

Exadata: adding a new Oracle Home with OEDACLI

A step-by-step guide on Exadata X9M2 / KVM

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The environment and the goal

Environment

- Exadata X9M2, virtualised with KVM
- **VM name:** ex2-itouglab01
- **OS:** Oracle Linux 7.9
- **Grid Home:** 19.22.0.0.240116
- **Cluster:** ex2-itouglab

The goal

- **Oracle Home in use:** 19.18.0.0
- **Oracle Home to install:** 19.22.0.0.240116
- New home added with OEDACLI, not runInstaller
- Each home lives on its own LVM volume (50 GB)

Talking about OEDA and OEDACLI

- OEDA (***Oracle Exadata Deployment Assistant***) is an Oracle-provided tool used to plan, configure, and deploy Exadata Database Machine environments.
- It generates the configuration required for the Exadata infrastructure, including compute nodes, storage cells, networking, and Oracle software.
- OEDACLI is the command-line interface used to manage and maintain an existing OEDA configuration. It allows administrators to modify the configuration and generate the corresponding deployment or configuration actions.
- OEDACLI can be used during initial deployment as well as for subsequent changes to the Exadata environment.
- Both tools are specifically designed by Oracle for Exadata and help standardize and automate configuration tasks.

Start with the right OEDA version

- An older OEDACLI cannot recognise an Oracle version newer than itself
- Always install the latest OEDA release before adding a home
- **Download:** both the Linux build for Exadata and the Windows build for your workstation, from <https://www.oracle.com/database/technologies/oeda-downloads.html>
- The Linux build goes to Dom0 node 1
- The desktop build runs the local OEDA web interface
- **Versions in this walkthrough:** OEDACLI 230721 upgraded to 240212

Protect Configuration directories

- OEDACLI lives on database node 1 under **/EXAVMIMAGES/onecommand/linux-x64**
- Subdir **WorkDir** holds the patch images and everything OEDA needs, including previous activities;
- Subdir **ExadataConfigurations** contains the OEDA configuration files and metadata used to manage and maintain the Exadata environment.
- A fresh install would leave you with an empty WorkDir
- To prevent a similar issue execute the following steps:

```
# mkdir /EXAVMIMAGES/onecommand/linux-x64.Conf
# cd /EXAVMIMAGES/onecommand/linux-x64
# mv WorkDir ExadataConfigurations /EXAVMIMAGES/onecommand/linux-x64.Conf
# ln -s /EXAVMIMAGES/onecommand/linux-x64.Conf/WorkDir
# ln -s /EXAVMIMAGES/onecommand/linux-x64.Conf/ExadataConfigurations
```

- With the symbolic links in place, any future OEDACLI installation reuses the same safe WorkDir

Install the new OEDACLI on Exadata

1. Check the remote server version of OEDACLI:

```
# cd /EXAVMIMAGES/onecommand/linux-x64
# ./oedaccli --version
230721
```

2. Rename the previous version

```
# cd /EXAVMIMAGES/onecommand
# mv linux-x64 linux-x64.230721
```

3. Copy the downloaded OEDA Linux version zip file in a temporary directory:

```
# scp V1041016-01-linux-x64.zip
# ex2dbadm01:/root/tmp
```

4. Unzip the downloaded file:

```
# cd /root/tmp
# unzip V1041016-01-linux-x64.zip
```

5. Move the new version to the correct path:

```
# cd /root/tmp
# mv linux-x64 /EXAVMIMAGES/onecommand
```

6. Remove the empty Workdir

```
# cd /EXAVMIMAGES/onecommand/linux-x64

# ls -l WorkDir
total 0

# rm -fR WorkDir
```

Install the new OEDACLI on Exadata

7. Create symbolic links from Linux-x64 to new locations:

```
# cd /EXAVMIMAGES/onecommand/linux-x64  
  
# ln -s /EXAVMIMAGES/onecommand/linux-x64.Conf/WorkDir  
# ln -s /EXAVMIMAGES/onecommand/linux-x64.Conf/ExadataConfigurations
```

8. Check the version:

```
# cd /EXAVMIMAGES/onecommand/linux-x64  
  
# ./oedacli --version  
240212
```

Using this strategy you set the WorkDir directory in a safe place and new OEDACLI installation wouldn't overwrite the old Workdir that is usually empty in a new OEDACLI installation.

