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

Standardise, Automate, Consolidate and Optimise

An Overview to Provisioning

Akshay Sangaonkar
Senior Principal Product Manager

Agenda

1. Modern Datacenter Challenges
2. Enterprise Manager Overview
3. Database Provisioning Overview
4. Deep Dive Database Provisioning
5. Deep Dive Database Cloning
6. Deep Dive Database Upgrade
7. Integration with Oracle Cloud
8. Customer References

Modern Data Center Challenges

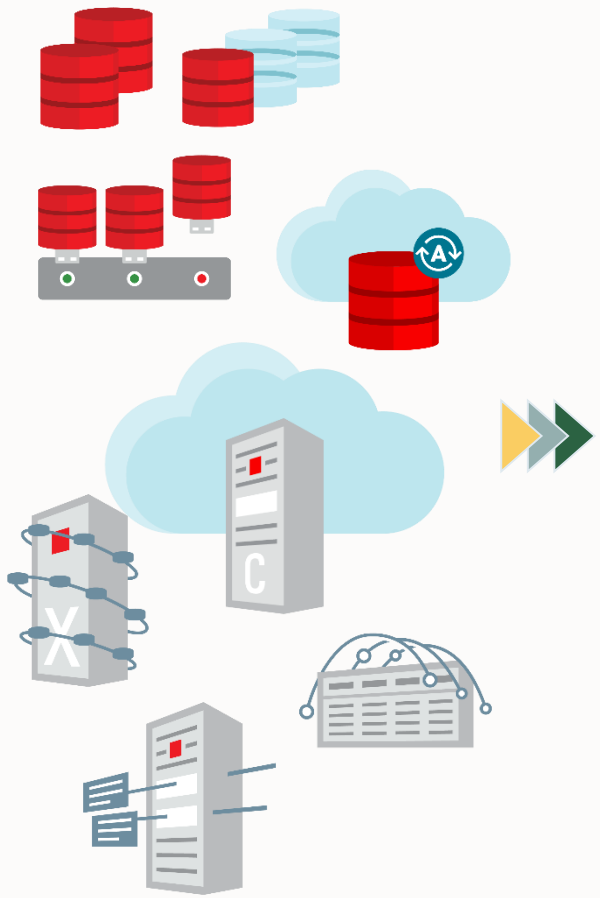
Modern Data Center Challenges

Creating databases is complex and time consuming

Ever increasing demand for resources

Database maintenance challenges

Monitoring, Management and Control for Oracle Database and Engineered Systems: Enterprise Manager

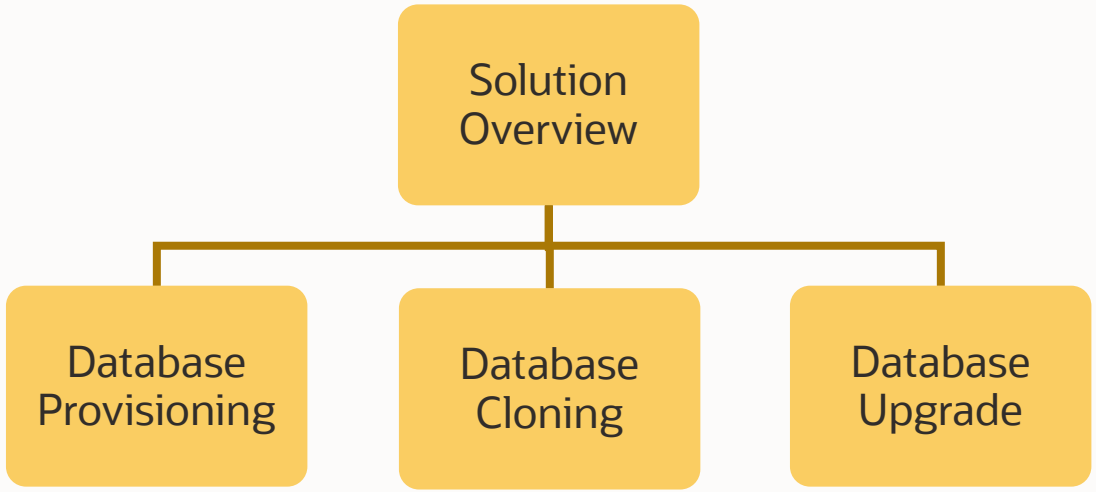


ORACLE
Enterprise Manager

- Comprehensive management for Oracle Database and Oracle Engineered Systems
- Fleet-wide automation and visibility across Oracle cloud and on-premises assets
- Centralized control of integrated diagnostic, tuning and lifecycle activities

Database Provisioning

Database Provisioning Overview



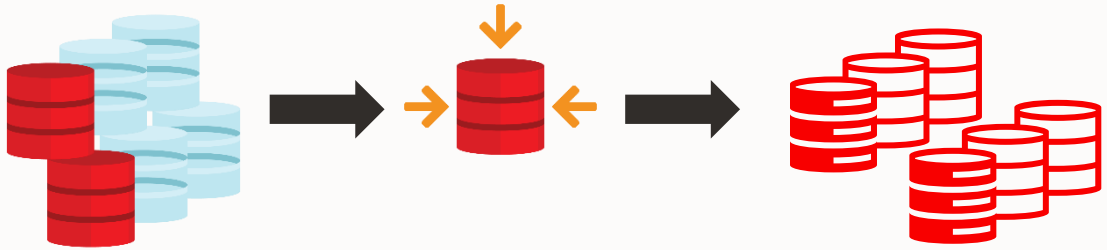
- Standardize database deployment for configuration and compliance
- Automate Database Lifecycle Management
- Provisioning, Cloning and Upgrade
- Enhance consolidation for Oracle Database
- Multitenant Lifecycle Management
- Oracle Database up to 19c
- Multitenant lifecycle management for on premise and OCI data centers

Database Provisioning: Building Blocks

- Gold Image based cloning and software deployment via Profiles
- Rapid provisioning made easy with mass deployment of Oracle Software such as Clusterware, Database, Client
- Deployment Procedures provide highly customizable orchestration engine.
- Lock down access for controlled and error free deployments

Save **Gold** image (and optionally data) from source systems to EM software library

