Safe harbor statement

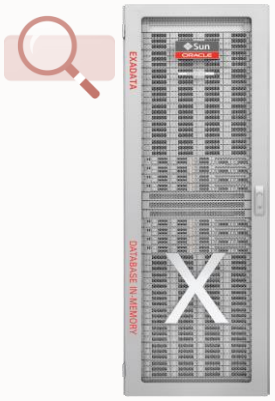
The following is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, 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

Excel with Engineered Systems

Björn Bolltoft
Consulting Product Manager
Oracle Product Development

Enterprise Manager 13c Exadata Management



Exadata Monitoring

Single pane of glass to monitor Exadata hardware and software

New hardware targets for incident management specific to hardware targets

Monitoring of Exadata Storage Server faults

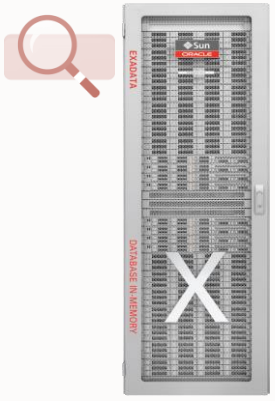
VM Provisioning

Exadata Create and delete a RAC Cluster including:

- VMs, Oracle Database (DB), Grid Infrastructure, and ASM

Scale up and scale down a RAC Cluster by adding or removing VMs including

- DB, Grid Infrastructure, and ASM



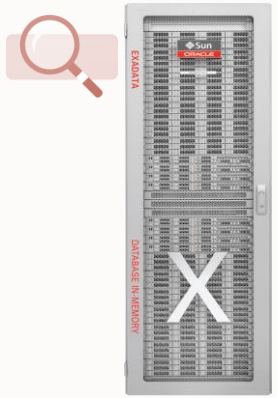
Exadata Management

Support for Columnar flash and IORM Profiles

Execute cell CLI

Execute commands on IB switches

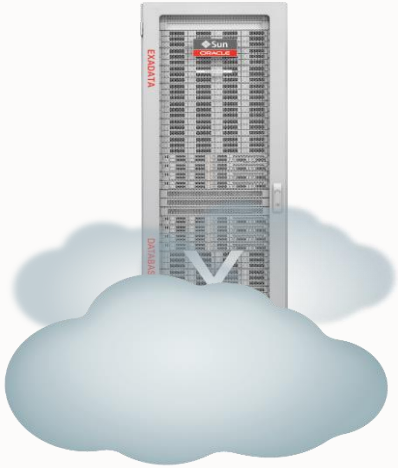
Enterprise Manager 13c Exadata Management



Exadata Migration and Cloning

Database Consolidation Workbench for all phases of consolidation from planning to deployment

Exadata Sparse Disk cloning for test/dev provisioning



Exadata Cloud Service

OPC Admin: Remotely monitor Exadata hardware

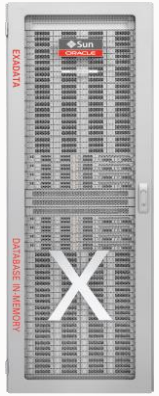
OPC Admin: No access to customer databases and host targets

Customer DBA: Hybrid management of databases, VMs targets (hosts)

Exadata Gains from EM Framework

- Discovery and Topology Modeling
  - Ability to discover target installations and present in a topology model
  - Associations with external targets in a topology model
- Monitoring and Incident Management
  - Monitoring by exception using metrics and thresholds
  - Incident management and integration with 3rd party ticketing system
- Configuration Management
  - Collection of configuration items
  - Search, compare and run configuration health checks using Compliance framework
- Reporting dashboard for Monitoring, Service Level Management, Compliance
- Automation and Active management
  - Jobs, Deployment Procedures, Software Library
  - EMCLI based operations
- Security and Access Control
  - Preferred credentials
  - Target level privileges to administrators

Enterprise Manager 13c Exadata Management



Exadata Monitoring

Single pane of glass to monitor Exadata hardware and software

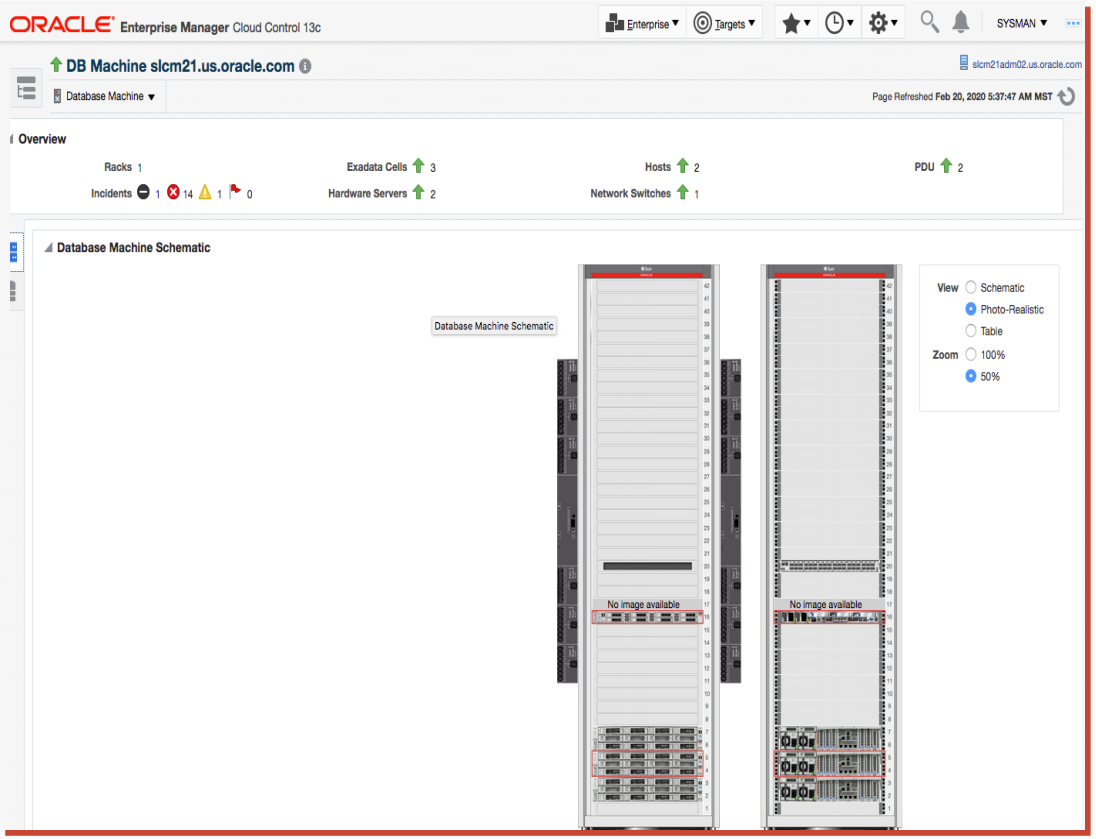
New hardware targets for incident management specific to hardware targets

Monitoring of Exadata Storage Server faults

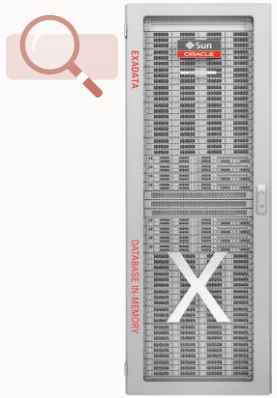
Exadata Monitor

Single pane of glass to monitor Exadata hardware and software

- Hardware view
  - Schematic of cells, compute nodes and switches
  - Hardware components views and alerts
  - Photo-realistic schematic
  - Integrated with Ops Center
- Software/system view
  - Performance, availability, usage by databases, services, clusters
  - Software alerts DB, Cluster, ASM
  - Topology view of DB systems/clusters
- Configuration view
  - Version summary of all components along with patch recommendations



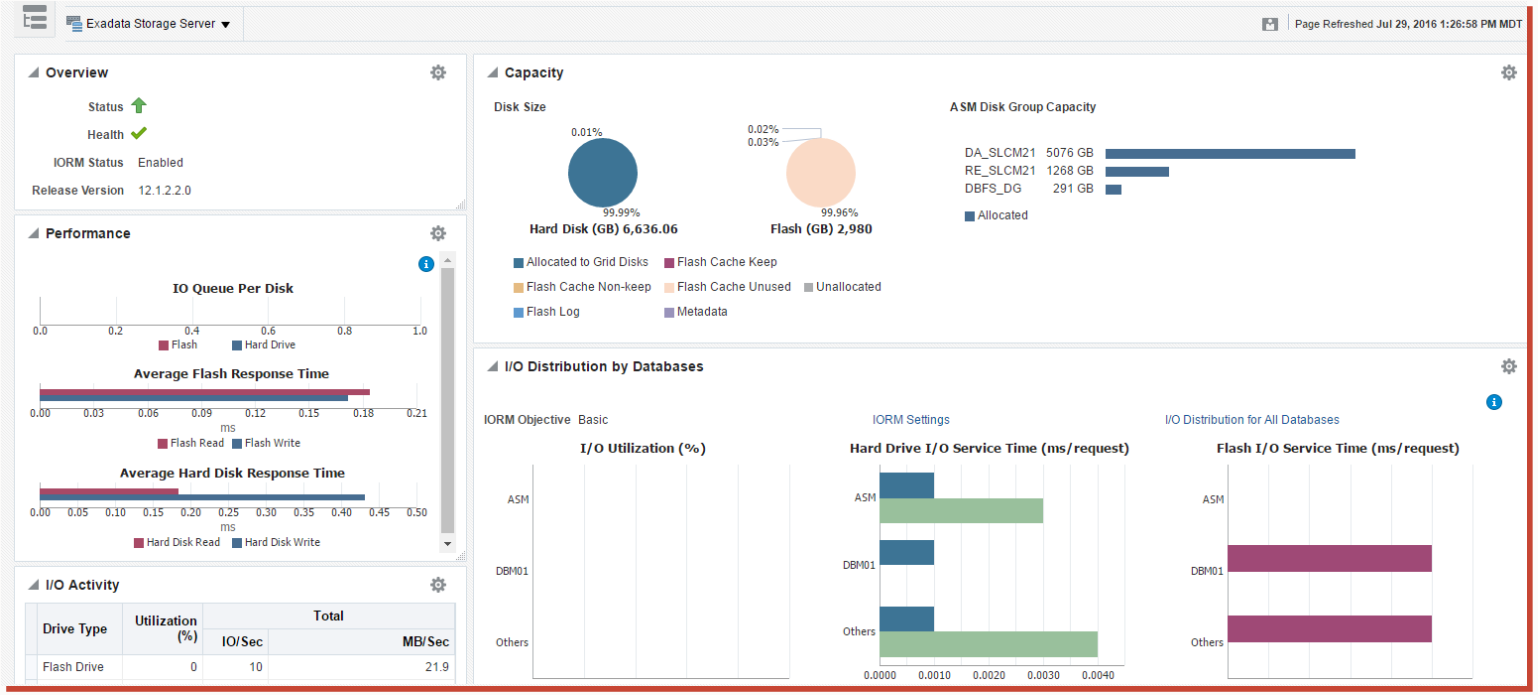
Enterprise Manager 13c Exadata Management



Exadata Management

- Support for Columnar flash and IORM Profiles
- Execute cell CLI
- Execute commands on IB switches

Storage Cell Management



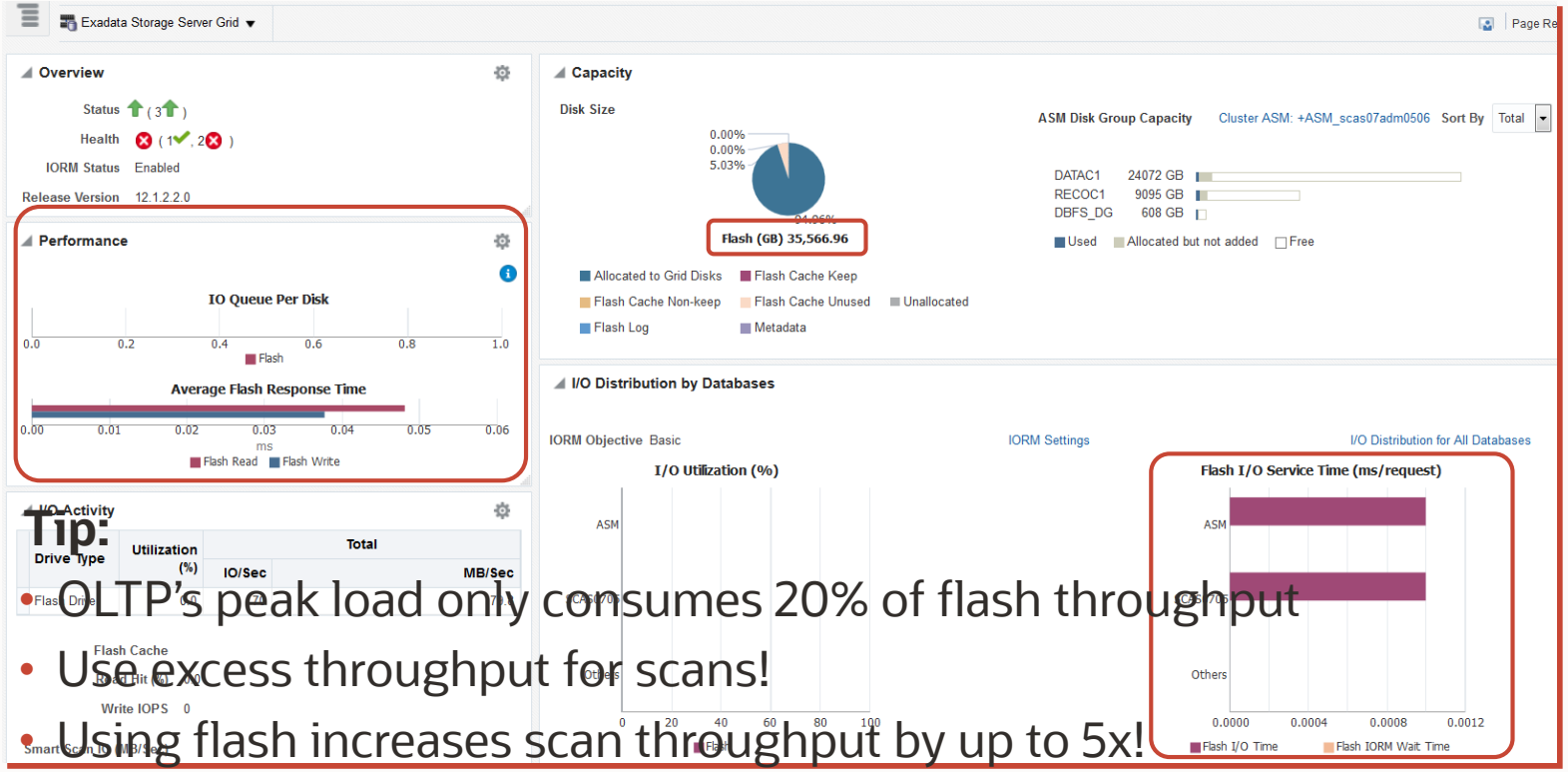
- Storage Cell monitoring and administration support
  - Cell Home page and performance pages
  - Actions supported: Run cellcli/Exacli, setup IORM

Monitor “Extreme Flash” Configuration

From Target Navigation Icon → Exadata Storage Server Grid

1. Target Navigation Icon

2. Perf. Section for Flash Read & Write



3. Note only Flash Disk Size

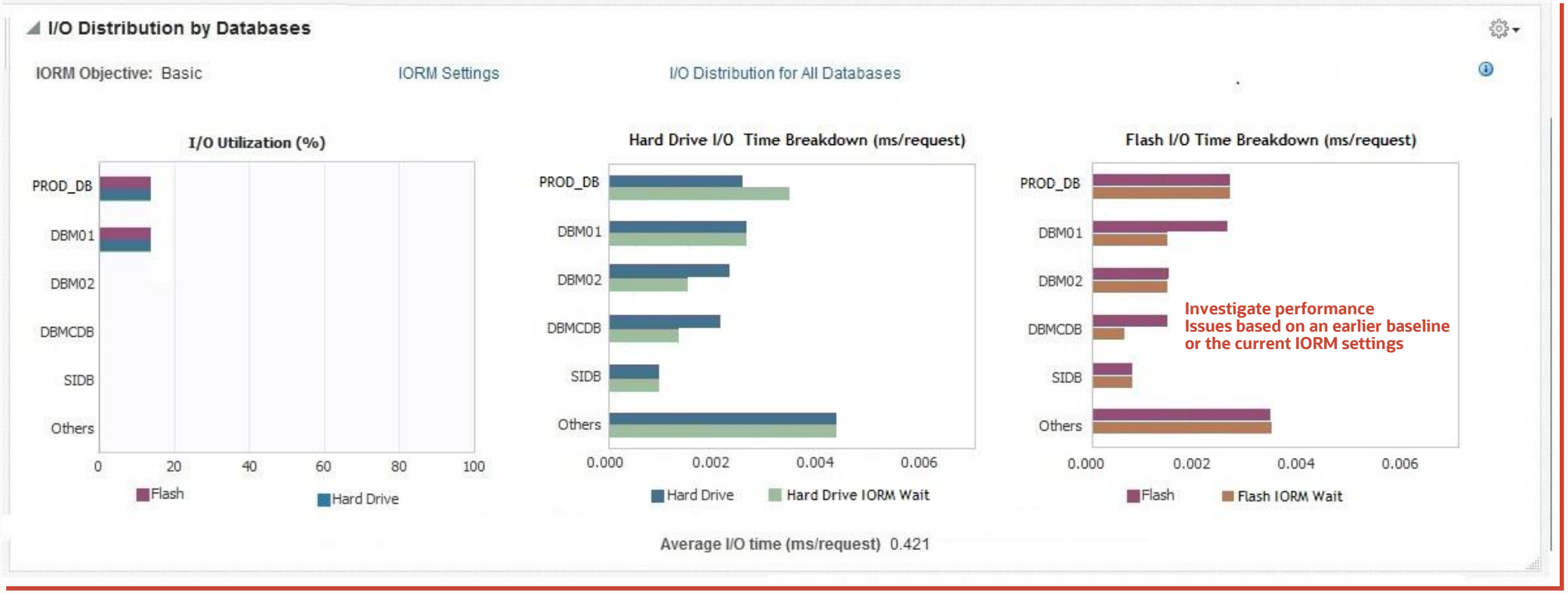
4. Monitor Flash IO service time

Tip:

- OLTP’s peak load only consumes 20% of flash throughput
- Use excess throughput for scans!
- Using flash increases scan throughput by up to 5x!

