Database Infrastructure As A Service

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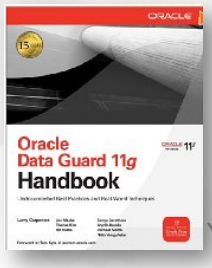
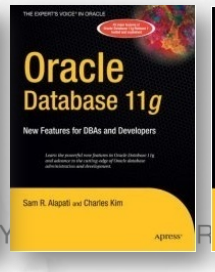
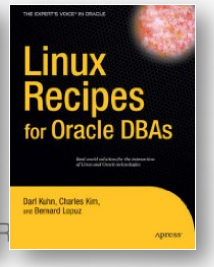
- Red Hat Cerified







ORACLE Certified Professional

RHCT

vmware vEXPERT

ORACLE ACE Director

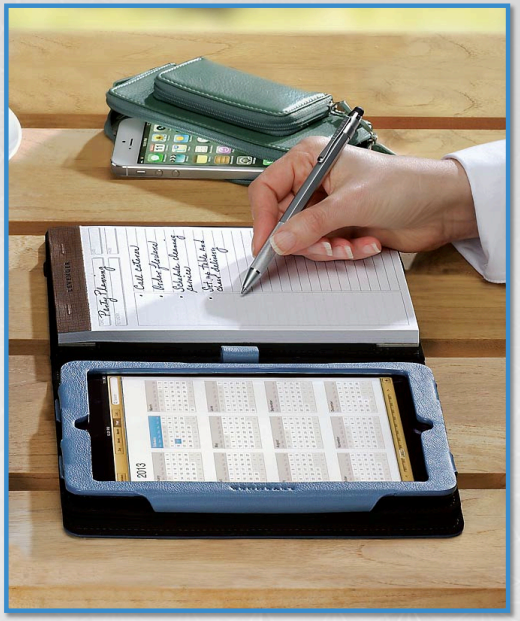
vmware certified PROFESSIONAL

Evolution of the DBA

Kind of DBA	Timeline
CLI DBA	Early 90's DBAs
GUI DBA	Late 90's and Dot Com
Google DBA	Dot Com and 2000's
iDBA	Dot Com, IOUG iDBA Master Curriculum
RAC DBAs	2000+ after 9.2 (but major spike with 10.2)
DMA	2010+ Database Machine Administrator
vDBA / vRAC DBA	2010+ Evolving role of a DBA in the virtual world
Cloud DBA	2011+ Database Consolidation with Private Database Cloud Oracle Database 12c Launches June 2013

Agenda

- **OS Configuration**
- Oracle 12c Rapid RAC Deployment
  - Creating and preparing our Golden Image Template
  - Cloning RAC Clusters
  - Adding and Removing node(s) to/from the cluster
- PDB



Setup Local Yum Repository – Easy as 1-2-3

Mount the ISO as loop device:

```
mkdir /mnt/RHEL.DVD /mnt/rhel6.5.iso
scp rhel-server-6.5-x86_64-dvd.iso root@duppy:/mnt/rhel6.5.iso
mount -o loop -t iso9660 /mnt/rhel6.5.iso/rhel-server-6.5-x86_64-dvd.iso /mnt/RHEL.DVD
```

Read the DVD .discinfo

```
[root@duppy RHEL.DVD]# pwd
/mnt/RHEL.DVD
[root@duppy RHEL.DVD]# cat .discinfo
1384196515.415715
Red Hat Enterprise Linux 6.5
x86_64
1
```

Setup Local Yum Repository

Create a file in the /etc/yum.repos.d:

```
# cat viscosity.repo
[viscosity]
mediaid=1384196515.415715
name=Local Viscosity Repo
baseurl=file:///mnt/RHEL.DVD/
enabled=1
gpgcheck=no
```

Confirm local yum repository

```
# yum repolist
Loaded plugins: product-id, security, subscription-ma
This system is not registered to Red Hat Subscripti
repo id                    repo name
viscosity                  Local Viscosity Repo
repolist: 3,690
```

Test Installation of simple RPM:

```
# yum install screen
```

Formerly Known as Oracle-Validated on Red Hat

public-yum.oracle.com/repo/OracleLinux/OL6/latest/x86_64/

Most Visited | Getting Started | Travel | Oracle | News | Popular | Lir

oracle-rdbms-server-11gR2-preinstall-1.0-3.el6.src.rpm

oracle-rdbms-server-11gR2-preinstall-1.0-3.el6.x86_64.rpm

oracle-rdbms-server-11gR2-preinstall-1.0-6.el6.src.rpm

oracle-rdbms-server-11gR2-preinstall-1.0-6.el6.x86_64.rpm

oracle-rdbms-server-11gR2-preinstall-1.0-7.el6.src.rpm

oracle-rdbms-server-11gR2-preinstall-1.0-7.el6.x86_64.rpm

oracle-rdbms-server-11gR2-preinstall-1.0-9.el6.src.rpm ← wget

oracle-rdbms-server-11gR2-preinstall-1.0-9.el6.x86_64.rpm

oracle-rdbms-server-12cR1-preinstall-1.0-11.el6.src.rpm ← wget

oracle-rdbms-server-12cR1-preinstall-1.0-11.el6.x86_64.rpm

oracle-rdbms-server-12cR1-preinstall-1.0-8.el6.src.rpm

oracle-rdbms-server-12cR1-preinstall-1.0-8.el6.x86_64.rpm

Re-Compile PreInstall RPM

1. **Install the rpm-build and rpmdevtools RPM**

yum install rpm-build rpmdevtools –y

2. **Create linux user called orarpm**

useradd orarpm -p orarpm -m -s /bin/bash

3. **su to the orarpm user and execute the rpmdev-setuptree** command

   # su – orarpm

   $ rpmdev-setuptree

4. **Try a mock installation** of the source RPM as orarpm user

$ rpm –ivh oracle-rdbms-server-12cR1-preinstall-1.0-11.el6.src.rpm

warning: oracle-rdbms-server-12cR1-preinstall-1.0-11.el6.src.rpm: Header V3 RSA/SHA256 Signature, key ID ec551f03: NOKEY

