

DB Lifecycle Automation using EM

Provisioning, Patching, Compliance



Overview

The objective of this lab is to highlight the Oracle Enterprise Manager Cloud Control 13c's lifecycle management capabilities around multitenant database and show how database organization can begin their cloud journey with multitenant database requesting a pluggable database for testing purposes and perform other lifecycle operations like clone, unplug etc. We will also focus on setting up private cloud for PDB's and highlighting the ease of provisioning, resizing and even deleting a PDB using a self-service option.

Mapping User Roles in the Organization



**Senior DBA /
Designer**



**Junior DBA /
Operator**

Hands on Lab Content

The estimated time to complete the lab exercise is between 50-60 minutes.

No	Feature	Approx Time	Details	Value proposition
1.1	Requesting a Pluggable Database (PDB)	10 minutes	Creation Pluggable database (PDB's) within a CDB and run a post-script to lock/unlock accounts.	Create multiple PDB's with few clicks while making sure they follow organization's standards by using automated post-scripts.
1.2	Un-Plug a Pluggable Database and then Plug it back (create from unplugged)	10 minutes	Un-plug a PDB and later Plug it back in a CDB when needed	Unplug a PDB when not needed and plug it back as per need hence maximizing resource utilization in your organization. Easily upgrade PDB's with few clicks by moving from one container to another.
1.3	Creating Pluggable Database PDB Full Clone	5 minutes	Create multiple copies (Clones) of a PDB to dev/test purpose	Create multiple PDB's clones for Dev/test with few clicks while making sure they follow organization's standards by using automated post-scripts.
1.4	Compliance for PDB	10 minutes	Apply a compliance standard on PDB and use corrective action to fix the violation	Make sure PDB's comply to compliance standards and fix them with a click of a button if there is any anomaly.
2.1	Use Self-service to request a PDB using PDBaaS (Private Cloud)	10 minutes	Request PDB pluggable database using Service Catalog. Resize the PDB and then Delete the PDB while preserving the contents.	Review self-service option to provision PDB, which only requires minimal inputs.
2.2	Administrative Setup for PDBaaS(Private Cloud)- Review only	10 minutes	An overview of the administrative setup involved for PDBaaS which includes setting up a PaaS Infrastructure Zone, Pluggable Database Pool, Data Sources, Service Template, etc.,	Setup private cloud using Enterprise Manager where admin can define resources and EM's placement algorithm makes sure that resources are utilized to their best. It is complimented by metering, and show back/chargeback capabilities.

Know your environment

This is a self-sufficient environment with Enterprise Manager 13.3 as well as all Database targets running on a single Virtual Machine.

OMS URL	https://<public Ip address>:7803/em
EM Credentials	Username: sysman Password: welcome1 Self –Service User: Username: CYRUS Password: welcome1
Database (CDB)	CDB186 (18.8) Sales (18.3)
DB Credentials	Name Credential as specified in use case or use sys/welcome1
Host Credentials	Login as OPC user using your private key Login to root if needed: sudo –s (from opc user) Login to oracle if needed: su – oracle (password : Commit12#)
Startup Scripts	All scripts are in /home/oracle

Create Pluggable database

1. Log into your Enterprise Manager VM using the IP provided on your cheat sheet. The Enterprise Manager credentials are “**sysman/welcome1**”.
2. **Navigate** to the “Enterprise menu > Provisioning and Patching > Database provisioning”.

The screenshot shows the Oracle Enterprise Manager Cloud Control 13c interface. The top navigation bar includes 'Enterprise', 'Targets', 'Favorites', 'History', 'Setup', and a search icon. The left sidebar shows a tree view with 'Enterprise' expanded, and 'Provisioning and Patching' highlighted. The main content area shows the 'Database Provisioning' page, which includes a 'Summary' tab, a 'Compliance Summary' section, and a 'Related Links' section. The 'Related Links' section contains a link to 'Provision Pluggable Databases'.

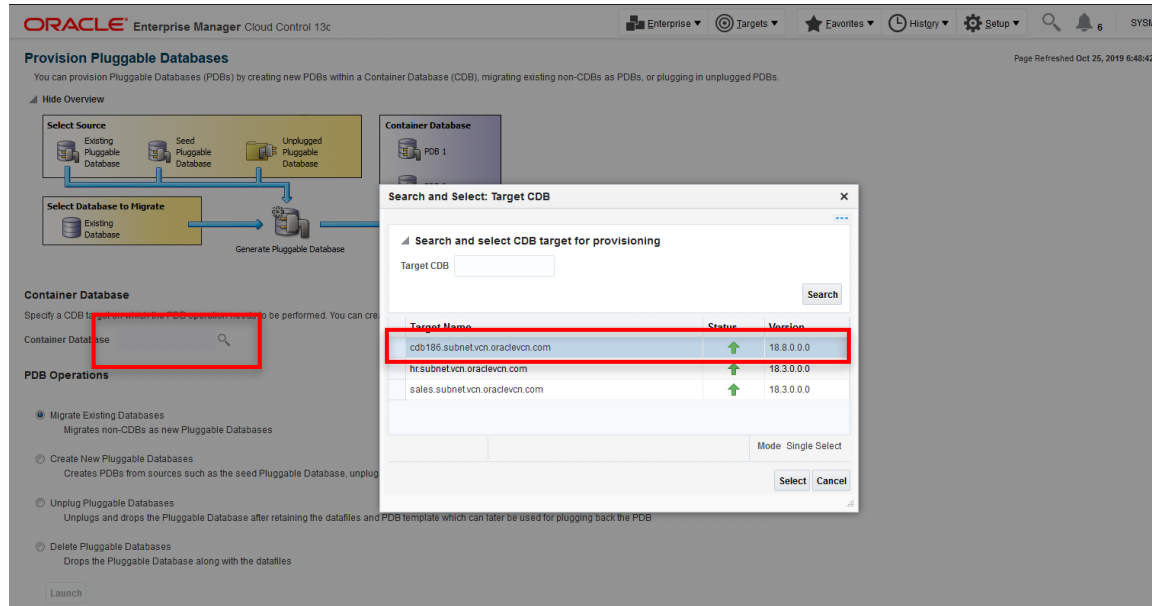
3. In the Database Provisioning page, in the Related Links section of the left menu pane, **click** “Provision Pluggable Databases”

The screenshot shows the Oracle Enterprise Manager Cloud Control 13c interface, specifically the 'Database Provisioning' page. The left sidebar contains a 'Related Links' section with a link to 'Provision Pluggable Databases' highlighted. The main content area displays a table of 'Profiles' and a section for 'Deployment Procedures'.

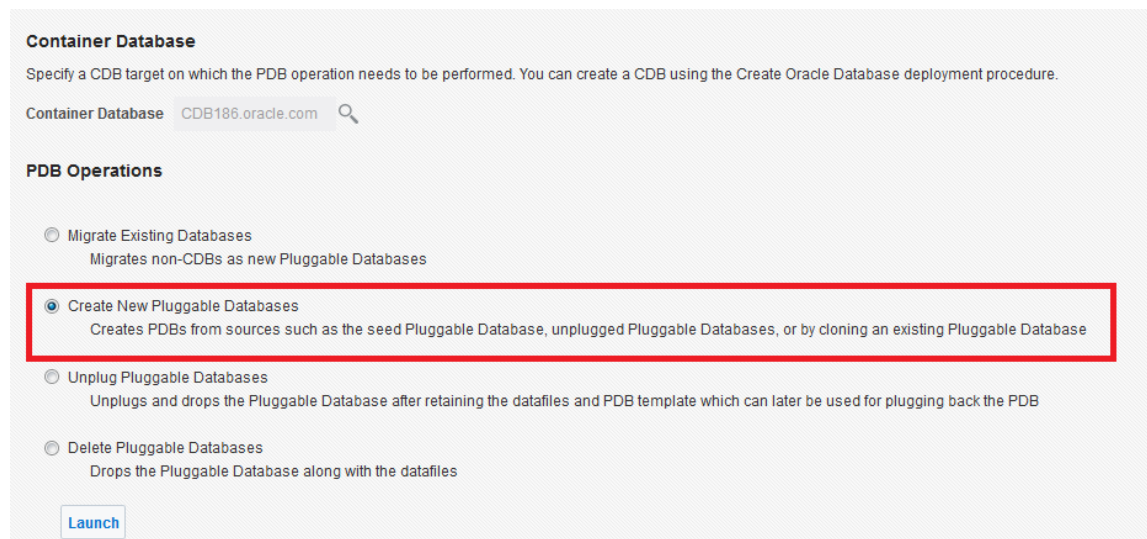
Profile Name	Description
Database emrep.us.oracle.com Profile 23-10-2019 08:2...	Database Reference Profile 23-10-2019 08:20 PM from emrep.us.oracle.com Version : 19.3.0.0.0
Database test.subnetvcn.oraclevcn.com Profile 24-10-2...	Database Reference Profile 24-10-2019 02:01 PM from test.subnetvcn.oraclevcn.com Version : 18.3.0.0.0
Database HR.subnetvcn.oraclevcn.com Profile 22-10-2...	Container Database Reference Profile 22-10-2019 03:09 PM from hr.subnetvcn.oraclevcn.com Version : 18.3.0.0.0
Database test.subnetvcn.oraclevcn.com Profile 24-10-2...	Database Reference Profile 24-10-2019 01:49 PM from test.subnetvcn.oraclevcn.com Version : 18.3.0.0.0

Procedure Name	Description
Data Masking for Fusion SaaS POD	Data Masking deployment procedure to run
Provision Oracle Database Client	This procedure installs or clones a databas
Provision Oracle Database	This procedure provisions the Oracle Grid I
Upgrade Oracle Restart	This procedure upgrade Oracle Restart 11g
Upgrade Oracle Database	Procedure to upgrade Single Instance Data

4. In the Provision Pluggable Database Console, in the **Container Database** section, **select** the CDB (**CDB186 – 18.8 version**) within which you want to create new PDBs.



5. In the PDB Operations section, **select** Create Pluggable Databases , **Click** Launch



6. Use the named credentials (CDB186_SYS) for login

ORACLE® Enterprise Manager Cloud Control 13c

↑ **cdb186.subnet.vcn.oraclevcn.com (Container Databases...)**

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

Database Login

* Database: cdb186.subnet.vcn.oraclevcn.com

Credential: ☒ Named ☐ New

Credential Name: **CDB186_SYS**

Attribute: User:sys Scope:CRED_SCOPE_INSTANCE Name:SYSMAN-CDB186_SYS

Credential Details	
Username	sys
Password	*****
Role	sysdba

[More Details](#)

7. In the Source page of the Create Pluggable Database Wizard, in the Source Type section, select Create a new PDB . Select Named credentials “ORACLE”

Create Pluggable Database: Creation Options

PDB Creation Options

☒ **Create a New PDB**

☐ Plug an Unplugged PDB

☐ Clone an Existing PDB

☐ Full Clone ☒ Snap Clone

Source PDB:

Container Database Host Credentials

Specify credentials for host "oscworkshop.oracle.com".

Credential: ☐ Preferred ☒ **Named** ☐ New

Credential Name: **ORACLE**

Credential Details	
UserName	oracle
Password	*****

[More Details](#)

8. In the Identification page, **enter** a unique name for the PDB you are creating (your initial_pdb).
Optionally, **select** check box to “create multiple DBs” and put **2** as number of copies.
9. In the PDB Administrator section, **enter** the credentials of the admin user account you need to create for administering the PDB.

UserName: pdbadmin

Password: welcome1

Click Next.

Create Pluggable Database: Identification

PDB Name

A PDB name uniquely identifies a PDB in a CDB. The PDB name is also used as a service name and it is recommended to be unique across all CDBs on a host or cluster.

☒ Create Multiple Copies
Number of Copies

NOTE For multiple copies, PDB name is generated by appending sequence number (<PDB Name>#)

PDB Administrator

A PDB administrator is a local user with privileges to administer a PDB.

