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PeopleSoft Application with Autonomous Database - Shared

Migration Guide with Oracle ZDM

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Due to the nature of the product architecture, it may not be possible to safely include all features described in this document without risking significant destabilization of the code.

TABLE OF CONTENTS

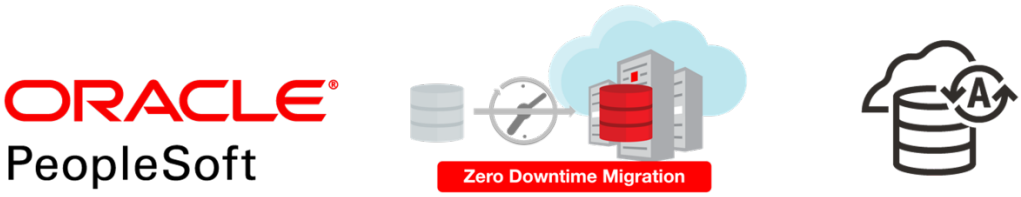

Figure 0 – Oracle PeopleSoft + ZDM + ADB Logo

INTRODUCTION

Oracle customers are moving Oracle workloads into the Oracle Cloud at a growingly rapid pace. However, migrating workloads has been a source of challenges for many years. Migrating database workloads from one system to another or into the Cloud is easier said than done.

Based on years of experience migrating Oracle workloads, Oracle has developed Zero Downtime Migration (ZDM). ZDM is Oracle's premier solution for a simplified and automated migration experience, providing zero to negligible downtime for the production system and depending on the migration scenario. ZDM allows you to directly and seamlessly migrate your Oracle Databases to and between any Oracle-owned infrastructure, including Exadata Database Machine On-Premises, Exadata Cloud at Customer (ExaC@C), and Oracle Cloud Infrastructure. Oracle ZDM supports a wide range of Oracle Database versions and, as the name implies, ensures minimal to no production database impact during the migration.

ZDM follows Oracle Maximum Availability Architecture (MAA) principles one and incorporates products such as GoldenGate and Data Guard to ensure High Availability and an online migration workflow that leverages technologies such as the Recovery Manager, Data Pump, and Database Links.

Oracle PeopleSoft customers who are migrating to the Oracle Cloud can benefit from ZDM and its automation, having then an easier, automated, Cloud Journey.

This Migration guide will walk you through all the requirements, steps, and best practices to Migrate your Database and have your PeopleSoft environment leverage Oracle Autonomous Database – Shared.

For more information on Oracle Zero Downtime Migration, please visit ZDM's product website.[1]
For more information on Oracle PeopleSoft, please visit PeopleSoft's product website.[2]
For more information on Oracle Autonomous Database, please visit Oracle Autonomous Database's website.[3]

[1] Http://www.oracle.com/goto/zdm

[2] https://www.oracle.com/applications/peoplesoft/

[3] https://www.oracle.com/autonomous-database/

PEOPLESOFT APPLICATION WITH AUTONOMOUS DATABASE - SHARED

Architecture

This step-by-step guide starts with a full-tier source PeopleSoft HCM environment deployed on an Oracle Linux VM. The objective of this guide is to migrate the database to **A**utonomous **D**atabase on **S**hared Exadata Infrastructure (now on ADB-S)– configured for Autonomous Transaction Processing workloads. At a high level, during this procedure, we will use Oracle **Z**ero **D**owntime **M**igration (now on ZDM). This document is based upon ZDM's **Offline Logical** migration methodology for migrating on-premises Database to ADB-S leveraging Oracle Data Pump.The migrated database at ADB-S can be rewired with the Mid-Tier of PeopleSoft provisioned at OCI Infrastructure.

- **Offline Migration with Data Pump and Backup Location**
  - ZDM logical offline migration with Data Pump and Backup Location offers customers a simple yet efficient method to migrate their databases to the Oracle Cloud. The backup location can be the Object Storage for OCI migrations and NFS for Exadata On-Premises and Exadata Cloud at Customer.

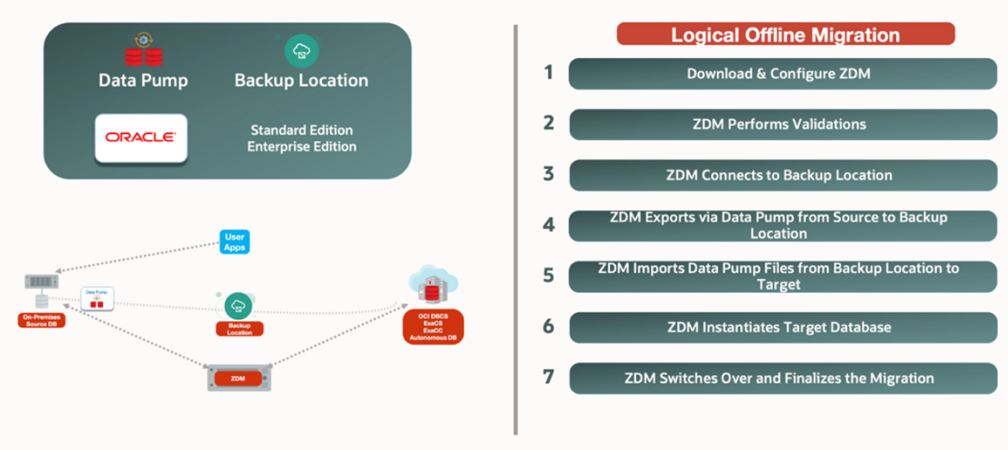

Figure 1 – Step-by-Step Logical Offline Migration with Data Pump and Backup Location
Step 1, Download and Configure ZDM. Step 2, ZDM Performs Validations. Step 3, ZDM Connects to Backup Location. Step 4, ZDM Exports Via Data Pump from Source to Backup Location. Step 5, ZDM Imports Data Dump Files from Backup Location to Target. Step 6, ZDM Instantiates Target Database. Step 7, ZDM Switches Over Finalizes the Migration Process.

Requirements for PeopleTools and Autonomous Database - Shared

- PeopleTools: For 8.57, it is 8.57.20 and above. For 8.58, it is 8.58.09 and above.

- Database Client: To obtain the required Oracle Client levels, the client needs to be updated by applying a Database Release Update (DBRU) patch on the middle tier. The minimum level required is 19.13 (October 2021) which can be found here:

  - Oracle Database 19c Release Update & Release Update Revision October 2021 Known Issues NOTE: 19202110.9
  - Supported Oracle Client version with TLS authentication without a wallet, based on: Oracle Client version supporting TLS authentication
    - Oracle Instant Client 19.13 - only on Linux x64
    - Oracle Instant Client 19.14 (or later) and 21.5 (or later) - all platforms
      - ** It's always recommended to select the latest version available at the time of deployment.*

Source Database

Source database for this step-by-step guide is configured on Oracle Linux 7 VM as a PUM Database with HRMS 9.2 Image 40 on PeopleTools 8.59.02. The Source database is running with Oracle Database Version 19.10.0.0 along with PSU Patch January 2021.

Source Database's stream pool must be configured with the initialization parameter STREAMS_POOL_SIZE:

```
SQL> alter system set streams_pool_size=512M scope=spfile sid='*';
```

**Restart Database upon setting the parameter*

Target Database

Target Database will be Autonomous Transaction Processing Database – Shared, referred as ADB-S in this document. This Database has been provisioned on OCI using the steps described below:

Database Provisioning

a. Change the compartment of your choice and create Autonomous Database via menu option of Autonomous Transaction Processing:

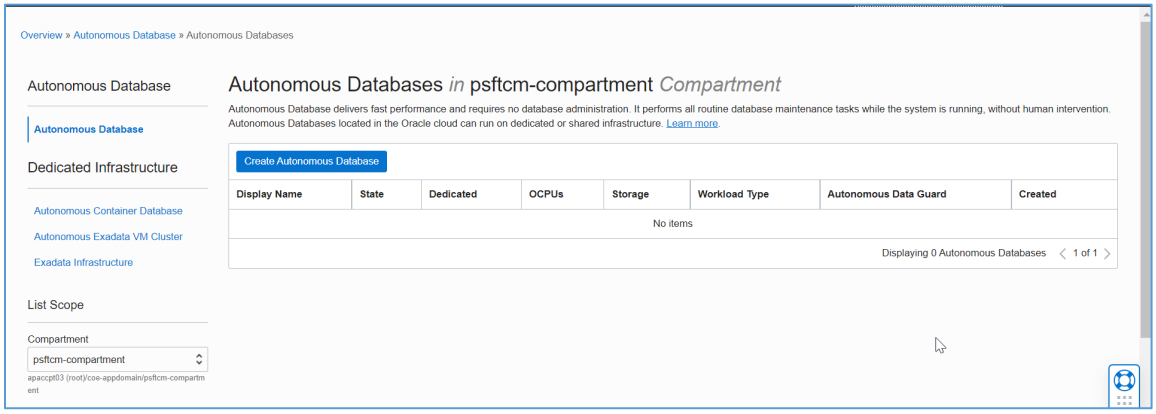

Figure 2 – Autonomous Database menu in Oracle Cloud Infrastructure

b. Database Options required for provisioning:

- **Workload Type**: Transaction Processing
- **Deployment Type**: Shared Infrastructure
- **Network Access**: We can control and restrict access to ADB-S by specifying network access control lists (ACLs). On an existing Autonomous Database instance with a public endpoint, you can add, change, or remove ACLs, which can be defined with one of the below options:

    i. **IP Address:** In the Values field enter values for the IP Address.

    ii. **CIDR Block:** In the Values field enter values for the CIDR Block.

    iii. **Virtual Cloud Network:** Use this option to specify the VCN for use with an Oracle Cloud Infrastructure Service Gateway.

    iv. **Virtual Cloud Network (OCID):** Use this option to specify the VCN for use with an Oracle Cloud Infrastructure Service Gateway.

  For more details, please refer Configure access control lists with an Autonomous Database instance

  For this Demo, select as "Secure access from allowed IPs and VCNs only" and uncheck the box for "Require mutual TLS (mTLS) authentication". Find more information here regarding TLS Authentication

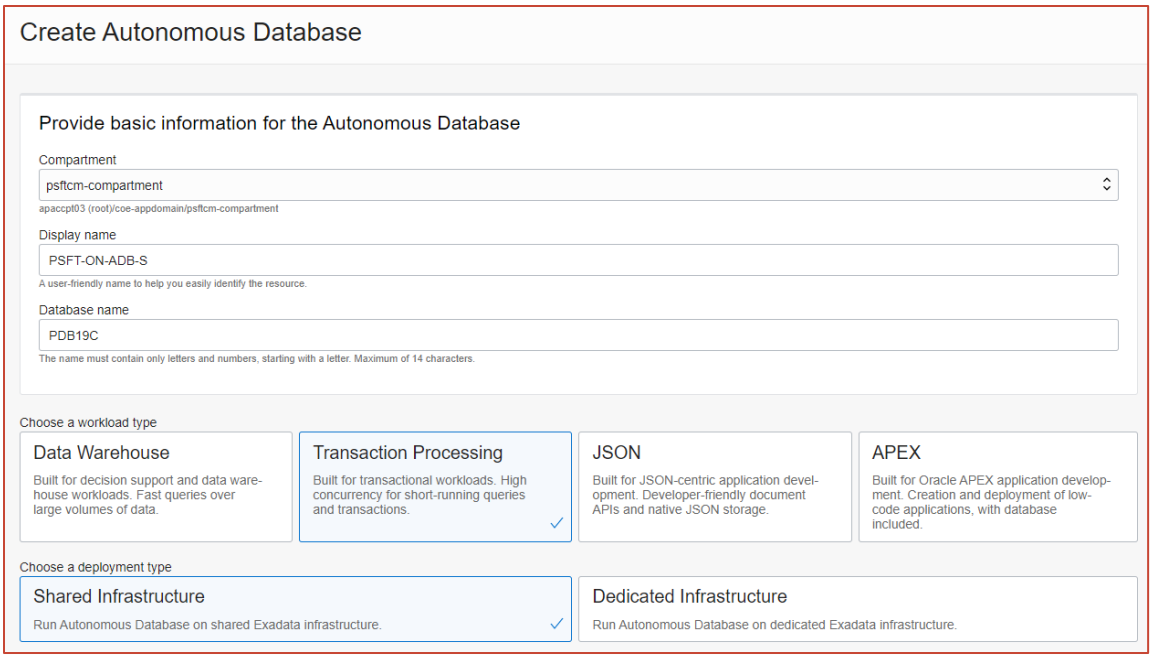

Figure 3 – Create Autonomous Database menu in Oracle Cloud Infrastructure

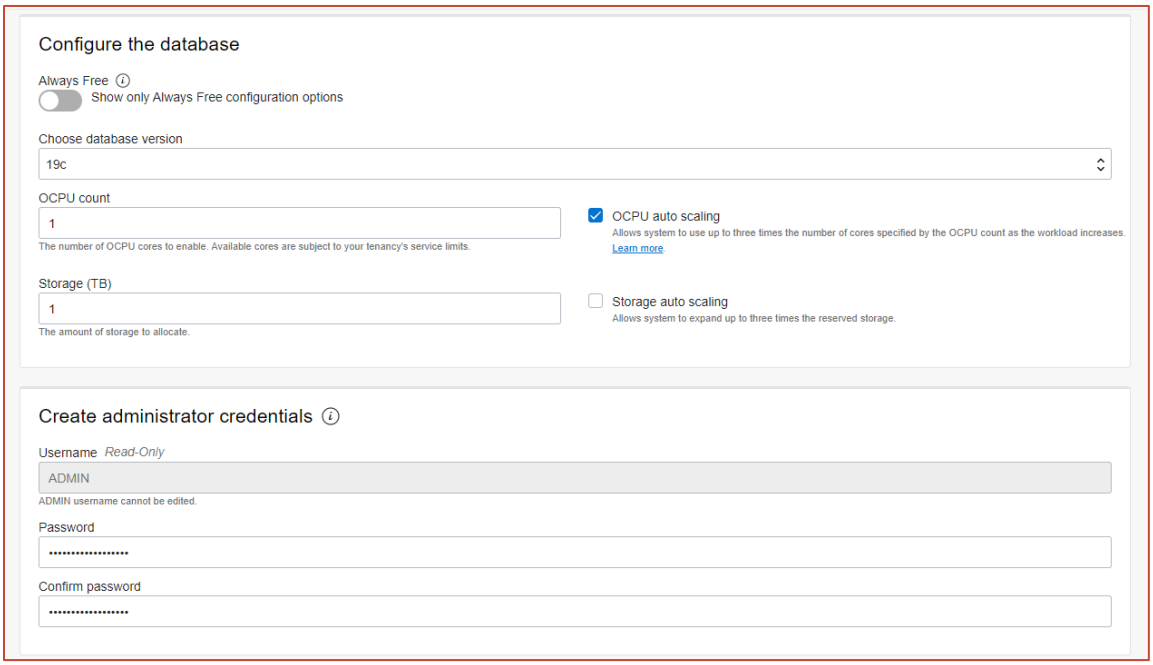

Figure 4 – Create Autonomous Database menu in Oracle Cloud Infrastructure

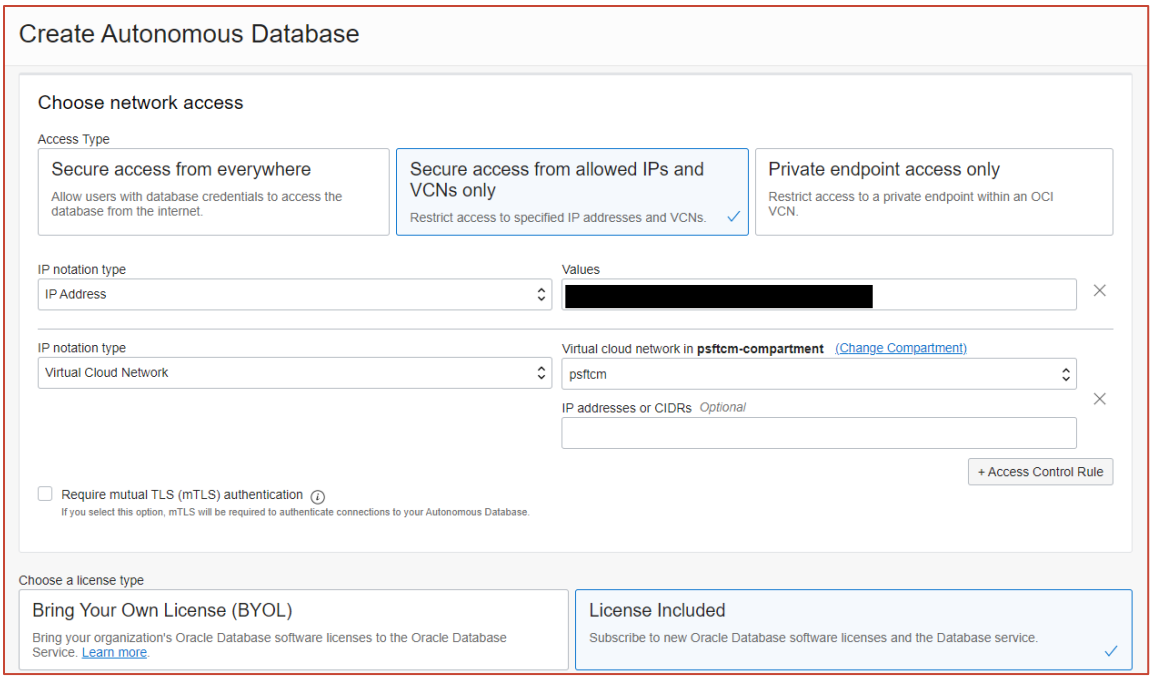

Figure 5 – Create Autonomous Database menu in Oracle Cloud Infrastructure

c. Validate the Pluggable Database (PDB) from OCI Console after it gets provisioned:

