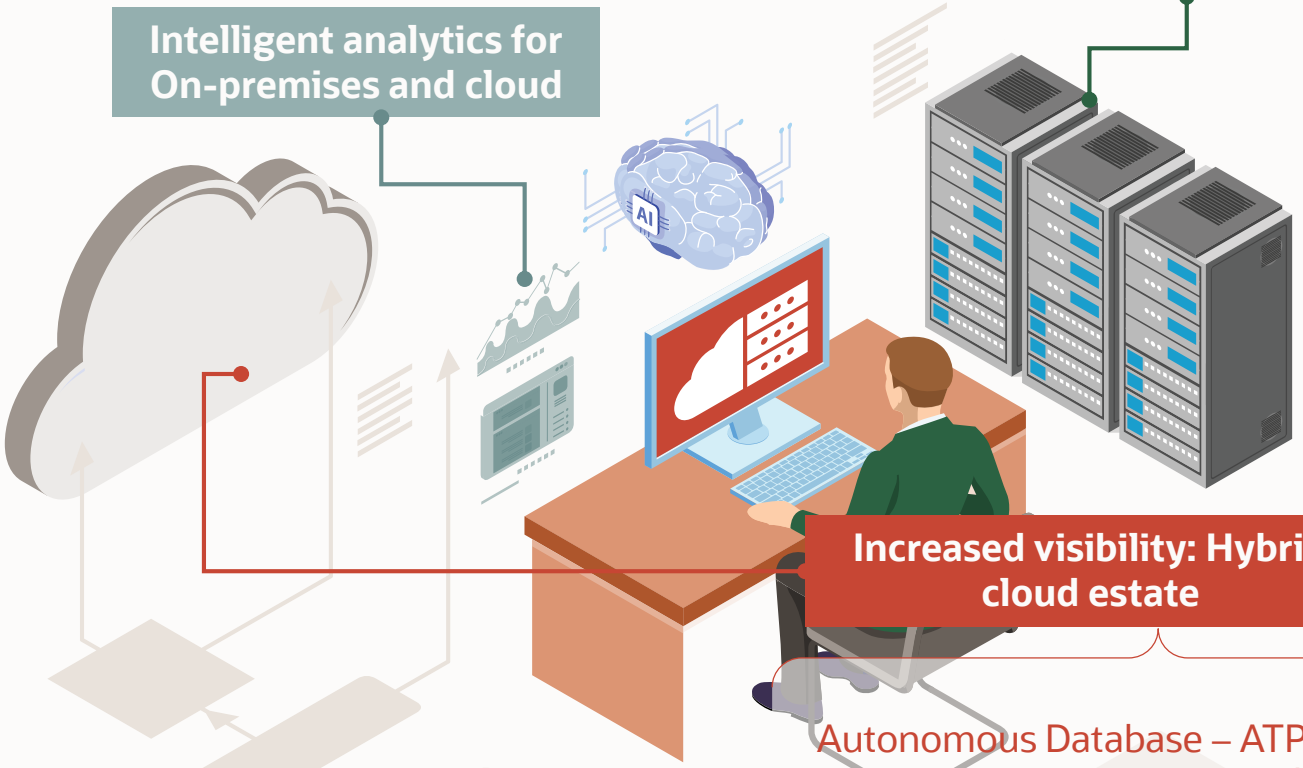
Source: Unisphere survey, January 2018. https://go.oracle.com/LP=63164?elqCampaignId=134833

Comprehensive Lifecycle Automation and Control



Increased Visibility and Intelligent Analytics

Oracle Enterprise Manager

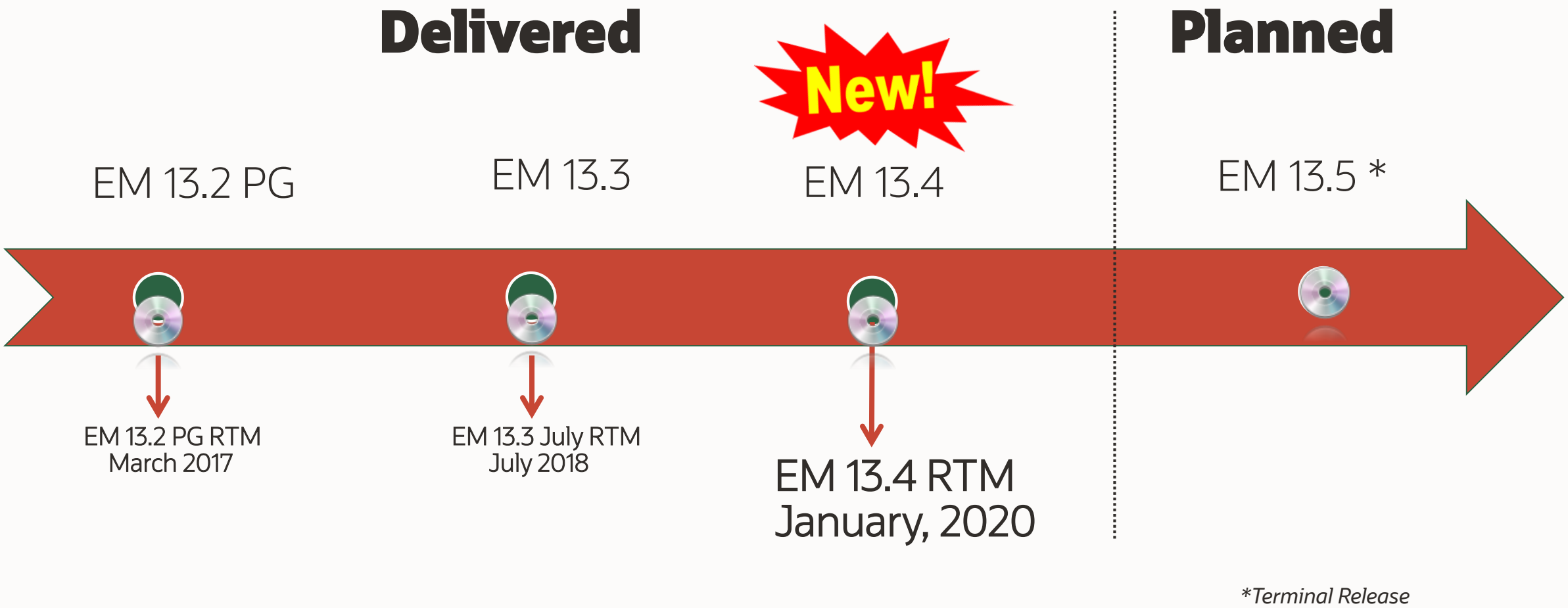


Agenda

1. EM Overview & Introduction
2. EM Framework, Install/Upgrade
3. Lifecycle Management, Migration Workbench
4. Break
5. Database Performance Management
6. Autonomous Database Support
7. Exadata Management

Oracle Enterprise Manager Release Roadmap

Continued Investment and Support



*Terminal Release

What's New in EM 13.4

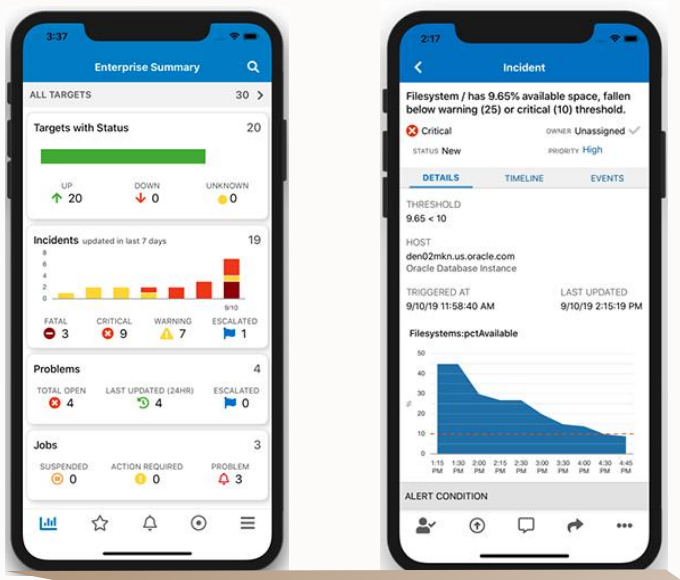
- Oracle Enterprise Manager 13.4 shipped with
  - Weblogic – 12.2.1.3.0
  - JDK 1.8 u231 - Default shipped version
  - BI Publisher – 12.2.1.3
  - JDK 1.8 u251 : Updated as part of RU2
- Oracle Enterprise Manager 13.4 release will allow you
  - Fresh Install – EM 13.4
  - Upgrade to EM 13.4
- Repository Database Versions and Type Supported – Single Instance, RAC, PDB
  - DB 12.1.0.2, 12.2
  - DB 18c (18.x)
  - DB 19c (19.x)

What's New in EM 13.4

- Upgrade optimization
- Additional OMS's Parallel Upgrade
- SQL Execution (Repository, Target Database) via REST API
- Mass Agent Decommission
- DB 18.6 and 19.5 Templates available for Install