☒ Create PDB Administrator

Username

PDBADMIN

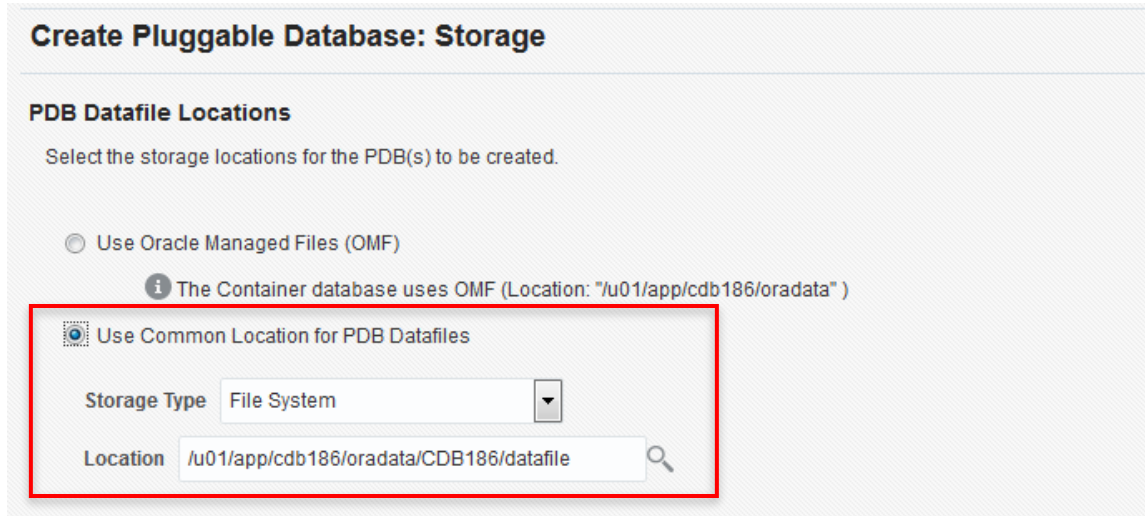
Password

••••••••

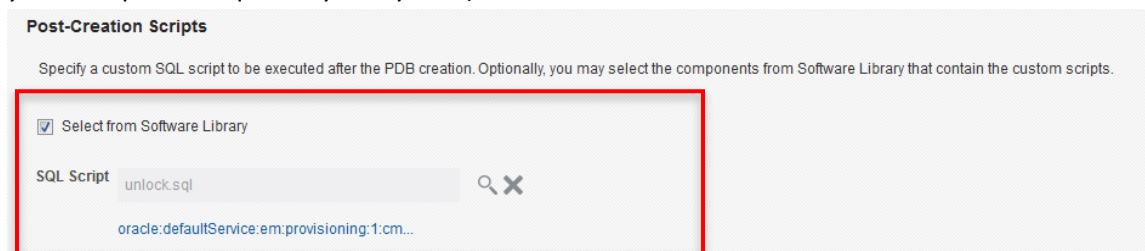
Confirm Password

••••••••

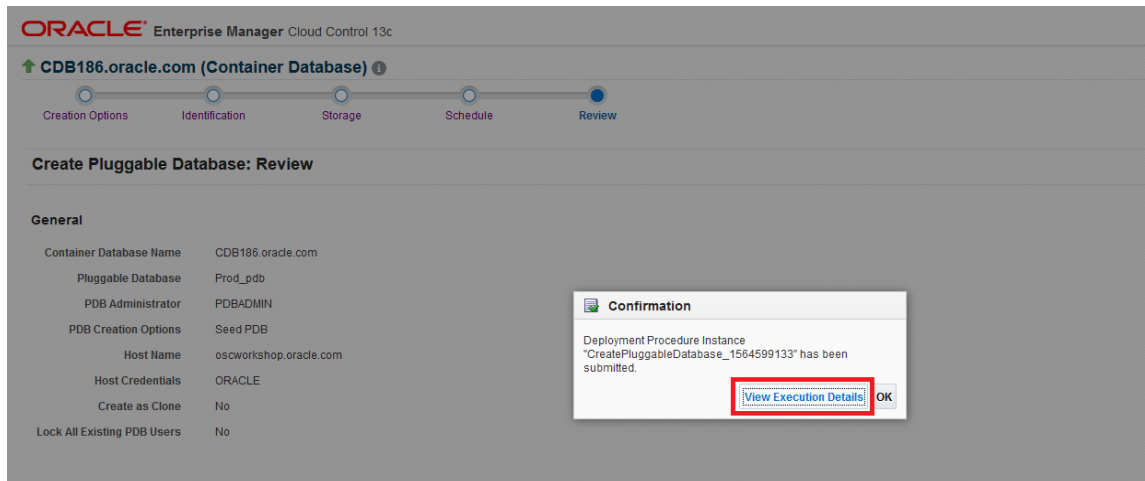
10. For storage option, **select** “Use Common Location for PDB Datafiles” and leave the defaults as-is.



Optionally, you may also want to select a post-script, which will run post creation of PDB. Choose “Select from software library” and then search for “**unlock**” and select unlock.sql (Or you can upload a sql from your system).

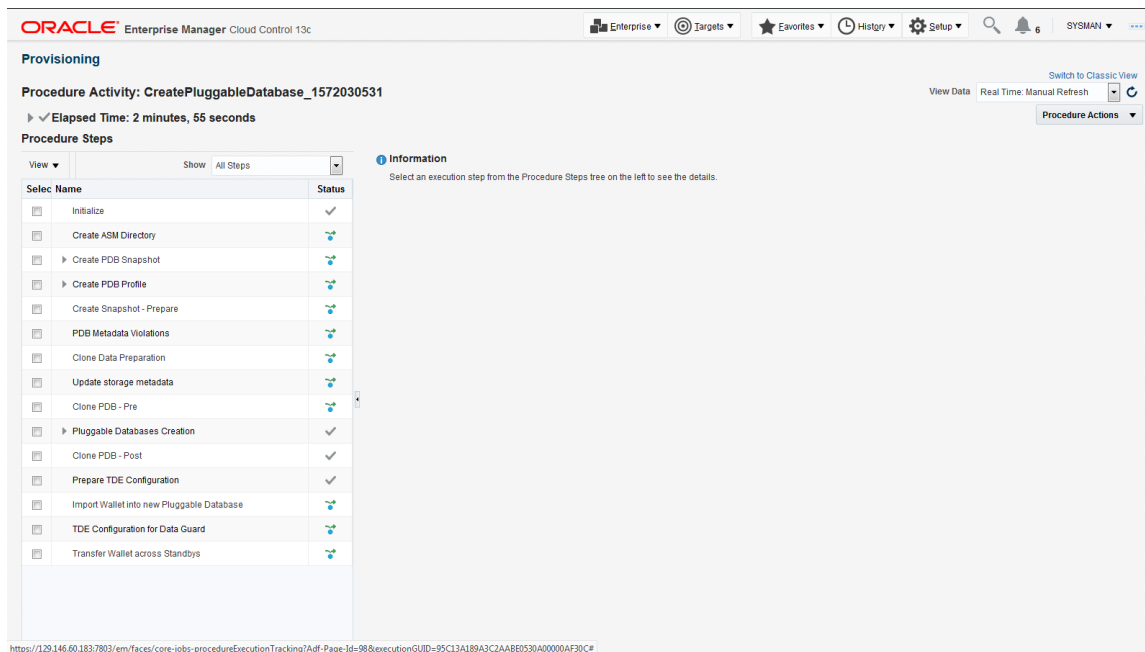


11. In the Schedule page, **select** immediately check box next to Start. **Click Next.**
12. **In the Review page, review the details you have provided for the deployment procedure.** If you are satisfied with the details, **click** Submit. You can now click on View Execution Details link to see details.



13. In the Procedure Activity page, view the status of the procedure.

Click the Status link for each step to view the details of the execution of each step.



Once the procedure is completed (takes about 3-5 mins), you can **Navigate to Targets > Databases, Click on CDB186** and you will see the newly created PDB

Databases

Performance ▼Availability ▼Security ▼Schema ▼Administration ▼

Auto Refresh Off

Page

View Database Load Map Search List

Search

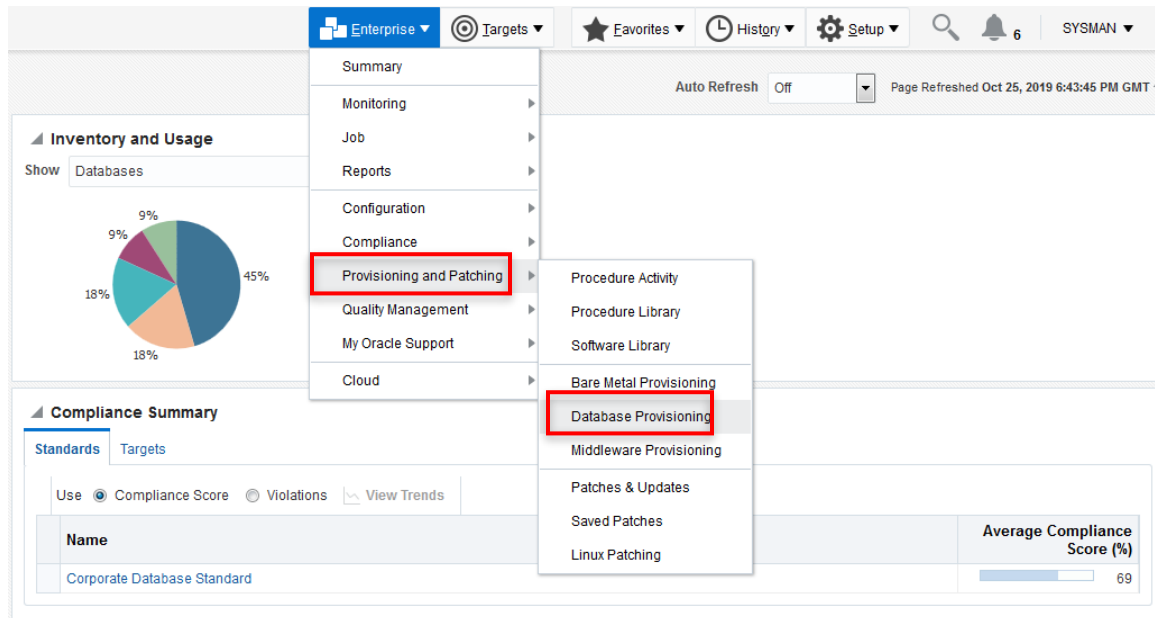
Find Name

View Add Remove Configure

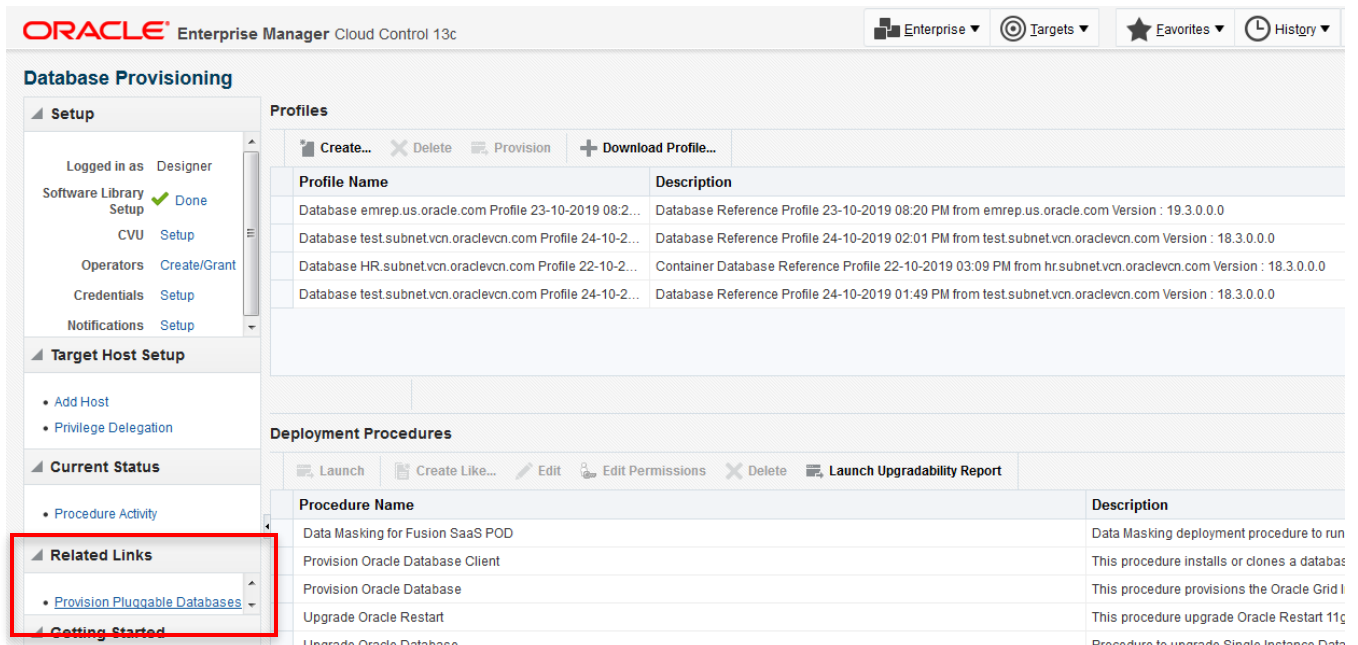
Name	Type	Status	Target Version	Incidents			Av Cc
cdbsubnet.vcn.oraclevcn.com	Database Instance : Container	↑	18.8.0.0.0	0	0	0	
Pluggable Databases		N/A		0	0	0	
cdbsubnet.vcn.oraclevcn.com_PROV_PDB1	Pluggable Database	↑	18.8.0.0.0	0	0	0	
cdbsubnet.vcn.oraclevcn.com_PROV_PDB2	Pluggable Database	↑	18.8.0.0.0	0	0	0	
cdbsubnet.vcn.oraclevcn.com_TESTPDB	Pluggable Database	↑	18.8.0.0.0	0	0	0	

Un-plug/Plug an existing Pluggable database (PDB)

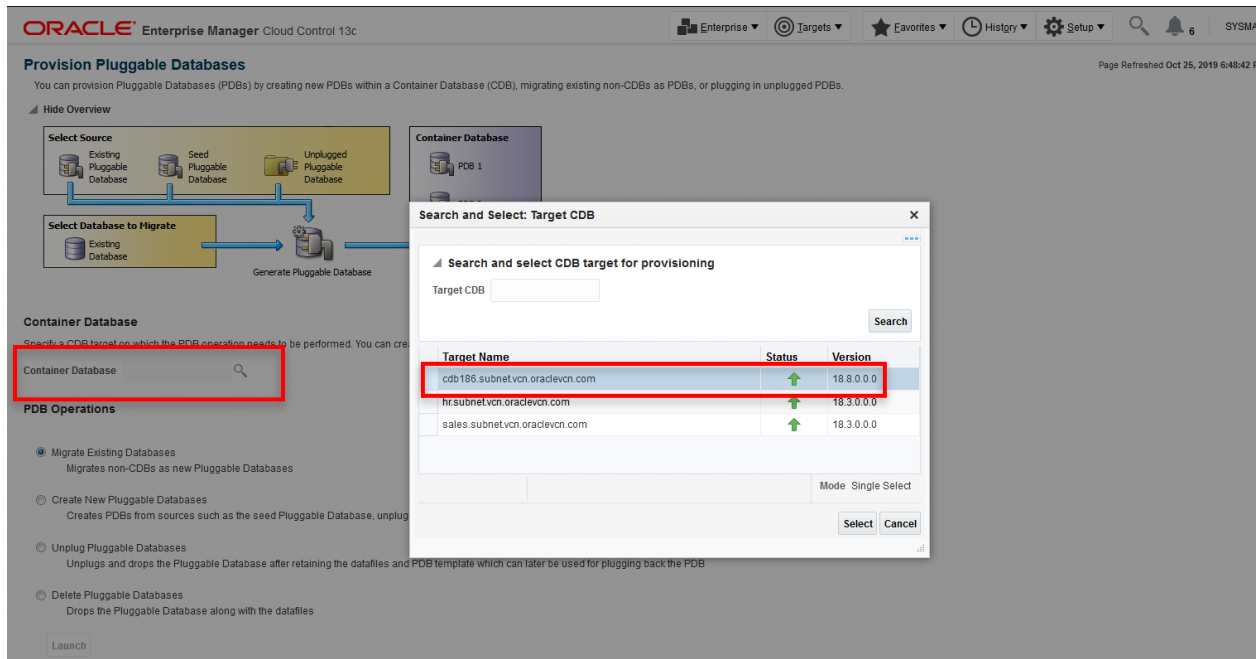
1. **Navigate** to the “Enterprise menu > Provisioning and Patching > Database provisioning”.