Deploy saved Image and data to target systems with customizations

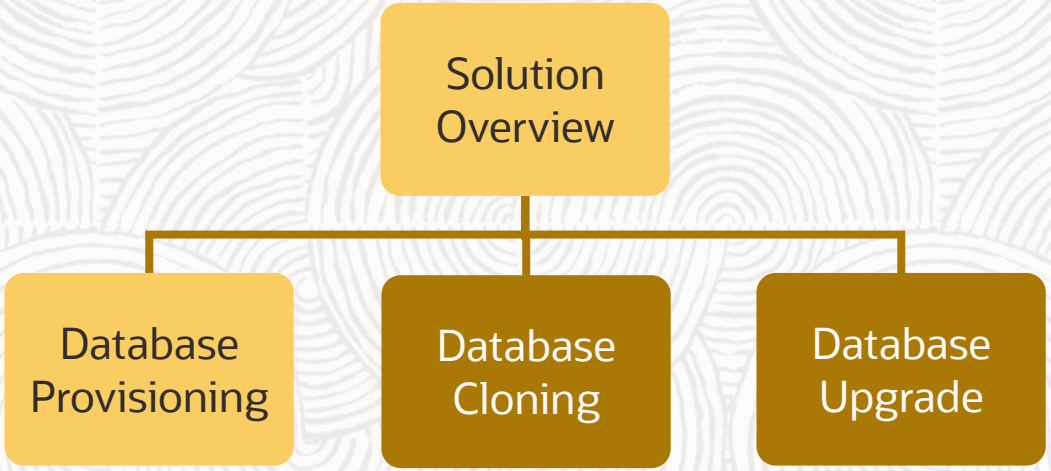


Source DB systems

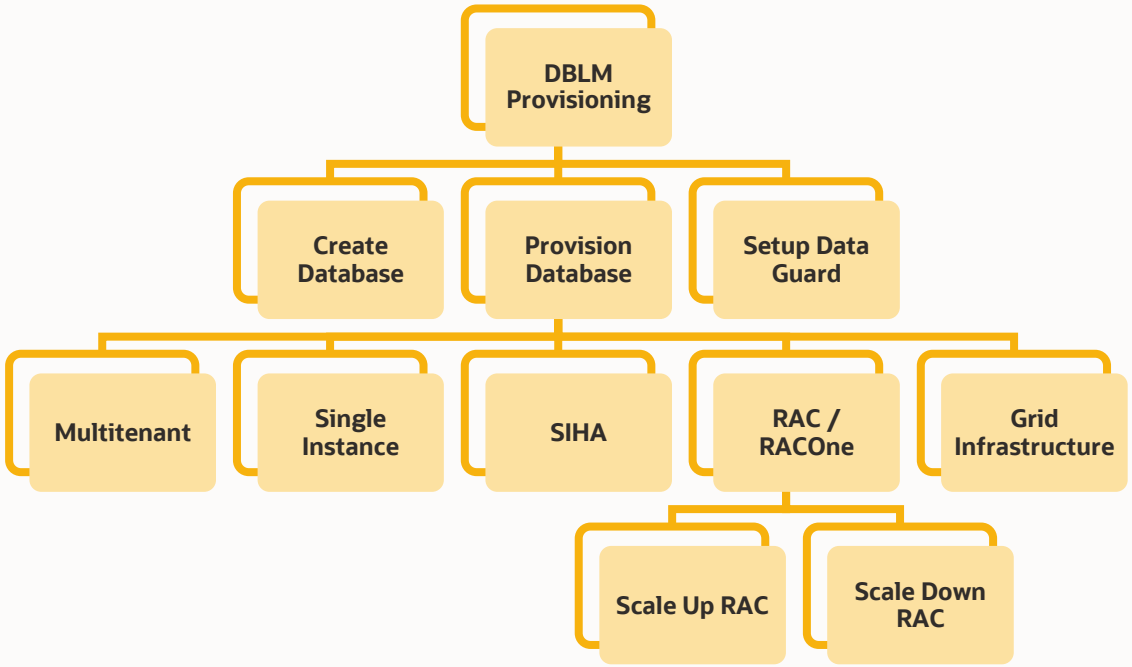
Software Library Storage

Target DB Systems

Deep Dive – Database Provisioning



Provisioning Solutions Landscape



- Complete Automation for mass deployment of Oracle Software
- Data Centre Standardization with Gold Images and Profiles
- Consolidation of non CDB to PDB using DB Migration workflows
- Lock down access for controlled and error-free deployments
- Flexibility with customized Deployment Procedures

Use Case 1 - Multitenant Lifecycle Management

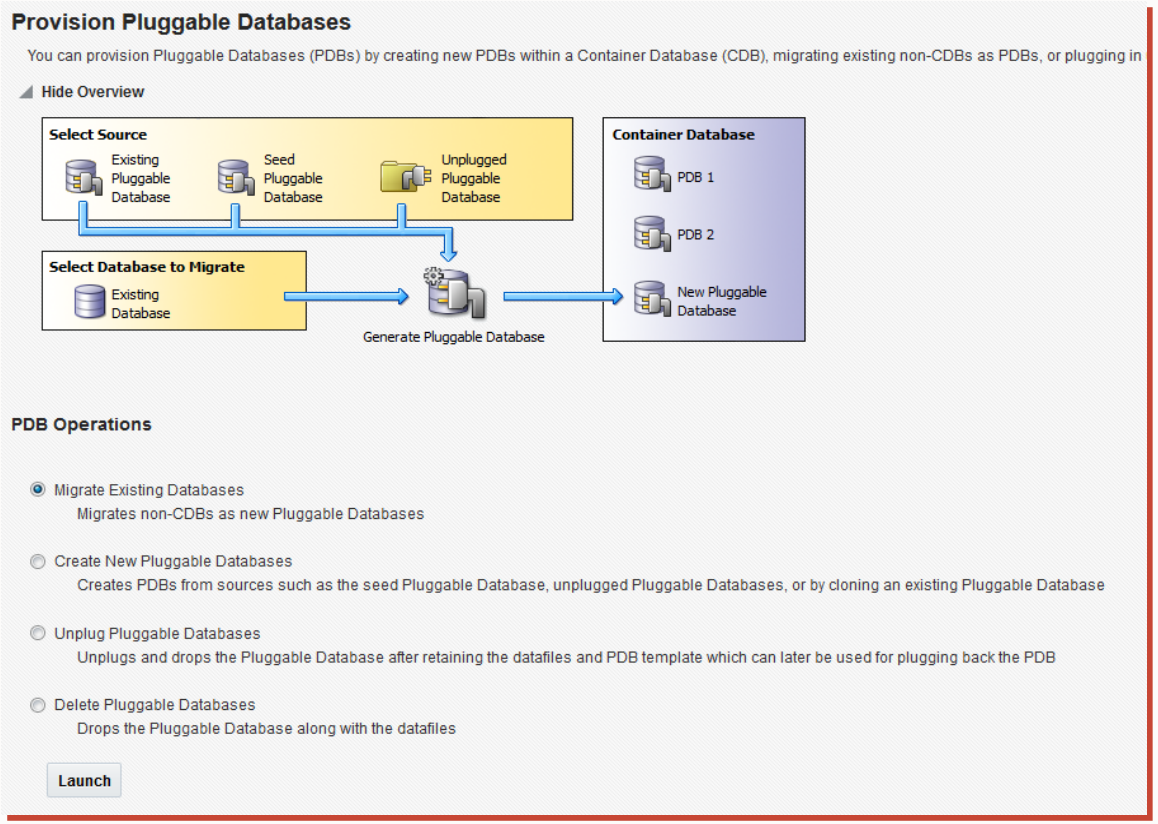
Use Case

- Customer has database estate comprising 1,000s of multitenant databases
- They want
  - Automated provisioning of new multitenant for agile development
  - Quick cloning for functional testing
  - Faster way to test upgrade scenarios