Enable OEDACLI to use SSH

It is necessary to **copy in the Workdir** all the **private keys** of involved VMs and physical hosts too so that OEDACLI will be able to connect on each of them.

The **SYNTAX** for rsa files is the following:

```
id_rsa.<hostname>.root
```

Example:

```
id_rsa.ex2-itouglab01-dbadm.root  
id_rsa.ex2dbadm01.root
```

Note:

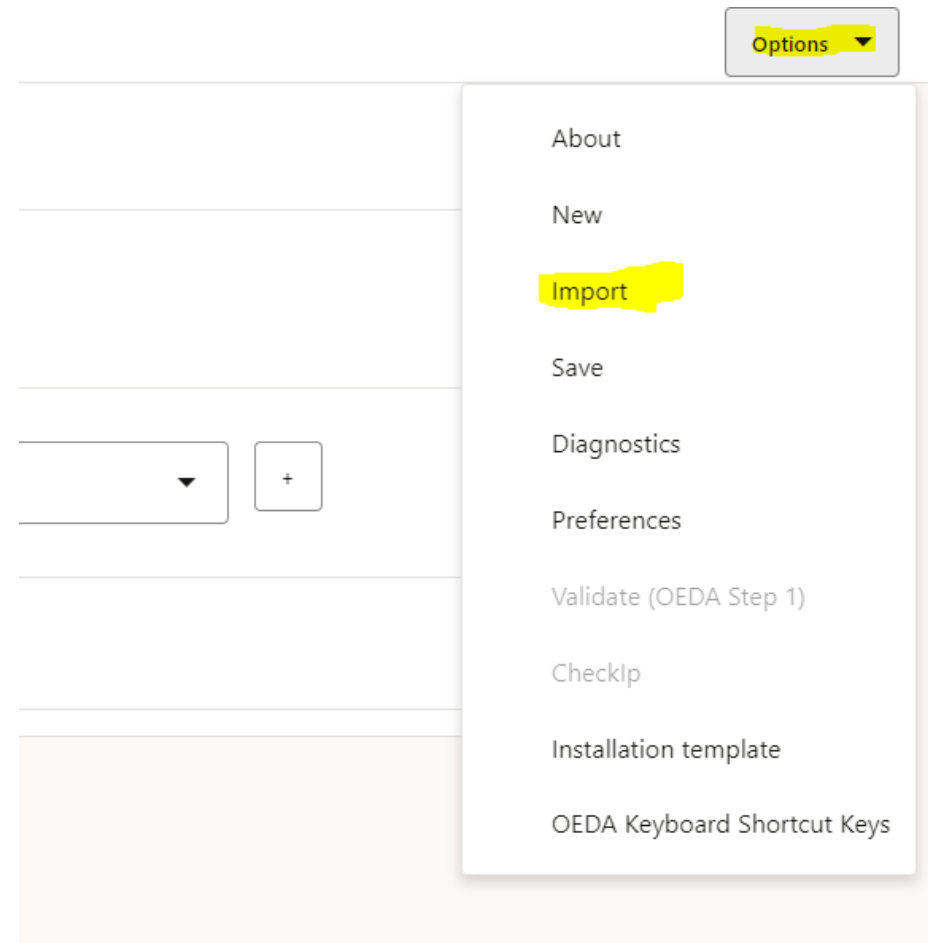
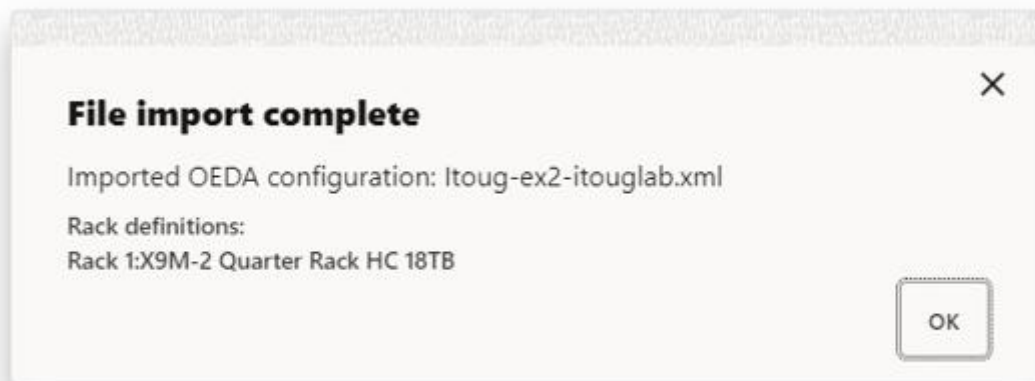
Missing keys are the most common cause of a failed deploy!