Enterprise-Grade Framework: Secure, Accessible and Extensible

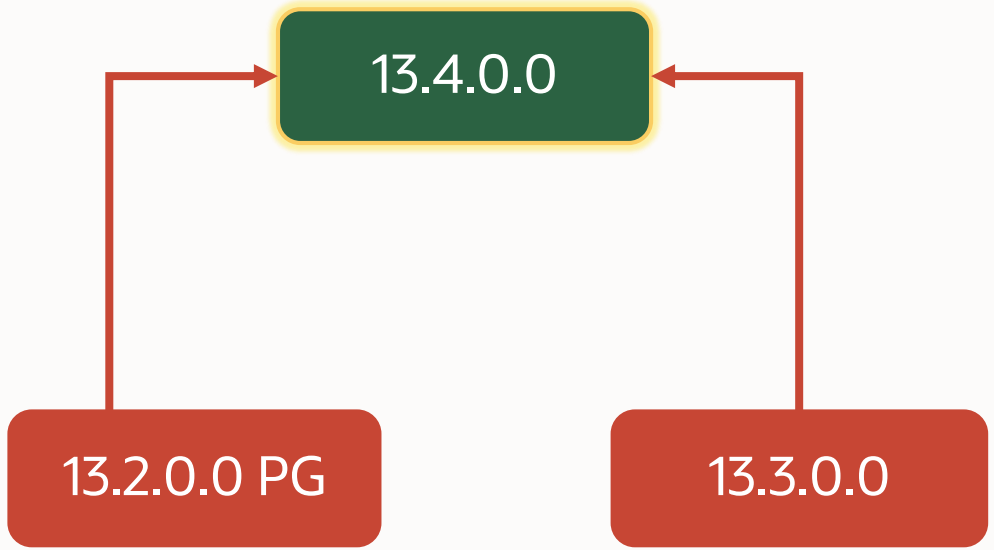
Access via NEW Mobile App



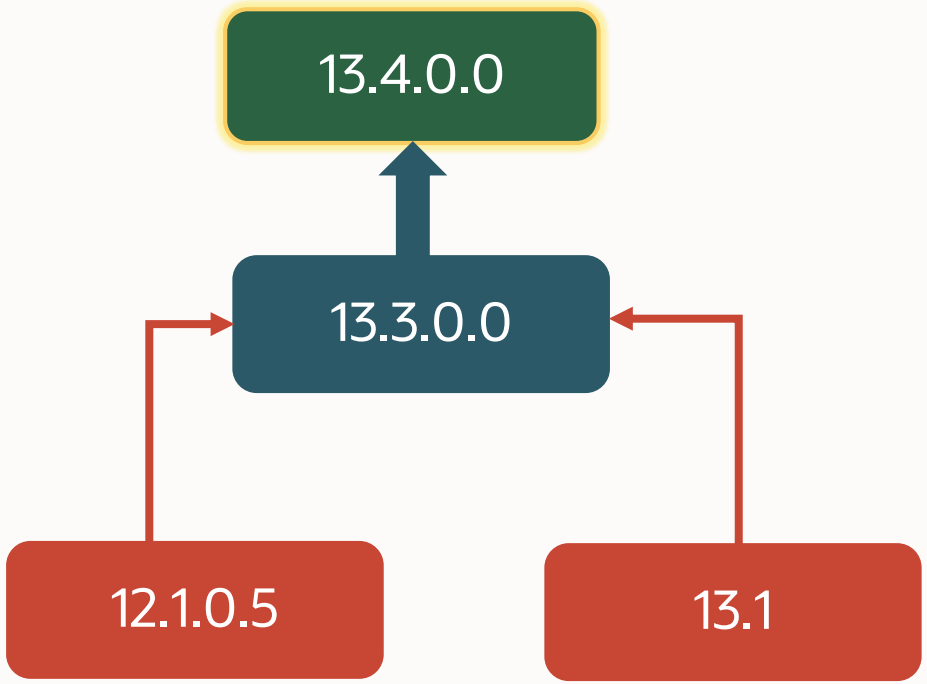
Access via NEW App for Grafana

Upgrade Paths to Enterprise Manager 13.4

- Direct Upgrade Paths to 13.4



- Pre-13.3 Upgrade Paths



Enterprise Manager 13.4

Software and Add-on Plug-ins Downloads

- Oracle Enterprise Manager software binaries for all platforms are available on oracle.com and edelivery.oracle.com
- Download the binaries from:
  - www.oracle.com/enterprise-manager/downloads/cloud-control-downloads.html (or)
  - https://edelivery.oracle.com/osdc/faces/SoftwareDelivery
- Add-on Plug-ins like Golden Gate, ODA, EBS, etc.
- Download for Install/Upgrade from:
  - https://www.oracle.com/enterprise-manager/downloads/oem-v134-update-plugins-downloads.html

Enterprise Manager PUMA Program - Value Addition

Reduced Risk

- ✓ Avoid Reactive Issues and Escalations
- ✓ Tuning the environment post-upgrade

Saving Time

- ✓ Fewer SRs to manage during Upgrade Lifecycle
- ✓ Completing Upgrades within the defined downtime window

Increased Efficiency

- ✓ Planning & getting Environment Ready for Upgrade
- ✓ Post-Upgrade follow-up calls for environment stability

Pain Free Patching

- ✓ Consistent Patch recommendations
- ✓ Proactive in nature to avoid running into patch failures

- PUMA = **P**roactive **U**pgrade **M**igration **A**ssistance
- Engage into PUMA program for better Upgrade experience

Enterprise Manager in Oracle Cloud Marketplace

Test drive the most current EM

- **Full install in less then 1 hour**
- Latest **Enterprise Manager** updated quarterly
- **Database**, with RAC and Transparent Data Encryption, for Oracle Management Repository
- **Oracle Linux** host

Deploy best-practice production EMs

- **Many OCI Shapes** for different environment sizes
- **Level 3 HA** (multi-host) EM configurations
- **Cloud Database** for OMR

EM 13.4 RU6 (September 2020)
Database 19.8 (Multitenant with RAC)
Oracle Linux 8.2

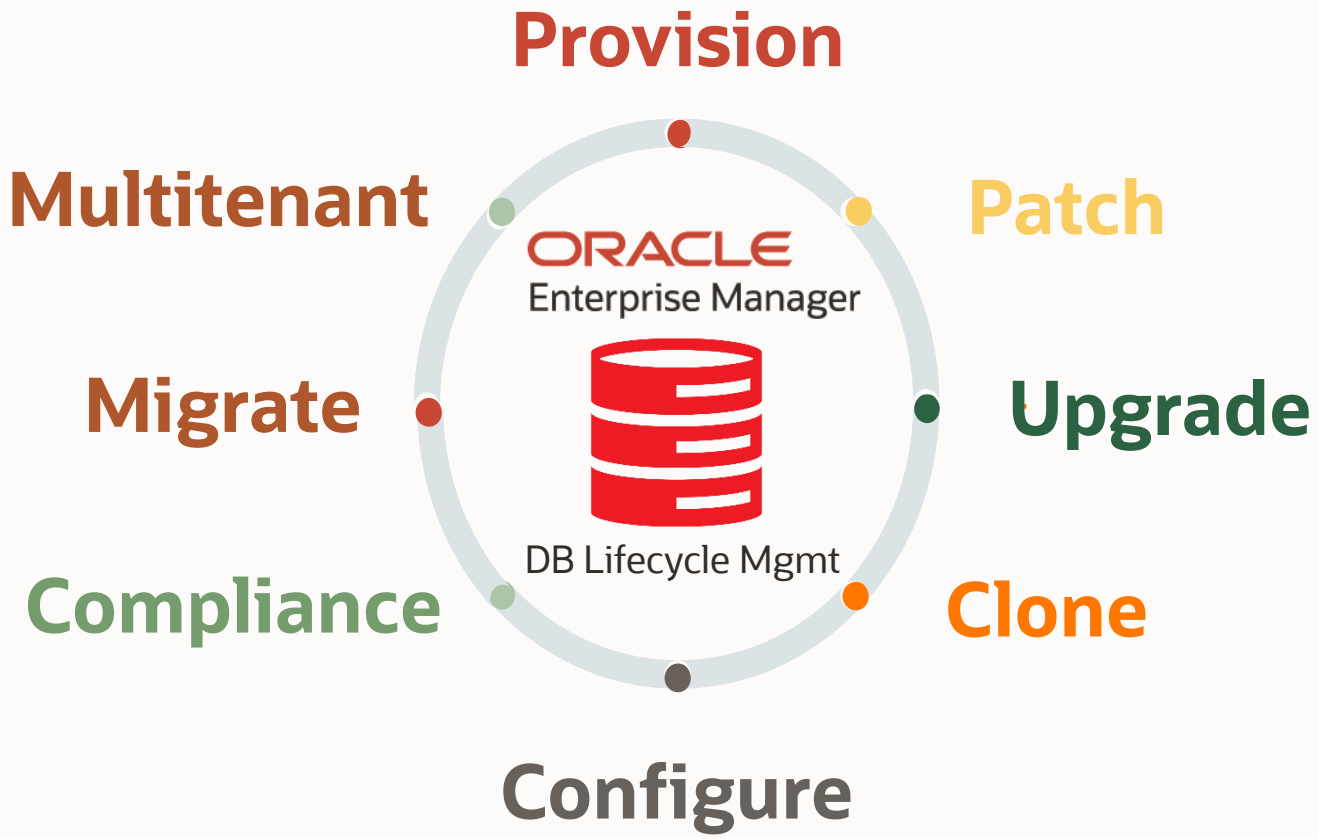
Agenda

1. EM Overview & Introduction
2. EM Framework, Install/Upgrade
3. Lifecycle Management, Migration Workbench
4. Break
5. Database Performance Management
6. Autonomous Database Support
7. Exadata Management

Database Lifecycle Management Overview

Comprehensive solution that helps database, system and application administrators automate the processes required to manage the Oracle Database Lifecycle.