1:oracle-rdbms-server-12c### [100%]

Re-Compile PreInstall RPM

5. Modify the .spec file

$ vi rpmbuild/SPECS/oracle-rdbms-server-12cR1-preinstall.spec

```
#System requirement
Requires:procps module-init-tools ethtool initscripts
Requires:bc bind-utils nfs-utils util-linux-ng pam
Requires:xorg-x11-utils xorg-x11-xauth
# -- get rid of the line below
# Requires:kernel-uek
Requires:smartmontools
```

6. **Execute the rpmbuild to create the .rpm file**

$ rpmbuild -ba rpmbuild/SPECS/oracle-rdbms-server-12cR1-preinstall.spec

7. **As root, install the 12cR1 preinstall RPM**

yum localinstall ~orarpm/rpmbuild/RPMS/x86_64/oracle-rdbms-server-12cR1-preinstall-1.0-11.el6.x86_64.rpm

OS Template - Red Hat 6.4+ ASMLIB Support

- As of May 2013
- ASMLib requires kmod-oracleasm (RHEL Supplementary Channel), oracleasmlib and oracleasm-support packages
- Convert from udev to ASMLIB – http://dbaexpert.com/blog/

VM Template - ssh setup – The Alternative Way

http://www.dbaexpert.com/blog/ssh-setup-the-oracle-way/
http://www.dbaexpert.com/blog/sshsetup-on-a-7-node-rac/

```
$ pwd
/nfs/software/12c/grid/sshsetup

$ ./sshUserSetup.sh -user oracle -hosts "rac1 rac2" \
      -noPromptPassphrase -advanced –exverify
```

Space

The output of this script is also logged into /tmp/sshUserSetup_2013-07-09-16-31-50.log

VM Template - OS Watcher – The Alternative Way

http://www.dbaexpert.com/blog/the-better-way-to-configure-oswatcher/

How To Start OSWatcher Black Box (OSWBB) Every System Boot [ID 580513.1]

Install OS Watcher Service RPM:
sudo rpm -ihv oswbb-service-1.1.5-1.noarch.rpm

Modify /etc/oswbb.conf
# Set OSW_HOME to the directory where you unpacked OSW or OSWbba
OSW_HOME='/u01/app/oracle/oswbb'
# Set OSW_INTERVAL to the number of seconds between collections
OSW_INTERVAL='30'
# Set OSW_RETENTION to the number of hours logs are to be retained
OSW_RETENTION='168'
# Set OSW_USER to the owner of the OSW_HOME directory
OSW_USER='root'
# Set OSW_COMPRESSION to the desired compression facility
OSW_COMPRESSION='gzip'

Start OSWatcher:
sudo /sbin/service oswbb start

Setup Auto-Start:
sudo /sbin/chkconfig oswbb on

Configure Hugepages

http://www.dbaexpert.com/blog/setting-up-hugepages/

```
Doc ID:  401749.1 → hugepages_settings.sh

# cat /etc/sysctl.conf |grep ^vm
vm.nr_hugepages=1

# cat /etc/security/limits.conf
# cat /etc/security/limits.d/oracle-rdbms-server-12cR1-preinstall.conf |grep memlock
soft memlock 4096000
hard memlock 4096000

# reboot

# cat /proc/meminfo |grep ^Huge
HugePages_Total:       1
HugePages_Free:        1
HugePages_Rsvd:        0
HugePages_Surp:        0
Hugepagesize:       2048 kB
```

Agenda

- OS Configuration
- Best Practices for Virtualizing Oracle
- **Oracle 12c Rapid RAC Deployment**
  - **Creating and preparing our Golden Image Template**
  - Cloning RAC Clusters
  - Adding and Removing node(s) to/from the cluster

Prepare Grid and Oracle Home

Unlock the Grid Home

```
# cd $GRID_HOME/crs/install
# perl rootcrs.pl –unlock –crshome $GRID_HOME
```

Create TAR ball of GI Home

- Exclude directories, logfiles, text files

```
# export GRID_HOME=/u01/app/grid/12.1.0
# cd ${GRID_HOME}
# tar cpfX - ${EXCLUDE_LIST} * > ${NFS_DIR}/Grid.tar
```

```
${GRID_HOME}/host_name
${GRID_HOME}/rdbms/audit/*
${GRID_HOME}/log/host_name
${GRID_HOME}/gpnp/host_name
${GRID_HOME}/log/diag/asmcmd/*
${GRID_HOME}/log/diag/tnslsnr/*
${GRID_HOME}/ccr/hosts/*
${GRID_HOME}/cdata/*
${GRID_HOME}/crs/install/*.txt
${GRID_HOME}/evm/log/*
${GRID_HOME}/install/*.log
${GRID_HOME}/network/admin/
*.bak.*
${GRID_HOME}/network/admin/*.ora
${GRID_HOME}/ohasd/init/*
${GRID_HOME}/root.sh
${GRID_HOME}/*ouibak*
*.ouibak
*.log
```

