Provisioning RAC and AS environments using Enterprise Manager 10*g*R2 based cloning

An Oracle White Paper
January 2006

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Introduction

Cloning helps in mass deploying tested and certified gold images. Data centers can put cloning as a part of their ongoing deployment process, thereby making sure that compliance is never compromised with

This document is intended to help Oracle database administrators and system integrators understand how to build new or extend existing Oracle Real application cluster (RAC) and Application Server (AS) environments using existing software images commonly referred to as 'gold images'. It covers the new features in Enterprise Manager 10gR2 that enable such methods of software deployment. The deployment features are also supported through the Enterprise Manager Command Line Interface (EMCLI). Related commands and sample scripts are covered in detail in sections 8,9 and 10 of the Appendix.

Gold image as a preferred source of deployment

As the server population in data centers grows, the administrators need to deploy software to new hosts. Most of them do not install Oracle software from scratch, but deploy tested and approved gold images. This process helps to ensure that the data center adheres to software compliance rules and specific version requirements. Starting 10gR1, Oracle provides a facility to clone reference installations. One can apply patchsets and interim patches to the installation before cloning, thereby saving the time and labor to patch individual installations. The cloning process also takes care of making environment specific changes in the cloning destination. The cloned ORACLE_HOME can be patched or used as a clone source subsequently. The fact that a single cloning operation from Enterprise Manager can distribute software to multiple hosts makes it a scalable and efficient method of deploying Oracle software.

In 10gR1, Oracle also provided a simple facility to clone a physical single instance database from an existing installation or a backup to set up a new one. This is a faster process than creating the entire database afresh. In 10gR2, one can also convert a single instance database to RAC.

Behind the scenes, provisioning a RAC system is a combination of the following technologies:

- Cloning of ORACLE_HOME
- Cloning of a single instance database
- Converting a single instance database to RAC

All these are seamlessly possible through Enterprise Manager 10gR2.

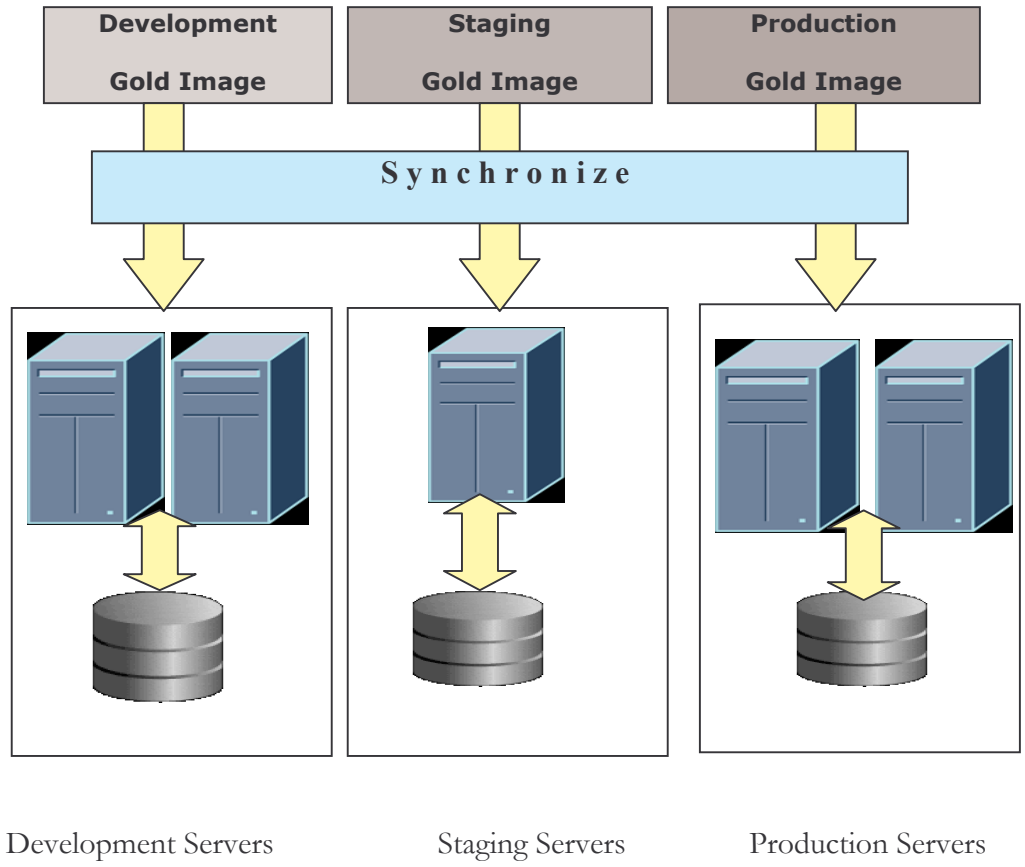


Figure 1: Gold image deployment

Basic flow of the Gold Image Cloning

In terms of flow, the cloning application in Enterprise Manager 10.2.0.1 is wizard driven. In the first screen we choose the source type and the source. In 10gR2, the cloning can be performed from either of two types of sources, from "Installed Oracle Homes" on reference hosts or from a "Software Library".

- **Clone from a reference installation**

Using this method of cloning, an administrator chooses a source host and ORACLE_HOME and clones the software to one or more target hosts.

- **Clone a gold image from the Software Library**

Using this method, the administrator chooses a reference image from the central software library of reference images and clones the image to a target location. A Software Library is a repository of deployable software images. The administrator may standardize on a single reference image for the entire data center, or store multiple reference images, one per application.

In the second screen of the cloning wizard, one can specify the credentials for accessing the source. This screen also allows to specify the temporary directory to package the software into, as well as files to exclude. In the third screen, one can specify the destination hosts, the credentials for each host and the target ORACLE_HOME paths. The credentials for each ORACLE_HOME will be automatically populated, if that has been saved before. The fourth screen allows execution of user supplied pre and post cloning steps as well as scripts like root.sh that need superuser privilege. Finally one can schedule the clone job at a convenient time.

ORACLE_HOME cloning uses http for file transfer between non-secure agents and https for transfer between secure agents. Finally the cloning job can be scheduled at a convenient interval of the day so that the software distribution process does not affect the network performance and the performance of production applications.

Installing the operating system and the Oracle Management Agent

Before starting the RAC deployment process on a target node, the operating system and the management agent need to be installed on that host. This can done through one of many methods.

One can install the operating system through regular methods and then install the Oracle Management Agent on it. In 10gR2, there are different ways to install the Management Agent.

Starting 10gR2, there is a way to mass deploy agents from the Management Server host. This uses the Secure shell (ssh) protocol to transfer the scripts to remote hosts that in turn download the agent bits and configure the agent to communicate with the Management Server.

On Linux machines the operating system and the agent software can also be deployed using the Bare Metal provisioning process introduced in 10gR2. The Bare Metal provisioning process makes use of the PXE technology to boot a 'kickstart image' of the operating system. Along with the operating system image the Management Agent is deployed on the host, which then registers the host with the Management Server. Once the host is registered as a new host, additional software images can be deployed onto it.

The remaining sections of this document assumes that this point in the whole deployment cycle has been reached, i.e. the operating system and the Management Agent are installed and operational on the host.

Uploading images to the software library

Before a gold image is provisioned from the software library, the administrator has to build and store the image. One can also associate specific descriptions to the image for it to be easily referenced over future. In this section, we will look into the details of creating and maintaining the gold image, this being a new concept in 10gR2. The "Provisioning" tab and its sub-tabs under Deployment provides the functionality of the Software Library.

The image components can be created from the "Components" tab. For creating a RAC or Clusterware or AS clone image, the administrator simply needs to point to the reference host that has the respective ORACLE_HOME installed. The image will be zipped up and then stored as a component in the Software Library. The Software Library provides the flexibility to upload any image as a "generic Image"

Depending on the type of Clone component selected, one will need to provide necessary parameters for preparing the home for Cloning, like the Host, the Oracle Home Location, User credentials for the home, a Working Directory and, for AS Clone component, an optional Internet Directory username / password. The values entered here will be verified, and any discrepancies, such as mismatching OH credentials, insufficient space in the working directory etc. will be reported as errors.

When the user submits the job to create the component, the component will be visible under its parent folder, but with status 'Incomplete'. It is only after successful completion of the job that the status changes to 'Ready'. To use a component for Cloning, one will need to select a component in the 'Ready' state and 'Activate' it. If this is not done, the component will not show up in the 'Source Home' page of Cloning.