Eliminates manual and time consuming tasks related to discovery, initial provisioning, patching, configuration management, and ongoing change management.



Database Provisioning, Cloning and Migration

Provision

- Complete Automation for mass deployment of Oracle Software
- Standardization with Gold Images and Profiles

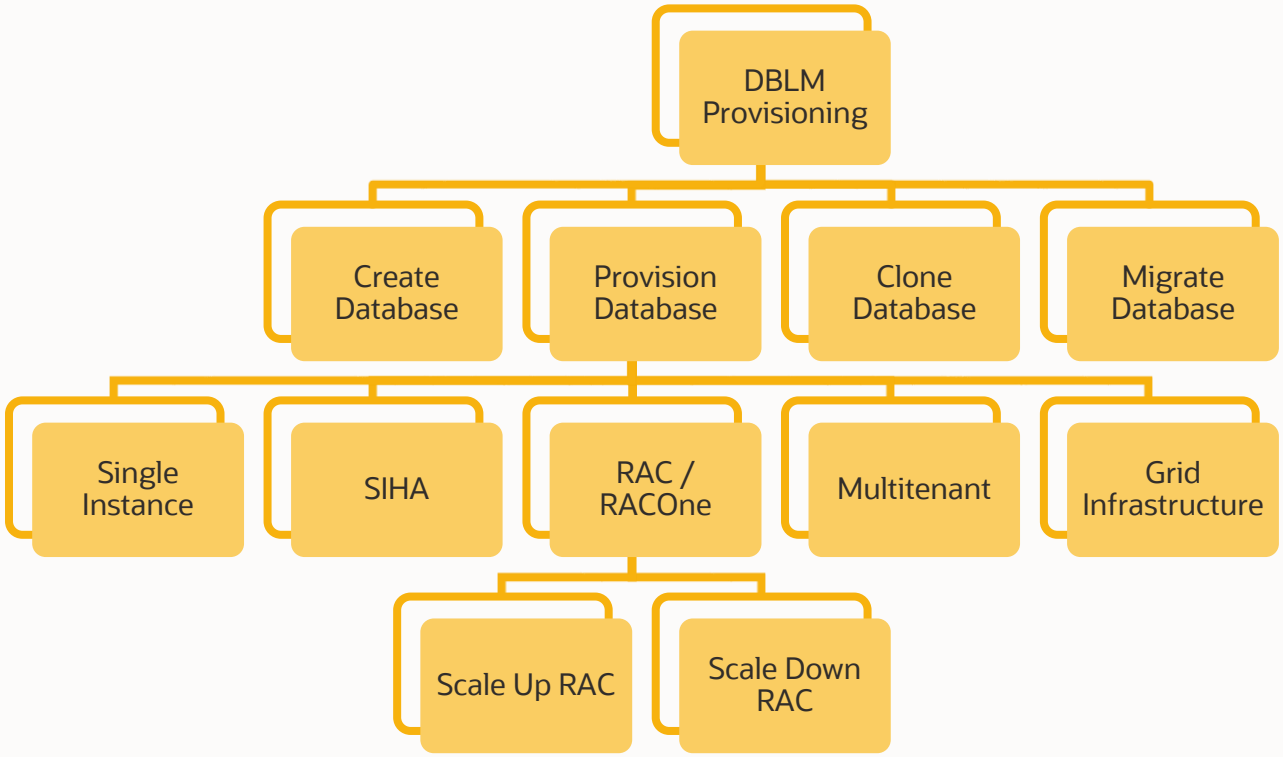
Clone

- Support full clones, hot clones and thin clones
- Clone Management Dashboard
- Rapid Creation of ‘Test Masters’

Migration

- On-premises databases to Oracle Cloud Infrastructure (OCI)
- Consolidation of non-CDB to PDB using DB Migration workflows

Database Provisioning, Cloning and Migration



- Supports all Oracle Database configurations:
  - Single Instance
  - RAC
  - Data Guard
  - Multitenant
- Provision Databases securely with locked down wizards and Gold images

Database Patching and Upgrade using Fleet Maintenance

Automated, Scalable Patching and Upgrades

- Out-of-place solution for both patching and upgrades
- Subscription-based software maintenance reduces maintenance windows
- Scalable: Patch ~100 Clusters-~1000 DBs in a single patching window
- Supports PSU, RU's and all DB versions from 11.2.0.4

Software Standardization Advisor

- Scans environment for the unique patching configurations
- Recommends standardized configurations and lists all the Oracle Homes on which the configurations should be applied

Database Patching and Upgrade using Fleet Maintenance

Enhanced Patching Operations

- Visual patch tracking
- Inject and automate environmental specific customizations.
- Supports Rollback
- Self service option available for application teams who want to choose their own patching window.

Complete Native Integration with EM

- Leverages EM blackouts for targets being patched to avoid unwanted notification/alerts.
- Leverages EM Named Credentials and privilege delegation for better and secure credential management.

Configuration Management

Complete Configuration and Inventory Collection

Automatically collects a wide variety of configuration information for all managed targets across the enterprise:

- Host
- Operating System
- Database
- Middleware, Applications
- Third-party software and others

Comparison and Drift Management

- Search collected configuration data
- Compare configurations
- View latest and saved configurations as well as inventory and usage details
- Monitor configuration history for changes
- Build configuration extensions and introduce custom target types
- Perform root cause analysis and impact analysis

Compliance Management

Continuous Compliance Auditing

- Validate conformance to standards using Reference configuration
- Best for critical and rapidly changing configuration settings
- Validate conformance to standards or benchmarks using discrete logic
- Best for Industry and internal standards (STIG,CIS)

Out-of-Box Standards

- Oracle's best practices and Security recommendations
- Oracle Database and WebLogic STIG Benchmarks
- ORAchk for Engineered Systems and Databases
- 1,000s of checks in Compliance Library
- Leverage Oracle provided rules matching your own

Automated Remediation with Corrective Actions

- Customizable to meet Internal best practices
- Option to run actions manually

Easily and Seamlessly Adopt the Cloud with Migration Workbench

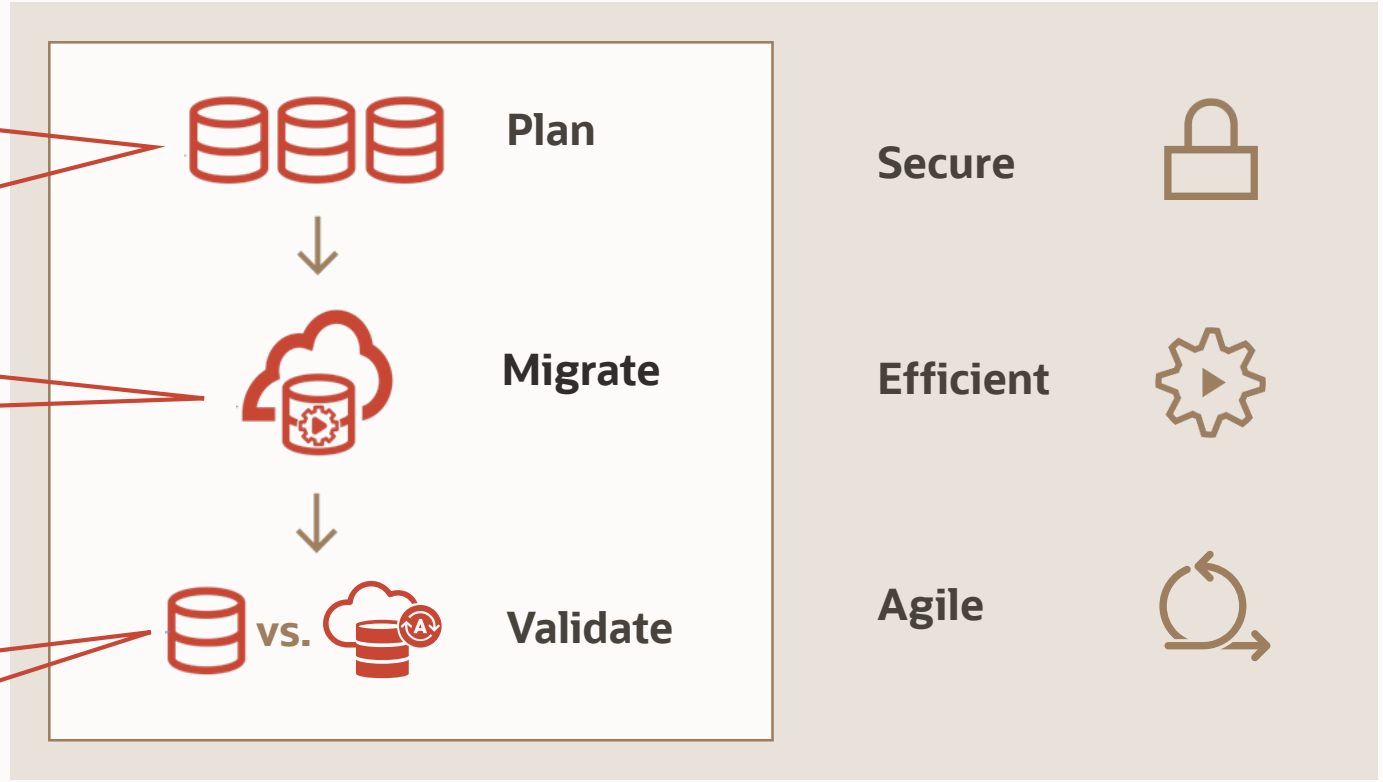
Easily Move to Autonomous Database with Migration Workbench

What databases can I consolidate?