Identify the Oracle Home image to download

- Download from Exadata latest saved VM, for example:

```
/EXAVMIMAGES/onecommand/Itoug-ex2-itouglab.xml
```

- Unzip the desktop OEDA build for windows and then:
 - run `installOedaServer.cmd`
 - open <http://localhost:7072/oeda/>
- Import the latest saved configuration for your VM



Identify the Oracle Home image to download

- OEDA generates an HTML configuration file: **Appendix B** lists the exact patch image name to fetch from My Oracle Support

Appendix B: Required Files and Patches

Download the following files from MOS into the Oracle Exadata Deployment Assistant's WorkDir directory

```
p34378299_12102220719ProactiveBP_Linux-x86-64.zip  
p34979367_1918000DBRU_Linux-x86-64.zip  
p36197122_1922000DBRU_Linux-x86-64.zip  
ahf_setup (Autonomous Health Framework setup file)
```

- Unzip the patch and confirm the full version in README.txt – here, database software version 19.22.0.0.240116
- Download the exact patch number from oracle support (*in the example 36197122*)
- copy the image into OEDA's WorkDir before running OEDA, that is:

```
/EXAVMIMAGES/onecommand/linux-x64/WorkDir
```

Align the cluster version

- The cluster version recorded in the VM xml configuration file must be greater than or equal to the new home version, otherwise DEPLOY ACTIONS fails.
- Execute OEDACLI to complete some steps in the environment:

STEP 1: Load XML file

```
LOAD FILE NAME=/EXAVMIMAGES/onecommand/Itoug-ex2-itouglab.xml
```

STEP 2: Check cluster details

```
list clusters
```

```
...
```

```
clusterVersion : "19.18.0.0.230117"
```

STEP 3: Alter the cluster version

Cluster version has to be greater or equal to the database home that you are installing, otherwise procedure will fail:

```
oedaccli> ALTER CLUSTER GIVERSION='19.22.0.0.240116' where CLUSTERNAME='ex2-itouglab'
```

Align the cluster version

STEP 4: Save and Merge the command

```
oedaccli> SAVE ACTION  
oedaccli> MERGE ACTIONS
```

STEP 5: Show XML actions that will be executed

```
oedaccli> LIST XMLACTIONS  
Action ID=1 merged=true deployed=false
```

STEP 6: Deploy the change

```
oedaccli> DEPLOY ACTIONS  
Deploying Action ID : 1 ALTER CLUSTER GIVERSION='19.22.0.0.240116' where  
...
```

STEP 7: Check new cluster version

```
oedaccli> LIST CLUSTERS  
clusterVersion : "19.22.0.0.240116"
```

Clean diag directories

- OEDACLI runs a recursive chmod across the diag trees; with hundreds of thousands of trace files its 512 MB Java heap runs out and the deploy fails:

```
OEDA-1002 KommandException on /bin/chmod -v -R 775 /u01/app/grid/diag/ with  
java.lang.OutOfMemoryError: Java heap space
```