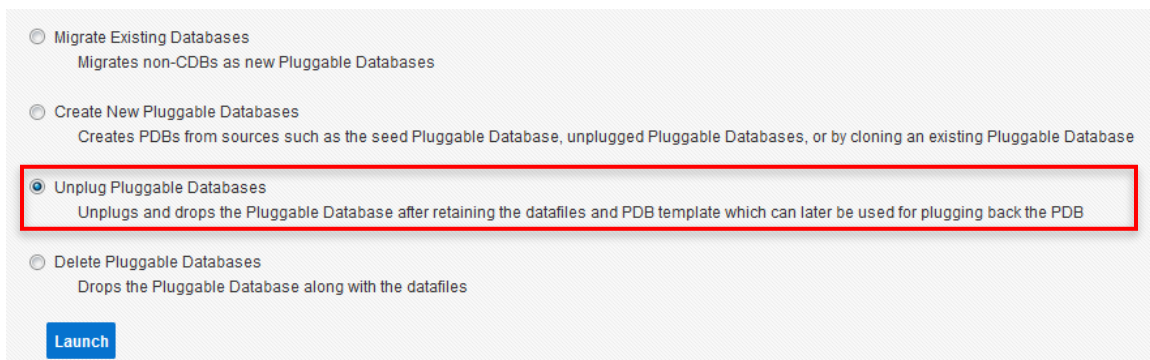
2. In the Database Provisioning page, in the Related Links section of the left menu pane, **click** “Provision Pluggable Databases”



3. In the Provision Pluggable Database Console, in the Container Database section, **select** the CDB (CDB186) within which you want to create new PDBs.



4. In the PDB Operations section, **select Unplug Pluggable Databases** , **Click Launch**



5. In the **Select** PDB page of the Unplug Pluggable Database Wizard, in the Select Pluggable Database section, select the PDB you want to unplug. Also **Select** Named credentials “ORACLE”

CDB186.oracle.com (Container Database) i

Select PDB

Destination

Schedule

Review

Unplug Pluggable Database: Select PDB

Select Pluggable Database

Select the PDB you want to unplug. Selected PDB will be unplugged and dropped from the CDB.

Pluggable Database

PROD_PDB

Container Database Host Credentials

Specify host credentials. Host credentials are required to perform validations and initiate PDB unplug on the CDB host or cluster.

Credential

☐ Preferred

☒ Named

☐ New

Credential Name

ORACLE

Attribute	Value
UserName	oracle
Password	*****

More Details

6. In the Destination page, select the type of PDB template you want to generate for unplugging the PDB, and the location where you want to store it. The PDB template consists of all datafiles as well as the metadata XML file.

Select radio button for software library.

Select Generate PDB archive.

Enter /tmp in location under Temporary working directory

↑ CDB186.oracle.com (Container Database) ⓘ

Select PDB

Destination

Schedule

Review

Unplug Pluggable Database: Destination

PDB Template Location

Unplug operation generates a PDB Template, which can be a PDB archive, PDB file set or PDB Metadata file. Y

☐ Target Host File System

☒ Software Library

☒ Generate PDB Archive

☐ Generate PDB File Set

☐ Generate PDB Metadata File

PDB Template Name

ⓘ

The PDB template will be created at "Database Configuration/18.0.0.0/unix/Database Templates

Temporary Working Directory

Location

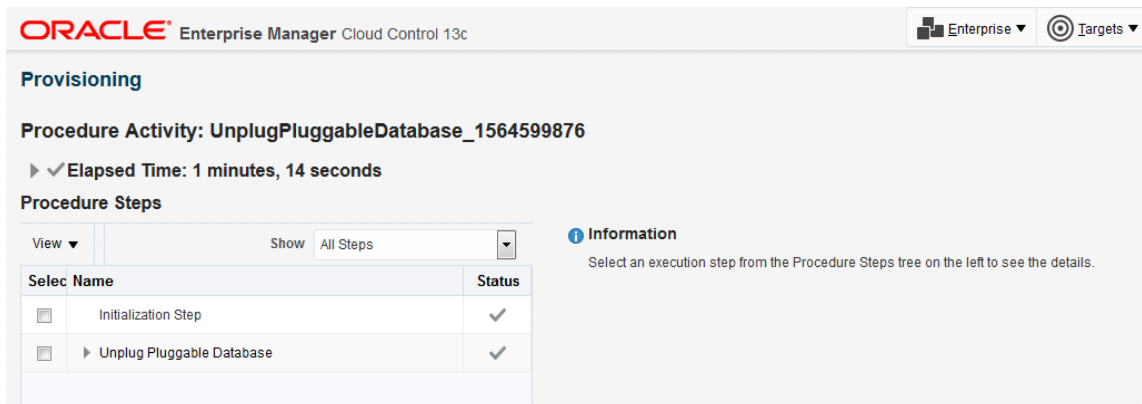
🔍

DB LIFECYCLE AUTOMATION USING EM

PAGE #: 14

7. In the Schedule page,
[Select](#) immediately check box next to Start.
[Click Next](#).
8. In the Review page, review the details you have provided for the deployment procedure.

If you are satisfied with the details, [click Submit](#).
9. In the Procedure Activity page, view the status of the procedure.



ORACLE Enterprise Manager Cloud Control 13c

Enterprise Targets

Provisioning

Procedure Activity: UnplugPluggableDatabase_1564599876

▶ ✓ Elapsed Time: 1 minutes, 14 seconds

Procedure Steps

View Show All Steps

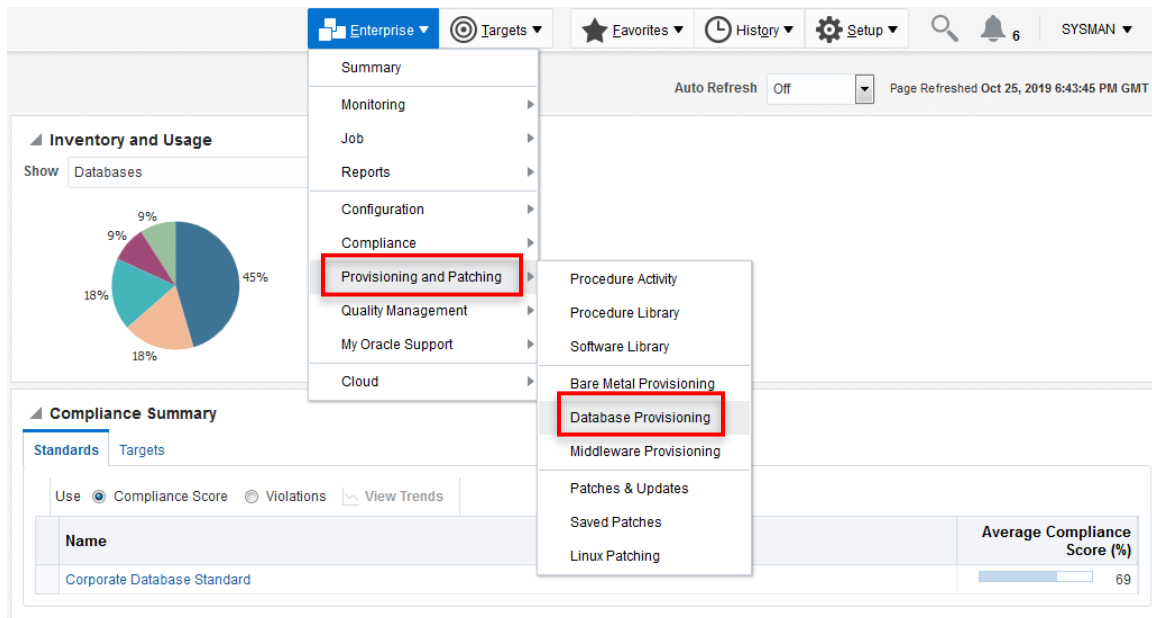
Select	Name	Status
<input type="checkbox"/>	Initialization Step	✓
<input type="checkbox"/>	▶ Unplug Pluggable Database	✓

Information
Select an execution step from the Procedure Steps tree on the left to see the details.

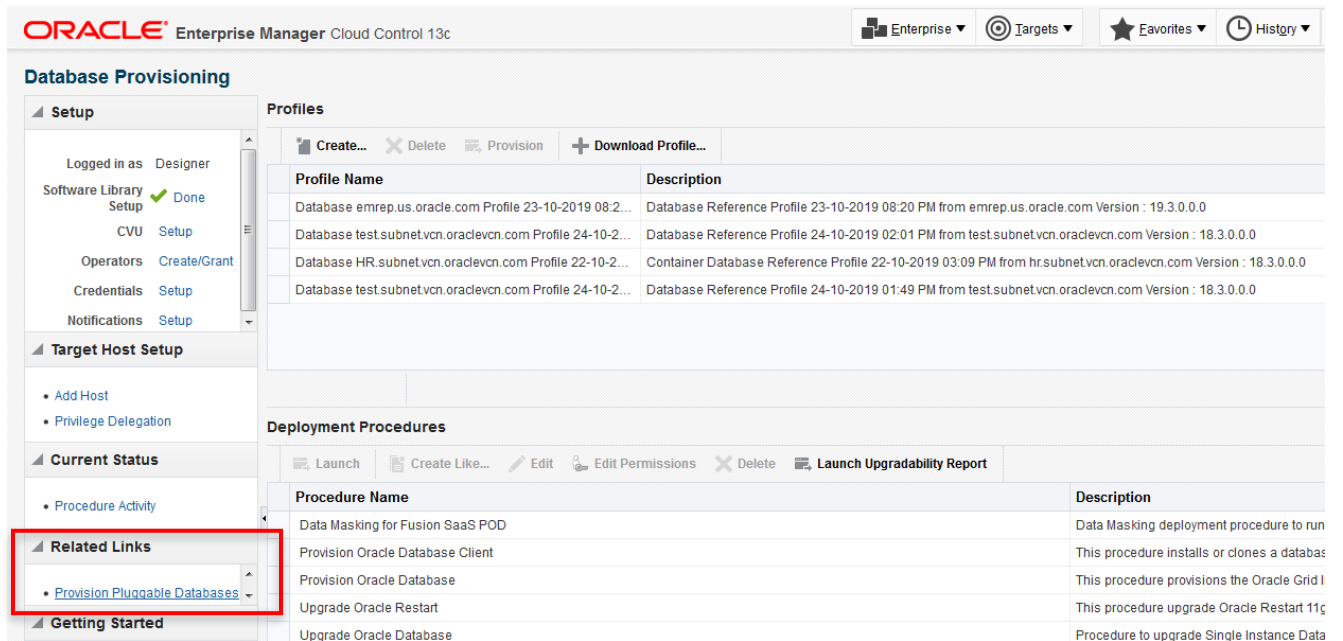
10. You can [Navigate to Targets > Databases](#), Click on CDB186 and you will see the PDB you unplugged is no longer in the list.

Let us continue to next steps and plug the same PDB back into the container database.

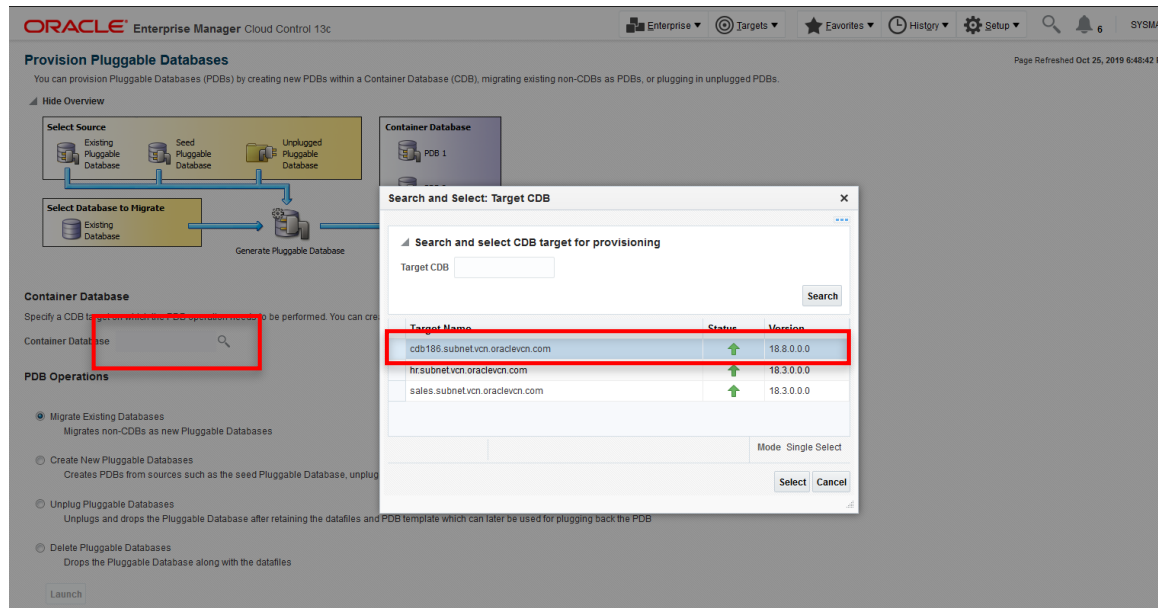
11. Navigate to the “Enterprise menu > Provisioning and Patching > Database provisioning”.