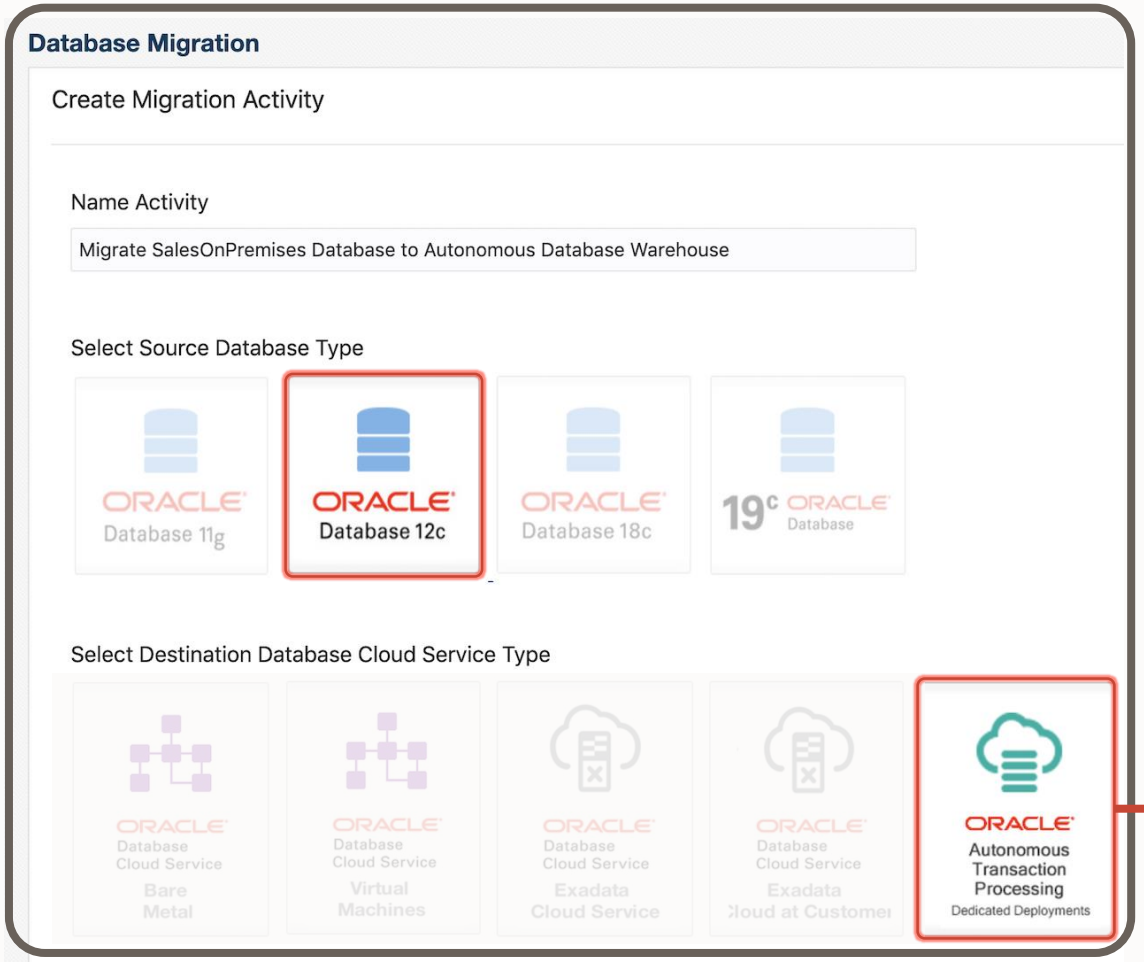
What cloud database shapes should I use?
What dependencies do I need to account for in my migration plans?

What mechanism should I use to perform the migration, and how do I use it?

How does my new environment compare against my old environment?



Guided Workflows Make Migration Simple and Efficient



Autonomous Databases
Data Pump

Exadata Cloud at customer
Data Pump, RMAN, nZDT

Exadata Cloud Service
Data Pump, RMAN, nZDT

Databases running on VM and BM
Data Pump, RMAN, nZDT, continuous refresh

Databases running on OCI Compute
Data Pump, RMAN, nZDT, continuous refresh

Compute within own datacenter
Data Pump, RMAN, nZDT, continuous refresh

Our Customers

Oracle Systems Management

COMCAST

Fleet-wide Database Automation

- On-demand database provisioning
- On-demand database patching
- Standardization for compliance

Solution: Enterprise Manager

Minutes
Down from 2-3 months for provisioning

2100
Databases patched automatically

Reduced
Database maintenance downtime

Agenda

1. EM Overview & Introduction
2. EM Framework, Install/Upgrade
3. Lifecycle Management, Migration Workbench
4. Break
5. Database Performance Management
6. Autonomous Database Support
7. Exadata Management

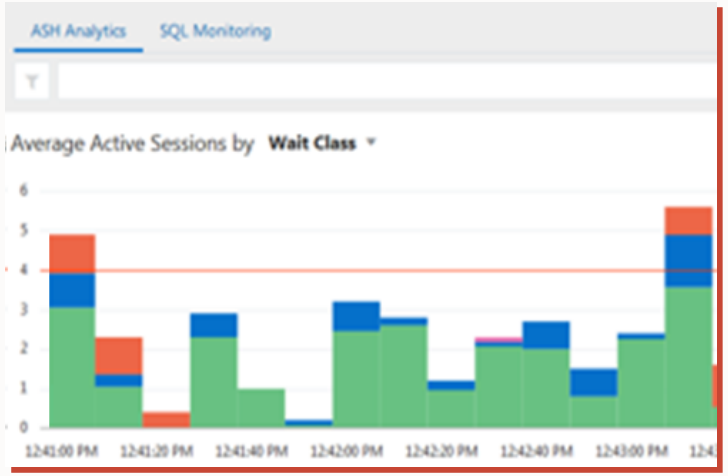
DB Performance Management

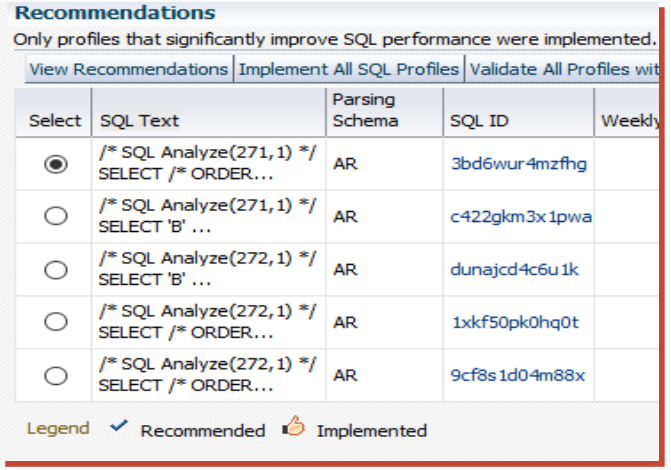
"Find → Fix → Validate" Methodology Rehash

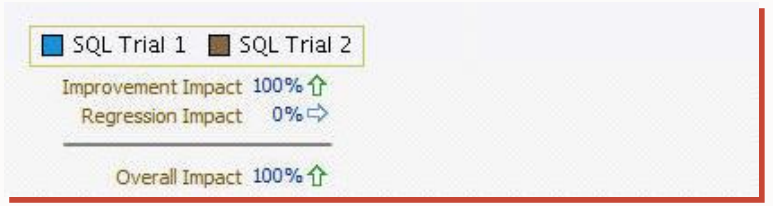
FIND:
Diagnostics Pack
(ADDM, ASH, AWR, …)

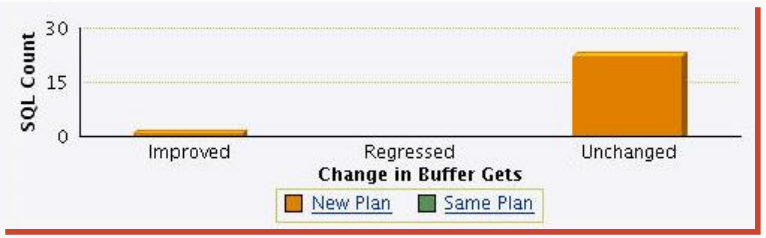
FIX:
Tuning Pack
(SQL Tuning Advisor, …)

VALIDATE:
Real Application Testing
(SQL Performance Analyzer, …)









EM 13.4 supports Autonomous Databases, Performance Hub, AWR Warehouse and other key features

Diagnostics Pack

- Part of the database management pack family
  - **Diagnostics**, Tuning, Life Cycle Management, Cloud Management packs
- Provides real time and automatic performance diagnostics and monitoring functionality
- Core functionality built in the Oracle Database kernel and exposed through EM interface
- Seamlessly integrated with Diagnostics Pack, Tuning Pack and Real Application Testing functionality
- Forrester Total Economic Impact of Database Management Packs
  - http://www.oracle.com/technetwork/database/manageability/forrester-packs-tei-white-paper-ow0-134611.pdf
  - http://www.oracle.com/technetwork/database/manageability/forrester-packs-roi-ow07-134239.pdf
  - In conjunction with Diagnostics Pack, payback period of 16 months (risk adjusted) and ROI of 100% (risk adjusted), 20% reduction in CAPEX over 3 years, improved OPEX and uptime

Diagnostics Pack Portfolio

- DB Time
- Automatic Workload Repository (AWR)
- AWR Warehouse
- Automatic Database Diagnostic Monitor (ADDM)
- Active Session History (ASH)
- Exadata Management
- System Monitoring and Notification