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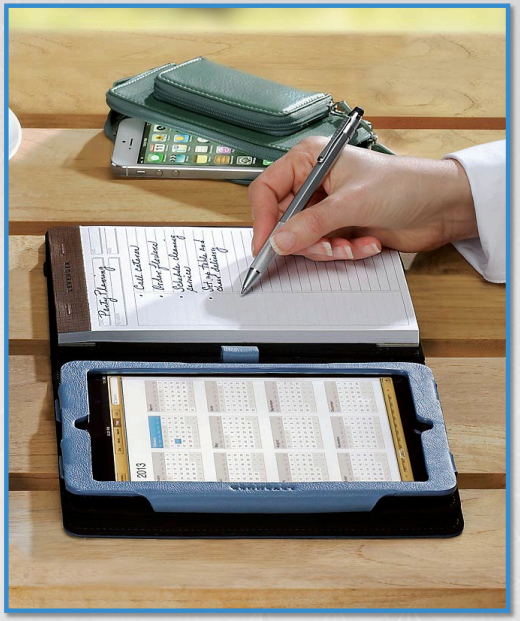
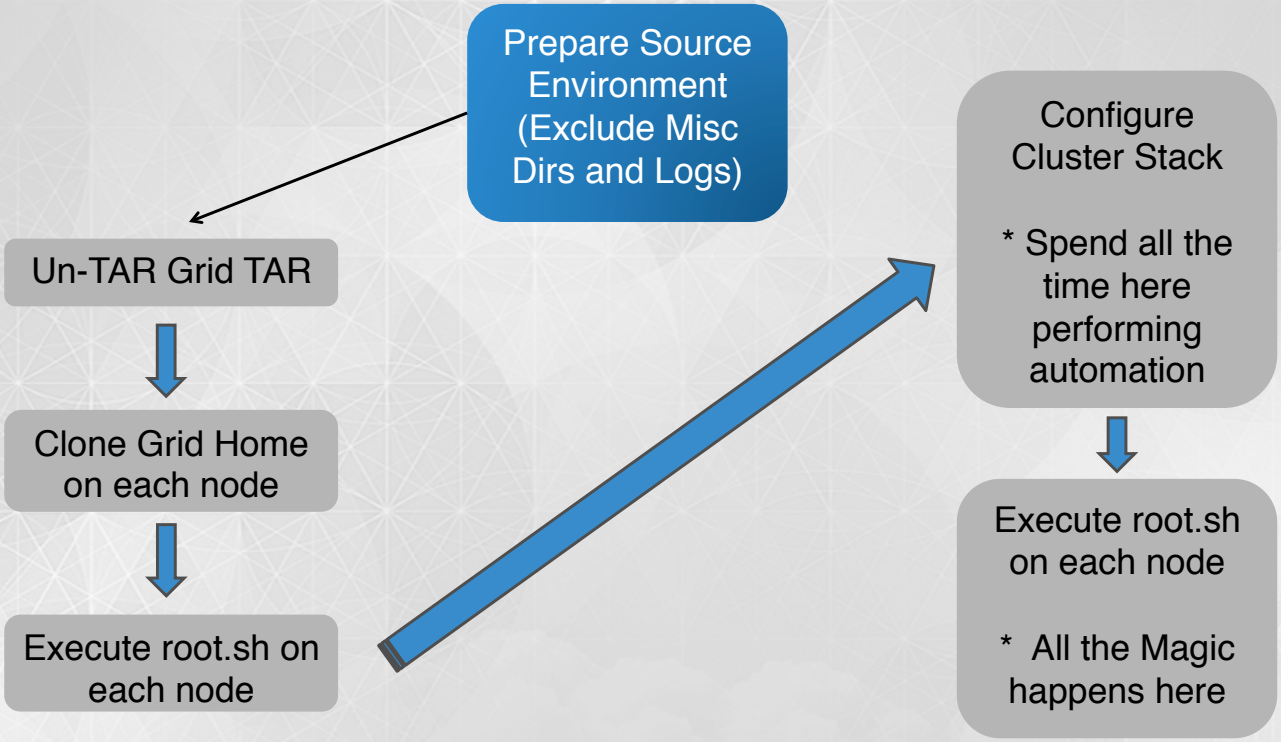
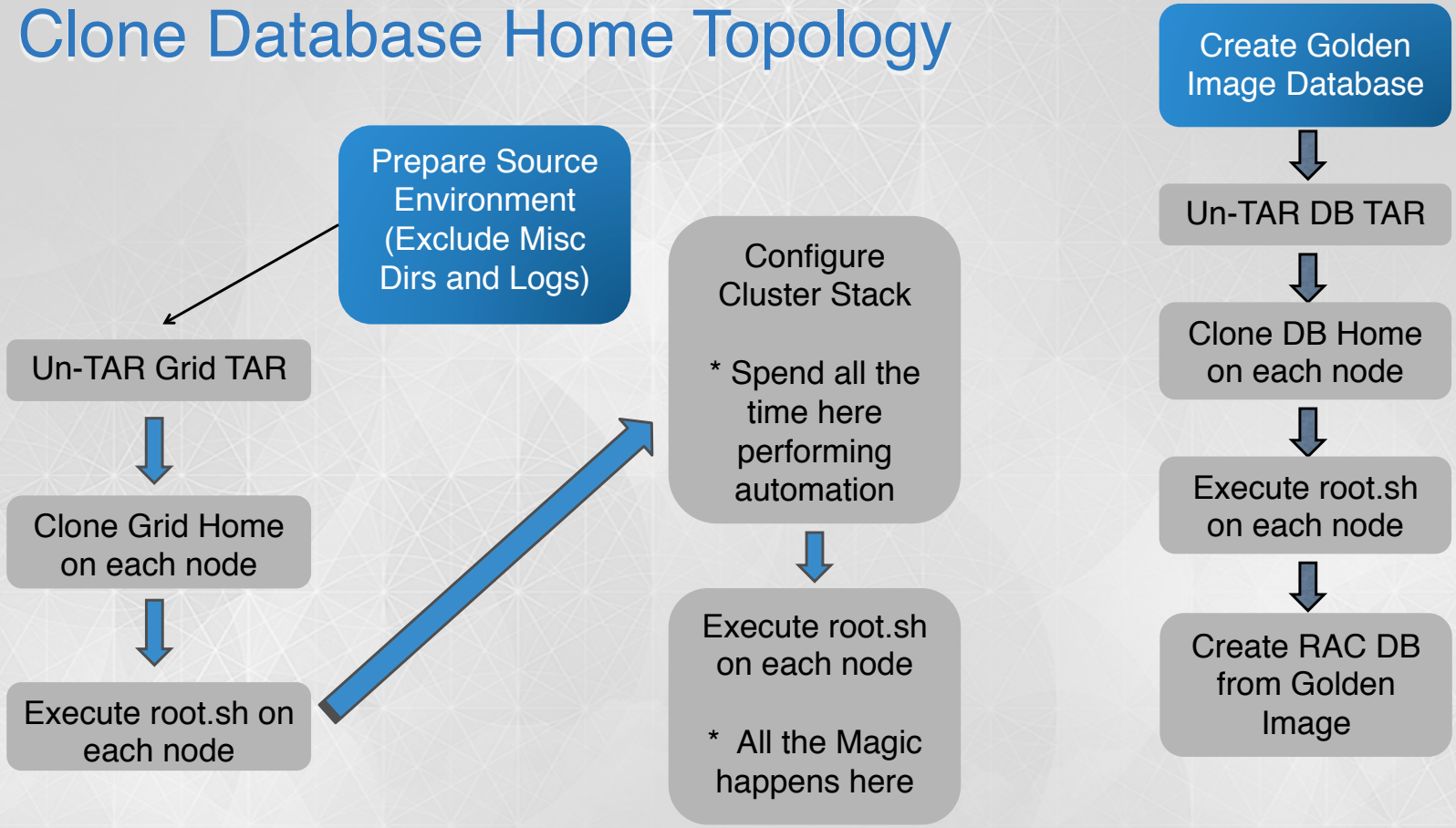
- PDB