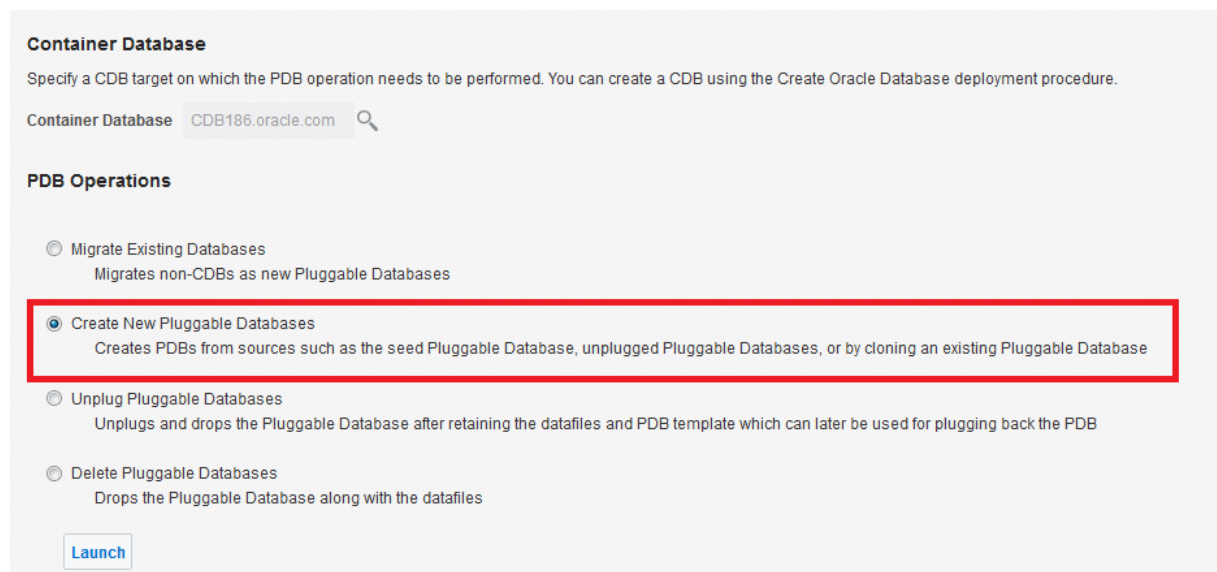
12. In the Database Provisioning page, in the Related Links section of the left menu pane, [click](#) Provision Pluggable Databases



13. In the Provision Pluggable Database Console, in the Container Database section, [select](#) the CDB (CDB186) within which you want to create new PDBs.



14. In the PDB Operations section, **select** Create Pluggable Databases , **Click** Launch



15. In the Source page of the Create Pluggable Database Wizard, in the Source Type section, select **Plug an unplugged PDB**. Select Named credentials “ORACLE”

ORACLE Enterprise Manager Cloud Control 13c

↑ cdb186.subnet.vcn.oraclevcn.com (Container Databas... i

Creation Options Identification Storage Schedule Review

Create Pluggable Database: Creation Options

PDB Creation Options

☐ Create a New PDB

☒ Plug an Unplugged PDB

☐ Clone an Existing PDB

i Information

Storage Management Framework plug-in version 12.1.0.3.0 or above is required to perform PDB Snap Clone

☒ Full Clone ☐ Snap Clone

Source PDB

Container Database Host Credentials

Specify credentials for host "emcc.marketplace.com".

Credential ☐ Preferred ☒ Named ☐ New

Credential Name

	Attribute	Value
Credential Details	UserName	oracle
	Password	*****

16. In the Identification page, enter a unique name for the PDB you are plugging in.
17. Select Create As Clone to ensure that Oracle Database generates unique PDB DBID, GUID, and other identifiers expected for the new PDB .
- Enter PDB name like “clone_pdb”.

↑ CDB186.oracle.com (Container Database) ⓘ

Creation Options Identification Storage Schedule Review

Create Pluggable Database: Identification

PDB Name

A PDB name uniquely identifies a PDB in a CDB. The PDB name is also used as a service name and it is recommended to be unique across all CDBs on a host or cluster.

* PDB Name

☐ Create as Clone

☐ Create Multiple Copies

18. **Note:** We will keep pdbadmin as a default admin. So, don't select anything in this section.

19. In the PDB Template Location section:

Select "Software Library" radio button.

Click on the torch icon placed on Location text box.

Select the Name which you created During Unplug

Click Next

Create Pluggable Database: Identification

✓ **NOTE** For multiple copies, PDB name is generated by appending sequence number (<PDB Name>#)

PDB Administrator

A PDB administrator is a local user with privileges to administer a PDB. A PDB created using archive, RMAN file set or PDB metadata file.

☐ Create PDB Administrator

Username

Password

Confirm Password

☐ Lock All Existing PDB Users

PDB Template Location

☐ Target Host File System ☒ Software Library

Specify the component in the software library that contains the PDB template.

Location 🔍

20. Select “Use Common Location for PDB Datafiles” and use **/tmp** as temporary working directory.

↑ CDB186.oracle.com (Container Database) ⓘ

Creation Options Identification **Storage** Schedule Review

Create Pluggable Database: Storage

PDB Datafile Locations

Select the storage locations for the PDB(s) to be created.

☐ Use Oracle Managed Files (OMF)

☒ Use Common Location for PDB Datafiles

Storage Type: File System

Location: /u03/app/oracle/oradata/CDB186/clone_pdb

☐ Use PDB File Locations Same as Source

Temporary Working Directory

Specify the location to store temporary files generated during Create PDB operation.

Temporary Location: /tmp

21. In the Schedule page, select immediately check box next to Start. Click Next.
22. In the Review page, review the details you have provided for the deployment procedure. If you are satisfied with the details, click Submit. You can now click on View Execution Details link to see details.
23. In the Procedure Activity page, view the status of the procedure.

Optionally, Click the Status link for each step to view the details of the execution of each step. Once the procedure is completed, you can **Navigate to Targets > Databases**, Click on CDB186 and you will see the newly created PDB

Note: You do not have to wait until the steps complete and move on to the next section.

Clone an existing Pluggable database (PDB)

1. **Navigate** to the “Enterprise menu > Provisioning and Patching > Database provisioning”.

The screenshot shows the Oracle Enterprise Manager Cloud Control 13c interface. The top navigation bar includes 'Enterprise', 'Targets', 'Favorites', 'History', 'Setup', and a search icon. The left sidebar contains a menu with 'Enterprise' selected. The main content area displays a 'Compliance Summary' section with a pie chart showing database usage (45%, 18%, 18%, 9%, 9%) and a table of standards. The 'Provisioning and Patching' menu item is highlighted in the left sidebar, and the 'Database Provisioning' sub-item is highlighted in the dropdown menu. The 'Average Compliance Score (%)' is shown as 69.

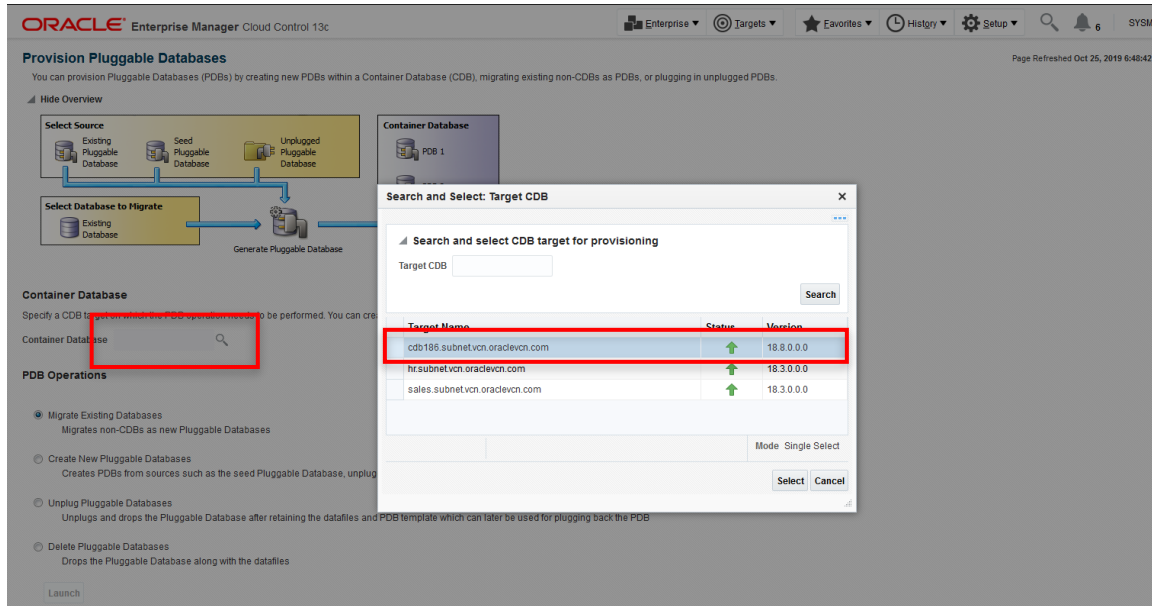
2. In the Database Provisioning page, in the Related Links section of the left menu pane, **click** Provision Pluggable Databases

The screenshot shows the Oracle Enterprise Manager Cloud Control 13c Database Provisioning page. The left sidebar contains a menu with 'Database Provisioning' selected. The main content area displays a 'Profiles' section with a table of database reference profiles. The 'Related Links' section in the left sidebar is highlighted, and the 'Provision Pluggable Databases' link is highlighted. The 'Deployment Procedures' section shows a table of procedures for data masking, database client, and database upgrade.

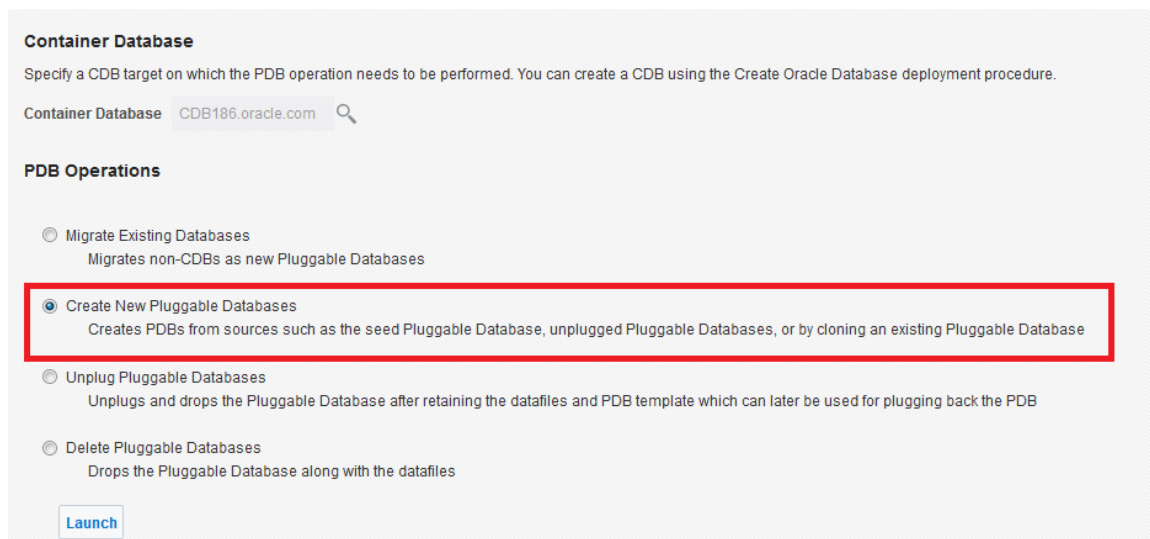
Profile Name	Description
Database emrep.us.oracle.com Profile 23-10-2019 08:2...	Database Reference Profile 23-10-2019 08:20 PM from emrep.us.oracle.com Version : 19.3.0.0.0
Database test.subnet.vcn.oracle.vcn.com Profile 24-10-2...	Database Reference Profile 24-10-2019 02:01 PM from test.subnet.vcn.oracle.vcn.com Version : 18.3.0.0.0
Database HR.subnet.vcn.oracle.vcn.com Profile 22-10-2...	Container Database Reference Profile 22-10-2019 03:09 PM from hr.subnet.vcn.oracle.vcn.com Version : 18.3.0.0.0
Database test.subnet.vcn.oracle.vcn.com Profile 24-10-2...	Database Reference Profile 24-10-2019 01:49 PM from test.subnet.vcn.oracle.vcn.com Version : 18.3.0.0.0

Procedure Name	Description
Data Masking for Fusion SaaS POD	Data Masking deployment procedure to run
Provision Oracle Database Client	This procedure installs or clones a databas
Provision Oracle Database	This procedure provisions the Oracle Grid I
Upgrade Oracle Restart	This procedure upgrade Oracle Restart 11g
Upgrade Oracle Database	Procedure to upgrade Single Instance Data

3. In the Provision Pluggable Database Console, in the Container Database section, **select** the CDB (**CDB186**) within which you want to create new PDBs.



4. In the PDB Operations section, **select** Create Pluggable Databases , **Click** Launch



5. **Select** clone PDB and select source as CDB186 (if you choose any other CDB , this operation might fail). Please keep Database link box empty.

Select named credentials “ORACLE”, **Click** Next.

Create Pluggable Database: Creation Options

PDB Creation Options

☐ Create a New PDB

☐ Plug an Unplugged PDB

☒ Clone an Existing PDB

i Information

Storage Management Framework plug-in version 12.1.0.3.0 or above is required to perform PDB Snap Clone

☒ Full Clone ☐ Snap Clone

Source PDB

Database Link

Container Database Host Credentials

Specify credentials for host "emcc.marketplace.com".

Credential ☐ Preferred ☒ Named ☐ New

Credential Name

Attribute	Value
UserName	oracle

Credential Details

6. **Enter** new PDB name

↑ CDB186.oracle.com (Container Database) ⓘ

Creation Options Identification Storage Schedule Review

Create Pluggable Database: Identification

PDB Name

A PDB name uniquely identifies a PDB in a CDB. The PDB name is also used as a service name and it is recommended to be unique across all CDBs on a host or cluster.

* PDB Name

☐ Create Multiple Copies

Number of Copies ^ v

NOTE For multiple copies, PDB name is generated by appending sequence number (<PDB Name>#)

7. select “Use Common Location for PDB Datafiles” in the Source page of the Create Pluggable

Database Wizard, **Please enter /tmp in temporary working directory**

Optionally, you can select the postscript as we did in the creation flow. **Click Next**

↑ CDB186.oracle.com (Container Database) ⓘ

Creation Options Identification Storage Schedule Review

Create Pluggable Database: Storage

PDB Datafile Locations

Select the storage locations for the PDB(s) to be created.