Charts on Cell and Grid Home Page

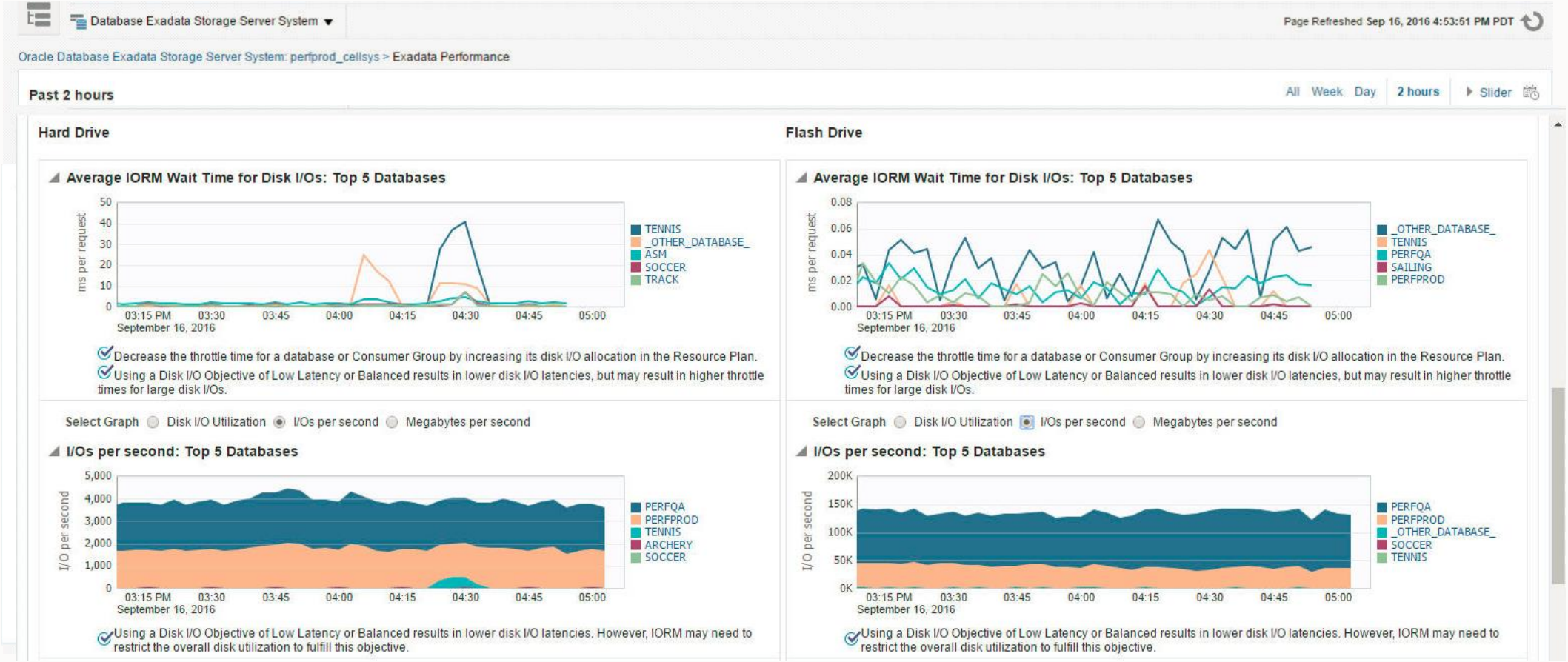
Cell and Grid Home page



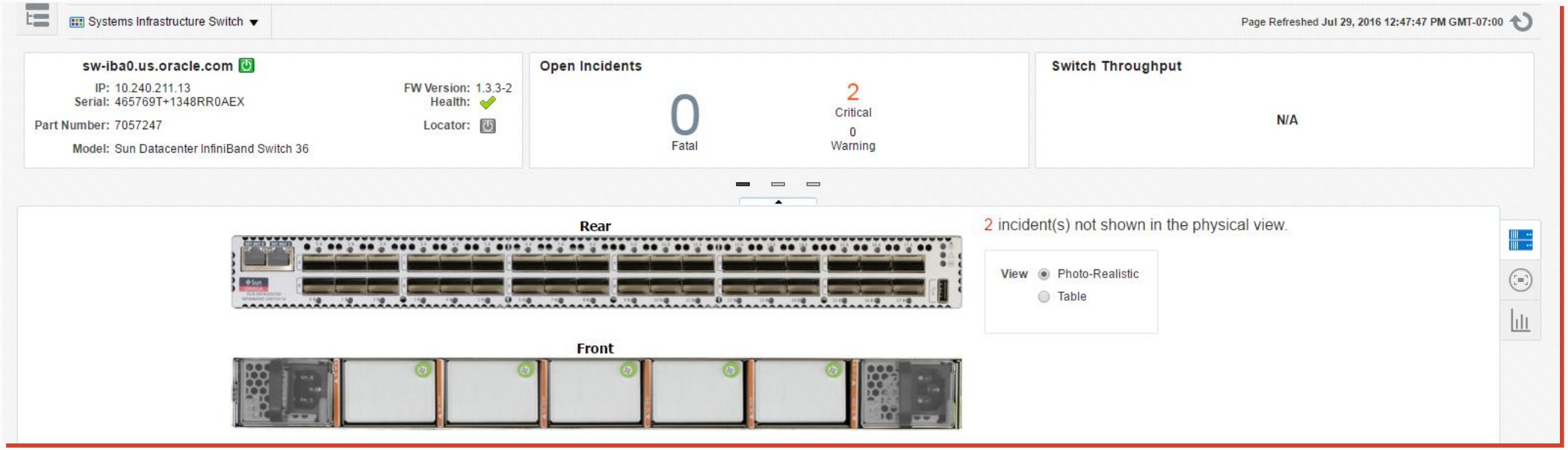
Monitor Flash performance and IORM waits

Cell and Grid Performance Page

From Target Navigation Icon → Exadata Storage Server Grid → Performance

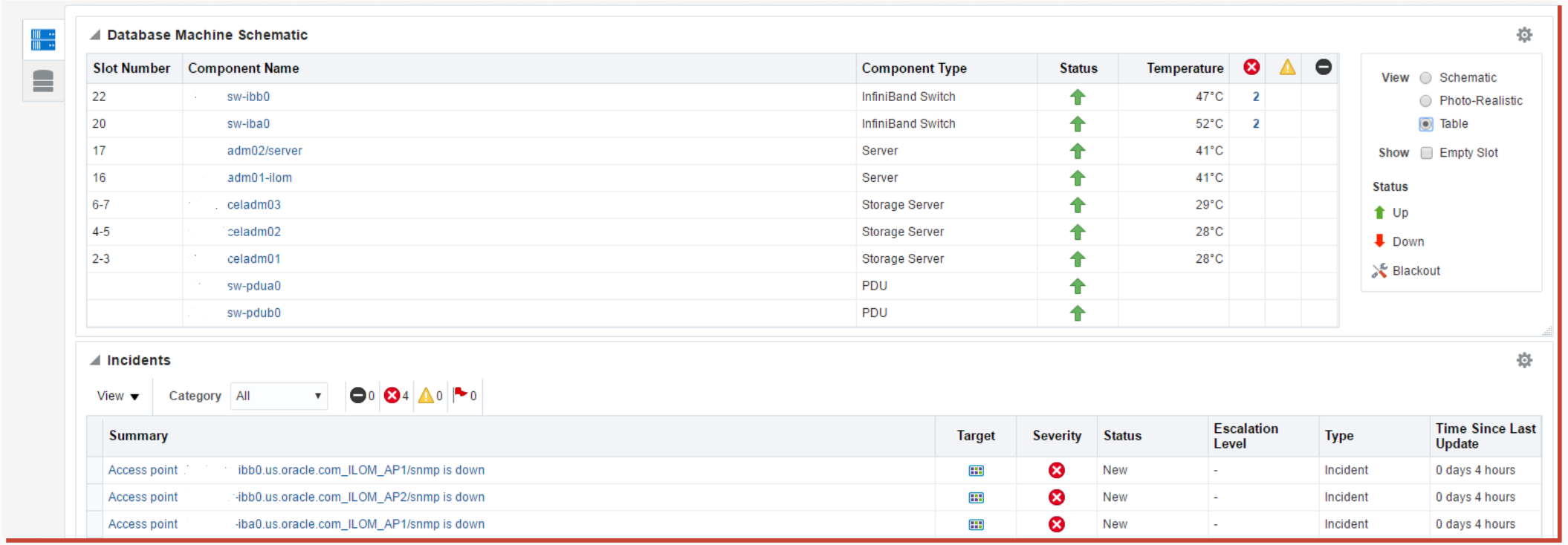


Infiniband Network Management



- Comprehensive monitoring
  - Alerts (switch generated and EM generated)
  - Performance metrics
  - Configuration metrics – detect and notify configuration changes/best practice violations

Monitoring: ILOM, Cisco Switches, PDU



- Metrics monitored
  - Power supply failure, Fan failure, Temperature out of range
  - Configuration change tracking and reporting, SNMP access issues

Enterprise Manager 13c Exadata Management

VM Provisioning

Exadata Create and delete a RAC Cluster including:

- VMs, Oracle Database (DB), Grid Infrastructure, and ASM

Scale up and scale down a RAC Cluster by adding or removing VMs including

- DB, Grid Infrastructure, and ASM

Exadata Virtualization Provisioning

VM provisioning on Virtualized Exadata involves reliable, automated, & scheduled mass deployment of RAC Cluster

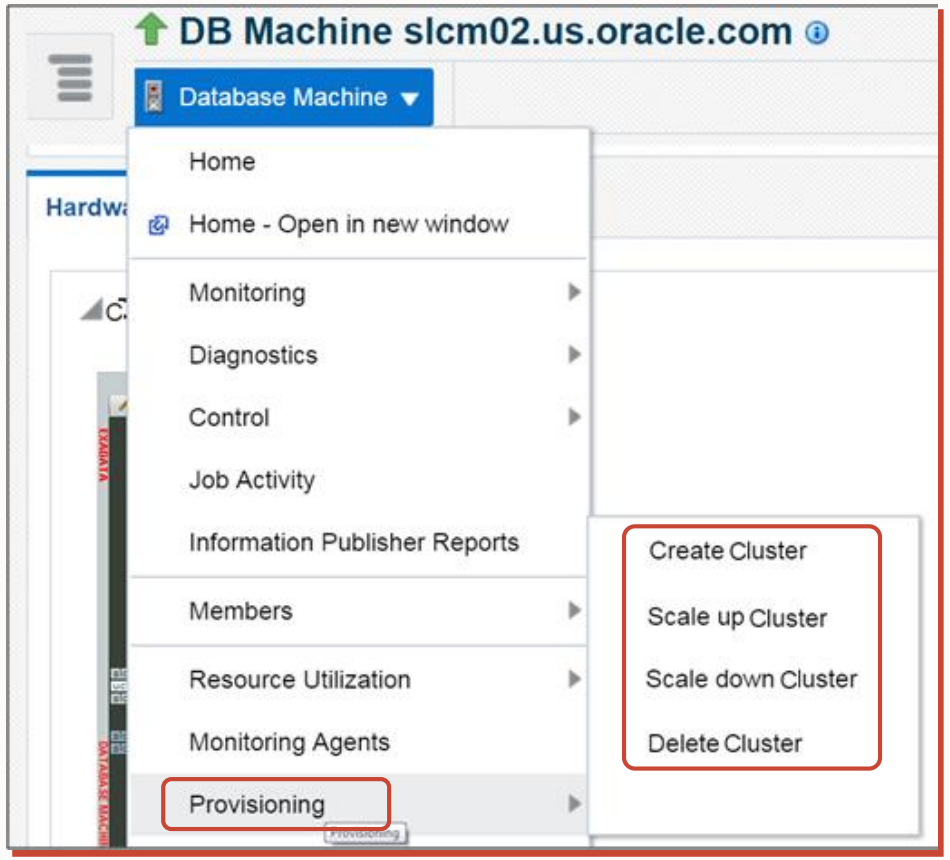
- Includes VMs/DB/GI/ASM

Create / delete RAC Cluster

- Including DB/GI/ASM

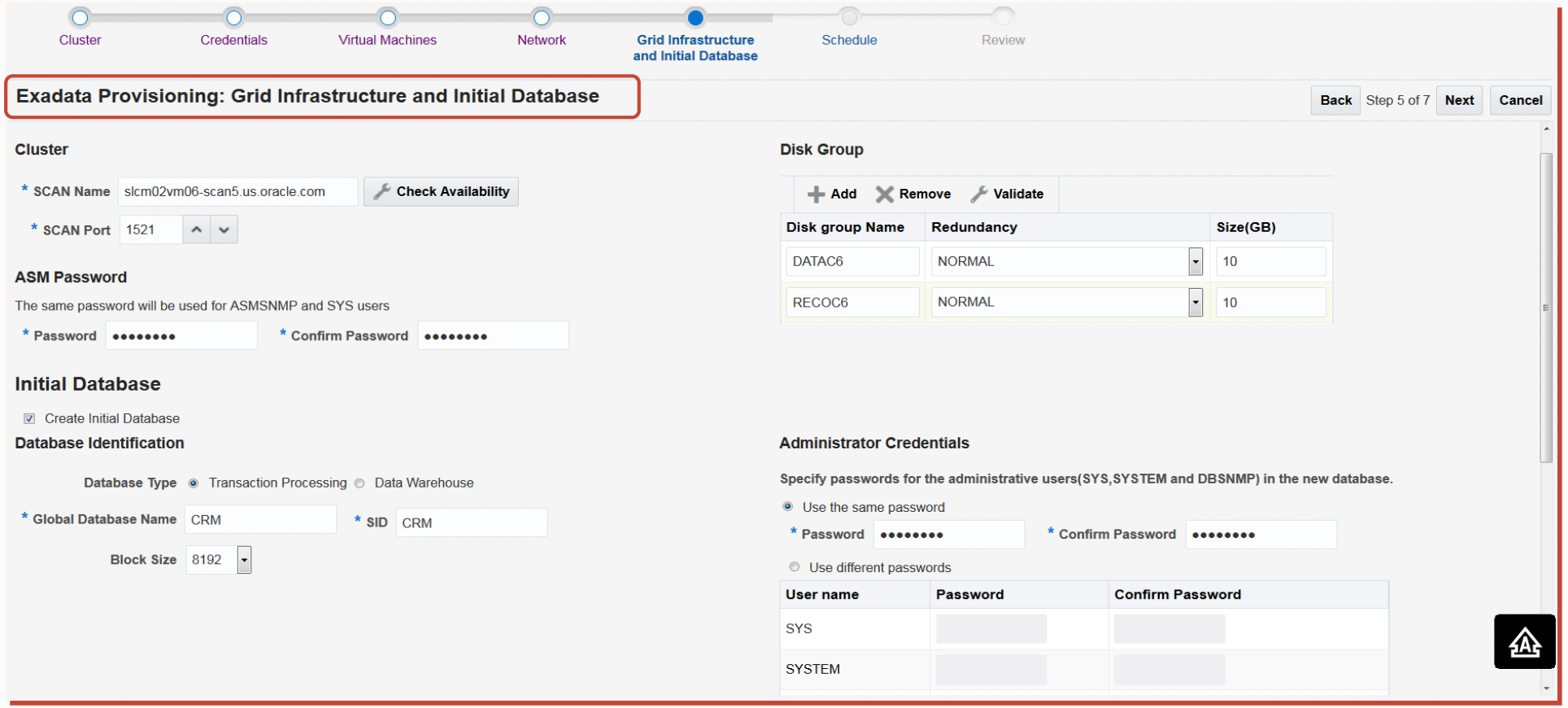
Scale up / down RAC Cluster by adding or removing VMs

- Includes DB/GI/ASM



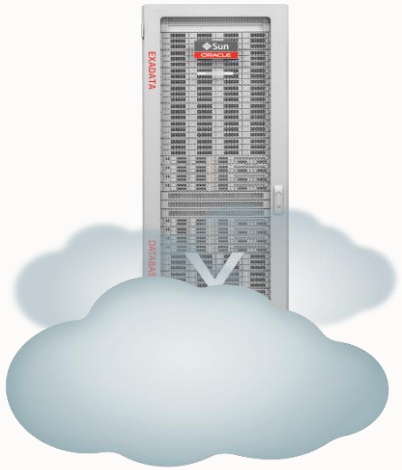
Increase Operational Efficiency by Deploying RAC Cluster Faster on Virtualized Exadata

Exadata Virtualization Provisioning



Exadata Provisioning Workflow

Enterprise Manager 13c Exadata Management



Exadata Cloud Service

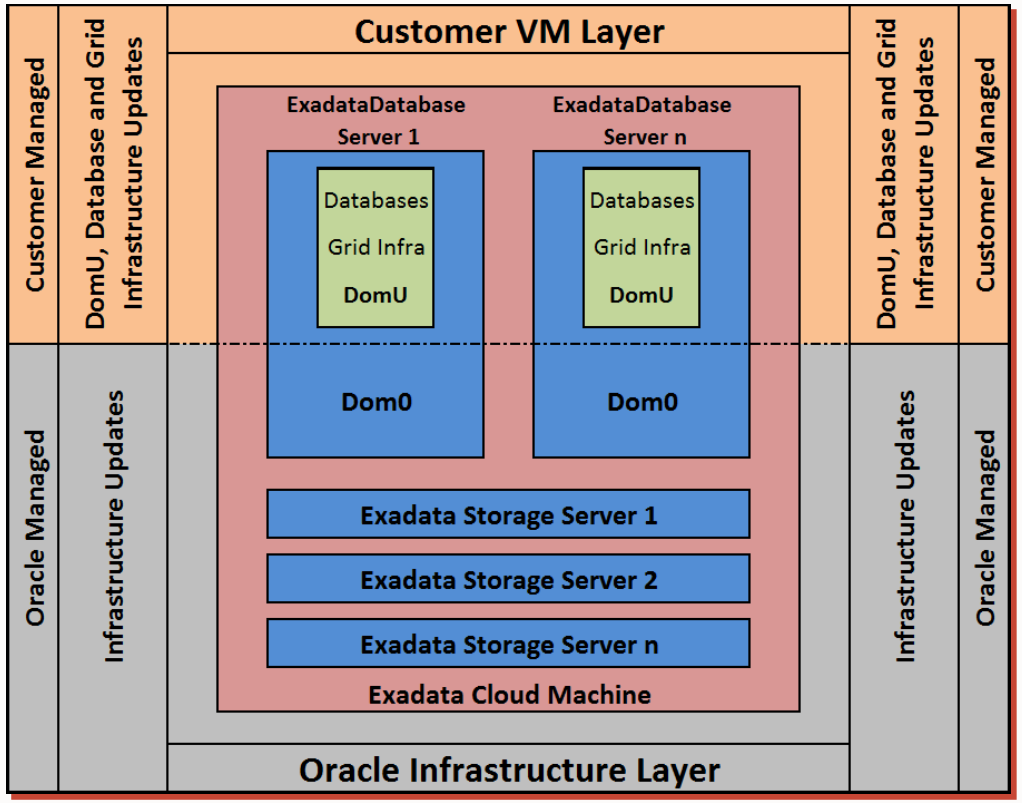
OPC Admin: Remotely monitor Exadata hardware

OPC Admin: No access to customer databases and host targets

Customer DBA: Hybrid management of databases, VMs targets (hosts)

Exadata Cloud: Shared Responsibility model

- Oracle Cloud Operations manages 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