Clone Grid Home Topology



Clone Database Home Topology



Clone Grid Home on Each Node

```
cd ${GI_HOME}/clone/bin

perl ${GI_HOME}/clone/bin/clone.pl -silent \
ORACLE_HOME=${GI_HOME} \
ORACLE_HOME_NAME=OraGridHome1 \
ORACLE_BASE=$ORACLE_BASE \
-O'"CLUSTER_NODES={rac1,rac2,rac3}"'  \
-O'"LOCAL_NODE=$(hostname -s)"'  \
CRS=TRUE INVENTORY_LOCATION=${INVENTORY_LOCATION}
```

config.sh in GUI mode

Oracle Grid Infrastructure - Setting up Grid Infrastructure - Step 14 of 16

Summary

ORACLE GRID INFRASTRUCTURE 12c

- Configuration Option
- Cluster Type
- Grid Plug and Play
- Cluster Node Information
- Network Interface Usage
- Grid Infrastructure Managemen
- Storage Option
- ASM Disk Group
- Create ASM Disk Group
- ASM Password
- Failure Isolation
- Root script execution
- Prerequisite Checks
- Summary
- Install Product
- Finish

Oracle Grid Infrastructure

Global Settings

- Install Option: Configure Oracle Grid Infrastructure for a Cluster [Edit]
- Oracle base for Oracle Grid Infrastructure: /u01/app/oracle
- Grid home: /u01/app/12.1.0/grid
- Privileged Operating System Groups: oinstall (OSDBA), dba (OSOPER), dba (OSASM)
- Root script execution configuration: Sudo program [Edit]

Grid Infrastructure Settings

- Cluster Type: Standard [Edit]
- Cluster Name: ol59-cluster [Edit]
- Nodes: [ol59a, ol59b] [Edit]
- Single Client Access Name (SCAN): ol59-scan [Edit]
- SCAN Port: 1521 [Edit]
- rface(s): eth2 [Edit]
- Private Interface(s): eth1 [Edit]
- Configure Grid Infrastructure Management Repository: true [Edit]

Storage Information

- Storage Type: Oracle ASM [Edit]
- ASM Disk Group: OCRVOTE [Edit]
- Storage Redundancy: EXTERNAL [Edit]
- Disks Selected: ORCL:OCRVOTE1 [Edit]

Save Response File...

Help | < Back | Next > | Install | cel

Oracle Grid Infrastructure - Setting up Grid Infrastructure - Step 15 of 16

Install Product

ORACLE GRID INFRASTRUCTURE 12c

- Configuration Option
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- Root scrip
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Progress

31%

Completed 'Prepare for configuration steps'

Status

Generate configuration file	Succeeded
Update Inventory	Succeeded
Execute Root Scripts	In Progress
• Execute root script on all nodes	Pending
Configure Oracle Grid Infrastructure for a Cluster	Pending

Details | Retry | Skip

Oracle Grid Infrastructure

Configuration scripts generated by the Installer need to be run as a privileged user (root). Installer will run these scripts using the privileged user credentials provided earlier.

Are you sure t to continue ?

Yes | No

INFRASTRUCTURE 12c Maximize Performance, Availability, and Productivity

Help | < Back | Next > | Install | Cancel

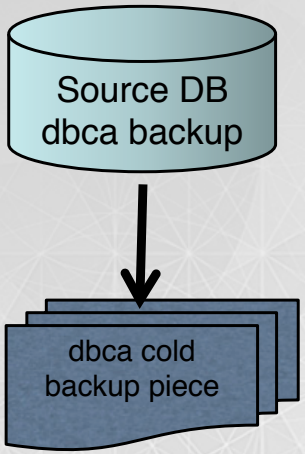
config.sh in silent mode

```
export DIR=$(pwd)
FN=`echo $0 | sed s/\.*[/]//`


${GRID_HOME}/crs/config/config.sh -silent -responseFile \
${DIR}/${CLUSTER_NAME}.rsp \
-ignorePrereq -ignoreSysPrereqs
```

Clone DB Home on Each Node

```
JAVA_HOME=${ORACLE_DB_HOME}/jdk/bin/java
PATH=$PATH:${JAVA_HOME}

cd ${ORACLE_DB_HOME}/clone/bin
perl ${ORACLE_DB_HOME}/clone/bin/clone.pl -silent \
ORACLE_HOME=${ORACLE_DB_HOME}
ORACLE_HOME_NAME=OraDBHome1 \
ORACLE_BASE=$ORACLE_BASE \
-O'"CLUSTER_NODES={rac1,rac2,rac3}"' \
-O'"LOCAL_NODE=$(hostname -s)"' CRS=TRUE \
INVENTORY_LOCATION=${INVENTORY_LOCATION}
```