☐ Use Oracle Managed Files (OMF)

☒ Use Common Location for PDB Datafiles

Storage Type

Location

Temporary Working Directory

Specify the location to store temporary files generated during Create PDB operation.

Temporary Location

8. In the Schedule page, [select](#) immediately check box next to Start. [Click](#) Next.
9. In the Review page, review the details you have provided for the deployment procedure. If you are satisfied with the details, [click](#) Submit. You can now click on View Execution Details link to see details.
10. In the Procedure Activity page, view the status of the procedure.

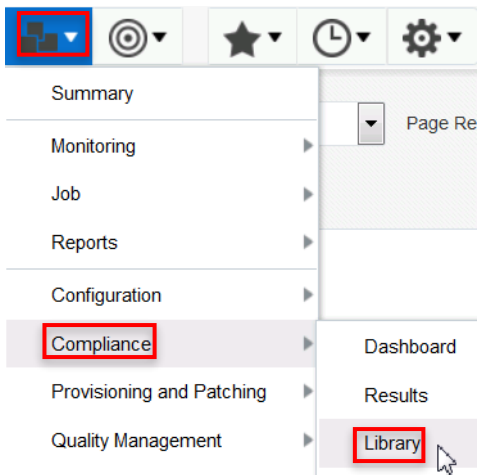
[Click](#) the Status link for each step to view the details of the execution of each step.

Once the procedure is completed, you can [Navigate](#) to Targets > Databases, Click on CDB186 and you will see the newly created PDB

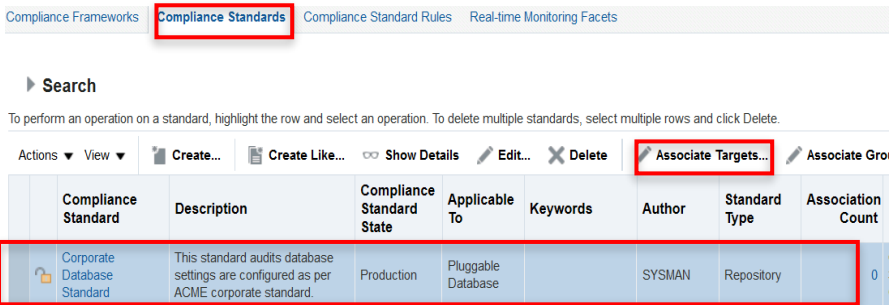
Compliance Management for PDB

Now database administrator applies a Corporate Standard on the newly created PDB database, which results in a “Violation”. Then, the DBA fixes the issue using corrective actions. Let us examine how a DBA applies the fixes in the following steps.

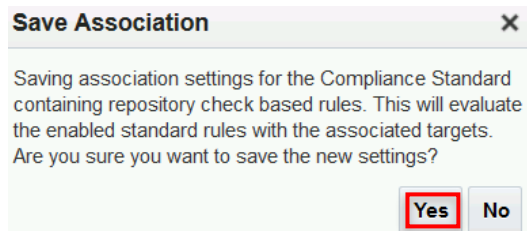
1. Click  → Click Compliance → Click Library



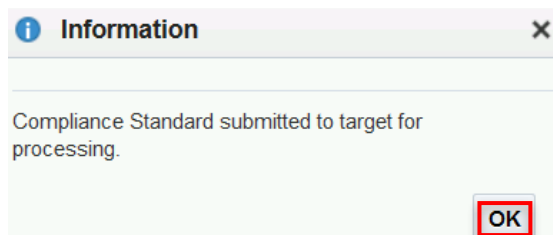
2. Click Compliance Standards tab → Choose the row “Corporate Database Standard” → Click Associate Targets




3. Click Add → Choose the row with your PDB → Click Select button
4. Click OK button
5. In the Save Association box → Click Yes button



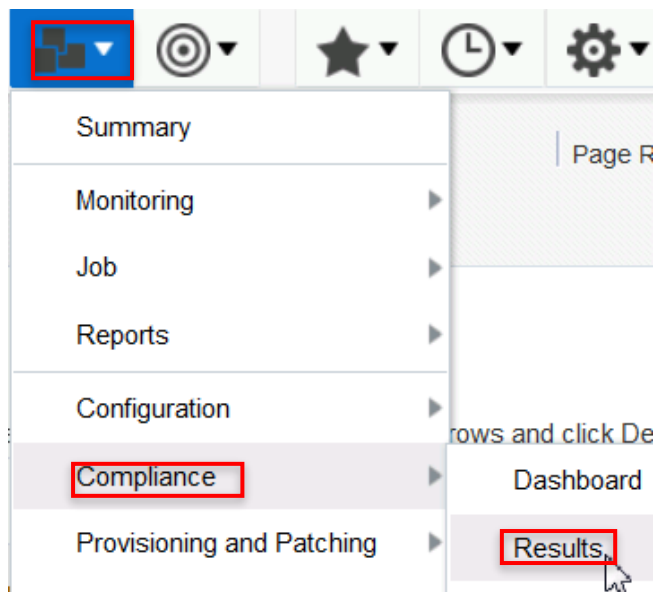
6. Click OK button



7. You have to refresh PDB statistics to see notifications, To refresh PDB database,

- click  → Click Databases → Click View → Click Expand All
- Right click on PDB → Click Oracle Database → Click Configuration → Click Latest → Click Refresh icon on the page(it will take few minutes for refresh to complete)

8. Click  → Click Compliance → Click Results



9. Click Corporate Database Standard under Compliance Standards

Compliance Frameworks

Compliance Standards

Target Compliance

Evaluation Results

Errors

Search

View ⌵ Show Details Manage Violations

Compliance Standards	Applicable To	Compliance Standard State
Security Recommendations For Oracle Products	Host	Production
Corporate Database Standard	Pluggable Database	Production

10. You will see the following screen as shown below

Corporate Database Standard

Open Cursor Setting

User must use TEMP tablespace

Job Queue Process

Users must use Default Profile

ARCHIVELOG must be Enabled

National Character Set must be U

Corporate Database Standard (Compliance Standard)

Summary

Trend Overview

Violations

Target Scorecard

Rule Evaluations

Targets By Severity

Rule Evaluations

Result By Target

Result By Compliance Standard Rule

Target Name	Required Data Available	Violations	Score (%)
CustDB.oracle.c...	Yes	<div><div>✖</div><div>⚠</div><div>⚠</div></div>	<div><div></div></div> 87

11. Click Violations link and then click on one of the Open Cursor Setting lines

Compliance Results > Corporate Database Standard

Corporate Database Standard

Corporate Database Standard

- Open Cursor Setting
- User must use TEMP tablespaces

Corporate Database Standard (Compliance Standard)

SummaryTrend OverviewViolations

Target ScorecardRule Evaluations

SummaryTrend OverviewViolations

This table lists information about events/violations of this compliance standard. Select an individual event/violation to view a detailed impact statement as well as recommended actions for quick remediation.

Search

Rule	Target Name	Applicable To	Severity	Keywords
Open Cursor Setting	CustDB.oracle.com_M...	Pluggable Database	Critical	

12. You will see open cursors notification → Scroll down if needed → Click on the link “Submit from Library” for corrective action .

Guided Resolution

Recommendations

Actions

- Disable rule for this target
- Corrective Actions
 - Submit from library

☒ This event will be automatically cleared when the underlying issue is resolved.

13. Choose “FIX OPEN CURSOR” corrective action from the pop-up

Corrective Actions

Name

Corrective Action Type

Owner

Event Type

Target Type

Search

☐ Search unpublished Corrective Actions.

Corrective Actions

Name	Version	Corrective Action Type	Owner	Target Type
FIX OPEN CURSOR	1	SQL Script	SYSMAN	Pluggable Database

14. Choose the Named Credentials for Database and Host → Click Submit button
- a. Named Credentials for Database: OEM_SYS (scroll down after Database Credentials to see Host Credentials)
 - b. Host Credentials: ORACLE_HOST

Corrective Actions ✕

Name

Corrective Action Type All ▼

Owner All ▼

Event Type Compliance Standard Rule Violation

Target Type Pluggable Database

☐ Search unpublished Corrective Actions.

Credentials to log into Oracle Database from SQL*Plus.

Credential ☐ Preferred ☒ Named ☐ New

Credential Name OEM_SYS ▼

Attribute	Value
Username	sys
Password	*****
Role	sysdba

[More Details](#)

Host Credentials

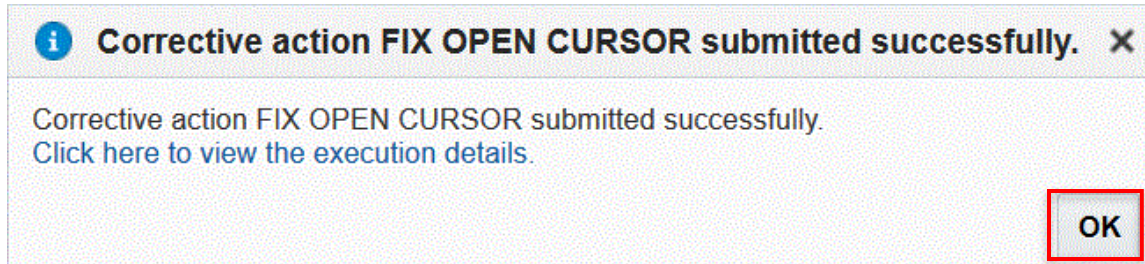
Credentials to authenticate on the host to launch SQL*Plus executable.

Credential ☐ Preferred ☒ Named ☐ New

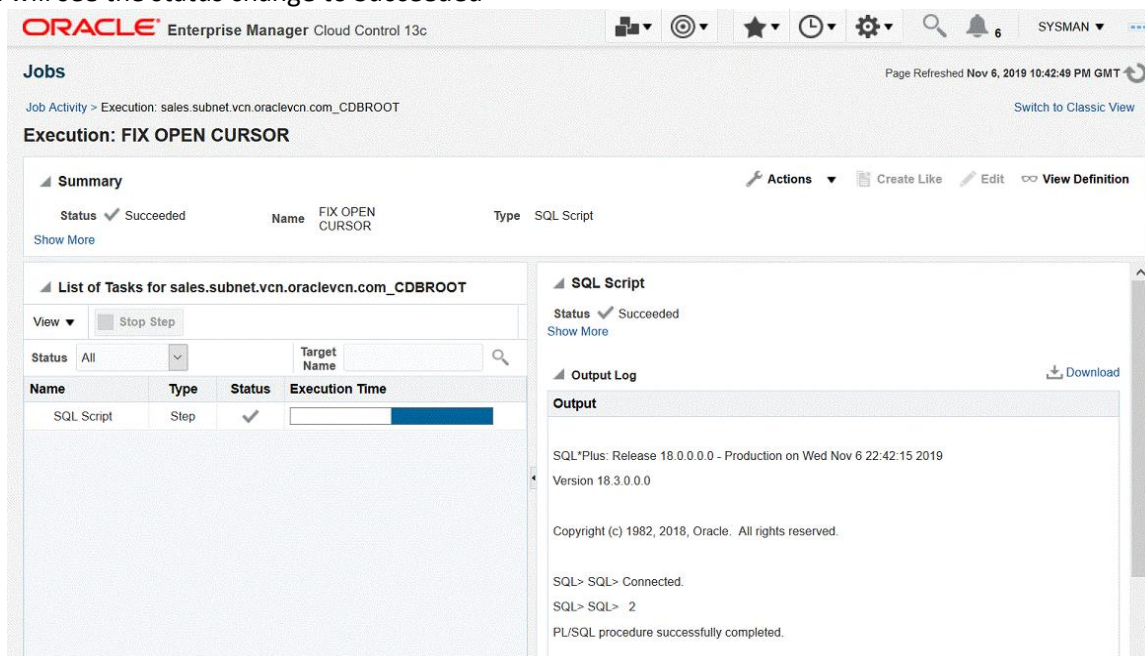
Credential Name ORACLE_HOST ▼


Attribute	Value
UserName	oracle
Password	*****

15. You will see an popup as shown below → Click on the link “Click here to view the execution details”



- Click on refresh icon if the job did not complete. The job will take about a minute to complete → you will see the status change to Succeeded



16. Once the status changes to Succeeded → Click  → Click Databases → Click View → Click Expand All → Click on Your PDB that you choose in earlier step .