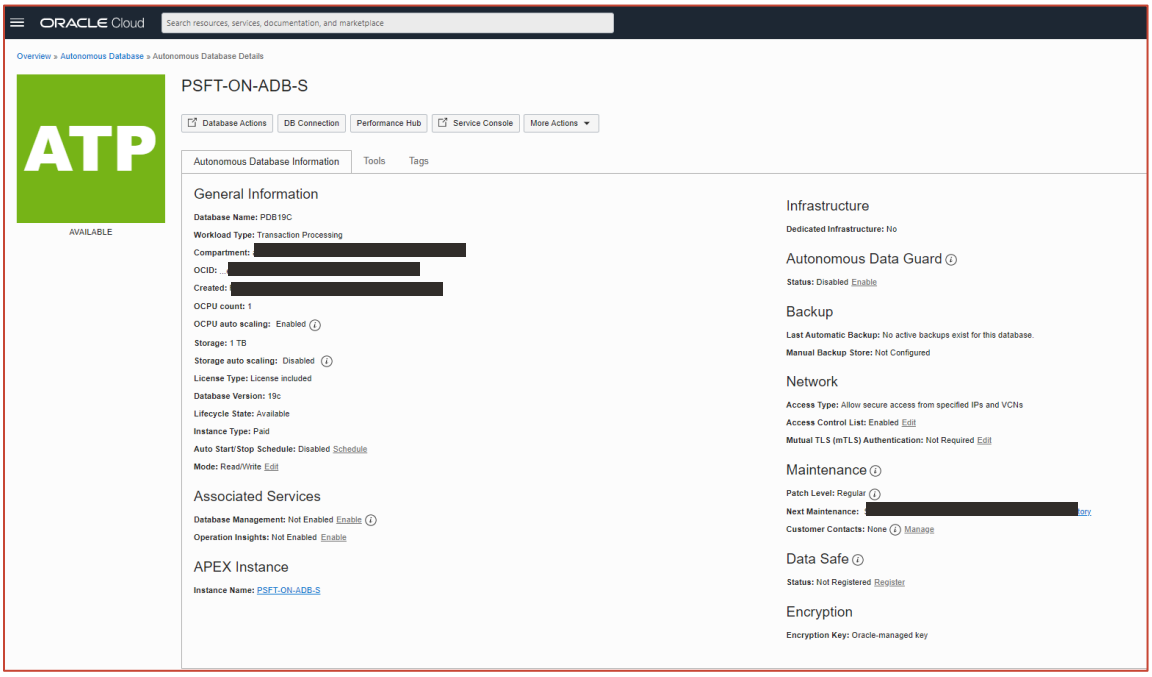

Figure 6 –Autonomous Database menu in Oracle Cloud Infrastructure

Click on the DB Connection button, copy and save the Connection Strings, please ensure 'TLS' is selected for 'TLS Authentication'.

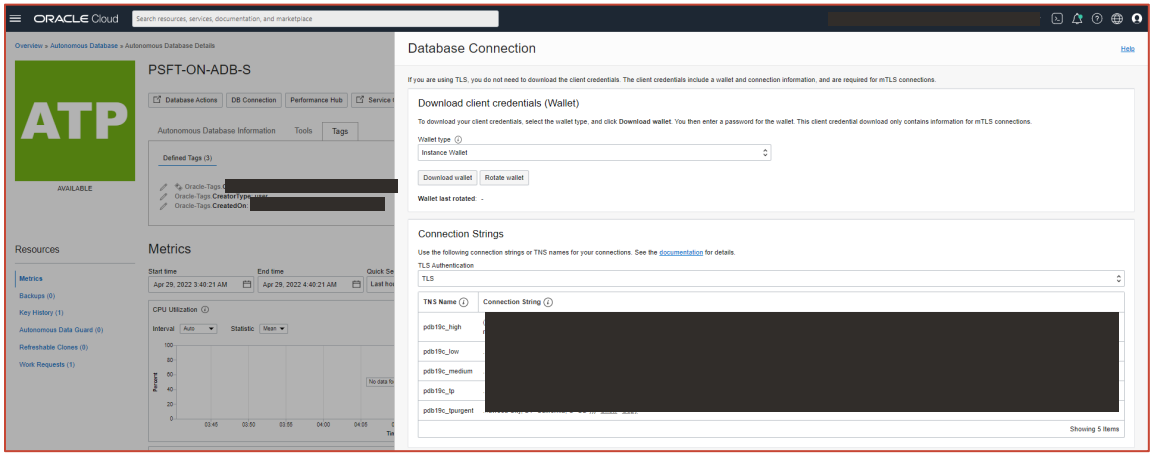

Figure 7 –Autonomous Database, Database Connection menu in Oracle Cloud Infrastructure

Summary of Source and Target Environments

Property	Source Database	Target Database
Hostname	hostname-lnfxt-database.test	-
Operating System	OL 7.9	-
DB Version	19c	19c
Patch	19.10.0.0.210119	-
File System	Standard	-
CDB Name	CDBHCM	-
PDB Name	CM92PUM	PDB19C
NLS_CHARACTERSET	AL32UTF8	AL32UTF8
NLS_NCHAR_CHARACTERSET	UTF8	AL16UTF16

Architecture Changes with ADB-S

Database Character Set

The database character set for ADB-S is Unicode AL32UTF8.

Tablespace Remap

The default data and temporary tablespaces for the database are configured automatically for ADB-S. Adding, removing, or modifying tablespaces is not allowed. Autonomous Database creates one tablespace or multiple tablespaces automatically depending on the storage size. Because of this, the migration process remaps tablespaces accordingly.

Password Policy for Database Users

Autonomous Database requires strong passwords; the password you specify for a user must meet the following default password complexity rules:

- The password must be between 12 and 30 characters long and must include at least one uppercase letter, one lowercase letter, and one numeric character.
- The password cannot contain the username.
- The password cannot be one of the last four passwords used for the same username.
- The password cannot contain the double quote (") character.
- The password must not be the same password that is set less than 24 hours ago.

To change the password complexity rules and password parameter values user can alter the default profile or create a new profile and assign it to users.

https://docs.oracle.com/en/cloud/paas/autonomous-database/adbsa/manage-users-create.html#GUID-72DFAF2A-C4C3-4FAC-A75B-846CC6EDBA3F

Note: Users can create a Password Verify Function (PVF) and associate the PVF with a profile to manage the complexity of user passwords. For details, please refer: https://docs.oracle.com/en/cloud/paas/autonomous-database/adbsa/manage-user-profiles.html#GUID-81E6B578-C942-4755-A693-33773350B0DA

* Data Pump allows to import Database Users with weak password for migration ease. For security purposes, there is a 30 days' time window to reset the password, in compliance with ADB-S Password Policy.

Initialization Parameters

Please refer to the document below for a list of initialization parameters that can be modified:

https://docs.oracle.com/en/cloud/paas/autonomous-database/adbsa/appendix-restrictions-database-initialization-parameters.html#GUID-7CF648C1-0822-4602-8ED1-6F5719D6779E

To ensure the most optimal application performance, PeopleSoft customers using ADB-S should work with OCI Support to set an init.ora environment variable to a non-standard setting by logging a Service Request in My Oracle Support, detailing the following information:

PRODUCT: Autonomous Database on Shared Infrastructure
ABSTRACT/SUMMARY: PSFT on ADBS: please set PeopleSoft DB identifier

Details to be included in the Service Request:

1. Oracle Cloud Infrastructure Region
2. Tenancy name and OCID
3. Autonomous DB name and OCID
4. Request to set init.ora paramaeter: _unnest_subquery=false

Target Database Required Settings

The Target Database needs to be prepared accordingly before starting the migration process. Please follow the steps as described below.

Target Database Parameter

PeopleSoft Unicode databases require NLS_LENGTH_SEMANTICS=CHAR. Update the NLS_LENGTH_SEMANTICS parameter as recommended for PeopleSoft Database following these My Oracle Support notes:

- https://support.oracle.com/epmos/faces/DocContentDisplay?id=1986664.1
- https://support.oracle.com/epmos/faces/DocContentDisplay?id=2626966.1

```
SQL> show parameter nls_length_semantics

NAME                                 TYPE        VALUE
------------------------------------ ----------- ------------------------------
nls_length_semantics                 string      BYTE
SQL> alter system set nls_length_semantics=CHAR;

System altered.

SQL>
```

Figure 8 –Target Autonomous Database nls_length_semantics parameter update

```
SQL> alter system set nls_length_semantics=CHAR;
```

* This is to ensure that the length of CHAR and VARCHARs is measured in characters and not bytes, to address the multibyte characteristics of AL32UTF8. For more details, please refer Oracle Documentation for NLS_LENGTH_SEMANTICS

Map Tablespaces for Autonomous Database - Optional Step

This step is only relevant to use cases where a set of identified Tablespace needs to be migrated to ADB-S. Mapping the Tablespace is an optional step. This step can be ignored if the goal is to migrate all Tablespace to ADB-S. Data Pump will map the Source Tablespace with 'DATA' Tablespace by default.

* **SYSTEM**, **SYSAUX**, **UNDO** and **TEMP** Tablespaces will be used from the provisioned target ADB-S Pluggable Database (PDB). In case there are any PeopleSoft objects created there, those will be treated as customization and out of the scope for this document.

Permanent Tablespace – Optional Step

The SQL statements below provide the list of Permanent Tablespaces needed to map with 'DATA' Tablespace:

```
zdmuser@zdmhost:~
[zdmuser@zdmhost ~]$ sqlplus sysadm@CM92PUM

SQL*Plus: Release 19.0.0.0.0 - Production on Mon May 9 04:52:31 2022
Version 19.15.0.0.0

Copyright (c) 1982, 2021, Oracle.  All rights reserved.

Enter password:
Last Successful login time: Mon May 09 2022 04:48:46 +00:00

Connected to:
Oracle Database 19c Enterprise Edition Release 19.0.0.0.0 - Production
Version 19.10.0.0.0

SQL> set heading off;
SQL> set echo off;
SQL> set pages 999;
SQL> set linesize 400;
SQL> set long 90000;
SQL> spool permanent_tablespace.txt;
SQL> SELECT 'DATAPUMPSETTINGS_METADATAREMAPS-1=type:REMAP_TABLESPACE,oldValue:' || TABLESPACE_NAME || ',newValue:DATA'
  2  FROM USER_TABLESPACES
  3  WHERE TABLESPACE_NAME not in ('SYSTEM','SYSAUX') and CONTENTS not in ('UNDO', 'TEMPORARY');

DATAPUMPSETTINGS_METADATAREMAPS-1=type:REMAP_TABLESPACE,oldValue:PSDEFAULT,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-1=type:REMAP_TABLESPACE,oldValue:AAAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-1=type:REMAP_TABLESPACE,oldValue:AALARGE,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-1=type:REMAP_TABLESPACE,oldValue:ADAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-1=type:REMAP_TABLESPACE,oldValue:AMAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-1=type:REMAP_TABLESPACE,oldValue:AVAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-1=type:REMAP_TABLESPACE,oldValue:BDAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-1=type:REMAP_TABLESPACE,oldValue:BNAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-1=type:REMAP_TABLESPACE,oldValue:BNLARGE,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-1=type:REMAP_TABLESPACE,oldValue:CCAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-1=type:REMAP_TABLESPACE,oldValue:COAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-1=type:REMAP_TABLESPACE,oldValue:CUAUDIT,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-1=type:REMAP_TABLESPACE,oldValue:CULARG1,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-1=type:REMAP_TABLESPACE,oldValue:CULARG2,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-1=type:REMAP_TABLESPACE,oldValue:CULARG3,newValue:DATA
```

Figure 9 –Target Autonomous Database list of Permanent Tablespaces to be mapped with 'DATA' Tablespace

```
set heading off;
set echo off;
set pages 999;
set linesize 400;
set long 90000;
spool permanent_tablespace.txt;
SELECT 'DATAPUMPSETTINGS_METADATAREMAPS-1=type:REMAP_TABLESPACE,oldValue:' || TABLESPACE_NAME ||
',newValue:DATA'
  FROM USER_TABLESPACES
  WHERE TABLESPACE_NAME not in ('SYSTEM','SYSAUX') and CONTENTS not in ('UNDO', 'TEMPORARY');
spool off;
```

Temporary Tablespace – Optional Step

The SQL statements below provide the list of Temporary Tablespaces needed to map with 'TEMP' Tablespace:

Figure 10 –List of Temporary Tablespaces needed to map with 'TEMP' Tablespace

```
set heading off;
set echo off;
set pages 999;
set linesize 400;
set long 90000;
spool temporary_tablespace.txt;
SELECT 'DATAPUMPSETTINGS_METADATAREMAPS-1=type:REMAP_TABLESPACE,oldValue:' || TABLESPACE_NAME ||
',newValue:DATA'
  FROM USER_TABLESPACES
  WHERE CONTENTS in ('TEMPORARY');
spool off;
```

The Output of these 2 files, *permanent_tablespace.txt* and *temporary_tablespace.txt*, will be used for populating ZDM's response file, specifically the 'DATAPUMPSETTINGS_METADATAREMAPS-n' parameter. Save these files, as they will be required later in the migration process.

Creating PeopleSoft User at the Target Database

Oracle ZDM's migration workflow takes care of importing PeopleSoft's Schema along withusers at the source database Level. For manual user creation, Password Policy for Database User mentioned above must be followed. This implies all additional tasks related to encrypting new password and update the PSOPRDEFN table as prerequisites which is an established and well known procedure for PeopleSoft Admin.

* Data Pump allows to import Database Users with weak password for migration ease. For security purposes, there is a 30 days' time window to reset the password, in compliance with ADB-S Password Policy.

Run 'psroles.sql' and 'psroles2.sql' for PSADMIN Role

Before running the import, it is important to create the PSADMIN role and grant required privileges to the role as 'ADMIN' user.

Copy 'psroles.sql' and 'psroles2.sql' from Mid-Tier

Proceed to copy 'psroles.sql' and 'psroles2.sql' from $PS_HOME/script/unix/pdb folder of Mid-Tier and run at ADB-S as the 'ADMIN' user to generate the PSADMIN role.

Run ‘psroles.sql’ and ‘psroles2.sql’ script

Run these scripts as admin user on ADB-S.