Create Golden Image Template of Database



Copy .dbc file to $ORACLE_HOME on Target
Copy dbca backup to target
Create symbolic link to NFS Mount

1. Create Golden Image DB Template

```
export BKUP_DIR=/bkups/templates
dbca -silent -createCloneTemplate \
-sourceSID RACDB \
-templateName db_gold_01 \
-sysDBAUserName sys \
-sysDBAPassword oracle123 \
-maintainFileLocations false \
-datafileJarLocation $BKUP_DIR
```

2. Locate the the tempate xml file in the format of .dbc

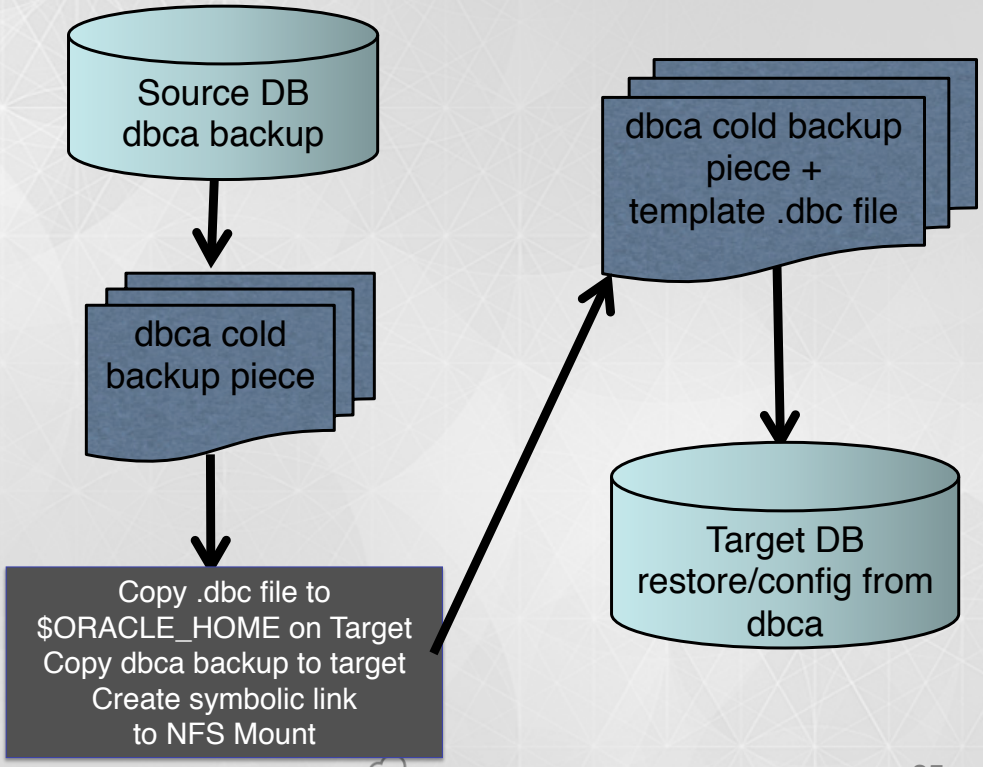
```
$ cd $ORACLE_HOME
$ find . -name '*.dbc'
./assistants/dbca/templates/General_Purpose.dbc
./assistants/dbca/
templates/Data_Warehouse.dbc
./assistants/dbca/templates/db_gold_01.dbc
```

3. Copy to the target $ORACLE_HOME/assistants/dbca/templates

```
db_gold_01.dbc

-- to /bkups/templates (or NFS)
```

Clone Database From Template

```
dbca -silent                          \
     -createDatabase                  \
     -templateName db_gold_01.dbc \
     -gdbName racdb \
     -sid racdb \
     -SysPassword oracle123 \
     -SystemPassword oracle123 \
     -emConfiguration NONE            \
     -redoLogFileSize 500 \
     -recoveryAreaDestination FRA \
     -storageType ASM                 \
       -asmSysPassword oracle123 \
       -diskGroupName DATA     \
            -listeners  LISTENER_RAC \
     -characterSet AL32UTF8 \
     -nationalCharacterSet AL16UTF16 \
     -databaseType MULTIPURPOSE \
     -nodelist rac1,rac2,rac3 \
     -initparams audit_file_dest='/oraacfs/trace/racdb/adump' \
            -initparams compatible='11.2.0.3' \
            -initparams db_create_file_dest='+DATA' \
            -initparams db_create_online_log_dest_1='+DATA' \
            -initparams db_create_online_log_dest_2='+FRA' \
            -initparams diagnostic_dest='/oraacfs' \
            -initparams parallel_max_servers=32 \
            -initparams pga_aggregate_target=524288000 \
            -initparams processes=400 \
            -initparams sga_target=4294967296 \
            -initparams db_recovery_file_dest='+FRA' \
     -initparams db_recovery_file_dest_size=2097152000
```



Putting it all together

How do we do it:

- Clone GRID Homes on all RAC nodes – Template script and replace Homes and Nodes

- Setup 2 Configuration files
  1. Primary config file that has only the relevant information

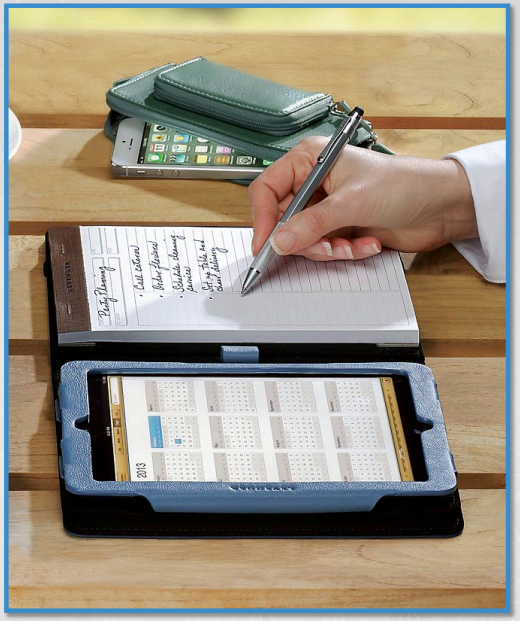
     (Hostname, VIPs, SCAN, Private Subnet, Listener Name, DB Name)
  2. Generic config file that applies to every build