17. Under Administration drop down → Click Initialization Parameters

18. Scroll down → You will see the “open_cursors” initialization parameter set to 300 as shown below

Oracle Database ▾ Performance ▾ Availability ▾ Security ▾ Schema ▾ Administration ▾					
Name	basic	Modified	Dynamic	Category	
	AI	AI	AI	AI	Go
Filter on a name or partial name					
<input type="checkbox"/> Apply changes in current running instance(s) mode to SPFile. For static parameters, you must restart the database.					
Name	Help	Value	Comments	Type	Basic
_catalog_foreign_restore		FALSE		Boolean	
audit_file_dest	?	/u01/app/oracle/admin/CustDB/adump		String	
audit_trail	?	DB		String	
diagnostic_dest		/u01/app/oracle		String	
dispatchers	?	(PROTOCOL=TCP) (SERVICE=CustDBXDB)		String	
enable_pluggable_database		TRUE		Boolean	
local_listener	?	LISTENER_CUSTDB		String	
compatible	?	12.1.0.2.0		String	✓
control_files	?	/acfsdata/CustDB/control02.ctl, /acfsdata/CustDB/control01.ctl		String	✓
db_block_size	?	8192		Integer	✓
db_domain	?	oracle.com		String	✓
db_name	?	CustDB		String	✓
open_cursors	?	400		Integer	✓

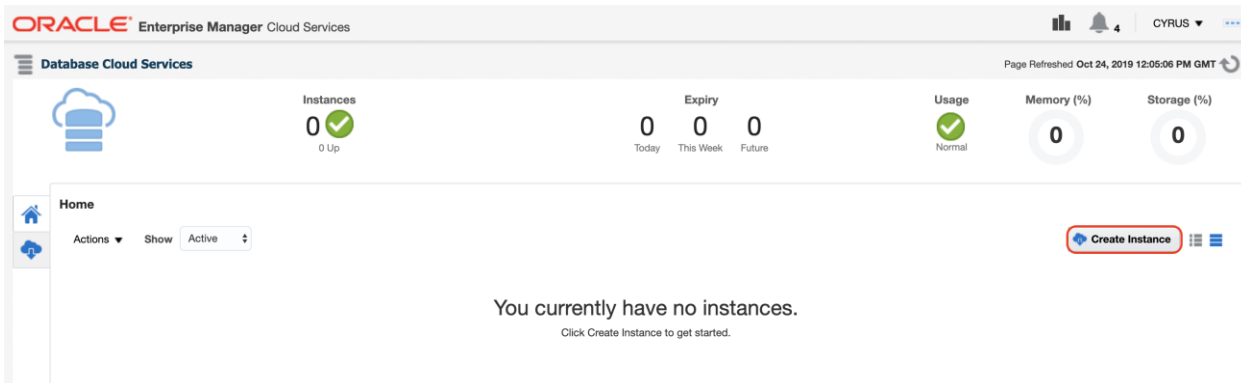
Now that you have gone through the various life cycle operation on PDB, we would switch focus and cover the use case of building a private cloud using Enterprise Manager and see how easy and quick it is to provision (with minimal inputs) and manage PDB using PDB-as-a-service (PDBaaS)

Self-Service to request PDB using PDBaaS

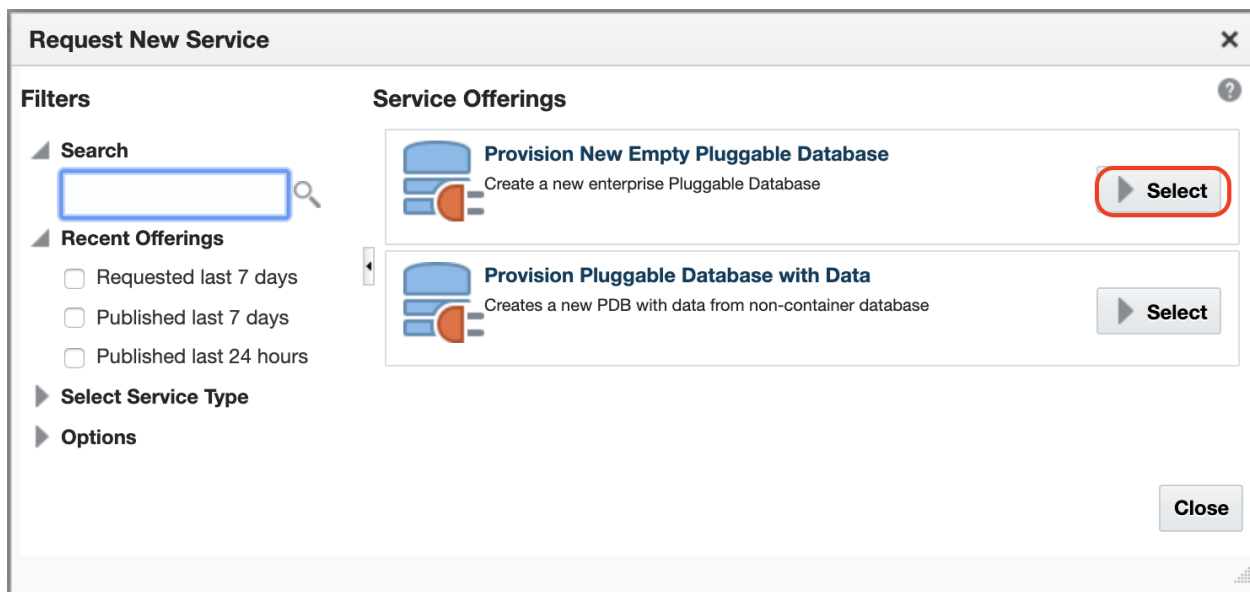
With the Self-Service Portal, cloud users can request a Pluggable Database through a simple process, monitor resource consumptions, and manage the pluggable database through an intuitive graphical user interface.

Expiry time is provided while requesting the PDB instance and PDB is automatically deleted based on the expiry time.

1. Login into Enterprise Manager as a Self-Service User. Self-Service User credentials are:
CYRUS/welcome1
2. By default, you will see the Database Cloud Self Service Portal landing page as shown below.



Click “Create Instance” button and then click on Select icon for “**Provision New Empty Pluggable Database**”



Note: There are two service templates pertaining to Pluggable Database

- **Provision New Empty Pluggable Database**
 - This template allows user to create a new pluggable database in a container database configured by DBA
- **Provision Pluggable Database with Data**

- This template allows user to create a new pluggable database with data from non-container database.
3. In the “**Pluggable Database Configuration**” section, enter Service and SID details :
- a. Name: **YOUR INITIALS_PDB2 (e.g. AS_PDB2)**
 - b. Database Service Name: **SERVICE_YOUR INITIALS_PDB2 (e.g. SERVICE_AS_PDB2)**
 - c. Workload Size: Choose **Small**

Create Pluggable Database

Pluggable Database Configuration

Service Template Provision New Empty Pluggable Database ⓘ

* PDB Name AS_PDB2

* Database Service Name Service_AS_PDB2

* Size ✓ Small(CPU-0.1 cores, Memory-0.1 GB, Sessions-1 units, Storage-0.1 GB)
large(CPU-0.4 cores, Memory-0.4 GB, Sessions-4 units, Storage-0.4 GB)

4. Enter Credentials details in the “**Pluggable Database Administrator Account**”
- a. Administrator Name: **PDBADMIN**
 - b. Password: **welcome1**
 - c. Confirm Password: **welcome1**
 - d. (Tablespaces): **Accept default**

Pluggable Database Administrator Account

* Administrator Name

* Password

* Confirm Password

Tablespaces

Please enter the name of the tablespace to be created as part of this request.

Tablespace Name
<input type="text" value="pdb_tbs1"/>

5. Instance Details

- Keep all defaults as they are

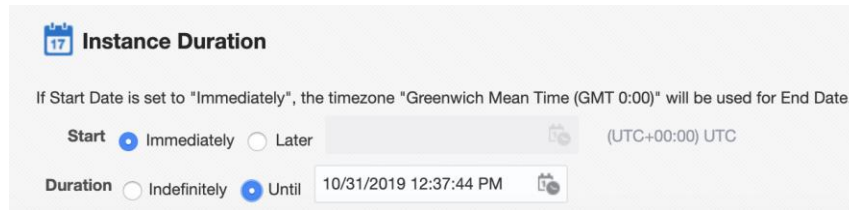
6. Properties

- Enter properties for instance. Self-Service Administrator has configured this as a optional step. However, properties help users find instances quickly. Enter
 - Contact: **CYRUS**
 - Lifecycle Status: **Test**

Properties	
Name	Value
Optional	
Contact	<input type="text" value="CYRUS"/>
Downtime Contact	<input type="text"/>
Location	<input type="text"/>
LifeCycle Status	<input type="text" value="Test"/>
Department	<input type="text"/>
Comment	<input type="text"/>
Line of Business	<input type="text"/>

7. Instance Duration

- a. (Instance Duration) Start: Accept default (Immediately)
- b. (Instance Duration) Duration: Specify duration of 4 hours from the current time by selecting the “Until” radio button, changing to current date and specify time 4 hours from the current time



The screenshot shows a form titled "Instance Duration" with a blue calendar icon and the number "17". Below the title, a note states: "If Start Date is set to 'Immediately', the timezone 'Greenwich Mean Time (GMT 0:00)' will be used for End Date." The form has two sections: "Start" and "Duration". In the "Start" section, the "Immediately" radio button is selected, and the "Later" radio button is unselected. In the "Duration" section, the "Indefinitely" radio button is unselected, and the "Until" radio button is selected. The "Until" field is set to "10/31/2019 12:37:44 PM". To the right of the "Start" section, the text "(UTC+00:00) UTC" is displayed.

8. Click on Submit button

What do these options represent? In most cases the PDBaaS options are self-explanatory.

The self-service user should be able to provision a PDB by entering minimal information.

Fields with an “*” represent mandatory input fields. Please refer to the table listed below for a description of each option:

Note

Field	Description
Request Name	By default, it is the Self-Service User Requestor name with timestamp. This field can be modified
Zone	The Zone is a PaaS Zone that represents hosts/vm, where the PDB database will be deployed for this request. The zones are configured by the administrator. Self-service user need not know the host or platform details.

PDB Name	Required input. PDB database with user defined will be created for the container database
Database Service Name	The user defined prefix for the database service or alias for this self-service PDB. The rest of the service name will be system generated and will be associated with a database resource management plan.
Workload Size	The resources allocated to the Database Service. The database resource management plan is derived from this option. You can configure multiple workload sizes. Each service template will contain unique workload sizes. This typically depends on the roles assigned to self-service user.
Schedule Request	Self-service user has the ability to create a PDB database immediately or choose to create at a later time. In this lab exercise, the administrator has defined a policy, so a self-service user has to specify time duration. The PDB database will be automatically deleted after the duration.
Administrator Name/Password	A database user with required administrative privileges will be created on the provisioned PDB. A self-service user will be able to administer the PDB database by logging in as this database user.

- Once you submit a request, you will be redirected back to the **“Database Cloud Services”** Page. Your PDB creation request has been submitted to Enterprise Manager for execution. Under **“Requests”** region, you should see 2 requests: **“Create”** and **“Delete”** request

The screenshot shows the 'Database Cloud Services' dashboard. At the top, there's a header with a menu icon and the title 'Database Cloud Services'. Below the header, there's a cloud icon, a status section showing 'Instances' (0 Up) with a green checkmark, and an 'Expiry' section showing '0' for 'Today', '0' for 'This Week', and '0' for 'Future'. The main section is titled 'Requests' and contains a table with columns: Name, Status, Type, Submission Date, and Begin Date. There are two rows in the table. The first row is 'Delete Pluggable Database_Pluggable Data...' with a status icon of a calendar. The second row is 'CYRUS - Thu Oct 24 2019 12:28:23 GMT_C...' with a status icon of an hourglass. A red box highlights the second row, and another red box highlights the hourglass icon in the Status column for that row.

Name	Status	Type	Submission Date	Begin Date
Delete Pluggable Database_Pluggable Data...		Delete Pluggable Database	Oct 24, 2019	Oct 31, 2019
CYRUS - Thu Oct 24 2019 12:28:23 GMT_C...		Create Pluggable Database	Oct 24, 2019	Oct 24, 2019

10. At this point, provisioning engine has received a request to create a PDB based on the service template and input provided by self-service user.

11. You will also notice the delete operation is scheduled for future (not started yet) time.

Click on the **hourglass** icon under Status column for the Create Pluggable Database step.

You will see details of request.

It will perform the following actions:

- Create database roles and PDB
- Create a resource plan based on the workload size
- Create and register the database

12. The request should take less than 10 minutes to complete. Click on refresh icon or in the alternative set Refresh to 30 seconds. The success status indicates that PDB database was successfully created. The new PDB database should be visible under Database Cloud Services page.

Request Details ✕

Progress ✓

Refresh 10 Seconds ↺

Name	CYRUS - Thu Oct 24 2019 12:28:23 GMT_...	Scheduled Start Time	Oct 24, 2019 12:43:04 PM
Type	Create Pluggable Database	Actual Start Time	Oct 24, 2019 12:43:10 PM
Service Instances	sales.subnet.vcn.oraclevcn.com_SSA	Last Modified Time	Oct 24, 2019 12:46:10 PM
Service Type	Pluggable Database	Description	Create Database for "CYRUS - Thu Oct ...
Submitted By	CYRUS	Time Elapsed	2 minutes, 50 seconds
Submitted On	Oct 24, 2019 12:43:04 PM	Service Offering	Provision New Empty Pluggable Database

Execution Steps

Name	Status	Submission Date	End Date	Time Elapsed (seconds)
Initialization	Succeeded	Oct 24, 2019 1...	Oct 24, 2019 1...	2
Prerequisite Evaluation	Succeeded	Oct 24, 2019 1...	Oct 24, 2019 1...	2
Request Configuration	Succeeded	Oct 24, 2019 1...	Oct 24, 2019 1...	2
▲ Request Execution	Succeeded	Oct 24, 2019 1...	Oct 24, 2019 1...	161
Initialize Deployment Procedure	Succeeded	Oct 24, 2019 1...	Oct 24, 2019 1...	1
Validate the Quotas	Succeeded	Oct 24, 2019 1...	Oct 24, 2019 1...	1
Obtain the Target Node List using the Placement Algorithr	Succeeded	Oct 24, 2019 1...	Oct 24, 2019 1...	4
Build configuration data for Creating Pluggable database	Succeeded	Oct 24, 2019 1...	Oct 24, 2019 1...	2

Close

13. Click on Close button. You will see the following under Requests section.

Database Cloud Services

Instances

1 ✓

1 Up

Expiry

0 1 0

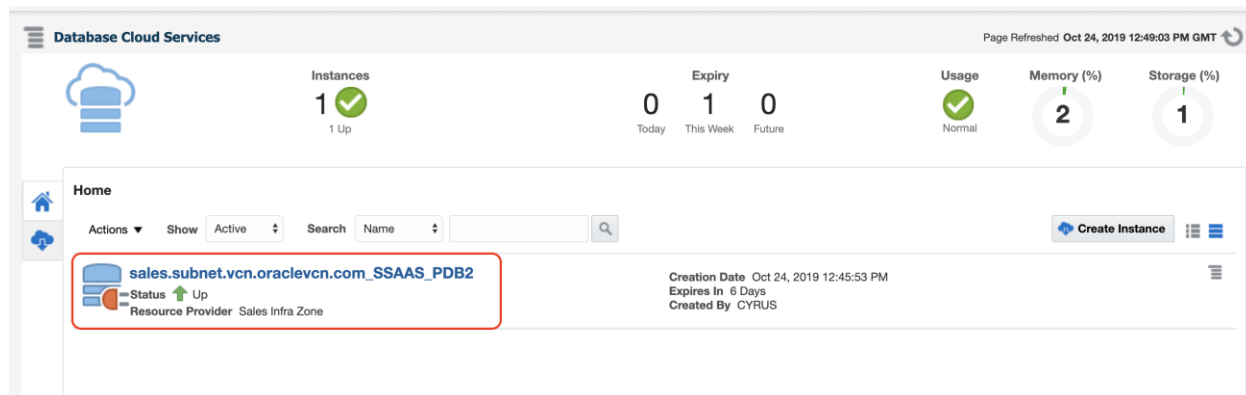
Today This Week Future

Requests

View ▾ Search Name

Name	Status	Type	Submission Date	Begin Date
Delete Pluggable Database_Pluggable Data...		Delete Pluggable Database	Oct 24, 2019	Oct 31, 2019
CYRUS - Thu Oct 24 2019 12:28:23 GMT_C...	✓	Create Pluggable Database	Oct 24, 2019	Oct 24, 2019

14. Click on the Home Icon. You will see new PDB instance.



Note

Following widgets are shown on the Database Cloud Services landing Page

Instances show the number and status (Up/Down) of the DB/PDB Instances provisioned by the self-service user.

