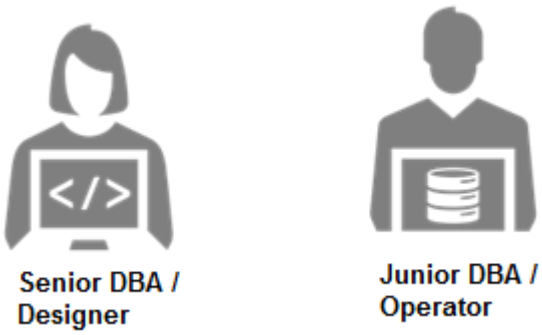
DB Lifecycle Automation using EM

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



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 of 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

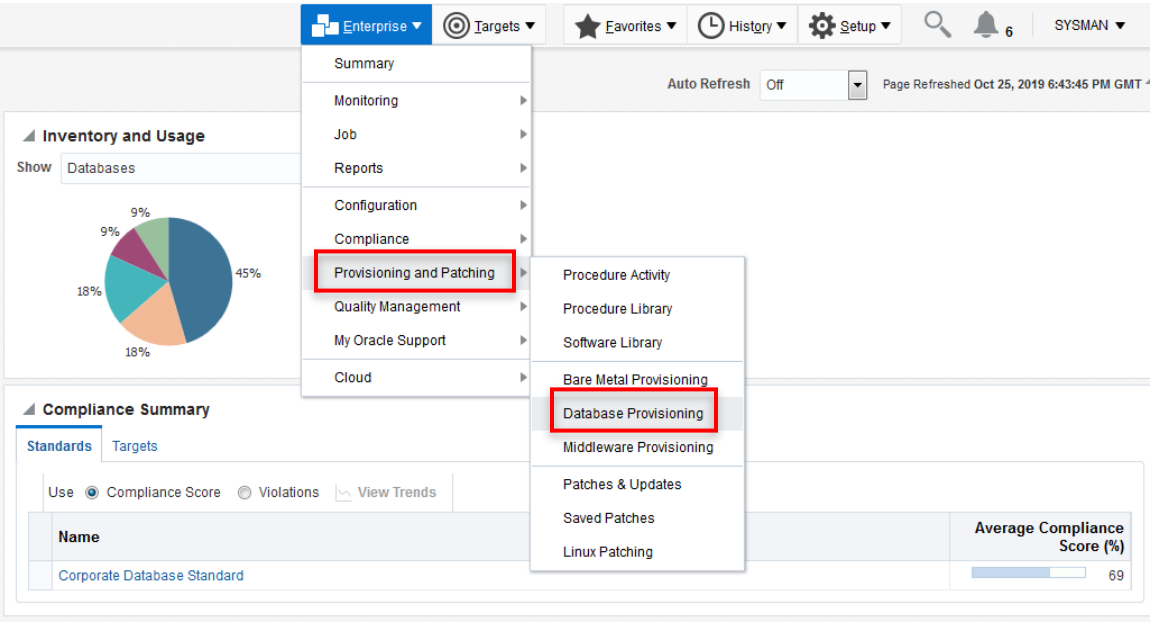
This is a self-sufficient environment with Enterprise Manager 13.3 as well as all Database targets running on a single Virtual Machine.

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

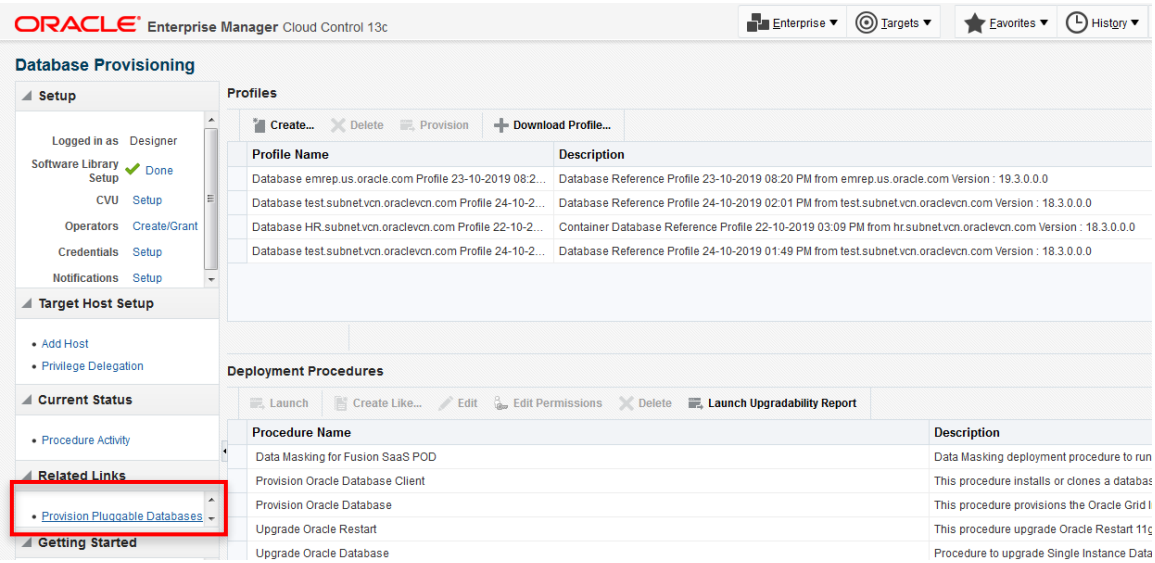
Create Pluggable database

1. Log into your Enterprise Manager VM using the IP provided on your cheat sheet. The Enterprise Manager credentials are "**sysman/welcome1**".

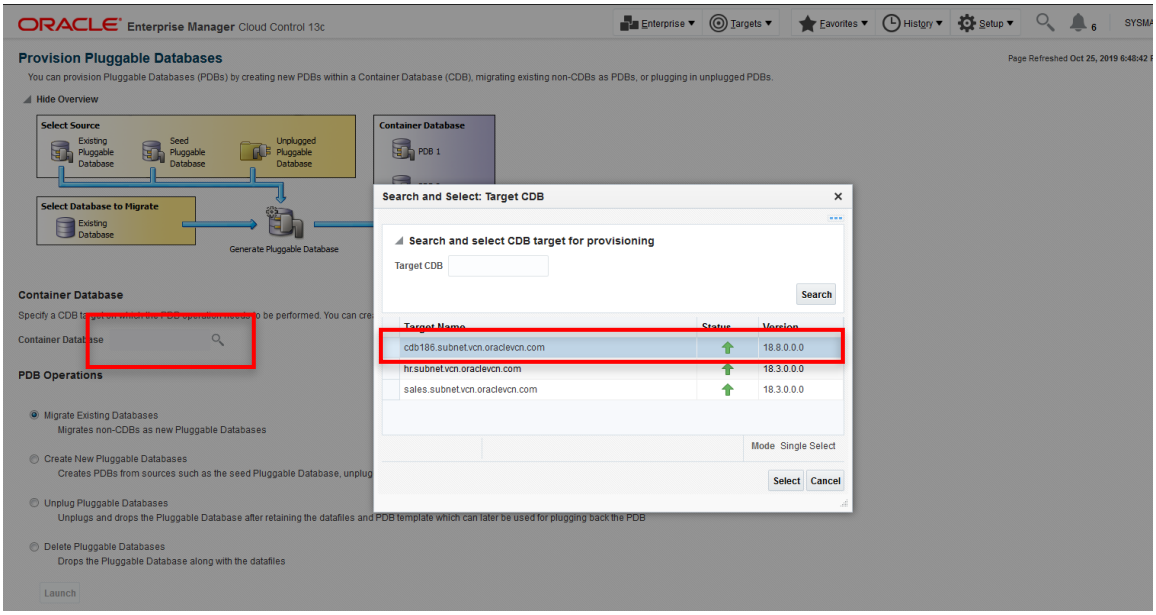
2. Navigate to the "Enterprise menu > Provisioning and Patching > Database provisioning".



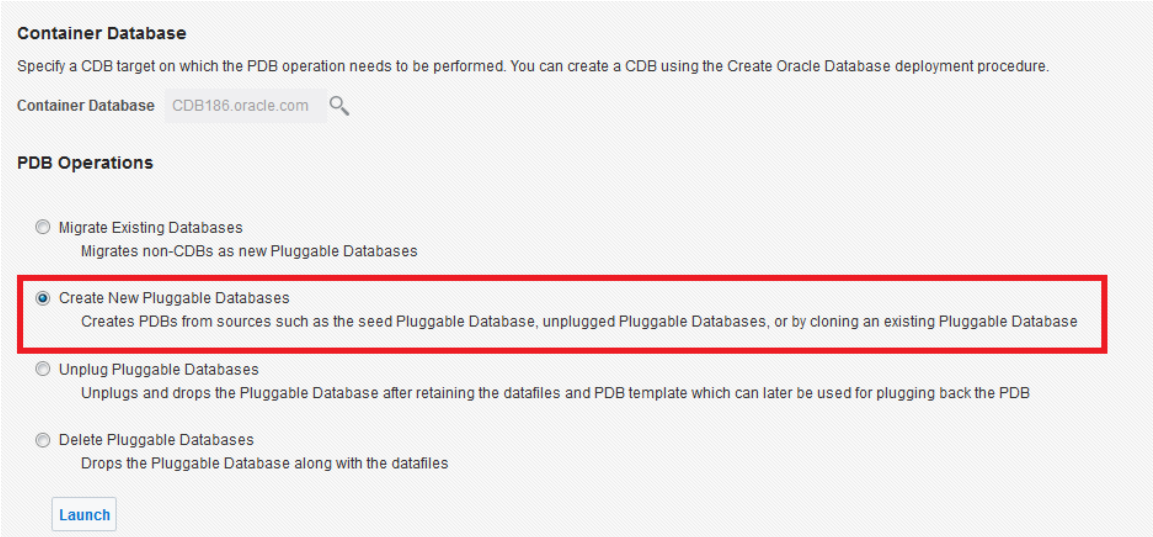
3. In the Database Provisioning page, in the Related Links section of the left menu pane, click "**Provision Pluggable Databases**"



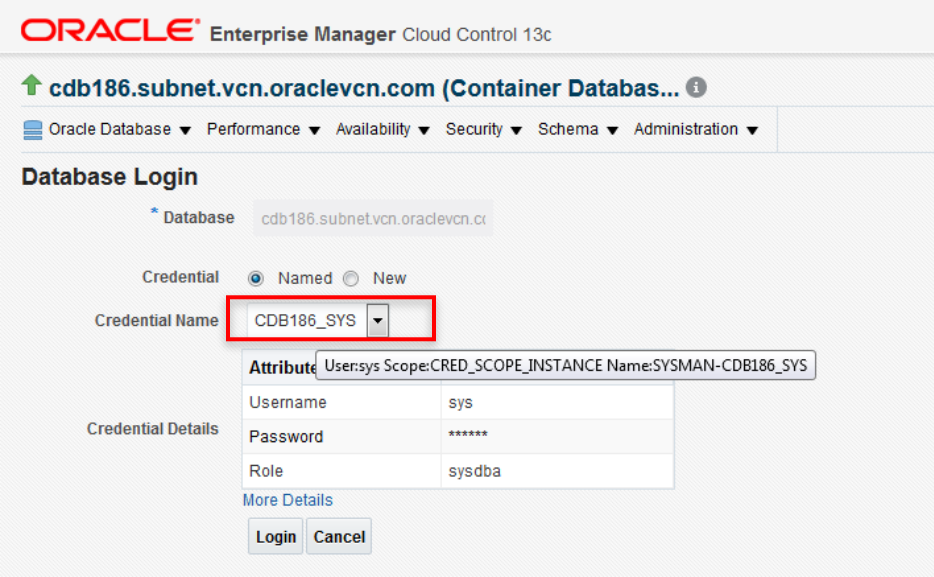
4. In the Provision Pluggable Database Console, in the **Container Database** section, select the CDB (**CDB186 – 18.8 version**) within which you want to create new PDBs.



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

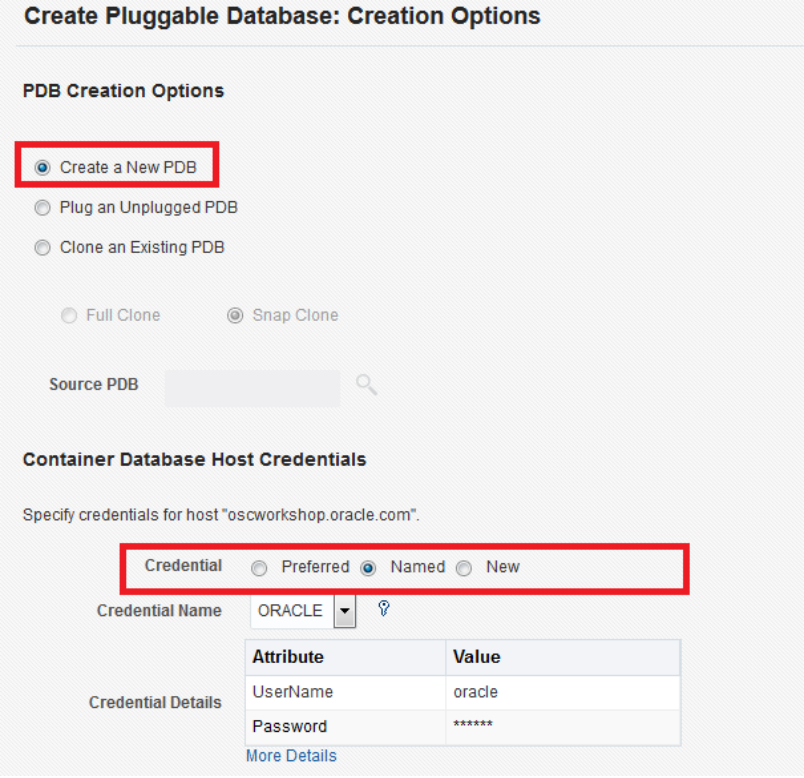


6. Use the named credentials (CDB186_SYS) for login



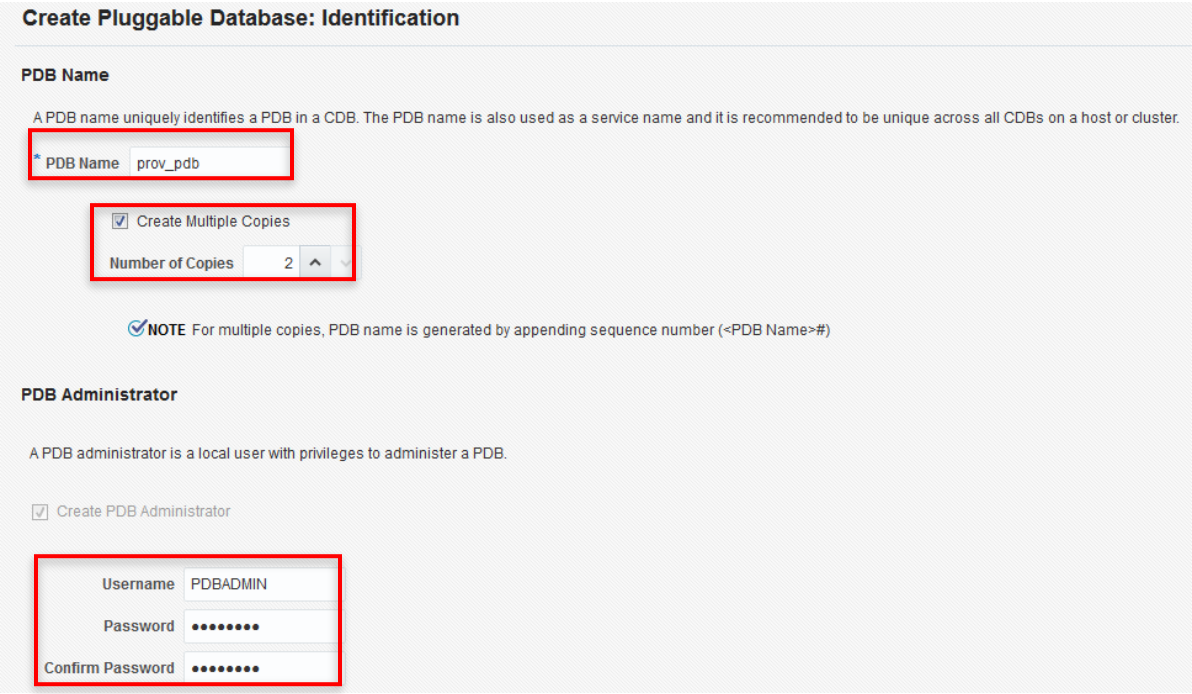
7. In the Source page of the Create Pluggable Database Wizard, in the Source Type section,

select Create a new PDB . Select Named credentials “ORACLE”

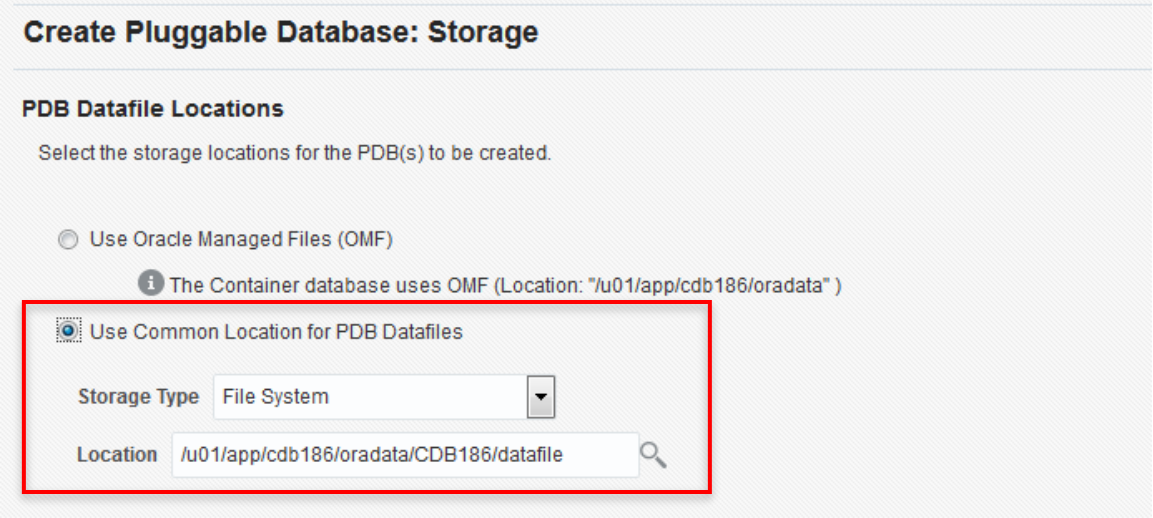


8. In the Identification page, enter a unique name for the PDB you are creating (your initial_pdb).
   Optionally, select check box to “create multiple DBs” and put **2** as number of copies.

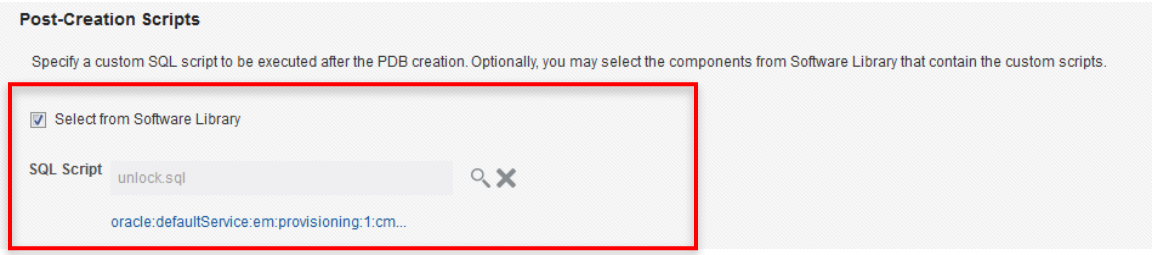
9. In the PDB Administrator section, enter the credentials of the admin user account you need to create for administering the PDB.
   UserName: pdbadmin
   Password: welcome1
   Click Next.