Run ‘psroles.sql’:

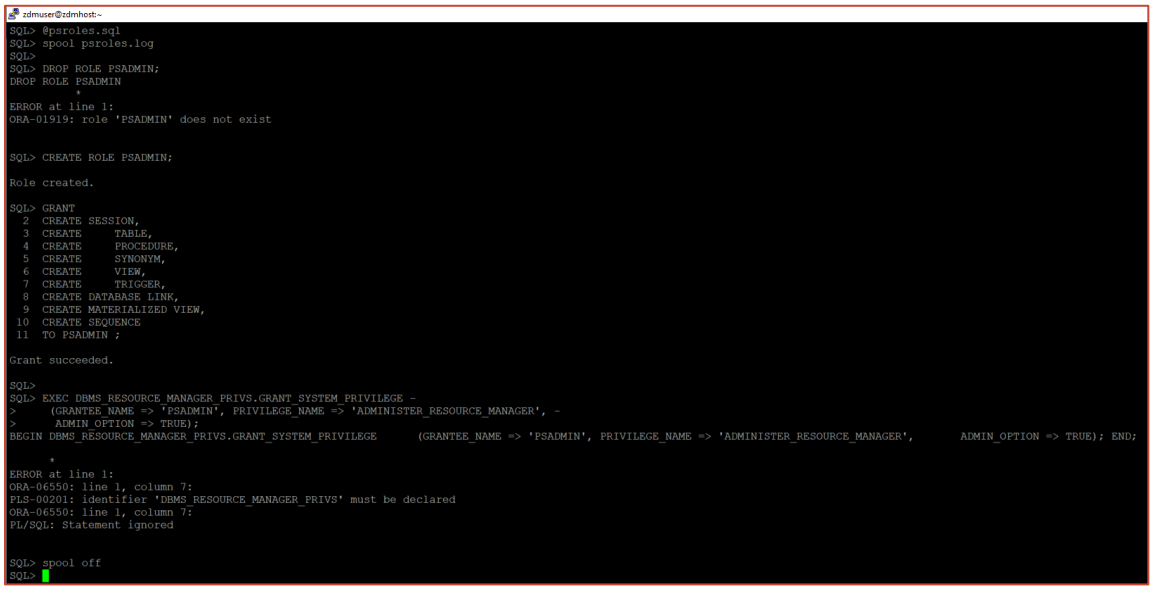

Figure 11 –psroles.sql script execution

Error noticed while running the scripts:

- DBMS_RESOURCE_MANAGER_PRIVS.GRANT_SYSTEM_PRIVILEGE: IGNORE THIS ERROR as Autonomous Database comes with predefined CPU/IO shares assigned to different consumer groups with limited flexibility.

Run ‘psroles2.sql’:

Before running the script, update it as per below:

Comment the following lines:

- `ALTER SESSION SET CONTAINER = <PDB_SERVICE_NAME>;`
    - Reason: The connection is with PDB Service itself as ‘admin’ user.
- `grant select,insert,update,delete on PS.PSDBOWNER to PSADMIN;`
    - Reason: Schema and Object don’t exist at ADB-S at this point of time.

```
zdmuser@zdmhost:~
set echo on
spool psroles2.log

REMARK -- Commented to run against ADB-S where connected to PDB
-- ALTER SESSION SET CONTAINER = <PDB_SERVICE_NAME>;
GRANT SELECT ON SYS.V_$MYSTAT to PSADMIN;
GRANT SELECT ON  USER_AUDIT_POLICIES to PSADMIN;
GRANT SELECT ON DBA_AUDIT_POLICY_COLUMNS to PSADMIN;
GRANT EXECUTE ON DBMS_FGA to PSADMIN;

REM -- If using 12c (12.1.0.2.0 or higher) with the IMDB feature,
REM -- the following two grants will be applied:
REM

SET SERVEROUTPUT ON
SET FEEDBACK ON

DECLARE
   Vdollarversion VARCHAR2(17);
BEGIN
    SELECT version
    into  Vdollarversion
    FROM v$instance;
    DBMS_OUTPUT.PUT_LINE('Oracle Version: '|| Vdollarversion);
    IF Vdollarversion >= '12.1.0.2.0'
    THEN
    DBMS_OUTPUT.PUT_LINE('EXEC 12c IMDB specific GRANTS');
    EXECUTE IMMEDIATE ('GRANT SELECT ON SYS.V_$IM_COLUMN_LEVEL to PSADMIN');
    EXECUTE IMMEDIATE ('GRANT SELECT ON SYS.V_$IM_USER_SEGMENTS to PSADMIN');
    ELSE
    DBMS_OUTPUT.PUT_LINE('IMDB grants not executed. IMDB feature is not available in this Oracle version.');
    END IF;
END;
/

grant execute on DBMS_METADATA to PSADMIN;
grant execute on DBMS_MVIEW to PSADMIN;
grant execute on DBMS_SESSION to PSADMIN;
grant execute on DBMS_STATS to PSADMIN;
grant execute on DBMS_XMLGEN to PSADMIN;
grant execute on DBMS_APPLICATION_INFO to PSADMIN;
grant execute on dbms_refresh to PSADMIN;
grant execute on dbms_job to PSADMIN;
grant execute on dbms_lob to PSADMIN;
grant execute on DBMS_OUTPUT to PSADMIN;
REMARK -- Commented to run against ADB-S where PS Schema hasn't been imported yet
-- grant select,insert,update,delete on PS.PSDBOWNER to PSADMIN;

REM READ privilege for ALL_DEPENDENCIES as added in 12.1.0.2 and
REM SELECT -> READ privilege changed for PUBLICLY available views was done in 12.2.
REM
DECLARE
    obj_priv varchar2(40);
    Vdollarversion VARCHAR2(17);
```

Figure 12 –psroles2.sql script execution

```
zdmuser@zdmhost:~
SQL> @psroles2.sql
SQL> -- *****************************************************************
SQL> --  This software and related documentation are provided under a
SQL> --  license agreement containing restrictions on use and
SQL> --  disclosure and are protected by intellectual property
SQL> --  laws. Except as expressly permitted in your license agreement
SQL> --  or allowed by law, you may not use, copy, reproduce,
SQL> --  translate, broadcast, modify, license, transmit, distribute,
SQL> --  exhibit, perform, publish or display any part, in any form or
SQL> --  by any means. Reverse engineering, disassembly, or
SQL> --  decompilation of this software, unless required by law for
SQL> --  interoperability, is prohibited.
SQL> --  The information contained herein is subject to change without
SQL> --  notice and is not warranted to be error-free. If you find any
SQL> --  errors, please report them to us in writing.
SQL> --
SQL> --  Copyright (C) 1988, 2021, Oracle and/or its affiliates.
SQL> --  All Rights Reserved.
SQL> -- *****************************************************************
SQL>
SQL>
SQL> --
SQL> -- ***********************************************************************
SQL> -- ***********************************************************************
SQL> --
SQL> --
SQL> --
SQL> --
SQL> --
SQL> -- ***********************************************************************
SQL> REMARK -- Replace <PDB_SERVICE_NAME> with your Pluggable database name.
SQL> REMARK -- This script has to run as "sqlplus / as sysdba" immediately after psroles.sql
SQL>
SQL> set echo on
SQL> spool psroles2.log
SQL>
SQL> REMARK -- Commented to run against ADB-S where connected to PDB
SQL> -- ALTER SESSION SET CONTAINER = <PDB_SERVICE_NAME>;
SQL> GRANT SELECT ON SYS.V_$MYSTAT to PSADMIN;

Grant succeeded.

SQL> GRANT SELECT ON  USER_AUDIT_POLICIES to PSADMIN;

Grant succeeded.

SQL> GRANT SELECT ON DBA_AUDIT_POLICY_COLUMNS to PSADMIN;

Grant succeeded.

SQL> GRANT EXECUTE ON DBMS_FGA to PSADMIN;

Grant succeeded.

SQL>
```

Figure 13 –psroles2.sql script execution

ZERO DOWNTIME MIGRATION SERVICE HOST

Zero Downtime Migration Service Host Requirements

Oracle Zero Downtime Migration installation must take place on a separate host, which must fulfill the following requirements:

- Linux host running on Oracle 7 (must be this OS version).
- 100 GB of free storage space. This space is required for all the logs that ZDM will generate.
- A `zdm` group and a `zdmuser` as part of this group.
- Following packages must be installed:
  - `glibc-devel`
  - `expect`
  - `unzip`
  - `libaio`
  - `oraclelinux-developer-release-el7`

- All host names and IP addresses to be used must be present as entries in the `/etc/hosts file.`

For more information on the ZDM Service Host requirements, please refer to Oracle ZDM's product documentation, specifically the "*Setting Up Zero Downtime Migration Software*"[4] section.https://docs.oracle.com/en/database/oracle/zero-downtime-migration/21.1/zdmug/installing-zero-downtime-migration-software.html - GUID-A55FEDBA-236A-4006-91A5-6F28D100C5B2https://docs.oracle.com/en/database/oracle/zero-downtime-migration/21.3/zdmug/installing-zero-downtime-migration-software.html#GUID-A55FEDBA-236A-4006-91A5-6F28D100C5B2

The ZDM software can be:

- Installed manually on-premises.
- Installed manually on OCI.

This Step-by-Step Guide will cover the manual installation of the ZDM Service Host, including a thorough description of all necessary instructions about the deployment and configuration. For this guide a VM in OCI has been provisioned with an attached block volume of 100 GB.

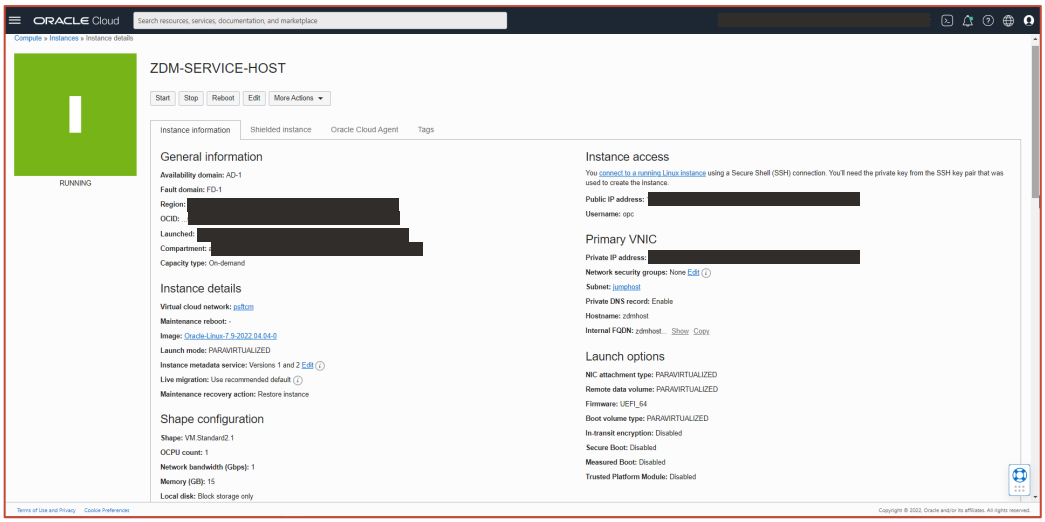

Figure 14 –ZDM Service-Host VM in Oracle Cloud Infrastructure

[4] https://docs.oracle.com/en/database/oracle/zero-downtime-migration/21.2/zdmug/installing-zero-downtime-migration-software.html#GUID-A55FEDBA-236A-4006-91A5-6F28D100C5B2

ZDM Service Host Installation

Log in to the ZDM Service Host, via terminal, as root user:

1 Create a new group, user, and the needed directories. As root user:

```
[root@zdmhost]# groupadd zdm
[root@zdmhost]# useradd zdmuser -g zdm
[root@zdmhost]# mkdir -p /home/zdmuser/zdminstall
[root@zdmhost]# mkdir /home/zdmuser/zdmhome
[root@zdmhost]# mkdir /home/zdmuser/zdmbase
[root@zdmhost]# chown -R zdmuser:zdm /home/zdmuser/
```

2 Install the required software packages. As root user:

```
[root@zdmhost]# yum -y install \
glibc-devel \
expect \
unzip \
libaio \
oraclelinux-developer-release-el7
[root@zdmhost]# yum list installed glibc-devel expect unzip libaio oraclelinux-
developer-release-el7.
Installed Packages
expect.x86_64                                                    5.45-14.el7_1
@ol7_latest-x86_64
libaio.x86_64                                                    0.3.109-
13.el7                                  @anaconda/7.9
oraclelinux-developer-release-el7.x86_64              1.0-6.el7
@ol7_latest
unzip.x86_64                                                     6.0-21.el7
@anaconda/7.9
```

3 Download ZDM binaries to /home/zdmuser/zdminstall from www.oracle.com/database/technologies/rac/zdm-downloads.html. Change the owner of the zip file to zdmuser. As root user:

```
[[root@zdmhost]# cd /home/zdmuser/zdminstall
[root@zdmhost zdminstall]# chown zdmuser:zdm /home/zdmuser/zdminstall/zdm21.3.zip
```

4 Install the ZDM software. As zdmuser:

```
 root@zdmhost zdminstall]# su - zdmuser
 [zdmuser@zdmhost ~]$ echo "ORACLE_HOME=/home/zdmuser/zdmhome; export ORACLE_HOME" >>
~/.bashrc
```

```
[zdmuser@zdmhost ~]$ echo "ORACLE_BASE=/home/zdmuser/zdmbase; export ORACLE_BASE" >>
~/.bashrc
[zdmuser@zdmhost ~]$ echo "ZDM_BASE=\$ORACLE_BASE; export ZDM_BASE" >> ~/.bashrc
[zdmuser@zdmhost ~]$ echo "ZDM_HOME=/home/zdmuser/zdmhome; export ZDM_HOME" >> ~/.bashrc
[zdmuser@zdmhost ~]$ echo "ZDM_INSTALL_LOC=/home/zdmuser/zdminstall; export
ZDM_INSTALL_LOC" >> ~/.bashrc
[zdmuser@zdmhost ~]$ cat  ~/.bashrc
ORACLE_HOME=/home/zdmuser/zdmhome; export ORACLE_HOME
ORACLE_BASE=/home/zdmuser/zdmbase; export ORACLE_BASE
ZDM_BASE=$ORACLE_BASE; export ZDM_BASE
ZDM_HOME=/home/zdmuser/zdmhome; export ZDM_HOME
ZDM_INSTALL_LOC=/home/zdmuser/zdminstall; export ZDM_INSTALL_LOC
[zdmuser@zdmhost ~]$ source ~/.bashrc
[zdmuser@zdmhost ~]$ cd /home/zdmuser/zdminstall/
[zdmuser@zdmhost zdminstall]$ unzip zdm21.3.zip
[zdmuser@zdmhost zdminstall]$ cd zdm21.3
-- Proceed to execute ZDM's installation script zdmuser:
[zdmuser@zdmhost zdm21.3]$ ./zdminstall.sh setup \
oraclehome=$ZDM_HOME \
oraclebase=$ZDM_BASE \
ziploc=./zdm_home.zip -zdm
```

5 Start ZDM and check the status. As zdmuser:

```
[zdmuser@zdmhost zdm21.3]$ $ZDM_HOME/bin/zdmservice start
Return code is 0
Server started successfully.
[zdmuser@zdmhost zdm21.3]$ $ZDM_HOME/bin/zdmservice status
----------------------------------------
        Service Status
----------------------------------------

 Running:       true
 Tranferport:
 Conn String:   jdbc:mysql://localhost:8897/
 RMI port:      8895
 HTTP port:     8896
 Wallet path:   /home/zdmuser/zdmbase/crsdata/zdmhost/security
```

6 Install the OCL CLI on the ZDM Service host, as 'root', execute the following:

```
[root@zdmhost ]# yum install python36-oci-cli
```

API Signing Public Key and Configuration File

1 Run as 'zdmuser' amd copy the contents of the public key:

```
[zdmuser@zdmhost ]# mkdir zdmhome/.oci

[zdmuser@zdmhost ]# cd zdmhome/.oci

[zdmuser@zdmhost .oci]# openssl genrsa -out /home/zdmuser/zdmhome/.oci/oci_api_key.pem
2048
Generating RSA private key
---

[zdmuser@zdmhost .oci]# openssl rsa -pubout -in
/home/zdmuser/zdmhome/.oci/oci_api_key.pem -out
/home/zdmuser/zdmhome/.oci/oci_api_key_public.pem

Writing RSA key
[zdmuser@zdmhost .oci]#cat oci api_key_public.pem
------BEGIN PUBLIC KEY--------
XXXXXXXXXXXX
------END PUBLIC KEY------
[zdmuser@zdmhost .oci]#
```