Exadata Cloud Target

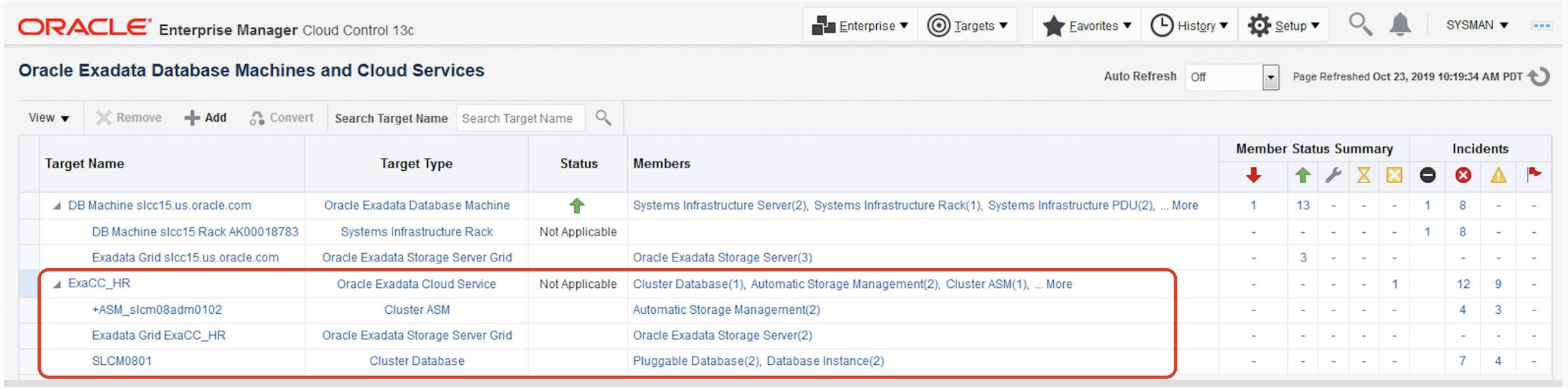
EM 13.4

- 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 Target
EM 13.4

Provides a single pane of glass for Exadata and Exadata Cloud

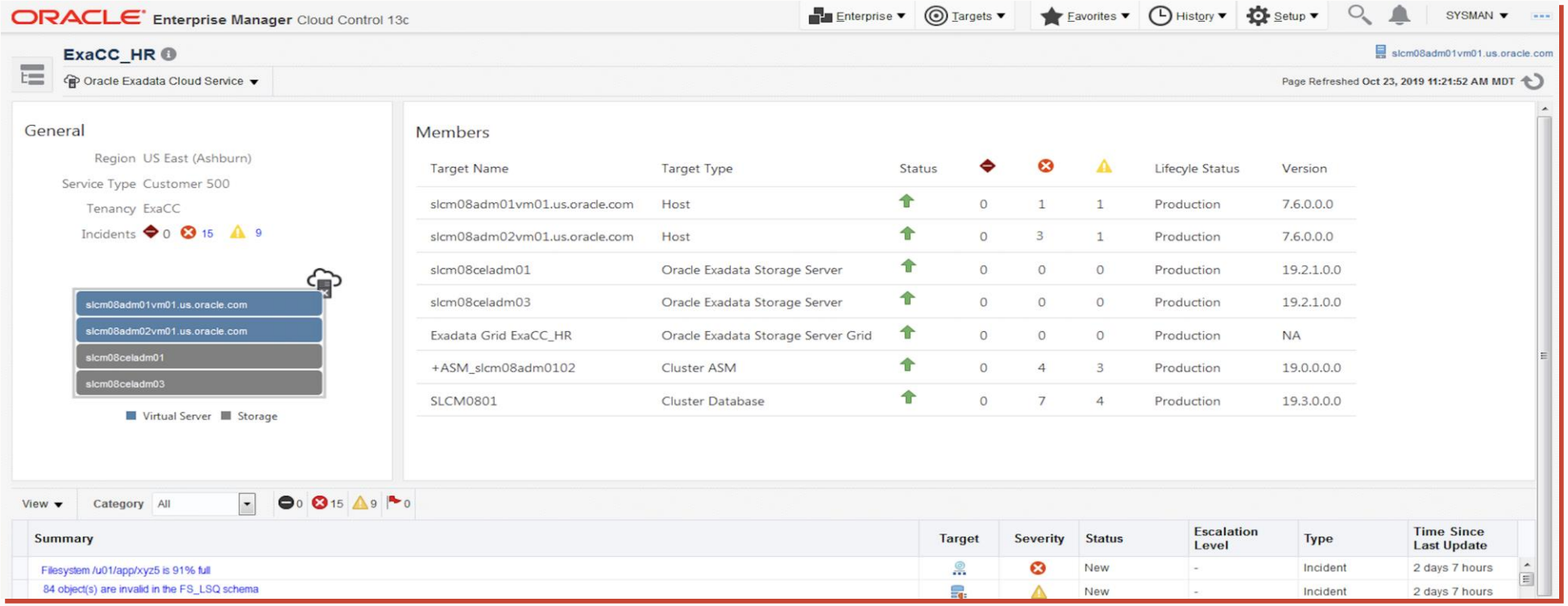
- Monitor and Manage Exadata, Exadata Cloud systems together via Targets -> Exadata menu
- Consistent experience across Exadata Cloud at Customer and Exadata Cloud Service



Exadata Cloud Target
EM 13.4

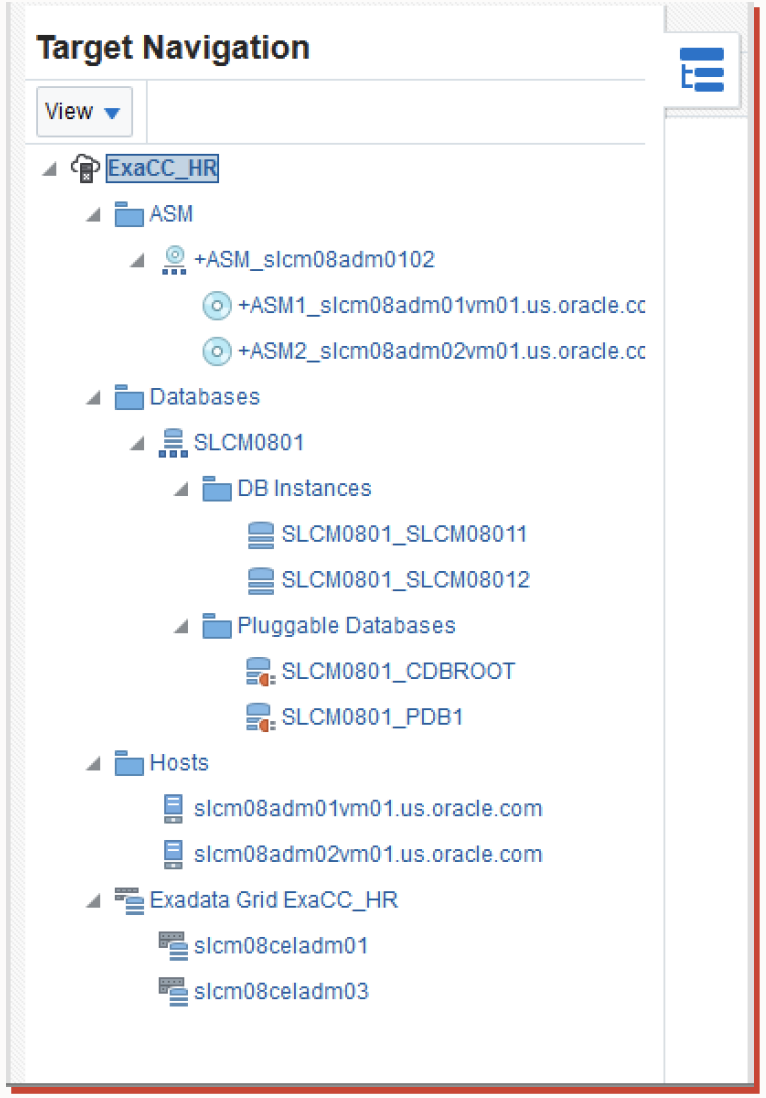
Visualization

- Visualize the databases and related targets associated with each ExaCC and ExaCS

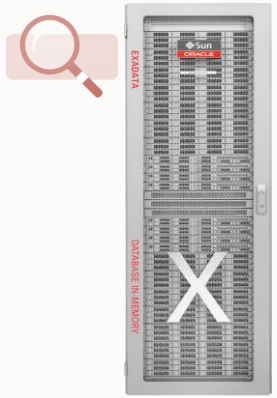


Exadata Cloud Target
EM 13.4

Exadata Target Navigation



Enterprise Manager 13c Exadata Management



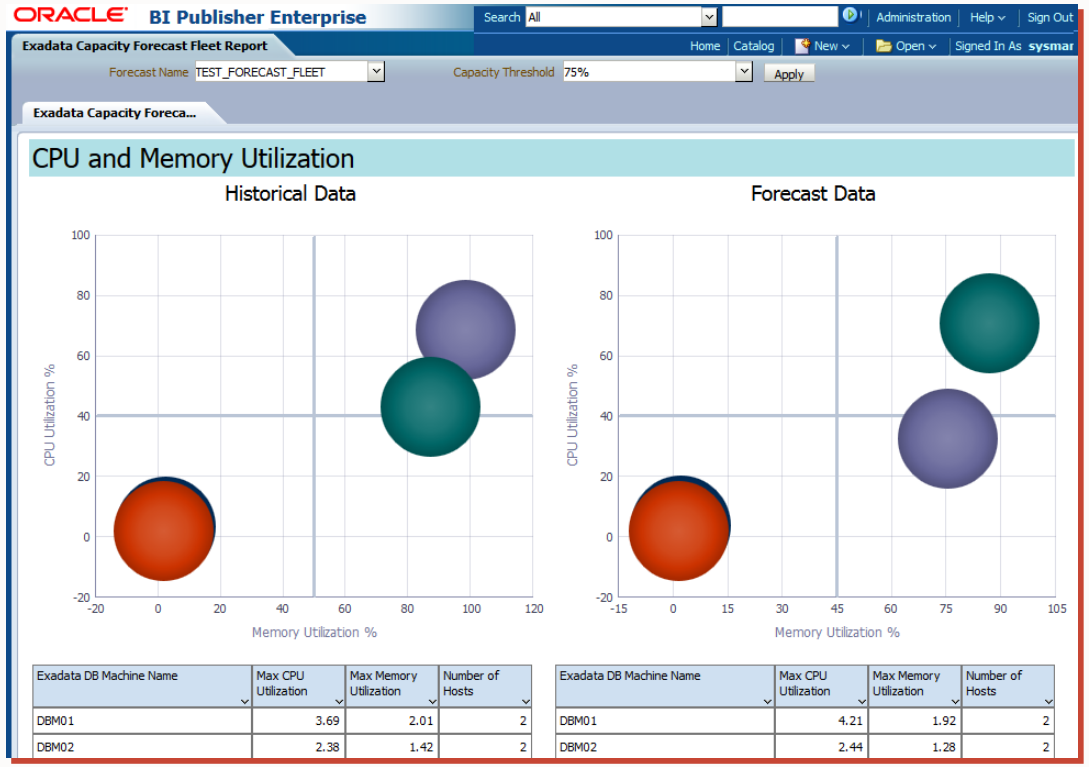
Exadata Migration and Cloning

- Exadata Capacity Planning using Exadata Warehouse
- Database Migration Planner for all phases of consolidation from planning to deployment
- Exadata Sparse Disk cloning for test/dev provisioning

Smart Insights from Exadata Warehouse

Post 13.4

- **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

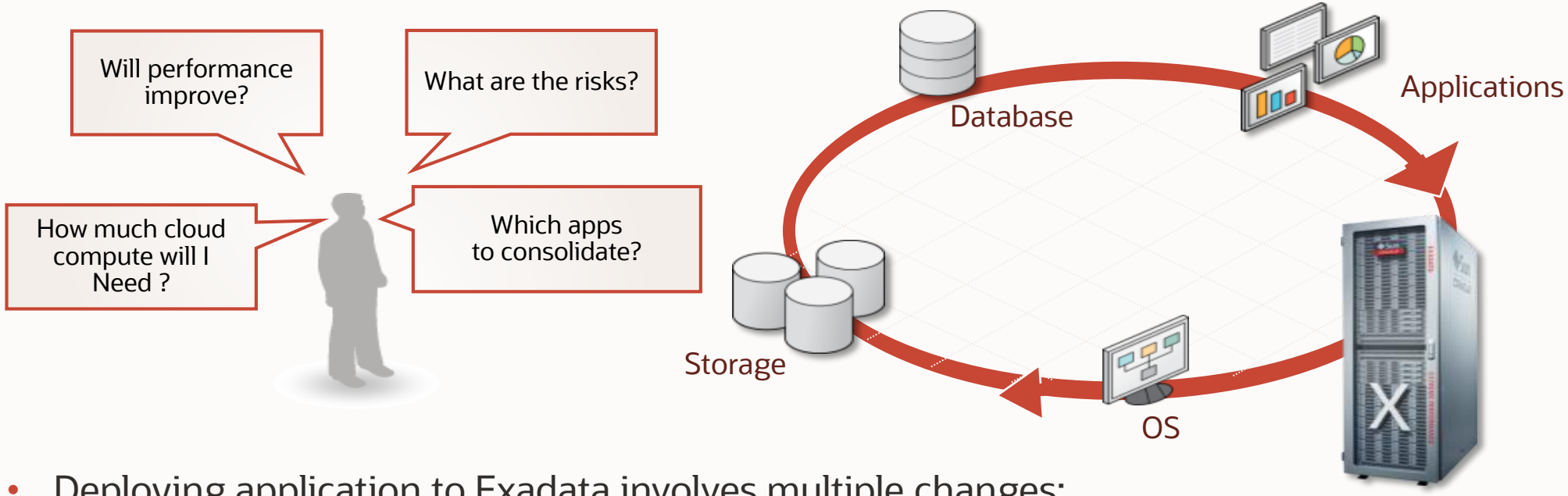


Exadata Capacity Report

Post 13.4

- Integrated view of current and projected resource utilization across Exadata fleet
  - Compute (CPU & Memory), Storage (IOPS, Disk space)
- Identify lead time to expand capacity using machine learning based forecast
  - Project resource growth vs. configured capacity headroom
  - Use seasonality to identify growth patterns, e.g. weekly peaks vs. daily peaks

Provisioning and Deployment Challenges



- Deploying application to Exadata involves multiple changes:
  - O/S migrations
  - Storage subsystem changes
  - Database upgrades
  - Single database instance to RAC
- Proper testing required for risk mitigation

Database Migration Planner

End-to-end Consolidation Solution

Plan

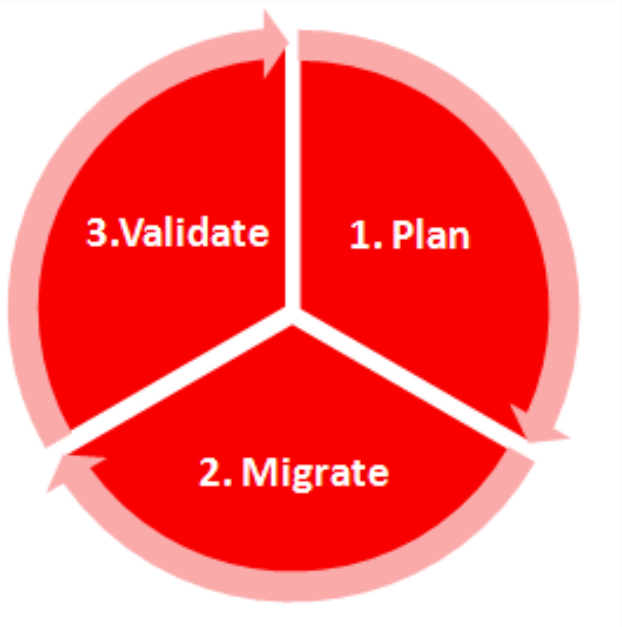
- Gives consolidation advice by identifying candidate databases for the designated consolidation platform using AWR data
- Accurately estimates requirements for Cloud migration

Migrate

- Implements consolidation plan by migrating databases to new consolidation platform using EM's provisioning features

Validate

- Validates consolidation plan with Real Application Testing (SPA) by running test workloads on consolidated databases



Database Migration Planner

Key Features

Estimates resource utilization under various consolidation scenarios

- Ultra Conservative (peak maximum) → Aggressive (average)

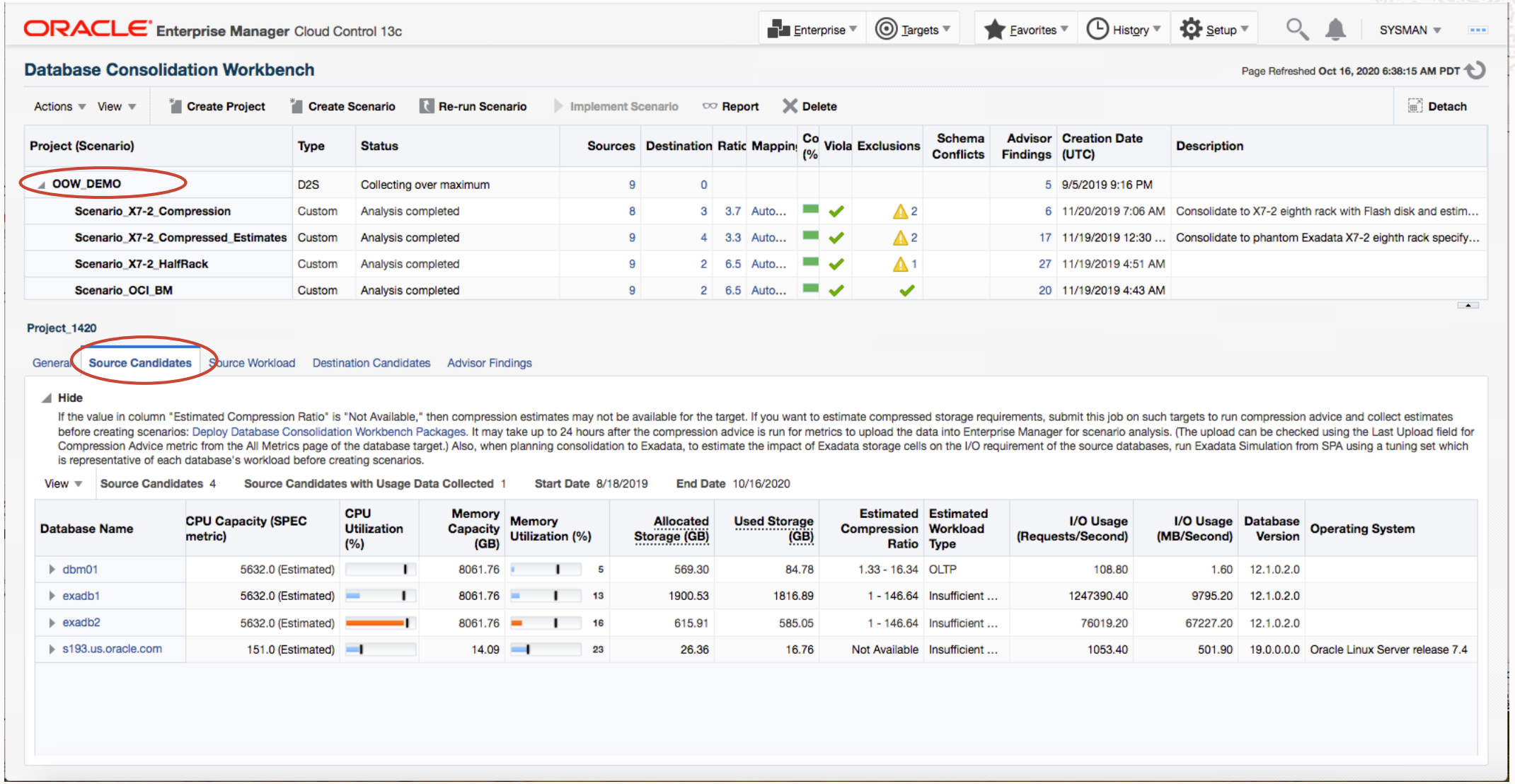
Supported consolidation modes

- Database-to-Database (Multitenant) consolidation
- Database-to-Server (Server, e.g. Exadata) consolidation
- Oracle Exadata Cloud Service migration