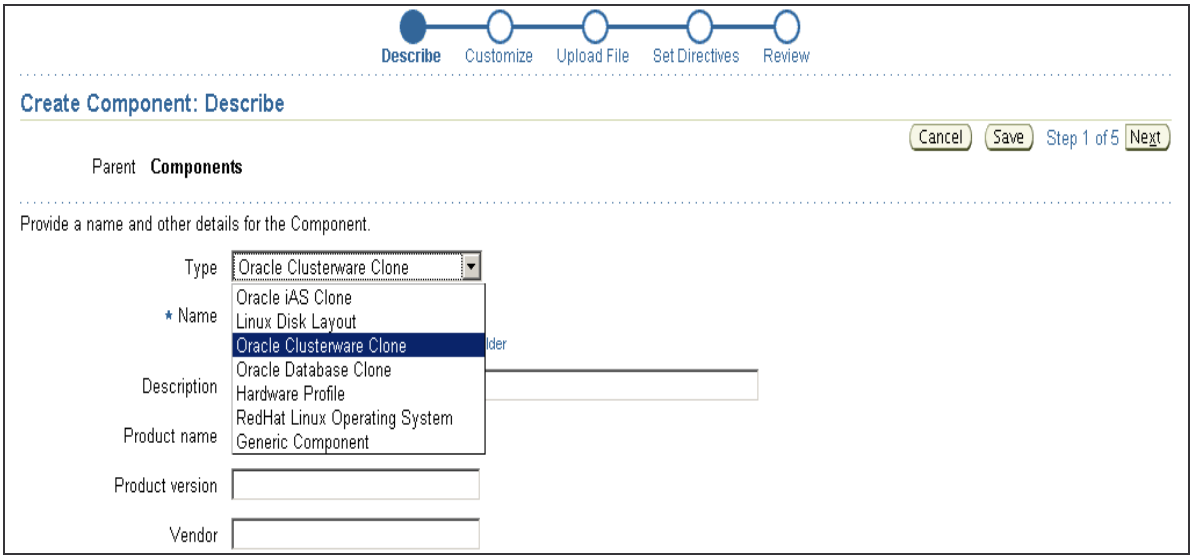


Figure 2: Creating software library components from out-of-box templates

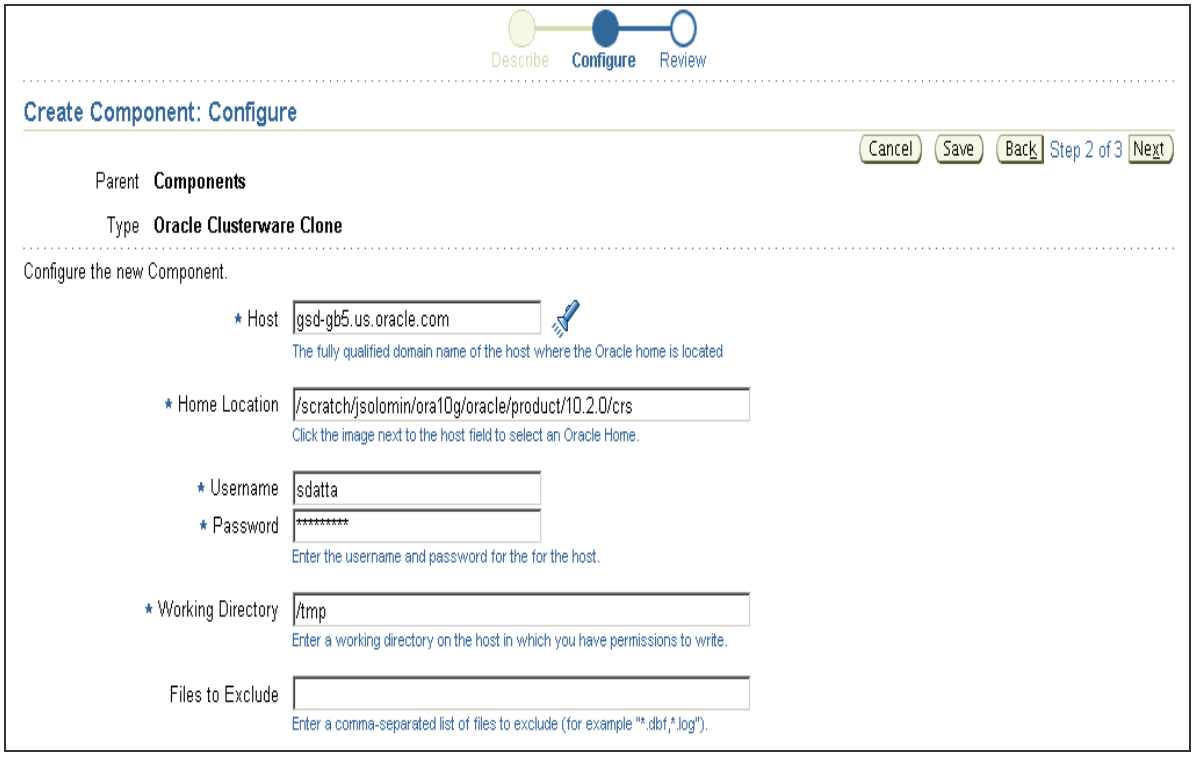


Figure 3: Creating software library component from a reference host source

RAC provisioning

The RAC provisioning features in Enterprise Manager 10gR2 consist of:

- Oracle Clusterware Software cloning
- RAC software cloning
- Conversion of single instance to RAC
- Adding and deleting instances in a RAC environment

For cloning, we start with the following assumptions:
Oracle Enterprise Manager 10.2 or later is installed in the enterprise.
The database administrator should have the following software, either installed on a reference host or uploaded to the software library from a reference host.
The software may be patched to an appropriate level.

- Oracle Clusterware 10.2 or higher
- Oracle Real Application cluster 10.2 or higher (Oracle database ORACLE_HOME with RAC libraries linked in the binaries)
- Empty database that the user wants to use as a starting template (alternately the user can create the database as a part of the provisioning process)
- Automatic Storage Management (ASM) ORACLE_HOME, of version 10.2.0.1 or higher, if ASM is being used.

The ORACLE_HOMEs serve as the source for the gold images that are stored in the Software Library. The metadata for the images are present in the Enterprise Manager repository schema.

Case 1: Building a new RAC Cluster

This is the case where the customer needs to build a new cluster from the gold images available. The Enterprise Manager Enterprise Manager helps in building the first node of a cluster, which can subsequently be extended through Enterprise Manager itself. The steps involved are:

- User chooses Oracle Clusterware gold image from software library and clones it to node 1

  For this one has to invoke the cloning application, which exists under the "Deployments" tab of Enterprise Manager Enterprise Manager. A Section of this document gives the generic flow of the Home Cloning Application.
- User runs cluster configuration utilities as post scripts
- User chooses RAC gold image from software library and clones it to node 1
- [OPTIONAL: If DB uses ASM, one needs to create an ASM home from where ASM instances will run]. User chooses ASM gold image from software library and clones it to node 1 to create a new ASM home
- User clones single instance database gold image to node 1

  Alternately, the user can run DBCA or own scripts to create the single instance database. Such scripts can be run from the Enterprise Manager using the job subsystem.
- User runs conversion utility to convert the single instance database to RAC.
- OPTIONAL: User configures the RAC database to use ASM.

