ORACLE

Exadata Cloud at Customer

Features - Smart-Scan, Subsetting, In-Memory and HCC

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Telma's Braga Knowledge Team

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Nossos Valores

- **Integridade**
- **Ética**
- **Compliance**
- **Inovação**
- **Trabalho em Equipe**
- **Respeito Mútuo**
- **Satisfação do Cliente**
- **Justiça**
- **Qualidade**
- **Comunicação**

Como empresa líder em tecnologia, abraçamos a **diversidade** em todas as suas formas. Acreditamos realmente que a **inovação** começa com a **inclusão**. E isso só pode ser alcançado com a cooperação de nossos **parceiros**. Afirmamos nosso **compromisso** em manter um **ambiente respeitoso** e **livre de discriminação** e esperamos isso dos nossos **parceiros de negócios.**

A Oracle espera que seus **parceiros** conduzam os negócios de forma **justa** e **ética**, para cumprir as leis anticorrupção em todo o mundo, para cooperar com os pedidos de informação da Oracle e evitar envolver-se em qualquer atividade que envolva até mesmo a aparência de impropriedade.

É vital que os nossos parceiros sejam aderentes aos valores do **Código de Ética e Conduta Empresarial da Oracle**, que baseia-se e implementa os valores que são essenciais para o nosso sucesso como empresa. Nossos valores são a base de tudo o que fazemos e todos nós devemos viver esses valores todos os dias.

Utilize o QR code para acessar o Código de Ética e Conduta Empresarial da Oracle.

Marcel Lamarca

- Father, *Caipira* , Husband, Cooker and *Corinthiano*!

- Graduated in Business Administration (FMU-SP)

- **Oracle DBA**

❑ 18 year dedicated to study and support Oracle Databases.
❑ 7 years working with Exadata (On-prem, C@C and Cloud Services) .
❑ About to complete 3 years at Oracle helping Customers and partners on the journey to Cloud.
❑ Oracle Latin-American Alliances & Channels Since 2022.

- **Oracle Certified Professional (OCP)**

❑ 10g, 11g and 12c.

- **Oracle Certified Specialist (OCE)**

❑ 11g Grid/RAC Database Administrator.
❑ OCI Foundation 2020 / 2022.
❑ Oracle Autonomous Database 2019 Administrator.
❑ Oracle Cloud Database Migration and integration 2021.

Alexandre Fagundes

- Father, Son, Husband, **Apps DBA**

- Graduated in Information Systems
- Applications & Database Administrator
- Certified OCI Architect Professional
- Certified Microsoft Azure Administrator

- **Oracle Apps DBA**

❑ Oracle E-Business Suite & Database Consultancy Services since 2002

❑ Oracle Latin-American Alliances & Channels since 2021

André Sousa

- Janes and Raul's father, Son, Husband 25 years, dba old school
- Graduated in Information Systems
- OCP Oracle 11g
- I live a little away from everything even before the world changes
- I'm working in Oracle for 21 with Oracle Database products adoption in South America, work mainly with ISVs and SIs helping them on different activities such as POCs, Application Validations, Tuning, he participated as advisor in more than 100 Migration and Upgrade projects.

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.

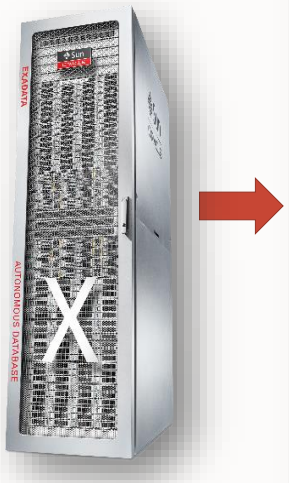
Agenda
Today's conversation

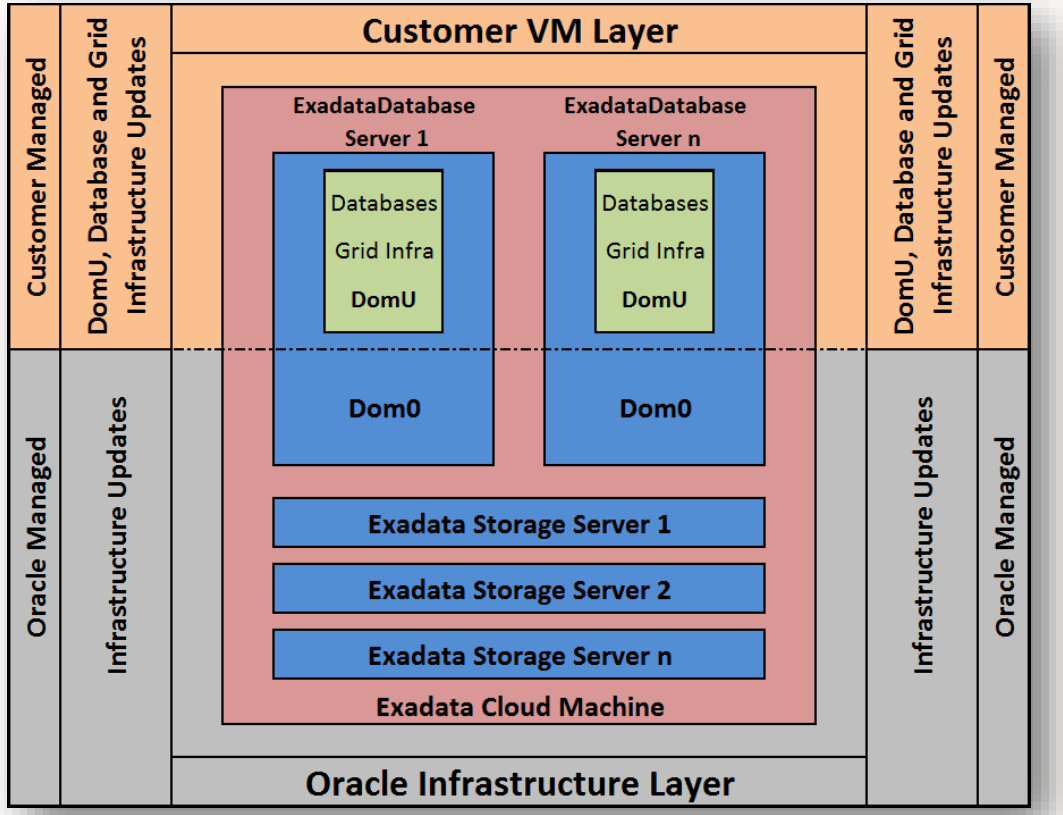
05th Out

- ❑ C@C *Dom0* and *DomU* responsibilities
- ❑ C@C Dom0 and DomU Subsetting
- ❑ C@C *Dom0* and *DomU* Subsetting Overview
- ❑ Oracle NO Exadata Database Query Patch
- ❑ Exadata High Columnar Compression Overview
- ❑ C@C Columnar Compression Types
- ❑ Exadata In-Memory
- ❑ Exadata Smart Scan Feature
- ❑ C@C Useful MOS Documents and Links

Exadata Cloud at Customer - Dom0 and DomU

Roles and Responsibilities physical and virtual environments





About Dom0 Oracle Responsibilities

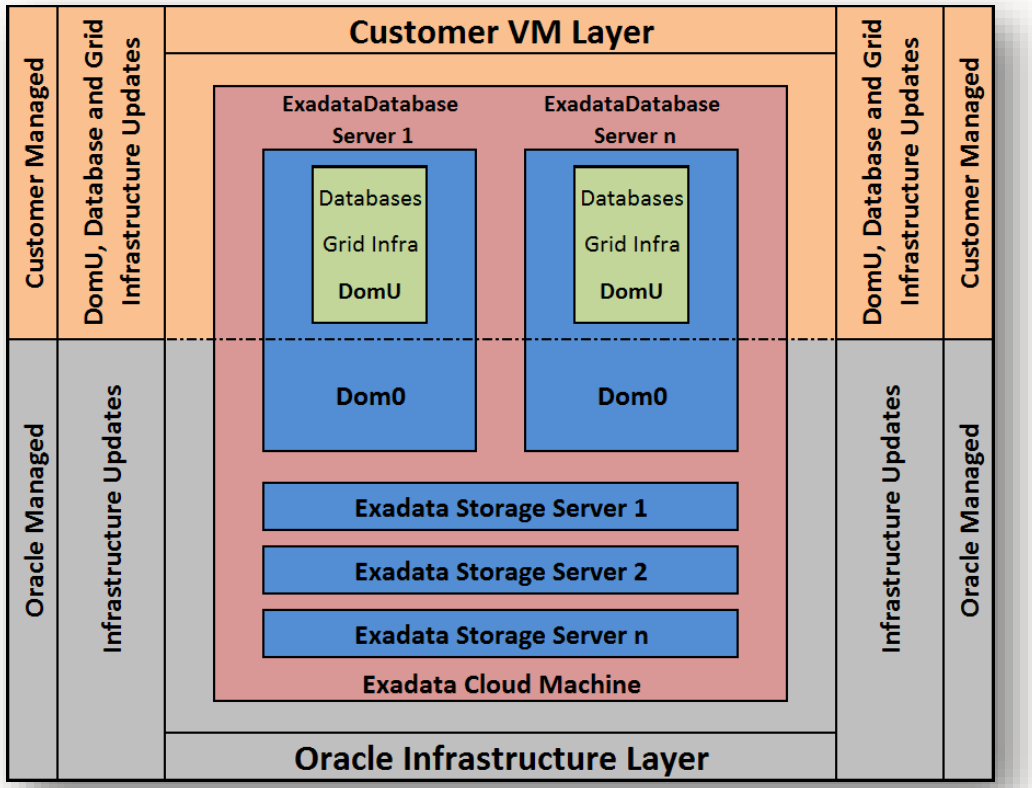
- Oracle Cloud Ops manage Exadata infrastructure (hardware, system software) & hypervisor (dom0);
- Oracle Suport is responsible for update any version;
- For ExaCC gen1, Oracle Support open an SR and request customer formal approval;
- For Exacc Gen2, the customer is responsible for scheduling Dom0 maintenance and must provide at least 4 dates per year;

About DomU Customer Responsabilities

- Adjust license (BYOL or License included)
- Scale UP/Down resources
- For Exadata C@C Gen 1 DomU uses Xen for virtualiztion
- For Exadatada Cloud at Customer Gen2 DomU uses KVM
- Customer have root access to domU;
- The customer is responsible for any update or configuration change on DomU;

Exadata Cloud at Customer - Subsetting Architectural Drawing

Subsetting Physical and virtual environments Overview



Let’s see how it works?