     (OFA related directories, DB Home, Grid Home, Oracle Base, OraInventory Loc, etc)
- Generate Response File and tag PLACEHOLDERS within the response file
  - Globally search and replace PLACEHOLDERS

- Clone DB Homes on all RAC nodes – Template script and replace Homes and Nodes

Agenda

- Business Drivers
- Best Practices for Virtualizing Oracle
- ➢ **Oracle 12c Rapid RAC Deployment**
  - Creating and preparing our Golden Image Template
  - Cloning RAC Clusters
  - ➢ **Adding and Removing node(s) to/from the cluster**
- vCOPs Metrics and Monitoring



Add Node – 4 Step Process

1. From one node (First Node)

```
export ORACLE_HOME=/u01/app/11.2.0/grid
export PATH=$ORACLE_HOME/bin:$PATH
export IGNORE_PREADDNODE_CHECKS=Y

${ORACLE_HOME}/oui/bin/addNode.sh -silent "CLUSTER_NEW_NODES={rac4}"  \
"CLUSTER_NEW_VIRTUAL_HOSTNAMES={rac4-vip}" \
"CLUSTER_NEW_PRIVATE_NODE_NAMES={rac4-priv}" -noCopy
```

2. Target Node Only:

```
cd /u01/app/oracle/product/11.2.0/db/clone/bin
perl /u01/app/oracle/product/11.2.0/db/clone/bin/clone.pl -silent \
ORACLE_HOME=/u01/app/oracle/product/11.2.0/db ORACLE_HOME_NAME=OraDBHome1 \
ORACLE_BASE=/u01/app/oracle -O'"CLUSTER_NODES={rac1,rac2,rac3,rac4}"' \
-O'"LOCAL_NODE=$(hostname -s)"' CRS=TRUE INVENTORY_LOCATION=/u01/app/oraInventory}
```

3. Original Nodes:

```
/u01/app/oracle/product/11.2.0/db/oui/bin/runInstaller -updateNodeList
    CLUSTER_NODES=rac1,rac2,rac3,rac4 \
ORACLE_HOME=/u01/app/oracle/product/11.2.0/db -local
```

Add Instance (Easy Way) – Last Step

```
export ORACLE_SID=racdb1
export ORACLE_HOME=$ORACLE_DB_HOME
export PATH=$ORACLE_DB_HOME/bin:$PATH
export LD_LIBRARY_PATH=$ORACLE_HOME/lib:$LD_LIBRARY_PATH

dbca -silent -addInstance -gdbName racdb -nodelist rac4 -instanceName racdb4 \
-sysDBAUsername sys -sysDBAPassword oracle123

srvctl config database –d racdb
```

Add Instance Manual Steps

Show Shell script for Manually Adding the Instance …

Delete Instance – 3 Step Process (Fist Step)

```
1.
export ORACLE_SID=racdb1
export ORACLE_HOME=$ORACLE_DB_HOME
export PATH=$ORACLE_DB_HOME/bin:$PATH
export LD_LIBRARY_PATH=$ORACLE_HOME/lib:$LD_LIBRARY_PATH

dbca -silent -DeleteInstance -gdbName racdb -nodelist rac4 \
-instanceName racdb4 -sysDBAUsername sys -sysDBAPassword oracle123

srvctl config database -d racdb
```

Delete Node

2. From one of the nodes:

```
export ORACLE_SID=+ASM1
export ORAENV_ASK=NO
. oraenv

export ORACLE_HOME=$ORACLE_CRS_HOME
export LD_LIBRARY_PATH=$ORACLE_HOME/lib:$LD_LIBRARY_PATH

${ORACLE_CRS_HOME}/bin/crsctl delete node -n ${NODE_TO_BE_DELETED}
```

3. Remaining nodes:

```
/u01/app/11.2.0/grid/oui/bin/runInstaller -updateNodeList
CLUSTER_NODES=rac1,rac2 \
ORACLE_HOME=/u01/app/11.2.0/grid -local

/u01/app/oracle/product/11.2.0/db/oui/bin/runInstaller -updateNodeList
CLUSTER_NODES=rac1,rac2 \
ORACLE_HOME=/u01/app/oracle/product/11.2.0/db -local
```

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- **PDB**

Oracle Database

	Named User Plus	Software Update License & Support	Processor License	Software Update License & Support
Database Products				
Oracle Database				
Standard Edition One	180	39.60	5,800	1,276.00
Standard Edition	350	77.00	17,500	3,850.00
Enterprise Edition	950	209.00	47,500	10,450.00
Personal Edition	460	101.20	-	-
Mobile Server	-	-	23,000	5,060.00
NoSQL Database Enterprise Edition	200	44	10,000	2,200.00
Enterprise Edition Options:				
Multitenant	350	77.00	17,500	3,850.00
Real Application Clusters	460	101.20	23,000	5,060.00
Real Application Clusters One Node	200	44.00	10,000	2,200.00
Active Data Guard	230	50.60	11,500	2,530.00
Partitioning	230	50.60	11,500	2,530.00
Real Application Testing	230	50.60	11,500	2,530.00
Advanced Compression	230	50.60	11,500	2,530.00
Advanced Security	300	66.00	15,000	3,300.00
Label Security	230	50.60	11,500	2,530.00
Database Vault	230	50.60	11,500	2,530.00
OLAP	460	101.20	23,000	5,060.00
Advanced Analytics	460	101.20	23,000	5,060.00
Spatial and Graph	350	77.00	17,500	3,850.00
In-Memory Database Cache	460	101.20	23,000	5,060.00

Create Database – DBCA in 12c with CDB/PDB

Creation Mode

ORACLE DATABASE 12c

- Database Operation
- Creation Mode
- Pre Requisite Checks
- Summary
- Progress Page

Create a database with default configuration

Global Database Name: CDB1

Storage Type: File System

Database Files Location: {ORACLE_BASE}/oradata Browse...