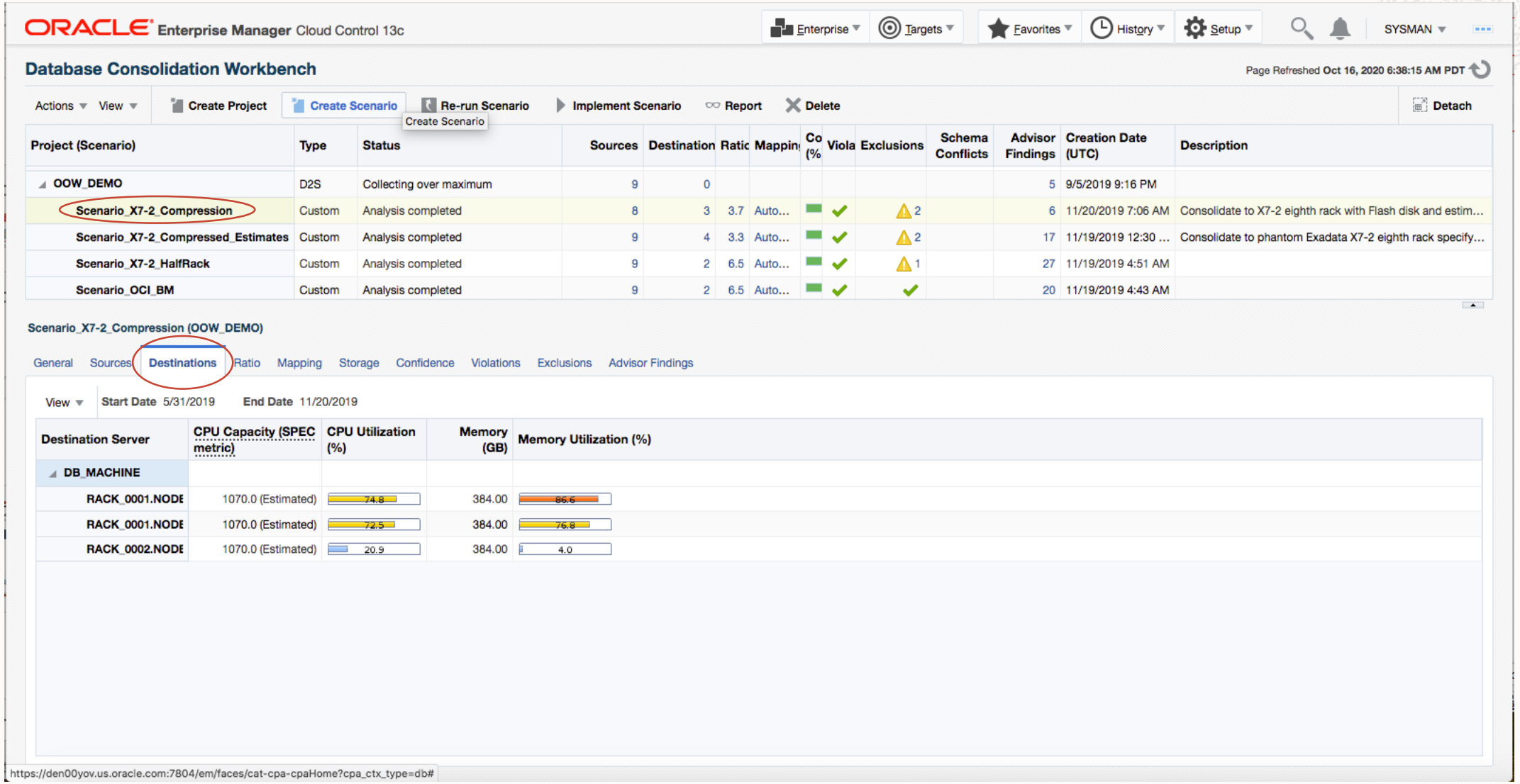
Consolidation optimization advice

- Identifies conflicts based on workload characteristics, Exadata suitability
- Storage/Platform advice: Impact of compression on I/O & storage, impact of I/O offloading & Flash Cache
- Accurately estimate required Oracle cloud compute size and shape for Exadata Cloud Service Instances

Migration Planner – Screen Shot demo



Migration Planner – Screen Shot demo



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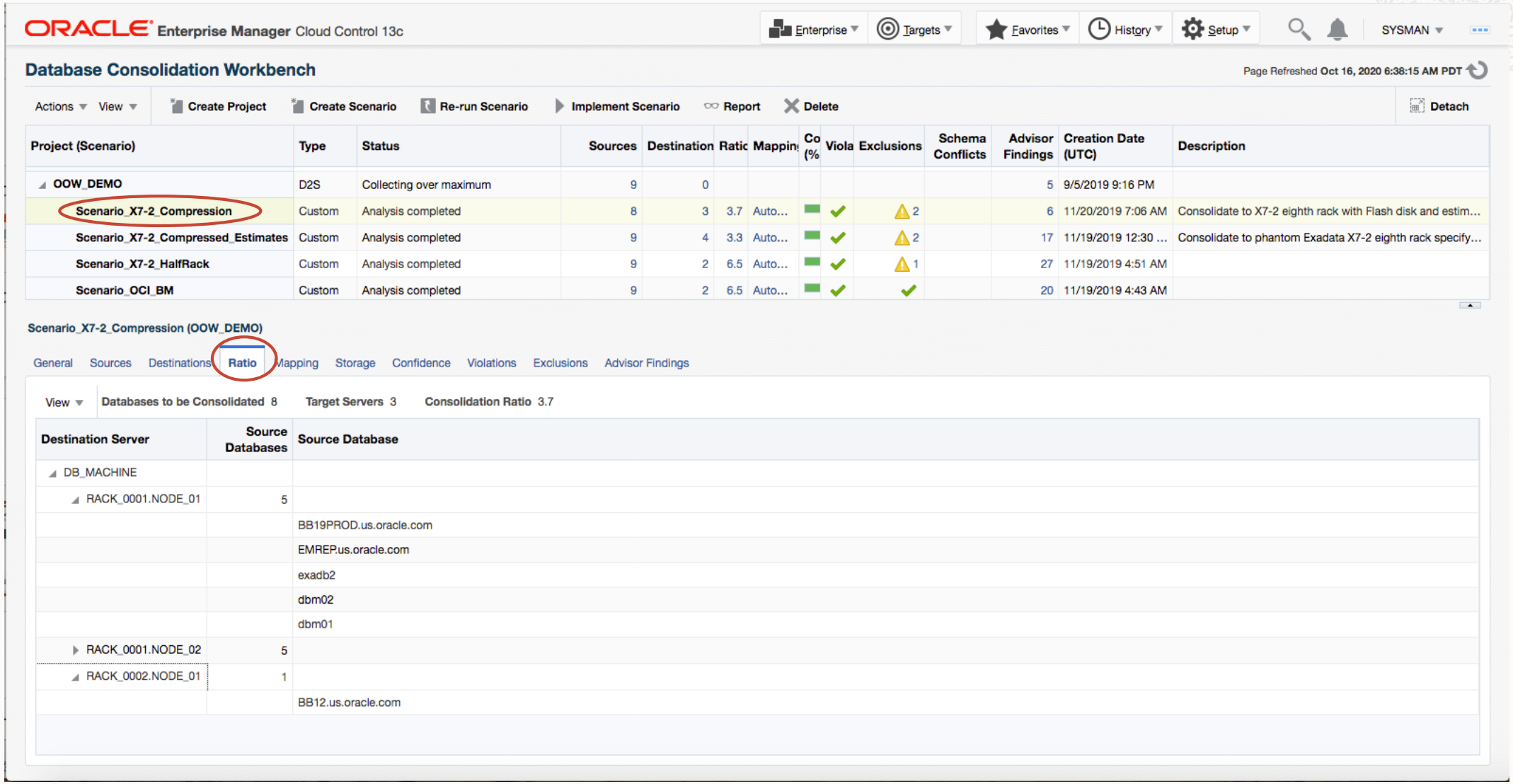

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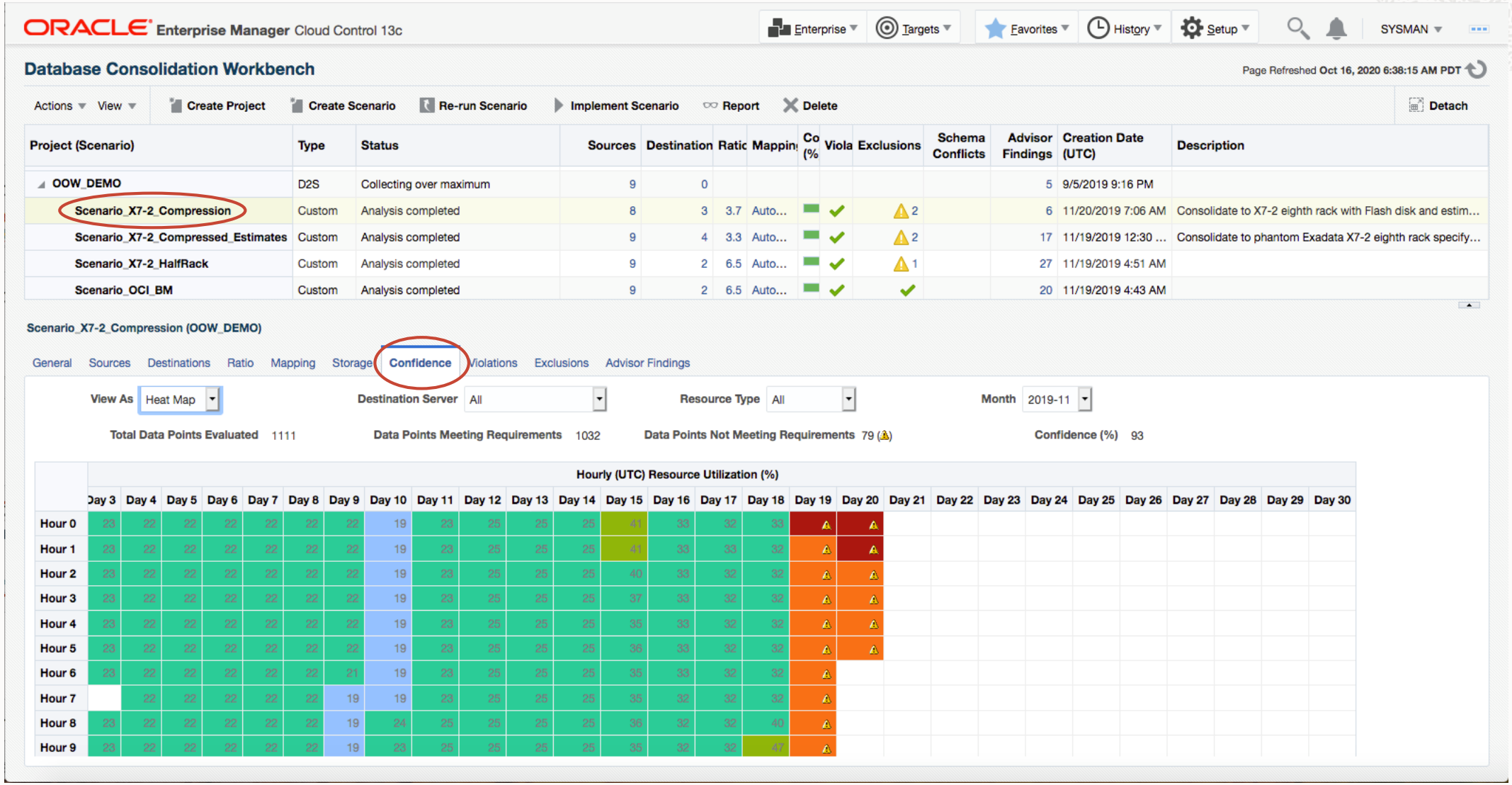

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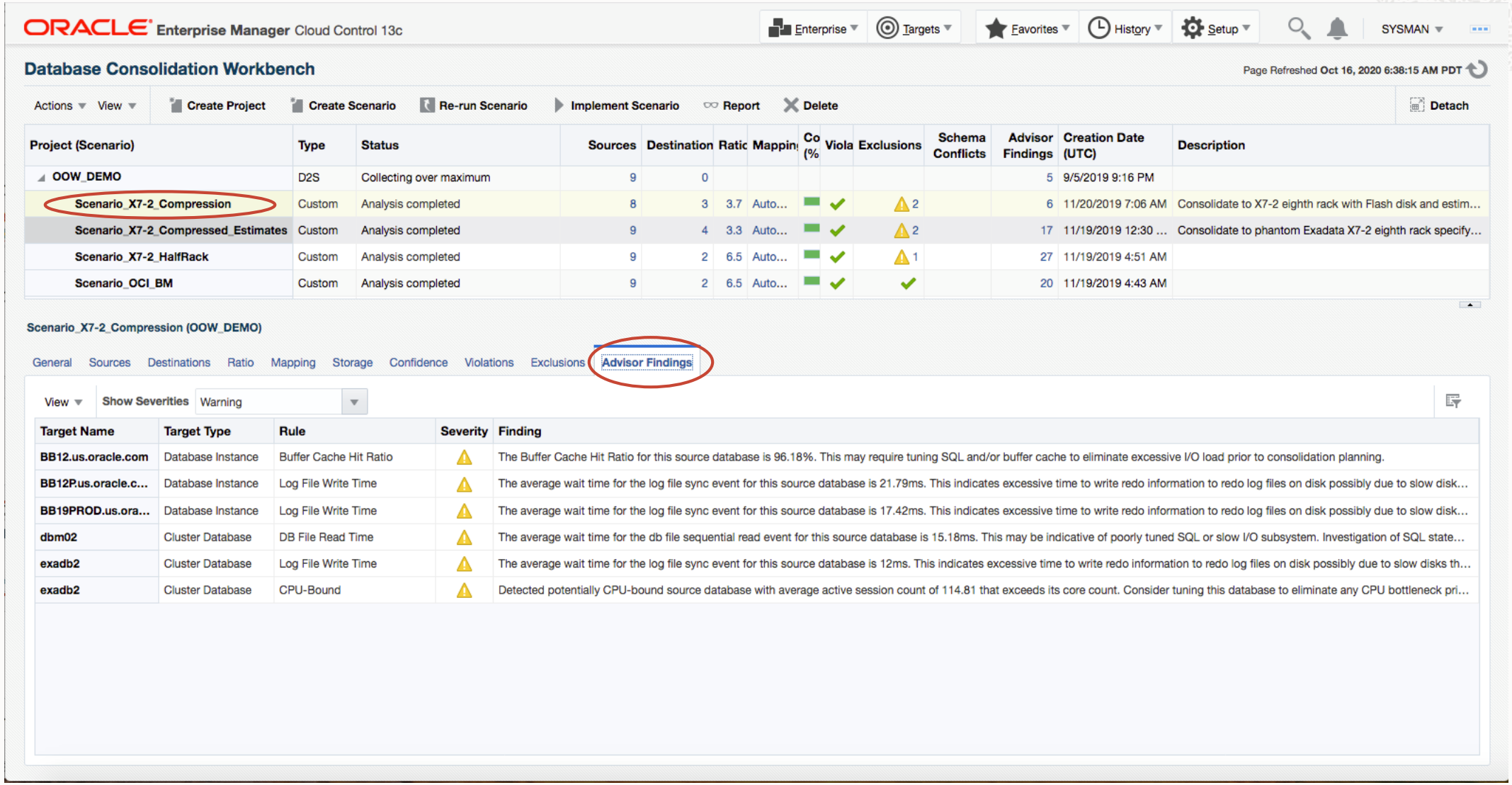

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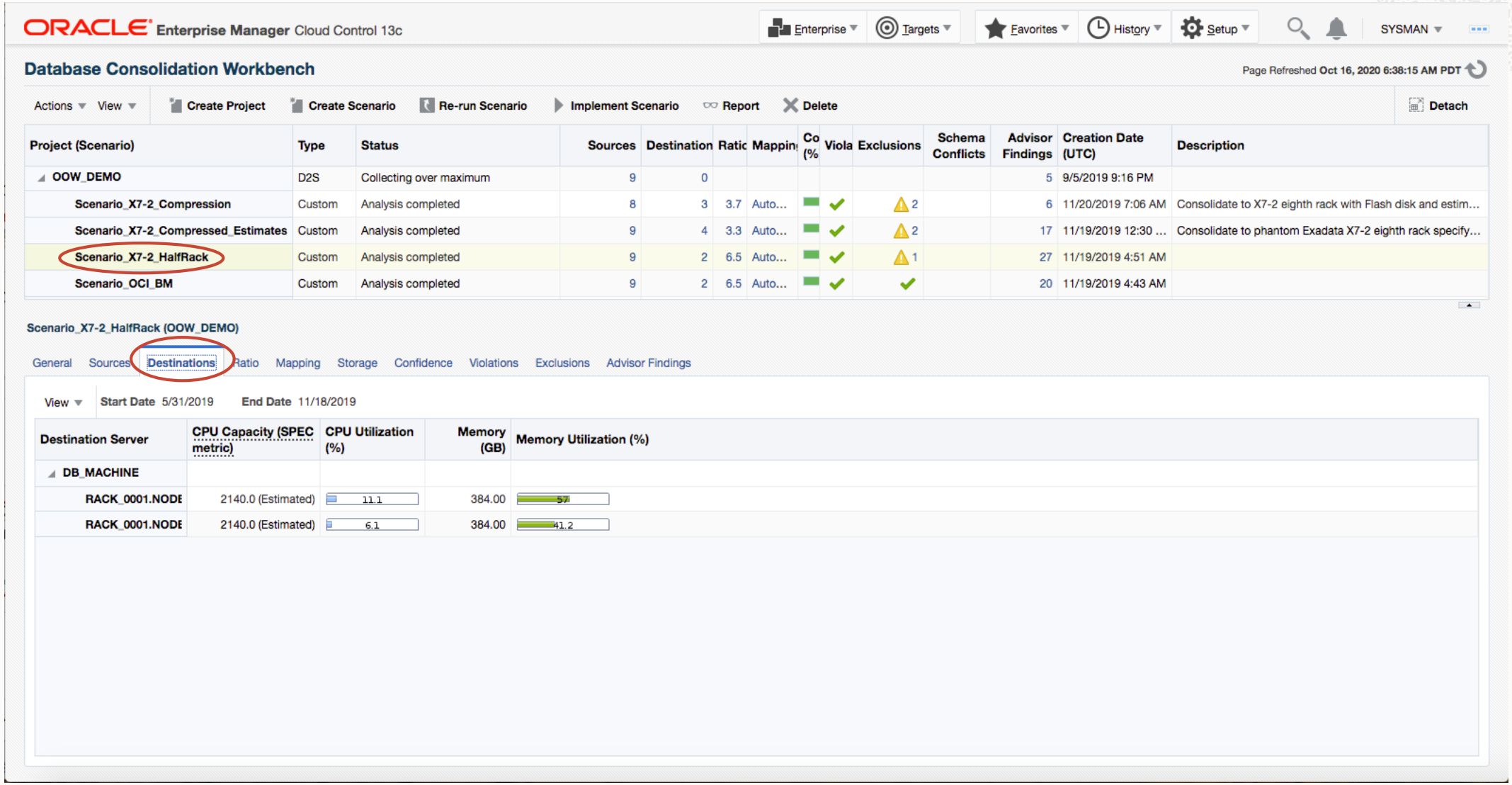