- Count the files first, as both the grid and the oracle user, *for example*:

```
# find /u01/app/grid/diag -type f -printf '%h\n' 2>/dev/null|sort|uniq -c|sort -nr  
171286 /u01/app/grid/diag/kfod/ex2itouglab/kfod/trace  
17685 /u01/app/grid/diag/apx/+apx/+APX1/trace  
...
```

- In this environment one kfod trace directory alone held over 171,000 files
- Purge with adrci as each owner

Add the database home – what we need

Before to add the new home you need to know:

1. Database owner = **oracle**
2. Exact new home database version = **19.22.0.0.240116** (you can find it in the readme of image files)
3. Oracle base dir = **/u01/app/oracle**
4. Volume size = **50g**
5. Database Home Location = **/u01/app/oracle/product/19.22.0.0/dbhome_1**
6. Database Home Name = e.g. **itouglab_home_1922**
7. Cluster Name = e.g. **ex2itouglab** (to extract on RAC execute # olsnodes -c)

Add the database home – cmd file

It always advisable to execute the oracle home add in a batch way using command file like **AddDBHome.cmd**:

```
LOAD FILE NAME=/EXAVMIMAGES/onecommand/Itoug-ex2-ex2itouglab.xml

RESET ACTIONS

ADD DATABASEHOME OWNER=oracle DBVERSION='19.22.0.0.240116' BASEDIR='/u01/app/oracle'
VOLUME SIZE=50G DBHOMELOC='/u01/app/oracle/product/19.22.0.0/dbhome_1'
DBHOMENAME='itouglab_home_1922' where CLUSTERNAME='ex2itouglab'

SAVE ACTION

MERGE ACTIONS

LIST XMLACTIONS

DEPLOY ACTIONS
```

Add the database home – deploy in batch mode

Now execute in **nohup mode** the oedacli using input parameters to use the ssh connection and the command file previously defined:

```
# nohup ./oedacli -f /EXAVMIMAGES/onecommand/linux-x64.Conf/AddDBHome.ex2itouglab.cmd  
--exitonerror --sshkeys --enablersa > /EXAVMIMAGES/onecommand/linux-x64.Conf/AddDBHome.ex2itouglab.log &
```

- *-f: A file containing commands to be executed.*
- *--sshkeys: Enable SSH Key login to remote nodes*
- *--enablersa: Use RSA keys for SSH. If not specified, ECDSA keys are used by default.*
- *--exitonerror: Exit OEDACLI session on error*

- **OEDACLI creates the volume, clones the home, relinks and configures it on every node**
- **First time execution could require about 1 hour to be completed**

OEDACLI log files

- Once the deploy reports success, check log files to confirm.
- nohup execution log file:

```
# cat /EXAVMIMAGES/onecommand/linux-x64.Conf/AddDBHome.ex2itouglab.log

SUCCESS - file loaded OK
...
Creating new disk image file on KVM Hosts [ex2dbadm01.farm.Itoug-italia.local,
ex2dbadm02.farm.Itoug-italia.local]
Required Base Image File /EXAVMIMAGES/db-klone-Linux-x86-64-19000240116.50.img already exists
on all KVM hosts..
Attaching disk image to Virtual Machine ex2-itouglab01-dbadm.farm.Itoug-italia.local
\\\\\\
Attaching disk image to Virtual Machine ex2-itouglab02-dbadm.farm.Itoug-italia.local
\\\\\\
Completed setting up additional Oracle Home on Cluster ex2itouglab
Configuring database home software, database home itouglab_home_1922
Relinking database software..
Completed configuration of database home software [/u01/app/oracle/product/19.22.0.0/dbhome_1]
on Cluster ex2itouglab
Done...
Done [Elapsed = 3442365 mS [57.0 minutes] Fri Jun 21 13:47:25 CEST 2024]]
```