Solution

- PDB Lifecycle Management in Enterprise Manager caters to all the requirements of the customer
  - PDBs can be easily provisioned and managed from the UI and EMCLI
  - Feature to provision/clone multiple PDBs at once to reduce time taken to complete the activity

Multitenant Lifecycle Management



Migrate Non-CDB to PDB OR Create New PDB

Clone PDB

Unplug PDB

Plug-in PDB

Drop PDB

Agile Development

Functional Testing

Upgrade Testing

Use Case 2 – Move to Multitenant from Non-CDB

Use Case

- Customer wants to migrate non-container to multi-tenant as a PDB
- With Source as Oracle 12.2 and Destination as Oracle 19c
- Include multiple configurations - SI, RAC or RAC One Node

Pre-requisite for the Source DB – Local Undo & Archive Log Mode

Solution

Clone Non-CDB to PDB using a DB Link

- Upgrade the database while migrating to a PDB
- Supports all the source configuration such as SI/RAC or RAC One

EMCLI:

emcli db_clone_management <command> <options>

<command>: {-createFullClonePDB | -createFullClone | -createTestMaster |

-createCloneDB | -createSnapClone | -createSnapshotClone |

-enableTestMaster | -disableTestMaster | -refreshDatabase |

-deleteDatabase | -listClones | -listTestMasters |

-listDatabaseBackups | -listDatabaseSnapshots}

Move to Multitenant from Non-CDB

Clone as PDB

Clone as PDB

- Plugs in a Non-CDB via a database link followed by upgrade and finally convert it to a PDB using noncdb_to_pdb.sql
- Supports migration from a lower version non-CDB to a higher version PDB

Data Pump TTS with RMAN

Minimum Downtime Method

- Prepare - Level 0 RMAN backup for non-CDBs
- Final - consistent final incremental backup for non-CDBs, create PDBs, import datafiles to complete the migration process

Data Pump TTS

Data Pump Full TTS

Uses Oracle Data Pump Full Transportable Export and Import to export data from a non-CDB and import into a newly created PDB

For use cases wherein databases sizes are small

Use Case 3 – Automate and Standardize Single Instance & RAC Deployments

Use Case

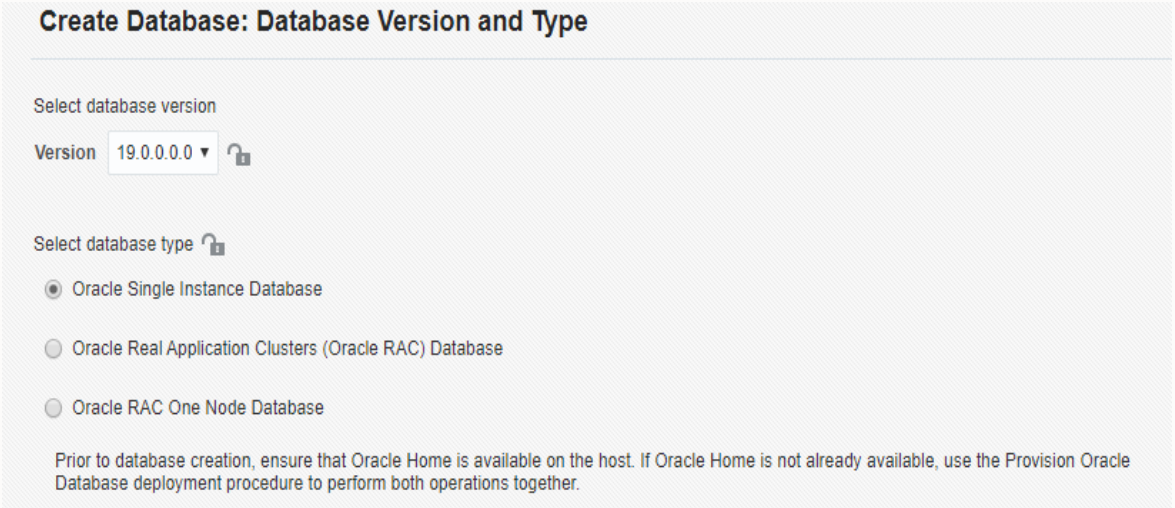
- Customer wants to install and manage multiple Single Instance and RAC databases
- They want to
  - Automate complete deployment
  - Standardize deployment for configuration and compliance
  - Integrate workflow with ticketing systems in data center

Solution

- Deploy Single Instance Database and Grid Infra via Deployment procedures
- Use of Database Templates to standardize database deployment and maintain consistency
- Role based granular access on provisioning
- EMCLI support for the deployment procedures
- ASM or Filesystem based storage options

Automate and Standardize Single Instance & RAC Deployments

- Provision RAC and RAC 1-Node
- Scale-up RAC nodes
- Scale-down or delete RAC nodes
- RAC Gold Image for faster provisioning
- Unified Experience across all platforms : Exadata, On-Premise Data Cente