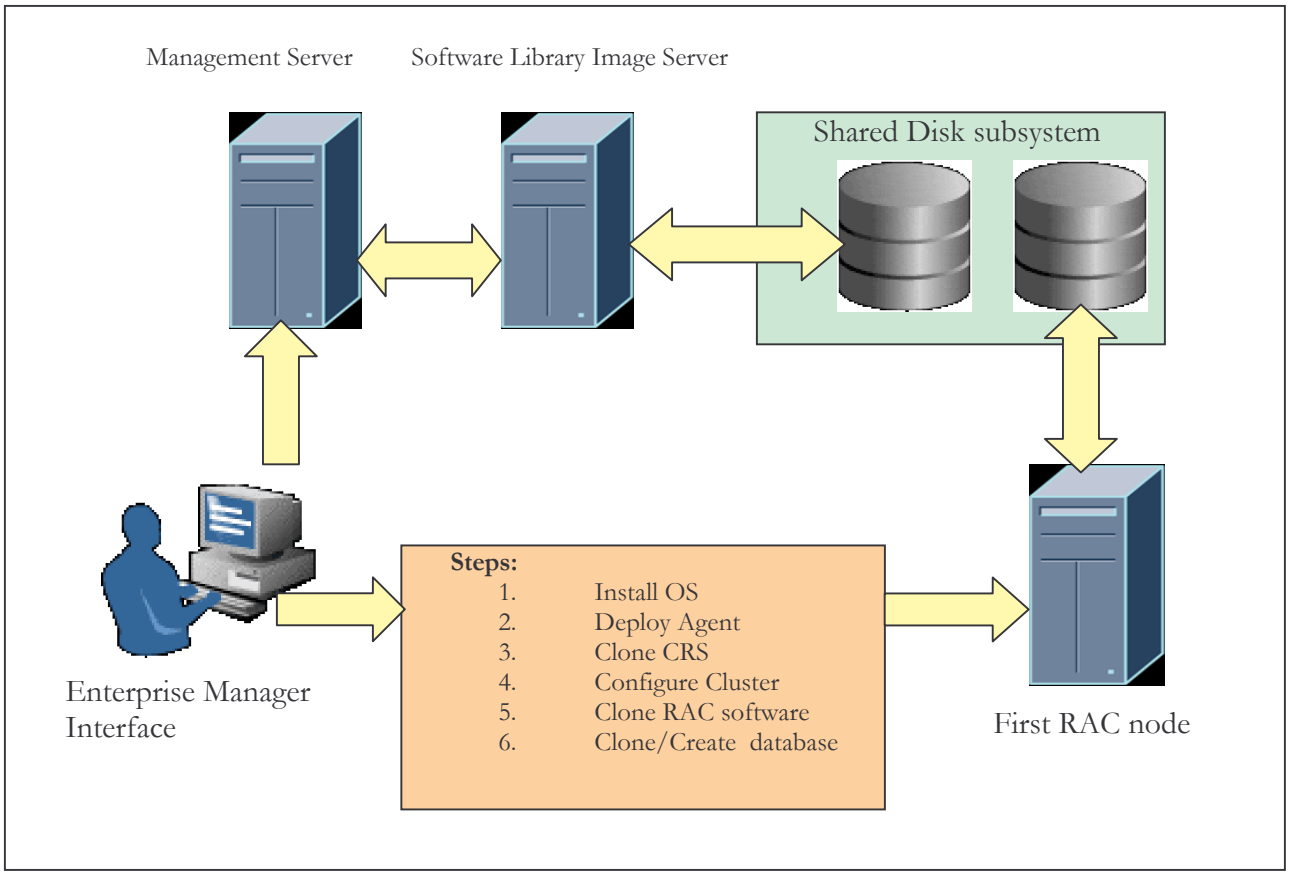
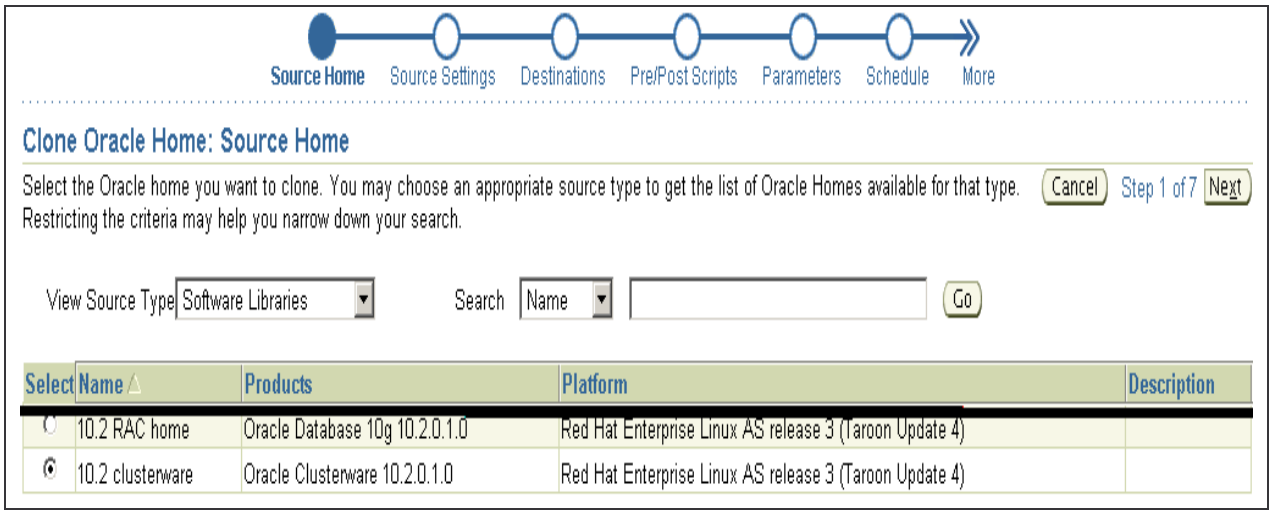
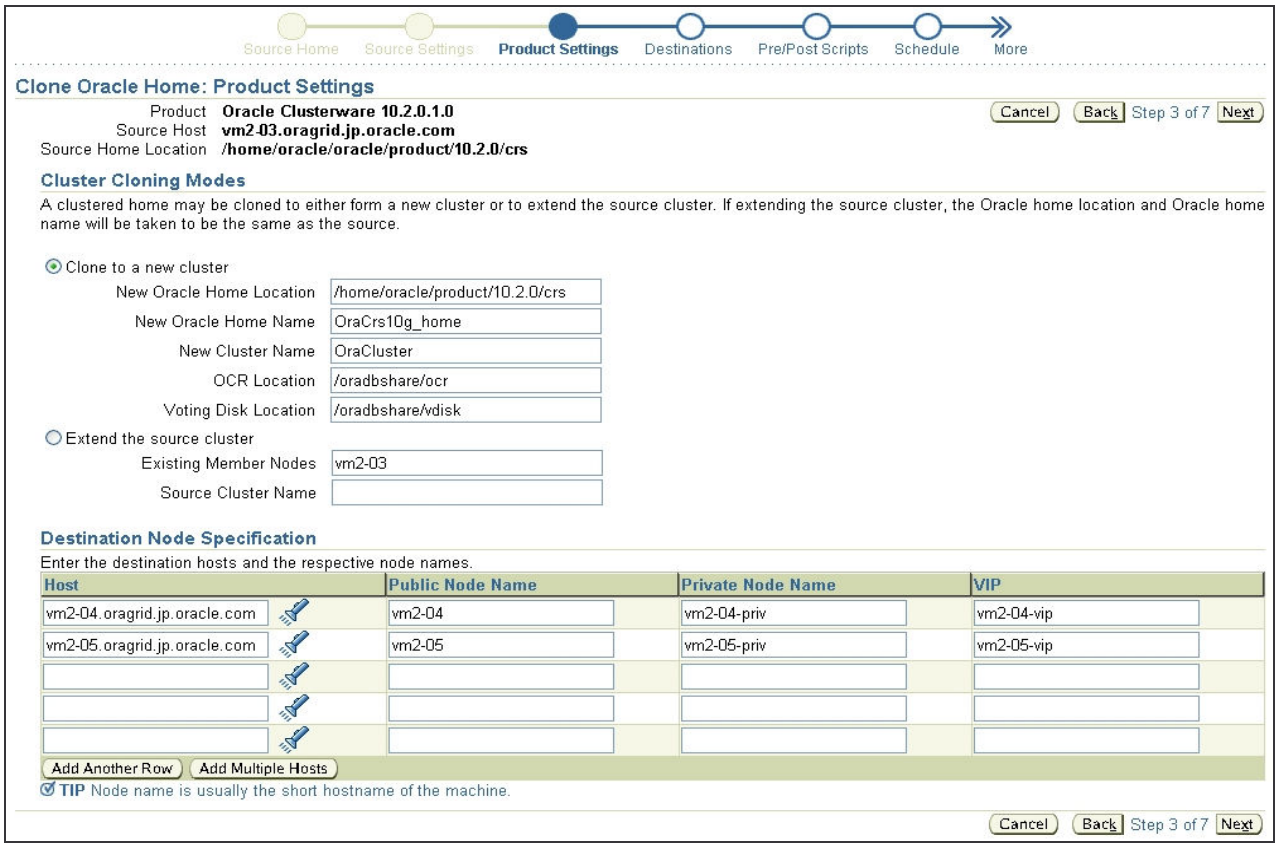


Figure 4: Creating a new cluster with gold images

The next three screenshots show how one can choose the clone source from the software library. The application is intelligent enough to detect that the source is clustered and presents a screen to either create a new cluster or extend a cluster. The application also allows running of root.sh scripts that need superuser privilege. For this "sudo" needs to be set up for the operating system user who is executing the cloning job. Apart from root.sh, it also allows execution of other "pre" and "post" cloning scripts. Pre and post scripts too may be run with superuser privileges. For a new cluster, the clusterware related configurations are automatically handled by the cloning job, so that a RAC software can be deployed on the new nodes immediately after.


Source Home
Source Settings
Destinations
Pre/Post Scripts
Parameters
Schedule
More
Clone Oracle Home: Source Home
Select the Oracle home you want to clone. You may choose an appropriate source type to get the list of Oracle Homes available for that type. Restricting the criteria may help you narrow down your search.
Cancel
Step 1 of 7
Next
View Source Type
Software Libraries
Search
Name
Go
Select
Name
Products
Platform
Description
10.2 RAC home
Oracle Database 10g 10.2.0.1.0
Red Hat Enterprise Linux AS release 3 (Taroon Update 4)
10.2 clusterware
Oracle Clusterware 10.2.0.1.0
Red Hat Enterprise Linux AS release 3 (Taroon Update 4)


Source Home
Source Settings
Product Settings
Destinations
Pre/Post Scripts
Schedule
More
Clone Oracle Home: Product Settings
Product Oracle Clusterware 10.2.0.1.0
Source Host vm2-03.oragrid.jp.oracle.com
Source Home Location /home/oracle/oracle/product/10.2.0/crs
Cancel
Back
Step 3 of 7
Next
Cluster Cloning Modes
A clustered home may be cloned to either form a new cluster or to extend the source cluster. If extending the source cluster, the Oracle home location and Oracle home name will be taken to be the same as the source.
Clone to a new cluster
New Oracle Home Location /home/oracle/product/10.2.0/crs
New Oracle Home Name OraCrs10g_home
New Cluster Name OraCluster
OCR Location /oradbshare/ocr
Voting Disk Location /oradbshare/vdisk
Extend the source cluster
Existing Member Nodes vm2-03
Source Cluster Name
Destination Node Specification
Enter the destination hosts and the respective node names.
Host
Public Node Name
Private Node Name
VIP
vm2-04.oragrid.jp.oracle.com
vm2-04
vm2-04-priv
vm2-04-vip
vm2-05.oragrid.jp.oracle.com
vm2-05
vm2-05-priv
vm2-05-vip
Add Another Row
Add Multiple Hosts
TIP Node name is usually the short hostname of the machine.
Cancel
Back
Step 3 of 7
Next

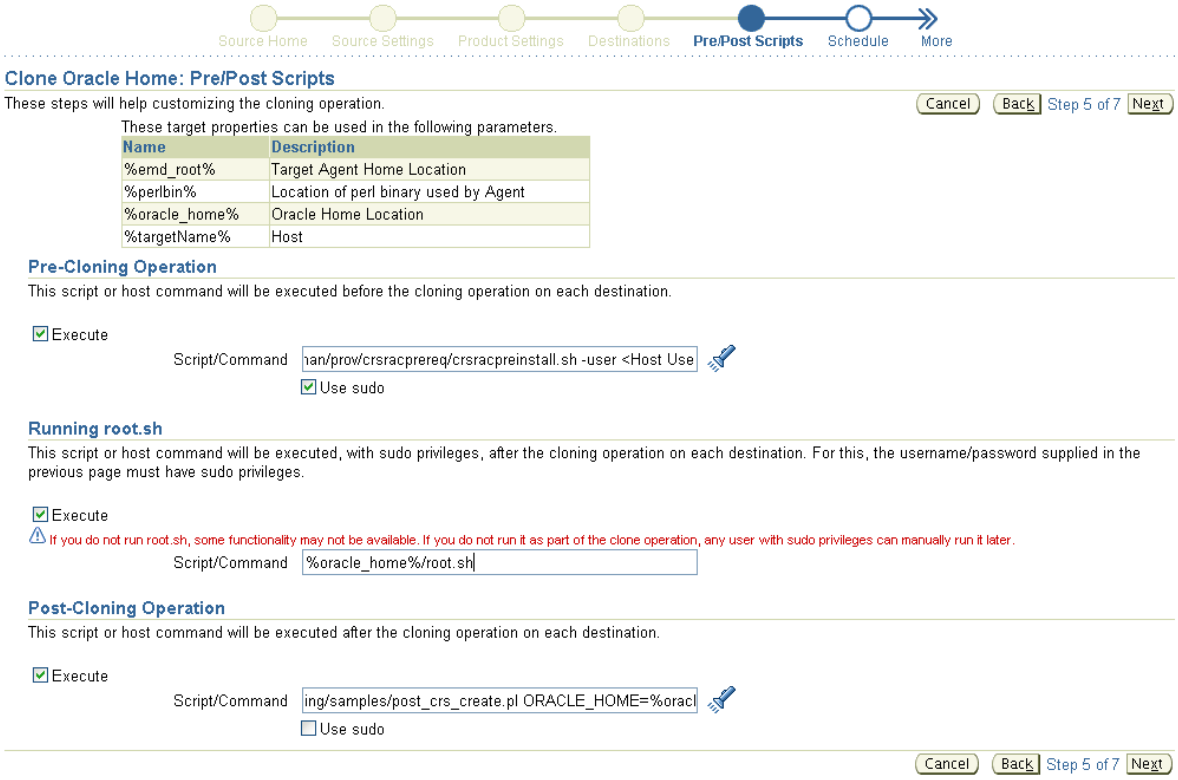


Figure 5,6,7: Flow in cloning clusterware software with additional pre and post scripts

After the Oracle Clusterware cloning is complete, the administrator has to kick off the RAC ORACLE_HOME cloning. The database configuration is not done by default as a part of RAC software cloning. One can run dbca in silent mode as a post cloning operation or create the database through other means either with or without using Enterprise Manager. In the following screenshot we just show the point of initiation of RAC cloning. The subsequent wizards have not been shown since they are very similar to Oracle Clusterware software cloning.