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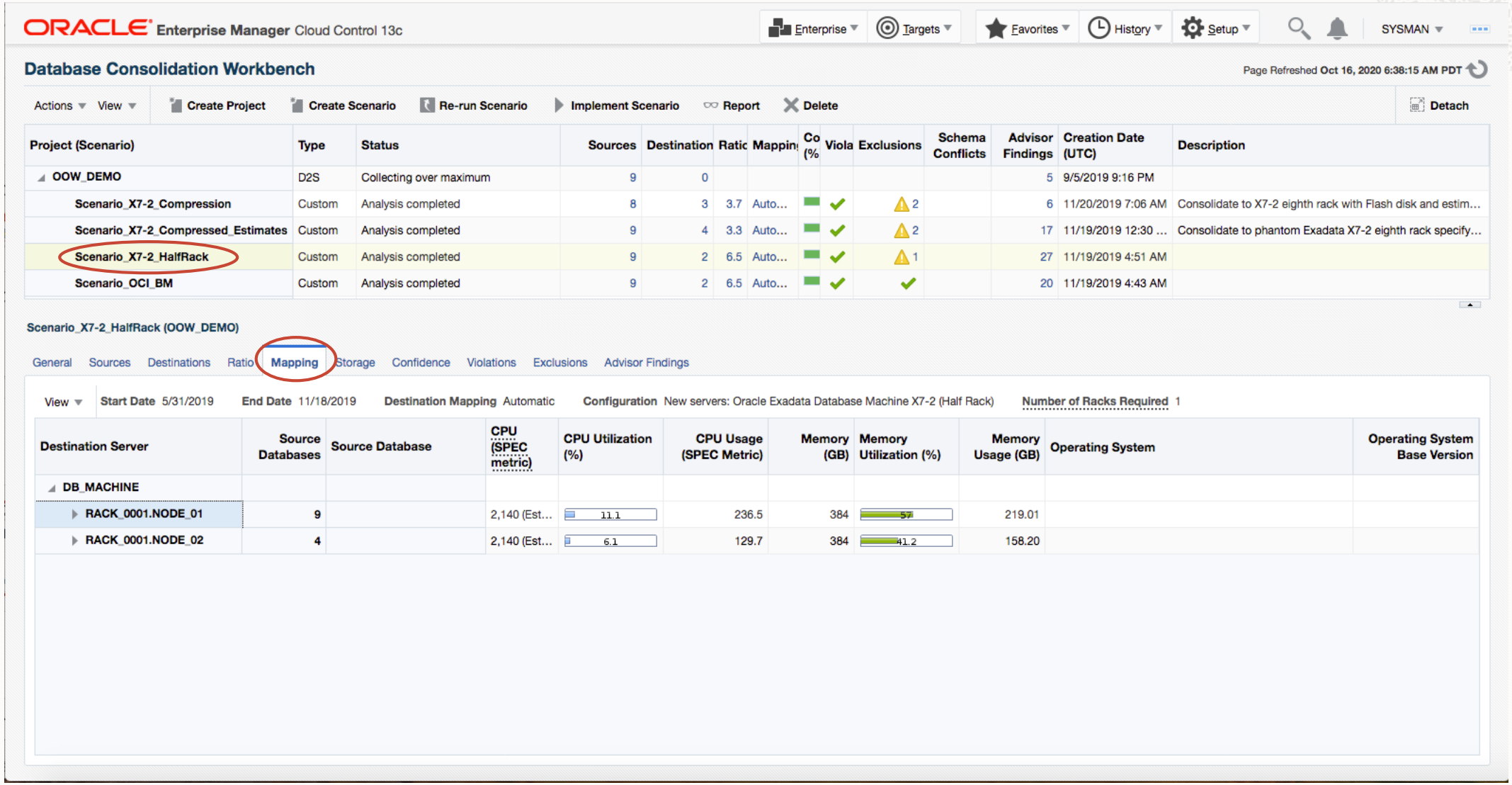

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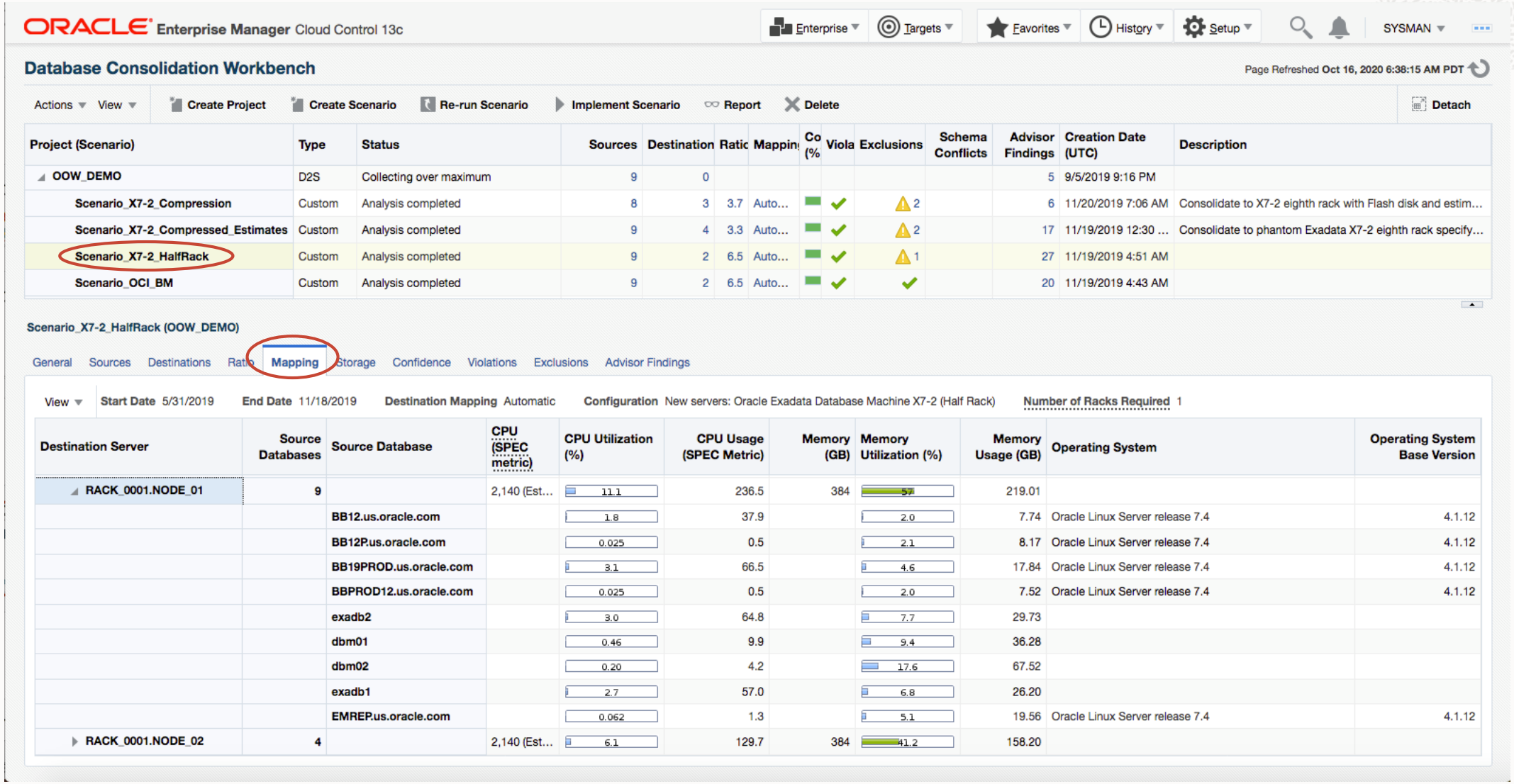

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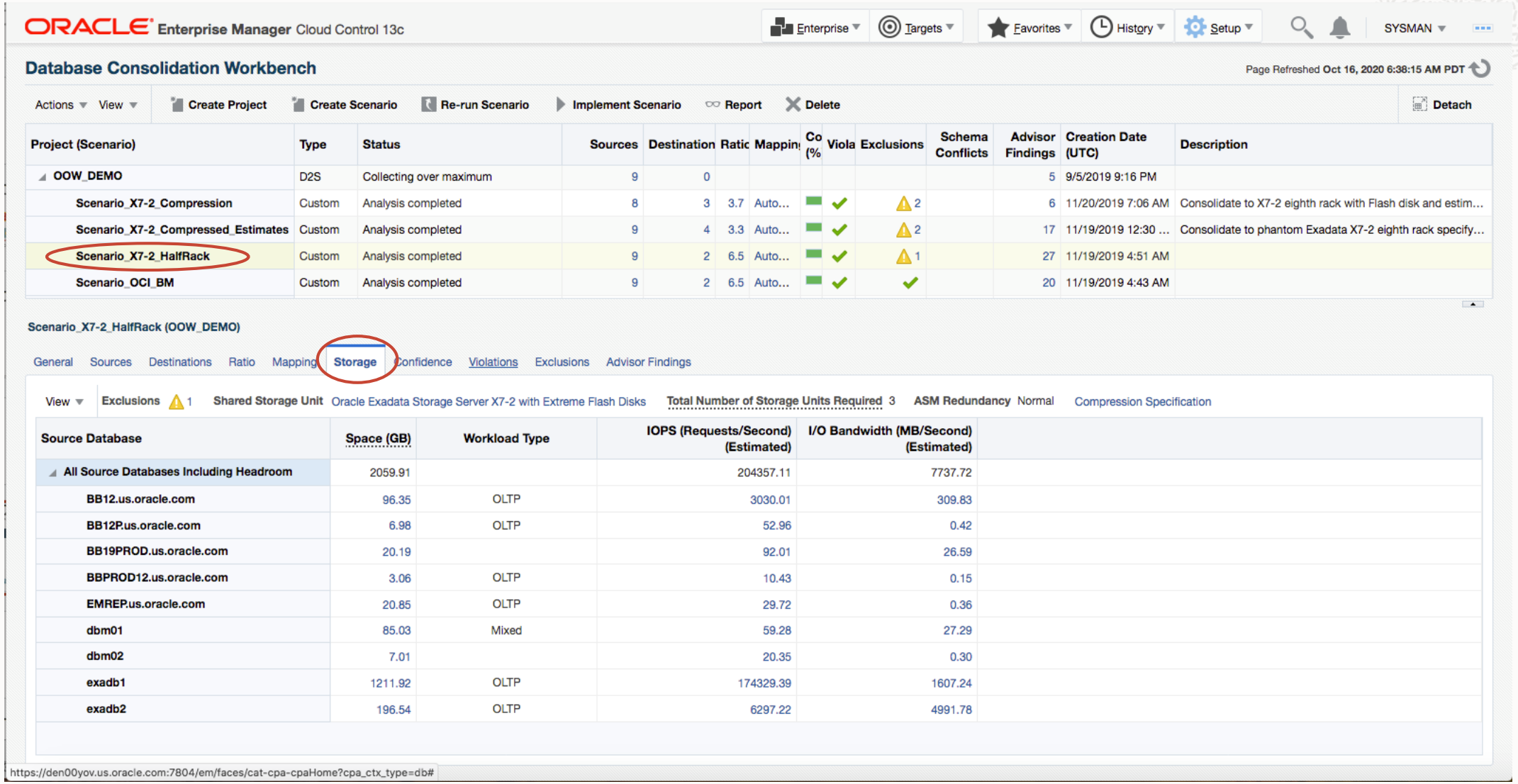

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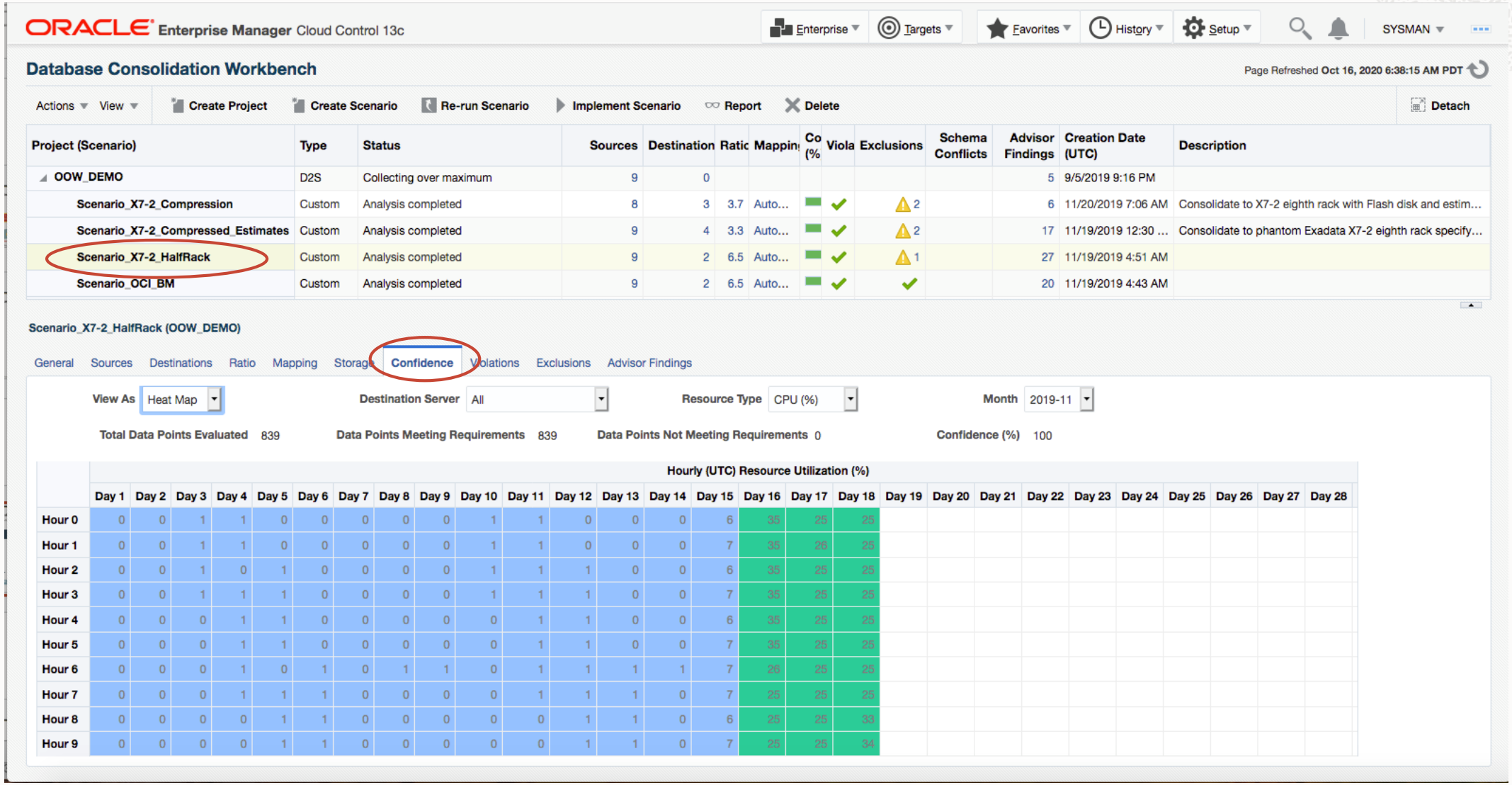
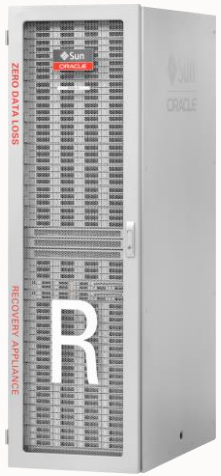


Enterprise Manager 13c ZDLRA Management



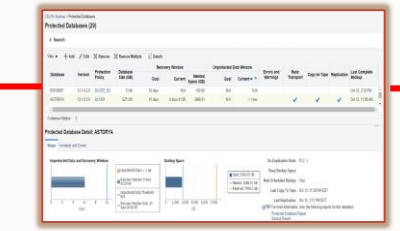
ZDR Monitoring and Management

Management and configuration

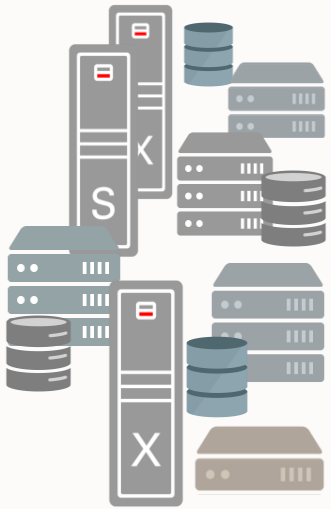
Comprehensive Performance and space monitoring

Analysis of Exadata Utilization and for Capacity Planning

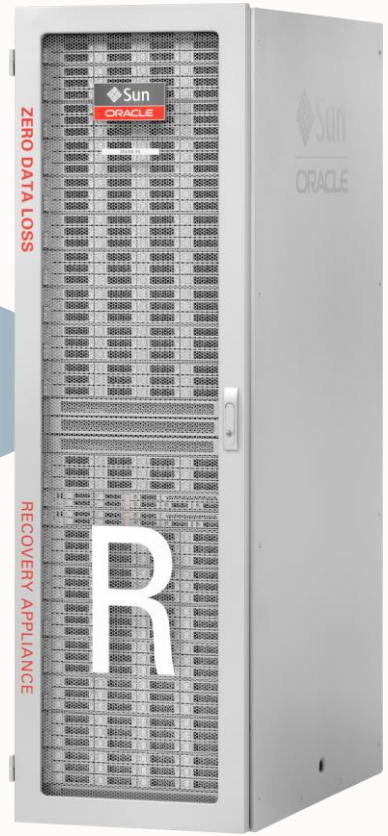
EM Real-Time Protection Status & Space Monitoring

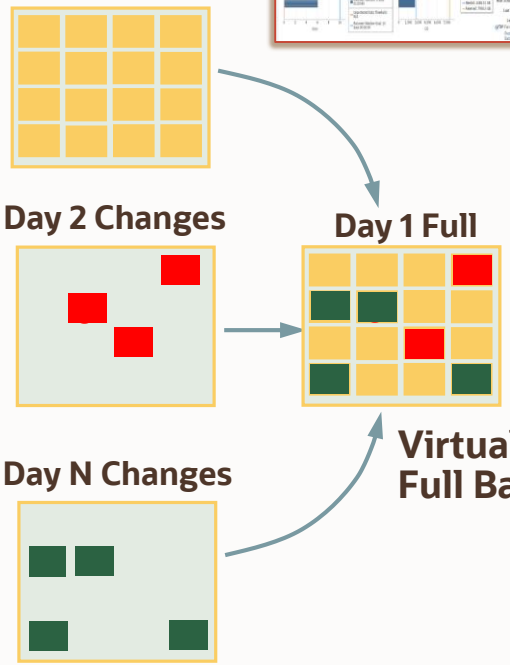


Databases



Transactional Block Changes (Redo)





Cloud Storage

Replica Recovery Appliance

Tape

Oracle DB 11g-19c on Any Platform

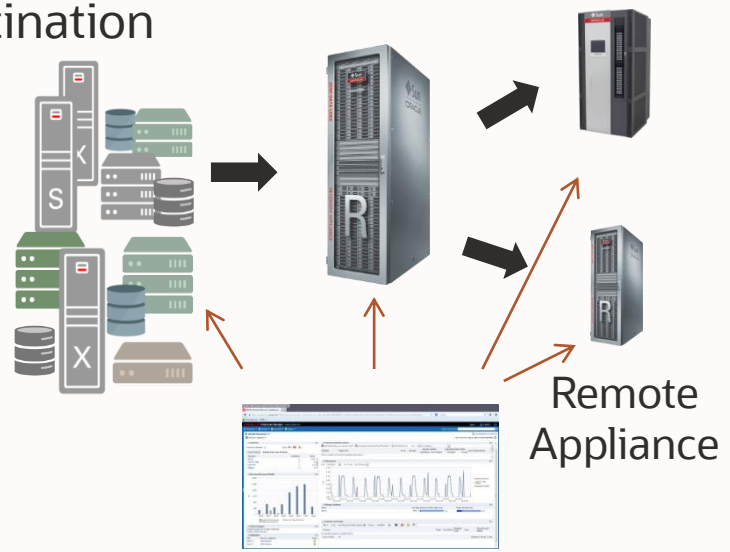
Incremental Forever, No More Full Backups