Diagnostics Pack features can be accessed via

- Database Server APIs
- **Enterprise Manager Cloud Control**
- Enterprise Manager Express

* This is not a comprehensive feature list

Automatic Workload Repository

Challenge

- How does a DBA monitor and be aware of problems as they arise
- Capture associated database statistics for problem detection and tuning

Solution

- AWR
- **Benefit:**
  By automating the gathering of database statistics for problem detection and tuning, AWR serves as the foundation for database self-management

Active Session History

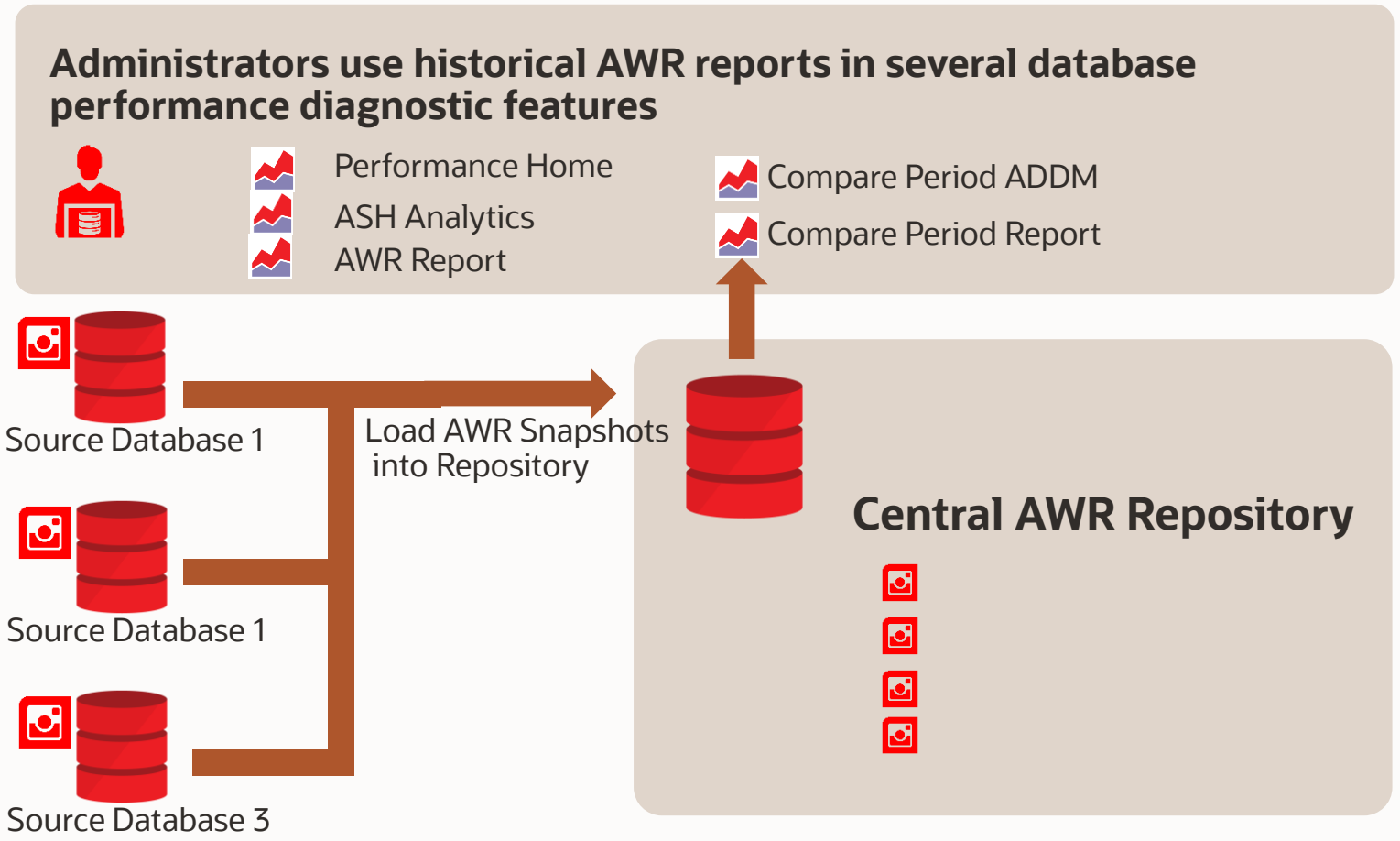
Challenge

- DBA on a production system and get an emergency call like “The Database is dead slow!”
- Identify the root cause of performance issues at a precise point in the past—even when the sessions have disconnected.
- Increasing AWR retention period increases storage overhead and cost in critical production environments

Solution

- Active Session History
- **Benefit:** Enables targeted performance analysis of transient problems
- Built into the Oracle kernel and highly optimized

AWR Warehouse: Overview



- 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)

AWR Warehouse (AWRWH): EM 13.4 Enhancements

- AWRWH support for Active Data Guard (ADG) databases
  - Previously ETL process would fail or stop when failover happened
  - When primary databases goes down, the databases are automatically switched in the AWR warehouse to standby databases when ADG is configured
  - Applies to source databases as well as AWRWH repository database
  - Similar to the above, RAC One databases are also supported
- AWRWH support for Pluggable Databases (PDBs)
  - Both source databases and AWRWH repository database can be a PDB
  - Supported for Oracle Database Release 12.2 and higher
- AWRWH ETL troubleshooting
  - Enhanced ability to for UI drill down on a failed load to determine the exact step the dump/transfer/load failed
  - View all relevant errors and log data from one place
- Proactively health check on configuration, credentials, space related to the ETL process
- AWRWH data can be stored in non-SYSAUX tablespaces (EM 13.4 RU3+)

Tuning Pack

- Part of the database management pack family
  - Diagnostics, **Tuning**, Life Cycle Management, Cloud Management packs
- Provides unique, automatic and deterministic SQL tuning functionality
- Core functionality built in the Oracle Database kernel and exposed through EM interface
- Seamlessly integrated with Diagnostics Pack, Real Application Testing and Automatic Tuning Optimizer functionality
- Forrester Total Economic Impact of Database Management Packs
  - http://www.oracle.com/technetwork/database/manageability/forrester-packs-tei-white-paper-ow0-134611.pdf
  - http://www.oracle.com/technetwork/database/manageability/forrester-packs-roi-ow07-134239.pdf
  - In conjunction with Diagnostics Pack, payback period of 16 months (risk adjusted) and ROI of 100% (risk adjusted), 20% reduction in CAPEX over 3 years, improved OPEX and uptime

Tuning Pack Portfolio

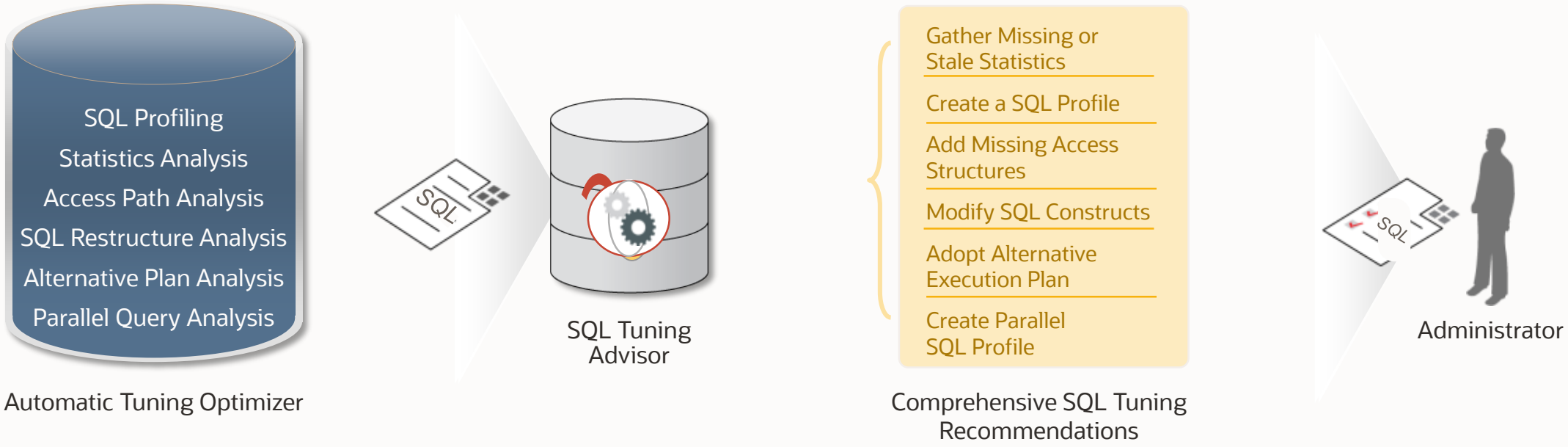
- SQL Tuning Sets
- SQL Tuning Advisor
- SQL Profiles
- Automatic SQL Tuning
- SQL Access Advisor
- Real-time SQL, PL/SQL and Database Operations Monitoring
- Reorganize Objects