Exadata Cloud at Customer - Subsetting Print 1

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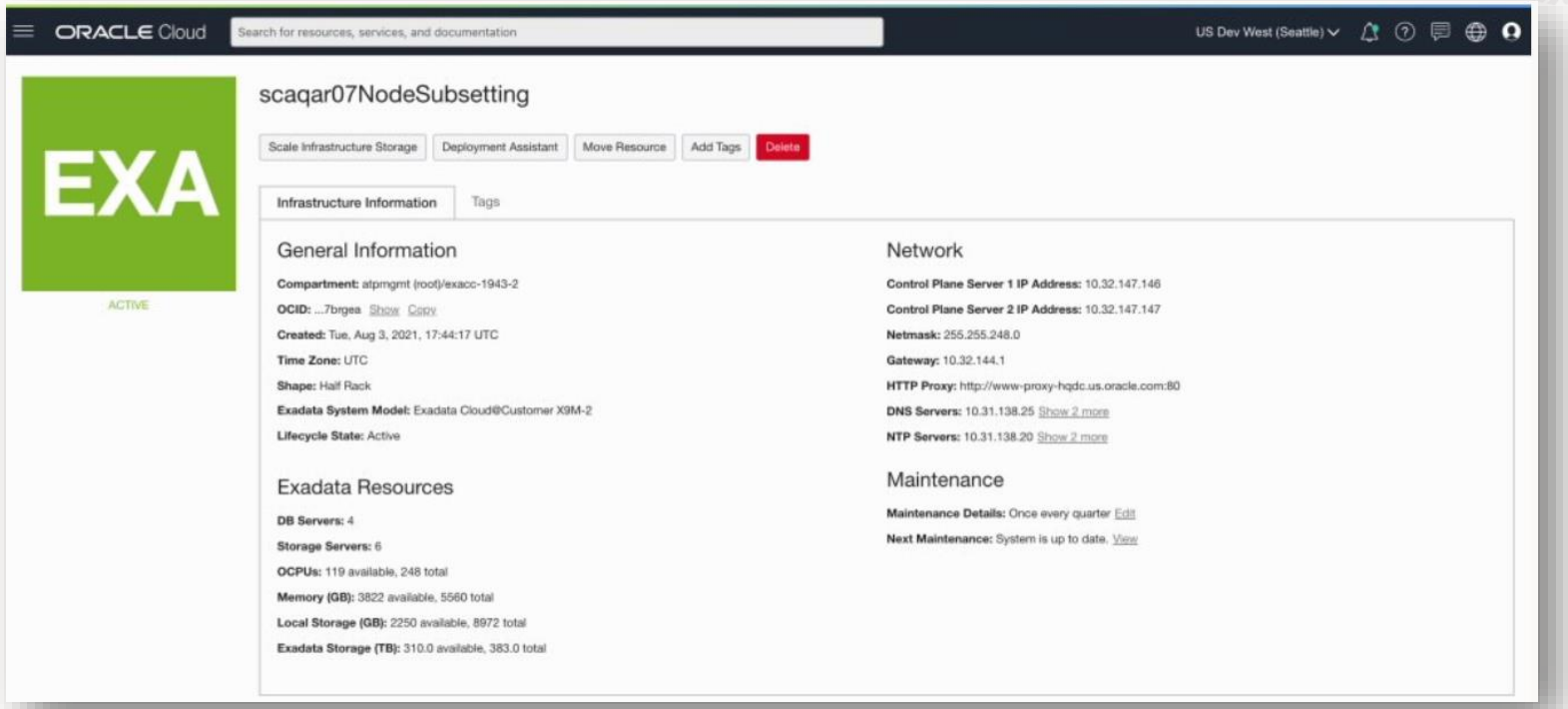

Exadata Cloud at Customer - Subsetting Print 2

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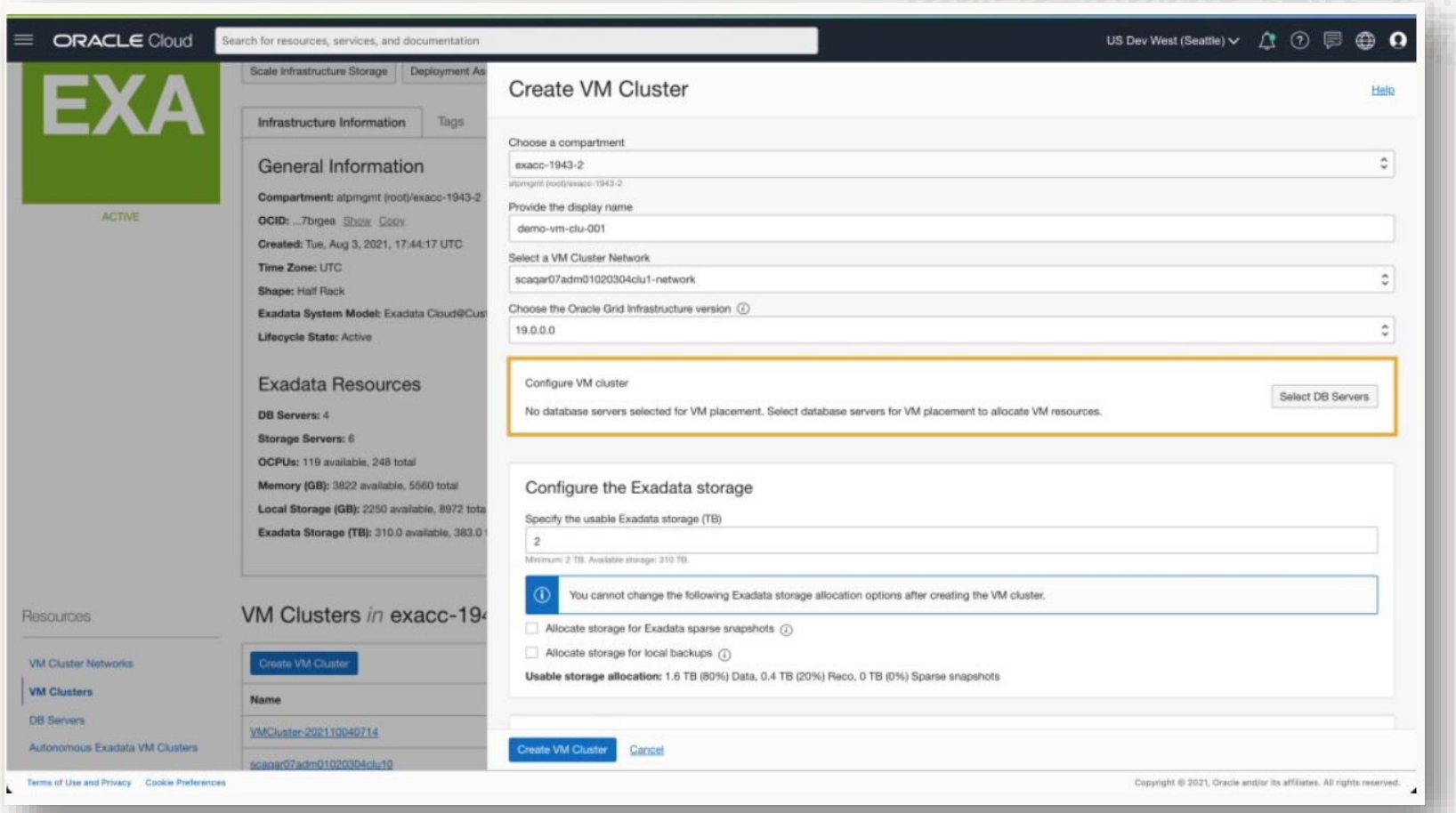

