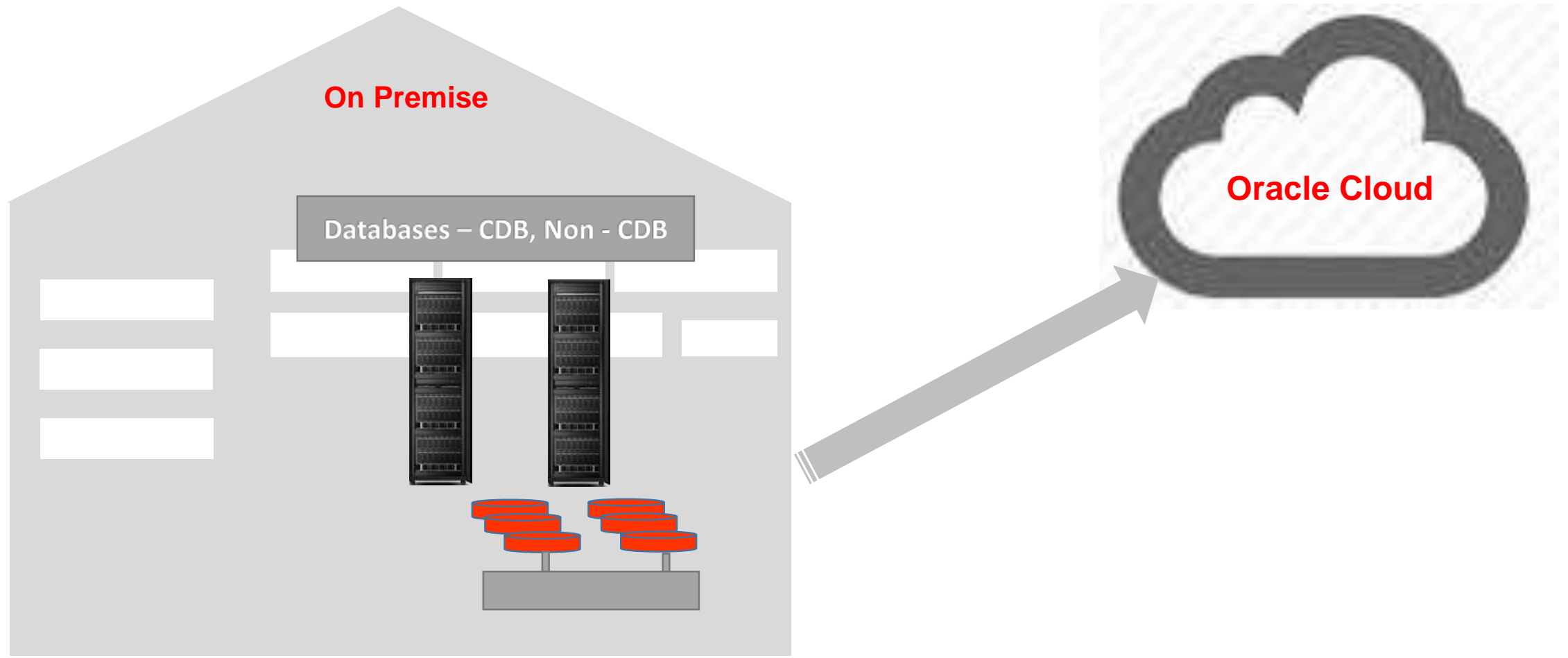


# Hot Cloning of On-Premise Non Container Database(Non-CDB) to Oracle Database Cloud Service (DBaaS) Container Database (CDB)



# About Me

- Oracle Database Professional with 19+ years of experience.
- Expertise in Database Migration (On-Premise to On-Premise and On-Premise to Oracle and Amazon Cloud), Database Replication, Database Upgrade, DBaaS, IaaS and Exadata
- Oracle Certified Professional in Oracle 11g and 12c
- Oracle Certified Professional in Cloud Administration (DBaaS)
- Oracle Certified Expert in Real Application Cluster – 11g
- Oracle Implementation Specialist in Exadata, GoldenGate
- AWS Certified Solution Architect – Associate
- IBM Certified Cloud Solution and Infrastructure Architect