Tuning Pack features can be accessed using

- EM Cloud Control
- EM Express
- Database Server APIs

* This is not a comprehensive feature list

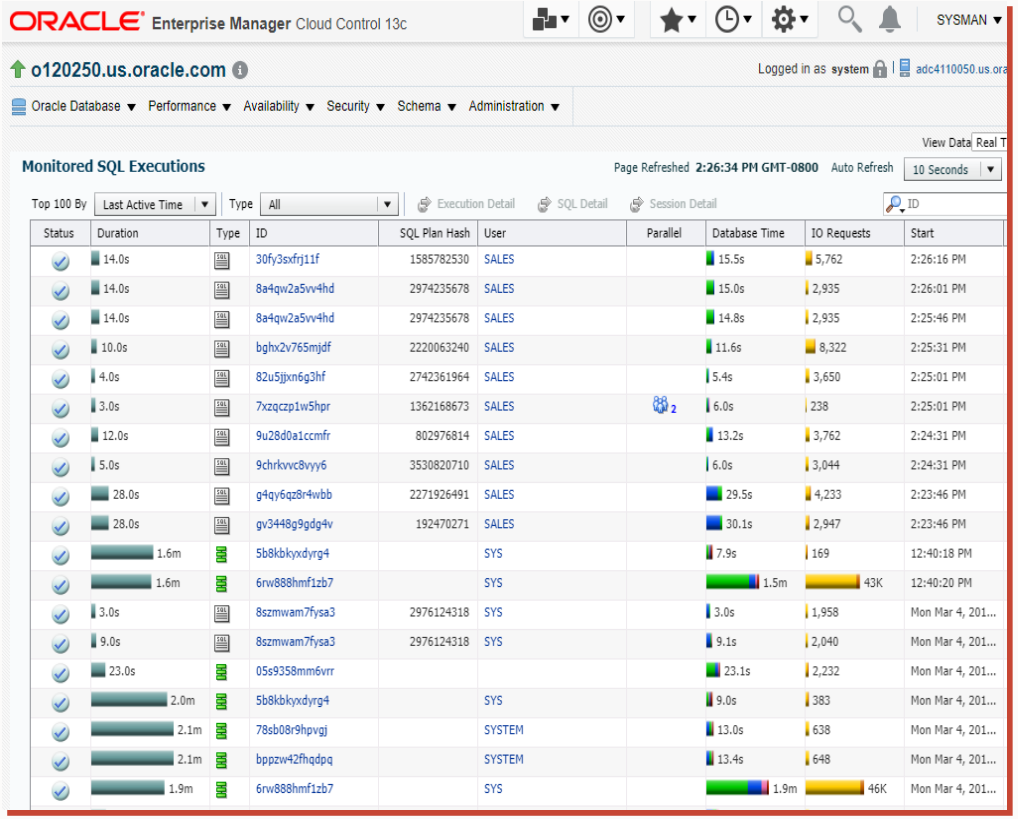
Tuning Pack – SQL Tuning Advisor



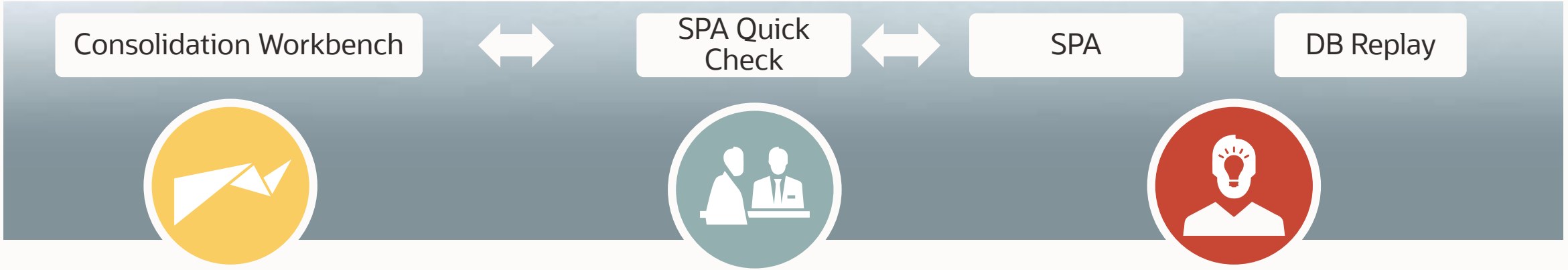
- Gives suggestions on the various problems identified during the diagnosis phase
- Uses the same CBO, but has more time budget to perform comprehensive analysis
- Identifies alternate execution plans using real-time and historical performance data
- Recommends parallel profile if it will improve SQL performance significantly

Tuning Pack – Real-time SQL Monitoring

- Automatically monitors long running SQL
- Enabled out-of-the-box with no performance impact
- Monitors each SQL execution
- Exposes monitoring statistics
  - Global execution level
  - Plan operation level
  - Parallel Execution level
- Guides tuning efforts
- Bind values shown
- SQL level metrics
  - CPU, I/O requests, throughput, PGA, temp space
- Graphical explain plan
- I/O statistics for each operation



Oracle Real Application Testing Value Proposition



Cloud Migration/Adoption

Move workloads to Oracle Cloud safely and quickly

Accurately estimate required Oracle cloud compute size and shape for cloud migration

Ensure database performance on cloud meets SLAs

Use DCS to test on-premise DB patching and upgrades

Performance Management

Proactively identify and fix performance problems before they occur on production systems whether on cloud or on premise

Upgrade and New Feature Adoption

Improves business agility through faster and risk-free new technology adoption (DB 12c upgrades, Sharding, Multitenant, In-memory, etc.)

224% ROI over 3 years
5.9 months payback period
Source: Forrester Study

CSX Corporation

Real Application Testing Help CSX Corporation Upgrade Databases Twice as Fast

Company Overview

CSX, based in Jacksonville, Florida, is a Premier transportation company..

It provides rail, intermodal, and rail-to-truck transload services and solutions to customers across a broad array of markets

Challenges / Opportunities

With more than 400 databases supporting critical commercial, packaged and proprietary business applications CSX wanted to take advantage of the enhanced functionality in Oracle Database while minimizing the business impact and downtime during the migration

Products

Oracle Real Application Testing

Solution

SQL Performance Analyzer, Database Replay

Benefits

Helped CSX to streamline the upgrade process and complete the database upgrade in less than half the time required for the company's previous database upgrade.

Providing critical insight to fully assess the impact of infrastructure changes

Fine-tune queries in a test environment before deploying the change in production

Agenda

1. EM Overview & Introduction
2. EM Framework, Install/Upgrade
3. Lifecycle Management, Migration Workbench
4. Break
5. Database Performance Management
6. Autonomous Database Support
7. Exadata Management

Autonomous DB Support

Cloud-aware targets types

Supported EM Features

Autonomous Indexing

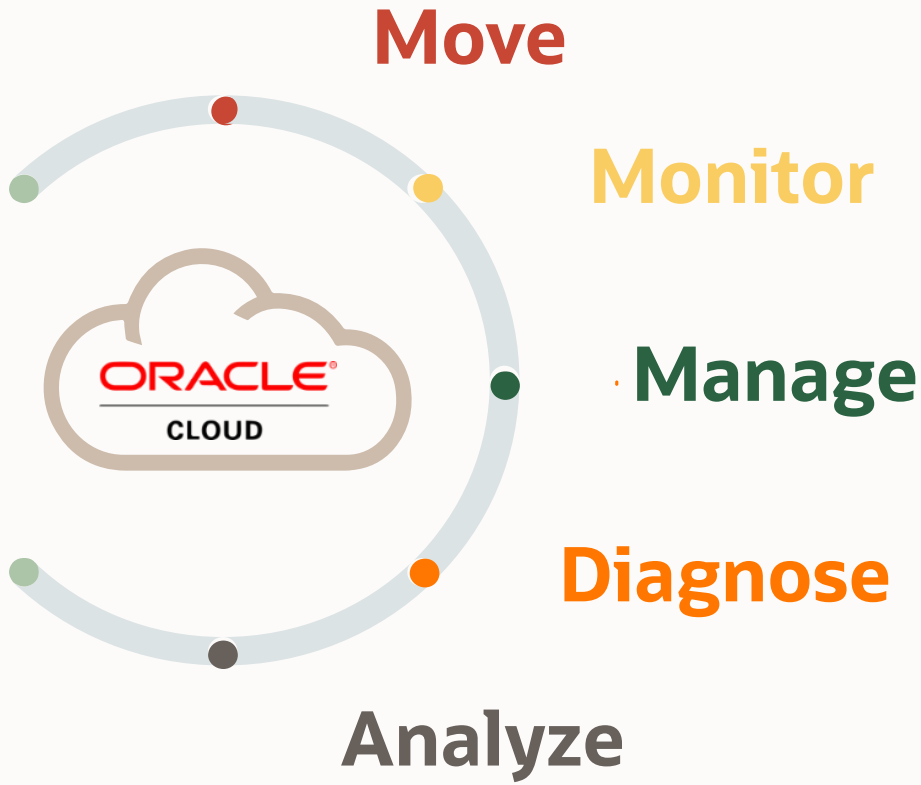
Seamless, Fleet-Wide Management of Autonomous and Cloud Databases

Adopt the cloud with confidence

- **New cloud-aware target types** for Autonomous and cloud DBs including Exadata Cloud
- **Enterprise-wide fleet dashboard** for finding "hot spots"

Optimize customer-managed components

- **Monitor** with automatic anomaly detection
- **Manage** users, schema, roles, space, etc.,
- **Diagnose and improve** application-level SQL logic
- **Lifecycle operations** like service instantiation, termination, scale-up/down etc., orchestrated via cloud-native APIs