2 Go to the OCI Dashboard, navigate to the top right, click on your user profile icon and select the top option representing your user. Select **API Keys** and **Add API Key**, copy the content of saved public key from step 1 above:

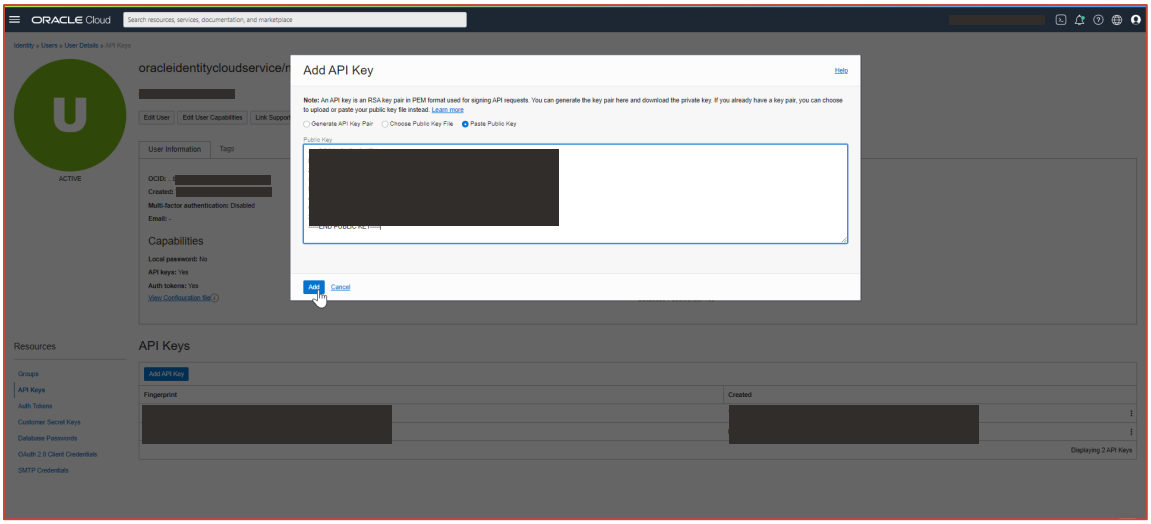

Figure 15 –Add API Key in Oracle Cloud Infrastructure

3 You will see a configuration file preview. Copy its contents, you will be using to populate your configuration file later:

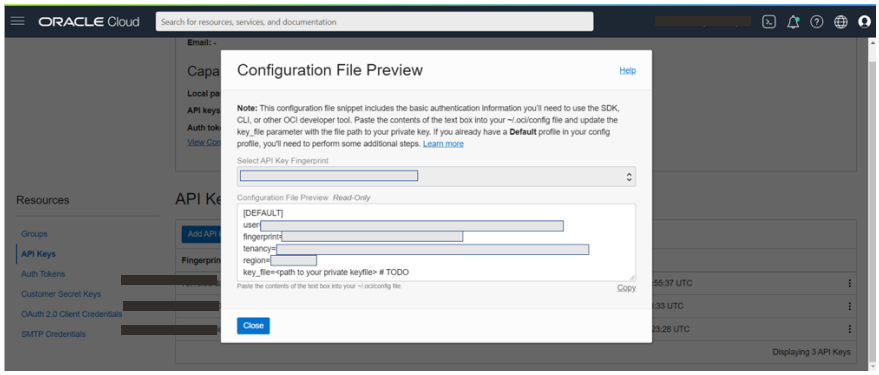

Figure 16 – Screenshot for "Configuration File Preview" window on Oracle Cloud.

4 As the zdmuser in the ZDM Service Host, in the command prompt, create a configuration file, you can use vi/vim or any editor of your preference. In the empty file, paste the configuration file contents copied from above. Replace < path to your private keyfile > # TODO with the line above, once done, save the file and quit the editor:

```
/u01/app/zdmhome/.oci/oci_api_key.pem
```

Install SQL Client

Autonomous Database by default supports Mutual TLS (mTLS) connections. Oracle provides the option to configure an Autonomous Database instance to support both mTLS and TLS connections. There are advantages for clients using TLS authentication with Autonomous Database, including the following:

- TLS connections do not require that you download a wallet.
- Since TLS connects are not dependent upon wallet, Clients connecting with TLS do not need to worry about wallet rotation.
- TLS connections can be faster (providing less connection latency).
- Using TLS authentication does not compromise the fully encrypted end-to-end communication between a client and Autonomous Database.

Based on these features and advantages, this document uses TLS connectivity. Oracle Call Interface (OCI) clients support TLS authentication without a wallet with using the following client versions:

- Oracle Instant Client 19.13 - only on Linux x64
- Oracle Instant Client 19.14 (or later) and 21.5 (or later) - all platforms

Oracle Client needs to be installed at ZDM Service Host and PeopleSoft Mid-Tier. The steps to achieve this are listed below as follows:

Download Oracle Instant Client

Download the RPM packages of Oracle Client for using the installer available at Oracle Instant Client Downloads for Linux x86-64 (64-bit)

- Basic Package (RPM)
- SQL*Plus Package (RPM)
- Tools Package (RPM)

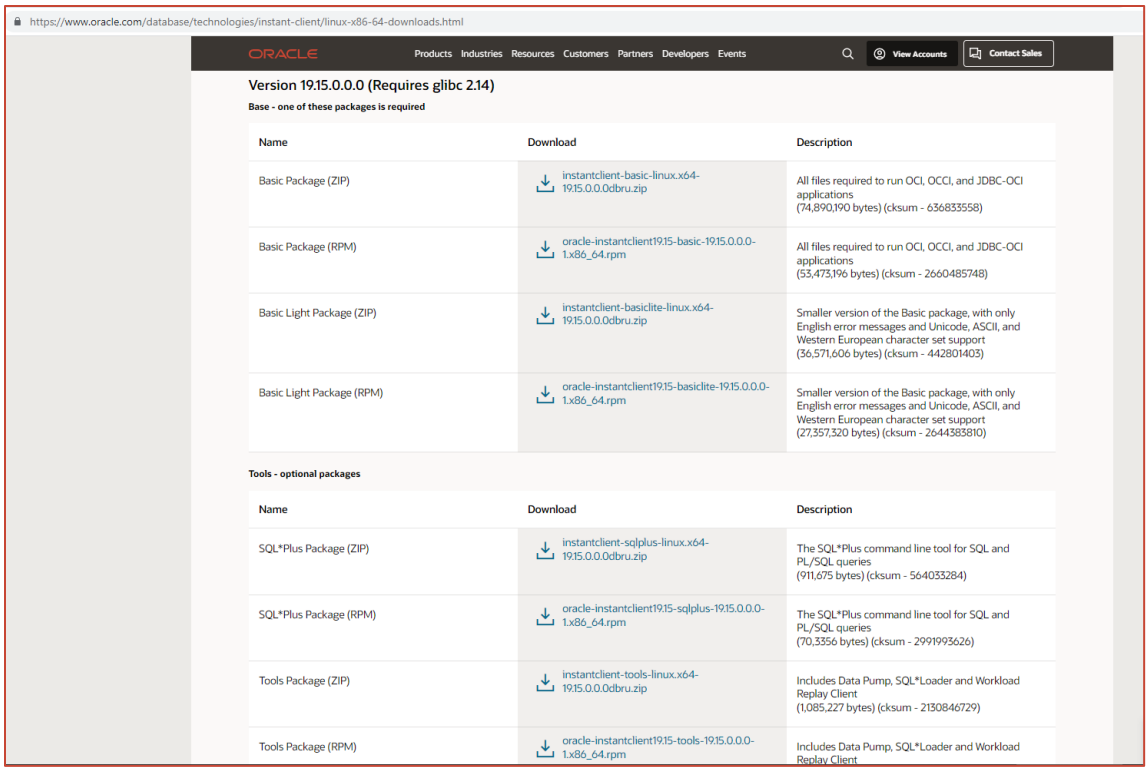

Figure 17 – Screenshot for Oracle Client download page.

** At the time of creating this document, Oracle Client 19.15 version is the latest available.*

Install Client Packages

As a 'root' user, install the packages in order. First Basic, followed by SQL*Plus and Tools Package to finish.

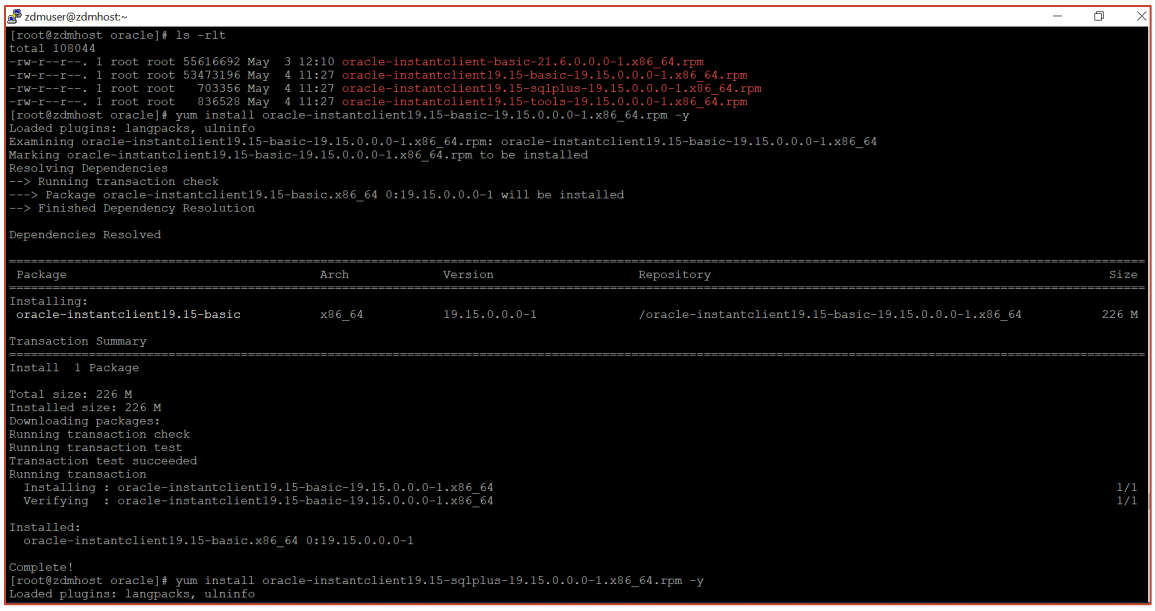

Figure 18 – Screenshot for package installation as zdmuser.

```
[root@zdmhost oracle]# yum install oracle-instantclient19.15-basic-19.15.0.0.0-1.x86_64.rpm -y
[root@zdmhost oracle]# yum install oracle-instantclient19.15-sqlplus-19.15.0.0.0-1.x86_64.rpm -y
[root@zdmhost oracle]# yum install oracle-instantclient19.15-tools-19.15.0.0.0-1.x86_64.rpm -y
```

Update Environment Variables

Update the environment variable for 'zdmuser' for TNS_ADMIN and PATH as shown below.

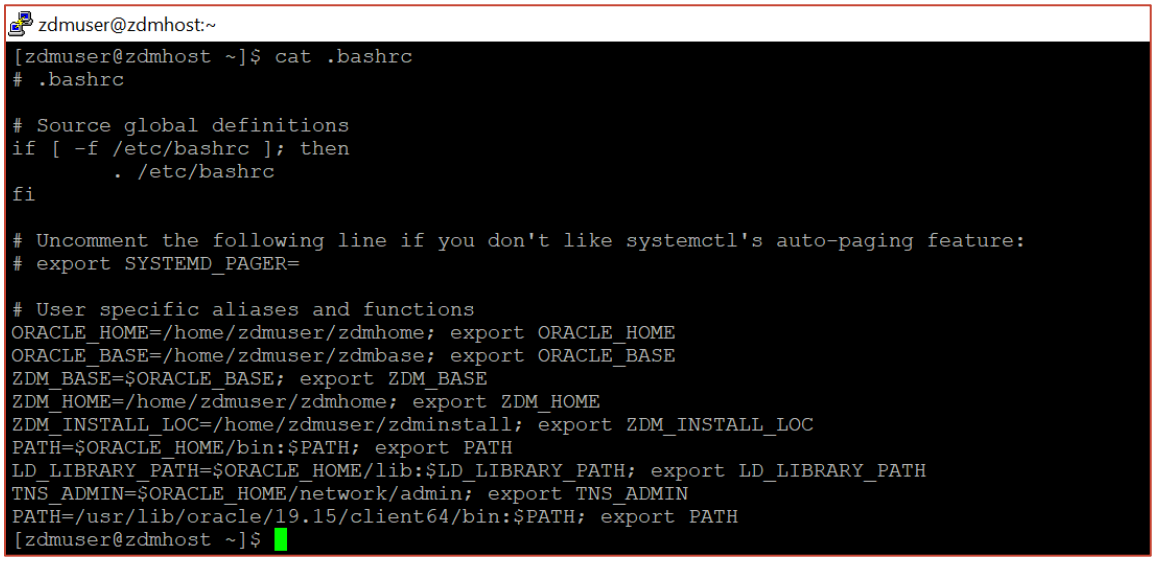

Figure 19 – Screenshot for environment variables update as zdmuser.

```
TNS_ADMIN=$ORACLE_HOME/network/admin; export TNS_ADMIN
PATH=/usr/lib/oracle/19.15/client64/bin:$PATH; export PATH
```

Update tnsnames.ora File

Using Source and Target Database details, update the tnsnames.ora file, available under the $TNS_ADMIN folder. Refer to the connection string for ADB-S as shown earlier in this guide under the '*Database Provision*' section.

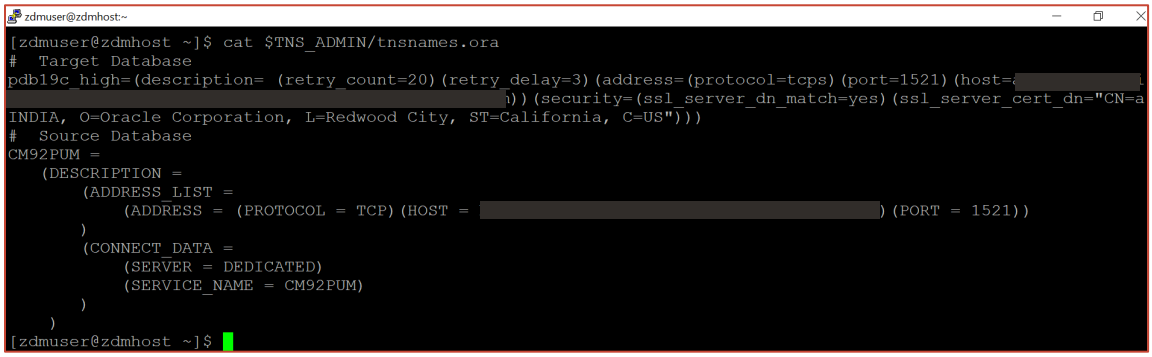

Figure 20 – Screenshot for tnsnames.ora file update.

Network Connectivity

Please ensure the network connectivity are met as per the table below.