Exadata Cloud at Customer - Subsetting Print 3

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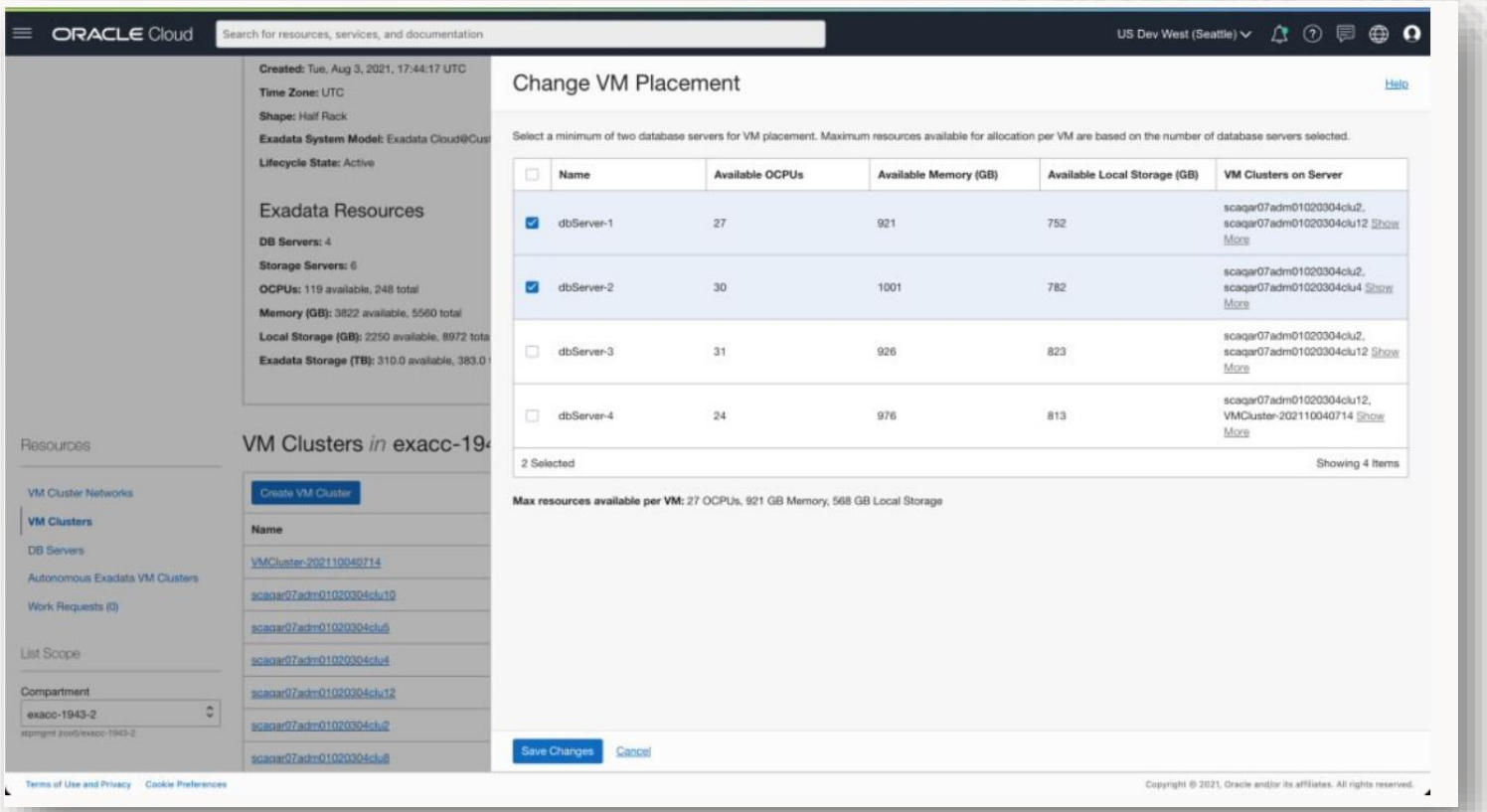

Exadata Cloud at Customer - Subsetting Print 4

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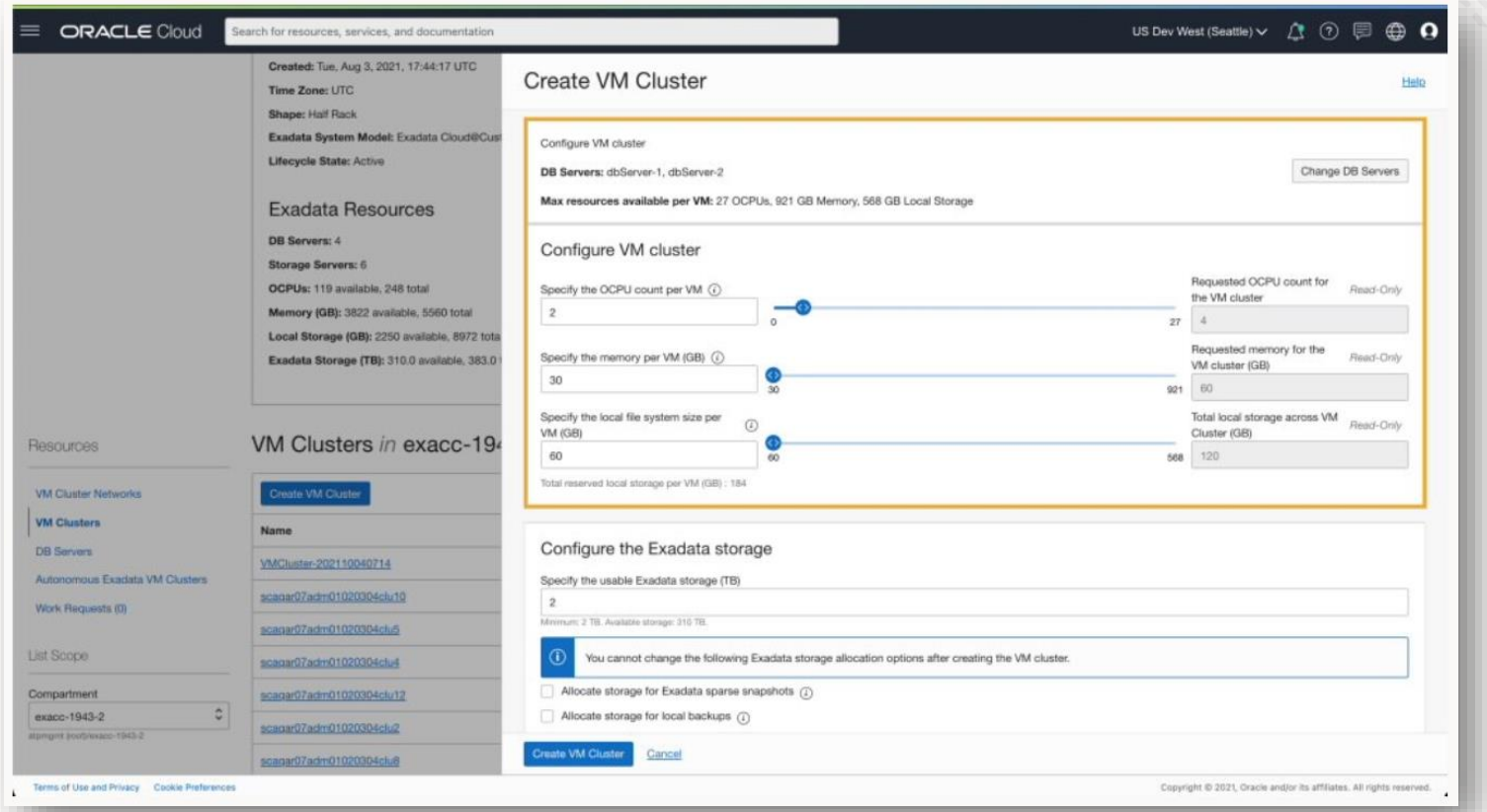

Exadata Cloud at Customer - Subsetting Print 5

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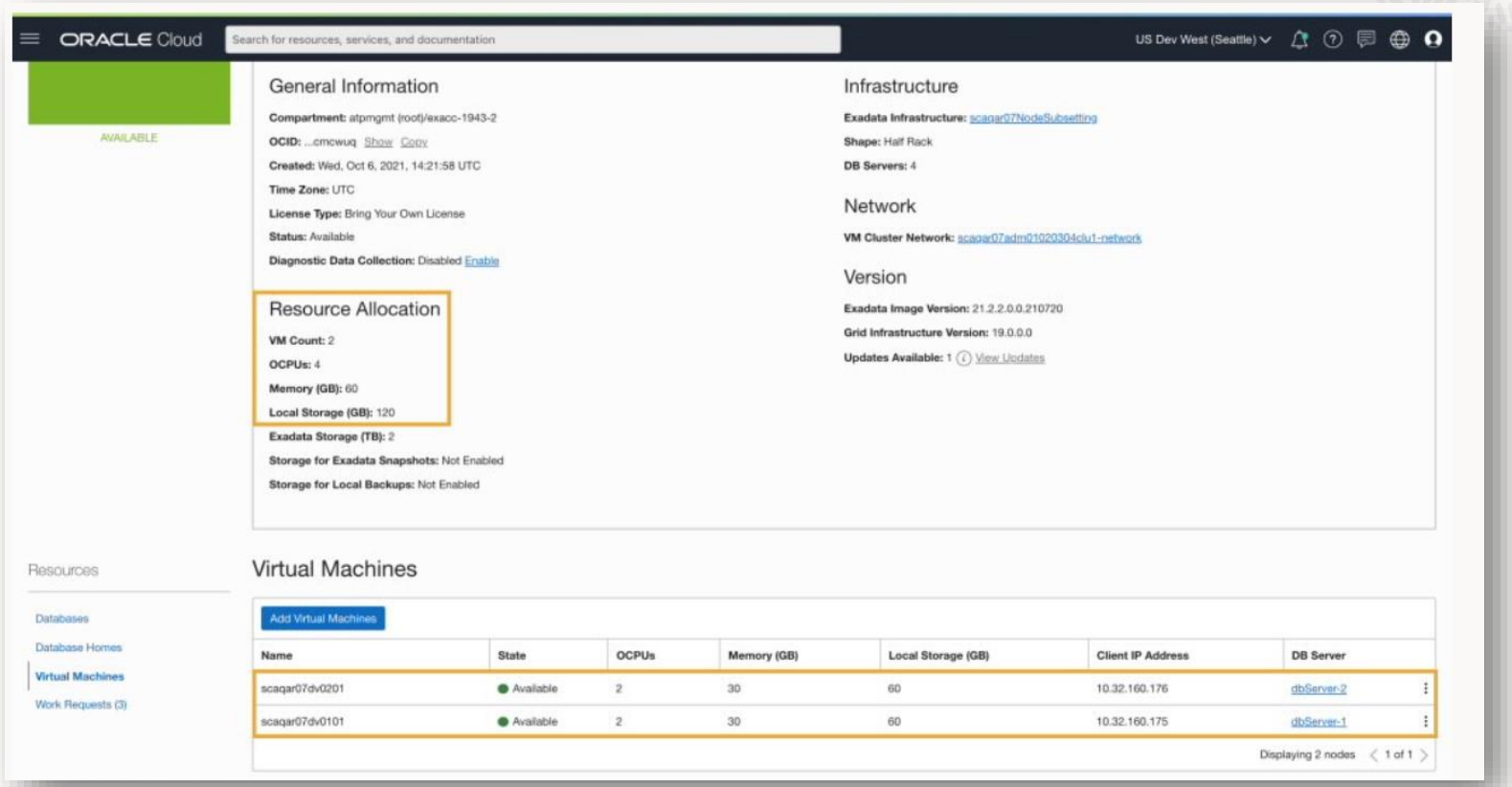