Expiry, shows the expiration summary of DB/PDB Instances.

Usage, resource usage status for the Self-Service user, status of the resource consumption for this user.

Memory, current memory consumption against the Quota for this user.

Storage, current storage consumption against the Quota for this user.

15. Click on the name of the PDB.

You can use the connection details to connect to the PDB using SQL tools.

ORACLE Enterprise Manager Cloud Services

sales.subnet.vcn.oraclevcn.com_SSAAS_PDB2 ↑

Database Cloud Self Service Portal > Pluggable Database Instance: sales.subnet.vcn.oraclevcn.com_SSAAS_PDB2

Shutdown Startup Update Database **Resize**

18.3.0.0.0 Version **0 Days, 0 Hours** Up Time **95.76%** Availability for Last 7 Days

Summary

PDBADMIN User Name

Load and Capacity

0.72 Storage (GB)
0.07 Memory (GB)

High Availability

N/A Last Backup Status

Connection Details

Connect String (DESCRIPTION=(ADDRESS_LIST=(ADDRESS=(PROTOCOL=TCP)(HOST=emcc.marketplace.com)(PORT=1523)))(CONNECT_DATA=(SERVICE_NAME=Service_AS_PDB2)(INSTANCE_NAME=sales)(UR=A)(SERVER=DEDICATED)))

User Name PDBADMIN

Target Properties

Name	Value
Global Property	
Contact	CYRUS
LifeCycle Status	Test

16. Click on **Resize** button to resize PDB instance.

ORACLE Enterprise Manager Cloud Services

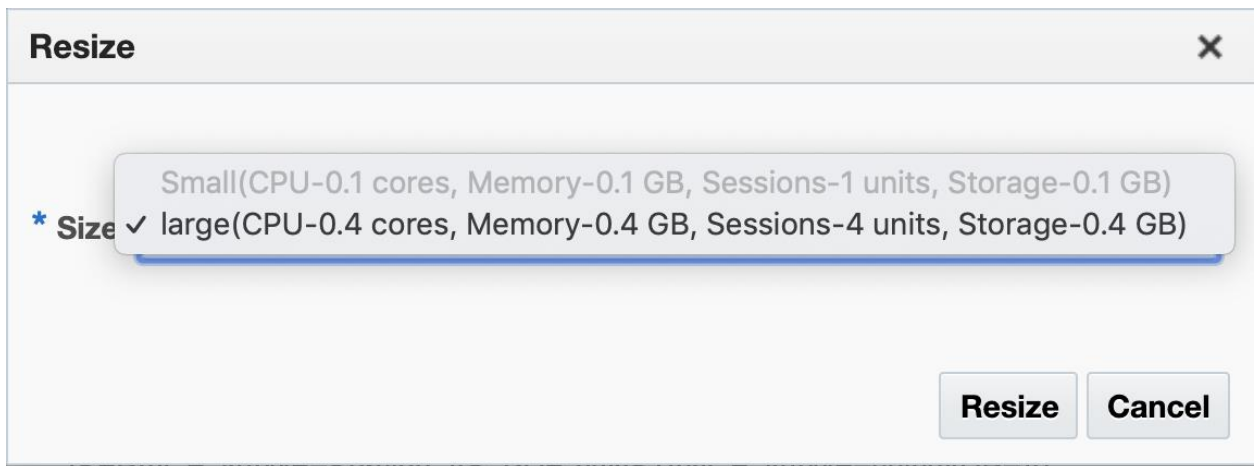
sales.subnet.vcn.oraclevcn.com_SSAAS_PDB2 ↑

Database Cloud Self Service Portal > Pluggable Database Instance: sales.subnet.vcn.oraclevcn.com_SSAAS_PDB2

Shutdown Startup Update Database **Resize**

18.3.0.0.0 Version **0 Days, 0 Hours** Up Time **95.76%** Availability for Last 7 Days

Resize allows you to resize your instance to other available resource sizes. We have 2 resource sizes available for Service Template. Both are displayed. Current size of PDB instance is Small, you can now resize it to large.



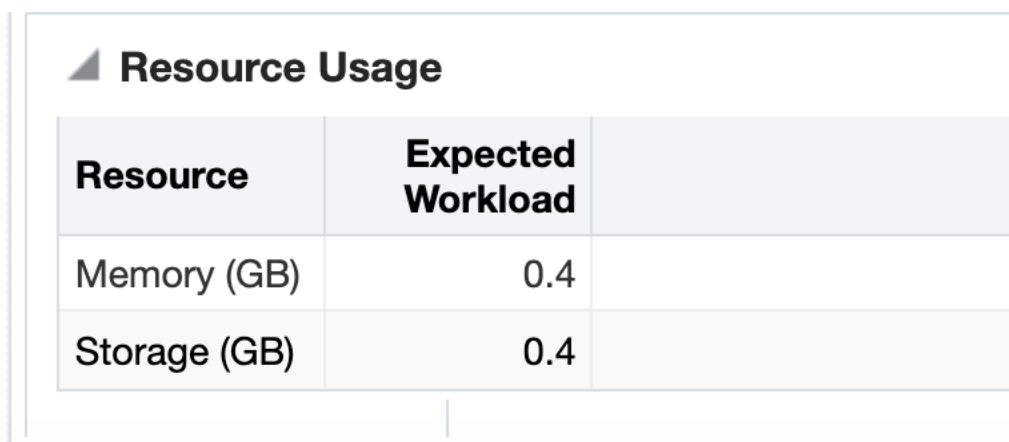
Resize [X]

* Size ✓ Small(CPU-0.1 cores, Memory-0.1 GB, Sessions-1 units, Storage-0.1 GB)
large(CPU-0.4 cores, Memory-0.4 GB, Sessions-4 units, Storage-0.4 GB)

Resize **Cancel**

One you click on **Resize**, a job will be submitted to resize instance. In few minutes instance resize is completed.

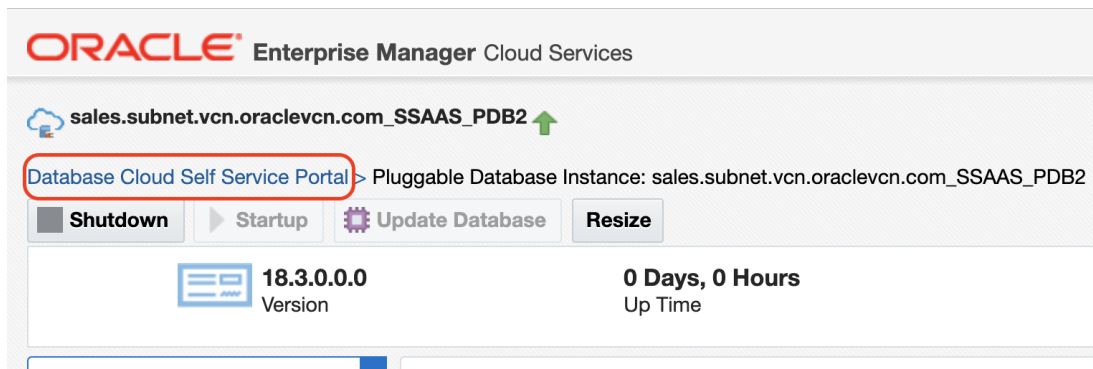
Expand **Resource Usage** section on PDB Home page. This shows now new resource usage limits.



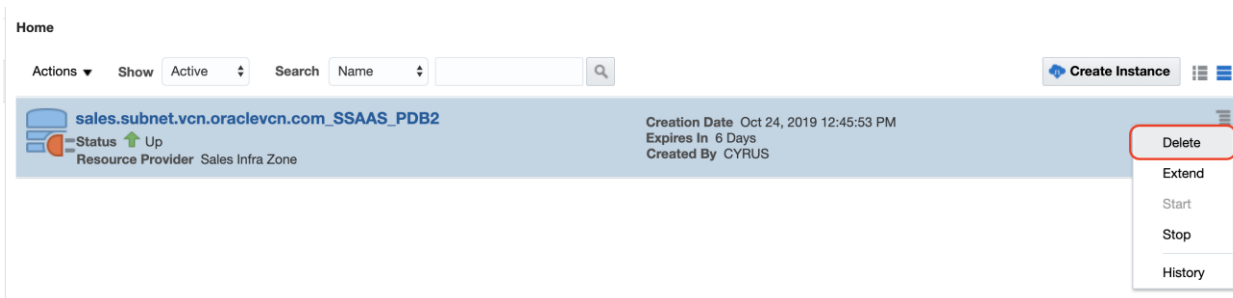
Resource Usage		
Resource	Expected Workload	
Memory (GB)	0.4	
Storage (GB)	0.4	

17. Delete the DB Instance:

- a. Go to the Database Cloud Services Home page by clicking on **Database Cloud Service Portal** link



- b. Click on the action menu for new PDB and delete this instance.



While deleting instance you can preserve a backup of the instance and create a new instance using this backup.

To store backup of this instance, select check-box: **Preserve a backup of this instance**

Delete sales.subnet.vcn.oraclevcn.com_SSAAS_PDB2 ✕

Start Date ☒ Immediately ☐ Later (UTC+00:00) UTC

☒ Preserve a backup of this instance

Save As sales.subnet.vcn.oraclevcn.com_SSAAS_PD|

Description sales.subnet.vcn.oraclevcn.com_SSAAS_PDB2 24-10-2019 01:05 PM

OK **Cancel**

Click OK. You will see confirmation to delete the instance.

Confirmation

Delete service instance(s) - Completed Successfully

Hide

Request to delete sales.subnet.vcn.oraclevcn.com_SSAAS_PDB2 has been rescheduled.

Delete operation completed for selected service instance(s).

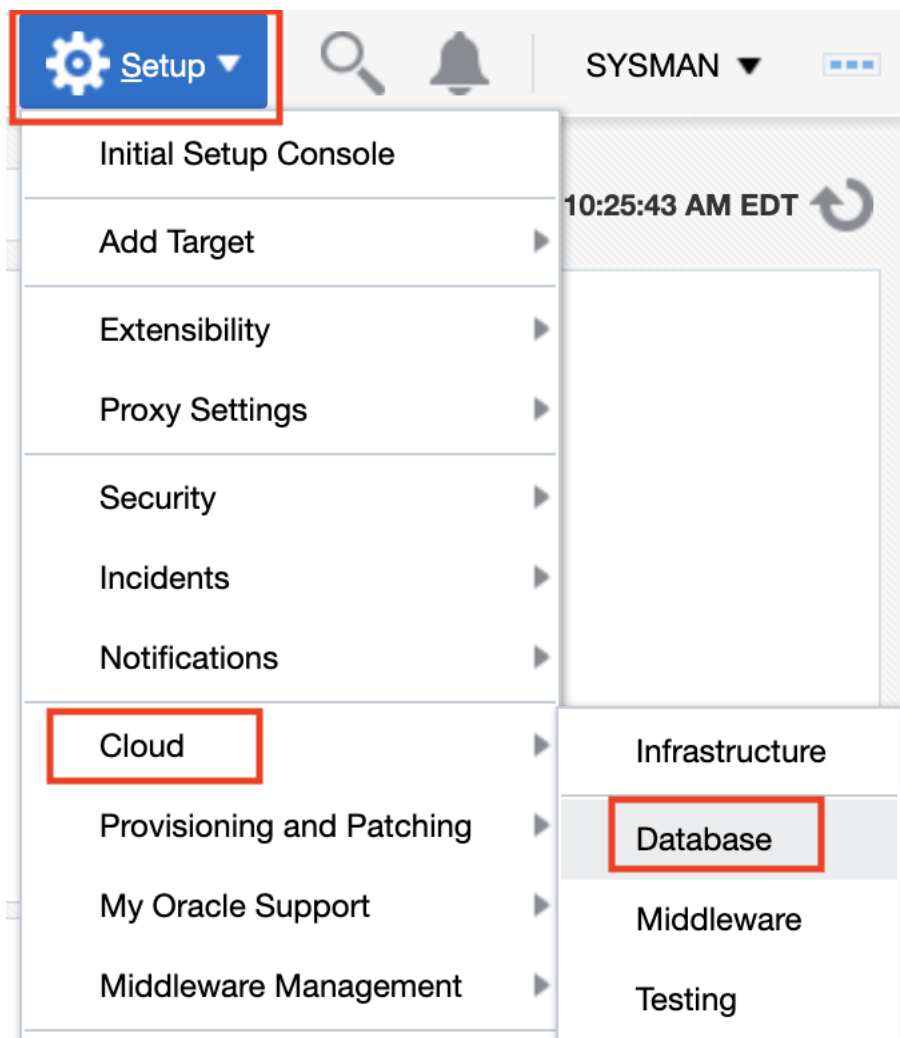
Administrative setup for PDB-as-a-Service(Private Cloud)

Previous exercises demonstrated the process of requesting PDBs using available service templates as done by a Self-Service user. In this section, we will see the Administrative setup for PDBaaS.