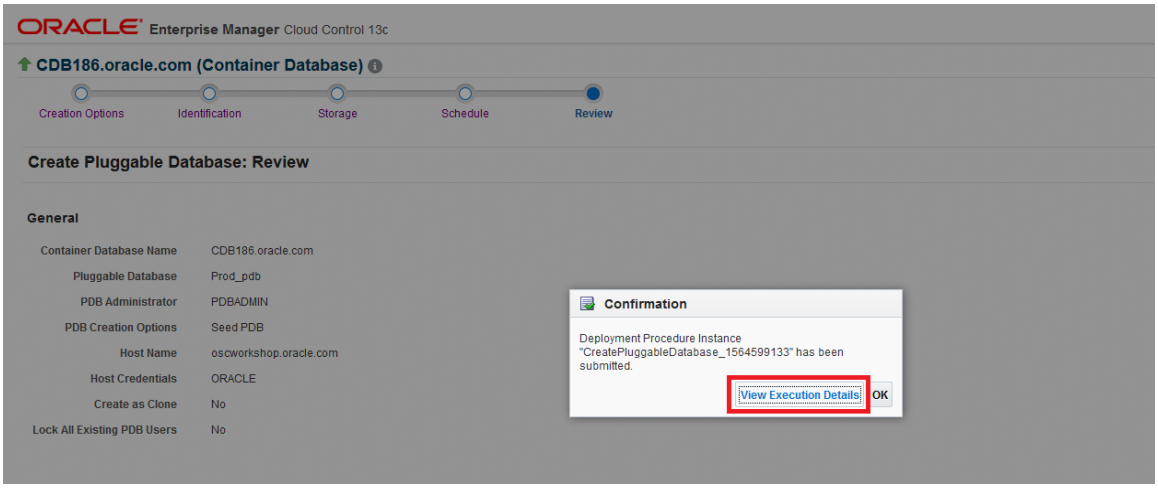
10. For storage option, select “Use Common Location for PDB Datafiles” and leave the defaults as-is.



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).

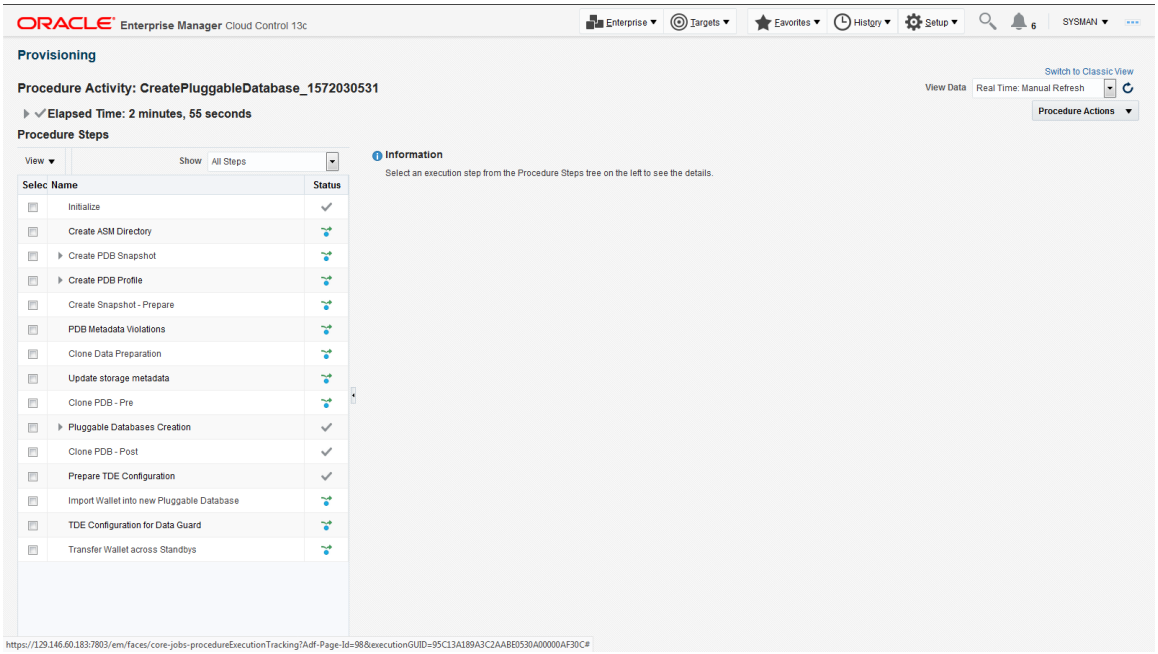


11. In the Schedule page, select immediately check box next to Start. Click **Next.**
12. **In the Review page, review the details you have provided for the deployment procedure. If you are satisfied with the details, click Submit. You can now click on View Execution Details link to see details.**



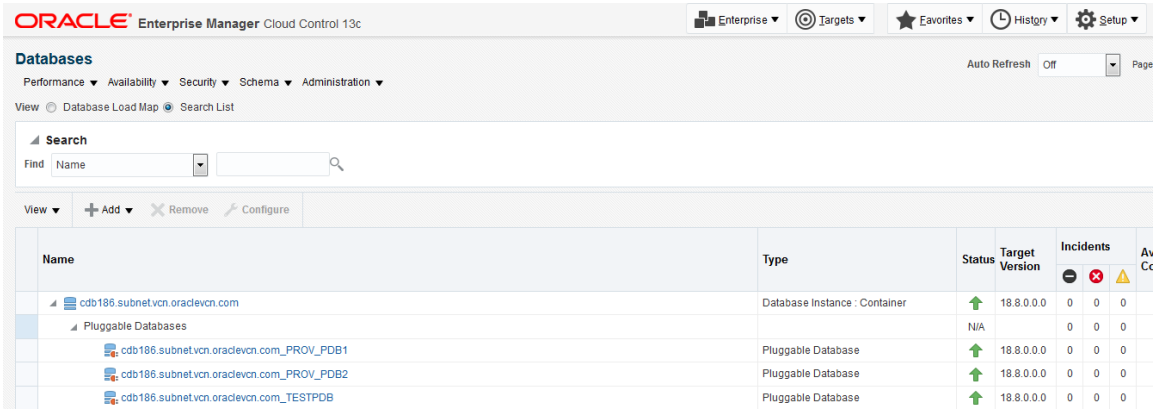
13. In the Procedure Activity page, view the status of the procedure.

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



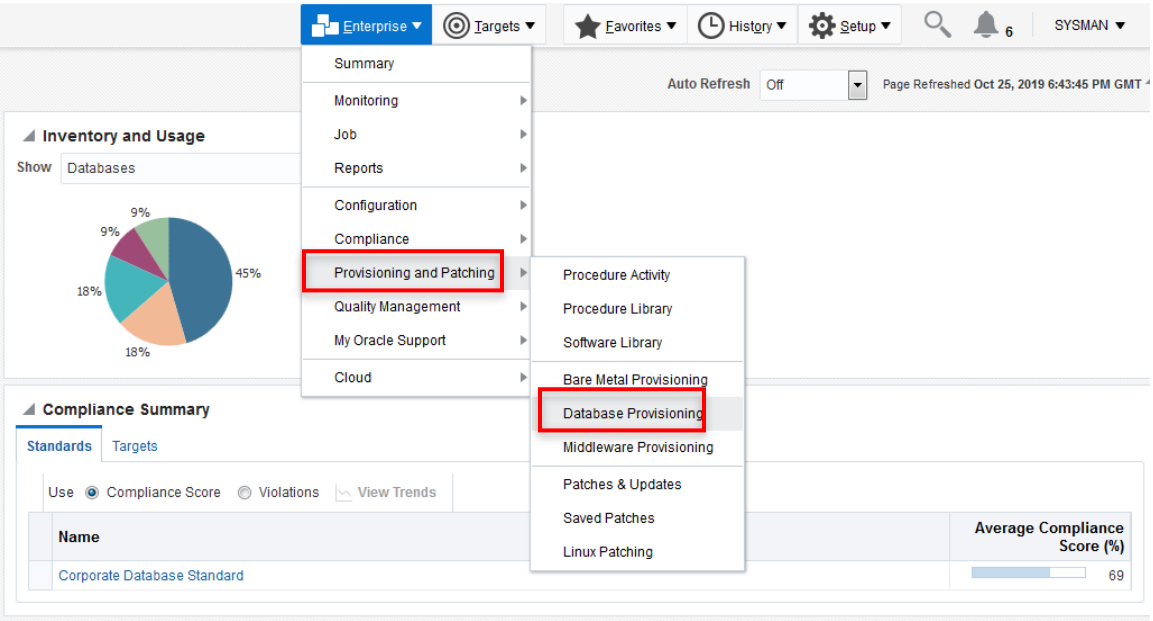
Once the procedure is completed (takes about 3-5 mins), you can **Navigate to Targets >**

Databases, Click on CDB186 and you will see the newly created PDB

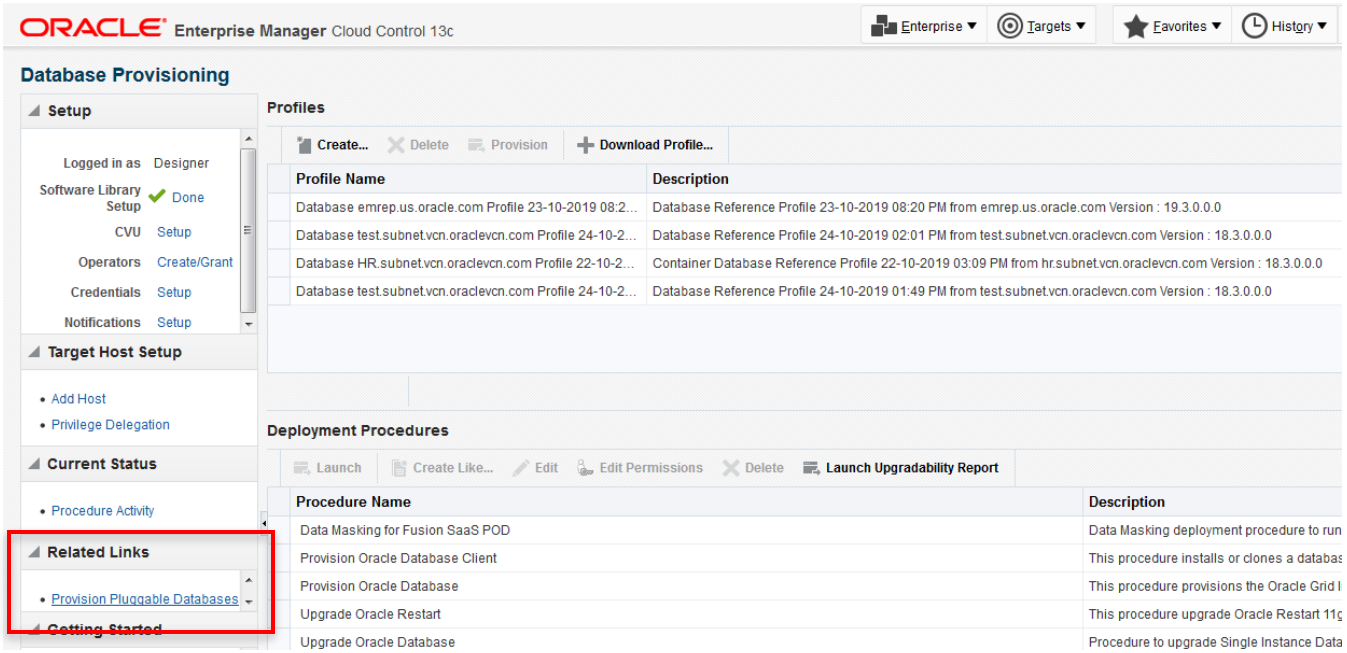

ORACLE Enterprise Manager Cloud Control 13c
Enterprise
Targets
Favorites
History
Setup
Databases
Auto Refresh
Off
Performance
Availability
Security
Schema
Administration
View
Database Load Map
Search List
Search
Find
Name
View
Add
Remove
Configure
Name
Type
Status
Target Version
Incidents
cdb186.subnet.vcn.oraclevcn.com
Database Instance : Container
18.8.0.0.0
Pluggable Databases
N/A
cdb186.subnet.vcn.oraclevcn.com_PROV_PDB1
Pluggable Database
cdb186.subnet.vcn.oraclevcn.com_PROV_PDB2
cdb186.subnet.vcn.oraclevcn.com_TESTPDB

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

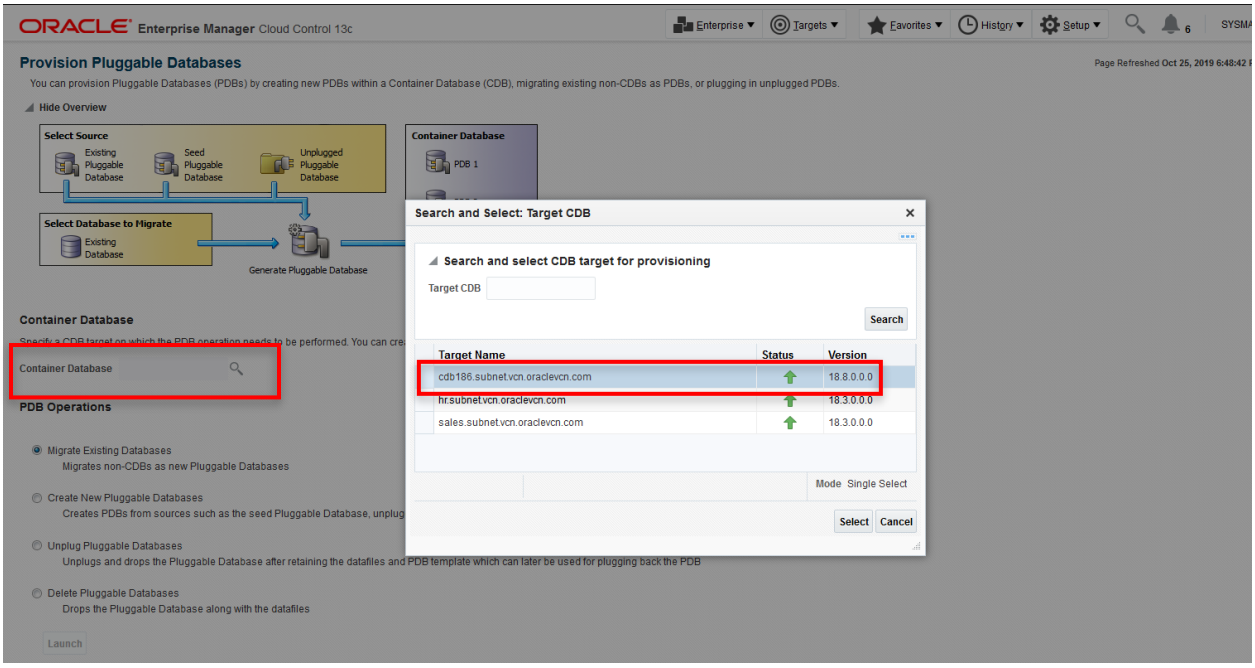
1. Navigate to the “Enterprise menu > Provisioning and Patching > Database provisioning”.



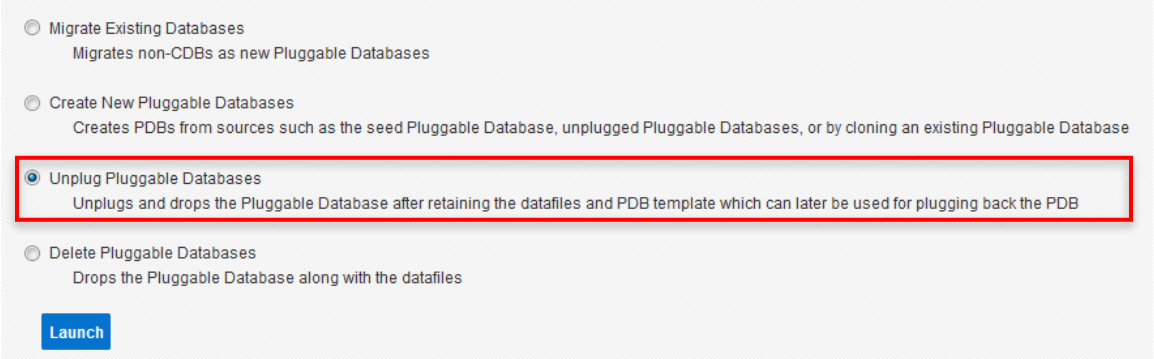
2. In the Database Provisioning page, in the Related Links section of the left menu pane, click “**Provision Pluggable Databases**”



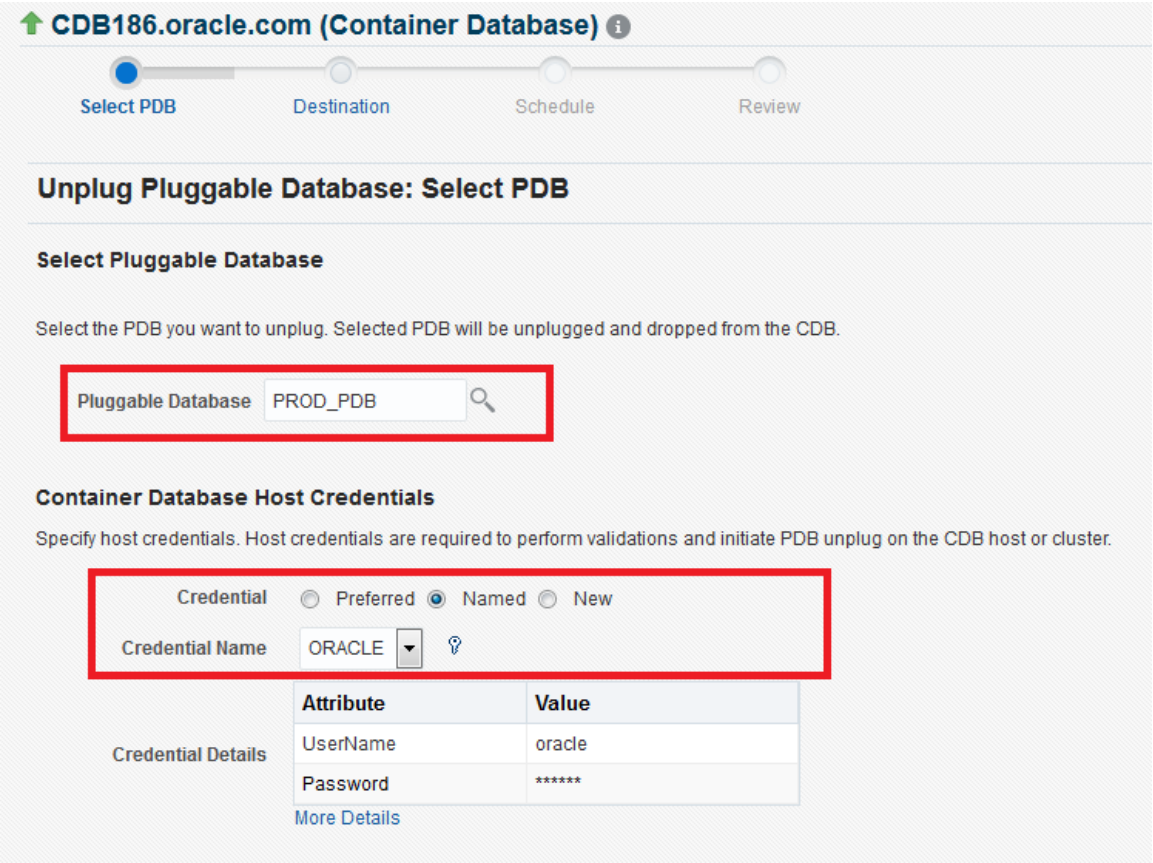
3. In the Provision Pluggable Database Console, in the Container Database section, select the CDB (**CDB186**) within which you want to create new PDBs.



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"

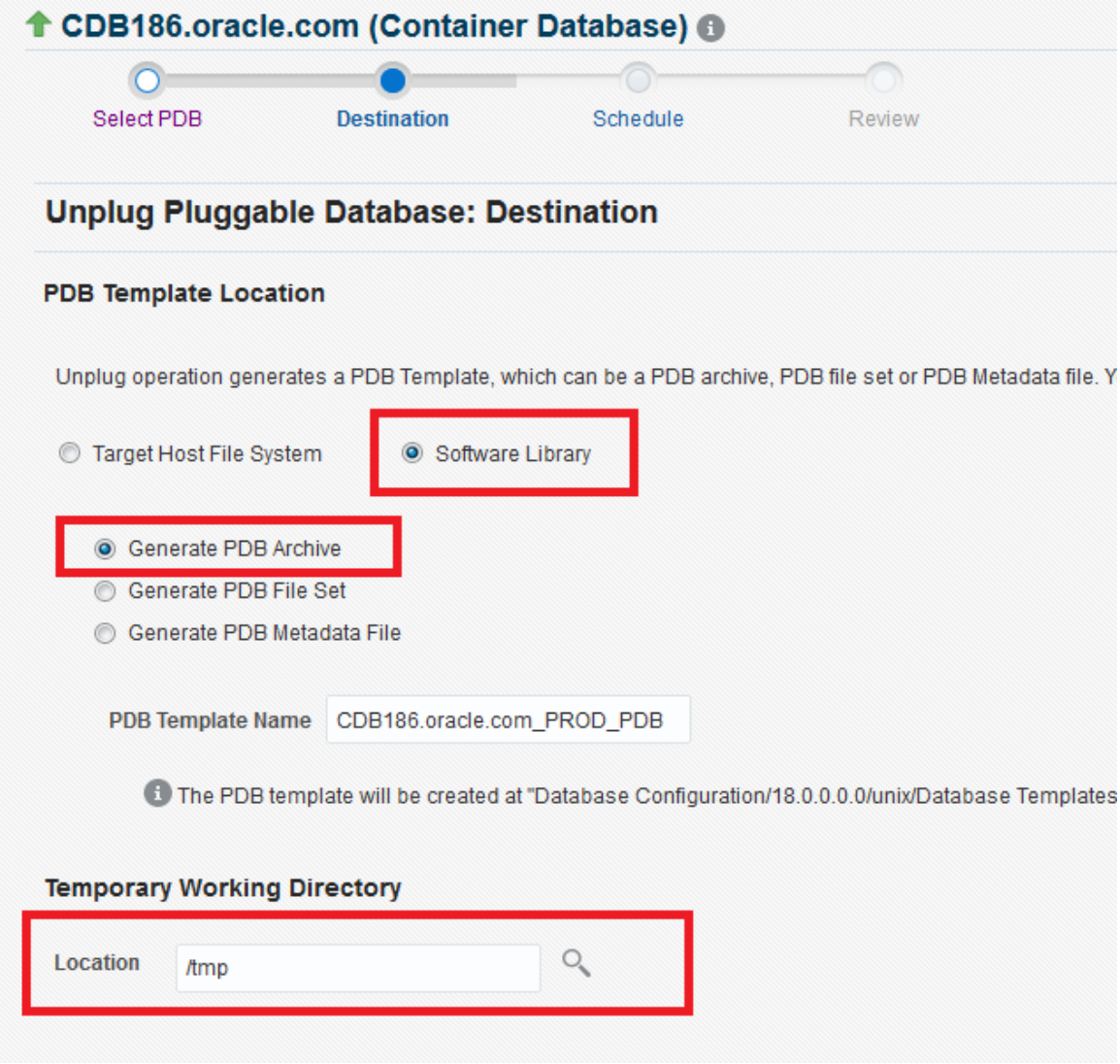


6. In the Destination page, select the type of PDB template you want to generate for unplugging the PDB, and the location where you want to store it. The PDB template consists of all datafiles as well as the metadata XML file.