Fast Recovery Area: {ORACLE_BASE}/fast_recovery_area Browse...

Database Character Set: WE8MSWIN1252 - MS Windows Code Page 1252 8-bit Wes...

Administrative Password : ••••••••••

Confirm Password: ••••••••••

Create As Container Database

Pluggable Database Name: VNA

Advanced Mode

Messages:

Administrative Password : The password entered does not conform to the Oracle recommended standards. A password should have minimum of 8 characters in length. In addition, the password must contain at least one upper case character, one lower case character and one digit.

Help | < Back | Next > | Finish | Cancel

Create Database – Summary

Database Configuration Summary

Global Database Name:	CDB1
Database Configuration Type:	Single Instance
SID:	CDB1
Create As Container Database	Yes
Number of Pluggable Databases:	1
Pluggable Database Name:	VNA
Storage Type:	File System
Memory Configuration Type:	Automatic Memory Management
Template Name:	General Purpose or Transaction Processi

Manage Pluggable Database – DBCA in 12c with CDB/PDB

Database Operation

ORACLE DATABASE 12c

- Database Operation
- Creation Mode
- Pre Requisite Checks
- Summary
- Progress Page

Select the operation that you want to perform:

- Create Database
- Configure Database Options
- Delete Database
- Manage Templates
- Manage Pluggable Databases

Select an operation that you want to perform in container database:

- Create a Pluggable Database
- Unplug a Pluggable Database
- Delete a Pluggable Database
- Configure a Pluggable Database

Select a container database in which the pluggable database can be created.

Select	Database
◉	CDB1

< Back | Next > | Finish | Cancel

- Create a new Pluggable Database
- Create Pluggable Database From PDB Archive
  - Pluggable Database Archive: Browse...
- Create Pluggable Database using PDB File Set
  - Pluggable Database Metadata File: Browse...
  - Pluggable Database Datafile Backup: Browse...

Identification | Database Vault & Label Security

Pluggable Database Name: PDB2

PDB Storage

- Use Oracle Managed Files
- Specify Common Location
  - Storage Type: File System
  - Database Location: /oradata/CDB1/datafile/{PDB_NAME} Browse...
- Create Default User Tablespace

PDB User

- Administrator Username: pdb2_admin
- Administrator Password: ••••••••••
- Confirm Administrator Password: ••••••••••

Database Configuration Assistant: Summary

Create Pluggable Database

Container Database:	CDB1
Pluggable Database:	PDB2
Pluggable database source:	Default
Datafile location:	/oradata/CDB1/datafile/PDB2
Configure Database Vault:	No
Configure Label Security:	No

Configure Pluggable Database – DBCA in 12c with CDB/PDB

Pluggable Database Options

ORACLE DATABASE 12c

- Database Operation
- Manage Pluggable Databases
- Database List
- Pluggable Database List
- Pluggable Database Options
- Summary
- Progress Page

Database Vault & Label Security

Database Vault

Configure Database Vault

Database Vault Owner:

Password: Confirm Password:

Create a Separate Account Manager

Account Manager:

Password: Confirm Password:

Label Security

Configure Label Security

Configure with OID

LBACSYS Password:

Help < Back Next > Finish Cancel

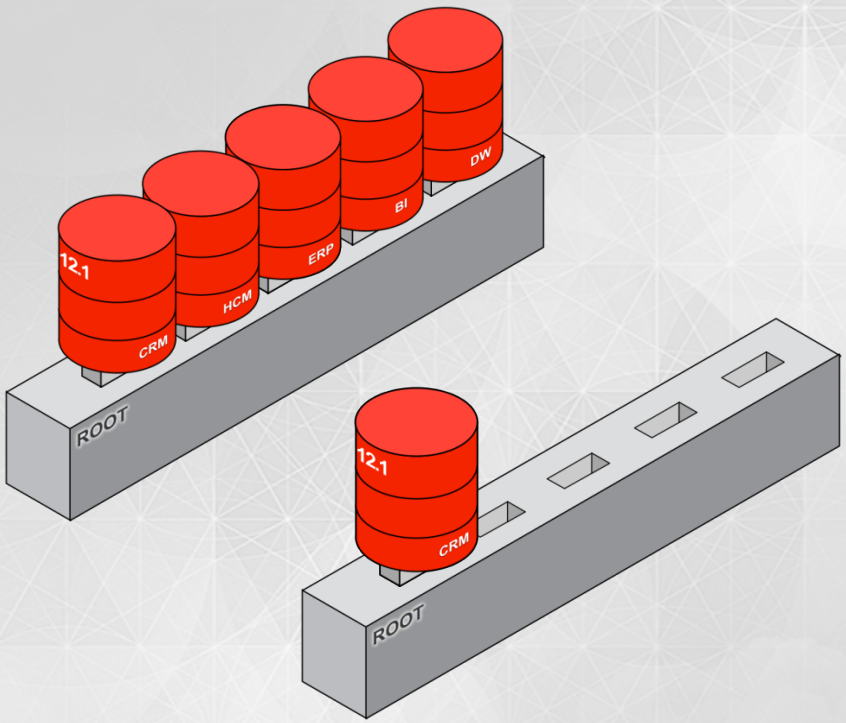
DBCA in 12c with CDB/PDB

```
cd /u01/app/oracle/product/12.1.0/dbhome_1/bin
./dbca -silent \
 -createDatabase \
 -templateName General_Purpose.dbc \
 -gdbName TEST \
 -sid TEST     \
 -SysPassword oracle123 \
 -createAsContainerDatabase true \
   -numberofPDBs 2 \
   -pdbName VNA \
 -SystemPassword oracle123 \
 -emConfiguration DBEXPRESS  \
 -redoLogFileSize 100   \
 -recoveryAreaDestination FRA \
 -storageType ASM            \
   -asmsnmpPassword oracle123 \
   -asmSysPassword oracle123  \
   -diskGroupName DATA \
```