# Oracle 12c Cloning Pluggable Database

**Introduction**

**Cloning PDB's**

**PDB Cloning Types**

**PDB Cloning Methods**

**Provisioning: Database Service on Oracle Cloud**

**Cloning Process**

# Introduction

- Prior to Oracle 12c Cloning a Database is a difficult process
- RMAN is the most efficient tool to clone a database but with quite a number of steps
- In 12c, CDB cloning required similar efforts but not PDB's
- PDB cloning can be done with execution of 3-4 commands
- PDB's stores all user data so is the most important component in multitenancy

# Cloning PDB's

- Great feature of Oracle 12c
- Database can be cloned in as soon as 30 minutes
- Very useful feature for database consolidation

# PDB Cloning Types

- Non-Container Database to Container Database
- PDB can be LOCALLY cloned
- PDB can be REMOTE cloned
- PDB's can be HOT cloned

## Comparison between HOT and COLD CLONE

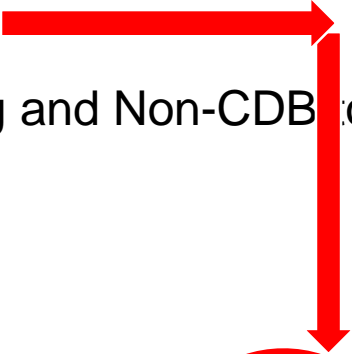
	HOT	COLD
Availability	12c Release 2	12c Release 1
Database Mode	READ WRITE	READ ONLY
Cloning Mode	Non-CDB to CDB, PDB-PDB in Same CDB, Remote PDB	Non-CDB to CDB, PDB-PDB in Same CDB, Remote PDB

# PDB Cloning Methods

- CREATE PLUGGABLE DATABASE XXX from YYY – LOCAL cloning of PDB within same CDB
- DBLINK – Remote PDB – PDB Cloning and Non-CDB to PDB
- DBMS\_PDB Procedure – LOCAL, Remote PDB – PDB Cloning and Non-CDB to PDB
- Oracle Data Pump Export/Import
- GoldenGate Replication

# PDB Cloning Methods

- CREATE PLUGGABLE DATABASE XXX from YYY – LOCAL cloning of PDB within same CDB
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- Oracle Data Pump Export/Import
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This article show how to  
do HOT cloning of On-  
Premise Non-CDB to  
CDB on Oracle Cloud  
Database Service  
(DBaaS) Instance



# Environment

Location	Host	Database Name	Container Database
On-Premise	premise	PNONCDB	No
		CDBPROD	Yes
Oracle Cloud	SGNON-CDB-CDBMIG12C	CDBPROD	Yes

# Step 1: Prepare On-Premise Non-CDB Database

```
[oracle@premise ~]$ . oraenv
ORACLE_SID = [PNONCDB] ? PNONCDB
The Oracle base remains unchanged with value /u01/app/oracle
[oracle@premise ~]$ sqlplus / as sysdba
```

```
SQL*Plus: Release 12.2.0.1.0 Production on Wed Oct 18 17:32:43 2017
```

```
Copyright (c) 1982, 2016, Oracle. All rights reserved.
```

```
Connected to:
Oracle Database 12c Enterprise Edition Release 12.2.0.1.0 - 64bit Production
```

```
SQL> SELECT CDB FROM V$DATABASE;
```

**CDB**

**---**

**NO**

```
SQL> --CHECK USER SCOTT HAS SOME TABLE. THIS WE WILL REQUIRE TO VALIDATE ONCE THE PDB IS CLONED TO ORACLE CLOUD (CDBPROD - CONTAINER DATABASE)
```

```
SQL>
```

```
SQL> SELECT COUNT (1) FROM SCOTT.MYTAB;
```

```
      COUNT(1)
-----
              4
```

# Create Target Database in Oracle Cloud (DBaaS)

## 1. From Database Service Page in Oracle Cloud click Create Service

### Enter following information on Service Page

Instance Name	-	SGNON-CDB-CDBMIG12C
Software Release	-	Oracle Database 12c Release 2
Software Edition	-	Enterprise Edition
Database Type	-	Single Instance

### Enter following information on Service Detail Page

Database Name	-	CDBPROD
Administrative Pwd	-	Set per your choice
SSH Public Key	-	Load Public Key
Backup Destination	-	None

The screenshot shows the Oracle Cloud 'Create Service' and 'Service Details' pages. The 'Service' page is at the top, with a progress bar showing 'Service' as the active step. Below it, the 'Service Details' page is shown, with a progress bar showing 'Details' as the active step. A red arrow points from the 'Service' page to the 'Service Details' page.