Select radio button for software library.

Select Generate PDB archive.

Enter /tmp in location under Temporary working directory

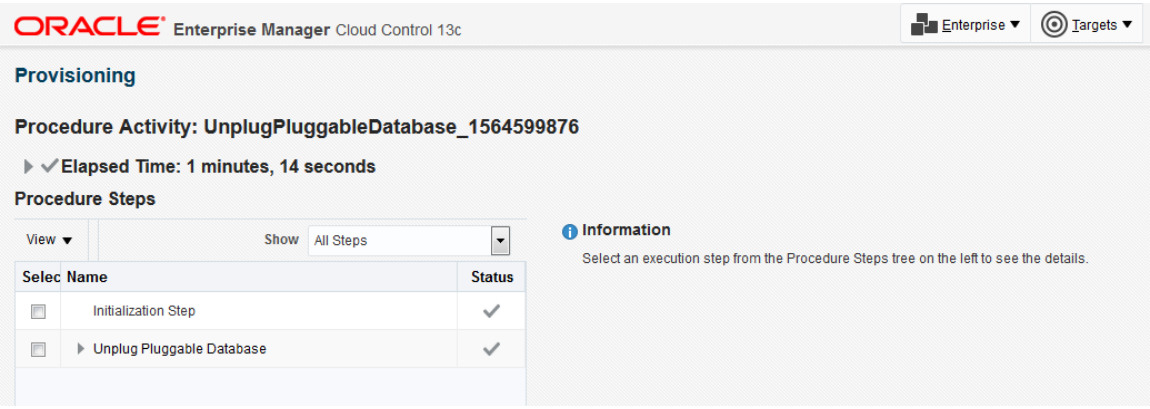


7. In the Schedule page,
   Select immediately check box next to Start.
   Click **Next.**

8. **In the Review page, review the details you have provided for the deployment procedure.**

   If you are satisfied with the details, click Submit.

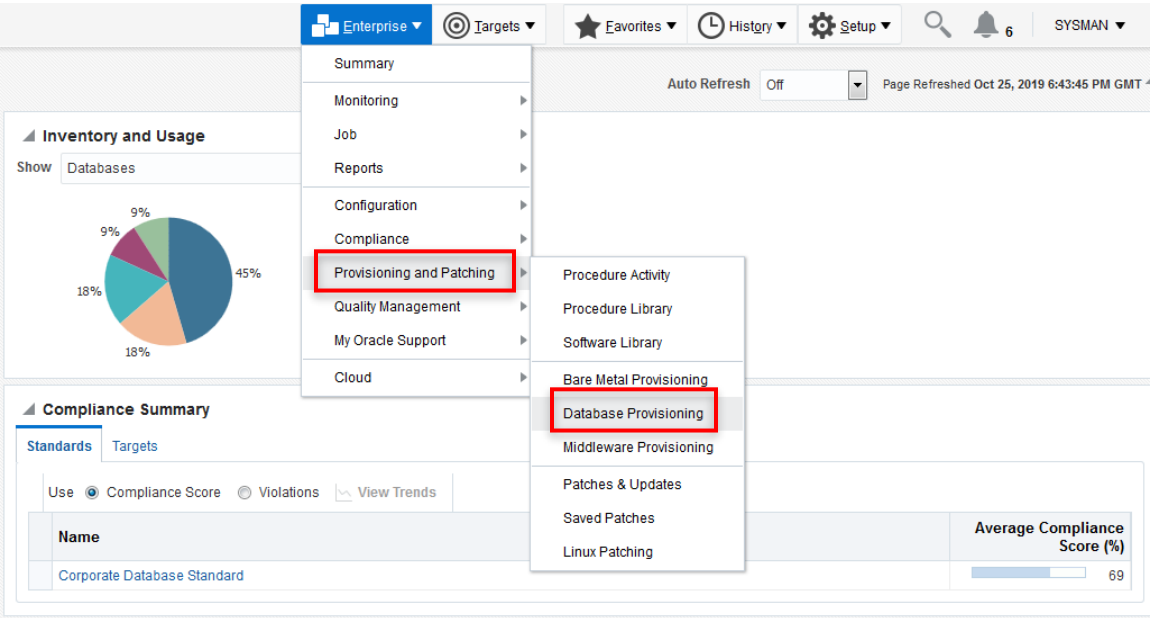
9. In the Procedure Activity page, view the status of the procedure.



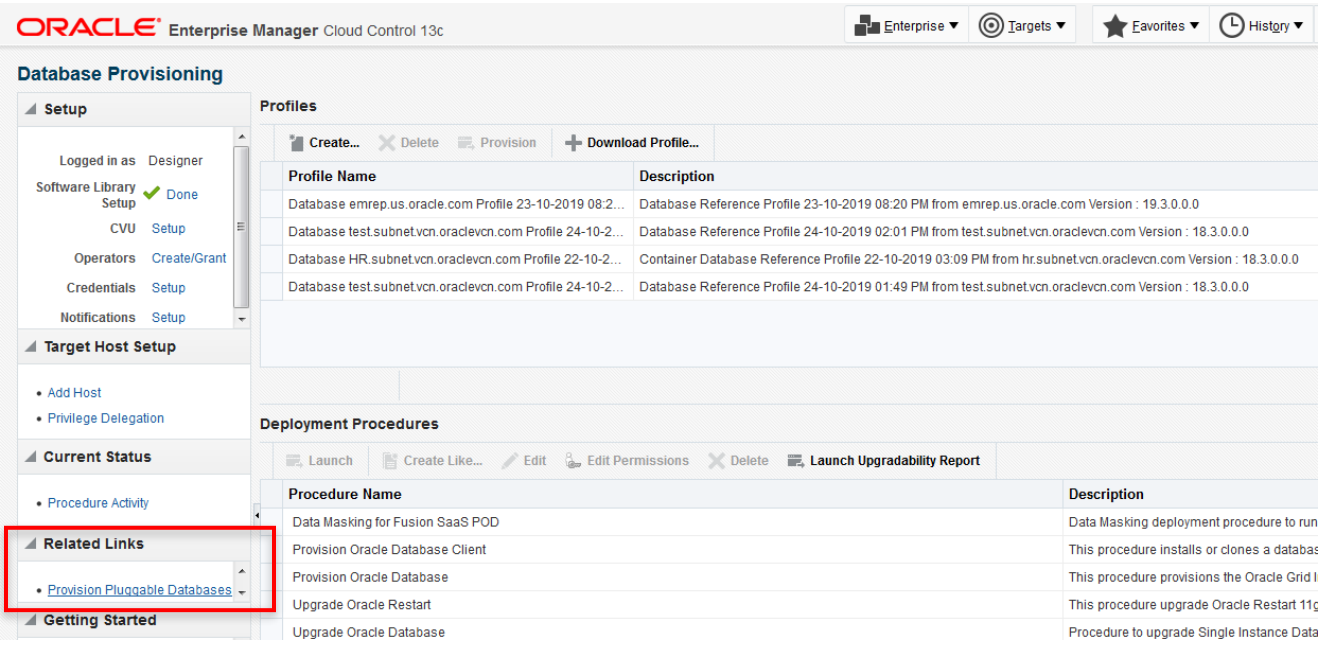
10. You can **Navigate to Targets > Databases,** Click on CDB186 and you will see the PDB you unplugged is no longer in the list.

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

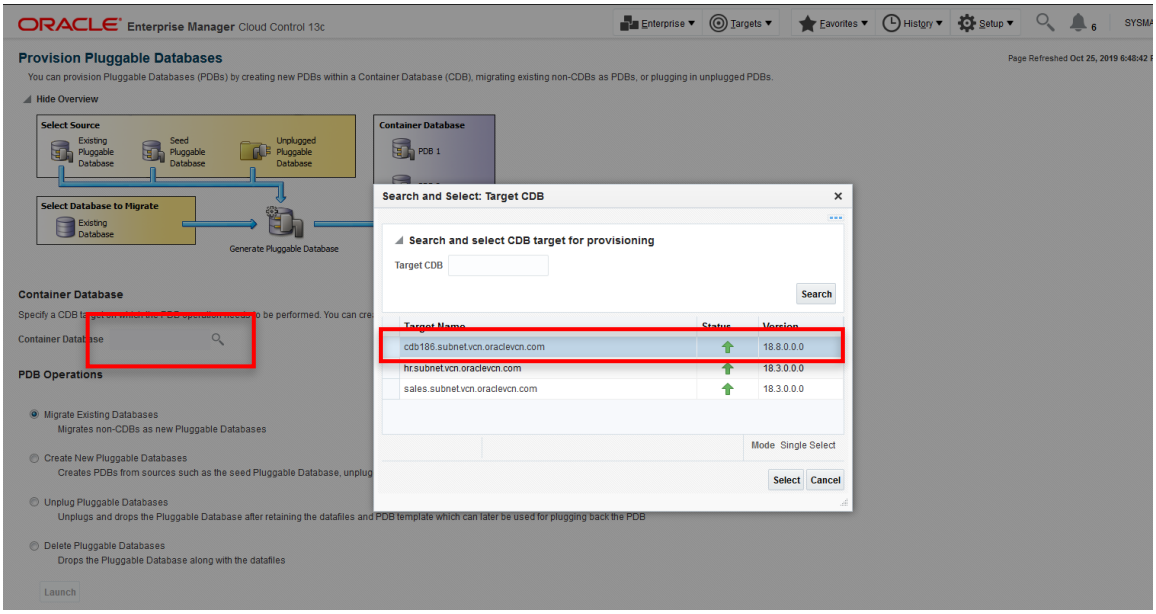
11. Navigate to the “Enterprise menu > Provisioning and Patching > Database provisioning”.



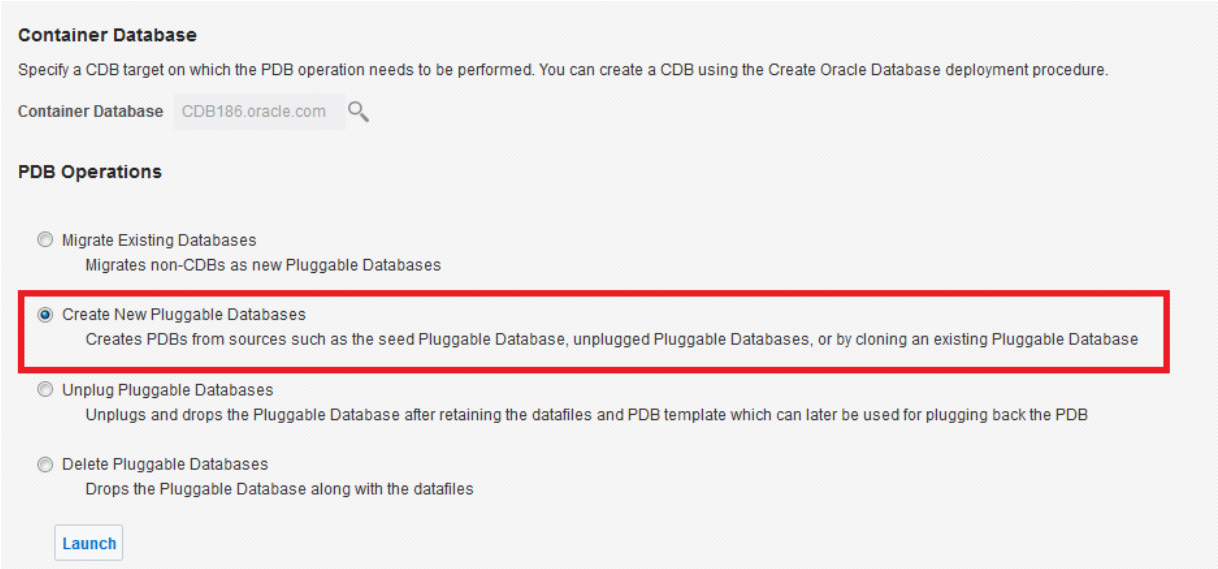
12. In the Database Provisioning page, in the Related Links section of the left menu pane, click Provision Pluggable Databases



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

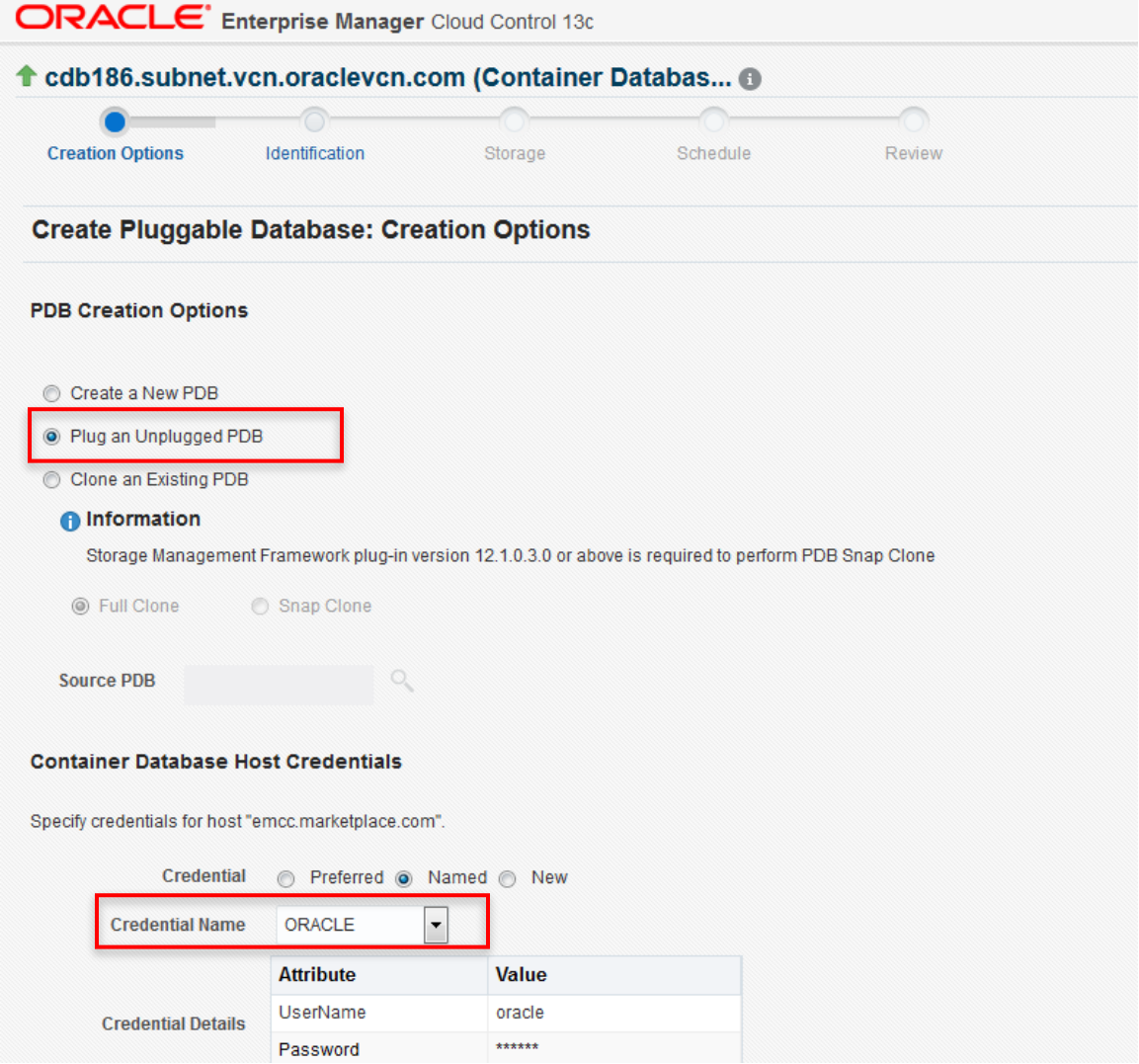


14. In the PDB Operations section, select Create Pluggable Databases , **Click** Launch

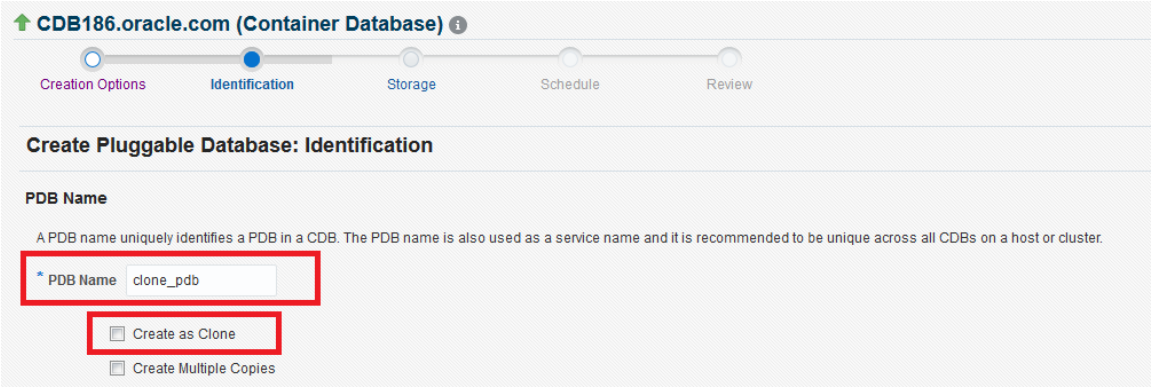


15. In the Source page of the Create Pluggable Database Wizard, in the Source Type section,

    select **Plug an unplugged PDB**. Select Named credentials “ORACLE”

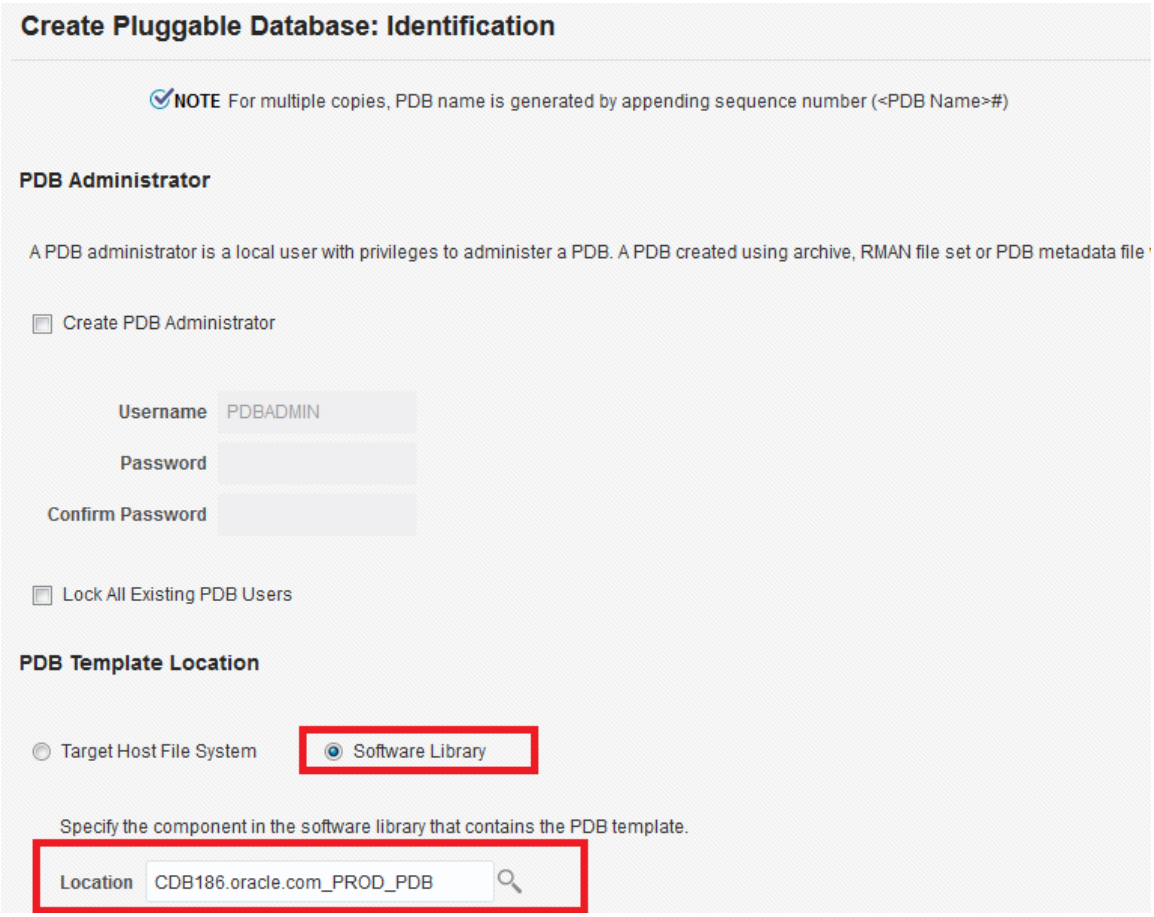


16. In the Identification page, enter a unique name for the PDB you are plugging in.
17. Select Create As Clone to ensure that Oracle Database generates unique PDB DBID, GUID, and other identifiers expected for the new PDB .
    Enter PDB name like “clone_pdb”.