....

```
-listeners LISTENER   \
 -registerWithDirService false \
 -characterSet AL32UTF8 \
 -nationalCharacterSet AL16UTF16 \
 -databaseType MULTIPURPOSE \
 -nodelist ol59a,ol59b \
 -initparams audit_file_dest='/u01/app/oracle/admin/TEST/adump' \
     -initparams compatible='12.1.0.0' \
     -initparams db_create_file_dest='+DATA' \
     -initparams db_create_online_log_dest_1='+DATA' \
     -initparams db_create_online_log_dest_2='+FRA' \
     -initparams db_recovery_file_dest='+FRA' \
     -initparams pga_aggregate_target=100M \
     -initparams diagnostic_dest='/u01/app/oracle' \
     -initparams parallel_max_servers=8 \
     -initparams processes=400 \
     -initparams sga_target=524288000 \
     -initparams db_recovery_file_dest_size=4322230272
```

Fast Cloning of PDBs



- PDBs can be cloned from PDBs within the same database
- PDBs can be cloned from remote PDBs
- PDB carries lineage from the PDB it was cloned from

LOCAL

- `create pluggable database ERP_PDB from ERP;`

REMOTE (DBLINK)

- `create pluggable database ERP_PDB from ERP@viscosityna.com;`

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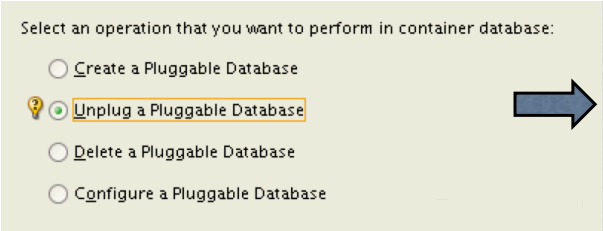
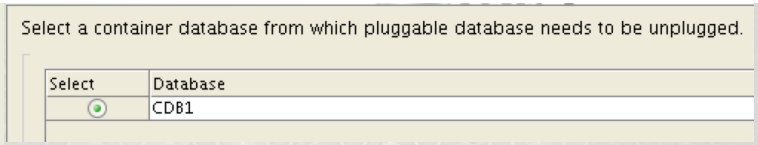
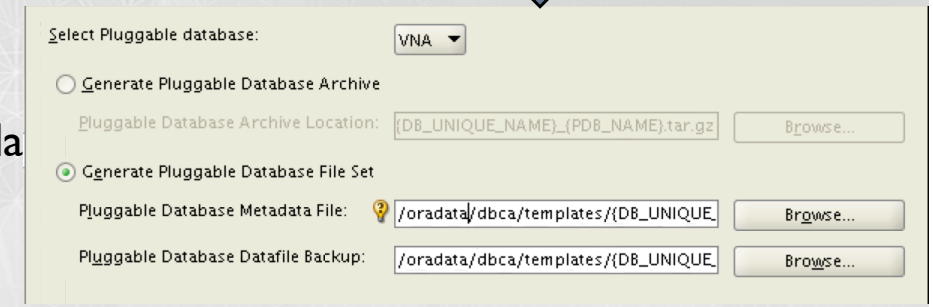
Provisioning of PDB

```
CREATE PLUGGABLE DATABASE mypdb
ADMIN USER mypdbadm IDENTIFIED BY oracle123
    STORAGE (MAXSIZE 32G MAX_SHARED_TEMP_SIZE 1000M)
    DEFAULT TABLESPACE data
DATAFILE '/oradata/mypdb/data01.dbf' SIZE 8192M AUTOEXTEND ON
    PATH_PREFIX = '/oradata/mypdb/'
    FILE_NAME_CONVERT = ('/oradata/pdbseed/', '/oradata/mypdb/');
```

Unplug and Plug





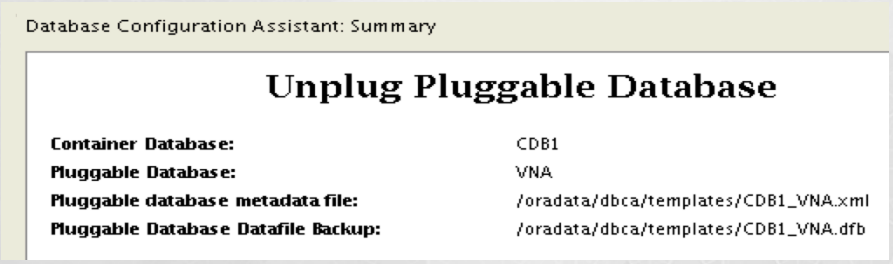


Unplug

alter pluggable database VNA unplug into '/orada
dbca/templates/CDB1_VNA.xml';

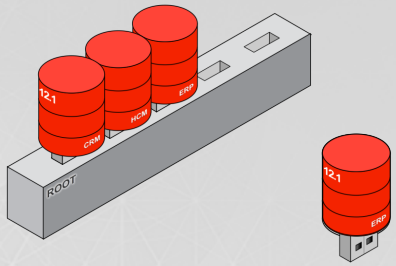
Plug

```
create pluggable database PDB2
using '/oradata/…/pdb2.xml';
```



Clone / Migrate Pluggable Database

create pluggable database VNA from VT;
create pluggable database VNA from VT@viscosityna.com;



Migrate PDB from Oracle Database 11g (Pre - 12c)

① Upgrade 11.2 database to 12.1 first
② Put the non-CDB into read only mode
③ On the non-CDB generate an XML Metadata file
④ Shutdown non-CDB database
⑤ Plug non-CDB into CDB
Can be on the same or different server
Can use existing datafiles or move to new location

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Questions

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