Demo

Provision a Single Instance DB using Deployment Procedure

Use Case 4 – Simplify Disaster Recovery using Data Guard

Use Case

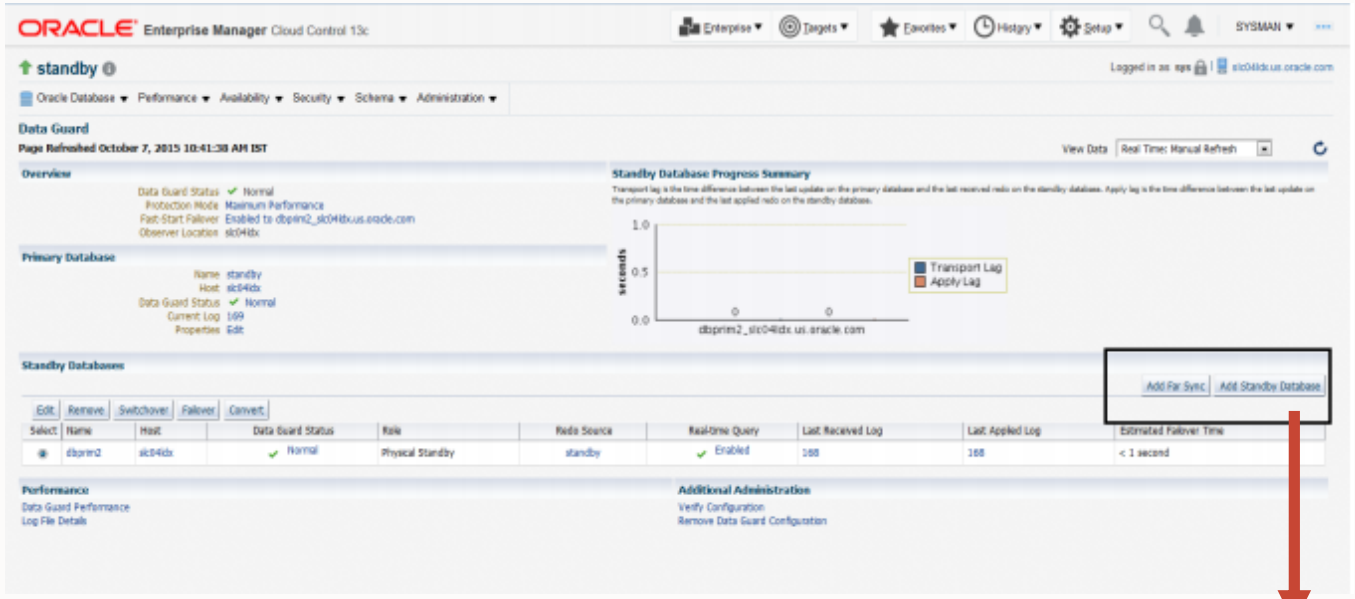
- Customer wants to setup Data Guard for Oracle Database which is TDE enabled
- Source configuration has different versions from 12.1.0.2 to 19c
- Standby database configuration to be Physical Standby or Logical Standby

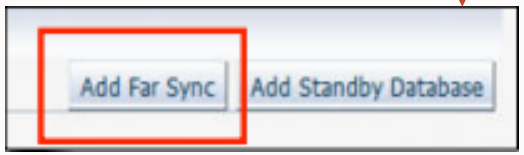
Solution

- Setup Data Guard in a seamless way using Standby setup flow
- TDE support for Primary database as well as Standby
- Easily customizable Standby database configuration from the UI

Use Case 4 – Simplify Disaster Recovery using Data Guard

- Creation of Far Sync Instance support
- REST APIs to Switchover and Convert Standby Database, FSFO and Observer targets
- Data Guard Broker support





*REST API Reference

Use Case 5 - Virtualized Exadata Database Provisioning

Use Case

Customer has large Exadata estate

DBA wants to

- Create Database Cluster on Virtualized Exadata and manage end to end from single pane
- Easily scale up and scale down the database cluster as required

Solution

Virtualized Plugin to discover and configure Exadata in a virtualized mode

- Physical Server, Dom0, DomU
- Exadata Storage Server
- Infiniband Switches and Compute nodes ILOM and PDU

Ability to administer RAC Clusters on Exadata Database Machine

Use Case 6 – Self Service for DevOps

Use Case

Customer's DBA team spends substantial time to address day-to-day tickets to provision or clone databases.

They want to

- Provide ability for devops user to create and manage databases through service catalog
- Control resource usage and grant quota for devops
- Setup policies for accessing service and create new resources

Solution

Use Enterprise Manager's Database as a Service to provide Self Service experience for devops

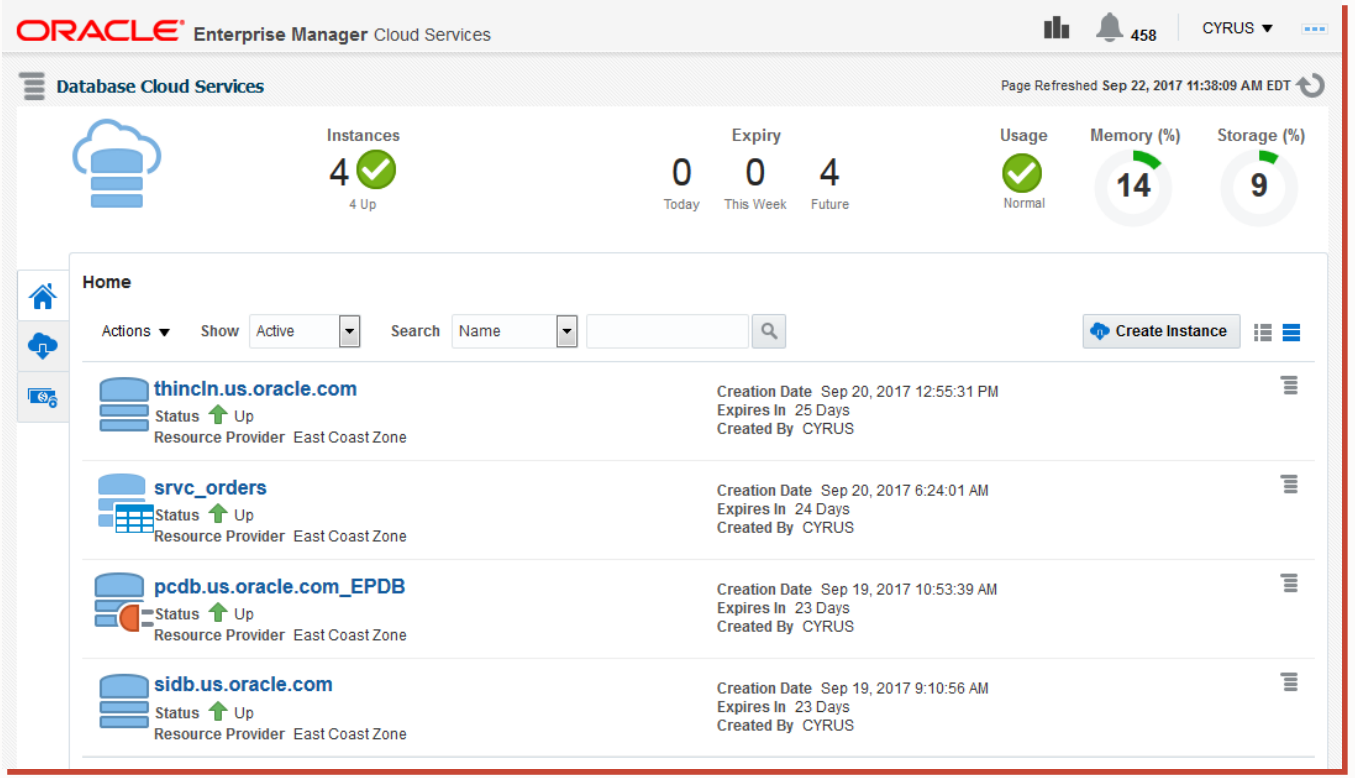
To setup Self Service Portal DBA defines -