End-to-End Oracle Recovery Validation

EM Support for Recovery Appliance

- EM ZDLRA Plug-in provides comprehensive management for the Recovery Appliance
  - Configuration, management, and monitoring of Recovery Appliance functionality
  - Recovery Appliance hardware monitoring: Integration with existing Exadata Plug-in hardware monitoring
- EM DB Plug-in provides Recovery Appliance protected database management
  - Configuration of databases to send backups to the Recovery Appliance
  - Schedule backups using suggested-strategy
  - Database recovery from the Recovery Appliance

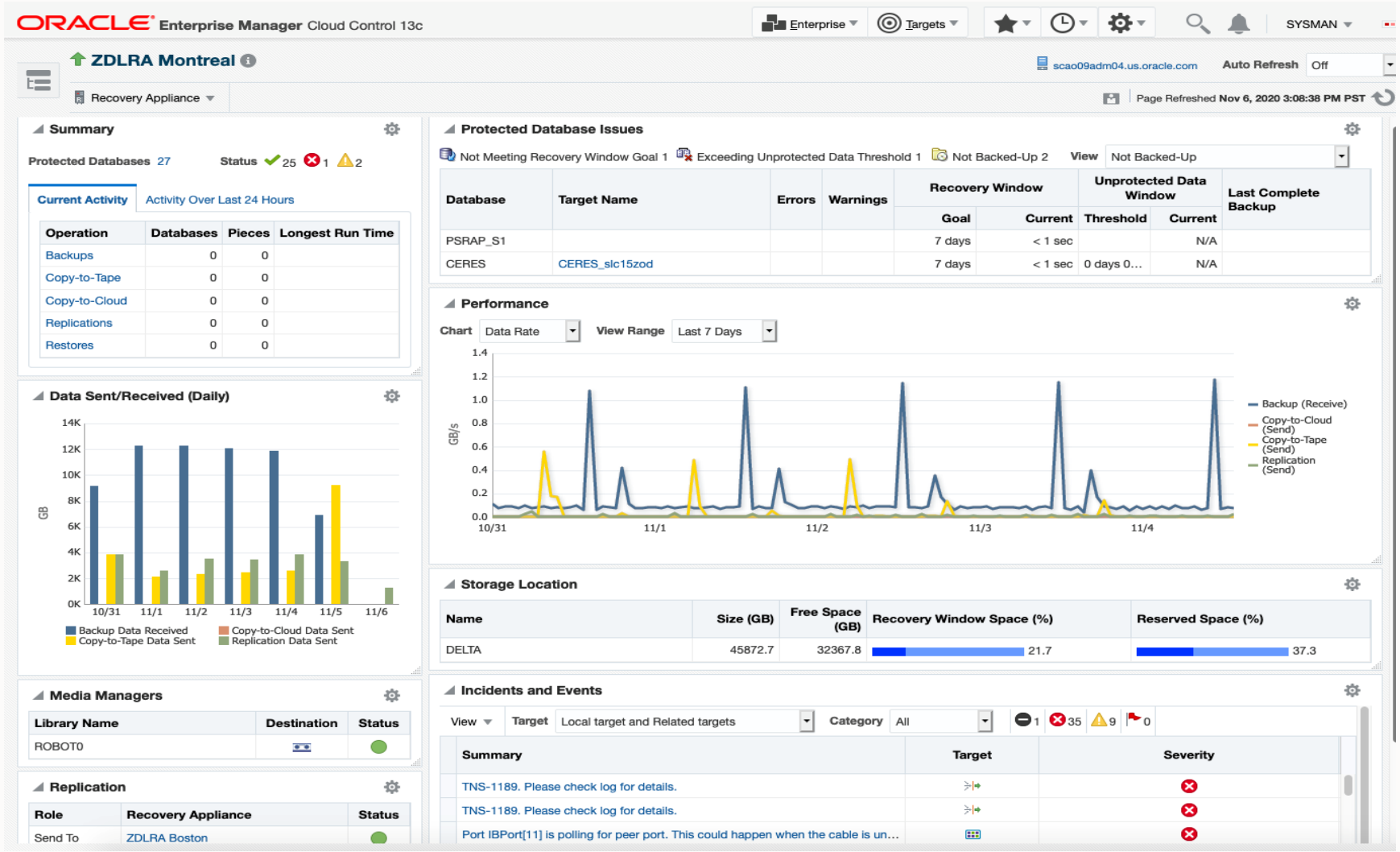
- Recovery Appliance Administrator monitors and manages all centralized backup activities
- Database Administrators schedule and manage individual database backup and recovery with the RA as the backup destination



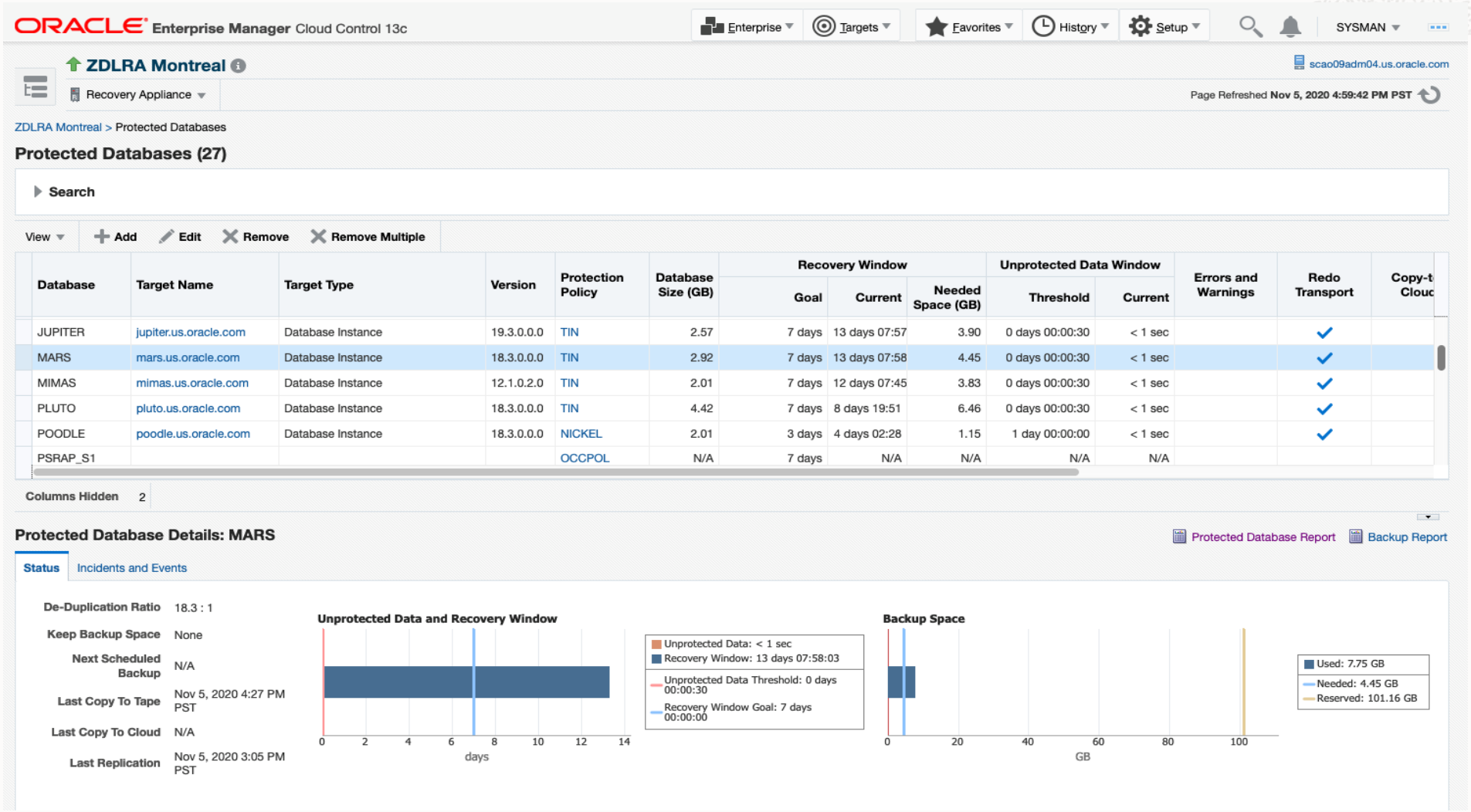
Recovery Appliance Monitoring: ZDLRA Administrator

- Full Access to the Recovery Appliance
  - Manage protection policies and protected databases
  - Configure replication and copy-to-media operations
- Access to all metrics for the Recovery Appliance
  - Performance Metrics
    - Data rates (backup, restore, copy-to-tape, replication)
    - Data received/sent (backup, copy-to-tape, replication)
  - Health: ZDLRA error conditions
  - Protected Database Statistics
    - Used/reserved/needed space
    - Recovery window and unprotected data window

ZDLRA Home Page



ZDLRA Database page



Database	Target Name	Target Type	Version	Protection Policy	Database Size (GB)	Recovery Window			Unprotected Data Window		Errors and Warnings	Redo Transport	Copy-t Cloud
						Goal	Current	Needed Space (GB)	Threshold	Current			
JUPITER	jupiter.us.oracle.com	Database Instance	19.3.0.0.0	TIN	2.57	7 days	13 days 07:57	3.90	0 days 00:00:30	< 1 sec		✓	
MARS	mars.us.oracle.com	Database Instance	18.3.0.0.0	TIN	2.92	7 days	13 days 07:58	4.45	0 days 00:00:30	< 1 sec		✓	
MIMAS	mimas.us.oracle.com	Database Instance	12.1.0.2.0	TIN	2.01	7 days	12 days 07:45	3.83	0 days 00:00:30	< 1 sec		✓	
PLUTO	pluto.us.oracle.com	Database Instance	18.3.0.0.0	TIN	4.42	7 days	8 days 19:51	6.46	0 days 00:00:30	< 1 sec		✓	
POODLE	poodle.us.oracle.com	Database Instance	18.3.0.0.0	NICKEL	2.01	3 days	4 days 02:28	1.15	1 day 00:00:00	< 1 sec		✓	
PSRAP_S1				OCCPOL	N/A	7 days	N/A	N/A	N/A	N/A			

ORACLE

Enterprise Manager 13c & Oracle's Private Cloud Appliance

Excel with Engineered Systems

Sam K Tan
Director, Business Development
Oracle Asia-Pacific and Japan

Introduction to Oracle's Private Cloud Appliance

Oracle Private Cloud Appliance

- Built for rapid and cost-effective private cloud deployment
- Prebuilt and ready to go with minimal setup
- Supports mix of Oracle and non-Oracle workloads
- Delivers low cost per VM
- Leverages same technologies and management as Oracle Cloud

ORACLE Solaris

ORACLE Linux

SUSE Linux

Red Hat Enterprise Linux

Microsoft

Private Cloud Infrastructure: Secure, Virtualized, Fast, Scalable

Full Infrastructure Stack - Engineered for Mission Critical Cloud Deployments

kubernetes
docker
cri-o

Cloud Native Environment

ORACLE Enterprise Manager

Cloud Management

18c Site Guard

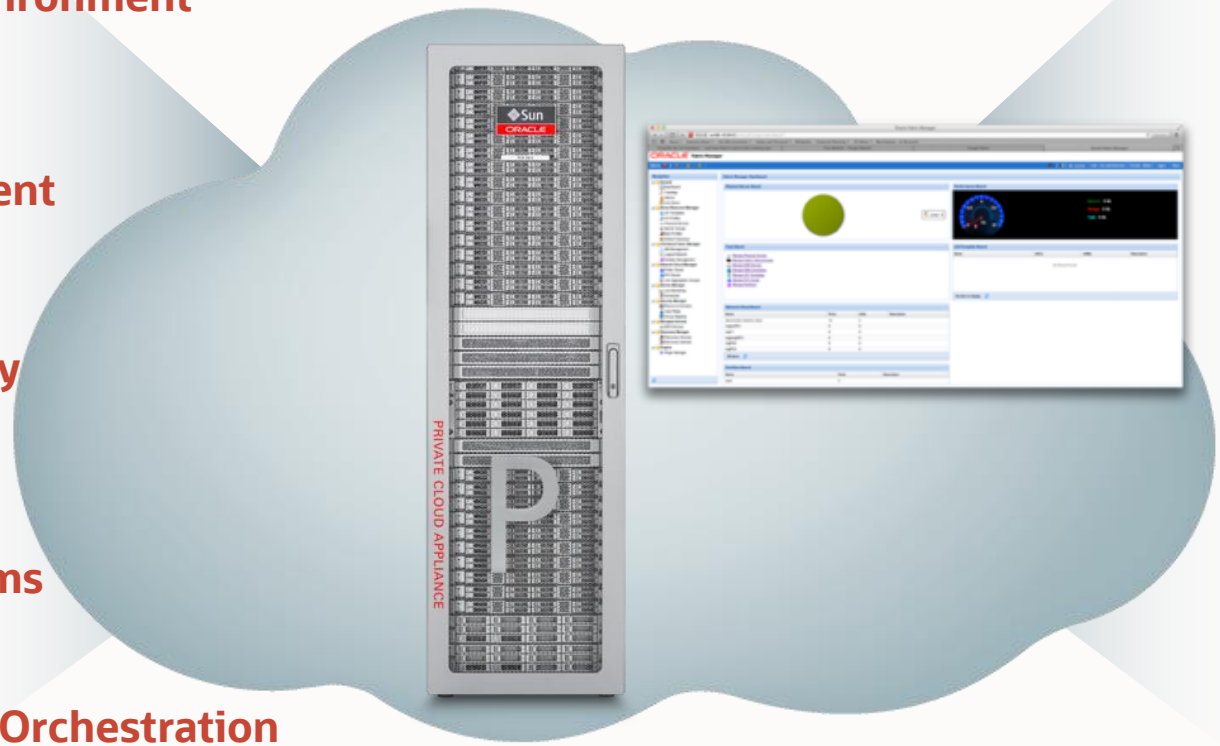
Disaster Recovery

ORACLE Solaris
Ksplice

Operating Systems

ANSIBLE

Automation and Orchestration



IaaS Out-of-the-Box

Virtualization
ORACLE VM

Network
100 Gb Ethernet

Storage
100 – 3300 TB

Servers
96 to 1200 cores

Oracle Private Cloud Appliance

IaaS out-of-the-box

Application Portability

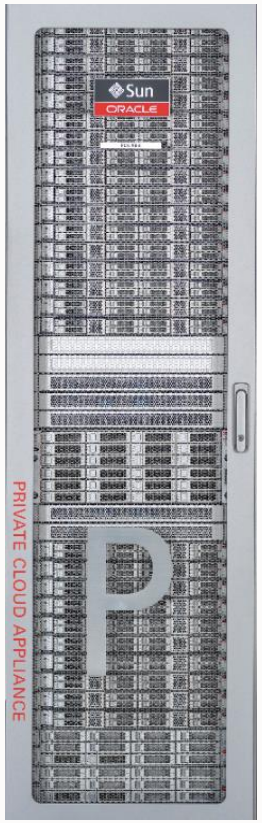
- Rapid deployment, scaling and management of containerized applications using Oracle Linux Cloud Native Environment
- Enables portability across any Kubernetes environment whether on-premises or on Oracle Cloud Infrastructure

Automate and accelerate

- Rapid provisioning of applications and DB in minutes
- Ansible based Infrastructure Lifecycle management

Intelligent and agile infrastructure

- Rapid scaling compute
- Software defined networking
- Rapid scaling, integrated Storage
- Run Linux, Windows, Solaris and container Workloads



Zero-downtime appliance upgrades

- Platinum Services enabled
- Single Bundle Patching for all components
- Ksplice for Oracle Linux VMs

Oracle Enterprise Manager

- Single pane management, monitoring
- Unified management
- IaaS portal with Metering and chargeback

Flexible licensing

- “Trusted Partitions”, 30-50% lower TCO

Business Continuity

- Built-In disaster recovery using EM Site Guard Plug-In

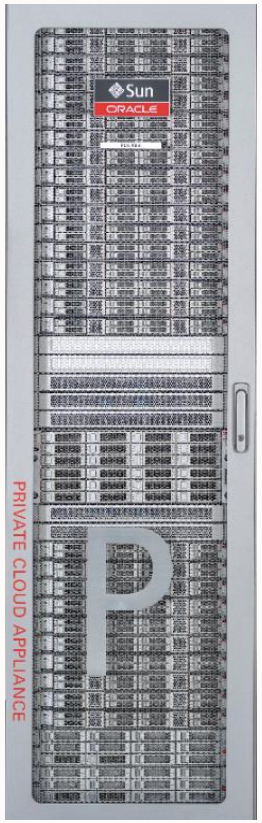
Less than **6 hours** from installation to production

Oracle Private Cloud Appliance X8-2 Specifications

Everything you need to get started - less than 6 hours from installation to production

HARDWARE

- Redundant management servers (X8-2)
- Compute scales to 1200 cores and storage scales to 3.3PB
- Scalable storage architecture
  - ZS7-2 dual-controller system with 2TB DRAM
  - Scalable disk storage (280TB raw increments)
  - Scalable flash storage (150TB raw increments)
- State-of-the-art networking
  - 100Gb Ethernet internal fabric (2x per Compute Node)
  - 100/40/25/10Gb Ethernet data center connectivity



SOFTWARE

Virtualization

- Oracle VM 3.4.x Hypervisor & Manager

Cloud Native

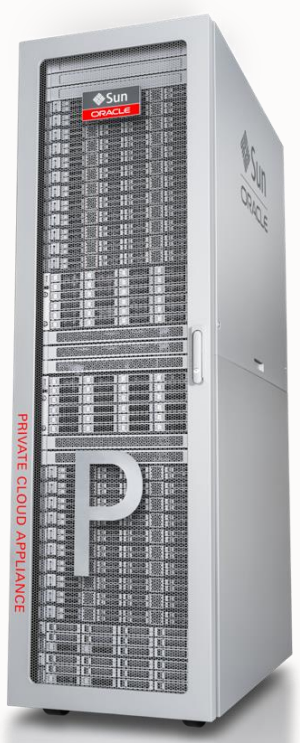
- Oracle Linux Cloud Native Environment

Infrastructure Software

- Oracle Linux, and Solaris
- Oracle Enterprise Manager 13c, and
- Oracle SiteGuard for DR
- Oracle OpenStack
- Oracle SDN
- Oracle ZFS Storage Appliance Cloning
- Oracle ZFS Storage Appliance Replication
- Oracle ZFS Storage Appliance Encryption
- Oracle Java 8 Standard Edition (SE)

Oracle Private Cloud Appliance Integrates Oracle Linux Cloud Native Environment

Container runtime for application development and Kubernetes for container orchestration provide application portability across containerized platforms