**Service Page:**

- Service Name: SGNON-CDB-CDBMIG12C
- Description: Remote Cloning from CDB to CDB
- Notification Email: suptilo.ganguly@gmail.com
- Region: No Preference
- Bring Your Own License: ☐
- Software Release: Oracle Database 12c Release 2
- Software Edition: Enterprise Edition
- Database Type: Single Instance

**Service Details Page:**

**Database Configuration:**

- DB Name: CDBPROD
- PDB Name: PDB1
- Administration Password: [Redacted]
- Confirm Password: [Redacted]
- Usable Database Storage (GB): 15
- Total Data File Storage (GB): 77.5
- Compute Shape: OC3 - 1.0 OCPU, 7.5 GB RAM
- SSH Public Key: cloud-pub-pub
- Use High Performance Storage: ☐

**Backup and Recovery Configuration:**

- Backup Destination: None
- Initialize Data From Backup: ☐
- Create Instance from Existing Backup: No

Cont...

# Create Target Database in Oracle Cloud (DBaaS)

## 1. From Database Service Page in Oracle Cloud click Create Service

**Review information and click Create to Create Database Service Instance**

**Confirmation**  
Confirm your configuration and create service instance.

**Service**

Service Name	SOADEV-DB-DBMSDEV-UC
Description	Remote Cloning Non-DB to ...
Bring Your Own License	No
Service Level	Oracle Database Cloud Service
Waiting Processing	Hourly
Software Release	Oracle Database 12c Release 2
Software Edition	Enterprise Edition
Compute Shape	OCS - 1.3 OCPU, 7.5 GB Mem
24x7 Public Key	ssh-rsa.pub
Use High Performance Storage	No
Region	

**Database Configuration**

DB Name	CDMPROD
PGN Name	PGN1
Initial Database Storage (GB)	15
Total Data File Storage (GB)	77.8
Listener Port	1521
Specimen	UTC Coordinated Univers...
Character Set	AL32UTF8 - Unicode UTF-8
National Character Set	AL16UTF16 - Unicode UTF-16
Include 'Catalyst' PDB	No
Include GoldenGate	No

**Backup and Recovery Configuration**

Backup Destination	None
--------------------	------

**Notification**

Notification Email	soa@cs.gangxi@gmail.com
--------------------	-------------------------

**Standby Database Configuration**

Standby Database with Data Guard	No
----------------------------------	----

Wait for 20 – 30 minutes for the Cloud Database Instance to created successfully.

Note down Host Name and IP address as this will require to set up SSH tunnel and to connect cloud database from On-Premise

The screenshot displays the Oracle Cloud console interface for a database instance. The top navigation bar shows the Oracle Database Cloud Service logo and the instance name 'SIGON-CDB-CDBMG12C'. The left sidebar contains navigation links for 'Overview', 'Administration', and 'Resources'. The main content area, titled 'Service Overview', provides key metrics: 1 Node, 1 OCPUs, 7.5 GB Memory, and 139 GB Storage. Below these metrics, the status is 'Ready', and the version is '12.2.0.1'. The connect string is 'SIGON-CDB-CDBMG12C-12C...', and the backup destination is 'None'. The PDB name is 'PDB1', and the container name is 'CDBP100'. The 'Resources' section at the bottom lists the host name 'SIGON-CDB-CDBMG12C', public IP '128.151.92.168', and ID 'CDBP100', along with OCPUs (1), Memory (7.5 GB), and Storage (139 GB).

Oracle Database Cloud Service / SIGON-CDB-CDBMG12C

Overview

1 Node

1 OCPUs

7.5 GB Memory

139 GB Storage

Status: Ready

Version: 12.2.0.1

Connect String: SIGON-CDB-CDBMG12C-12C...