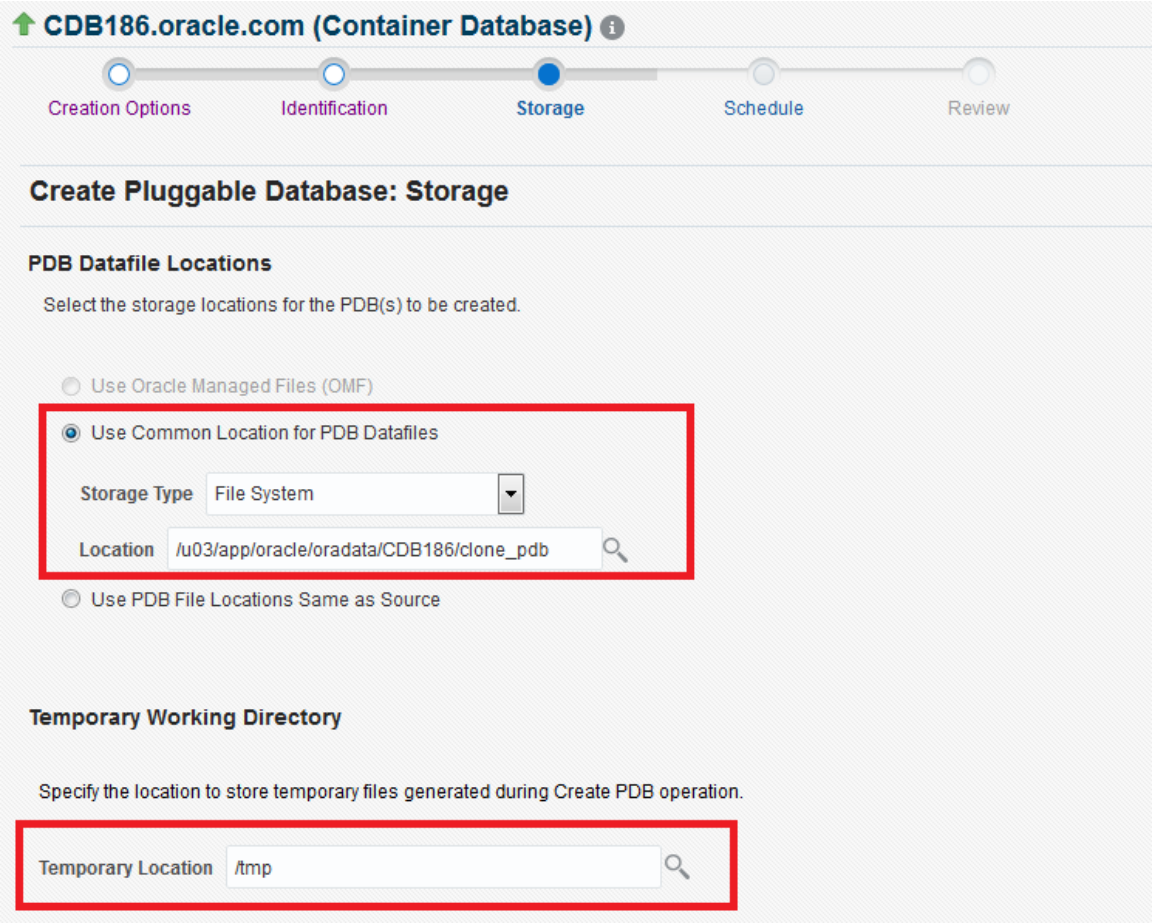


18. **Note**: We will keep pdbadmin as a default admin. So, don't select anything in this section.

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



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



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

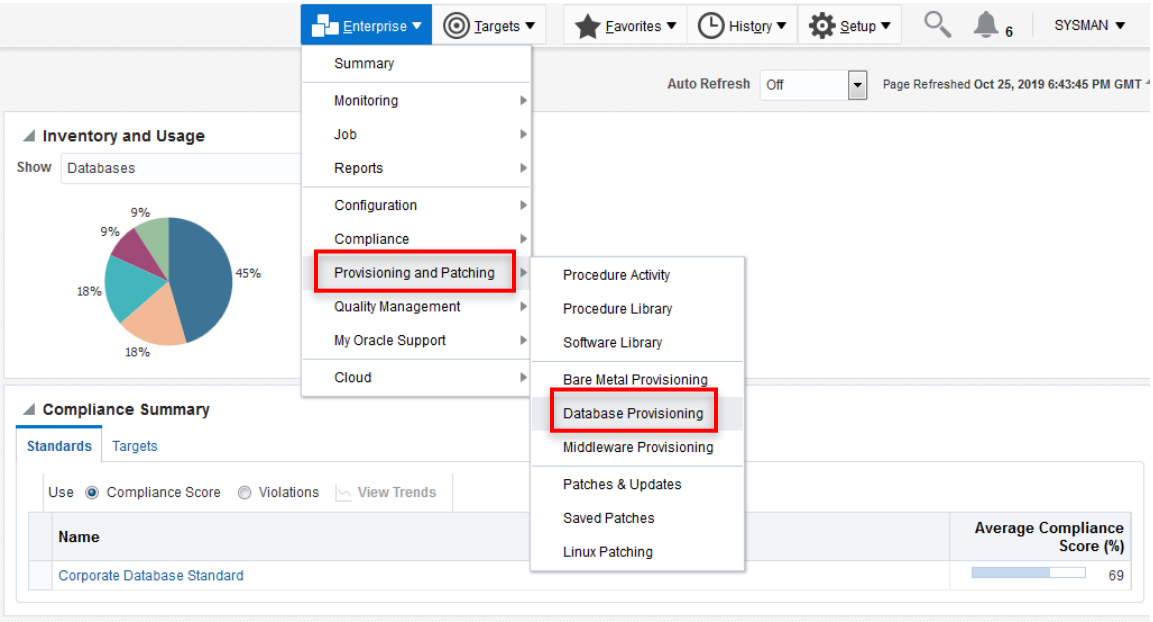
    step. Once the procedure is completed, you can **Navigate to Targets > Databases,** Click on

    CDB186 and you will see the newly created PDB

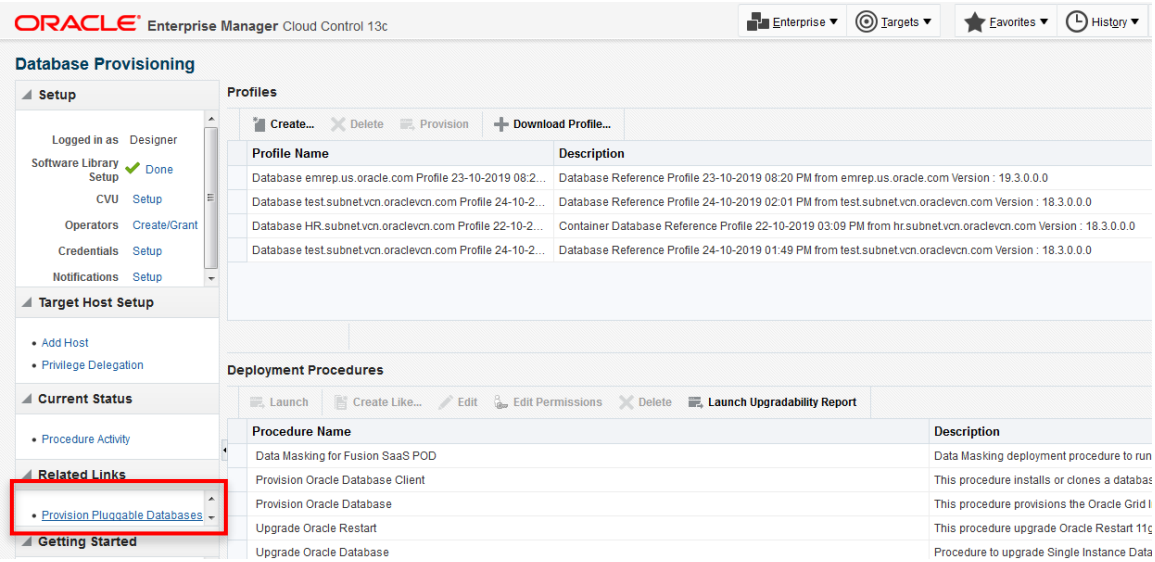
    Note: You do not have to wait until the steps complete and move on to the next section.

Clone an existing Pluggable database (PDB)

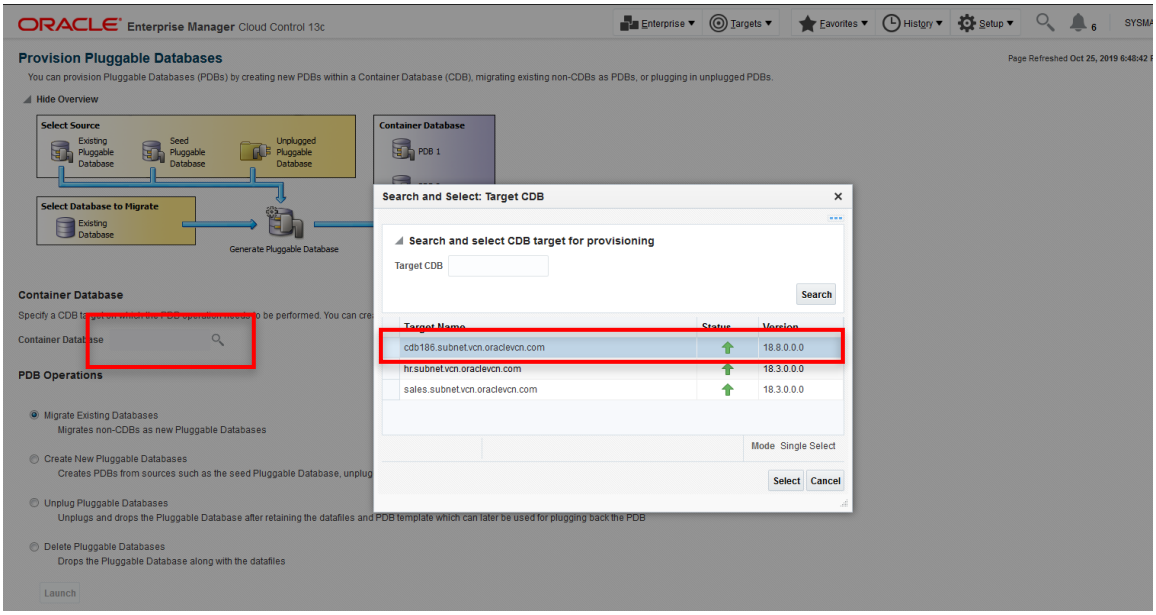
1. Navigate to the “Enterprise menu > Provisioning and Patching > Database provisioning”.



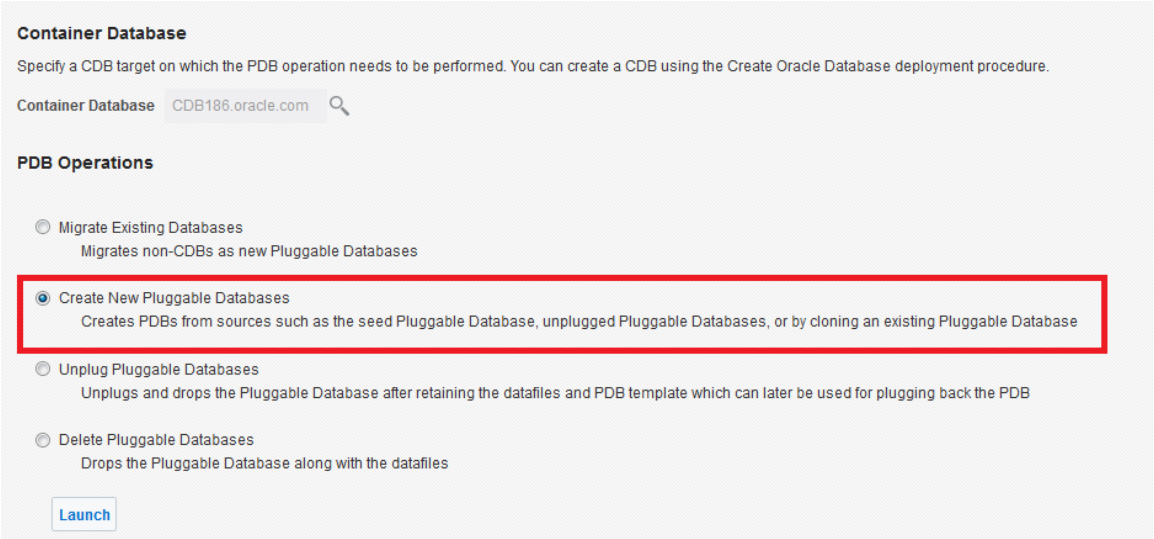
2. In the Database Provisioning page, in the Related Links section of the left menu pane, click Provision Pluggable Databases



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

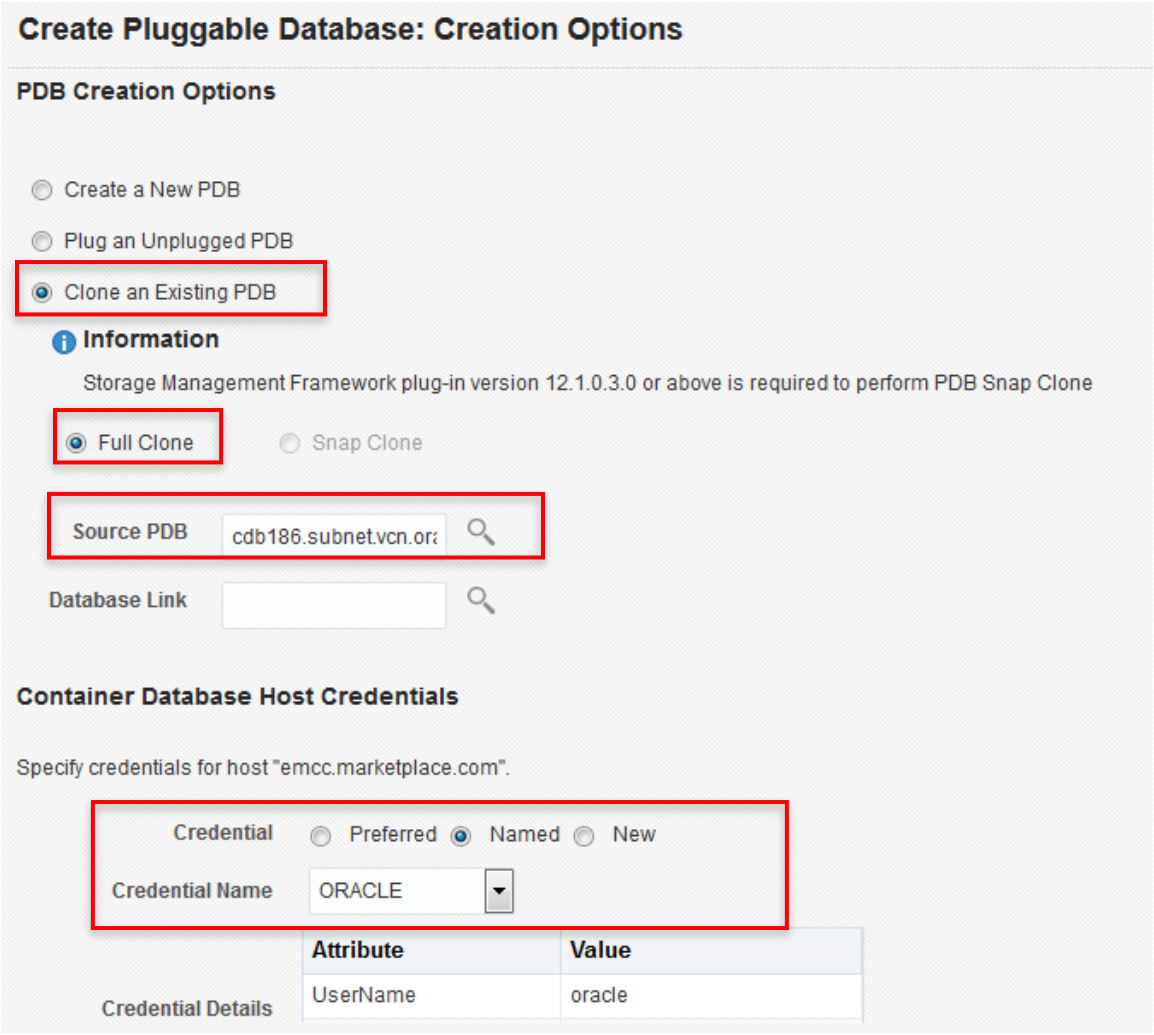


4. In the PDB Operations section, select Create Pluggable Databases , **Click** Launch

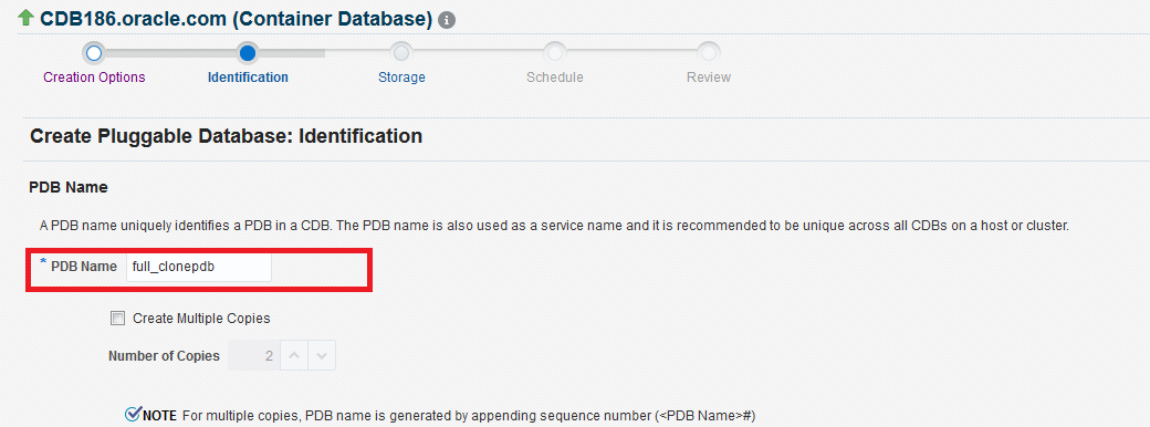


5. Select clone PDB and select source as CDB186 (if you choose any other CDB , this operation might fail). Please keep Database link box empty.

Select named credentials “ORACLE”, Click Next.