Oracle Private Cloud Appliance Cloud Native Capabilities

- Preconfigured VM/Container Infrastructure
- Ansible/Terraform Provisioning
- Kubernetes Orchestration & Management
- Runtime
- Oracle Enterprise Manager Cloud Observability & Analysis

cri-o
docker
OPEN CONTAINER INITIATIVE runc
kata
kubernetes
13c

ORACLE Private Cloud Appliance
ORACLE Private Cloud at Customer
ORACLE Cloud

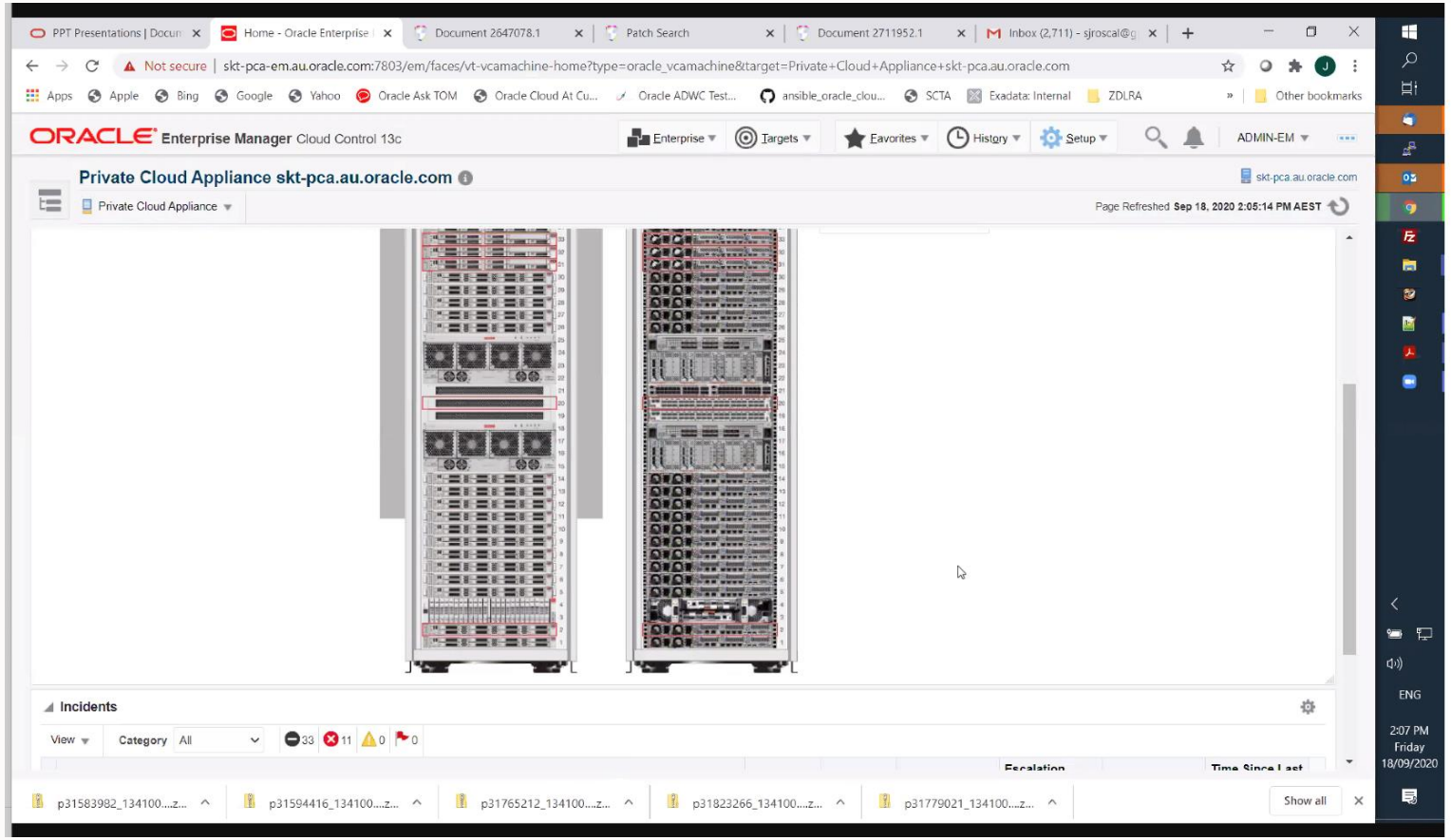
NASA deep space network powered by Oracle Private Cloud Appliance

$4 Trillion	in satellite assets managed and monitored with PCA
Zero Downtime	For critical operations
6 Sites	in Australia, Spain and US all managed by single Oracle Systems Manager