Exadata Cloud at Customer - Subsetting Print 6

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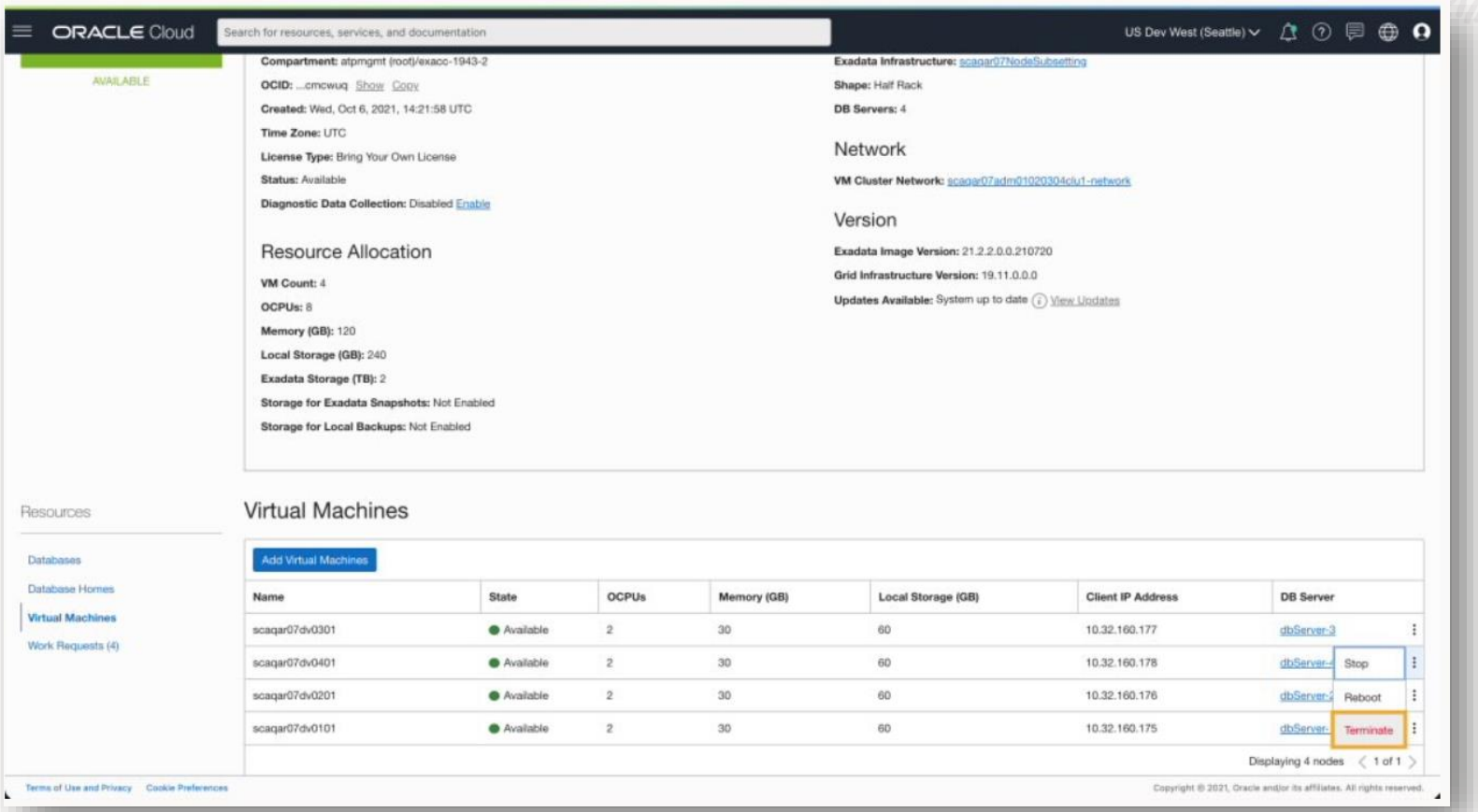

Exadata Cloud at Customer - Subsetting Print 7

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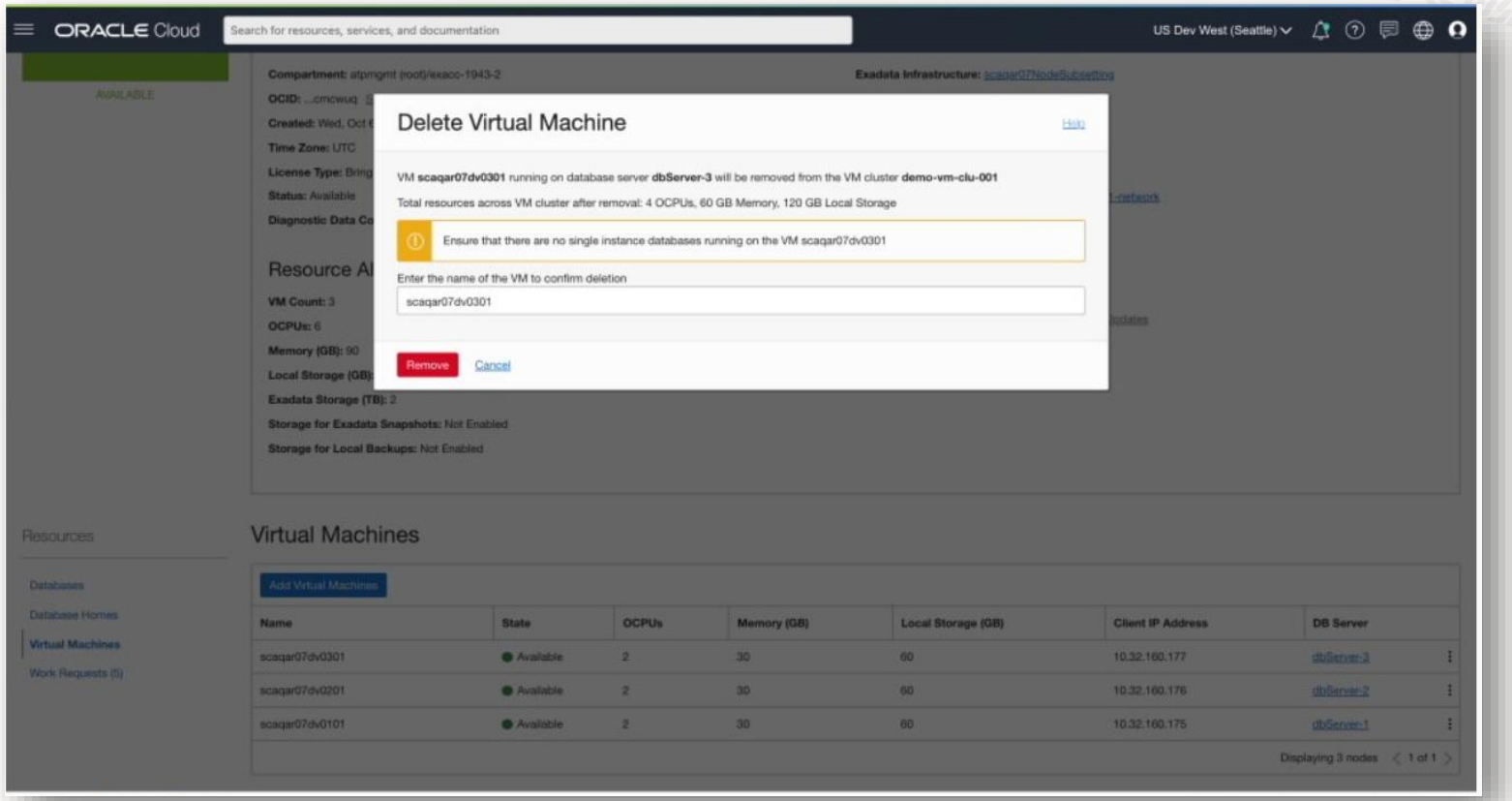