Please refer to the APPENDIX section for examples of pre and post cloning scripts that need to be run.

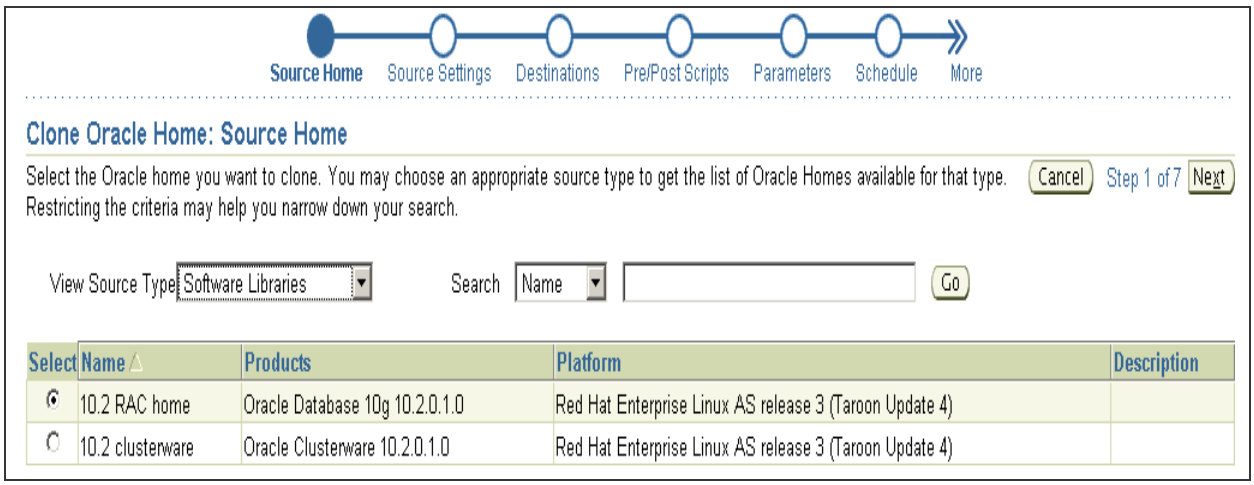


Figure 8: Interface to clone a RAC gold image from the software library

Case 2:Extending a cluster

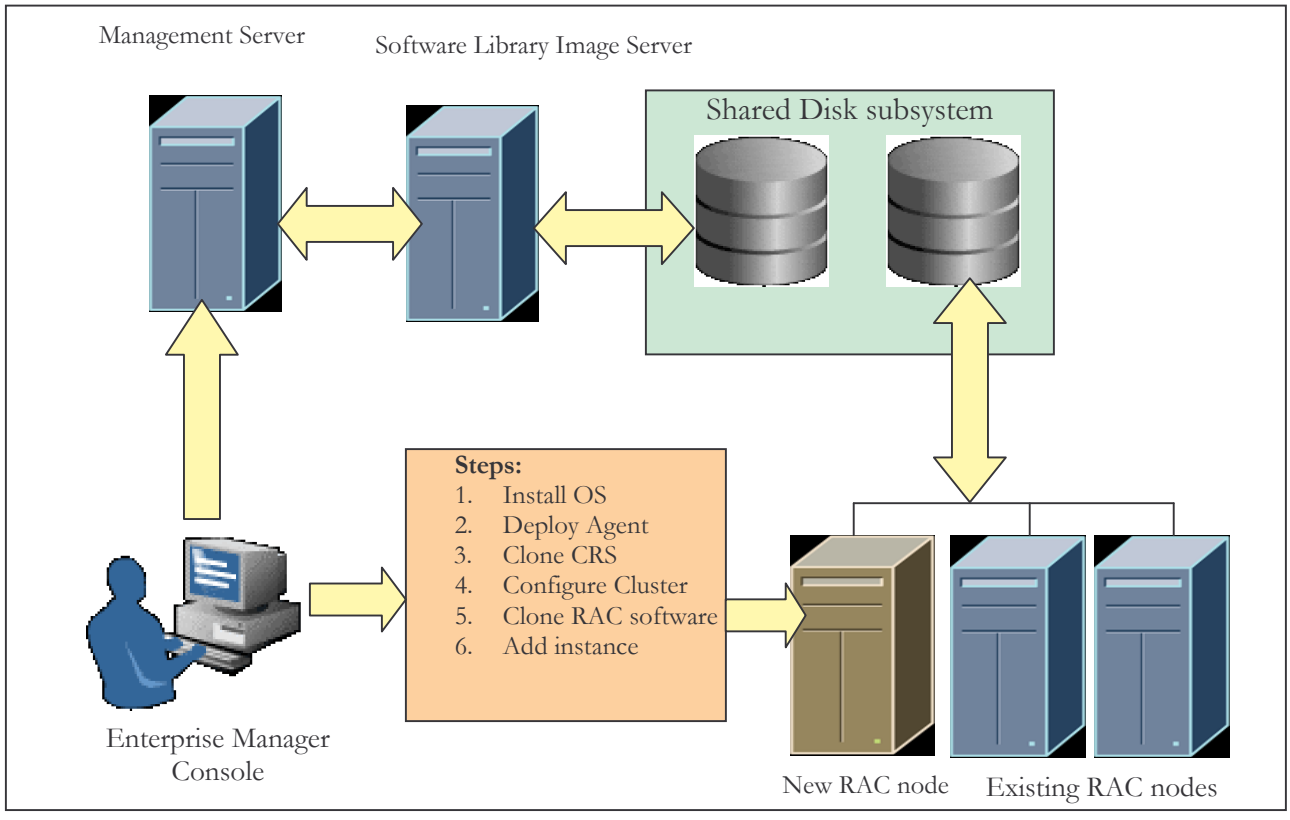
Once the first node of the cluster has been set up, one can add nodes to the same cluster. Similarly, one may want to add nodes to a cluster of multiple nodes, if the workload on the system increases. As mentioned earlier, the first step in setting up such additional node would be to deploy the operating system and the Management Agent. On Linux this could be done using the Bare Metal Provisioning technology (Review the Bare Metal Provisioning starter kit, available on OTN, for details). After the node registers with the Management Server as a standalone host, Clusterware and database software can be deployed on it. Such software can be sourced either from the existing nodes of the cluster or from the Software Library. As a best practice, it is recommended to keep the images in the Software Library up to date with all the patches and updates. The steps in adding software to the new node and configuring it as a part of the existing cluster includes:

- User chooses Oracle Clusterware gold image from software library and clones it to node 2 to n.
- User runs cluster extend configuration scripts as post scripts. Review section 2.2 for details.

- User chooses RAC gold image from software library and clones it to nodes 2 to n.

  [OPTIONAL: If DB uses ASM, one needs to extend the ASM home] User chooses ASM gold image clones it to nodes 2 to n.
- User invokes "add instance" from EM and chooses a list of nodes (subset of 2 to n) to add the database instances to. Thus user has a n node RAC cluster.

As in figure, the public, private and virtual hostnames are automatically populated with default values once the user chooses the target for deployment. The user can, however, choose to change these.