Editor: Enterprise Edition

Backup Destination: None

PDB Name: PDB1

Container Name: CDBP100

Show more...

Resources

Host Name: SIGON-CDB-CDBMG12C

Public IP: 128.151.92.168

ID: CDBP100

OCPUs: 1

Memory: 7.5 GB

Storage: 139 GB

## Cont...

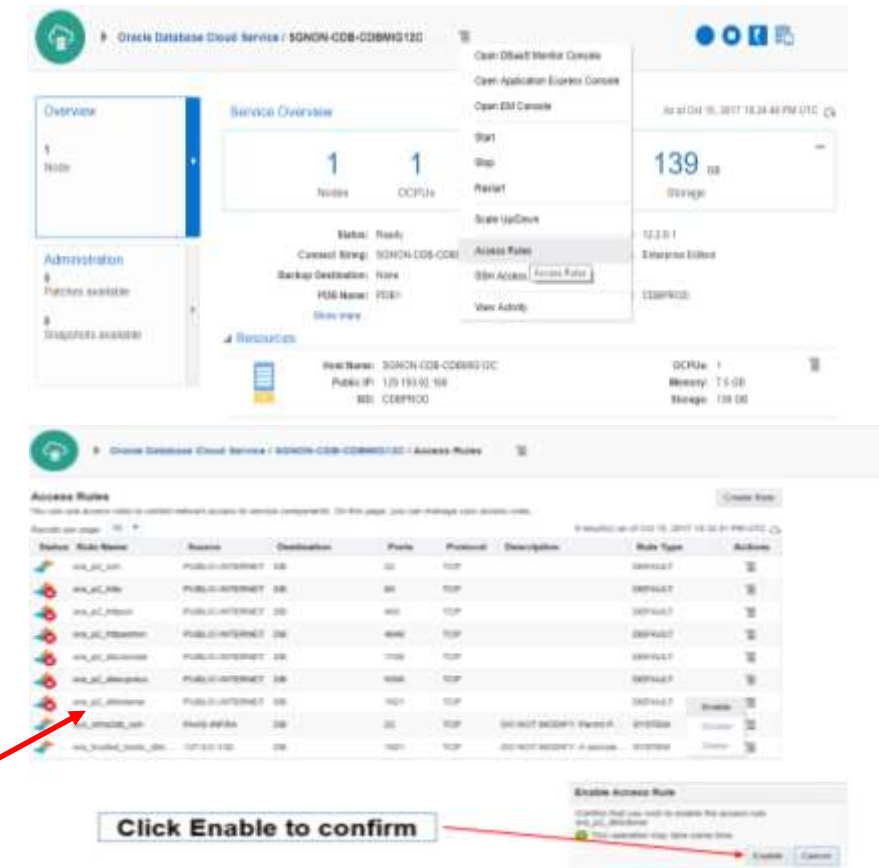
# Create Target Database in Oracle Cloud (DBaaS)

## 2. Enable dblistener access rule

**Dblistener access rule needs to be enabled in order to access cloud database from outside cloud environment (On-Premise).**

**From Database Service Page, select Access rules from** 

Go to ora\_p2\_listener and select Enable

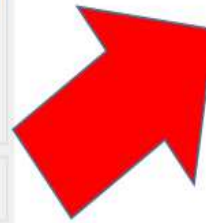
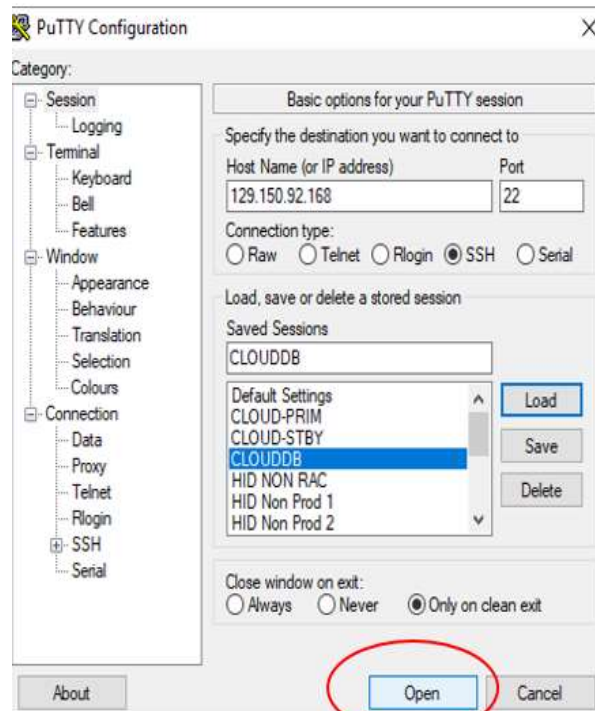


Cont...