- Zone and Pool to group resources
- Service Catalog to standardize database deployments
- Quota for user groups
- Access privileges for service catalog and specific features

Use Case 6 - Self Service for DevOps (Database as a Service)

Self Service features for devops

- Provision databases
  - Data Guard
  - Non-Container DB
  - Container DB
  - Empty PDB
  - PDB with Schema
  - PDB using SSA user data profiles
- Clone and Relocate
- Patch and Upgrade



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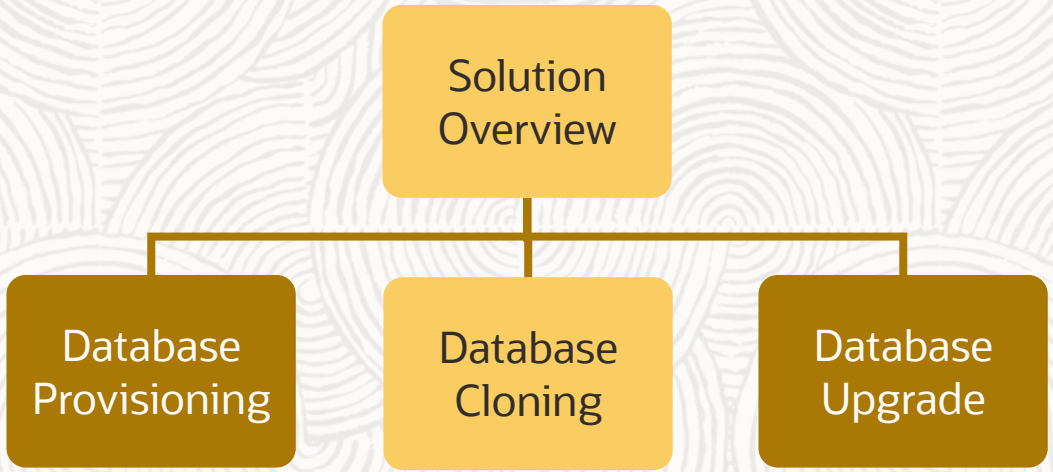
Standardise, Automate, Consolidate and Optimise

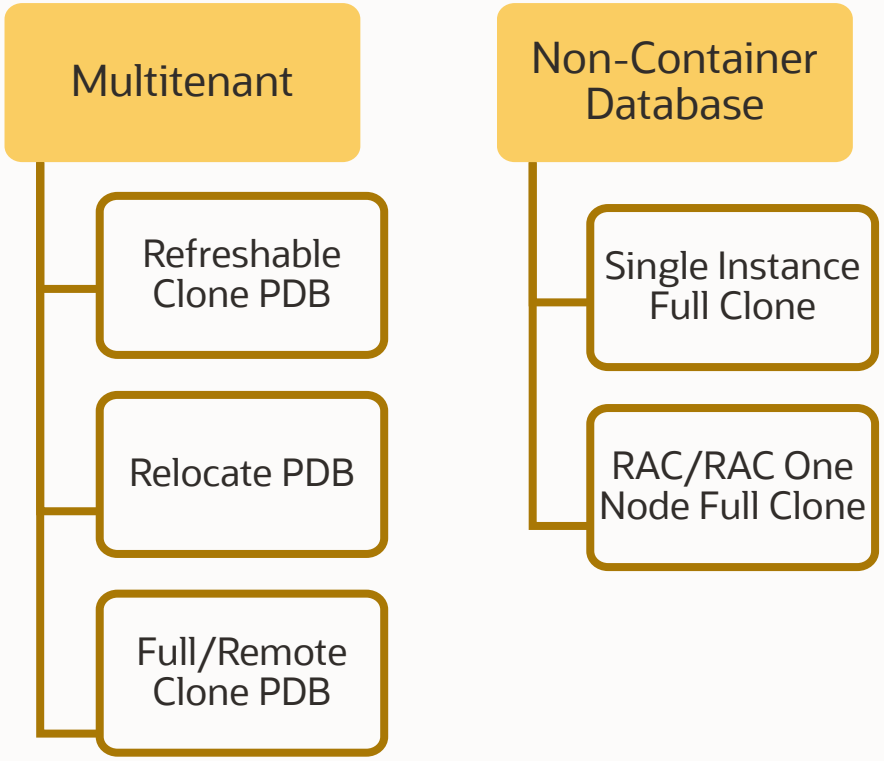
An Overview to Cloning and Self Service

Abilash Rengasamy
Senior Product Manager

Database Cloning



Cloning Solutions Landscape



- Complete Clone Management for all database configurations
- Single Clone Wizard to manage all the Clones
- Inventory management of the Database Clones catering to different needs

Use Case 7 – Replicate Data for Reporting Purpose (Refreshable Clone)

Use Case

- Customer wants to have a reporting PDB where financial recon reports would be run
- PDB has to refreshed at frequent intervals as per need

Solution

- User can use Refreshable Clone feature in Enterprise Manager to replicate data from Production database
- Refresh can be triggered manually as per the requirement from the user
- Beneficial for Off load reporting queries from Production PDB so reduce the load

Use Case 8 – Minimal Downtime PDB Migration (Relocate)

Use Case

- Customer wants to move the PDB from One production server to another
- Movement of PDB should be seamless without having manual changes
- Requirement is also to have the PDB upgraded from lower version to higher version

Solution

- Relocate PDB feature can be used to move a PDB from one Container to another Container database
- The feature minimizes the downtime when migrating from source to destination using
  - Maximum Availability Or
  - Performance mode

Use Case 9 – Full Clone PDB for Dev/UAT Testing

Use Case

- Customer wants a copy of the Production PDB in the same container database as well as copy in a different Container database
- Dev and UAT teams to work on the Cloned copy of the PDB rather than the actual Production PDB
- Requirement is also to create multiple clones at the same time

Solution

- Full Clone PDB feature can be used to fulfil this requirement
- Multiple Clone copies can be created at one go
- Clone operations can be scheduled as per requirement to streamline the process

Use Case 10 – Create Full Clone of CDB/Non-CDB

Use Case

- Customer wants to have a copy of their Non-Container database
- The configuration of the database is Single Instance, RAC and also RAC One node across multiple servers
- User would also want to have point in time restore from older backups