Initiator	Target	Protocol	Port	Purpose
ZDM Service Host	Source Database Server	TCP	22	SSH
ZDM Service Host	Source Database Server	TCP	1521	SQL*Net
ZDM Service Host	Target Database Server	TCP	1521	SQL*Net
Source Database Server	Oracle Cloud Object Store Service	SSL	443	Database backup store
Target Database Server	Oracle Cloud Object Store Service	SSL	443	Database backup store

SSH Connectivity

Configure SSH Connectivity from ZDM host as 'zdmuser' to Source Database host based on SSH Keys without a passphrase

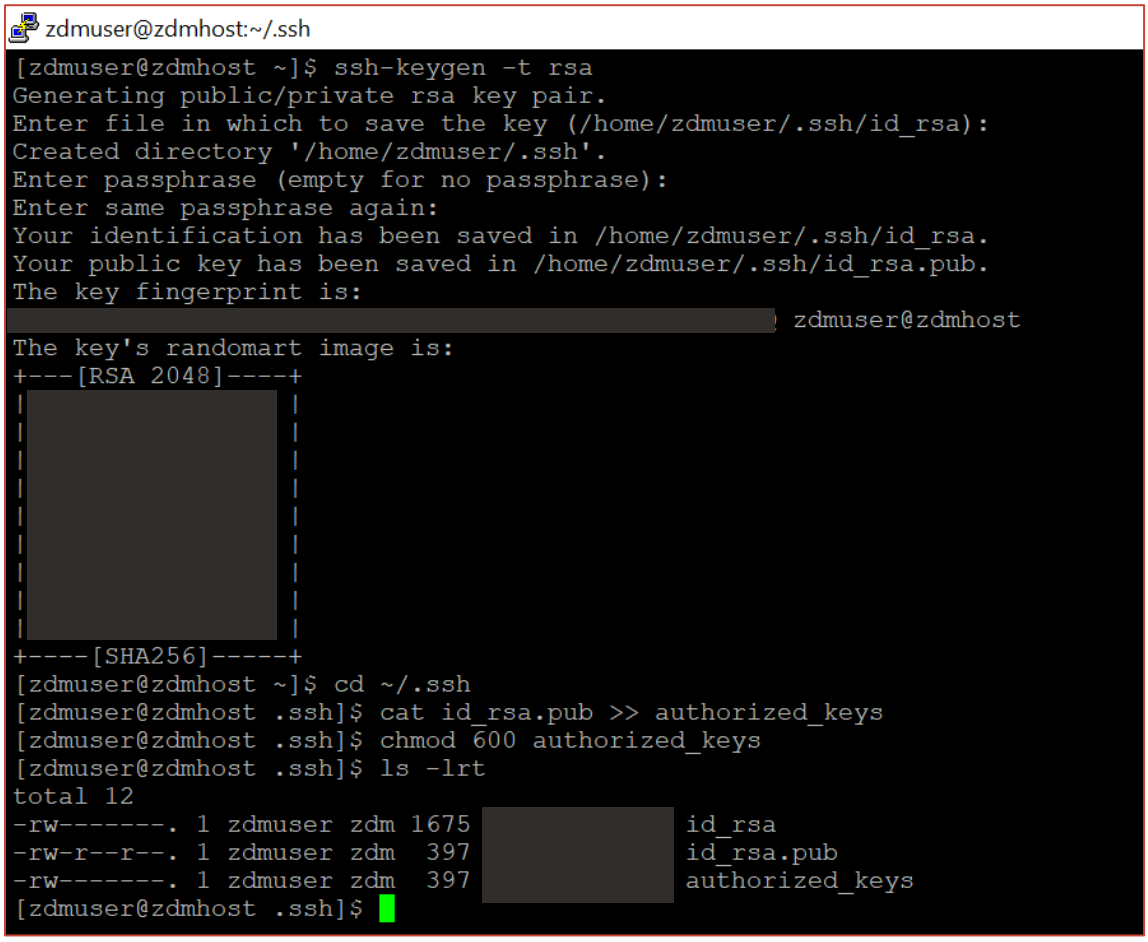

Figure 21 – Screenshot for ssh configuration.

```
ssh-keygen -t rsa
cd ~/.ssh
cat id_rsa.pub >> authorized_keys
chmod 600 authorized_keys
```

SQL*Net Connectivity

Ensure required ports of both Source and Target Databases are open and accessible to allow SQL*Net connectivity from the ZDM Service Host. The Ingress Rules shown below are as follows: First rule allows access of Source Database from Mid-Tier and the second rule allows access of Target Database from Mid-Tier.

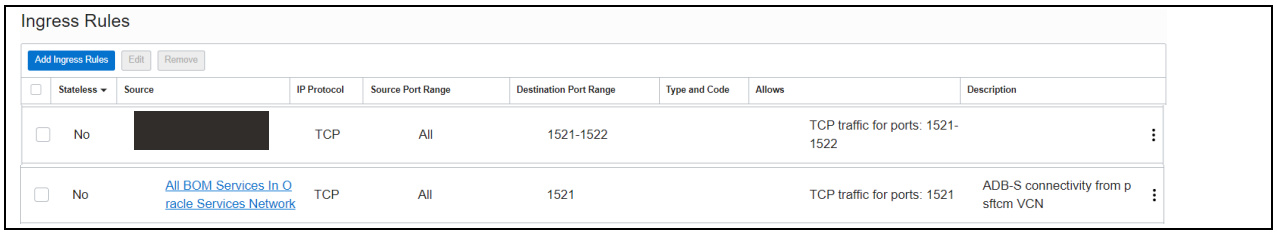

Figure 22 – Screenshot for Ingress Rules.

OSS Connectivity

Ensure that Source and Target Databases can connect to Oracle Object Storage on port 443.

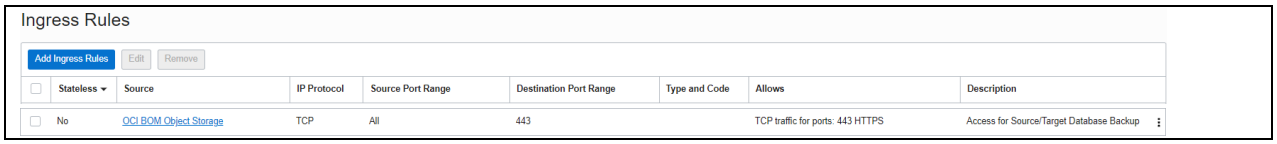

Figure 23 – Screenshot for Ingress Rules.

Backup Location

Create a standard Object Storage Bucket named ZDMBucket for Database Backup.

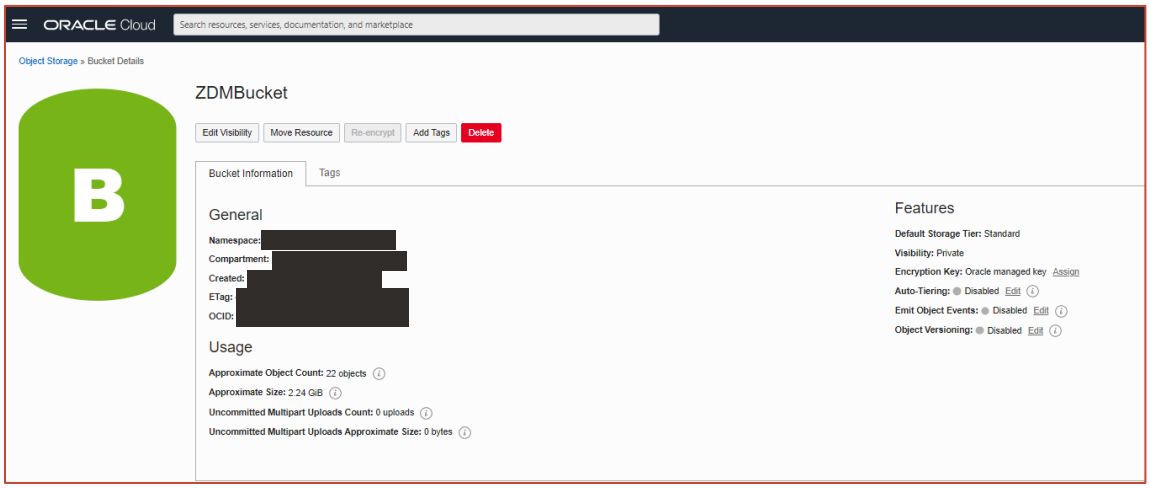

Figure 24 – Screenshot for Object Storage.

Preparing the Response File

Oracle Zero Downtime Migration leverages a response file that is fully customizable by the customer. A wide array of parameters for the logical migration methodology allows the customer to configure the migration according to the appropriate use case. For more information on the complete set of response file parameters for logical migration, refer to ZDM's Product Documentation section **Zero Downtime Migration Logical Migration Response File Parameters Reference**[5].

A response file template has been provided with each install. As a 'zdmuser', copy the template file to update parameters based on the environment:

```
[zdmuser@zdmhost ~]$ mkdir ~/template
[zdmuser@zdmhost ~]$ cp zdmhome/rhp/zdm/template/zdm_logical_template.rsp ~/template/
```

The template as is, contains parameters to handle all supported methodologies. For this step-by-step guide, **Offline Logical** migration methodology was selected, please proceed to update the response file based on this.

As discussed previously, for the purpose of this step-by-step guide, a Tablespace Map was generated to be used an example only, where a set of identified Tablespace needs to be migrated to ADB-S. This can be skipped or, for the purpose of this guide use as shown below:

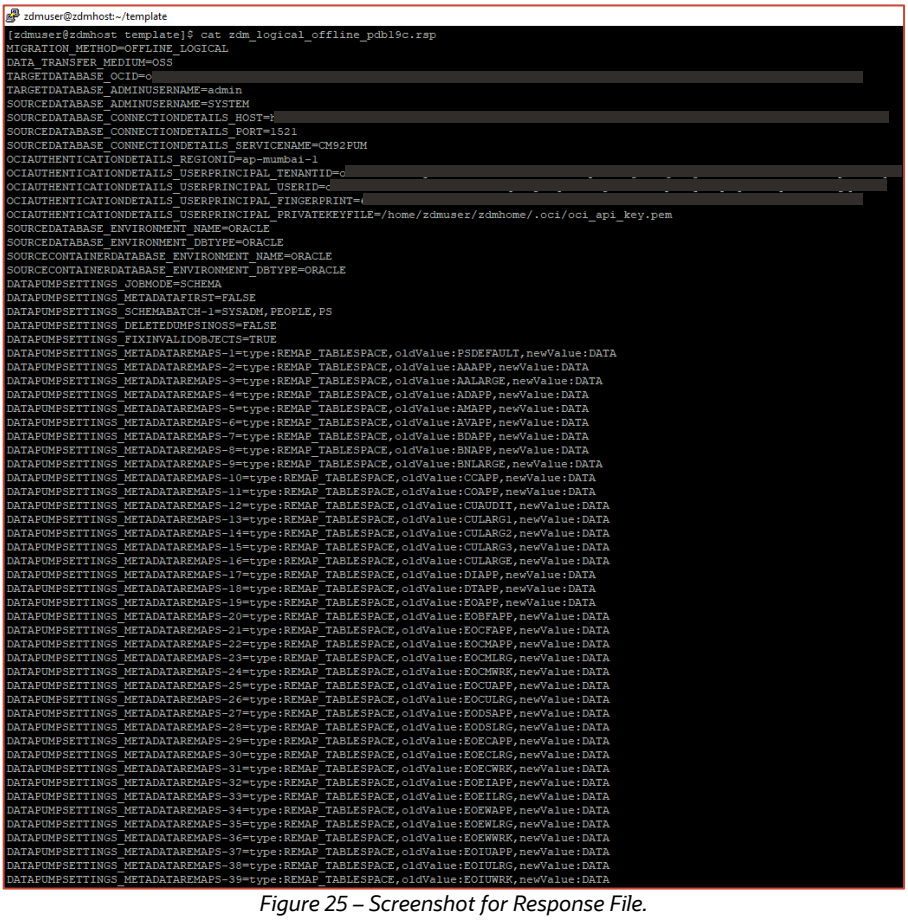

Figure 25 – Screenshot for Response File.

[5] https://docs.oracle.com/en/database/oracle/zero-downtime-migration/21.2/zdmug/zero-downtime-migration-logical-migration-response-file-parameters-reference.html#GUID-D580AD1C-C209-4F0F-A630-863D206FF0E5

```
DATAPUMPSETTINGS_METADATAREMAPS-40=type:REMAP_TABLESPACE,oldValue:EOLARGE,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-41=type:REMAP_TABLESPACE,oldValue:EOLTAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-42=type:REMAP_TABLESPACE,oldValue:EOPPAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-43=type:REMAP_TABLESPACE,oldValue:EOPPLRG,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-44=type:REMAP_TABLESPACE,oldValue:EOTPAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-45=type:REMAP_TABLESPACE,oldValue:EOTPLRG,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-46=type:REMAP_TABLESPACE,oldValue:EPAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-47=type:REMAP_TABLESPACE,oldValue:EPLARGE,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-48=type:REMAP_TABLESPACE,oldValue:ERAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-49=type:REMAP_TABLESPACE,oldValue:ERLARGE,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-50=type:REMAP_TABLESPACE,oldValue:ERWORK,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-51=type:REMAP_TABLESPACE,oldValue:FAAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-52=type:REMAP_TABLESPACE,oldValue:FALARGE,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-53=type:REMAP_TABLESPACE,oldValue:FGAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-54=type:REMAP_TABLESPACE,oldValue:FGLARGE,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-55=type:REMAP_TABLESPACE,oldValue:FSAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-56=type:REMAP_TABLESPACE,oldValue:GIAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-57=type:REMAP_TABLESPACE,oldValue:GPAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-58=type:REMAP_TABLESPACE,oldValue:GPDEAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-59=type:REMAP_TABLESPACE,oldValue:HPAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-60=type:REMAP_TABLESPACE,oldValue:HRAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-61=type:REMAP_TABLESPACE,oldValue:HRAPP1,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-62=type:REMAP_TABLESPACE,oldValue:HRAPP2,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-63=type:REMAP_TABLESPACE,oldValue:HRAPP3,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-64=type:REMAP_TABLESPACE,oldValue:HRAPP4,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-65=type:REMAP_TABLESPACE,oldValue:HRAPP5,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-66=type:REMAP_TABLESPACE,oldValue:HRAPP6,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-67=type:REMAP_TABLESPACE,oldValue:HRAPP7,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-68=type:REMAP_TABLESPACE,oldValue:HRIMAGE,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-69=type:REMAP_TABLESPACE,oldValue:HRLARG1,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-70=type:REMAP_TABLESPACE,oldValue:HRLARGE,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-71=type:REMAP_TABLESPACE,oldValue:HRSAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-72=type:REMAP_TABLESPACE,oldValue:HRSARCH,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-73=type:REMAP_TABLESPACE,oldValue:HRSLARGE,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-74=type:REMAP_TABLESPACE,oldValue:HRSWORK,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-75=type:REMAP_TABLESPACE,oldValue:HRWORK,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-76=type:REMAP_TABLESPACE,oldValue:HTAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-77=type:REMAP_TABLESPACE,oldValue:INAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-78=type:REMAP_TABLESPACE,oldValue:PAAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-79=type:REMAP_TABLESPACE,oldValue:PALARGE,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-80=type:REMAP_TABLESPACE,oldValue:PCAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-81=type:REMAP_TABLESPACE,oldValue:PCLARGE,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-82=type:REMAP_TABLESPACE,oldValue:PIAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-83=type:REMAP_TABLESPACE,oldValue:PILARGE,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-84=type:REMAP_TABLESPACE,oldValue:PIWORK,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-85=type:REMAP_TABLESPACE,oldValue:POAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-86=type:REMAP_TABLESPACE,oldValue:PSIMAGE,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-87=type:REMAP_TABLESPACE,oldValue:PSIMAGE2,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-88=type:REMAP_TABLESPACE,oldValue:PSIMGR,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-89=type:REMAP_TABLESPACE,oldValue:PSINDEX,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-90=type:REMAP_TABLESPACE,oldValue:PTAMSG,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-91=type:REMAP_TABLESPACE,oldValue:PTAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-92=type:REMAP_TABLESPACE,oldValue:PTAPPE,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-93=type:REMAP_TABLESPACE,oldValue:PTAUDIT,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-94=type:REMAP_TABLESPACE,oldValue:PTCMSTAR,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-95=type:REMAP_TABLESPACE,oldValue:PTLOCK,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-96=type:REMAP_TABLESPACE,oldValue:PTPRC,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-97=type:REMAP_TABLESPACE,oldValue:PTPRJWK,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-98=type:REMAP_TABLESPACE,oldValue:PTRPTS,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-99=type:REMAP_TABLESPACE,oldValue:PSMATVW,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-100=type:REMAP_TABLESPACE,oldValue:PTTBL,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-101=type:REMAP_TABLESPACE,oldValue:PTTLRG,newValue:DATA
```