Supported EM Features

Functionality	Features
Database Home	Overview page
Monitoring	Key Metrics, Incident Manager, Alert History etc.
Performance	Performance Hub, STS, SQL Tuning Advisor, AWR reports, SPA etc.
Database Administration	Storage Management, Monitoring Automated Indexes
Schema Management	Database Objects and Programs (Functions, Packages etc.)
Security	Users, Profiles, VPD and Privilege Analysis

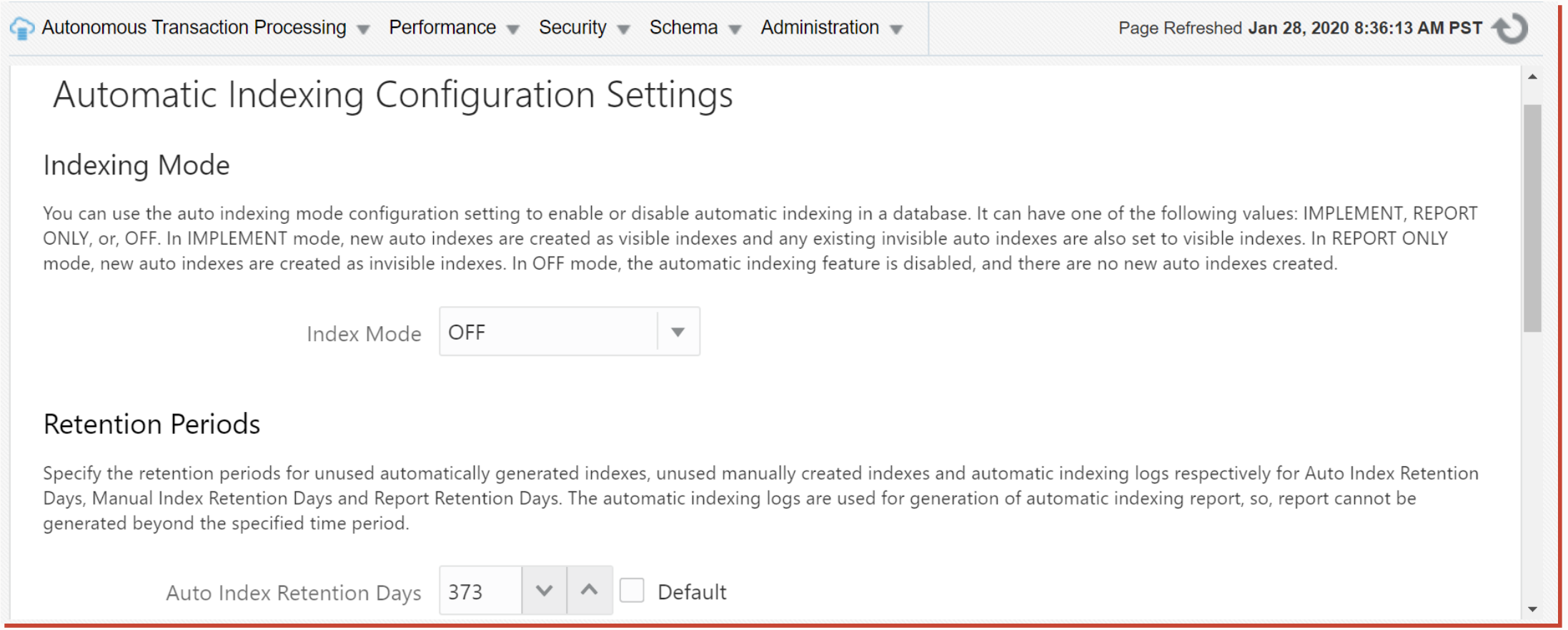
- EM 13.3 PG supports ATP-D
- EM 13.4 RU3+ supports ADW-D, ADB-S

Autonomous Database Features in EM 13.4

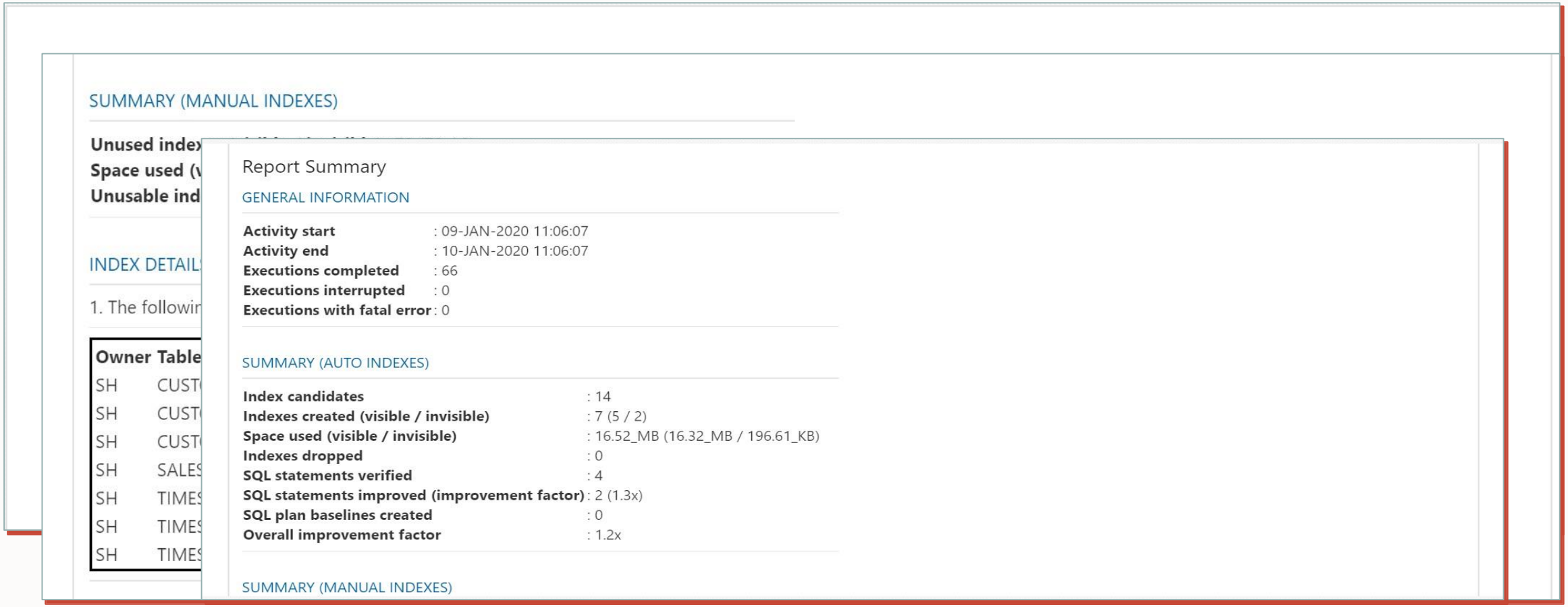
- New cloud-aware target types for Autonomous Databases
  - Support for Autonomous Data Warehouse Dedicated Deployment and Autonomous Database Shared Deployment via credential wallet based discovery.
  - Enhanced discovery and monitoring of Autonomous targets via cloud-native APIs
  - Tight integration with OCI APIs for discovery and management
- Automatic Indexing configuration and reports
- Autonomous Database Metrics
  - You can monitor the configuration, capacity, and performance of your Autonomous dedicated databases with metrics and create alerts, notifications etc. from EM.
  - These are service specific metrics and aligned with OCI Monitoring metrics.
- Lift n Shift on On-premises databases to Autonomous Databases
- Lifecycle management of Autonomous targets (startup, backup, migrate, etc.) via cloud-native APIs

Autonomous Database Features in EM 13.4

ORACLE AUTONOMOUS DATABASE



Autonomous Database Features in EM 13.4



Agenda

1. EM Overview & Introduction
2. EM Framework, Install/Upgrade
3. Lifecycle Management, Migration Workbench
4. Break
5. Database Performance Management
6. Autonomous Database Support
7. Exadata Management