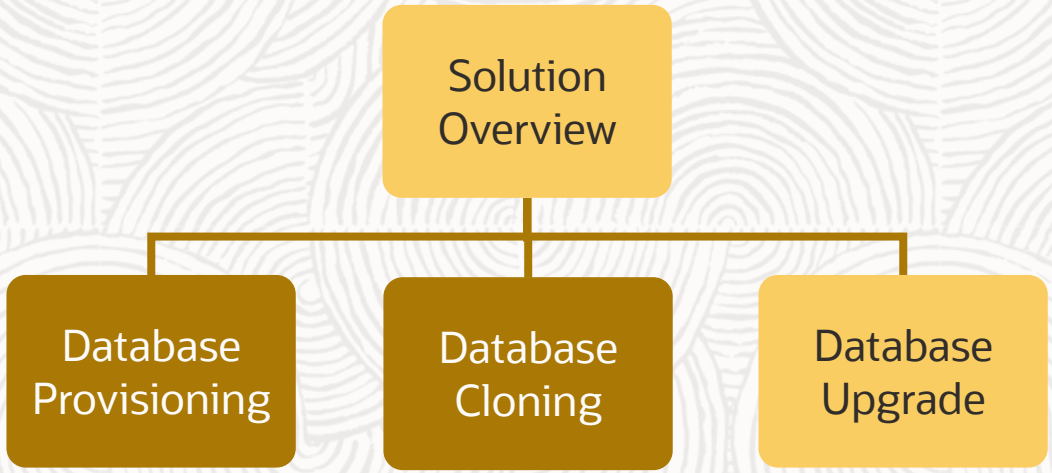
Solution

- Full Clone a Non-CDB or a CDB
  - Single Instance
  - RAC
  - RAC One Node
- Flexibility using pre and post script
- Point in time restore from previous backups

Demo

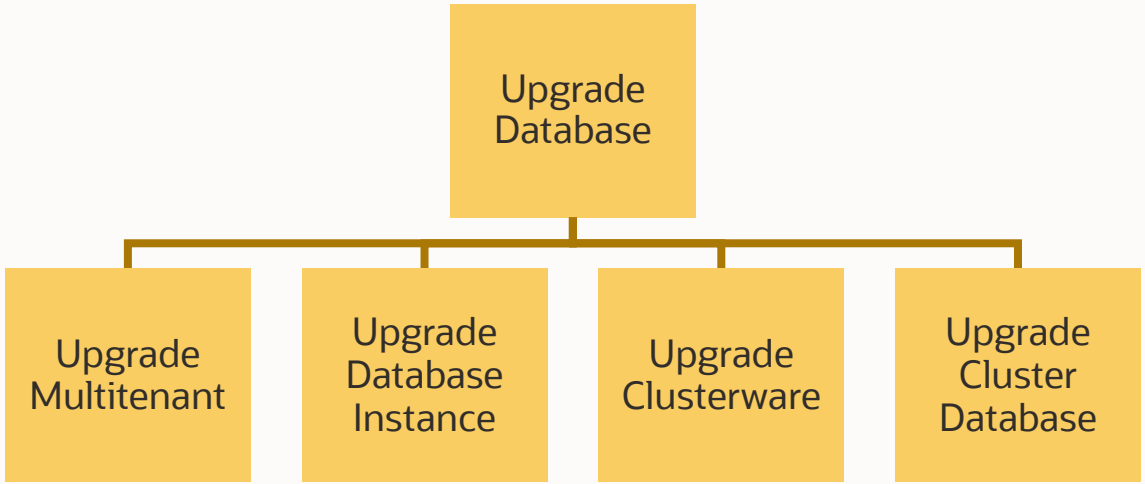
Refreshable Clone PDB

Database Upgrade



Use Case 11 - Database Upgrade

- Mass Upgrade of Oracle Databases
- Database Upgradability Report for RAC Databases to check the readiness for Upgrade
- Standardize deployment procedures for upgrades
- Data Guard Rolling Upgrade for targets with Standby configuration
- Support for various target types such as Multitenant/SI/SIHA/RAC/RAC One



Use Case 12 – Fleet Maintenance

Features

- Patch and Upgrade entire database estate with minimal downtime
- The subscription based model enables updates at scale across your entire database estate
- Total Control, centralized, Self service maintenance

Supported Configurations

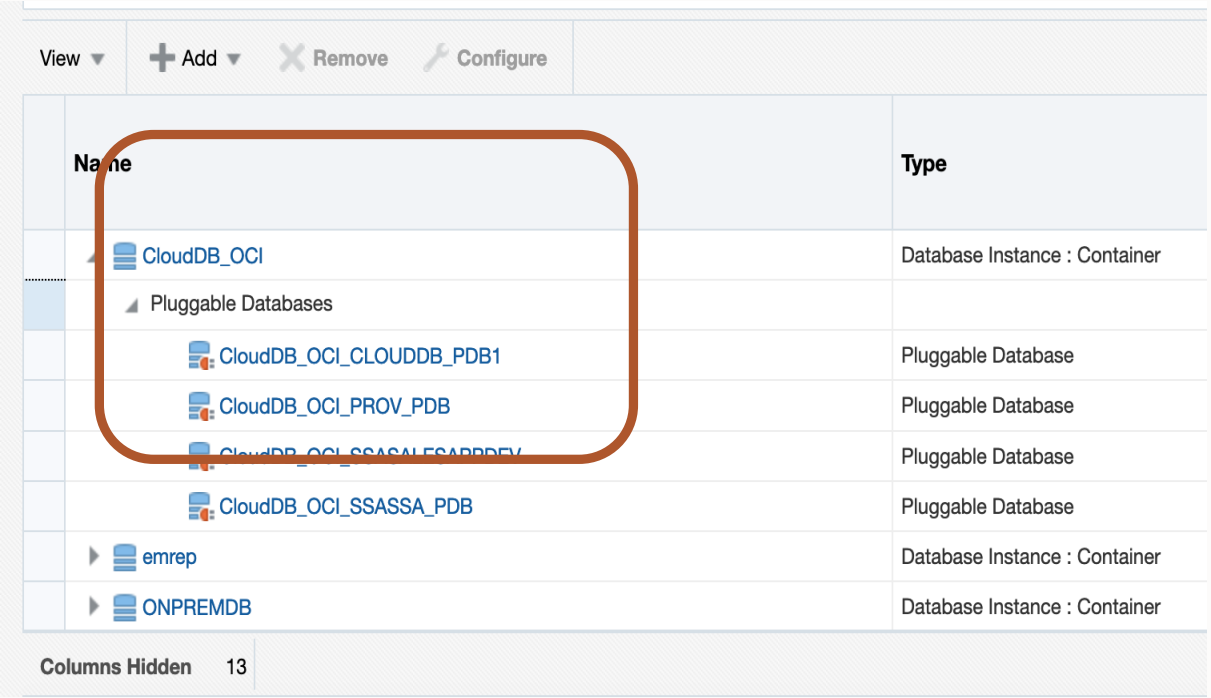
- RAC Oracle Homes and associated databases
- Grid Infrastructure Homes and associated Grid Instances
- Oracle Multitenant DBs (Container and Pluggable)
- Standby databases (single instance and RAC)