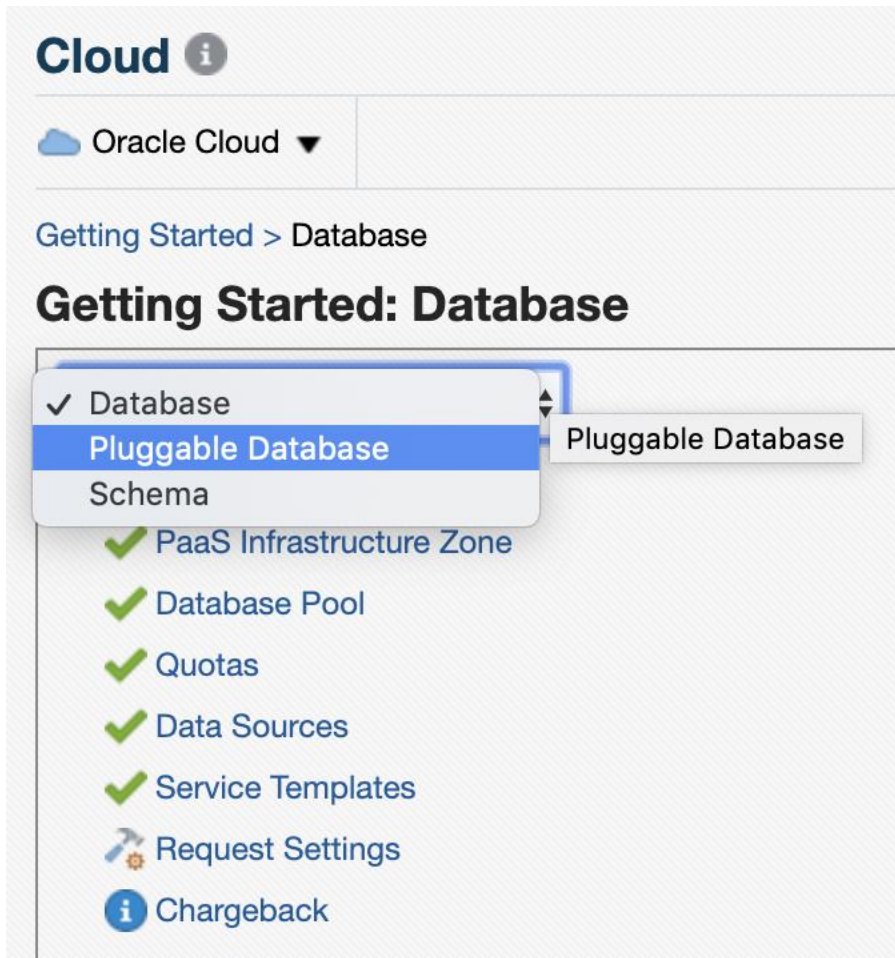
Login to EM Console as super administrator **sysman/welcome1**

PaaS Infrastructure Zone

On the EM Console, go to Setup -> Cloud -> Database.



Select **Pluggable Database** from the drop-down menu.



And then click on '**PaaS Infrastructure Zone**'

"**Sales Infra Zone**" is the zone where PDBs were provisioned in the previous sections. Click on name of zone.

Cloud

Oracle Cloud

[Getting Started](#) > Database

Getting Started: Database

Database

Overview

PaaS Infrastructure Zone

Database Pool

Quotas

Data Sources

Service Templates

Request Settings

Chargeback

Database: PaaS Infrastructure Zone

View

Create

Edit

Delete

Res

Name	Type
Sales Infra Zone	PaaS Infrastructure Zone

You are taken to the Zone Home page, you can see all the details of Zone such as the host members of this zone. You can explore more about the zone on this page.

Sales Infra Zone

PaaS Infrastructure Zone

Page Refreshed Aug 21, 2019 11:40:12 AM EDT

General

Summary

Hosts 1

Dependent Providers 2 (2)

Service Instances 2 (2)

Requests 8

Virtual Machine Adapter No Adapter Associated

Placement Constraints

Maximum CPU Utilization(%) 80

Maximum Memory Allocation(%) 80

Request Status (%)

View

All Service Types

All Actions

Last 24 Hours

CPU and Memory

CPU Utilization

Total Hosts 1

100%

Memory Utilization

Total Hosts 1

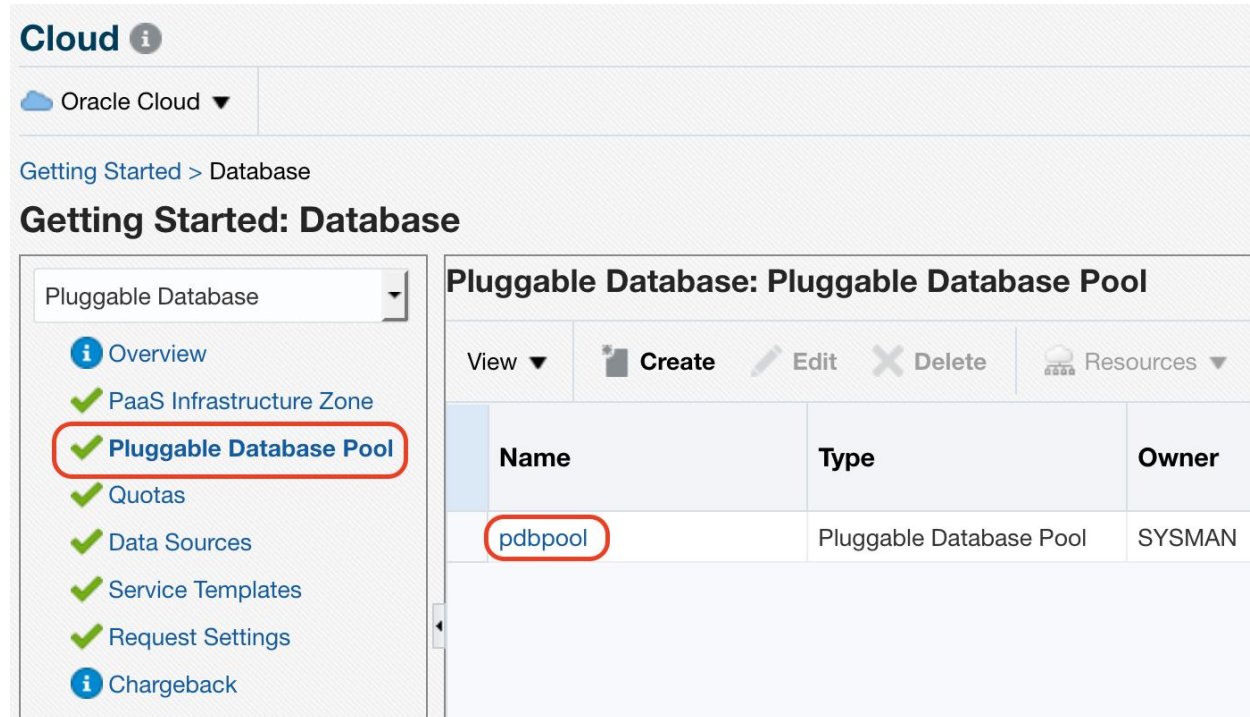
100%

Pluggable Database Pool

On the EM Console, go to Setup -> Cloud -> Database.

Select Pluggable Database from the drop-down menu. And then click on '**Pluggable Database Pool**'.

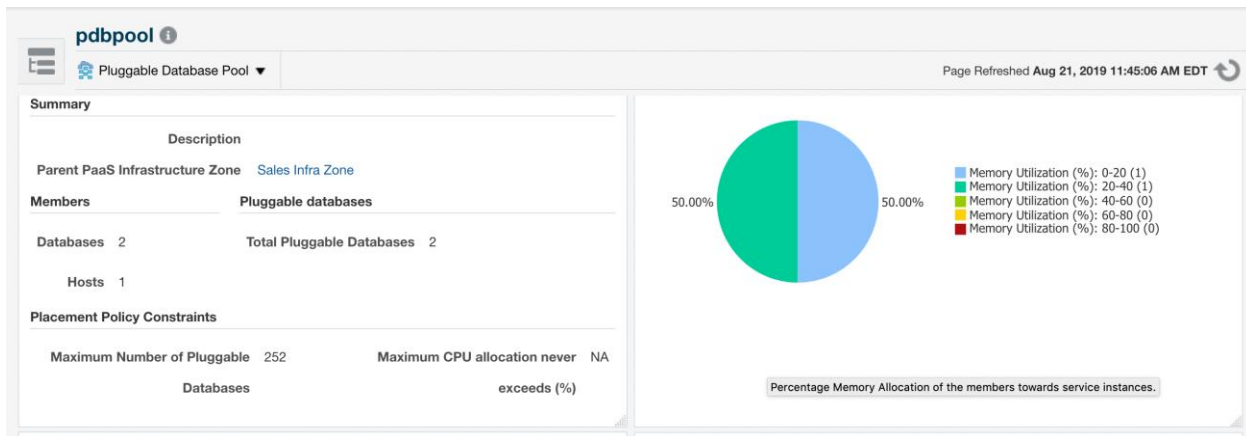
A Pluggable Database Pool consists of a set of Container Databases on which PDBs will be provisioned.



The screenshot shows the Oracle EM Cloud console interface. At the top, there's a 'Cloud' header with an information icon. Below it, a breadcrumb trail reads 'Getting Started > Database'. The main heading is 'Getting Started: Database'. On the left, a sidebar contains a list of database-related items: 'Overview', 'PaaS Infrastructure Zone', 'Pluggable Database Pool' (highlighted with a red box), 'Quotas', 'Data Sources', 'Service Templates', 'Request Settings', and 'Chargeback'. The main content area is titled 'Pluggable Database: Pluggable Database Pool'. It features a toolbar with 'View', 'Create', 'Edit', 'Delete', and 'Resources' buttons. Below the toolbar is a table with three columns: 'Name', 'Type', and 'Owner'. The table contains one row with the name 'pdbpool' (highlighted with a red box), Type 'Pluggable Database Pool', and Owner 'SYSMAN'.

Name	Type	Owner
pdbpool	Pluggable Database Pool	SYSMAN

Click on Name of the pool to see more details.



Scroll down to see details of Members and Service Templates.

Members

View ▼

Name	Status	Type	Owner	Active	SSA Pluggal Host Database	Host Status
sales.subnet.vcn.orac...	↑	SYS...	CYRUS	Active	emcc.market...	↑
sales.subnet.vcn.c...	↑	SYS...			emcc.market...	↑
sales.subnet.vcn.c...	↑	SYS...			emcc.market...	↑

Service Templates and Instances

View ▼

Service Offering	Service Instances
Provision New Empty Pluggable Database	0
Provision Pluggable Database with Data	1

Data Sources

On the EM Console, go to Setup -> Cloud -> Database.

Select Pluggable Database from the drop-down menu. And then click on **'Data Sources'**

Observe that profile is based on Schema Export(s). This Data Profile was used for provisioning PDB with data.

Getting Started: Database

Pluggable Database

Overview

PaaS Infrastructure Zone

Pluggable Database Pool

Quotas

Data Sources

Service Templates

Request Settings

Pluggable Database: Data Sources

Test Master DatabasesData ProfilesTest Master Snapshots

Profiles are entities that capture source database information for provisioning. A profile can represent a complete database or a set of related

View Create... Edit Refresh Profile Delete Search Name

Name	Contains	Owner	Removal Overdue
Database emrep.us.oracle.com Profile 23-10-2019 08:20 PM	1 Schema Expo...	SYSMAN	None
Database test.subnet.vcn.oraclevcn.com Profile 23-10-2019 11:26	1 Schema Expo...	SYSMAN	None

Select the row with profile to see more details.

Test Master DatabasesData ProfilesTest Master Snapshots

Profiles are entities that capture source database information for provisioning. A profile can represent a complete database or a set of related schemas that form an application.

View Create... Edit Refresh Profile Delete Search Name

Name	Contains	Owner	Removal Overdue	Source Database	Purge Policy	Sche
Database emrep.us.oracle.com Profile 23-10-2019 08:20 PM	1 Schema Expo...	SYSMAN	None	emrep.us.oracle	None	None
Database test.subnet.vcn.oraclevcn.com Profile 23-10-2019 11:26	1 Schema Expo...	SYSMAN	None	test.subnet.vcn	None	None

Contents: Database test.subnet.vcn.oraclevcn.com Profile 23-10-2019 11:26

View Delete Modify Retention Policy

Name	Created	Used By	Status	Procedure Activity	
				Create	Delet
Export_10_23_2019_23_27_04_PM	23-Oct-2019 11:27:18 PM GMT	None	Active	Succeeded	n/a

Service Templates

On the EM Console, go to Setup -> Cloud -> Database.

Select Pluggable Database from the drop-down menu. And then click on **Service Templates** from your left menu .

Getting Started > Database

Getting Started: Database

Pluggable Database

- Overview
- ✓ PaaS Infrastructure Zone
- ✓ Pluggable Database Pool
- ✓ Quotas
- ✓ Data Sources
- ✓ **Service Templates**
- ✓ Request Settings

Pluggable Database: Service Templates

Actions ▼	View ▼	Create	Create Like	Edit	Delete	Search
Display Name		Service Type				
Provision New Empty Pluggable Database		Pluggable Database				
Provision Pluggable Database with Data		Pluggable Database				

There are two service templates pertaining to Pluggable Database

- **Provision New Empty Pluggable Database**
 - This template allows user to create a new pluggable database in a container database configured by DBA
- **Provision Pluggable Database with Data**
 - This template allows user to create a new pluggable database with data from non-container database.

Click on name of any template to explore more details.

Service Template Details
X

Summary

Display Name
Provision Pluggable Database with Data

Owner
SYSMAN

Name
Provision Pluggable Database with Data

Created On
Wed Oct 23 23:41:59 GMT 2019

Description
Creates a new PDB with data from non-container ...

Published
Yes

Details

Service Characteristic

Display Name	Value	Description
Allows to dehydrate the ...	TRUE	Only be to be provided for the PDBAAS templates templates.
Contact		
Cost Center		

Roles

Display Name	Description
DEVELOPER	

Resource Providers

Payload

Configurations

View ▼

Name	Value	Hide	Lock	Description
Pluggable Database as a Service		<input type="checkbox"/>		The Pluggable Database as a Service Procedure creates a new Pluggable database for every request along with seed data from the selected profile.

Close

This concludes the lab. Thank you!