OEDACLI log files

- oedacli standard log files:

```
# /EXAVMIMAGES/onecommand/linux-x64/log
```

```
oedacli.out
```

```
Step1_Cli_AddDbHome_240621_125002.out
```

```
===== End Output from node ex2-itouglab02-dbadm.localdomain Ret code 0. Elapsed time: 13305 mS =====
```

```
2024-06-21 13:47:25,003 [INFO][ main][ CliDeployUtils:7047] Completed configuration of database home  
software [/u01/app/oracle/product/19.22.0.0/dbhome_1] on Cluster ex2itouglab
```

```
2024-06-21 13:47:25,003 [FINE][ main][ DatabaseHomeCli:1441] processDeployDatabaseHome returning :  
...
```

```
2024-06-21 13:47:25,052 [INFO][ main][ DeployCommands:97] Done [Elapsed = 3442365 mS [57.0 minutes] Fri  
Jun 21 13:47:25 CEST 2024]]
```

```
2024-06-21 13:47:25,053 [FINE][ main][ oedacli:539] Exiting status 0
```

Check the inventory

- Once the deploy reports success, confirm the central inventory picked up the new home.
- Check inventory location:

```
# cat /etc/oraInst.loc - inventory_loc=/u01/app/oraInventory
```

```
# cat /u01/app/oraInventory/ContentsXML/inventory.xml
```

- The HOME_LIST should now contain the new entry alongside the existing ones:

```
<HOME NAME="itouglab_home_1922"  
LOC="/u01/app/oracle/product/19.22.0.0/dbhome_1" TYPE="O" IDX="5"/>
```

Never edit inventory.xml by hand – if the entry is missing, investigate the deploy log instead

Optional: rename the volume group

Why bother

- OEDACLI names the new volume group after the clone image, for example:

```
VGExaDbDisk.db-klone-Linux-x86-64-19000240116.50.img
```

- A version-based name makes the home obvious months later

Suggested syntax:

```
VGExaDbDisk.db<version and date>[_<progressive number>].img
```

Optional: rename the volume group

How

- `umount /u01/app/oracle/product/19.22.0.0/dbhome_1`
- `vgchange -an <old name>`
- `vgrename <old name> VGExaDbDisk.db19.22.0.0.240116_4.img`
- `vgchange -ay <new name>` then
- `lvchange /dev/<new name>/LVDBDisk --refresh`
- Back up `/etc/fstab`, update the mount entry
- mount and run `systemctl daemon-reload`
- Confirm with `df -h` - the 50 GB home should be mounted again
- Do the same on other node in the cluster

New home ready for patching

Carry over your configuration

- New home images do not include OJVM – install it the standard way if your environment needs it
- Do the same for OCW
- Copy network/admin, dbs and sqlplus/admin from the old home, checking the contents first
- Compare enabled components between the homes, for example the audit option via

```
ar -t $ORACLE_HOME/rdbms/lib/libknlopt.a | grep kzaiang.o | wc -l
```
- Repeat everything on the other cluster nodes

Conclusions

Takeaways

- The procedure is not trivial, but it pays off
- With several RAC clusters in a KVM environment, Dom0 reuses the same base image and only the delta is allocated – real space savings
- Once the home exists, switching a database over is just a restart from the new home plus datapatch
- Get the OEDA version, the cluster version and the diag cleanup right and the rest is mostly waiting

References

Oracle documentation

- docs.oracle.com - ADD DATABASEHOME
- docs.oracle.com - ALTER CLUSTER
- docs.oracle.com - OEDA command line interface
- docs.oracle.com - XML actions

My Oracle Support notes

- Oracle Linux: How to Rename Non-Root Volume Group (Doc ID 2989489.1)
- How to create a new Database Home and Database using OEDACLI (Doc ID 2789297.1)

ITOUG Articles

- <https://itoug.it/blog/2024/09/exadata-add-oracle-home-using-oedaccli-part-1>
- <https://itoug.it/blog/2024/12/exadata-add-oracle-home-using-oedaccli-part-2>