Integration with Oracle Cloud (OCI)

EM for Oracle Cloud (OCI) Database Cloud Service (DBCS)

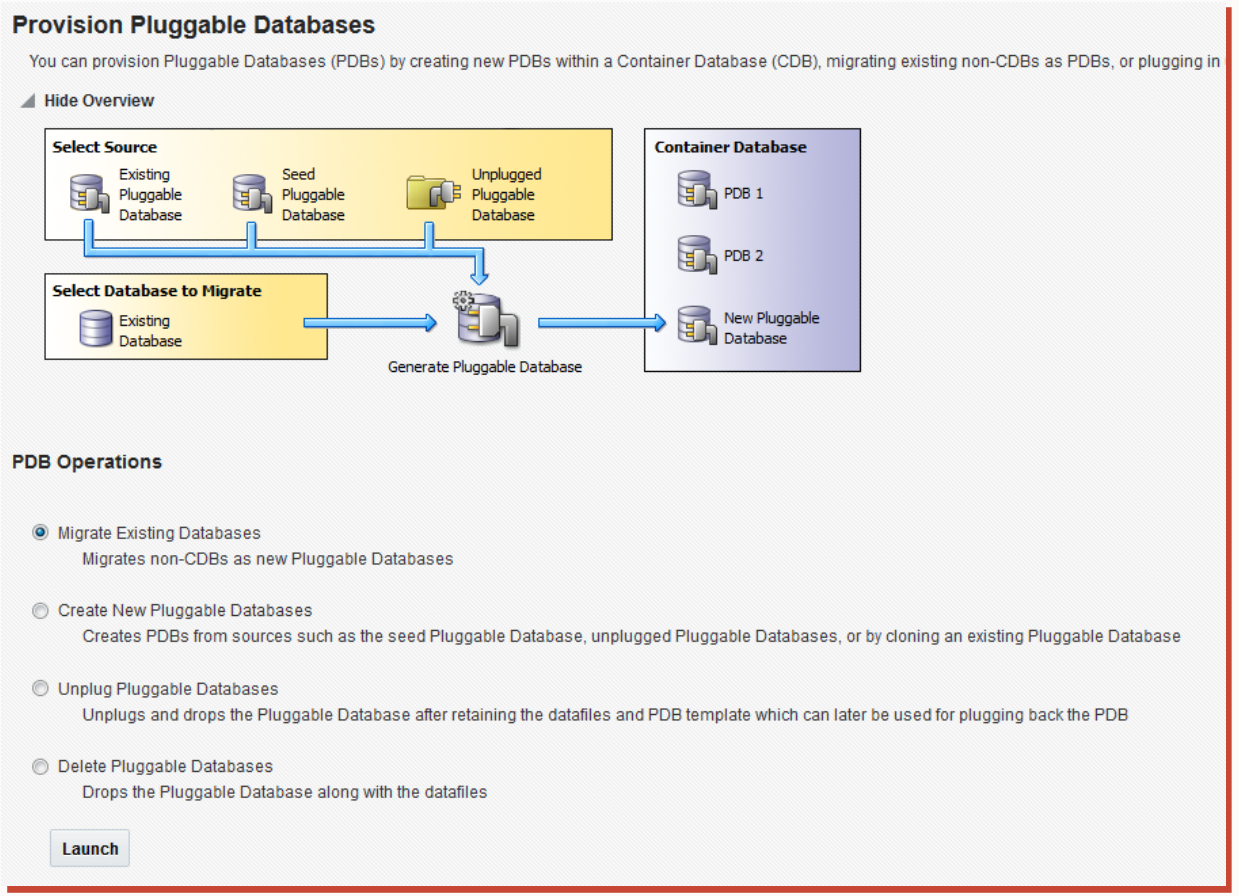
Manage Databases running in OCI DBCS

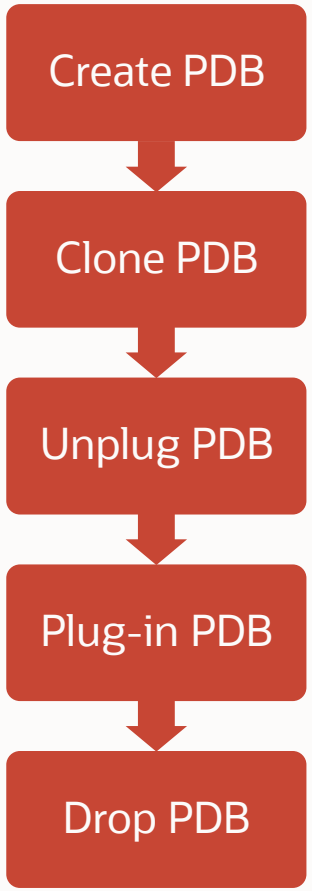
- On-premise EM or Marketplace EM
- Discover DBCS running on VM/BM
  - Deploy EM agent on host where OCI DB System is running
  - Discover CDB within DB System in EM
  - Requires OCI Connectivity
- Use DBLM and CMP features to manage pluggable databases.