# Create Target Database in Oracle Cloud (DBaaS)

## 3. Open Putty and check connectivity from On-Premise to Cloud

Open a Putty from On-Premise and check connectivity to the Oracle Database Cloud computing node.



```
oracle@SGNON-CDB-CDBMIG12C:~  
login as: oracle  
Authenticating with public key "rsa-key-20171012"  
[oracle@SGNON-CDB-CDBMIG12C ~]$ df -h  
Filesystem      Size  Used Avail Use% Mounted on  
/dev/mapper/vg_main-lv_root  
19G  12G  6.0G  66% /  
tmpfs           3.7G  0    3.7G   0% /dev/shm  
/dev/xvdbl      477M  69M  379M  16% /boot  
/dev/xvdel      59G   18G   39G  31% /u01  
/dev/mapper/dataVolGroup-lvol0  
15G  3.7G  11G  27% /u02  
/dev/mapper/fraVolGroup-lvol0  
6.8G  2.1G  4.4G  33% /u03  
/dev/mapper/redoVolGroup-lvol0  
25G  3.3G  21G  14% /u04  
[oracle@SGNON-CDB-CDBMIG12C ~]$
```

## Step 2: Check Cloud Database - CDBPROD

```
[SGNON-CDB-CDBMIG12C ~]. oraenv
ORACLE_SID = [oracle] ? CDBPROD
The Oracle base has been set to /u01/app/oracle
[SGNON-CDB-CDBMIG12C ~]sqlplus / as sysdba
```

```
SQL*Plus: Release 12.2.0.1.0 Production on Wed Oct 18 17:41:22 2017
```

```
Copyright (c) 1982, 2016, Oracle. All rights reserved.
```

```
Connected to:
Oracle Database 12c Enterprise Edition Release 12.2.0.1.0 - 64bit Production
```

```
SQL> SELECT CDB FROM V$DATABASE;
```

```
CDB
---
YES
```

```
SQL> SHOW PDBS
```

CON_ID	CON_NAME	OPEN MODE	RESTRICTED
2	PDB\$SEED	READ ONLY	NO

```
SQL>
```

## Step 3: Create Database Link to On-Premise Database

```
[SGNON-CDB-CDBMIG12C ~]. oraenv
ORACLE_SID = [oracle] ? CDBPROD
The Oracle base has been set to /u01/app/oracle
[SGNON-CDB-CDBMIG12C ~]sqlplus / as sysdba
```

```
SQL*Plus: Release 12.2.0.1.0 Production on Wed Oct 18 17:41:22 2017
```

```
Copyright (c) 1982, 2016, Oracle. All rights reserved.
```

```
Connected to:
Oracle Database 12c Enterprise Edition Release 12.2.0.1.0 - 64bit Production
```

```
SQL>SQL> --CREATE DATABASE LINK TO ON-PREMISE DATABASE (PNONCDB)
SQL>
SQL> CREATE DATABASE LINK ON_PREMISE CONNECT TO system IDENTIFIED BY oracle8i USING
'PNONCDB';
```

```
Database link created.
```

```
SQL>
```



## Step 4: Create Pluggable Database on Oracle Cloud from On-Premise

```
SQL> --CREATE HOT CLONE OF ON-PREMISE DATABASE ON ORACLE CLOUD. THIS STATEMENT AUTOMATICALLY  
CREATES DIRECTORY FOR NEW PLUGGABLE DATABASE.
```

```
SQL>
```

```
SQL> CREATE PLUGGABLE DATABASE PREMDB FROM PNONCDB@ON_PREMISE FILE_NAME_CONVERT =  
( '/u02/oradata/PNONCDB/data/PNONCDB/', '/u01/app/oracle/oradata/CDBPROD/premdb/' );
```