Figure 26 – Screenshot for Response File.

```
DATAPUMPSETTINGS_METADATAREMAPS-102=type:REMAP_TABLESPACE,oldValue:PTTREE,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-103=type:REMAP_TABLESPACE,oldValue:PTWORK,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-104=type:REMAP_TABLESPACE,oldValue:PVAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-105=type:REMAP_TABLESPACE,oldValue:PYOLRG,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-106=type:REMAP_TABLESPACE,oldValue:PYAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-107=type:REMAP_TABLESPACE,oldValue:PYLARGE,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-108=type:REMAP_TABLESPACE,oldValue:PYWORK,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-109=type:REMAP_TABLESPACE,oldValue:SAAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-110=type:REMAP_TABLESPACE,oldValue:SACAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-111=type:REMAP_TABLESPACE,oldValue:SALARGE,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-112=type:REMAP_TABLESPACE,oldValue:SRAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-113=type:REMAP_TABLESPACE,oldValue:STAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-114=type:REMAP_TABLESPACE,oldValue:STLARGE,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-115=type:REMAP_TABLESPACE,oldValue:STWORK,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-116=type:REMAP_TABLESPACE,oldValue:TLAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-117=type:REMAP_TABLESPACE,oldValue:TLLARGE,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-118=type:REMAP_TABLESPACE,oldValue:TLWORK,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-119=type:REMAP_TABLESPACE,oldValue:WAAPP,newValue:DATA
DATAPUMPSETTINGS_METADATAREMAPS-120=type:REMAP_TABLESPACE,oldValue:TEMP,newValue:TEMP
DATAPUMPSETTINGS_METADATAREMAPS-121=type:REMAP_TABLESPACE,oldValue:PSTEMP,newValue:TEMP
DATAPUMPSETTINGS_METADATAREMAPS-122=type:REMAP_TABLESPACE,oldValue:PSGTT01,newValue:TEMP
DATAPUMPSETTINGS_CREATEAUTHTOKEN=TRUE
DATAPUMPSETTINGS_OMITENCRYPTIONCLAUSE=TRUE
DATAPUMPSETTINGS_SECUREFILELOB=TRUE
DATAPUMPSETTINGS_SKIPDEFAULTTRANSFORM=FALSE
DATAPUMPSETTINGS_DATAPUMPPARAMETERS_NOCLUSTER=FALSE
DATAPUMPSETTINGS_DATAPUMPPARAMETERS_ESTIMATEBYSTATISTICS=FALSE
DATAPUMPSETTINGS_DATAPUMPPARAMETERS_RETAININDEX=FALSE
DATAPUMPSETTINGS_DATABUCKET_NAMESPACENAME=apaccpt03
DATAPUMPSETTINGS_DATABUCKET_BUCKETNAME=ZDMBucket
DATAPUMPSETTINGS_EXPORTDIRECTORYOBJECT_NAME=DATA_PUMP_DIR
DATAPUMPSETTINGS_EXPORTDIRECTORYOBJECT_PATH=/u01/app/oracle/product/db/oracle-server/admin/CDBHCM/dpdump
GOLDENGATESETTINGS_ACCEPTABLELAG=30
GOLDENGATESETTINGS_EXTRACT_PERFORMANCEPROFILE=HIGH
GOLDENGATESETTINGS_REPLICAT_MAPPARALLELISM=4
GOLDENGATESETTINGS_REPLICAT_MINAPPLYPARALLELISM=4
GOLDENGATESETTINGS_REPLICAT_MAXAPPLYPARALLELISM=50
DUMPTRANSFERDETAILS_PARALLELCOUNT=3
DUMPTRANSFERDETAILS_RETRYCOUNT=3
DUMPTRANSFERDETAILS_RSYNCAVAILABLE=FALSE
DUMPTRANSFERDETAILS_SOURCE_USEOCICLI=FALSE
DUMPTRANSFERDETAILS_TARGET_USEOCICLI=FALSE
TABLESPACEDETAILS_AUTOCREATE=FALSE
TABLESPACEDETAILS_USEBIGFILE=FALSE
TABLESPACEDETAILS_EXTENDSIZEMB=512
TABLESPACEDETAILS_REMAPTARGET=DATA
```

Figure 27 – Screenshot for Response File.

SHUTDOWN PEOPLESOFT DOMAIN GRACEFULLY

Before executing any database migration activity, as a best practice, shutdown PeopleSoft Application domain gracefully.

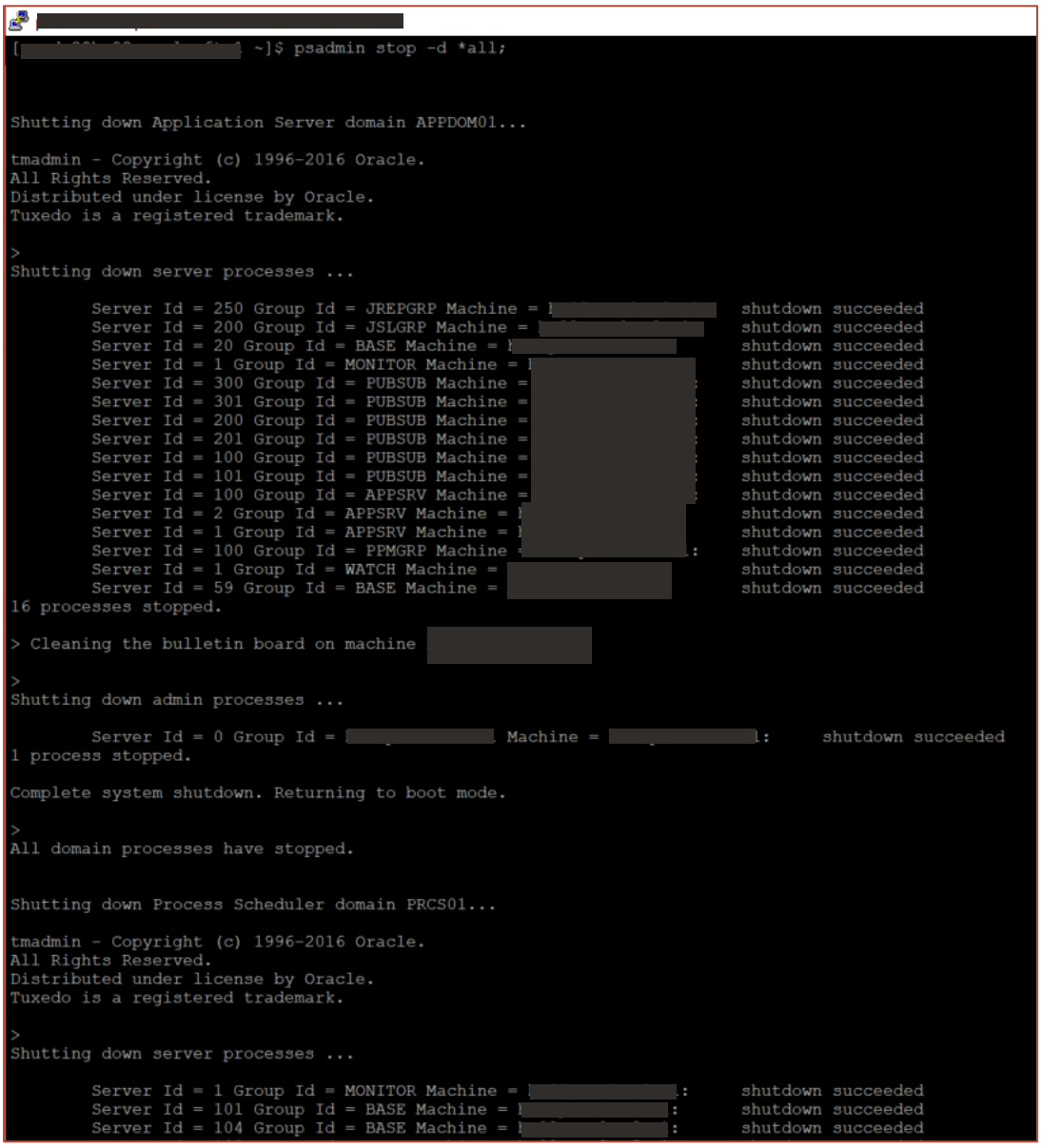

Figure 28 – Screenshot for Shutting Down PeopleSoft Application.

```
[psadm2@xxxxxx ~]$ psadmin stop -d *all;
```

Performing a Test Database Migration on Evaluation Mode

Oracle Zero Downtime Migration includes an evaluation mode that performs a dry run of the migration process; this is an optional step. It allows customers to ensure that the migration will run swiftly and will encounter no issues. When migrating with the evaluation flag on, ZDM evaluates all the different stages and will alert the user if there are any inconsistencies or potential issues; this way, customers can fix any problems beforehand. As a best practice, run a Test Database Migration before executing the migration.

ZDM also provides a tool (Cloud Premigration Advisor Tool, CPAT) that performs analysis of the source database, looking for uses of database features and constructs that are problematic when migrating to one of Oracle's Autonomous Cloud offerings before you run it against the production database.

In order to start the evaluation of the source database, do as follows:

Run the EVAL Job

Run the job as 'zdmuser' which needs the credentials for the Source and Target database. ZDM will then request the different required passwords and will generate a job id. The generated job id can be queried for progress using the `zdmcli query job -jobid job_id` command.

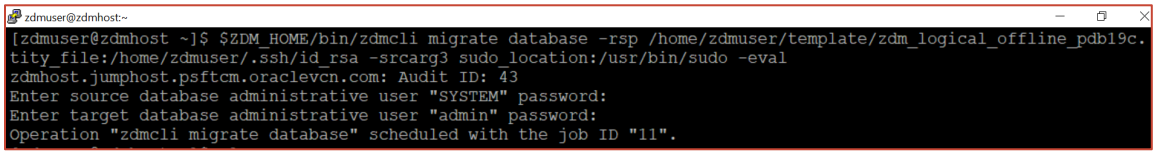

Figure 29 – Screenshot of a ZDM Migration Job with evaluation mode

```
[zdmuser@zdmhost ~]$ $ZDM_HOME/bin/zdmcli migrate database -rsp
/home/zdmuser/template/zdm_logical_offline_pdb19c.rsp -sourcenode hostname-lnfxt-database.test -
sourcesid CM92PUM -srcauth zdmauth -srcarg1 user:opc -srcarg2
identity_file:/home/zdmuser/.ssh/id_rsa -srcarg3 sudo_location:/usr/bin/sudo -eval
```

Monitor the Job

Use the provided Job ID to find the run status of the job. You can do this by querying the ZDM server with the `zdmcli query job -jobid job_id` command.

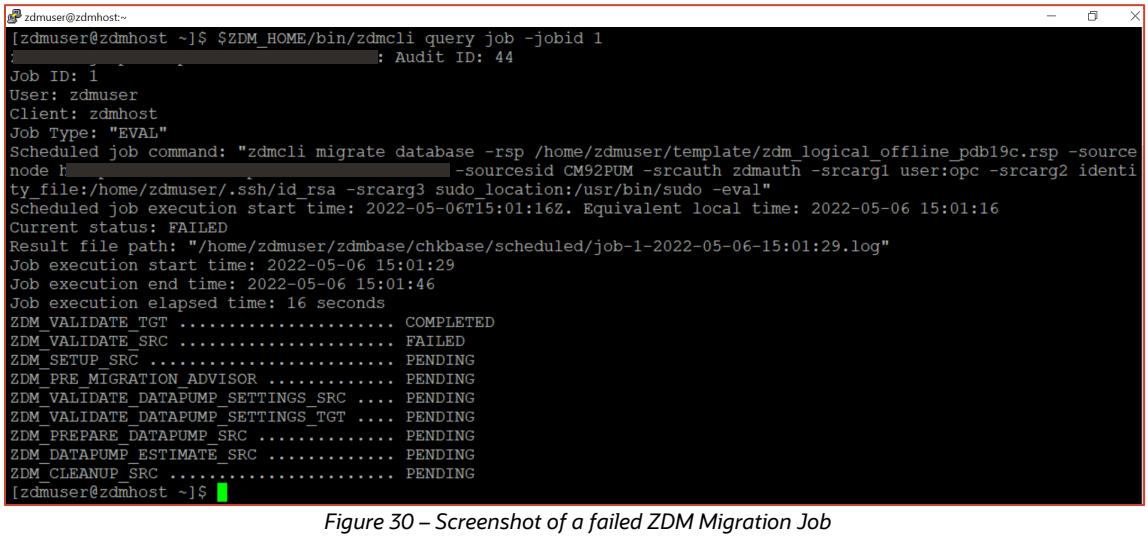

Figure 30 – Screenshot of a failed ZDM Migration Job

[zdmuser@zdmhost ~]$ $ZDM_HOME/bin/zdmcli query job -jobid 1

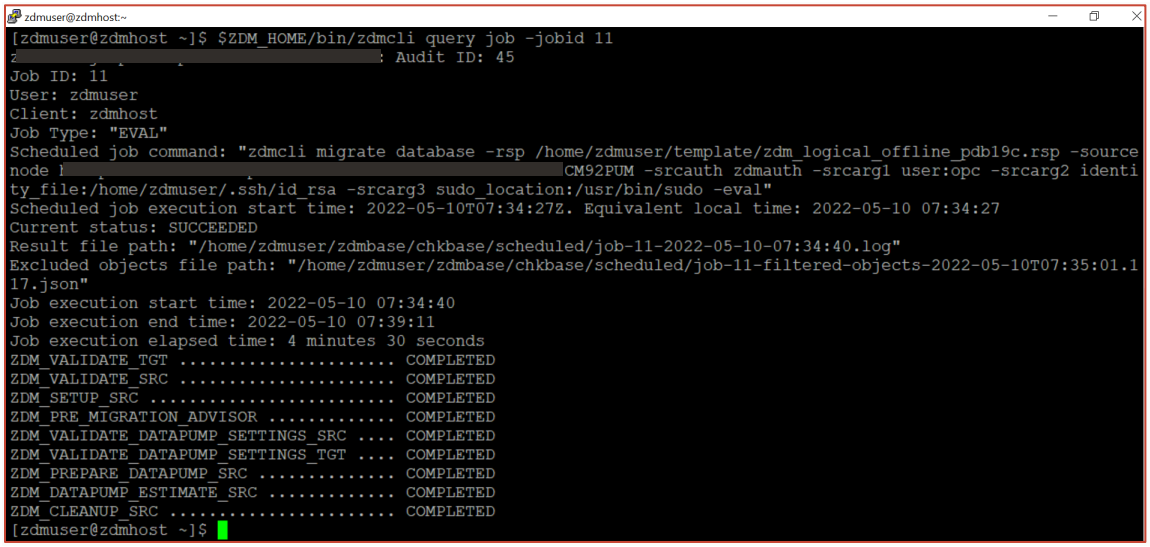

Figure 31 – Screenshot of a successful ZDM Migration Job

Log File Review

Proceed to review the log file mentioned under "Result file path". This log file contains any warnings or showstoppers for the migration. Each check successfully executed by the migration advisor tool (CPAT) will have a result of **PASS**, **INFORMATIONAL**, **WARNING**, or **BLOCKER**.