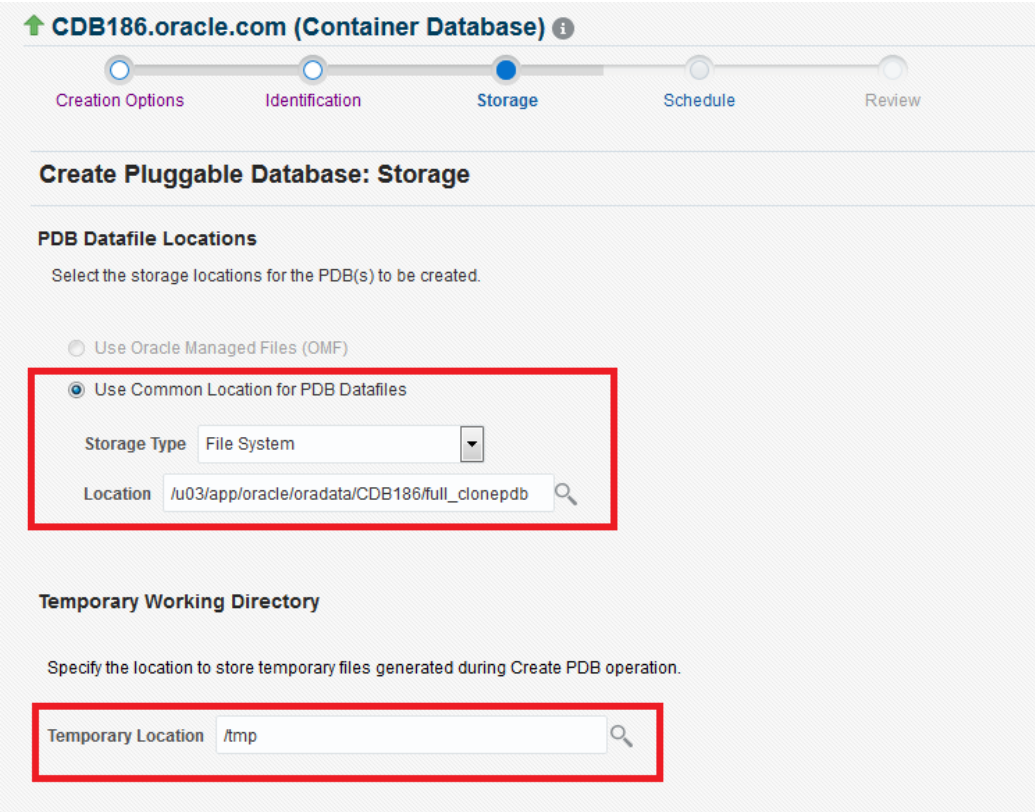


6. Enter new PDB name



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



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.

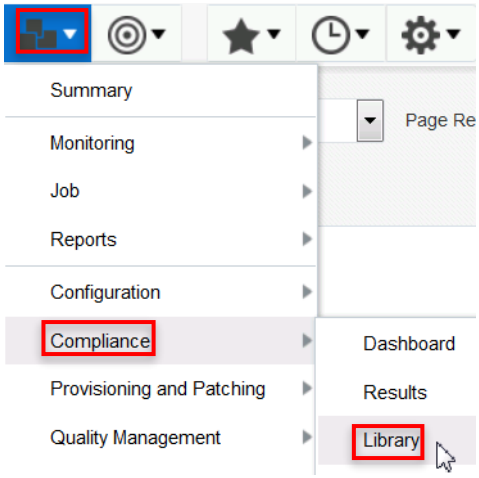
    Once the procedure is completed, you can **Navigate to Targets > Databases, Click on CDB186**

    and you will see the newly created PDB

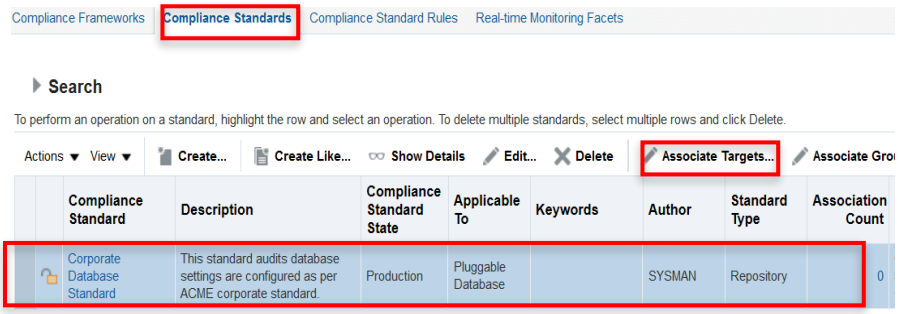
Compliance Management for PDB

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



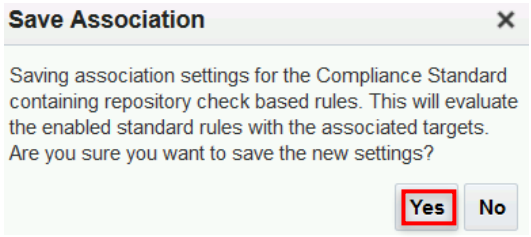
2. Click Compliance Standards tab → Choose the row “Corporate Database Standard” → Click Associate Targets



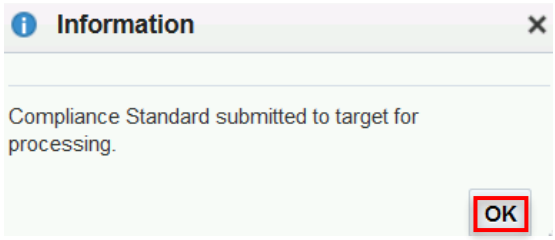
3. Click Add → Choose the row with your PDB → Click Select button

4. Click OK button

5. In the Save Association box → Click Yes button

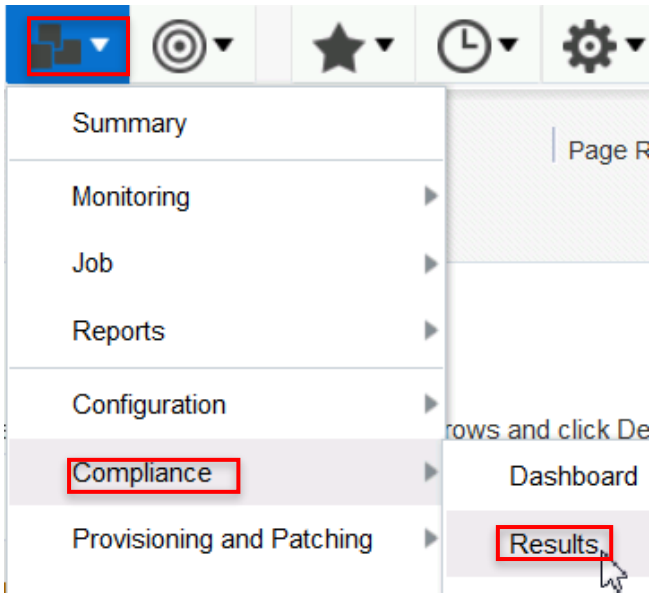


6. Click OK button

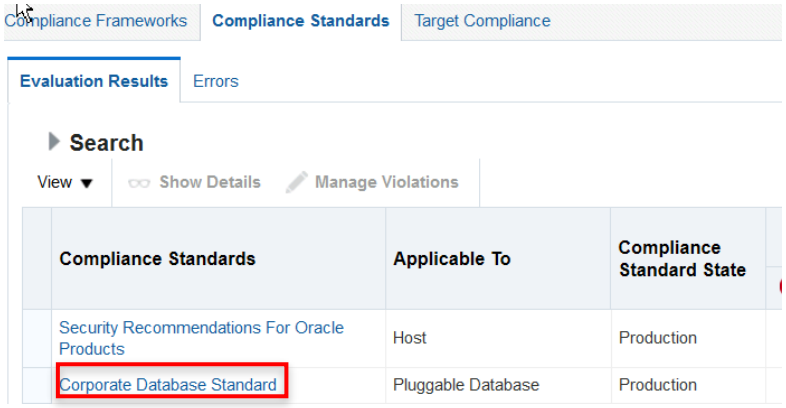


7. You have to refresh PDB statistics to see notifications, To refresh PDB database,
    a. click → Click Databases → Click View → Click Expand All
    b. Right click on PDB → Click Oracle Database → Click Configuration → Click Latest → Click Refresh icon on the page(it will take few minutes for refresh to complete)

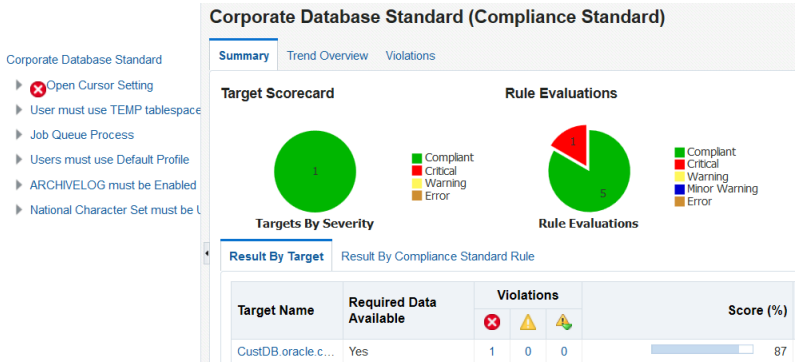
8. Click → Click Compliance →Click Results



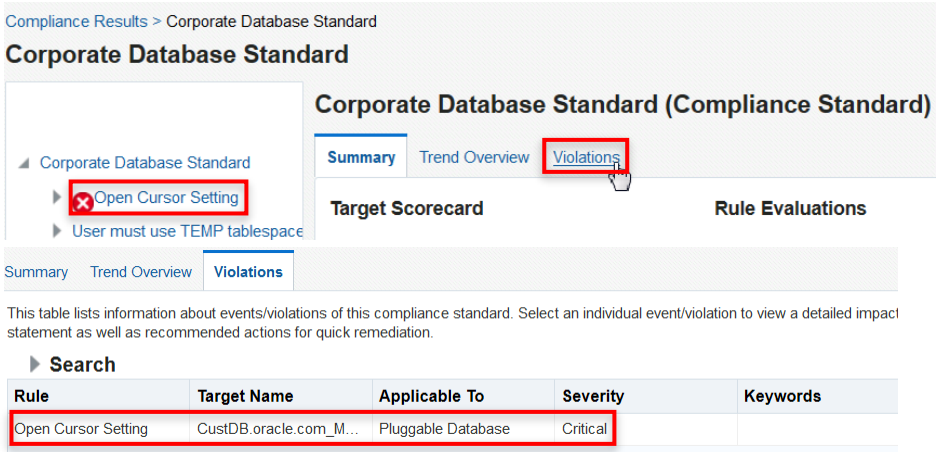
9. Click Corporate Database Standard under Compliance Standards



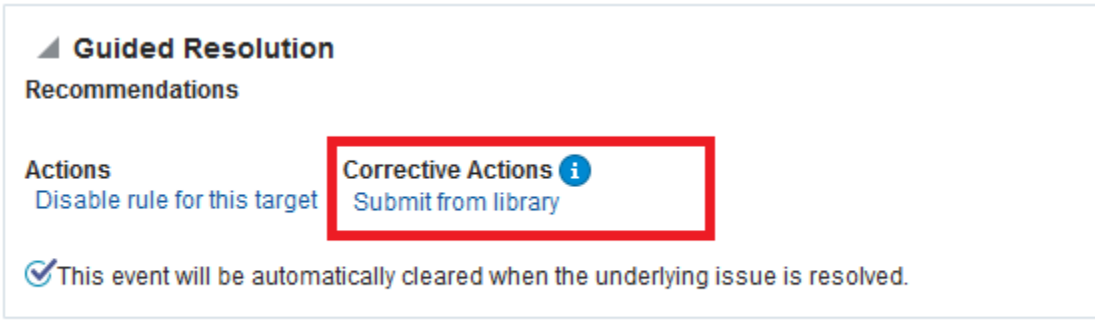
10. You will see the following screen as shown below



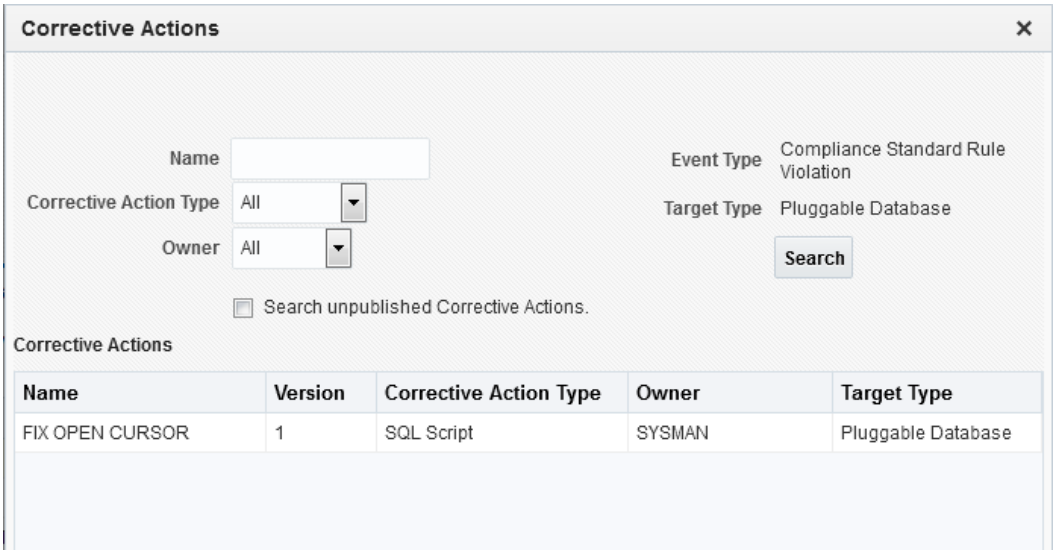
11. Click Violations link and then click on one of the Open Cursor Setting lines



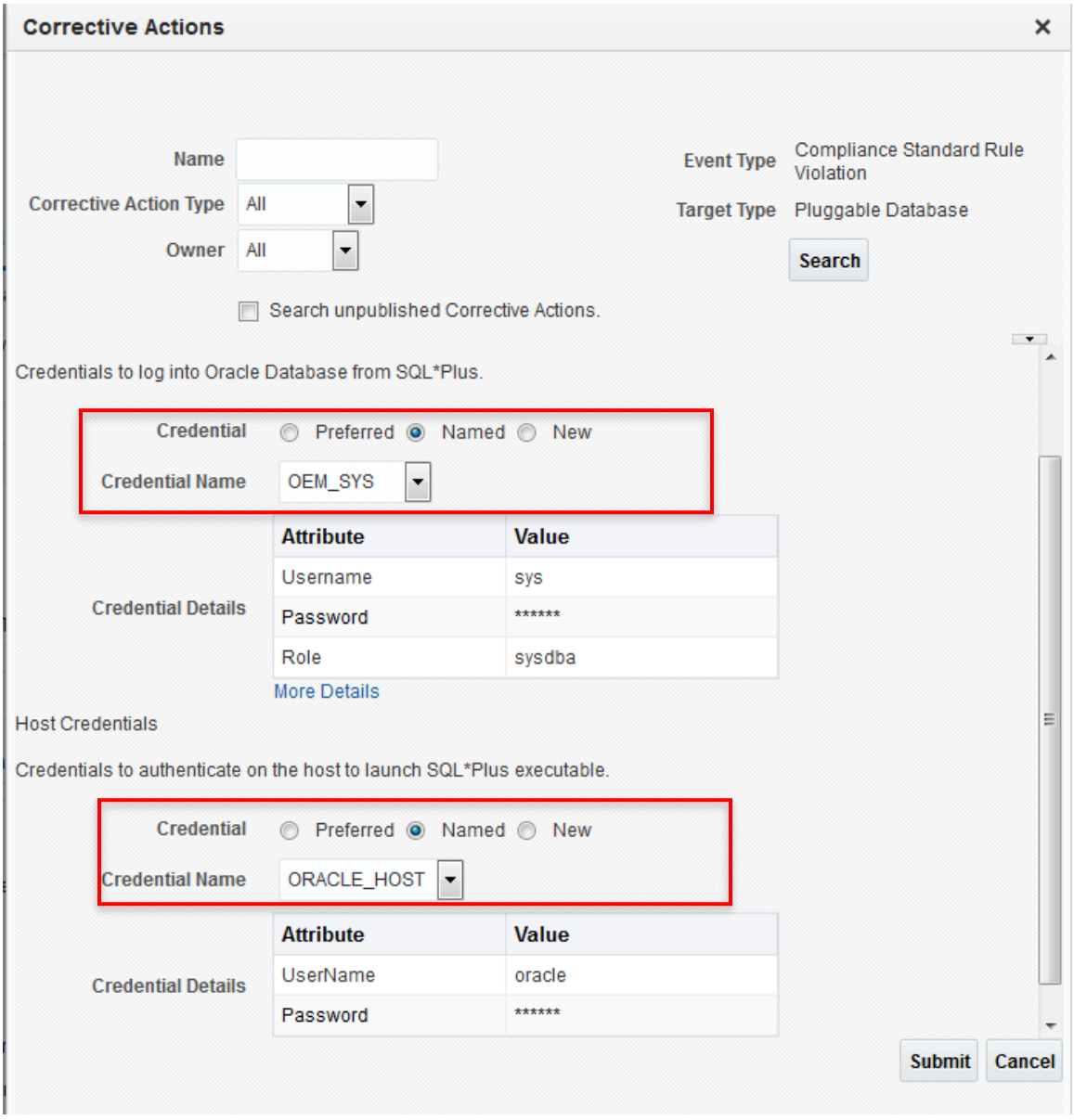
12. You will see open cursors notification → Scroll down if needed → Click on the link "Submit from Library " for corrective action .



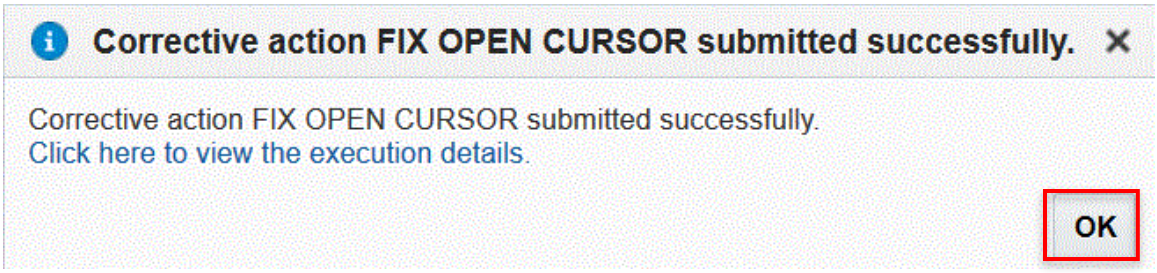
13. Choose "FIX OPEN CURSOR" corrective action from the pop-up



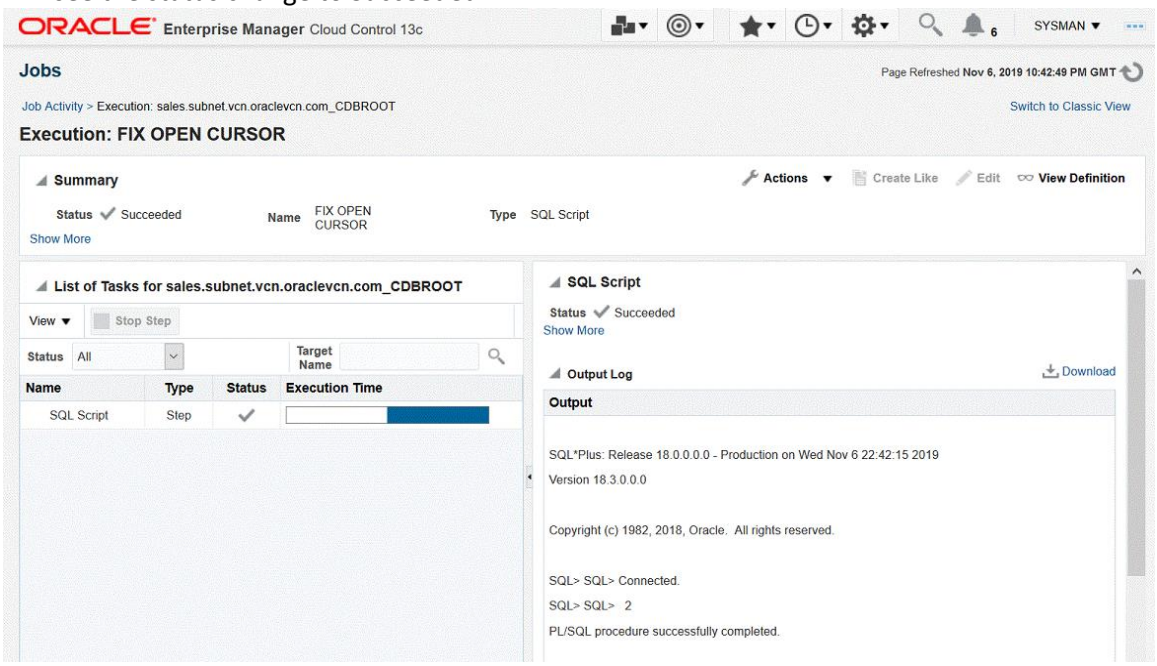
14. Choose the Named Credentials for Database and Host → Click Submit button
    a. Named Credentials for Database: OEM_SYS (scroll down after Database Credentials to see Host Credentials
    b. Host Credentials: ORACLE_HOST