Exadata Cloud at Customer - Subsetting Print 8

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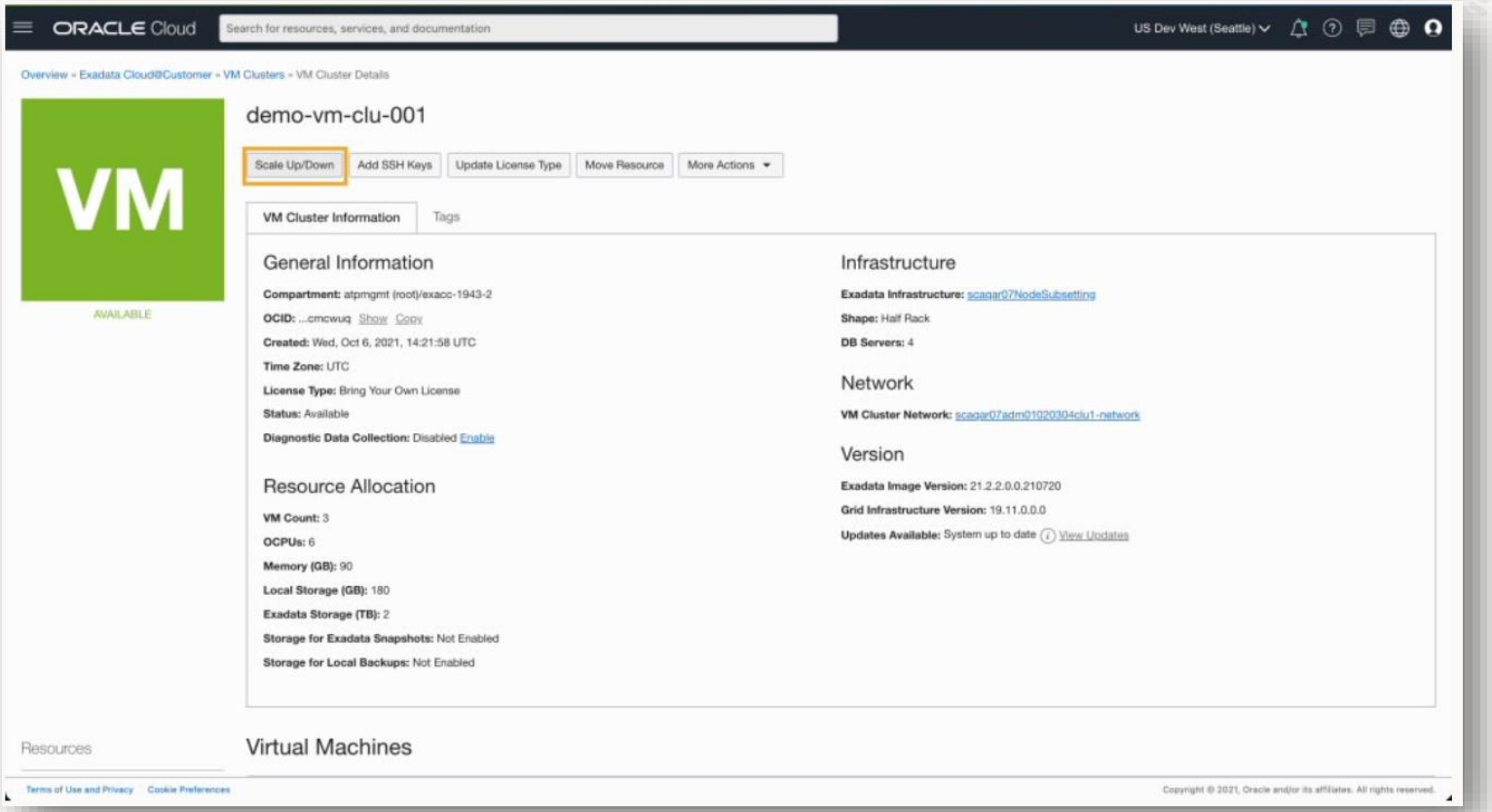
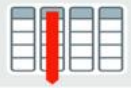
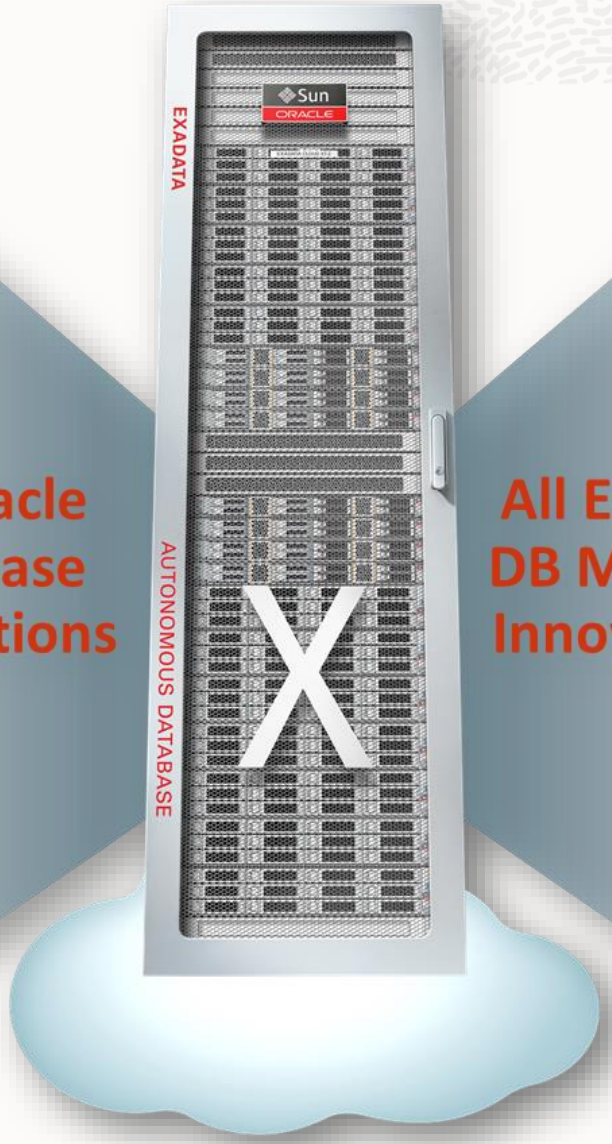


Exadata Cloud Most Powerful Database + Platform

All Exadata Features available with no extra costs

	Multitenant
	In-Memory DB
	Real Application Clusters
	Active Data Guard
	Partitioning
	Advanced Compression
	Advanced Security, Label Security, DB Vault
	Real Application Testing
	Advanced Analytics, Spatial and Graph
	Management Packs for Oracle Database

All Oracle Database Innovations

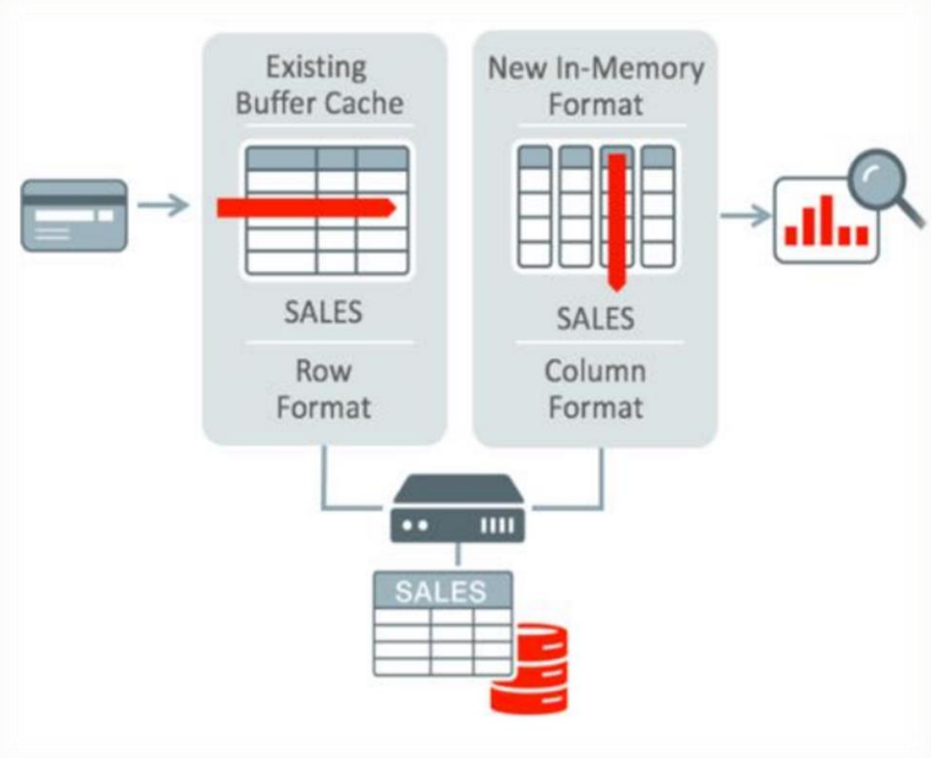


All Exadata DB Machine Innovations

Offload SQL to Storage	
InfiniBand Fabric	
Smart Flash Cache, Log	
Storage Indexes	
Columnar Flash Cache	
Hybrid Columnar Compression	
I/O Resource Management	
Network Resource Management	
In-Memory Fault Tolerance	
Exafusion Direct-to-Wire Protocol	

Oracle Database - In Memory Feature

Understanding Exadata In- Memory Characteristics



In-Memroy

- Dual-Format Architecture – Both row and column formats for table
- Transactions benefit with existing row format
- Analytics benefit with In-Memory columnar format – Simultaneously active and consistent
- Blazing Fast Analytic Scans – SIMD on Compressed Columnar Data Formats
- Seamlessly built into Oracle RDBMS – RAC, Dataguard, Flashback, etc.