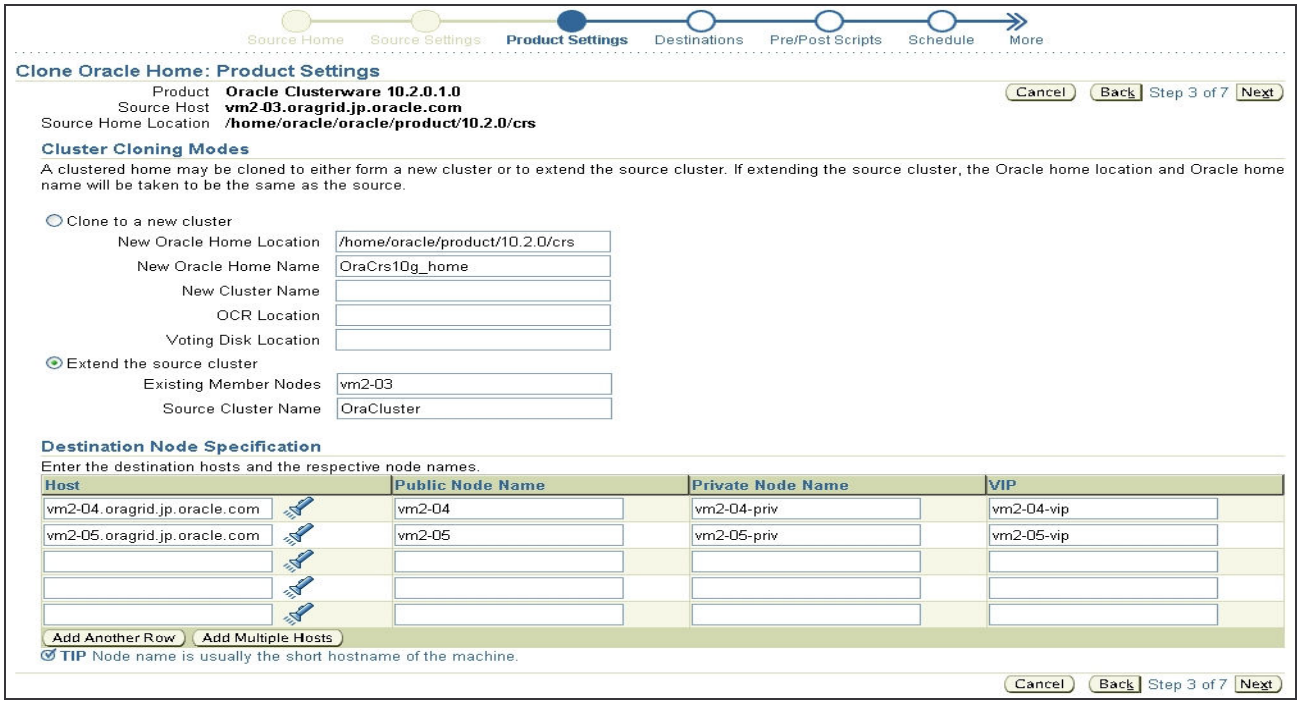


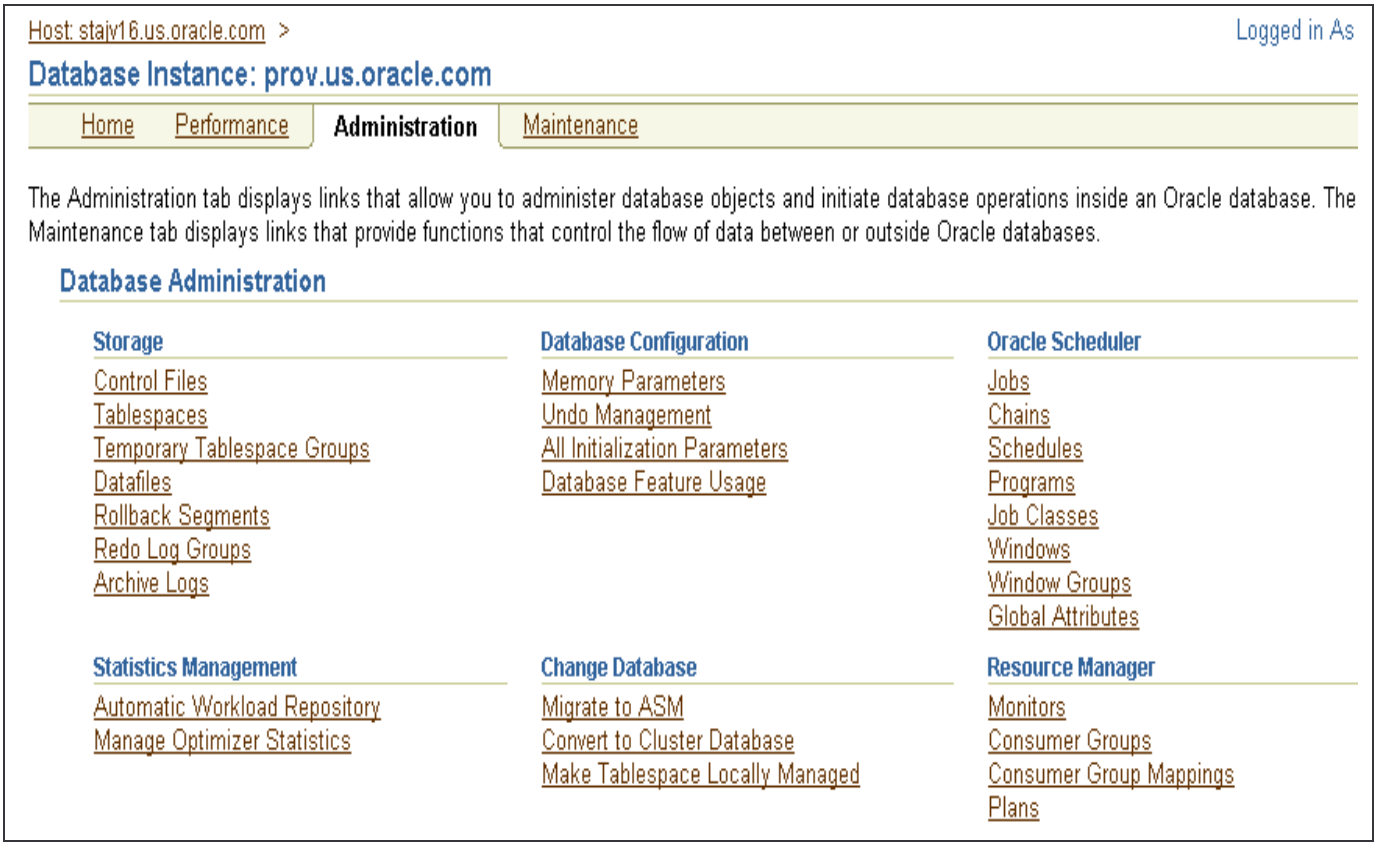
Figure 9,10: Extending the CRS and RAC software

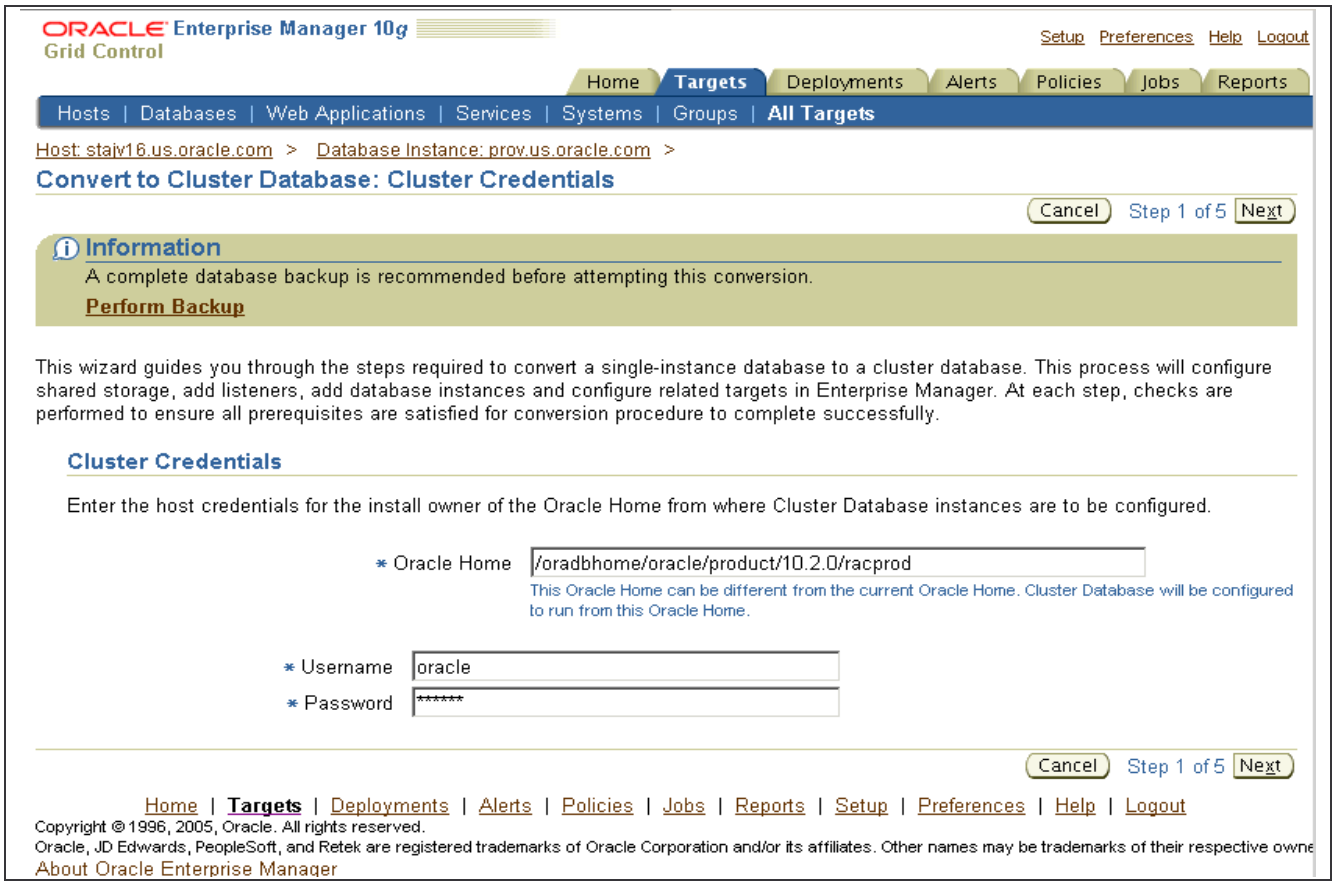
Case 3: Conversion of single instance to RAC

Enterprises can start with a single instance and scale out only when demand increases. One can also add and delete instances based on load fluctuations. These features can help data centers maximize the utilization without compromising on cost

Enterprise Manager 10gR2 provides a facility to convert an existing single instance database to a RAC database. During database cloning in 10gR2, the clone process always creates a single instance database, which can then be converted to RAC. The conversion to RAC is integrated and can be done within a single Enterprise Manager operation. This facility also helps enterprises that want to start with single instance systems and then convert to RAC as computational demand increase.

The series of screenshots below illustrate the application flow for converting a single instance database to RAC. It is interesting to note that best practices like ASM and Flash recovery area are configured in the same workflow.