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

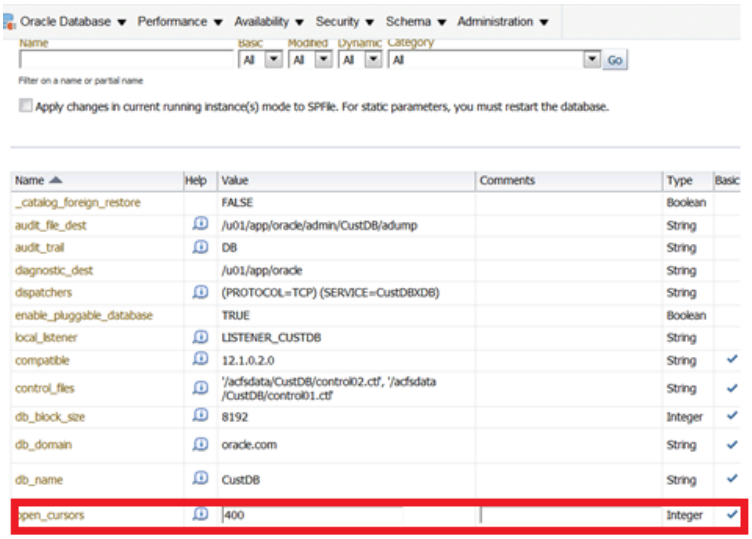


Click on refresh icon if the job did not complete. The job will take about a minute to complete → you will see the status change to Succeeded



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



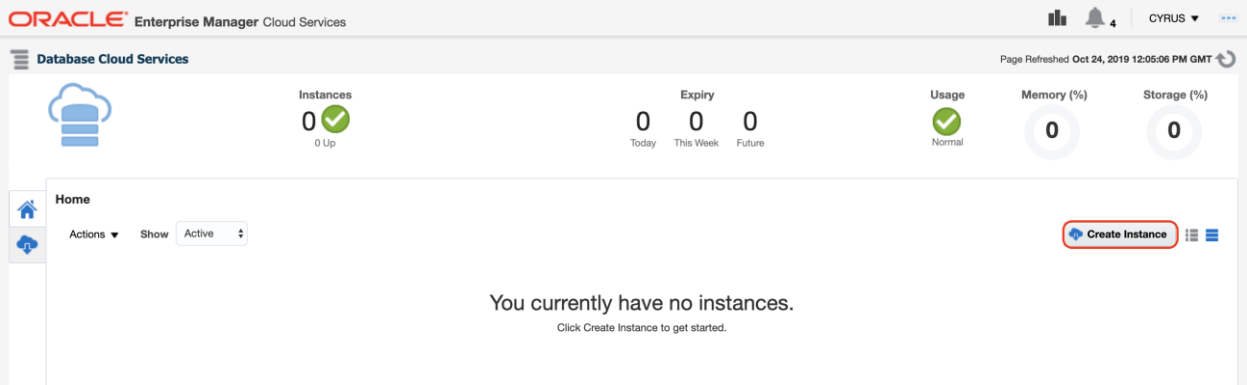
Now that you have gone through the various life cycle operation on PDB, we would switch focus and cover the use case of building a private cloud using Enterprise Manager and see how easy and quick it is to provision (with minimal inputs) and manage PDB using PDB-as-a-service (PDBaaS)

Self-Service to request PDB using PDBaaS

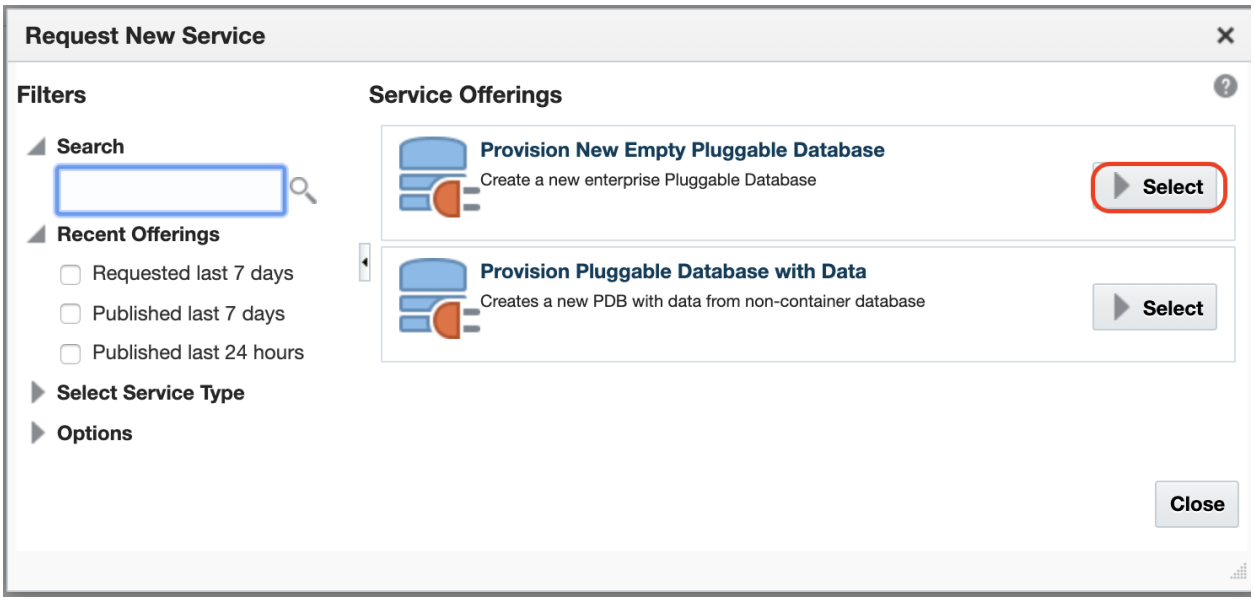
With the Self-Service Portal, cloud users can request a Pluggable Database through a simple process, monitor resource consumptions, and manage the pluggable database through an intuitive graphical user interface.

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**”

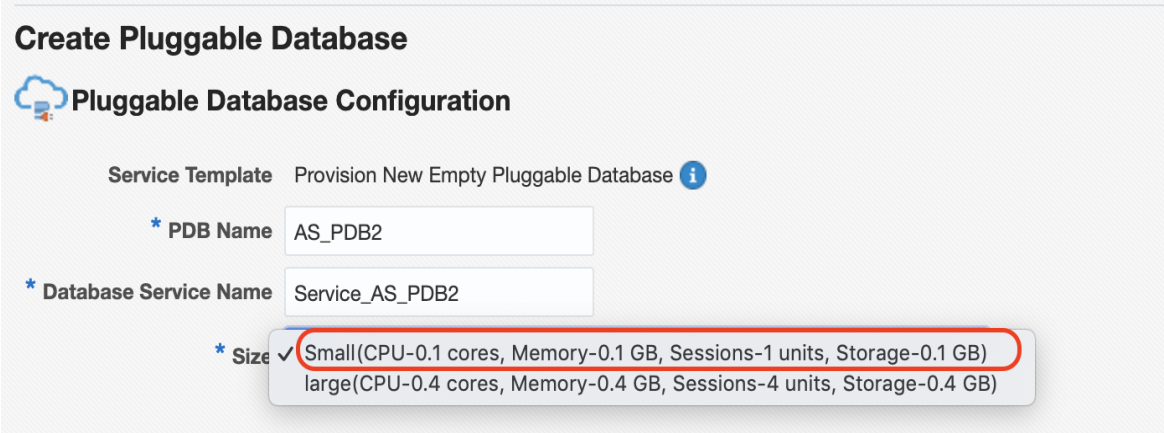


Note: There are two service templates pertaining to Pluggable Database

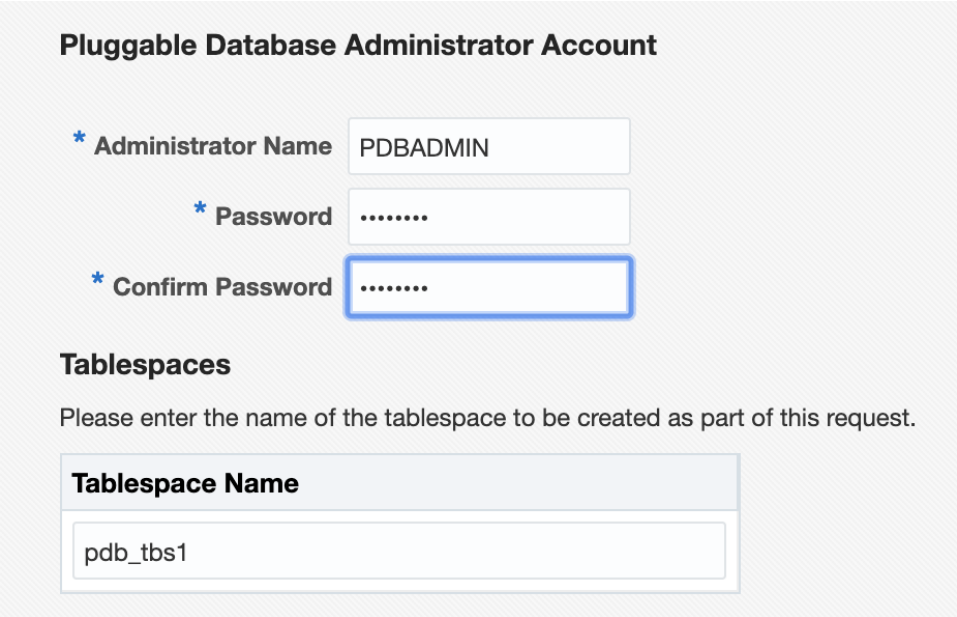
- **Provision New Empty Pluggable Database**
  - This template allows user to create a new pluggable database in a container database configured by DBA
- **Provision Pluggable Database with Data**

- This template allows user to create a new pluggable database with data from non-container database.

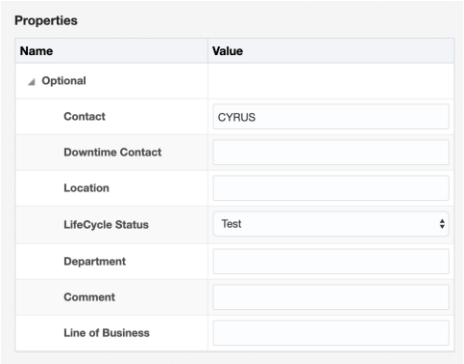
3. In the "**Pluggable Database Configuration**" section, enter Service and SID details :
   a. Name: **YOUR INITIALS_PDB2 (e.g. AS_PDB2)**
   b. Database Service Name**: SERVICE_YOUR INITIALS_PDB2 (e.g. SERVICE_AS_PDB2)**
   c. Workload Size: Choose **Small**



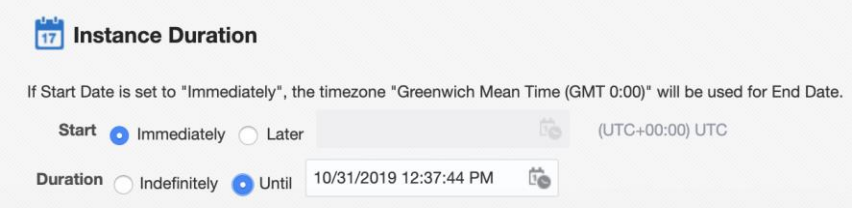
4. Enter Credentials details in the "**Pluggable Database Administrator Account**"
   a. Administrator Name: **PDBADMIN**
   b. Password: **welcome1**
   c. Confirm Password: **welcome1**
   d. (Tablespaces): **Accept default**



5. **Instance Details**
    a. Keep all defaults as they are
6. **Properties**
    a. Enter properties for instance. Self-Service Administrator has configured this as a optional step. However, properties help users find instances quickly. Enter
        i. Contact: **CYRUS**
        ii. Lifecycle Status: **Test**



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



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.

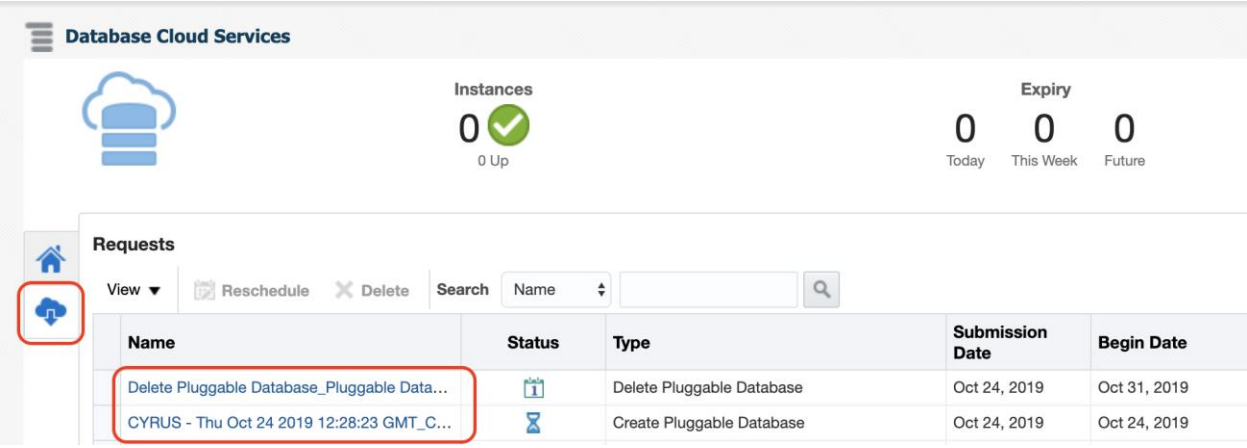
Fields with an ‘*’ represent mandatory input fields. Please refer to the table listed below for a description of each option:

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.

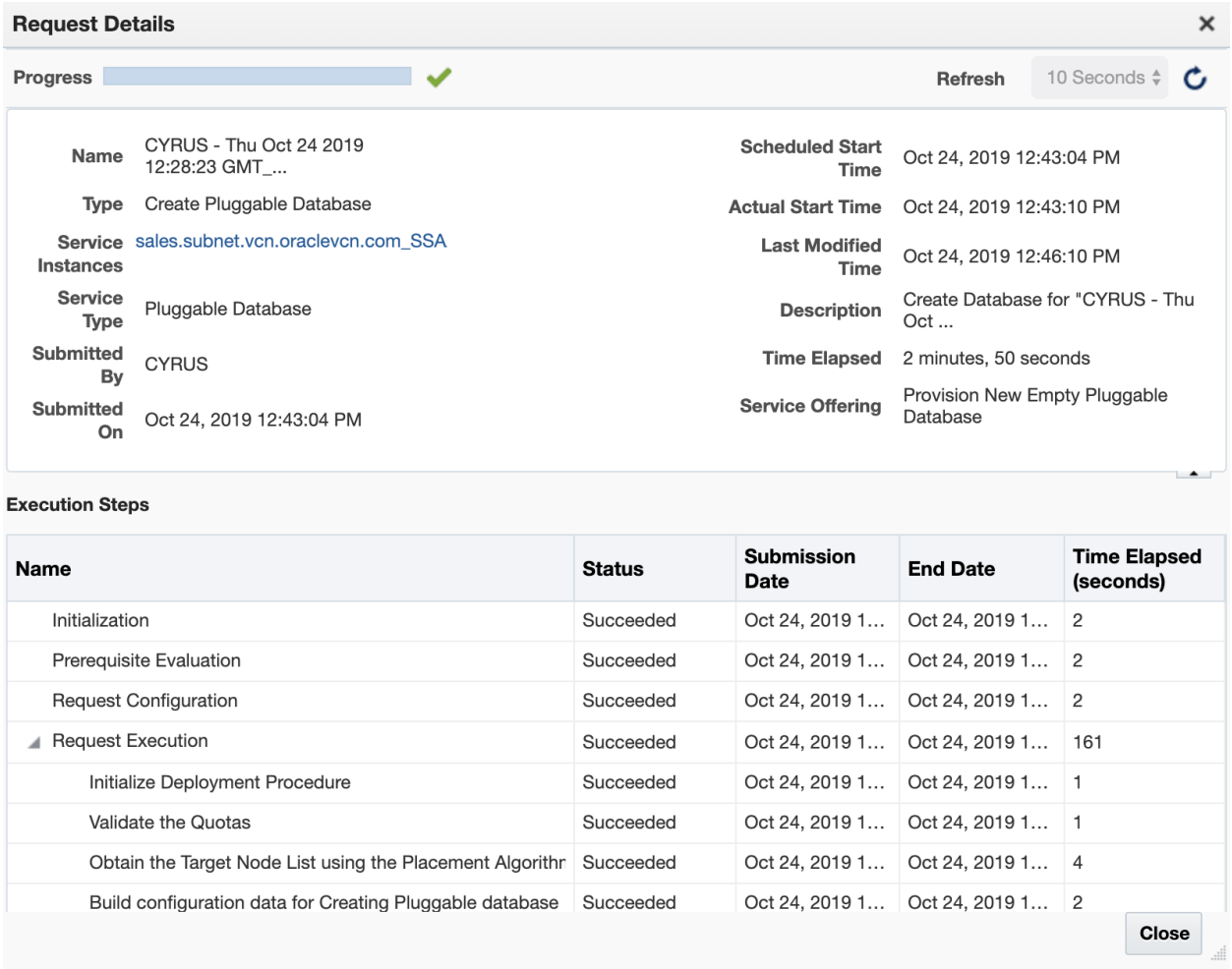
9. Once you submit a request, you will be redirected back to the "**Database Cloud Services**" Page. Your PDB creation request has been submitted to Enterprise Manager for execution. Under "**Requests**" region, you should see 2 requests: "**Create**" and "**Delete**" request



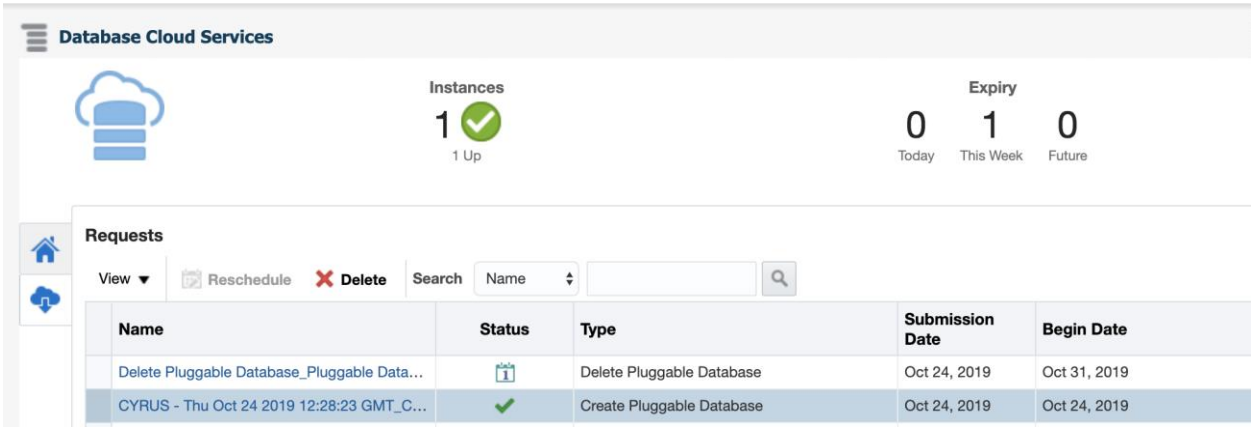
10. At this point, provisioning engine has received a request to create a PDB based on the service template and input provided by self-service user.

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:
    a. Create database roles and PDB
    b. Create a resource plan based on the workload size
    c. Create and register the database

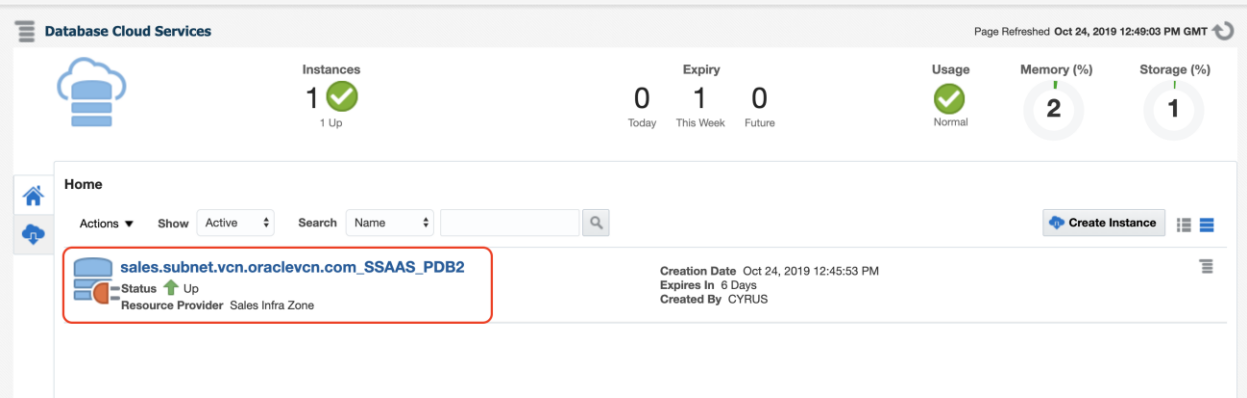
12. The request should take less than 10 minutes to complete. Click on refresh icon or in the alternative set Refresh to 30 seconds. The success status indicates that PDB database was successfully created. The new PDB database should be visible under Database Cloud Services page.