Let’s see how it works?

Exadata Cloud at Customer - EHCC

Exadata Compress High Column Compression concepts

Hybrid Columnar Compression is a feature included in Exadata Storage Server. This feature provides a high level of compression of data about objects in an Oracle database and offers the ability to customize the level of compression, depending on whether the environment is an OLTP type (frequent reads and writes to non-sequential data) or an Datawarehousing (frequent queries for large amounts of data). One of the possibilities that Oracle provides us is to deal with this type of scenario using the data compression called Hybrid Columnar Compression, which this time we will implement in an Oracle Exadata Machine. Let's see how we can benefit from this feature and also discuss the results of compression between the different types that exist.

This feature allows the database to reduce the number of physical reads and writes required to utilize a table, so large amounts of data can be processed quickly without generating high I/O rates. You can use Exadata Hybrid Columnar Compression at several levels:

- Table Level
- Partition Level
- Tablespace Level

There are two types of Exadata Hybrid Columnar:

- Warehouse Compression

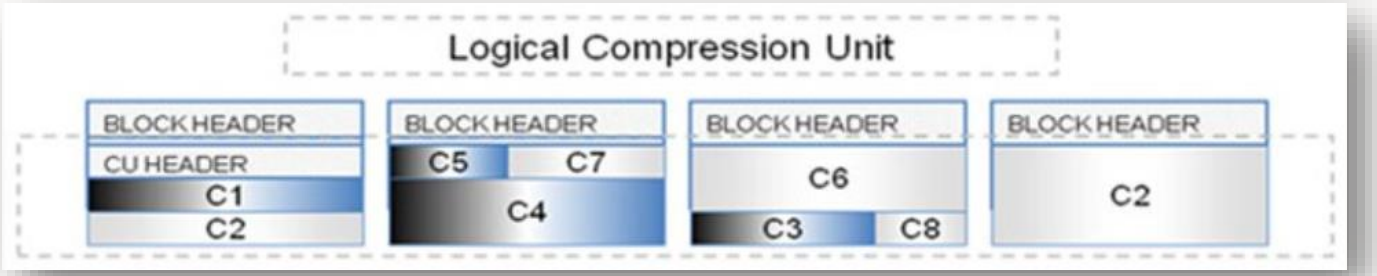
Otimiza o desempenho de consultas. Indicado para aplicações do tipo *Warehouse.*
Disponível em duas opções: *Query High* e *Query Low.*

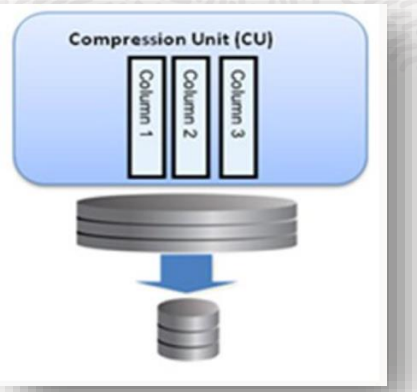
- Compress for Archive

Foco na compressão máxima dos dados.Adequado para dados que não mudam com frequência.
Disponível em duas opções: *Archive High* e *Archive Low.*

Exadata - High Columnar Compression

Understanding Exadata EHCC Compression types and caricaturists





Features of Exadata Hybrid Columnar Compression (EHCC):

- The tables are organized into Compression Units (UC).
- CUs are larger than database blocks.With CUs, data is organized by columns and not by records.
- Each column is compressed separately.
- The average storage reduction varies between 10x and 15x.
- There are cases where the reduction of a table by 52x was achieved.
- Data decompression is performed by the Exadata Storage Server.
- If the table is partitioned, it is allowed to use different forms of compression for the same table.
- It may be necessary to re-compress the table after some modifications, as per Metalink note Nro 1332853.1 .Not recommended for tables that are frequently modified.
- Not allowed in Index Organized Tables (IOT) type tables.

Exadata Cloud at Customer - EHCC

Compress sample results

TABLE_NAME	PAR	COMPRESS	COMPRESS_FOR	BLOCKS	NUM_ROWS	NET_MB	BLOCKS_MB
TESTE_OLTP	NO	DISABLED		9077	2160000	51.5	284

TABLE_NAME	PAR	COMPRESS	COMPRESS_FOR	BLOCKS	NUM_ROWS	NET_MB	BLOCKS_MB
TESTE_OLTP	NO	ENABLED	QUERY HIGH	9077	2160000	51.5	284

TABLE_NAME	PAR	COMPRESS	COMPRESS_FOR	BLOCKS	NUM_ROWS	NET_MB	BLOCKS_MB
TESTE_OLTP	NO	DISABLED		9077	2160000	51.5	284

Let’s see how it works?

Exadata Cloud at Customer - Smart Scan

Here is the Smart-Scan can do for you… (off-Loading querying)

Smart Scan is one of the great feature in Oracle Exadata. With this technology storage send only required rows to database node from storage instead of entire Oracle Block. Multiple rows are stored in one Oracle Block but non-exadata system return entire block even only one rows is required. On the other hand, Exadata Storage returns only interested rows but not entire block.

How does Smart Scan work?

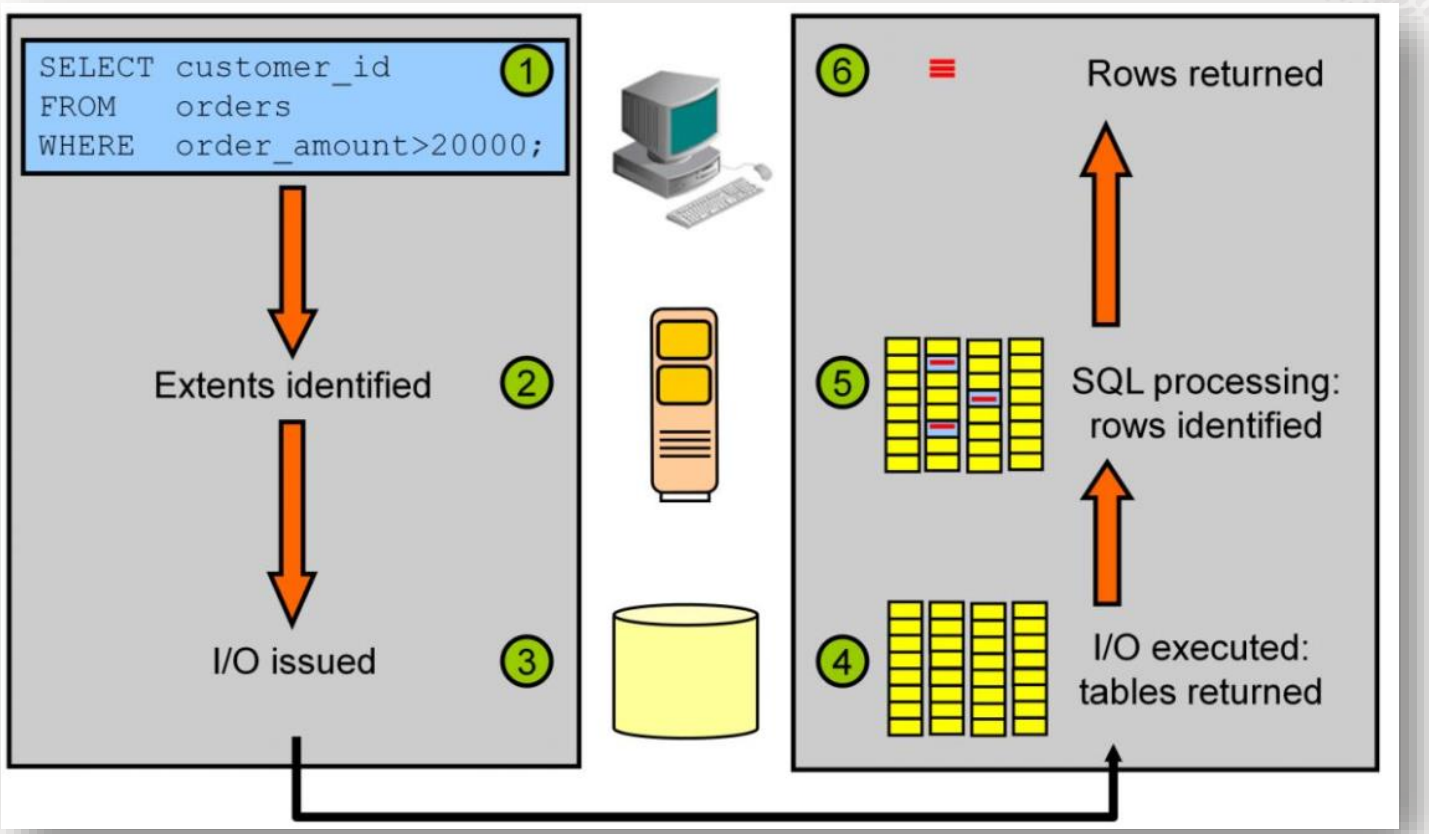
- Database servers or compute nodes send additional query details to the storage cells via a protocol known as iDB (Intelligent Database Protocol)
- Storage cells can take over a large portion of the data-intensive query processing
- Exadata storage cells can search the storage layer with this added intelligence about the query and send only the relevant bytes, not all the database blocks, to the database compute nodes
- The Smart Scan sends a more concentrated set of rows and columns directly to the program Global Area(PGA) of the requesting process instead of the data buffers in the SGA