Demo

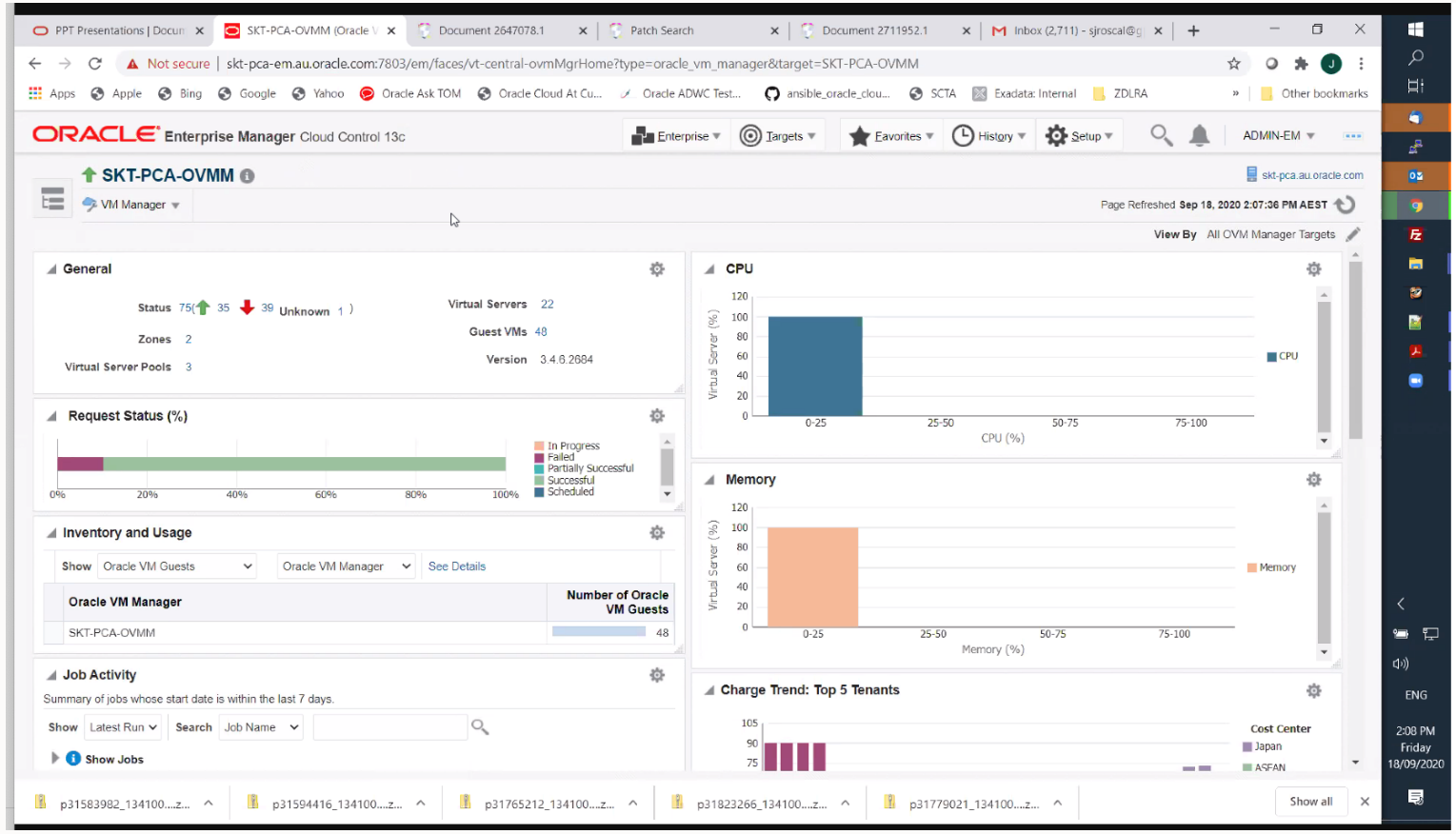
Enterprise Manager 13c with PCA

Placeholder



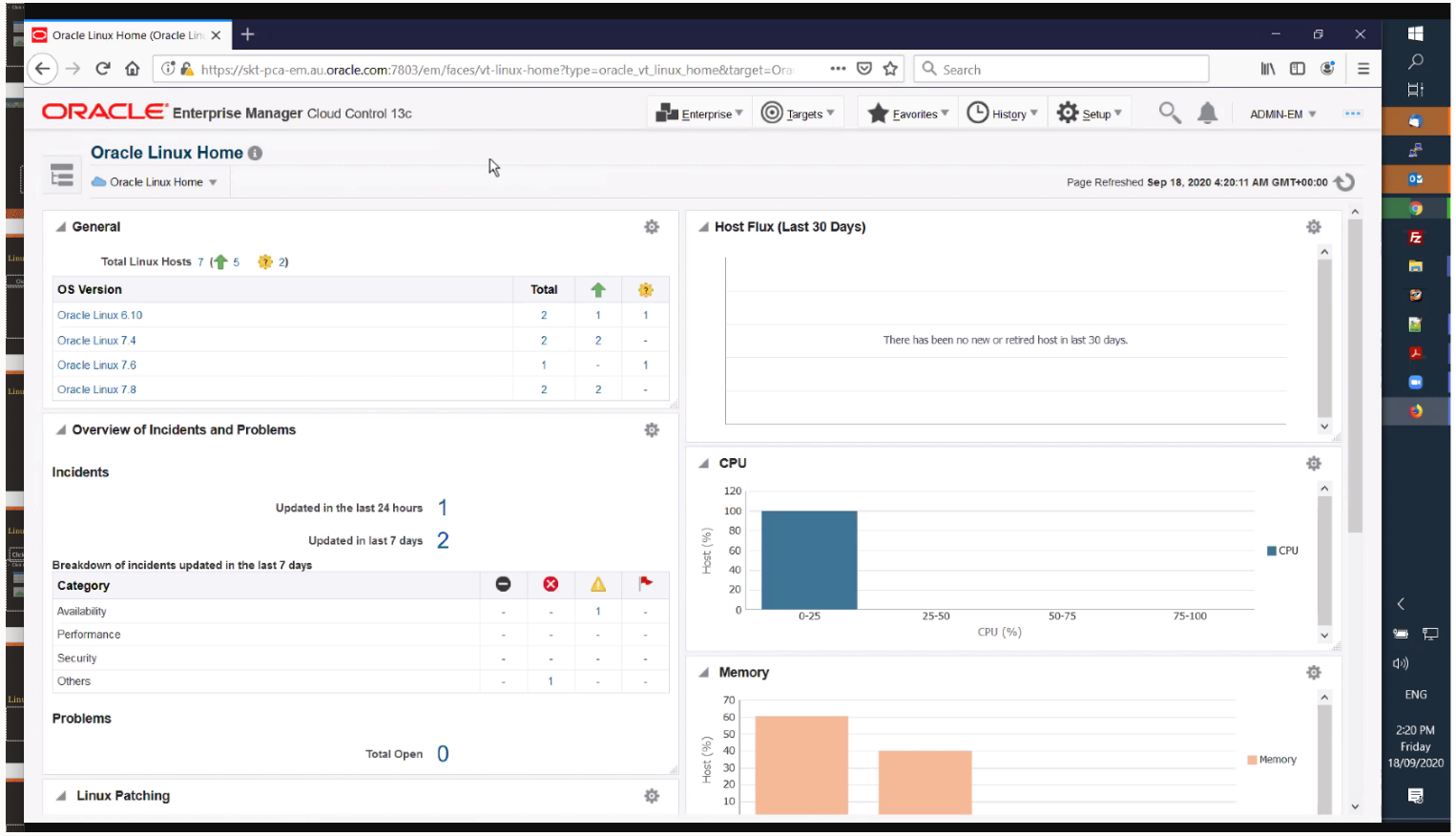
Oracle VM Monitoring and Management

Placeholder



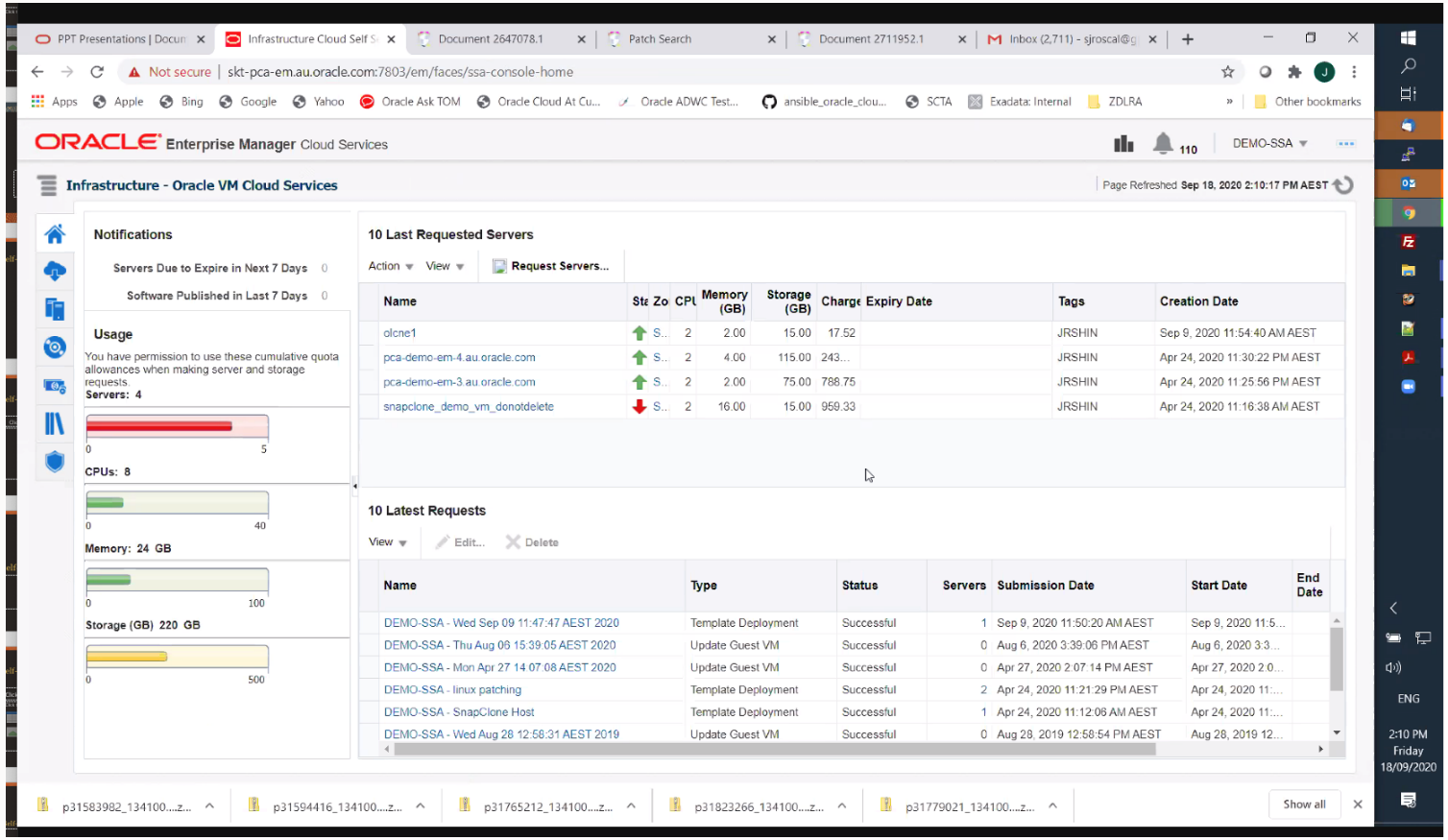
Oracle Linux Monitoring

Placeholder



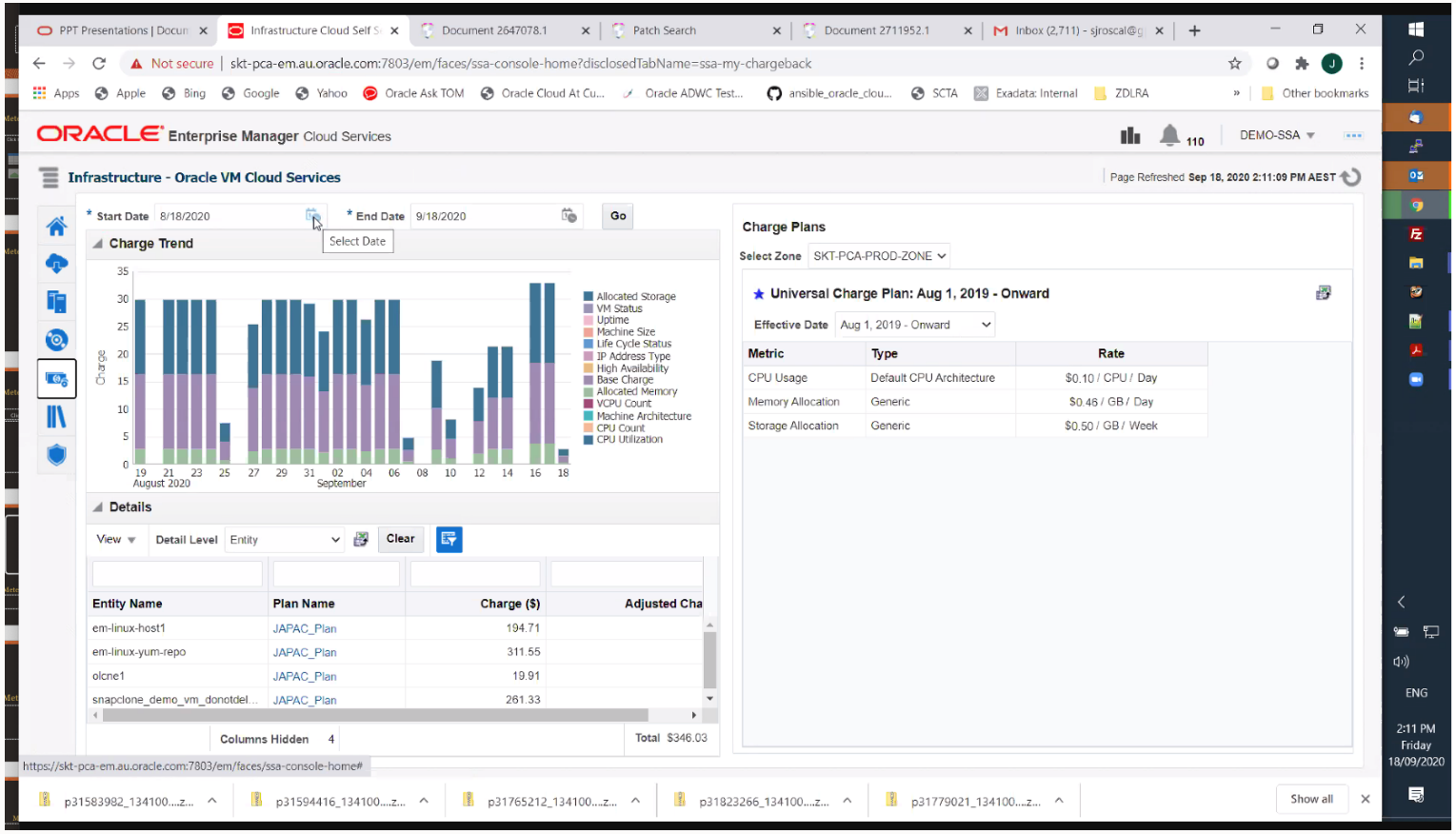
Self-service / RBAC

Placeholder



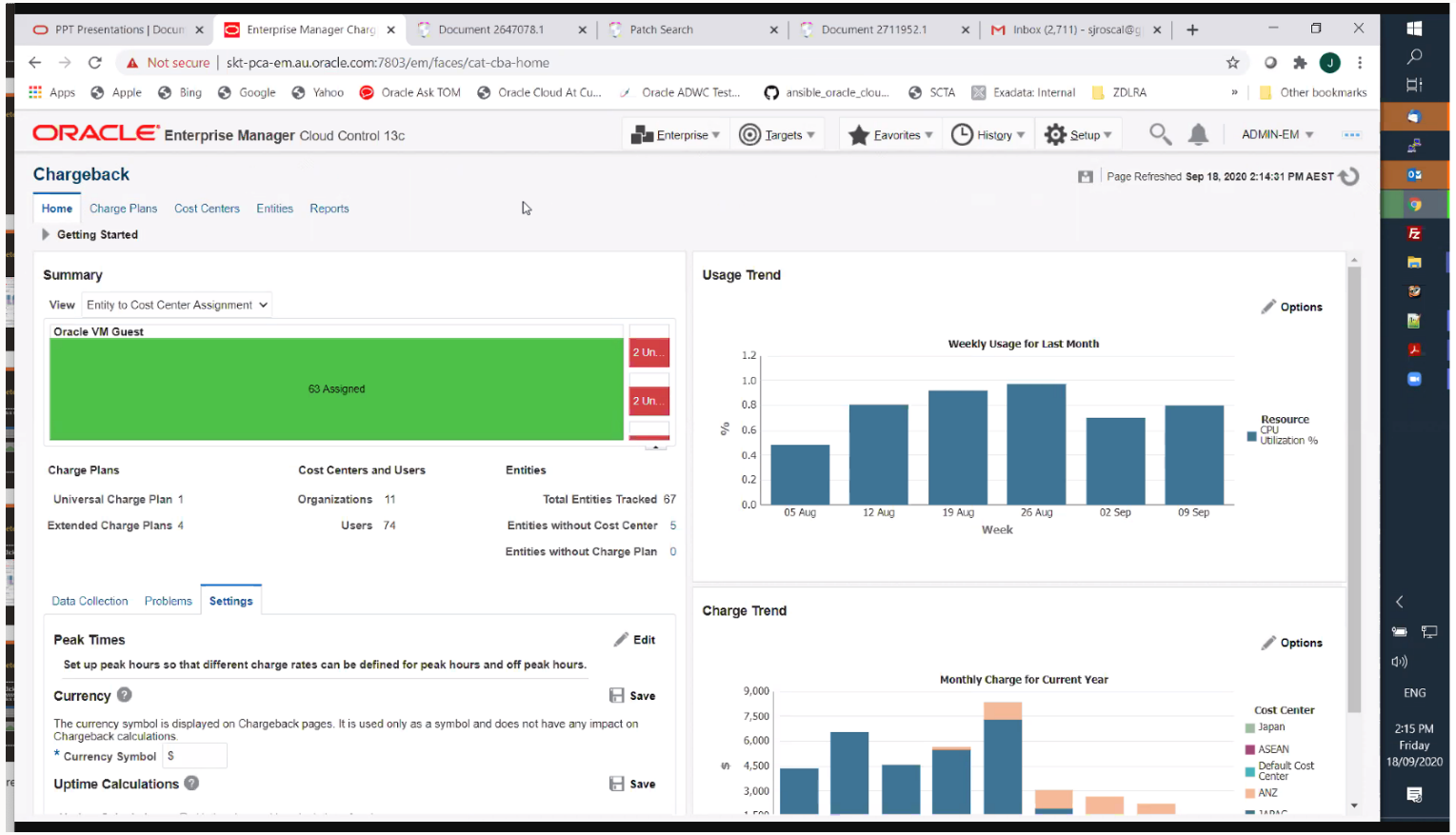
Metering and Chargeback

Placeholder



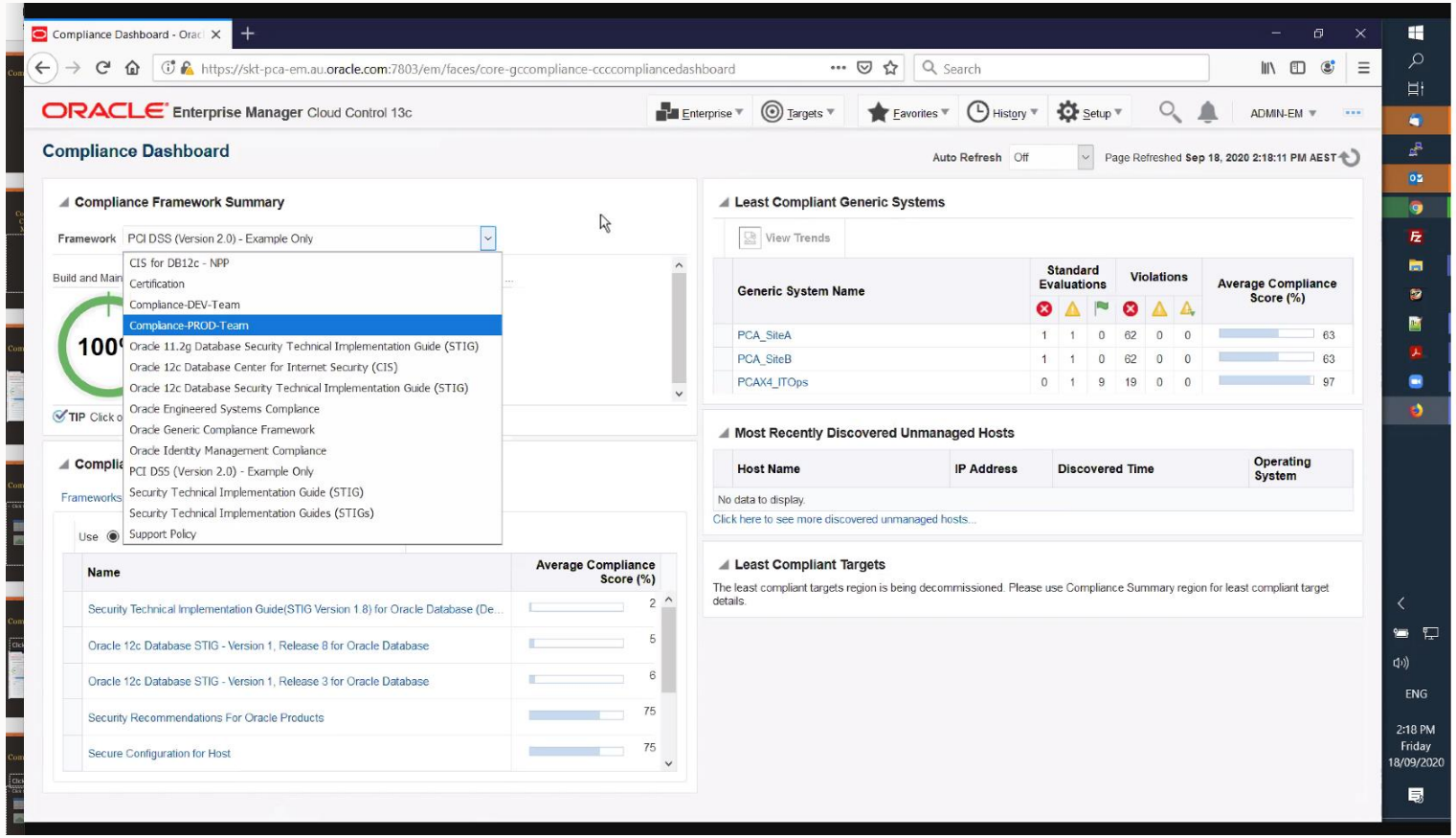
Metering and Chargeback

Placeholder



Compliance and Configuration Management

Placeholder



ORACLE

Oracle Enterprise Manager for Engineered Systems

Oracle Advanced Customer Services

Brian Chan

Principal Advanced Support Engineer

Program agenda

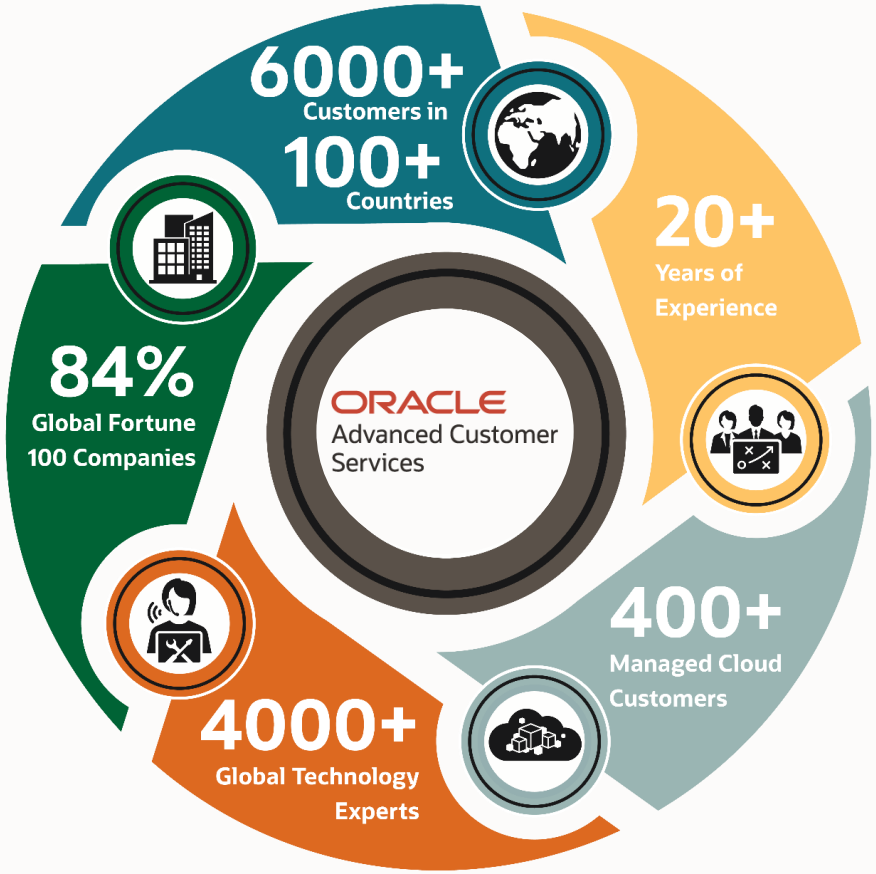
1. ACS Service Overview
2. Expert Services
3. Managed Cloud Services
4. Summary

Oracle Advanced Customer Services

Your trusted partner

ORACLE
Advanced Customer Services

Who knows Oracle …better than Oracle?



"Top notch Advanced Customer Services associates at all levels… Very experienced and knowledgeable, quickly resolved issues, good communication. Trusted partner to team up with…"

Jason LaPierre, Enterprise Systems Manager

NATIONAL RETAIL PROPERTIES
NYSE:NNN

Our Key Capabilities

ORACLE
Advanced Customer Services

Category	Capability	On Premise	OCI	SaaS
 **System Optimization**	• Installations • Product optimization • Supporting older versions	✓	◐	○
 **Expert Services**	• Advanced Support Engineers • Technical Account Managers	✓	✓	✓
 **Transition Services**	• Database Transition • Systems Transition • Packaged Application Transition	✓	✓	○
 **Mission-Critical Services**	• Priority Support • Solution Support Center • Mission Critical Support for SaaS	✓	✓	✓
 **Managed Platform**	• Monitoring and resolution (Database, OCI)	✓	✓	○
 **Managed Applications and Help Desk**	• Applications Unlimited Management • Functional Services (help desk, extension and integration support, regression testing, critical process management) • Government/Federal	✓	✓	✓
 **Security Services**	• Identity Management • Vulnerability Assessments • Database Security Support	✓	✓	✓

Expert Support
How we can help

ORACLE
Advanced Customer Services

- OEM Design and Installation
  - Design highly available OEM solution customized to your environment
  - Install and deliver fully functional monitoring and management solution
- OEM Service Enhancement
  - Deployment reviews, uplift OEM in accordance to Oracle best practices
- Management Packs Enablement
  - Introduce OEM management packs to maximize return of investment
- Engineering System Monitoring and Management
  - Discover Engineered System such as Exadata, ZDLRA, PCA
  - Design monitoring strategy for Engineered Systems and associated targets
  - Uplift existing OEM deployment to meet certification requirements
  - Virtualized Exadata and PCA with efficient DevOps practices
- Knowledge Transfer Workshop
  - Upskill customer with latest features and industry knowledge

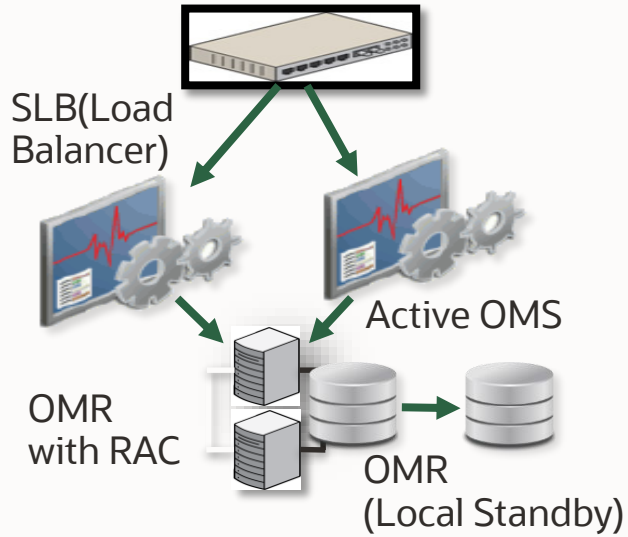
Expert Support

Customer – One of the New Zealand largest financial services group

ORACLE
Advanced Customer Services

Scope:

- Design new shared Oracle Database platform based on virtualized X8 Exadata hardware
- Architect highly available Oracle Enterprise Manager 13c solution to monitor and manage the new Oracle Database platform
- Deploy Oracle best practice for end to end solution
- Assist customer with database migration



Customer Benefits:

- Consolidate database fleet onto virtualized Exadata platform
- Leverage ACS product expertise and industry-leading expertise
- Supporting and working with partnership at every stage of project

Managed Cloud Services
How we can help

ORACLE
Advanced Customer Services

- Managed Services
  - Provide fully managed services for customer's on-premise Engineered Systems includes:
    - Change Management
    - Access Management
    - Configuration management
    - Release Management
    - Incident and Problem Management
    - Service Monitoring
    - Service Level and Availability Management
  - Experienced on-site and remote engineers deliver around the clock service
  - Apply bug fixes and regular security patches
- Governance
  - Dedicated Oracle ACS Account Manager as single point of contact
  - Provide access to OEM reports and dashboards for entire technology stacks
  - Governed by SLA to ensure highest level of service availability

Managed Cloud Services

Customer – One of the four largest financial institutions in Australia

ORACLE
Advanced Customer Services

Scope:

- Manage complex core banking environment deployed on Exalogic, Exadata, PCA and ZFS storage
- Comprehensive OEM monitoring setup for applications and hardware
- Integrate with external ticketing systems
- Use OEM capabilities to efficiently manage the BAU activities
- Migrate Exalogic workload to PCA

Customer Benefits:

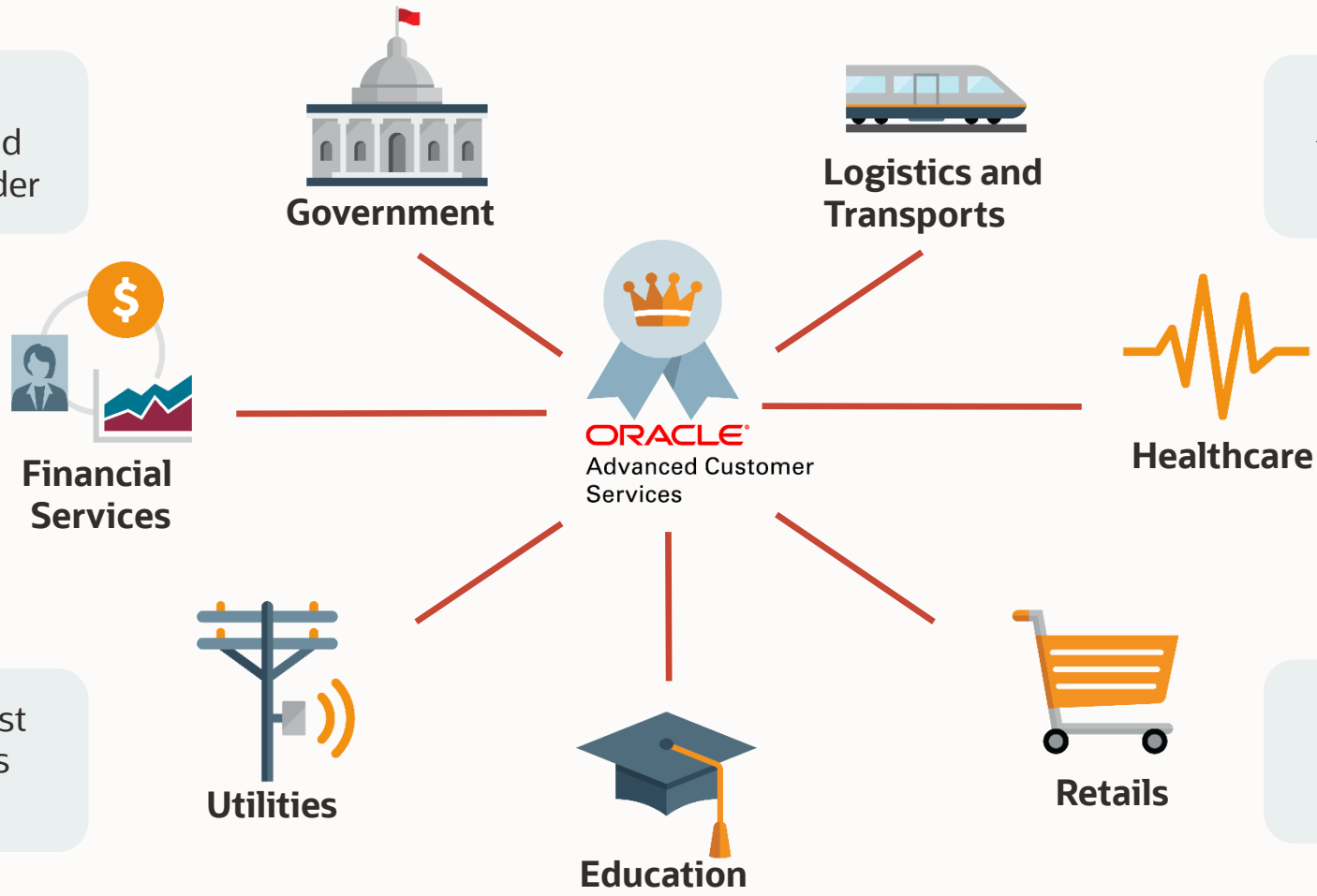
- ACS delivers highest level of management services to customer's critical business, successfully meet SLA over years of practice

Customer Categories

ORACLE
Advanced Customer Services

Australia Leading Wholesale Broadband access network provider

NewZealand latest financial services group



One of the four largest financial institutions in Australia

One of Australia largest grocery chain with over 990+ stores

Summary

ORACLE
Advanced Customer Services

Transform Tomorrow, Today

Supporting You Every Step of the Way

ORACLE®
Advanced Customer Services

Find out more at:
oracle.com/acs