Pluggable database created.

```
SQL>
```

Go to On-Premise  
and create a table

```
oracle@premise:~  
SQL> --LET US CREATE A TABLE WHEN HOT CLONING OF PLUGGABLE DATABASE IS IN PROGRE  
SQL> --WE WILL SEE ONCE THE PLUGGABLE DATABASE IS UP WHETHER THIS TABLE IS  
SQL> --CLONED OR NOT  
SQL>  
SQL>  
SQL> SELECT NAME FROM V$DATABASE;  
  
NAME  
-----  
PNONCDB  
  
SQL> CREATE TABLE SCOTT.MYCTL AS SELECT * FROM V$CONTROLFILE;  
  
Table created.  
  
SQL> SELECT COUNT (1) FROM V$DATAFILE;  
  
COUNT(1)  
-----  
4  
  
SQL>
```

# Step 5: Check CDBPROD Environment once again

```
[SGNON-CDB-CDBMIG12C ~]. oraenv
ORACLE_SID = [oracle] ? CDBPROD
The Oracle base has been set to /u01/app/oracle
[SGNON-CDB-CDBMIG12C ~]sqlplus / as sysdba
```

```
SQL*Plus: Release 12.2.0.1.0 Production on Wed Oct 18 17:41:22 2017
```

```
Copyright (c) 1982, 2016, Oracle. All rights reserved.
```

```
Connected to:
Oracle Database 12c Enterprise Edition Release 12.2.0.1.0 - 64bit Production
```

```
SQL> SHOW PDBS
```

CON_ID	CON_NAME	OPEN MODE	RESTRICTED
2	PDB\$SEED	READ ONLY	NO
4	PREMDB	MOUNTED	

```
SQL> ALTER SESSION SET CONTAINER=PREMDB;
```

```
Session Altered.
```

```
SQL>
```

```
SQL>--WE HAVE PLUGGED A NON-CDB DATABASE INTO CONTAINER DATABASE SO WE HAVE TO EXECUTE "noncdb_to_pdb.sql" SCRIPT
```

```
SQL>--THIS STEP IS NOT REQUIRED IN CASE ON-PREMISE DATABASE IS A CONTAINER DATABASE (CDB)
```

```
SQL>
```

```
SQL> @/u01/app/oracle/product/12.2.0.1/db_1/rdbms/admin/noncdb_to_pdb.sql
```

# Step 6: Open PREMDB Database on Cloud

```
SQL> SHOW PDBS
```

CON_ID	CON_NAME	OPEN MODE	RESTRICTED
4	PREMDB	MOUNTED	

```
SQL> SHOW CON_NAME
```

CON_NAME
PREMDB

```
SQL> --OPEN PREMDB DATABASE ON ORACLE CLOUD
```

```
SQL>
```

```
SQL> ALTER DATABASE PREMDB OPEN;
```

```
Database altered.
```

```
SQL> SHOW PDBS
```

CON_ID	CON_NAME	OPEN MODE	RESTRICTED
4	PREMDB	READ WRITE	NO

# Step 7: Validate Clone by Querying the tables

```
SQL> --OPEN PREMDB DATABASE ON ORACLE CLOUD
SQL>
SQL> ALTER DATABASE PREMDB OPEN;
```

Database altered.

```
SQL> SHOW PDBS
```

CON_ID	CON_NAME	OPEN	MODE	RESTRICTED
4	PREMDB	READ	WRITE	NO

```
SQL> show user
USER is "SYS"
```

```
SQL> ALTER SESSION SET CONTAINER=PREMDB;
```

Session altered.

```
SQL> SELECT COUNT (1) FROM SCOTT.MYTAB;
```

COUNT(1)
4

1 row selected.

```
SQL> --NOW LET'S SELECT MYCTL TABLE WHICH HAS BEEN CREATED ON ON-PREMISE (PNONCDB) DATABASE AFTER CLONING PROCESS HAS STARTED
SQL>
SQL> SELECT COUNT (1) FROM SCOTT.MYCTL;
```

COUNT(1)
2



Yes MYCTL  
Table is  
Copied to  
Cloud



**THANK  
YOU**