Host: stajv16.us.oracle.com >
Logged in As
Database Instance: prov.us.oracle.com
Home
Performance
Administration
Maintenance
The Administration tab displays links that allow you to administer database objects and initiate database operations inside an Oracle database. The Maintenance tab displays links that provide functions that control the flow of data between or outside Oracle databases.
Database Administration
Storage
Control Files
Tablespaces
Temporary Tablespace Groups
Datafiles
Rollback Segments
Redo Log Groups
Archive Logs
Database Configuration
Memory Parameters
Undo Management
All Initialization Parameters
Database Feature Usage
Oracle Scheduler
Jobs
Chains
Schedules
Programs
Job Classes
Windows
Window Groups
Global Attributes
Statistics Management
Automatic Workload Repository
Manage Optimizer Statistics
Change Database
Migrate to ASM
Convert to Cluster Database
Make Tablespace Locally Managed
Resource Manager
Monitors
Consumer Groups
Consumer Group Mappings
Plans


ORACLE Enterprise Manager 10g
Grid Control
Setup Preferences Help Logout
Home Targets Deployments Alerts Policies Jobs Reports
Hosts | Databases | Web Applications | Services | Systems | Groups | All Targets
Host: stajv16.us.oracle.com > Database Instance: prov.us.oracle.com >
Convert to Cluster Database: Cluster Credentials
Cancel Step 1 of 5 Next
Information
A complete database backup is recommended before attempting this conversion.
Perform Backup
This wizard guides you through the steps required to convert a single-instance database to a cluster database. This process will configure shared storage, add listeners, add database instances and configure related targets in Enterprise Manager. At each step, checks are performed to ensure all prerequisites are satisfied for conversion procedure to complete successfully.
Cluster Credentials
Enter the host credentials for the install owner of the Oracle Home from where Cluster Database instances are to be configured.
* Oracle Home /oradbhome/oracle/product/10.2.0/racprod
This Oracle Home can be different from the current Oracle Home. Cluster Database will be configured to run from this Oracle Home.
* Username oracle
* Password ******
Cancel Step 1 of 5 Next
Home | Targets | Deployments | Alerts | Policies | Jobs | Reports | Setup | Preferences | Help | Logout
Copyright © 1996, 2005, Oracle. All rights reserved.
Oracle, JD Edwards, PeopleSoft, and Retek are registered trademarks of Oracle Corporation and/or its affiliates. Other names may be trademarks of their respective owne
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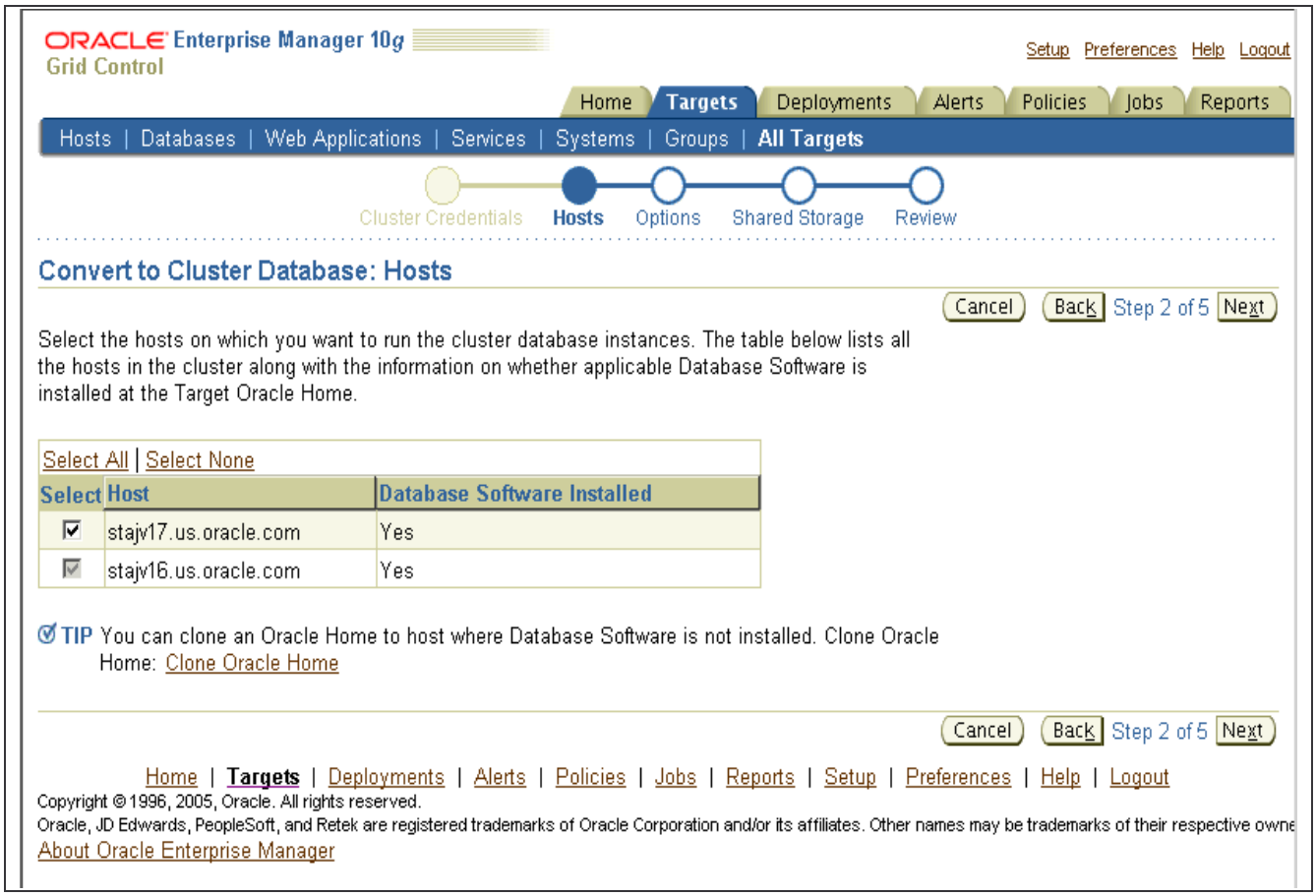
ORACLE Enterprise Manager 10g
Grid Control
Setup Preferences Help Logout
Home Targets Deployments Alerts Policies Jobs Reports
Hosts | Databases | Web Applications | Services | Systems | Groups | All Targets
Cluster Credentials Hosts Options Shared Storage Review
Convert to Cluster Database: Hosts
Cancel Back Step 2 of 5 Next
Select the hosts on which you want to run the cluster database instances. The table below lists all the hosts in the cluster along with the information on whether applicable Database Software is installed at the Target Oracle Home.
Select All | Select None
Select Host Database Software Installed
stajv17.us.oracle.com Yes
stajv16.us.oracle.com Yes
TIP You can clone an Oracle Home to host where Database Software is not installed. Clone Oracle Home: Clone Oracle Home
Cancel Back Step 2 of 5 Next
Home | Targets | Deployments | Alerts | Policies | Jobs | Reports | Setup | Preferences | Help | Logout
Copyright © 1996, 2005, Oracle. All rights reserved.
Oracle, JD Edwards, PeopleSoft, and Retek are registered trademarks of Oracle Corporation and/or its affiliates. Other names may be trademarks of their respective owne
About Oracle Enterprise Manager

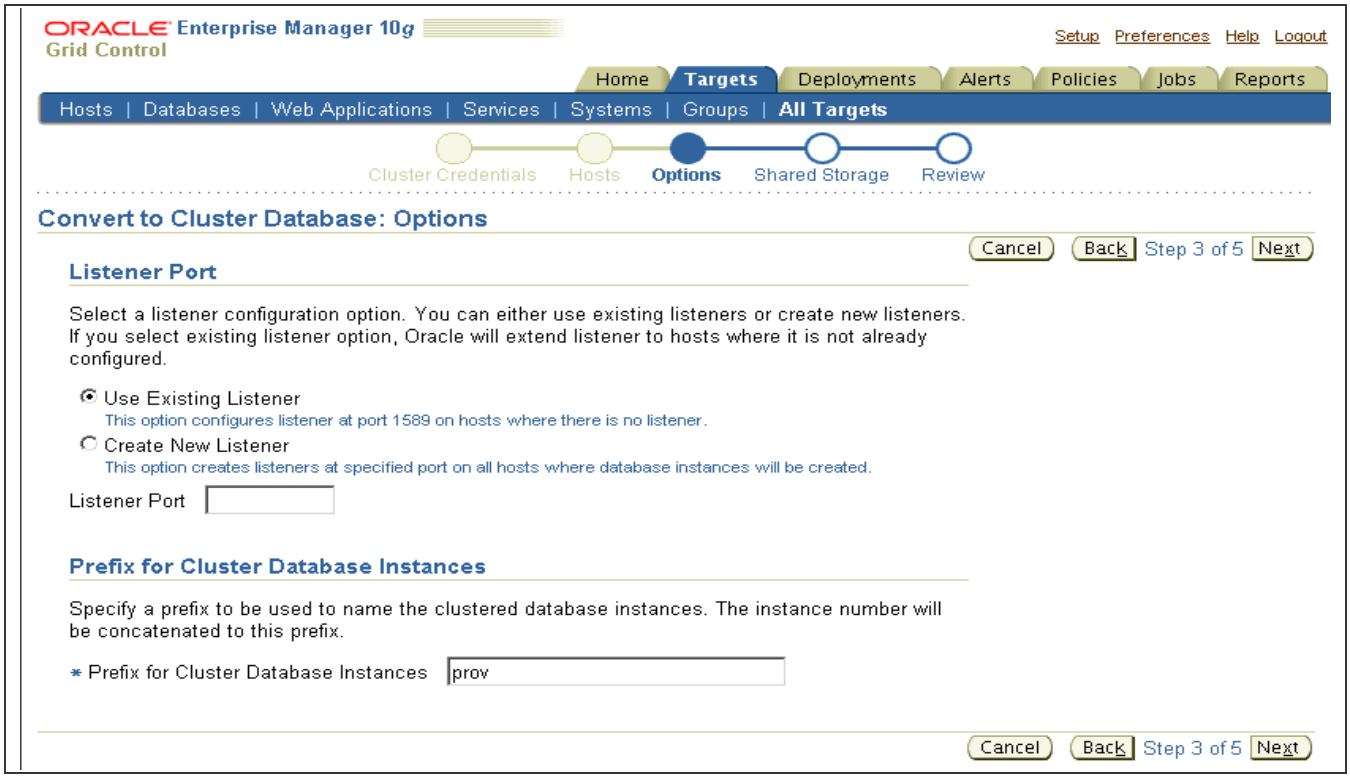

Figure 11-15: Wizard based flow for converting single instance to RAC

Case 4: Adding and deleting instances from Enterprise Manager

For cluster databases, Enterprise Manager also provides the facility to add or delete instances. It is assumed that the Clusterware and RAC software is already installed on all the nodes. These functionalities (hence links within EM) are available only in context of a RAC database target and help flexing the resources based on load. The entire operation is automated through an easy to use wizard and need no elaboration here.