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



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.

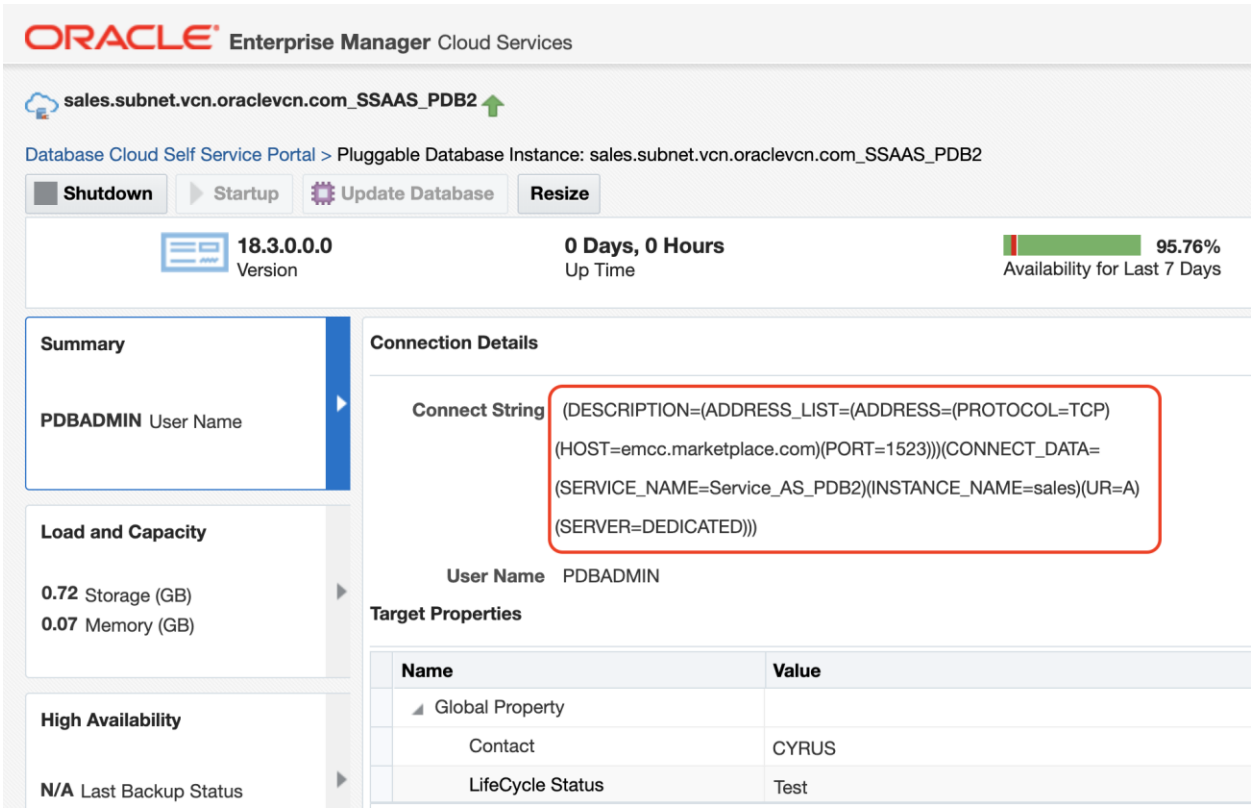
Usage, resource usage status for the Self-Service user, status of the resource consumption for this user.

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

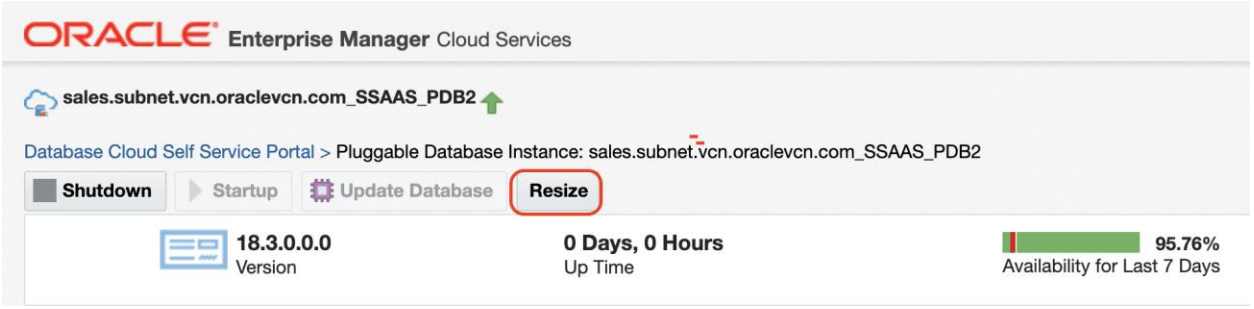
Storage, current storage consumption against the Quota for this user.

15. Click on the name of the PDB.

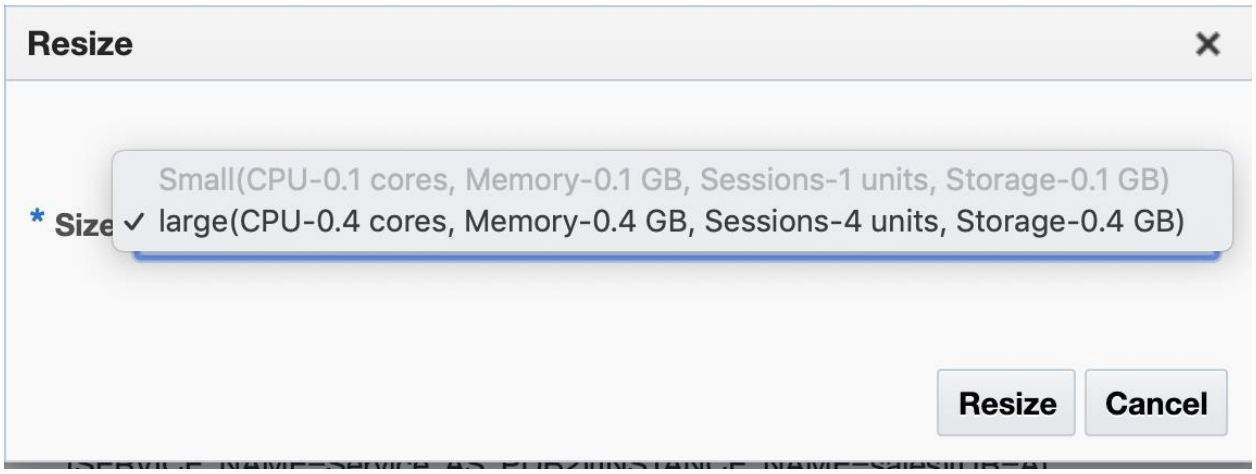
You can use the connection details to connect to the PDB using SQL tools.



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

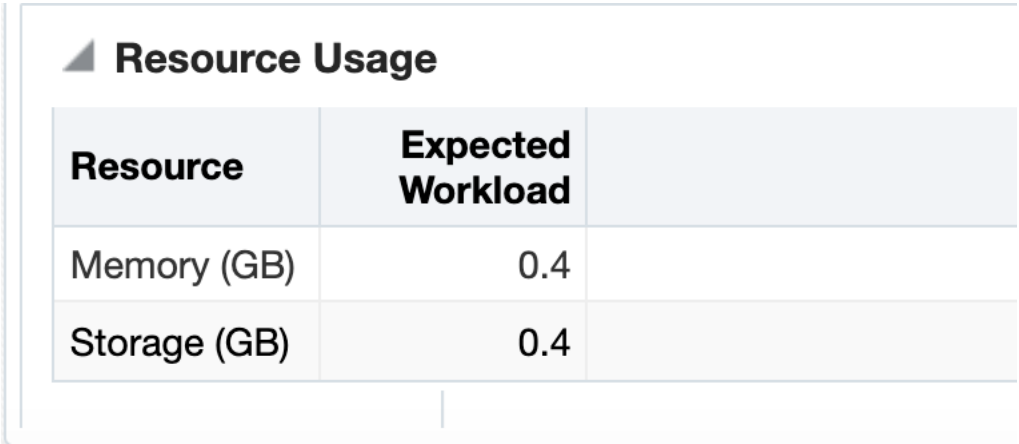


Resize allows you to resize your instance to other available resource sizes. We have 2 resource sizes available for Service Template. Both are displayed. Current size of PDB instance is Small, you can now resize it to large.



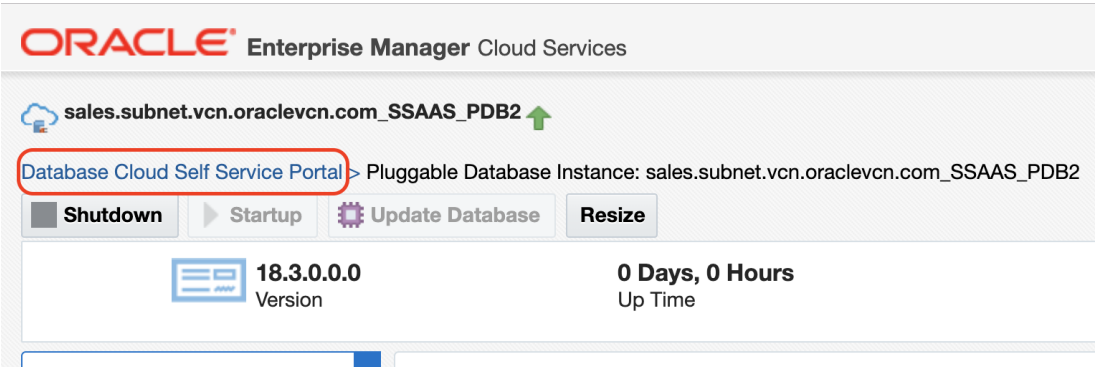
One you click on **Resize**, a job will be submitted to resize instance. In few minutes instance resize is completed.

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

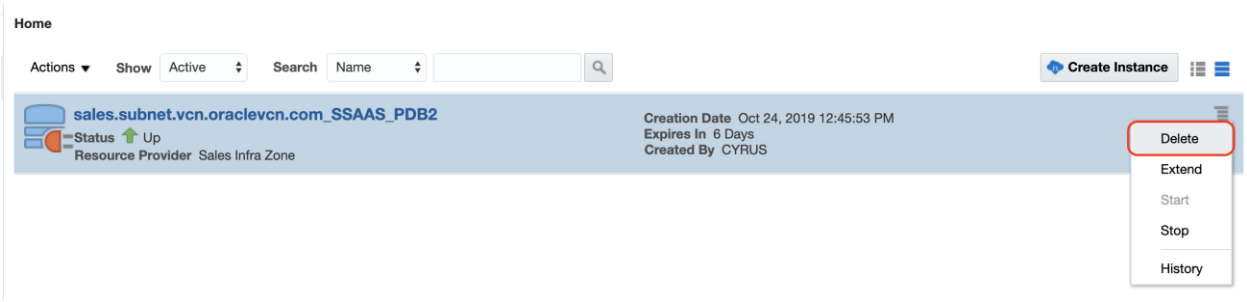


17. Delete the DB Instance:

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

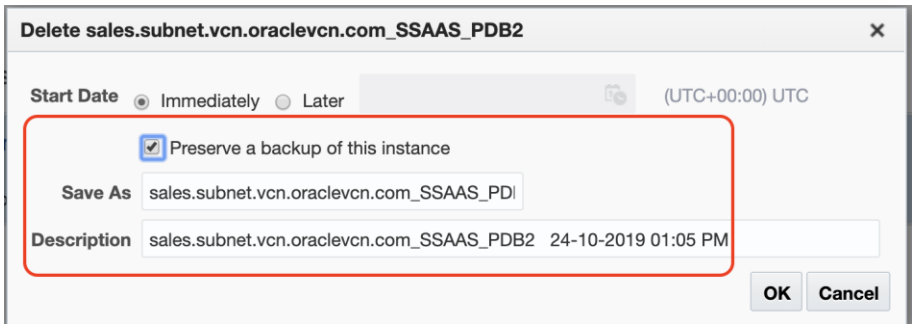


b. Click on the action menu for new PDB and delete this instance.

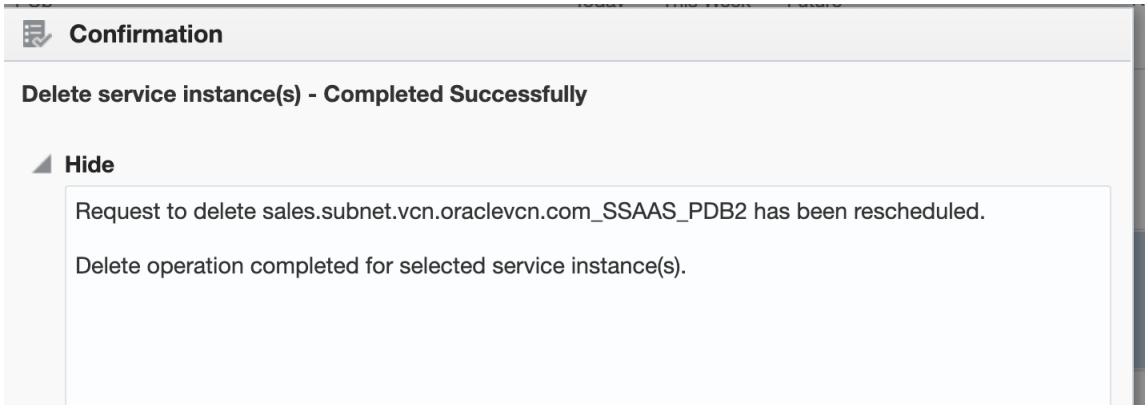


While deleting instance you can preserve a backup of the instance and create a new instance using this backup.

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



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



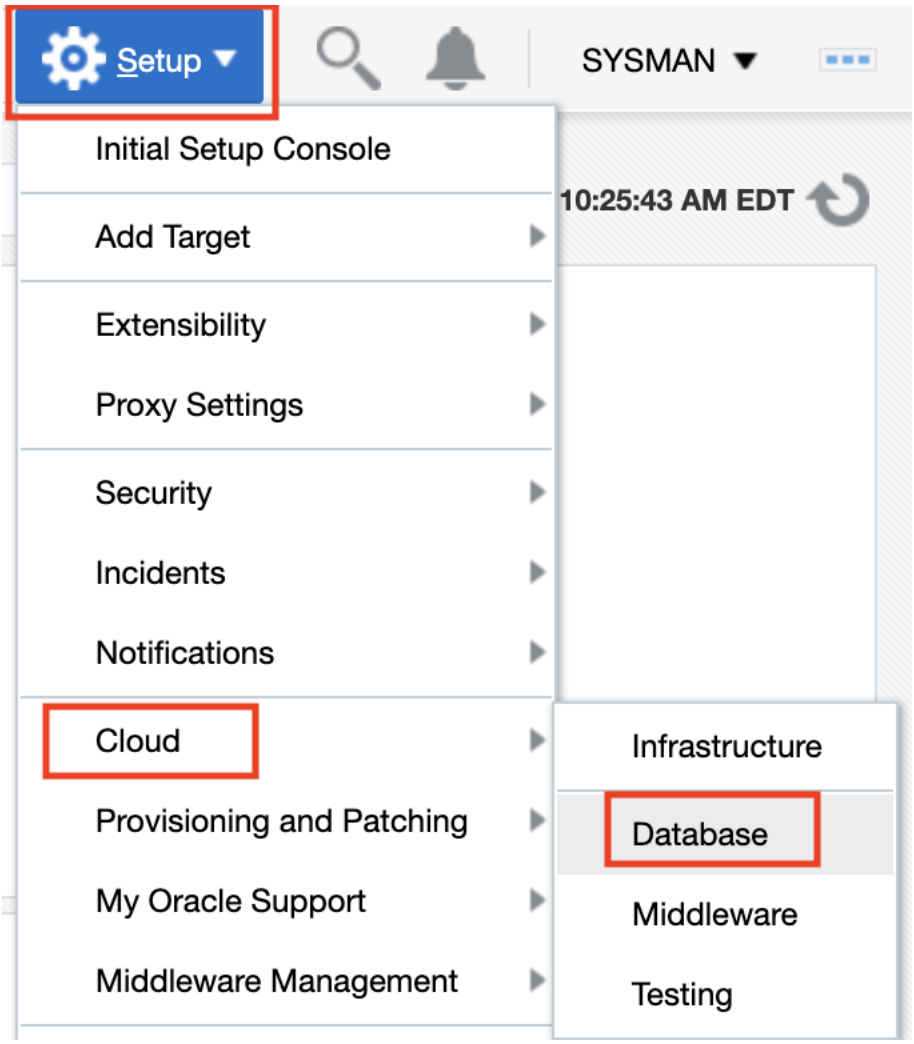
Administrative setup for PDB-as-a-Service(Private Cloud)

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.

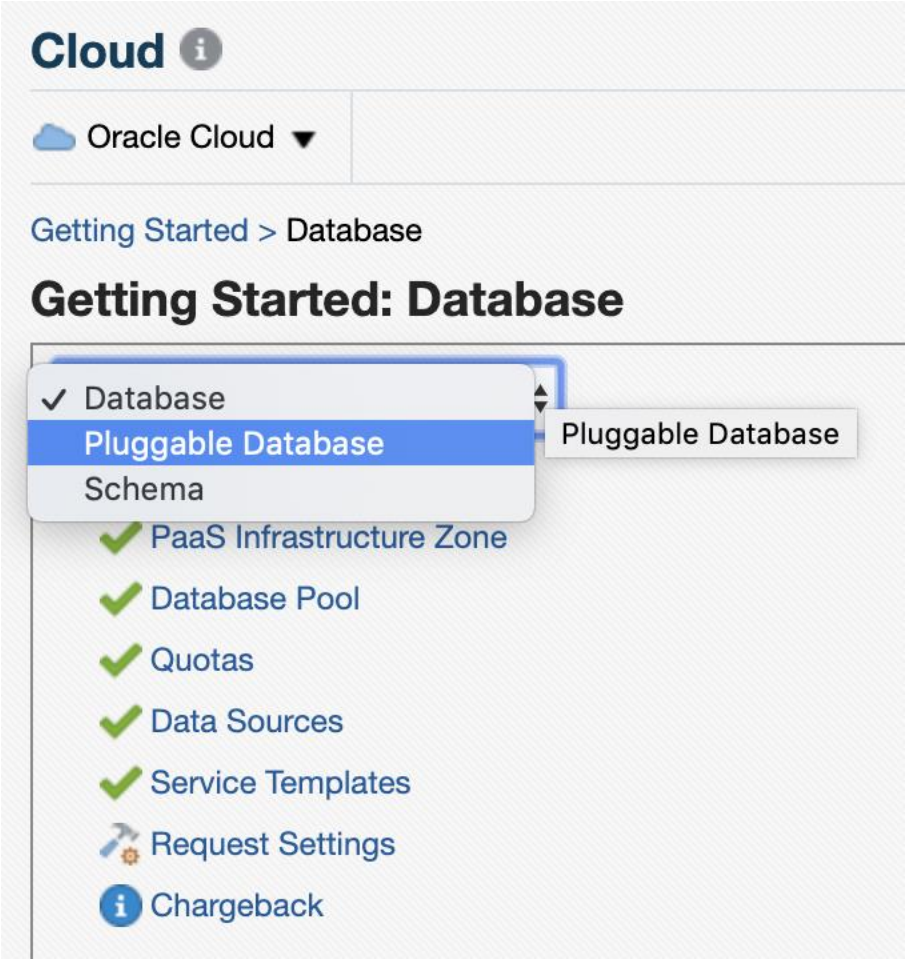
Login to EM Console as super administrator **sysman/welcome1**

PaaS Infrastructure Zone

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

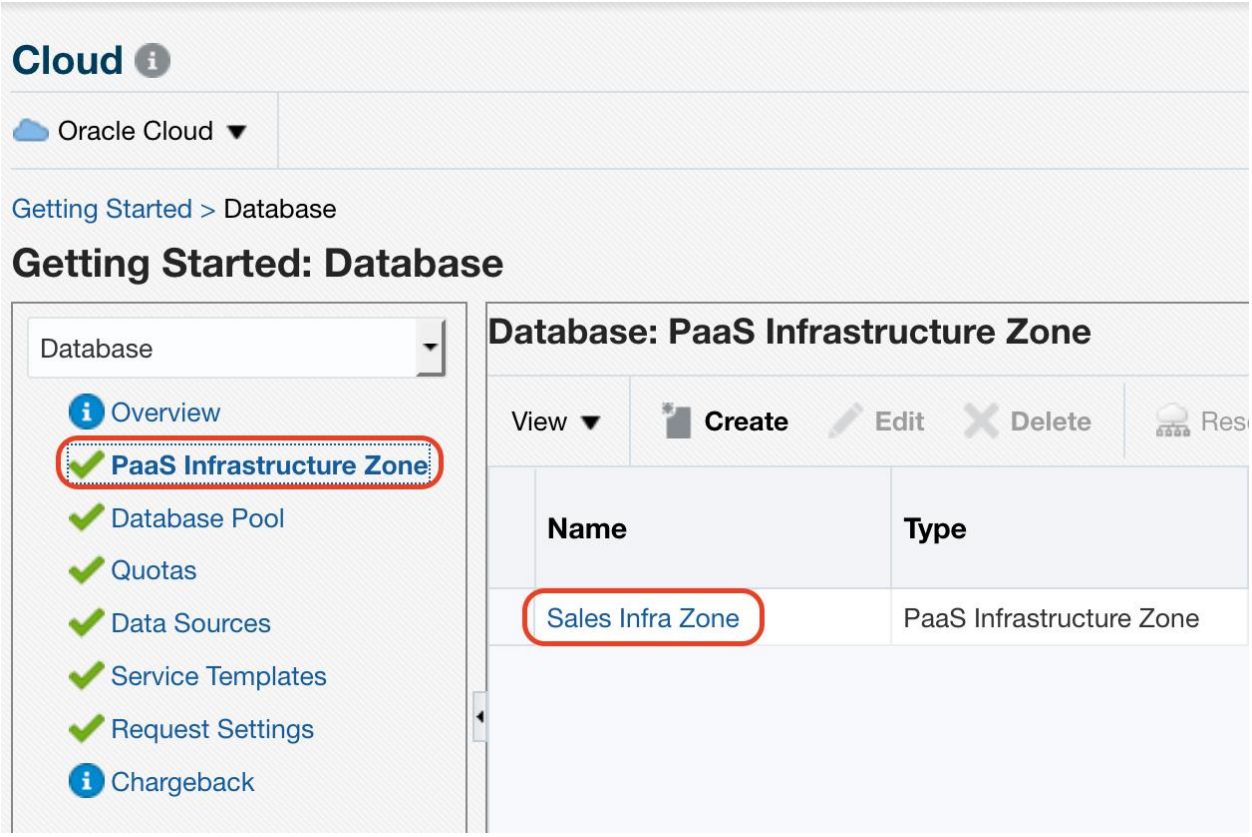


Select **Pluggable Database** from the drop-down menu.