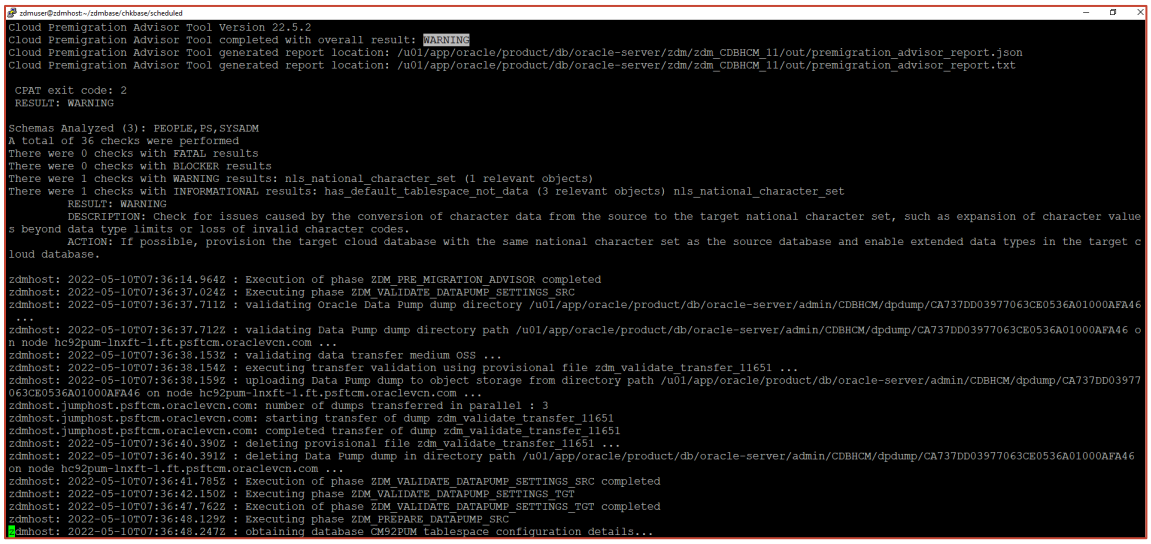

Figure 32 – Screenshot of a CPAT report

Sample report outcome:

```
Schemas Analyzed (3): PEOPLE,PS,SYSADM

A total of 36 checks were performed

There were 0 checks with FATAL results

There were 1 checks with BLOCKER results: has_role_privileges (1 relevant objects)

There were 1 checks with WARNING results: nls_national_character_set (1 relevant objects)

There were 1 checks with INFORMATIONAL results: has_default_tablespace_not_data (3 relevant objects)
has_role_privileges
```

Some of the issues encountered and their resolution:

- PRGZ-1190 : OCI user "ocid1.user.oc1..xxxxxxxxxxxx" already has two OCI Auth Tokens.
    - Process creates an Auth Token at OCI console for the User. Need to keep one placeholder available before initiating the process.
- PRGZ-1141 : failed to verify configuration and status of Oracle database "hostname-lnfxt-database.test:1521/CM92PUM"
    - Connectivity issue because of Port for TNS Listener was not open.
- PRGZ-3593 : Cloud Premigration Advisor Tool (CPAT) execution found blockers.
  <EXCEPTION>Cloud Premigration Advisor Tool Version 22.5.2Cloud Premigration Advisor Tool completed with overall result: BLOCKER
  There were 1 checks with BLOCKER results: has_role_privileges (1 relevant objects)
    - PSADMIN role at Target Database was missing.

For more information on the Cloud Pre-migration Advisor Tool please visit My Oracle Support and review Doc ID 2758371.1
https://support.oracle.com/rs?type=doc&id=2758371.1

Performing a Database Migration

Run the Migration Job

As the 'zdmuser', submit the migration job as described below:

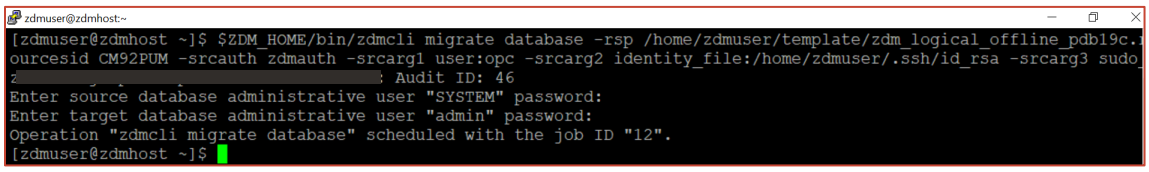

Figure 33 – Screenshot of a ZDM Migration job

```
[zdmuser@zdmhost ~]$ $ZDM_HOME/bin/zdmcli migrate database -rsp
/home/zdmuser/template/zdm_logical_offline_pdb19c.rsp -sourcenode hostname-lnfxt-database.test -
sourcesid CM92PUM -srcauth zdmauth -srcarg1 user:opc -srcarg2
identity_file:/home/zdmuser/.ssh/id_rsa -srcarg3 sudo_location:/usr/bin/sudo
```

Check the Migration Job Status

After submitting the migration job, ZDM will return a JOB ID which helps to track the job status with the zmdcli query job command.

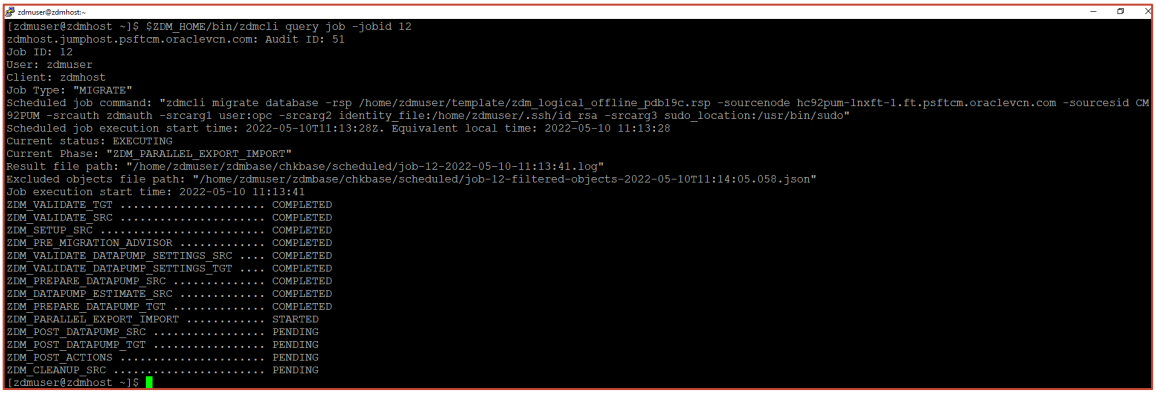

Figure 34 – Screenshot of a ZDM Migration job

```
[zdmuser@zdmhost ~]$ $ZDM_HOME/bin/zdmcli query job -jobid 12
```

POST MIGRATION DATABASE ACTIVITIES

After successful completion of the ZDM Migration Job, please follow these steps as part of the required post-migration activities. These steps are unique for the migration described in this step-by-step guide where there is a PeopleSoft environment present.

Execute required Grant Script

A grant statement part of 'psroles.sql' is required to be executed, bear in mind this statement could not be run before since before the migration the required user and objects were not present.

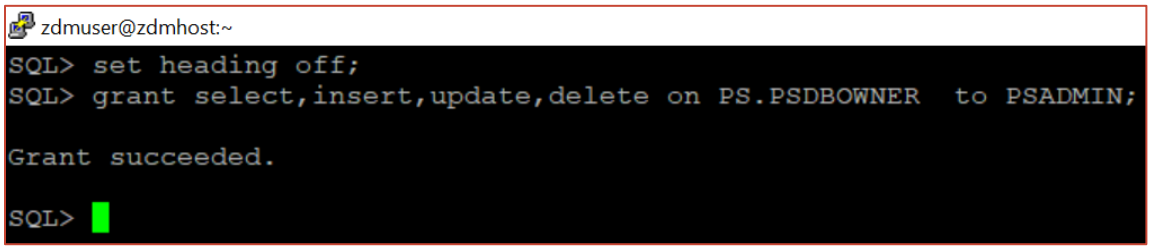

Figure 35 – Screenshot of a Grant Statement

```
set heading off;
grant select,insert,update,delete on PS.PSDBOWNER  to PSADMIN;
```

Validate PSDBOWNER Table

Validate the PSDBOWNER Table for DB Name: If there is a change in DB Name from source to target, it is required to update the PSDBOWNER table.

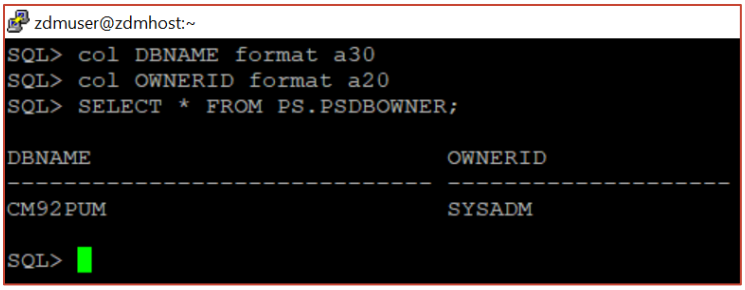

Figure 36 – Screenshot of PSDBOWNER Validation

```
col DBNAME format a30
col OWNERID format a20
SELECT * FROM PS.PSDBOWNER;
```

Validation of PeopleSoft Schema Objects

Validate the object count of PeopleSoft Schemas by running the object count at Source and Target.

Source Database - Objects Count

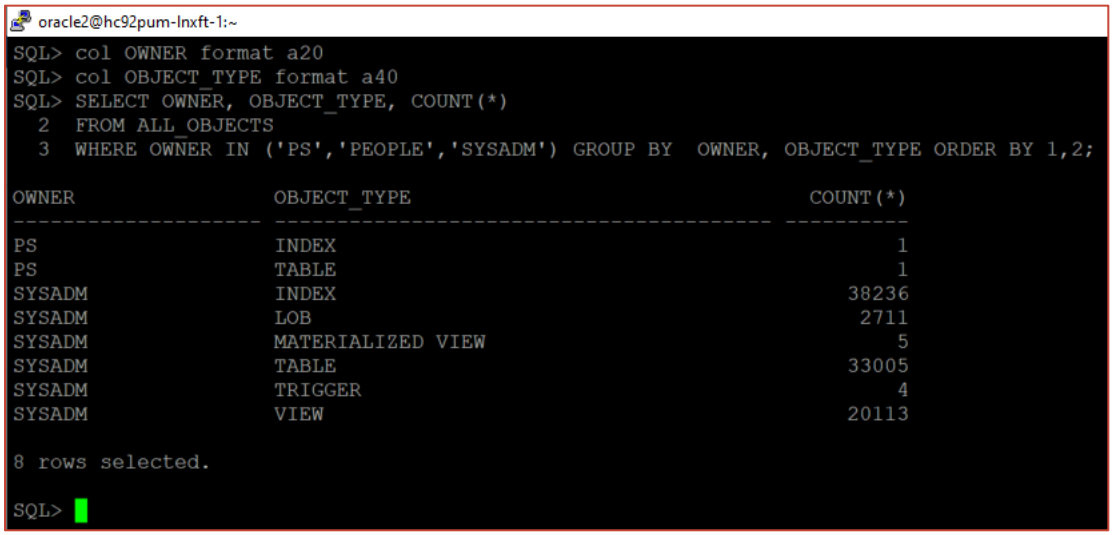

Figure 37 – Screenshot of Source Database – Object Count

```
col OWNER format a20
col OBJECT_TYPE format a40
SELECT OWNER, OBJECT_TYPE, COUNT(*)
FROM ALL_OBJECTS
WHERE OWNER IN ('PS','PEOPLE','SYSADM') GROUP BY  OWNER, OBJECT_TYPE ORDER BY 1,2;
```

Target Database - Object Count

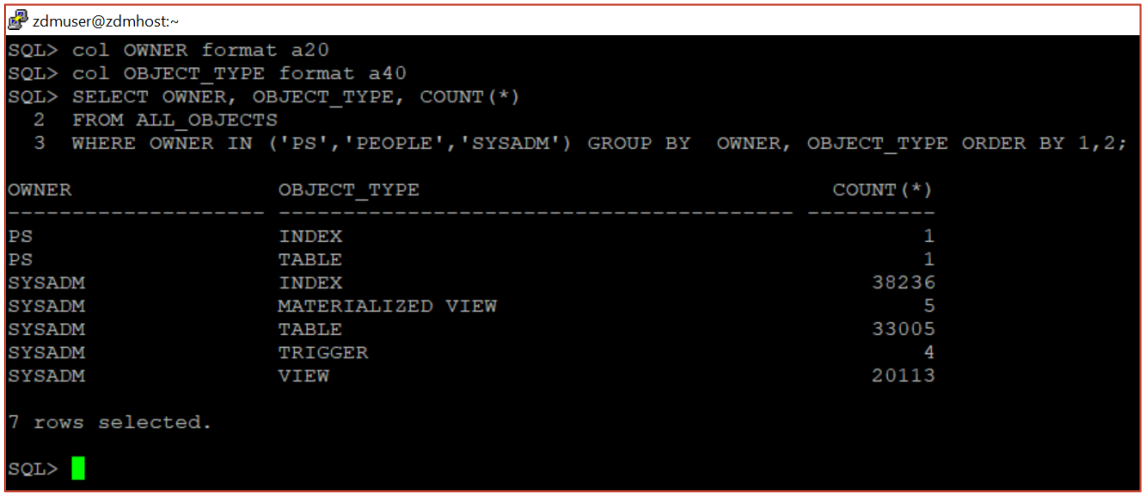

Figure 38 – Screenshot of Target Database – Object Count

```
col OWNER format a20
col OBJECT_TYPE format a40
SELECT OWNER, OBJECT_TYPE, COUNT(*)
FROM ALL_OBJECTS
WHERE OWNER IN ('PS','PEOPLE','SYSADM') GROUP BY  OWNER, OBJECT_TYPE ORDER BY 1,2;
```

MID-TIER CONFIGURATION AT OCI

Mid-Tier Instance at Oracle Cloud Infrastructure

There are multiple ways to migrate the mid-tier to OCI:

- Using a tar ball backup
- Provisioning a new mid-tier using PUM Images or PeopleSoft Cloud Manager

For this example, the existing Mid-Tier is being re-wired with ADB-S DataBase on OCI:

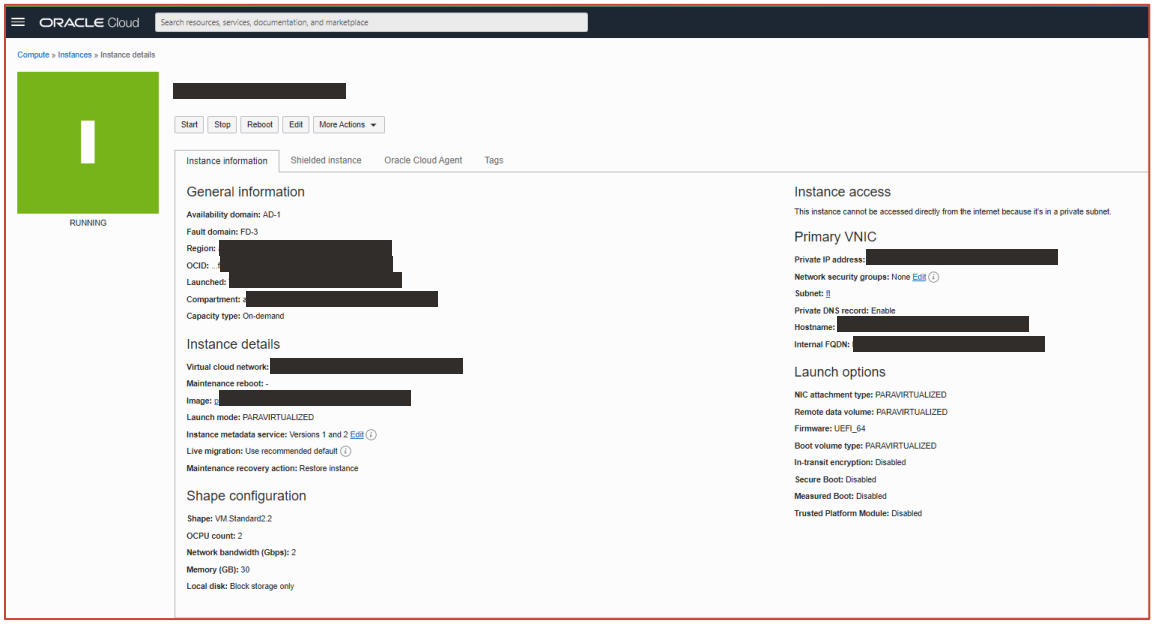

Figure 39 – Screenshot of OCI Instance

Install Oracle Client

To support Oracle Client version with TLS authentication without a wallet, install the latest available version of Oracle Client, in this guide, the version used was 19.15. Execture the following as 'root' user in the provided order:

```
[root@zdmhost oracle]# yum install oracle-instantclient19.15-basic-19.15.0.0.0-1.x86_64.rpm -y
[root@zdmhost oracle]# yum install oracle-instantclient19.15-sqlplus-19.15.0.0.0-1.x86_64.rpm -y
[root@zdmhost oracle]# yum install oracle-instantclient19.15-tools-19.15.0.0.0-1.x86_64.rpm -y
```

Update Environment Variables

Several environment variables for PeopleSoft and Oracle Database users such as oracle2, psadm1, psadm2 and psadm3 need to be updated.

```
echo "PATH=/usr/lib/oracle/19.15/client64/bin:$PATH; export PATH" >> ~/.bashrc
echo "LD_LIBRARY_PATH=/usr/lib/oracle/19.15/client64/lib:$LD_LIBRARY_PATH; export
LD_LIBRARY_PATH" >> ~/.bashrc
```

Update TNS Entry and Test Database Connectivity

The tnsnames.ora file needs to be updated as the root user. Proceed to copy the connect string of service names <db_name>_low or <db_name>_tp and make another service name with 8 characters or shorter service name as per PeopleSoft App Server requirements. For instance, the service name 'CM92PUM' is the service that will be utilized for re-wiring the Mid-Tier with the Database.