OCI Database Discovered in EM

Complete Pluggable Database Lifecycle for OCI

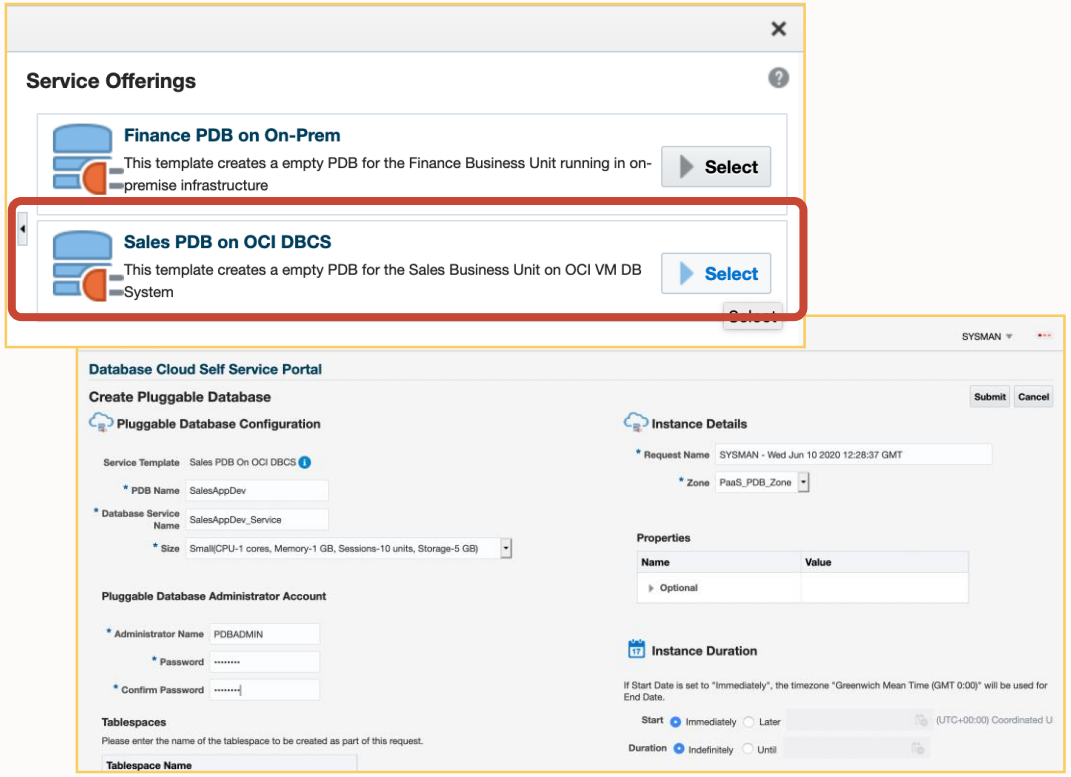




Hybrid Pluggable Database as a Service

Provision PDB in On-premise and OCI from Self Service Portal

- Unified User Experience
  - Same set of inputs for provisioning a PDB in on-premise and OCI data center.
- Simplified Automated Provisioning
  - Administrator grants policy based access.
  - End user do not need infrastructure/network knowledge to provision a PDB.
- Quota Management for User
  - Supplement OCI's compartment level quota by EM's user level quota management
- Centralized Control of Self Service Model
  - Administrator uses privilege delegation to control user accounts.



Provisioning PDB on OCI DBCS on VM

Demo

Hybrid Pluggable Database as a Service

Customer References

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

Announced In Jan 2020

Oracle Enterprise Manager 13.4

Manage the entire on-premises and cloud Oracle software at scale with less effort

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

Available Updates:

EM 13.4 RU1 (April 2020)

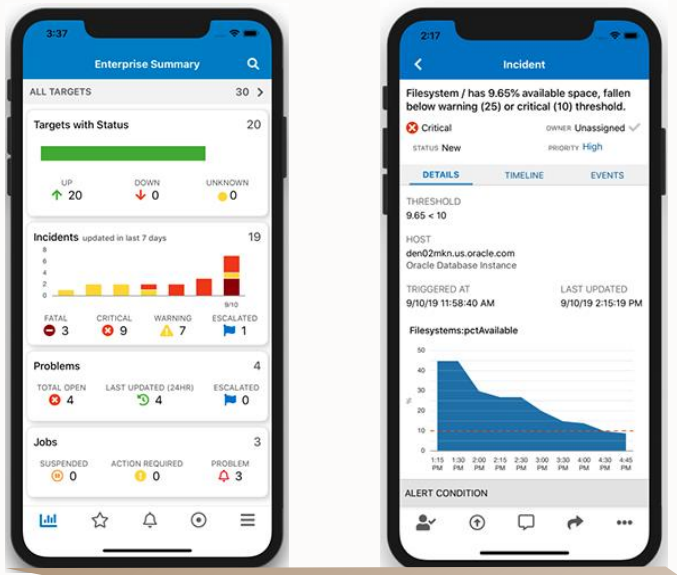
EM 13.4 RU2 (May 2020)

EM 13.4 RU3 (June 2020)

EM 13.4 RU4 (July 2020)

Enterprise-Grade Framework: Secure, Accessible and Extensible

Access via NEW Mobile App



Access from Grafana via new Plug-In

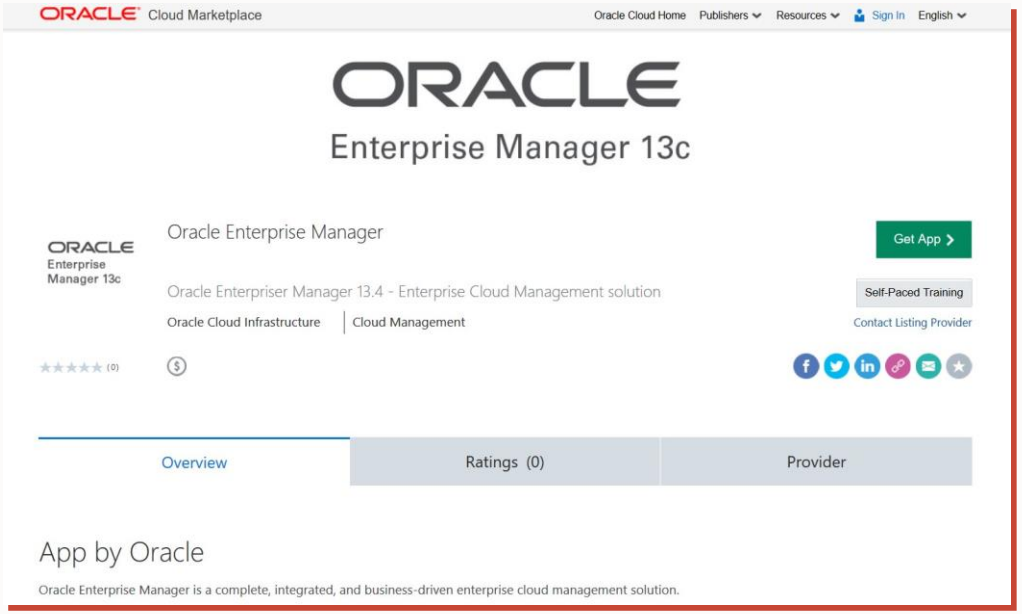
Enterprise Manager in Oracle Cloud Marketplace

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



Spring 2020 Update:
EM 13.4 RU1 (April 2020)
Database 19.6 (Multitenant with RAC)
Oracle Linux 7.7

Learn More

[EM Blog]
[Provisioning Webcast]

[EM OCI Marketplace]
[NEW! multi-node OMS for Level 3 High Availability]

[EM Workshop]
[Enterprise Manager Workshop on OCI Marketplace]

[Webcasts]
[Oracle Enterprise Manager Deep-Dive Webcasts]

Thank you