Oracle Application Server Cloning

Cloning gold images should be the deployment method of choice in Oracle Application Server environments as well, for the same reasons mentioned earlier in this document. The Application Server cloning is particularly useful when extending the Application Server mid tier for scalability purposes.

Standardization in Oracle Application Server environments

Using Enterprise Manager's automated provisioning tools, administrators can ensure standardization in their data center and also significantly reduce the time spent on these tasks. To consistently maintain standardization in the topology, it is recommended that the new instances be added through "cloning" rather than "install and configure". Cloning ensures that the new instance is installed and configured exactly like other instances in the enterprise topology.. During Cloning, Oracle Universal Installer replays all actions that have been executed to install the home while preserving its configuration and deployments. The Enterprise Manager Console's cloning wizard automates the duplication of application server installations specifically, the directories where the Oracle homes reside). Thanks to its "multicasting" capability even multiple clones on multiple target hosts can easily be created in a single operation. Enterprise Manager home cloning automatically adjusts context specific configuration i.e. host names, instance name and IP addresses etc.

Application Server cloning can be done from the same two types of sources mentioned earlier viz. the Software library and the reference host. The administrator may standardize on a single reference image for the entire data center, or store multiple reference images-one per application. The images can be loaded in the Software Library via the method described earlier.

The Application Server cloning is useful to

- Clone a core J2EE middle tier
- Extend the middle tier across a cluster

- Clone the middle tier and associate it with a new infrastructure

Case 1: Cloning the core J2EE mid-tier

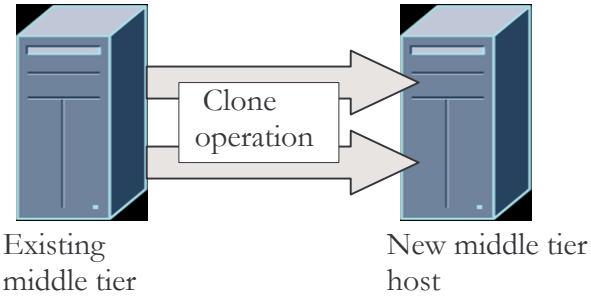

Figure 16:Cloning an AS J2EE mid-tier

In this case, the user clones a J2EE and webcache mid-tier (not connected to an infrastructure). The core installation has at least Oracle http Server (OHS) and J2EE installed. It may also have WebCache. In 10gR2 the cloning application allows changing the instance name (with AS 10.1.2) so that the operation can be performed within the same host. It is also important to note that not only the Application Server software but all J2EE application will be cloned from the source to the target. Behind the scenes the cloning application

- Invokes chgiphost to update the information of the new host.
- Adds the new instance name in DCM
- Optionally, adds the new instance name to the infrastructure, if the source mid-tier was connected to an infrastructure.

Case 2: Cloning mid-tier to expand mid-tiers for scalability/HA

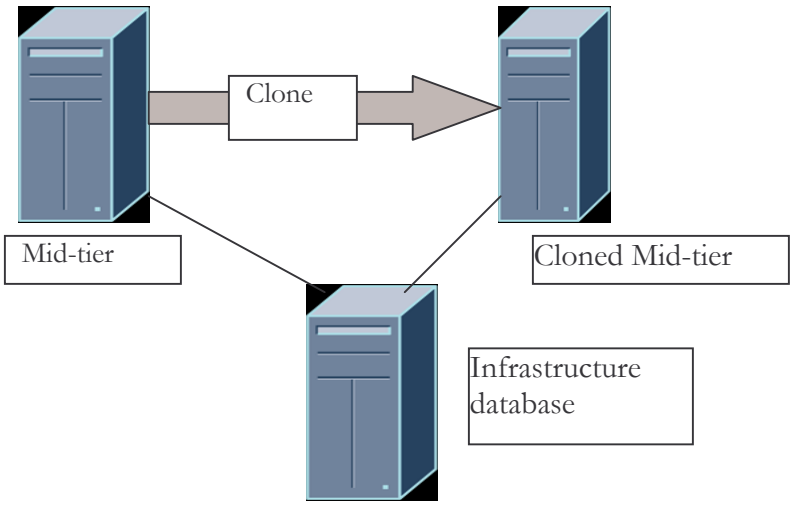

Figure 17: Extending mid-tier for enhanced scalability

In this scenario the mid-tier instance is cloned for the purpose of scalability. The cloned mid-tier is connected to the same infrastructure as the source instance. This implies that a new instance name must be added during the cloning process.

Since the cloned mid-tier uses the same infrastructure, it will be able to access the same information as the source instance. For example, portal applications that were accessible to the source instance will also be accessible to the cloned instance. The screenshot in figure 19 shows how the Application Server instance can join an existing cluster as a part of the cloning process.

Case 3: Cloning Mid-Tier to New Infrastructure (Post 10.1.2)

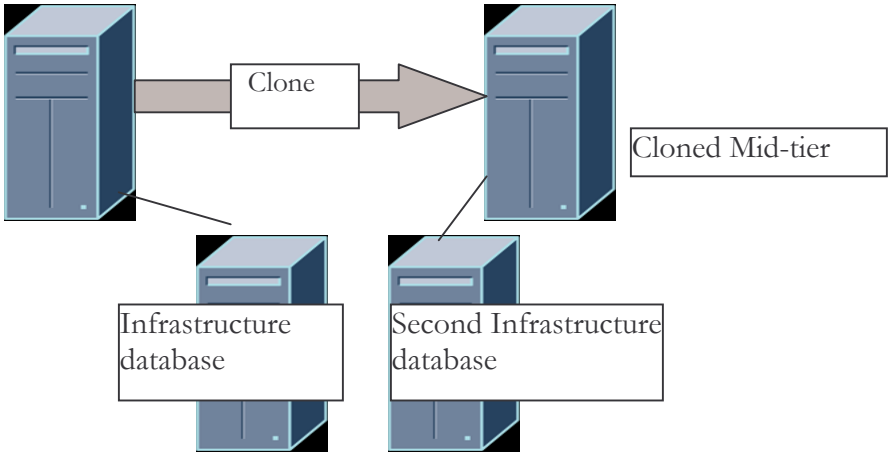

Figure 18: Cloning AS mid-tier and associating with new infrastructure

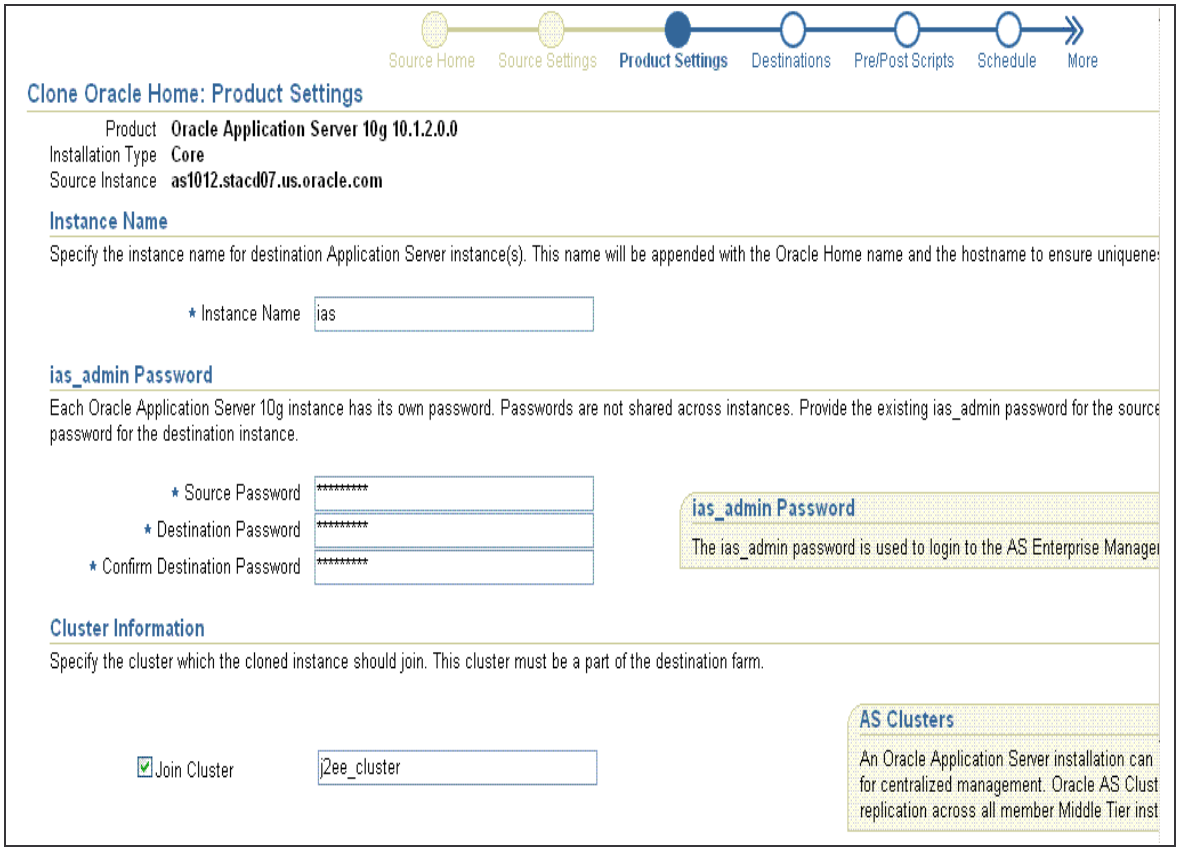

Figure 19: Interface for cloning AS ORACLE_HOME and joing an AS cluster

In that scenario the mid-tier is cloned and connected to a different infrastructure. The instance name may be left unchanged in that case. Since the infrastructure is not cloned, some applications may not be available for the cloned mid-tier. For example, portal applications which are stored in the metadata repository will not be available to the cloned mid-tier unless they were replicated to the new infrastructure by other means.