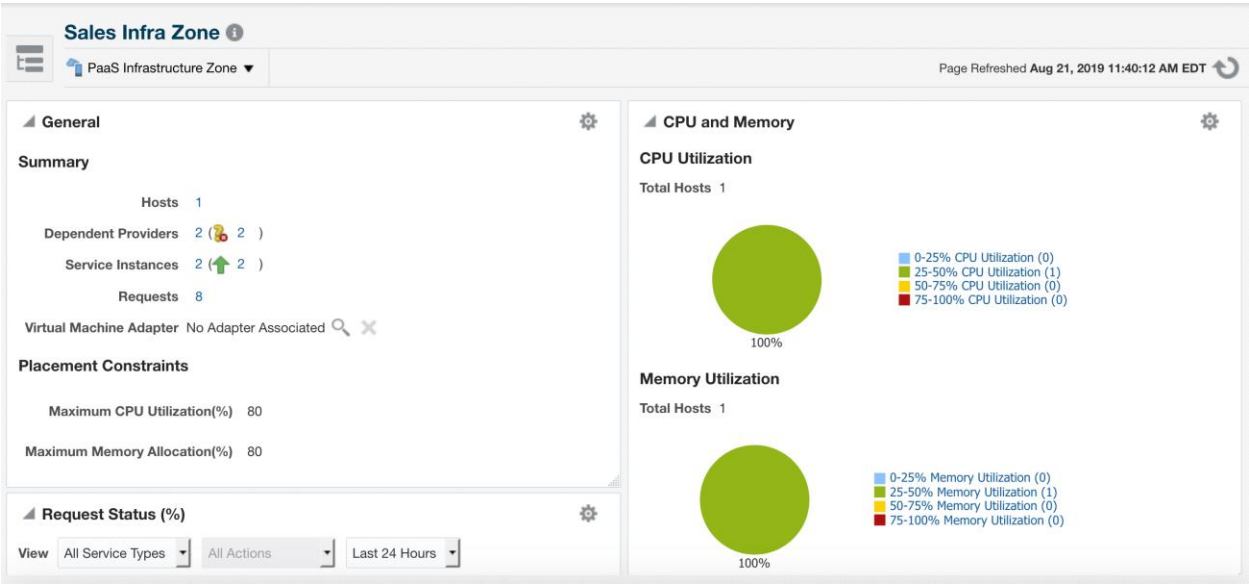


And then click on '**PaaS Infrastructure Zone**'

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



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.

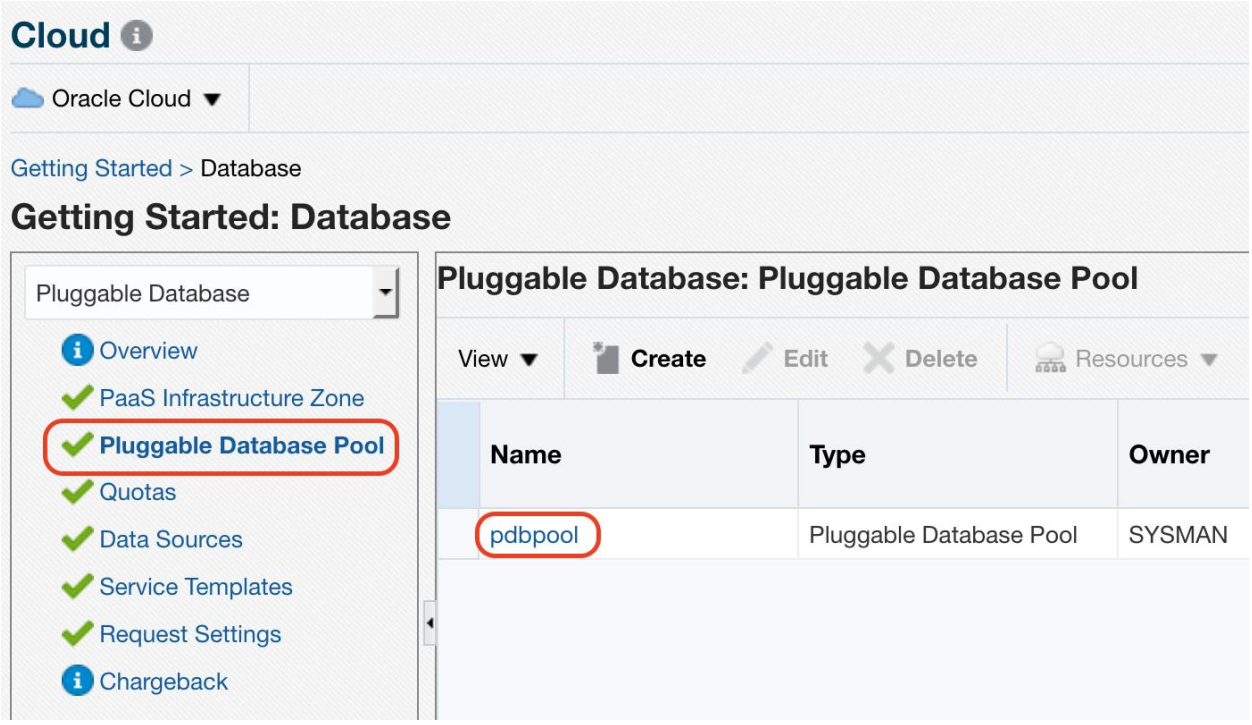


Pluggable Database Pool

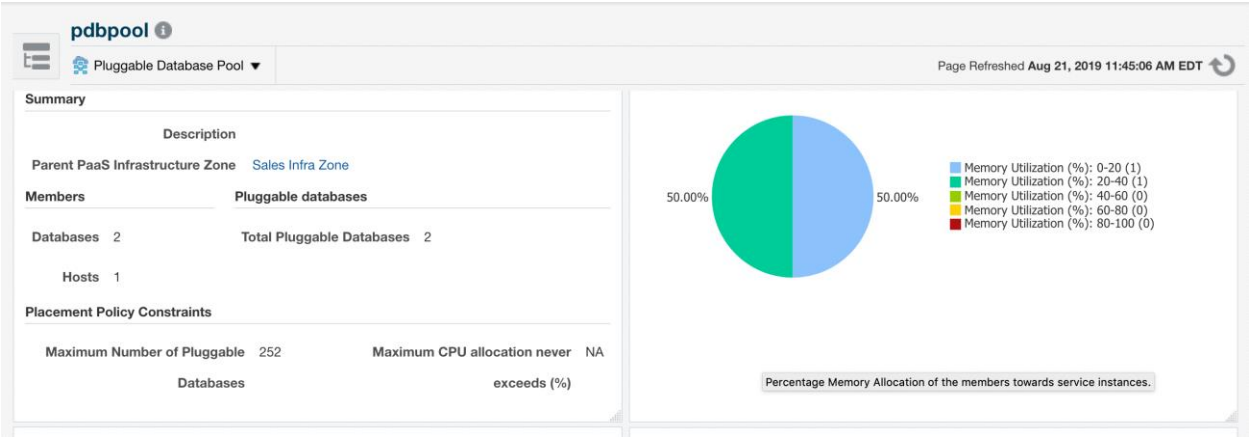
On the EM Console, go to Setup -> Cloud -> Database.

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

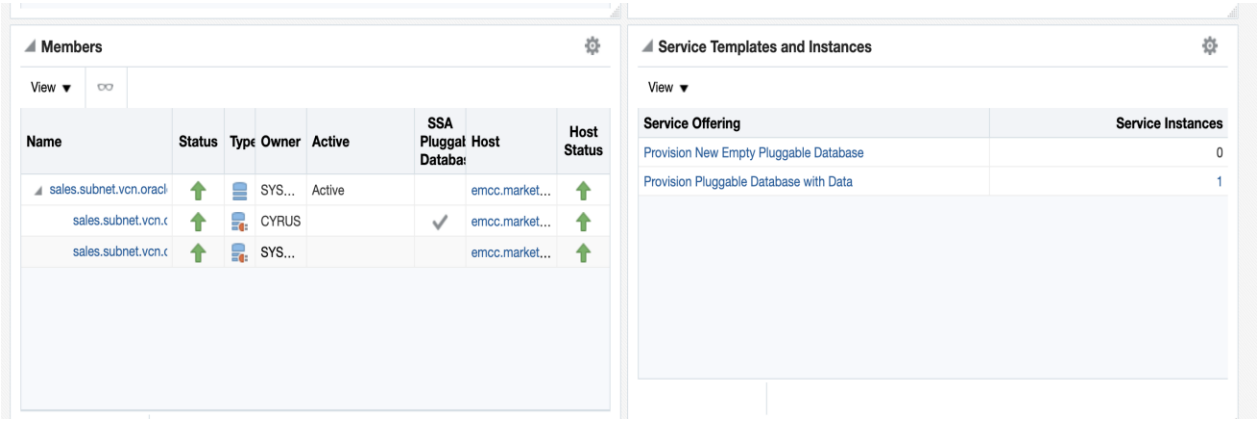
A Pluggable Database Pool consists of a set of Container Databases on which PDBs will be provisioned.



Click on Name of the pool to see more details.



Scroll down to see details of Members and Service Templates.

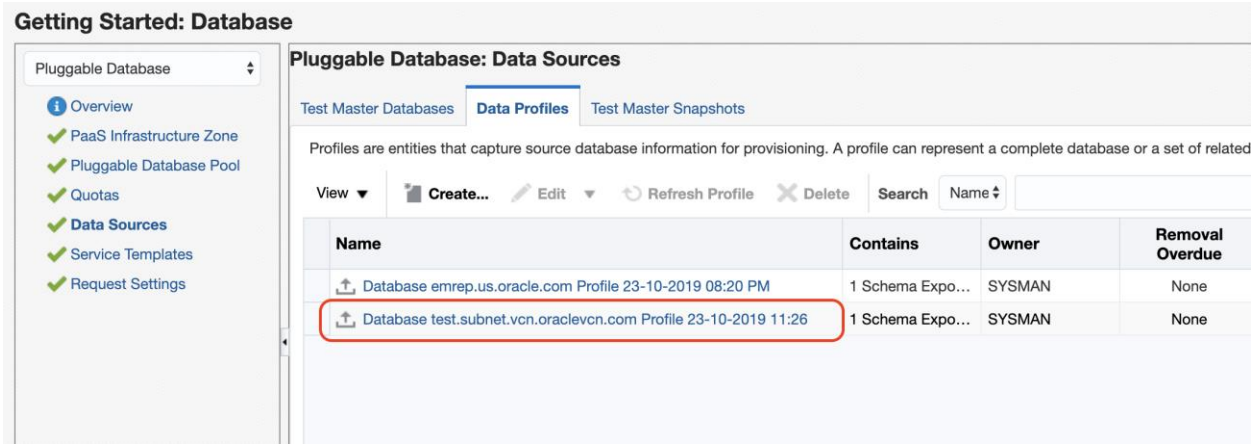


Data Sources

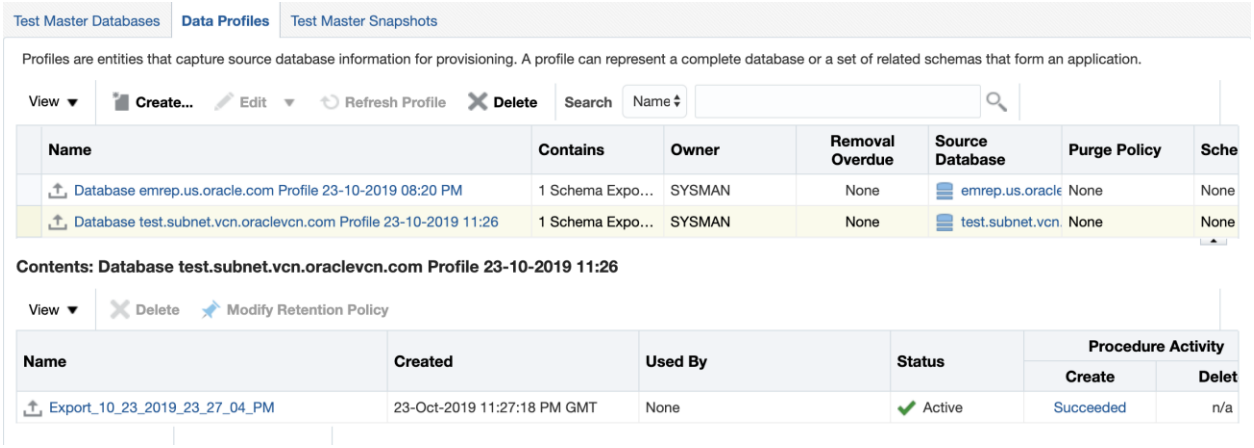
On the EM Console, go to Setup -> Cloud -> Database.

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.



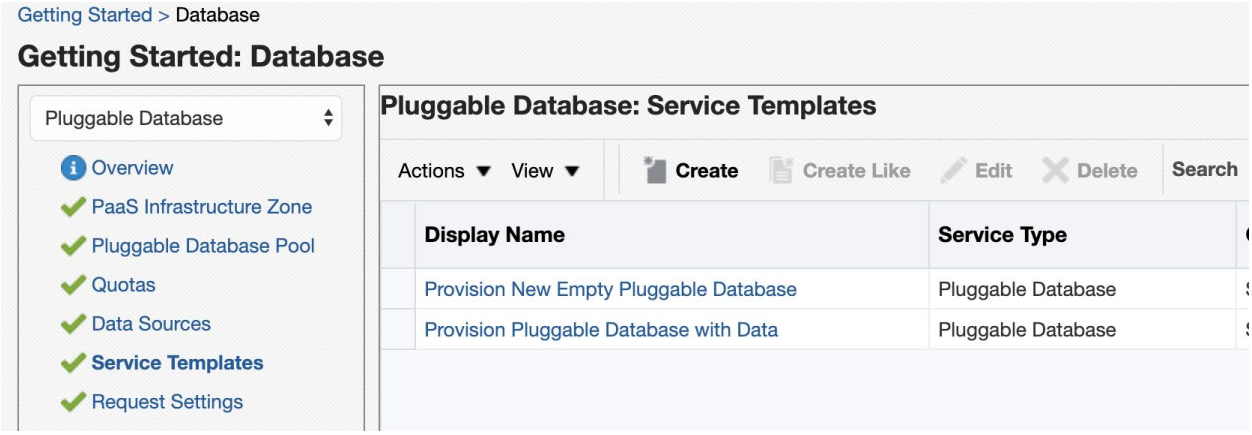
Select the row with profile to see more details.



Service Templates

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

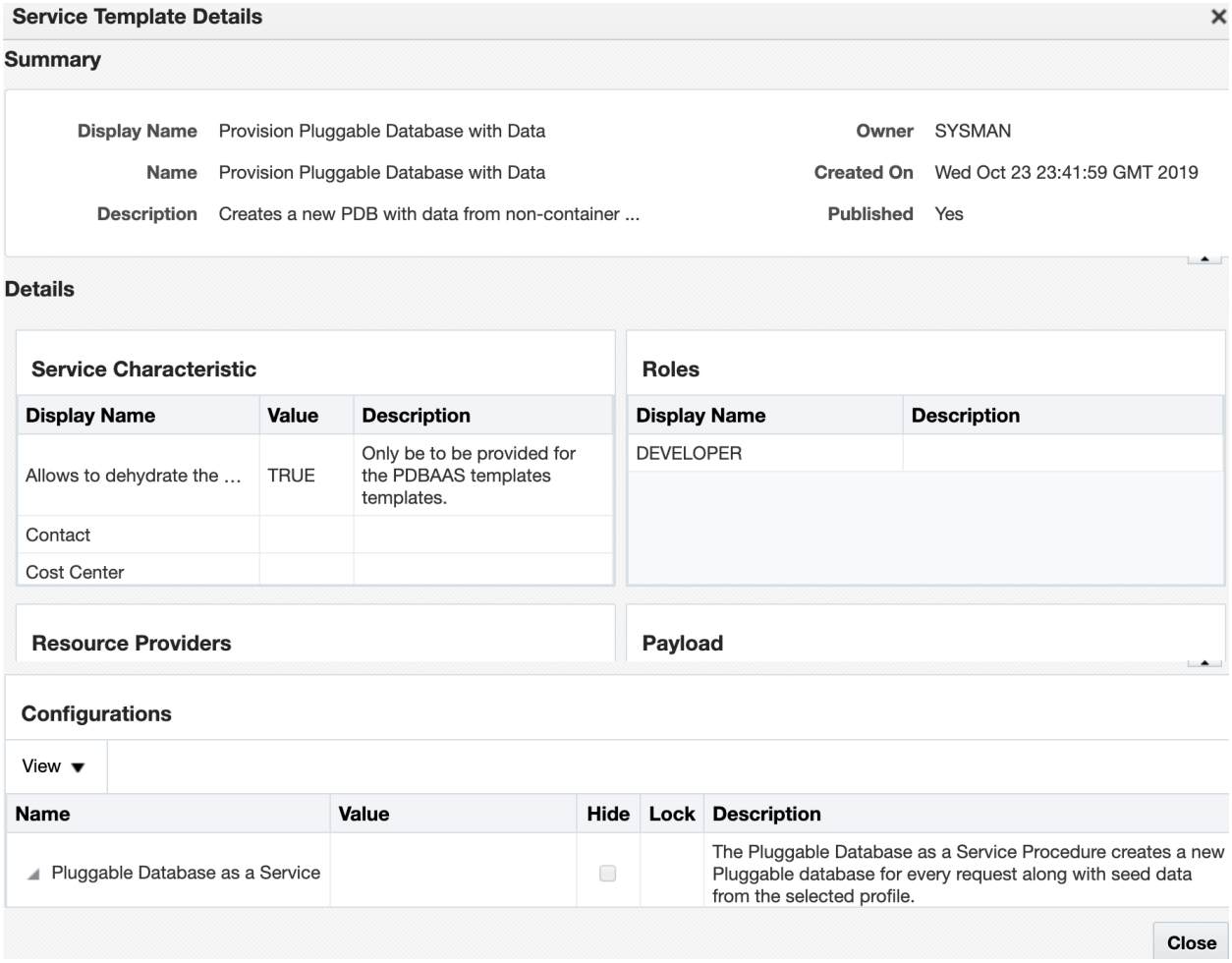
Select Pluggable Database from the drop-down menu. And then click on **Service Templates from you left menu .**



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.



This concludes the lab. Thank you!