Exadata Management

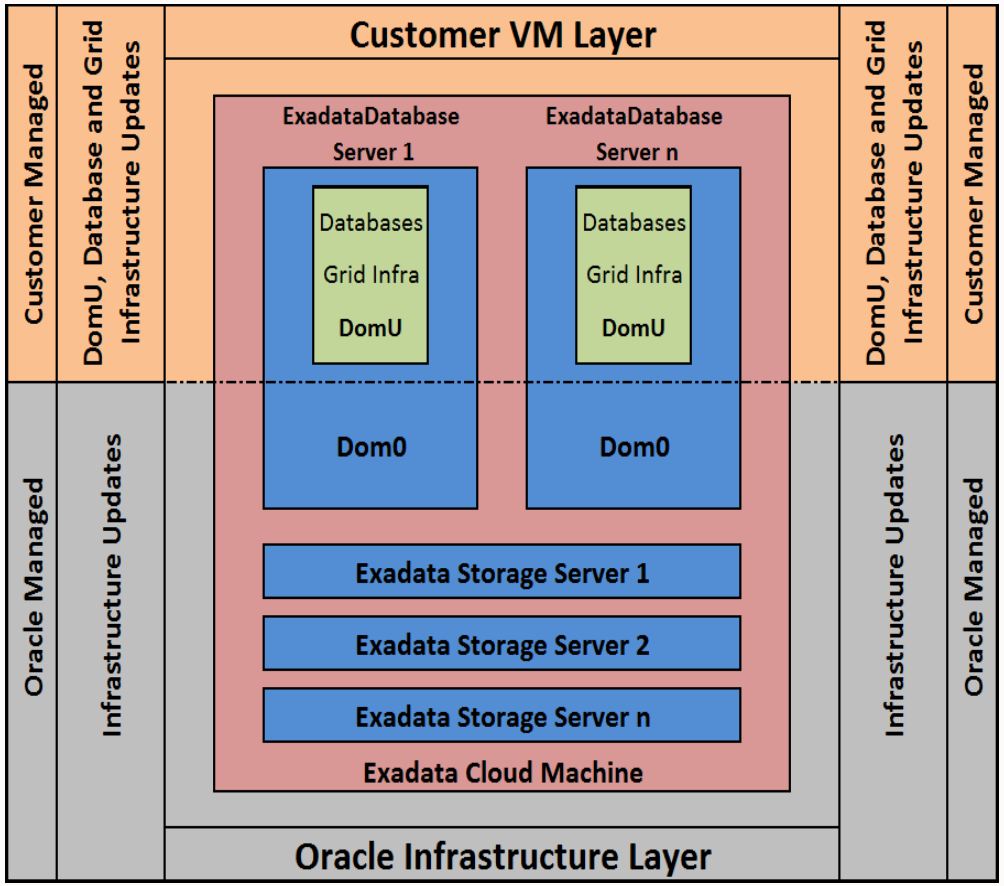
Exadata Cloud Target

Support for new HW and SW

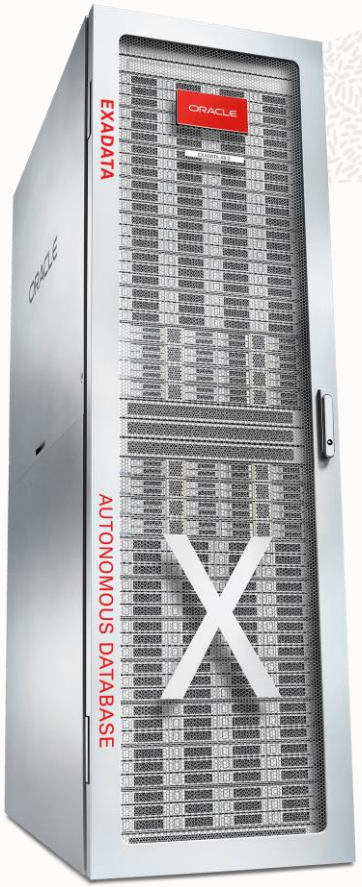
Exadata Warehouse

Exadata Cloud: Shared Responsibility model

- Oracle Cloud Operations manage the physical infrastructure up to and including the compute node hypervisor and dom0's
  - ILOMs, compute nodes, storage servers, network switches, PDUs
- Customer manages the software running on the compute node DomU's and the allocation of resources
  - Customer does not discover the Exadata Database Machine target in EM

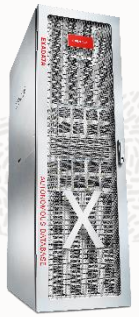


New Exadata Cloud Target (EM 13.4)

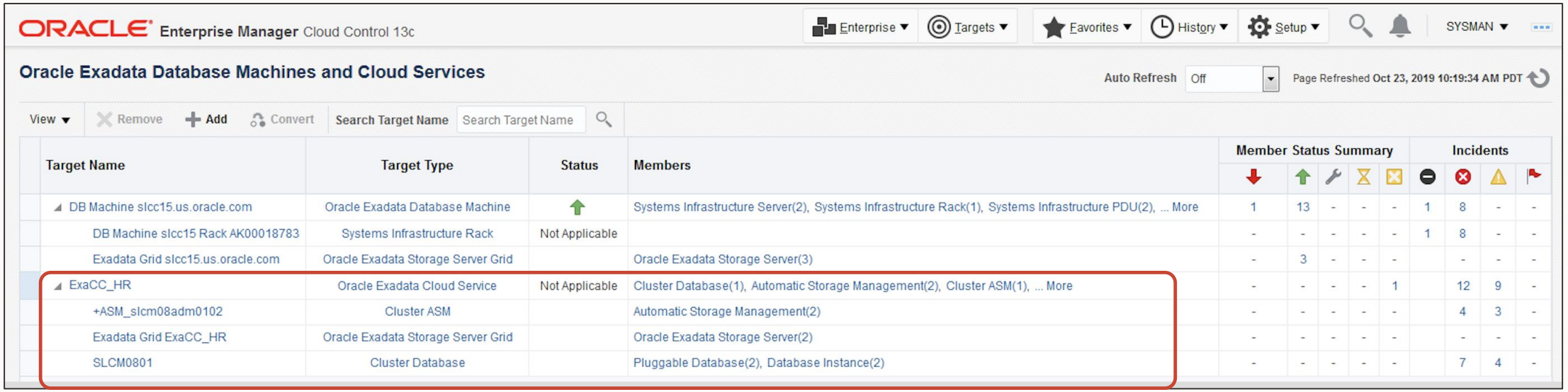


- Monitors Exadata Cloud targets as an Engineered System
  - Takes full advantages of EM built-in functionality delivered for Exadata
  - Provides ability to run supported ExaCli commands from EM
- First-class EM target for Exadata Cloud
  - Automatically identifies and organizes related targets
  - Provides an integration point for Exadata Cloud specific functionality
- Improved Performance Monitoring
  - Adds Exadata Storage Server and Exadata Storage Grid targets
  - Offers visualization of storage and compute performance for Exadata Cloud
  - Enables use of the same MAA KPIs developed for on-premises Exadata
- Scripted CLI-based discovery
  - Script the discovery of Exadata Cloud, including existing host, cluster, ASM, database and related targets, and adding storage servers
- Exadata Cloud Service and Exadata Cloud@Customer Management have new capacity planning reports (BIP)

Exadata Cloud Target



- Provides a single pane of glass for Exadata and Exadata Cloud
  - Monitor and Manage Exadata, Exadata Cloud systems together via Targets -> Exadata menu
  - Consistent experience across Exadata Cloud at Customer and Exadata Cloud Service



EM 13.4 support for Exadata HW and SW updates

- Support for HW and SW latest releases
  - X8M (RoCE + PMEM + KVM)
  - Support Exadata 19.3
  - Support for Exadata Extended Storage Server (XT)
  - ILOM 4.0 and 5.0
- Above EM Exadata support also backported to EM 13.3PG

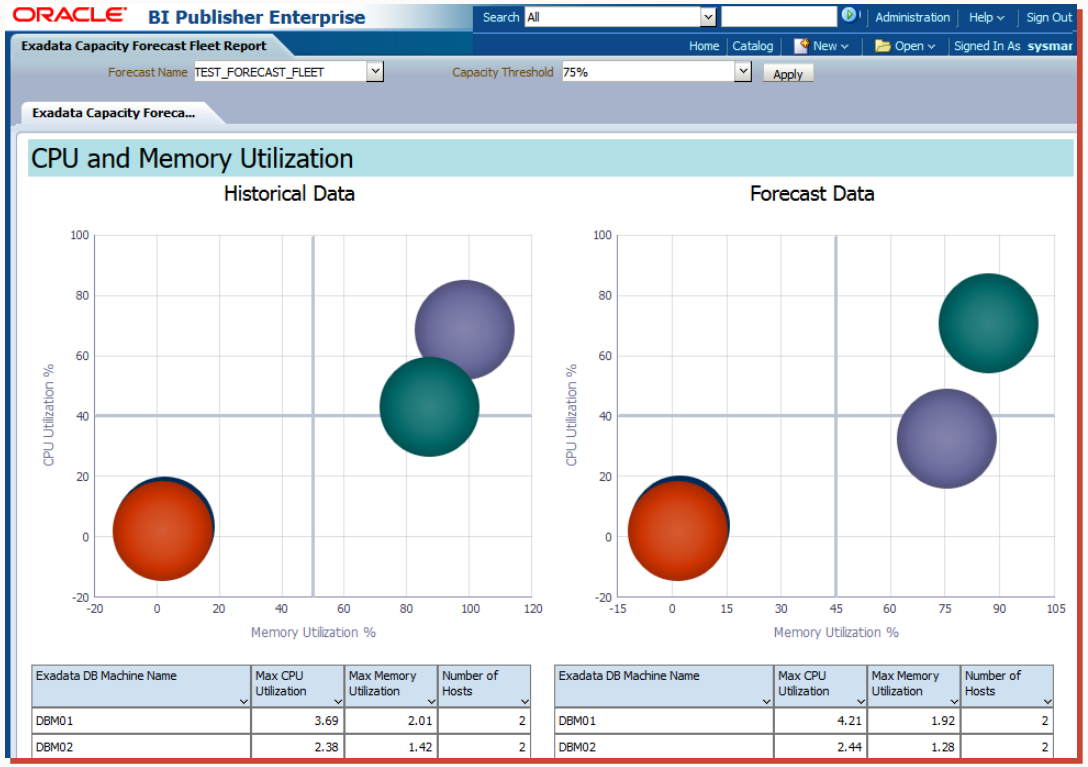
Smart Insights from Exadata Warehouse

Proactively optimize Exadata utilization through Enterprise Manager

- **Warehouse** stores very fine-grained Exadata storage, cell and host data along with AWR DB performance data
- **Forecasting algorithms** identify resource issues
- **Retention of analytic results** for use in BI tools

Drive consolidation onto ExaCS, ExaCC and Autonomous Databases

- **Integrated capacity planning** for both on-premises and cloud-based Exadata



For more information

Visit us online

www.oracle.com/manageability

www.oracle.com/enterprise-manager

blogs.oracle.com/oem

youtube.com/OracleEnterpriseMgr

twitter.com/Oracle_Mgmt

Thank you