Smart Scan includes

- Full Table and Fast Full Index Scans: Scans are performed inside Exadata Storage Server, rather than transporting all the data to the database server.
- Predicate filtering: Only the requested rows are returned to the database server, rather than all the rows in a table.
- Column filtering: Only the requested columns are returned to the database server, rather than all the table columns.
- Join filtering: Join processing using Bloom filters are offloaded to Exadata Storage Server

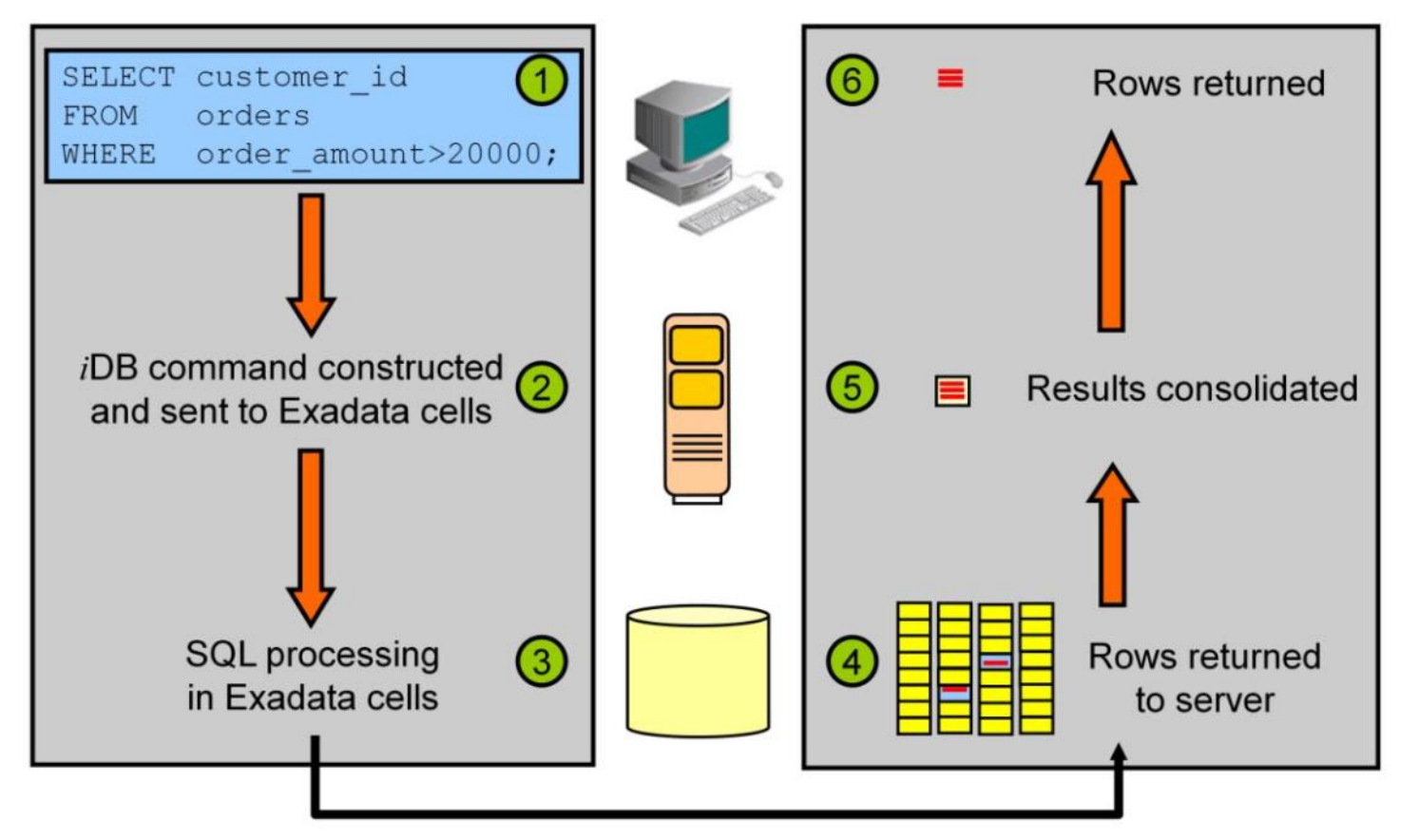
On-prem, OCI Dbcs and other Database Products

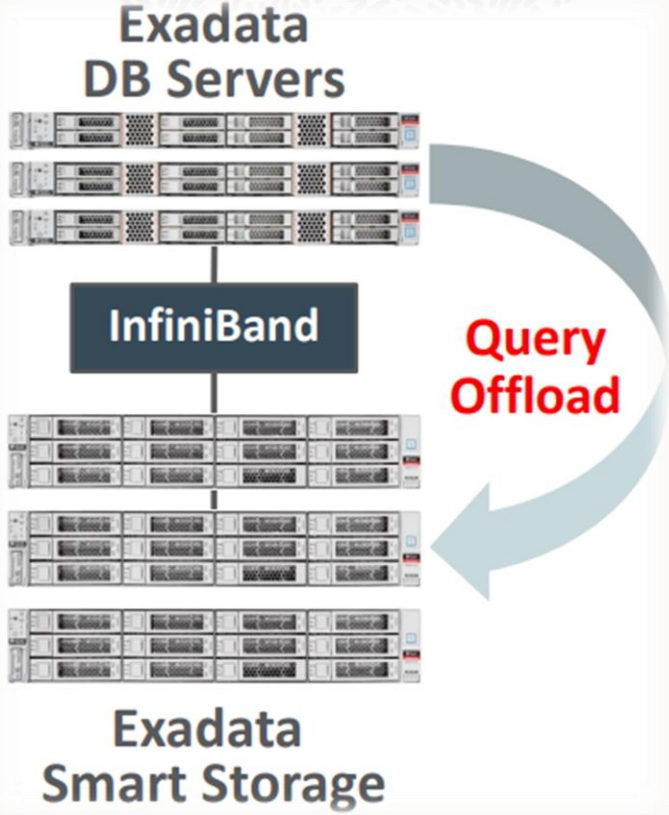
NO Exadata Sql querying patch…



Exadata Cloud at Customer - Smart Scan

Exadata off load querying patch…





Exadata - Smart Scan - Enable / Disable

Understanding when off-load querying are used to happen and how to enable it

When It Happens

- Full Table Scans
- Full Index Scans
- Direct-path reads
- Direct-path reads are automatically used for parallel queries
- Not used by default for serial scans of small tables Can be forced via _serial_direct_read=TRUE at either session or system level

Smart Scan includes

How to enable It on Exadata

- *cell_offload_procecessing* parameter value set to TRUE (default)
- *cell.smart_scan_capable* ='TRUE' *on ASM instance*

Exadata Cloud at Customer - General Links

ExaCC General Useful doc's and tips

- Oracle Exadata Best Practices (Doc ID 757552.1)
- Exadata Critical Issues (Doc ID 1270094.1)
- Exadata Cloud Support Information Center (Doc ID 2522950.2)
- Getting Started with Oracle E-Business Suite on Oracle Exadata Cloud@Customer Gen 2 (Doc ID 2774983.1)
- Cloud@Customer Gen 2 (Doc ID2758998.1)
- Cloud Infrastructure or Oracle Cloud at Customer (Doc ID 2368508.1)
- Release Schedule of Current Database Releases (Doc ID 742060.1)

Exadata Cloud at Customer - Troublesoothing

ExaCC Troubleshooting useful doc's and tips

- How To Collect Sosreport on Oracle Linux (Doc ID 1500235.1)
- How to Create Sosreport in Alternate Location? (Doc ID 2163668.1)
- Oracle Exadata Database Machine EXAchk (Doc ID 1070954.1)
- Autonomous Health Framework Compliance Checks and Diagnostics: https://docs.oracle.com/en/engineered-systems/health-diagnostics/autonomous-health-framework
- Autonomous Health Framework (AHF) - Including TFA and ORAchk/EXAChk (Doc ID 2550798.1)
- HugePages on Oracle Linux 64-bit (Doc ID 361468.1)
- When And Why To Use HugePages on Linux x86-64? (Doc ID 2314903.1)
- USE_LARGE_PAGES To Enable HugePages (Doc ID 1392497.1)
- ORA-00845 Raised When Starting Instance (Doc ID 465048.1)
- HugePages on Linux: What It Is... and What It Is Not... (Doc ID 361323.1)
- Shell Script to Calculate Values Recommended Linux HugePages / HugeTLB Configuration (Doc ID 401749.1)
- Troubleshooting Exadata Database Service on Cloud@Customer Systems : https://docs.oracle.com/en-us/iaas/exadata/doc/ecc-troubleshooting-systems.html#GUID-84CF1009-A4FA-4C73-8C16-5EC556D8F1A1
- Quick Instructions For Obtaining The Automatic Workload Repository (AWR) Report (Doc ID 1086120.1)
- Performance Diagnosis with Automatic Workload Repository (AWR) (Doc ID 1674086.1)
- ExaWatcher Utility On Exadata and SuperCluster Compute and Storage Nodes (Doc ID 1617454.1)