Configure PeopleSoft Server

Configure App Server

Configure and start the Application Server Domain:

```
psadm2@hc92pum-lnxft-1:~
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> Prog Name      Queue Name  2ndQueue Name  Grp Name      ID RqDone Load Done Current Service
---------      ----------  ----------     --------      -- ------ --------- ---------------
BBL            201292                     hc92pum+       0    155      7750 (  IDLE )
PSAPPSRV       APPQ                       APPSRV         1      0         0 (  IDLE )
PSMONITORSRV   MONITOR                    MONITOR        1      0         0 (  IDLE )
PSWATCHSRV     WATCH                      WATCH          1      0         0 (  IDLE )
PSAPPSRV       APPQ                       APPSRV         2      0         0 (  IDLE )
WSL            00001.00020                BASE          20      0         0 (  IDLE )
TMMETADATA     00094.00250                JREPGRP      250      0         0 (  IDLE )
PSBRKDSP       BRKDQ_dflt                 PUBSUB       100      0         0 (  IDLE )
PSSAMSRV       SAMQ                       APPSRV       100      0         0 (  IDLE )
PSPPMSRV       PPMQ2                      PPMGRP       100     12       600 (  IDLE )
PSBRKHND       BRKHQ_dflt                 PUBSUB       101      0         0 (  IDLE )
JSL            00095.00200                JSLGRP       200      0         0 (  IDLE )
PSPUBDSP       PUBDQ_dflt                 PUBSUB       200      0         0 (  IDLE )
PSPUBHND       PUBHQ_dflt                 PUBSUB       201      0         0 (  IDLE )
TMUSREVT       00001.00059                BASE          59      0         0 (  IDLE )
PSSUBDSP       SUBDQ_dflt                 PUBSUB       300      0         0 (  IDLE )
PSSUBHND       SUBHQ_dflt                 PUBSUB       301      0         0 (  IDLE )

>

----------------------------
PeopleSoft Domain Status Menu
----------------------------
     Domain Name: APPDOM01

  1) Server status
  2) Client status
  3) Queue status
  q) Quit
```

Figure 40 – Screenshot of Application Server Domain Config and Start

Configure Process Scheduler

Configure Process Scheduler:

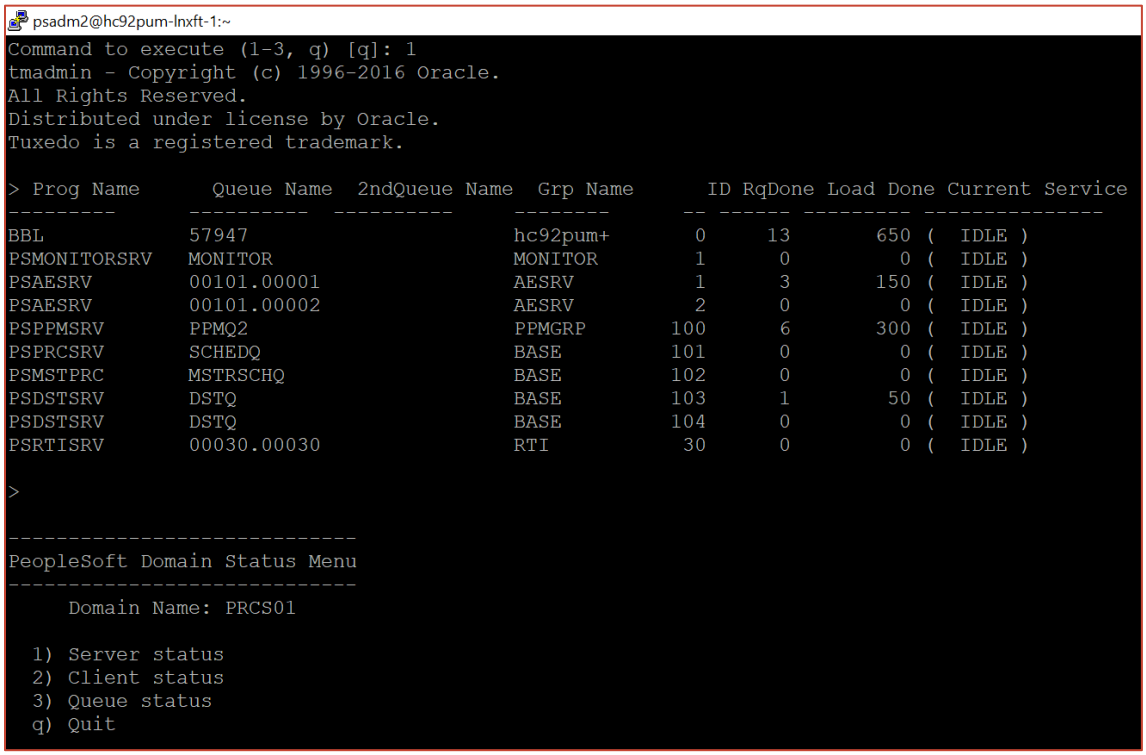

Figure 41 – Screenshot of Process Scheduler Config

Configure Web Server

Configure and start a new Web Server Domain:

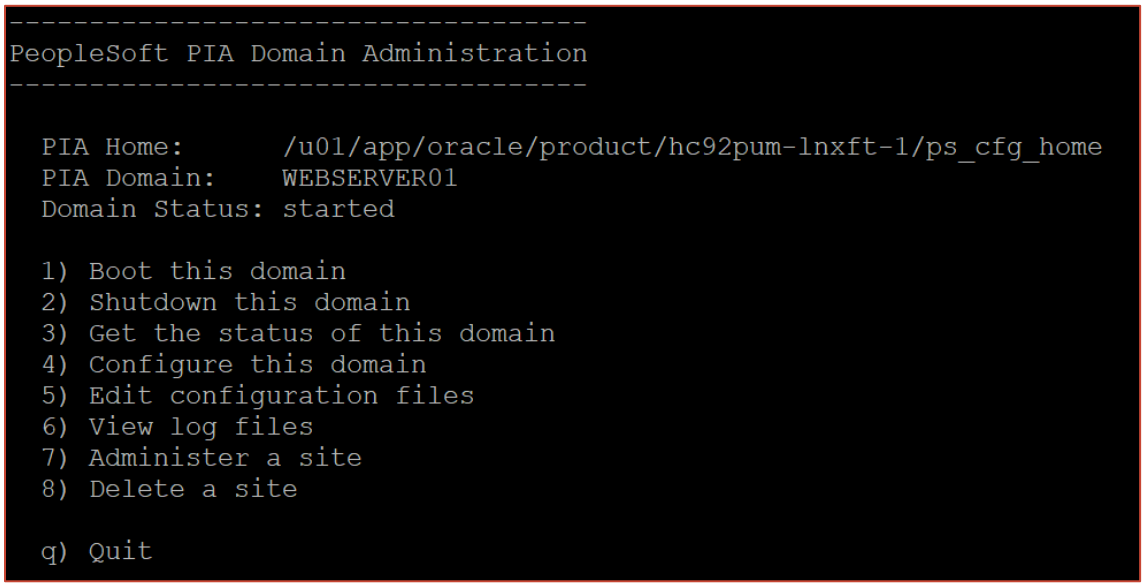

Figure 42 – Screenshot of Web Server config

Configure PeopleSoft Components

Configure IB, Nodes, Report Repository, Printers, etc. as part of the post configuration of PeopleSoft Application.

VALIDATE PEOPLESOFT APPLICATION WITH ADB-S

Login via PIA of OCI Target Application and validate system health and performance.

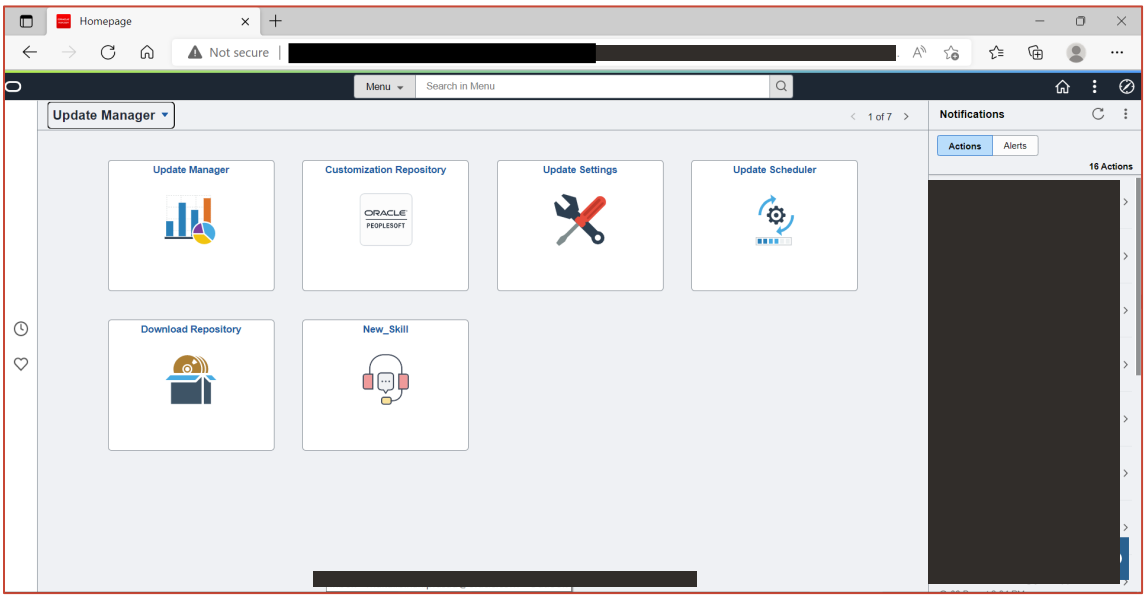

Figure 43 – Screenshot of OCI Target Application

Run the reports and validate the System Health:

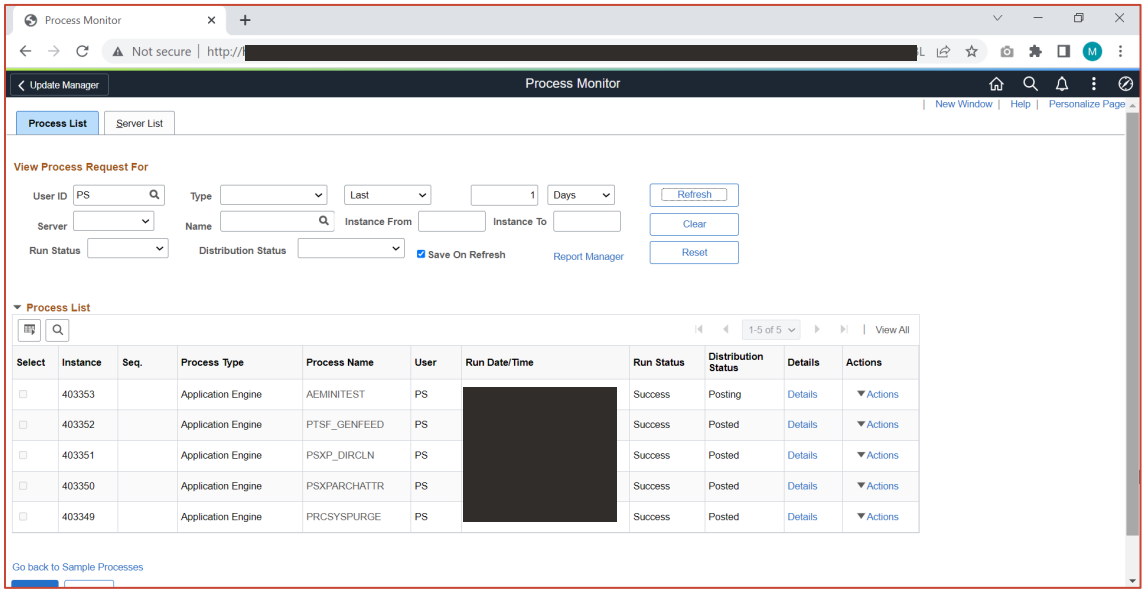

Figure 44 – Screenshot of Reports and System Health Validation

REFERENCES

My Oracle Support Articles

- DB RU: Oracle Database 19c Release Update & Release Update Revision October 2021 Known Issues (Doc ID 19202110.9)
- ZDM: MAA Practices for Cloud Migration Using ZDM (Doc ID 2562063.1)
- CPAT: Cloud Premigration Advisor Tool (CPAT) Analyzes Databases for Suitability of Cloud Migration (Doc ID 2758371.1)
- NLS_LENGTH_SEMANTICS: E-INST PPLTLS84CURML Project Copy Is Failing with ORA-12899: value too large for column on Unicode database (Doc ID 1986664.1)
- NLS_LENGTH_SEMANTICS: E-INST: Get the Following Failure When Running DataMover to Create a Unicode PeopleSoft Database: character length semantics (CLS) feature is not enabled (Doc ID 2626966.1)

OCI Documentation

- OCI Documentation: https://docs.cloud.oracle.com/en-us/iaas/Content/services.htm
- OCI CLI: https://docs.cloud.oracle.com/en-us/iaas/Content/API/SDKDocs/cliinstall.htm
- Compute: https://docs.cloud.oracle.com/en-us/iaas/Content/Compute/Concepts/computeoverview.htm
- Block Volume: https://docs.cloud.oracle.com/en-us/iaas/Content/Block/Concepts/overview.htm
- OCI Network: https://docs.cloud.oracle.com/en-us/iaas/Content/Network/Concepts/overview.htm
- ADB: https://docs.cloud.oracle.com/en-us/iaas/Content/Database/Concepts/adboverview.htm
- ADB-S: https://docs.oracle.com/en/cloud/paas/autonomous-database/adbsa/getting-started.html#GUID-00645C09-4E76-44C6-8BBE-B433D501AADB
- TLS vs mTLS: https://docs.oracle.com/en/cloud/paas/autonomous-database/adbsa/support-tls-mtls-authentication.html

ZDM Documentation

- ZDM for migration to ADB-S: https://www.oracle.com/a/tech/docs/oracle-zdm-logical-migration-to-autonomous-guide.pdf
- ZDM Response File: https://docs.oracle.com/en/database/oracle/zero-downtime-migration/21.3/zdmug/preparing-logical-database-migration1.html#GUID-FCA7FEC2-D064-432F-A793-EF63419A924C
- Oracle Data Pump Settings for ZDM: https://docs.oracle.com/en/database/oracle/zero-downtime-migration/21.3/zdmug/preparing-logical-database-migration1.html#GUID-B723C1D5-DE14-4A2E-B5EB-61AF8AE9273C

BLOG

- Connecting ADB-S using client authenticates server (one-way TLS or simply TLS): https://blogs.oracle.com/datawarehousing/post/connecting-your-autonomous-database-has-never-been-easier

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July, 2022
Author: Mukul Prasad