Exadata Cloud at Customer - Backup & Restore

ExaCC Backup and Restore useful doc's and tips

- How To Collect Sosreport on Oracle Linux (Doc ID 1500235.1)
- How to Create Sosreport in Alternate Location? (Doc ID 2163668.1)
- Oracle Exadata Database Machine EXAchk (Doc ID 1070954.1)
- Autonomous Health Framework Compliance Checks and Diagnostics: https://docs.oracle.com/en/engineered-systems/health-diagnostics/autonomous-health-framework
- Autonomous Health Framework (AHF) - Including TFA and ORAchk/EXAChk (Doc ID 2550798.1)
- HugePages on Oracle Linux 64-bit (Doc ID 361468.1)
- When And Why To Use HugePages on Linux x86-64? (Doc ID 2314903.1)
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- HugePages on Linux: What It Is... and What It Is Not... (Doc ID 361323.1)
- Shell Script to Calculate Values Recommended Linux HugePages / HugeTLB Configuration (Doc ID 401749.1)
- Troubleshooting Exadata Database Service on Cloud@Customer Systems : https://docs.oracle.com/en-us/iaas/exadata/doc/ecc-troubleshooting-systems.html#GUID-84CF1009-A4FA-4C73-8C16-5EC556D8F1A1
- Quick Instructions For Obtaining The Automatic Workload Repository (AWR) Report (Doc ID 1086120.1)
- Performance Diagnosis with Automatic Workload Repository (AWR) (Doc ID 1674086.1)
- ExaWatcher Utility On Exadata and SuperCluster Compute and Storage Nodes (Doc ID 1617454.1)

Exadata Cloud at Customer - Upgrade

Upgrading Exacc useful doc's and tips

- to Oracle 19c Release using DBUA (Doc ID 2543981.1)
- Oracle 19c Complete Checklist for upgrading Oracle 12c, 18c Container Database (CDB)
- 19c Database Self-Guided Upgrade with Best Practices (Doc ID 1919.2)
- Upgrading to 19c Oracle Grid Infrastructure on Exadata Cloud Service (ExaCS) and Exadata Cloud at Customer Gen2 (ExaCC) (Doc ID 2624992.1)
- Exadata Cloud at Customer Gen2 ExaCC (Doc ID 2624992.1)
- Upgrading to 19c Oracle Grid Infrastructure on Gen 1 Exadata Cloud at Customer (Doc ID 2709296.1)
- Upgrading to 19c Oracle Database on Gen 1 Exadata Cloud at Customer (Doc ID 2709284.1)

Exadata Cloud at Customer - Patching

Exacc Patching useful doc's and tips

- Patch Set Updates for Oracle Products (Doc ID 854428.1)
- Primary Note for Database Proactive Patch Program (Doc ID 888.1)
- Updating Exadata Database Server Software using the DBNodeUpdate Utility and patchmgr (Doc ID 1553103.1)
- Exadata System Software Certification (Doc ID 2075007.1)
- Exadata Cloud Compute Node Backup and Restore Operations (Doc ID 2809393.1)
- How to boot Exadata database server with diagnostic ISO image (Doc ID 1947114.1)
- OPatch Error - Inventory load failed... OPatch cannot load inventory for the given Oracle Home (Doc ID 2075765.1)
- Steps to shut down or reboot an Exadata storage cell without affecting ASM (Doc ID 1188080.1)
- Gen 1 - Patching Exadata Cloud at Customer: https://docs.oracle.com/en/cloud/cloud-at-customer/exadata-cloud-at-customer/exacc/patch.html
- Gen 1 - Rolling Back a Patch or Failed Patch: https://docs.oracle.com/en/cloud/cloud-at-customer/exadata-cloud-at-customer/exacc/roll-back-patch.html#GUID-0D1B9B1E-62E4-4A66-8D5D-6D1AC2B69A3F
- Atualização do cloud tooling sem utilizar dbaascli (necessário em versões antigas): https://docs.oracle.com/en/cloud/paas/database-dbaas-cloud/csdbi/problems-administering-deployments.html#GUID-14724B31-FE0B-4D8C-BE36-CEE81FC84A5B

Exadata Cloud at Customer - Monitoring Useful Link´s

Exadata Cloud at Customer Monitoring useful doc's and tips

- Using Privilege Analysis - a feature of Oracle Database Enterprise Edition (Doc ID 2588251.1)
- Privilege Analysis is not Working in a Procedure PL/SQL block Using DBMS_PRIVILEGE_CAPTURE (Doc ID 2891332.1)
- AutoUpgrade.jar fails in preupgrade fixup phase with deadlock issues when DBA_PRIV_CAPTURES is enabled (Doc ID 593325.1)
- TFA-00104 Cannot establish connection with TFA Server" Error While Installing/Upgrading Trace File Analyzer (Doc ID 2301598.1)
- https://community.oracle.com/mosc/discussion/3913477/without-database-vault-installed-use-of-dbms-privilege-capture-needs-licence
- https://community.oracle.com/mosc/discussion/4517433/how-to-use-dbms-privilege-capture-generate-result-when-using-database-wide-capture-and-database-link
- https://docs.oracle.com/en/database/oracle/oracle-database/21/arpls/DBMS_PRIVILEGE_CAPTURE.html
- https://docs.oracle.com/en/database/oracle/oracle-database/19/arpls/DBMS_PRIVILEGE_CAPTURE.html
- https://docs.oracle.com/en/database/oracle/oracle-database/18/arpls/DBMS_PRIVILEGE_CAPTURE.html
- https://docs.oracle.com/en/database/oracle/oracle-database/12.2/arpls/DBMS_PRIVILEGE_CAPTURE.html

Exadata Cloud at Customer - Migration Useful Link´s

Exadata Cloud at Customer Migration useful doc's and tips

- Creating a Physical Standby Database for 11g Through 19c Databases (Doc ID 2275154.1)
- Creating a Physical Standby using RMAN Duplicate (RAC or Non-RAC) (Doc ID 1617946.1)
- Using Transportable Tablespaces to Migrate Oracle E-Business Suite Release 12.2 Using Oracle Database 19c Enterprise Edition On a Multitenant Environment (Doc ID 2674405.1)
- V4 Reduce Transportable Tablespace Downtime using Cross Platform Incremental Backup (Doc ID 2471245.1)
- Cross Platform Database Migration using ZDLRA (Doc ID 2460552.1)
- Is GG certified for EBS Database Migrations and upgrades (Doc ID 2491869.1)
- [BACKUP AND RECOVER BEST PRATICES FOR RECOVER APPLIENCE] https://www.oracle.com/a/otn/docs/oda-backup-recovery-technical-brief.pdf
- [WALLET MANAGER] https://docs.oracle.com/en/database/oracle/oracle-database/19/dbimi/using-oracle-wallet-manager.html#GUID-D0AA8373-B0AC-4DD8-9FA9-403E345E5A71
- [ORACLE DATABASE 19C SEURTY GUIDE] https://docs.oracle.com/en/database/oracle/oracle-database/19/dbseg
- https://www.oracle.com/webfolder/s/assets/webtool/cloud-migration-advisor/index.html
- https://docs.oracle.com/en-us/iaas/Content/Database/Tasks/mig-onprembackup.htm
- https://docs.oracle.com/en/cloud/paas/database-dbaas-cloud/csdbi/create-hybrid-dr-deployment.html

Exadata Cloud at Customer - Smart Scan Feature

ExaCC Smar-Scan useful doc's and tips

- Creating a Physical Standby Database for 11g Through 19c Databases (Doc ID 2275154.1)
- Creating a Physical Standby using RMAN Duplicate (RAC or Non-RAC) (Doc ID 1617946.1)
- Using Transportable Tablespaces to Migrate Oracle E-Business Suite Release 12.2 Using Oracle Database 19c Enterprise Edition On a Multitenant Environment (Doc ID 2674405.1)
- V4 Reduce Transportable Tablespace Downtime using Cross Platform Incremental Backup (Doc ID 2471245.1)
- Cross Platform Database Migration using ZDLRA (Doc ID 2460552.1)
- Is GG certified for EBS Database Migrations and upgrades (Doc ID 2491869.1)
- [BACKUP AND RECOVER BEST PRATICES FOR RECOVER APPLIENCE] https://www.oracle.com/a/otn/docs/oda-backup-recovery-technical-brief.pdf
- [WALLET MANAGER] https://docs.oracle.com/en/database/oracle/oracle-database/19/dbimi/using-oracle-wallet-manager.html#GUID-D0AA8373-B0AC-4DD8-9FA9-403E345E5A71
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- https://www.oracle.com/webfolder/s/assets/webtool/cloud-migration-advisor/index.html
- https://docs.oracle.com/en-us/iaas/Content/Database/Tasks/mig-onprembackup.htm
- https://docs.oracle.com/en/cloud/paas/database-dbaas-cloud/csdbi/create-hybrid-dr-deployment.html

"El analfabeta del siglo XXI no será el que no sepa leer y escribir, sino el que no pueda aprender, desaprender y reaprender".

Alvin Toffler.
1928 - 2016

Thank You ☺

Questions / Feedback / Training Suggestions

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Ask for help ☺


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