P.S.: This scenario is planned for post 10.1.2 AS release. In 10.1.2, users can use a scenario 2 followed by re-association to achieve a similar outcome. This applies to all use cases where the mid-tier is being cloned to a different environment, for example, from the development to the production environment and vice versa. Also, note that cloning of Metadata Repository or Idenitity Management environment is not supported in this release. For more details on changing the infrastructure services used by a mid-tier please refer to the Oracle Application Server Administrator's Guide, Chapter 8: Changing Infrastructure Services.

APPENDIX

The Appendix section contains sample pre and post scripts as well as other best practice procedures that accompany cloning. It also contains open issues in the base release of 10.2 i.e. 10.2.0.1. This section is intended for integrators and system administrators. The scripts are samples and may need modifications to suit the environment.

1. Oracle Clusterware cloning to create a new cluster on Unix

1.1. Running the pre-requisite checks on the target hosts

To run the pre-requisite checks on the target hosts please run the 'crsracpreinstall.sh' script. This script verifies that the target machine has been correctly setup so that there are no issues executing the clone operation. It also tries to fix issues found wherever possible. Please note that this script needs to be run as root (sudo access is required) since it also fixes the kernel parameters. It is fine that this script not be run if the user is confident that the target machine has been correctly setup.

Example:

```
%emd_root%/sysman/prov/crsracprereq/crsracpreinstall.sh
-user <Host User Name for the Oracle Home> -oh
%oracle_home% -ohname <Oracle Home Name> -agentHome
%emd_root% -check oracle.sysman.crsracprov.crs
```

Please note that this script cannot be run in standalone mode. It must be run only from the clone wizard.

Also review the Pre-Installation Tasks mentioned in *the* ***Oracle Database Oracle Clusterware and Oracle Real Application Clusters Installation Guide 10g Release 2 (10.2) for Linux.***

1.2. Running the post cloning script

Usually manual steps are required to configure the Oracle Clusterware stack in the cloned Oracle Home. Oracle provides a sample script out of box - 'post_crs_create.pl' – that may be run as a post cloning script to configure the Oracle Clusterware stack.

Example:

```
cd %emd_root%/sysman/admin/scripts/cloning/samples
%perlbin%/perl /post_crs_create.pl
ORACLE_HOME=%oracle_home%
```

If one chooses not to run the above-mentioned scripts then the following steps would need to be executed manually on each remote node.

a) Get the remote port from the $ORACLE_HOME/opmn/conf/ons.config file

b) Get the nodelist from the $ORACLE_HOME/inventory/ContentsXML/ oraclehomeproperties.xml file.

c) Run the following command from the $ORACLE_HOME/bin directory:

```
./racgons add_config node1:<remote_port>
node2:<remote_port>
```

d) Run the following command from the $ORACLE_HOME/bin directory to find the interconnect information

```
./oifcfg iflist -p
```

The above step will return the following data

- <interface_name> <subnet> <PRIVATE/UNKNOWN>

- If you get multiple "interface_name" of type UNKNOWN, then you need to choose one interface and mark it as "public".

- If you get multiple "interface_name" of type PRIVATE, then you need to choose one interface and mark it as "cluster_interconnect"

e) Run the following command from the $ORACLE_HOME/bin directory:

```
./oifcfg setif -global <interface_name>/<subnet>:public
<inteface_name>/<subnet>:cluster_interconnect
```

1.3. Specifying mirror locations for OCR and Voting Disk.

To specify these locations one would need to select the 'updateCSProps.pl' pre cloning script passing to it the required parameters.

Example:

```
cd %emd_root%/sysman/admin/scripts/cloning/samples

%perlbin%/perl updateCSProps.pl -oraclehome
%oracle_home%  n_storageTypeOCR=1 s_ocrMirrorLocation=
<OCR Mirror Loc> n_storageTypeVDSK=1
s_OcrVdskMirror1RetVal=<Vdisk1 Loc>
s_VdskMirror2RetVal=<Vdisk2 Loc>
```

If one chooses not to run the above-mentioned scripts then the $ORACLE_HOME/clone/config/cs.properties file in the source Oracle Home can be updated to pass in these options. Update the clone_command_line variable to include the following options –

```
n_storageTypeOCR=1 s_ocrMirrorLocation=<OCR Mirror Loc>
n_storageTypeVDSK=1 s_OcrVdskMirror1RetVal=<Vdisk1 Loc>
s_VdskMirror2RetVal=<Vdisk2 Loc>
```

One will not be able to pass in these variables via a response file in this specific case only.

1.4. Open Issues

As one can run only a single script as a pre/post script if one needs to run 1.1 and 1.3. at the same time one would need to write a wrapper script to do so and place the same in the source Oracle Home.

1.5. What if sudo based access is not available

Part of cloning Oracle Clusterware to create a new cluster on Linux includes a step that requires a user to have sudo access. The step in question is the running of the root.sh script on the target nodes. If a user does not have sudo access, one would need to uncheck the 'Execute' checkbox for root.sh in the 'Clone Oracle Home: Pre/Post Scripts' screen.

After the job completes one would now need to go to each node in the new cluster and run root.sh. This needs to be done serially.

Next one would need to run the 'post_crs_create.pl' script on each new node as follows –

```
>cd
AGENT_ORACLE_HOME/sysman/admin/scripts/cloning/samples/
>perl post_crs_create.pl ORACLE_HOME=<CRS_ORACLE_HOME>
```

One can use perl from the Agent Oracle Home (AGENT_ORACLE_HOME/perl/bin/perl). Please note that the version of perl used should be 5.6.1 or above.

2. Oracle Clusterware cloning to extend an existing cluster on Unix

2.1. Running the pre-requisite checks on the target hosts

To run the pre-requisite checks on the target hosts please run the 'crsracpreinstall.sh' script. This script verifies that the target machine has been correctly setup so that there are no issues executing the clone operation. It also tries to fix issues found wherever possible. Please note that this script needs to be run as root (sudo access is required) since it also fixes the kernel parameters. It is fine that this script not be run if the user is confident that the target machine has been correctly setup.

Example:

```
%emd_root%/sysman/prov/crsracprereq/crsracpreinstall.sh
-user <Host User Name for the Oracle Home> -oh
%oracle_home% -ohname <Oracle Home Name> -agentHome
%emd_root% -check oracle.sysman.crsracprov.crs
```

Please note that this script cannot be run in standalone mode. It must be run only from the clone wizard.

Also review the Pre-Installation Tasks mentioned in *the* ***Oracle Database Oracle Clusterware and Oracle Real Application Clusters Installation Guide 10g Release 2 (10.2) for Linux.***

2.2. Running the post cloning script

Manual steps are required to configure the Oracle Clusterware stack in the cloned Oracle Home. Oracle has provided a sample script - 'post_crs_extend.pl' – that may be run as a post cloning script to configure the Oracle Clusterware stack.

Example:

```
cd  %emd_root%/sysman/admin/scripts/cloning/samples/
%perlbin%/perl post_crs_extend.pl
ORACLE_HOME=%oracle_home%
```

If one chooses not to run the above-mentioned scripts then the following steps would need to be executed manually on each remote node.

a) Get the remote port from the $ORACLE_HOME/opmn/conf/ons.config file

b) Get the LOCAL_NODE from the $ORACLE_HOME/inventory/ContentsXML/oraclehomeproperties.xml file

c) Run the following command from the $ORACLE_HOME/bin directory:

```
./racgons add_config local_node:<remote_port>
```

2.3. What if sudo based access is not available?

Part of cloning Oracle Clusterware to extend a cluster on Linux includes a step that requires the user to have sudo access. The step in question is the running of the root.sh script on the target nodes. If a user does not have sudo access, one would need to uncheck the 'Execute' checkbox for root.sh in the 'Clone Oracle Home: Pre/Post Scripts' screen.

After the job completes one would now need to first run rootaddnode.sh as root on the node on which the addNode step was run – one can determine the node on which the addNode step ran by reviewing the job steps and examining the target for the addNode step.

After the job completes one would now need to go to each node in the new cluster and run root.sh. This needs to be done serially.

Next one would need to run the 'post_crs_extend.pl' script on each new node as follows –

```
>cd
AGENT_ORACLE_HOME/sysman/admin/scripts/cloning/samples/
>perl post_crs_extend.pl ORACLE_HOME=<CRS_ORACLE_HOME>
```

One can use perl from the Agent Oracle Home (AGENT_ORACLE_HOME/perl/bin/perl). Please note that the version of perl used should be 5.6.1 or above.

3. Incorporating pre-requisite checks in a 10.2 Management Agent

The scripts are required to verify pre-requisites, and take corrective action if possible, to setup the environment for a Oracle Clusterware install. These will not be available in an installed 10.2 Agent.
The following steps need to be followed to deploy the 'crsracpreinstall.sh' and dependent files.
a. Execute the following command in the Agent Oracle Home:

```
mkdir -p $ORACLE_HOME/ sysman/prov/crsracprereq
```

b. From the OMS Oracle Home copy the $ORACLE_HOME/sysman/rac_download/10.2/linux/release/10.2.0.1.0/prereqs/crsrac_prereq_fixup_<platform>.jar file to the following location in the Agent Oracle Home:

```
$ORACLE_HOME/sysman/prov/crsracprereq
```

One should copy the jar file corresponding to the platform the 10.2 Agent is installed on. In this example, "linux" has been used.

c. Execute the following commands on the Agent Oracle Home:

```
cd $ORACLE_HOME/sysman/prov/crsracprereq
jar xvf crsrac_prereq_fixup_<platform>.jar
chmod +x agent10g/sysman/prov/crsracprereq/crsracpreinstall.sh
rm crsrac_prereq_fixup_<platform>.jar
```

Note: These scripts should have been present in a Agent deployed using the 'Agent Push' mechanism. This is however not the case. Bug 4695582 is tracking this issue. The fix is being included in the 10.2.0.2 patchset.

4. Recovery scenarios

The only supported recovery scenario is for Oracle Clusterware Cloning (new cluster and extension cases) if the post-script is not available at the location specified in the wizard. The job will stop at this failure condition and the user may retry the job after ensuring that the scripts are placed in the location specified in the wizard.

For all other failure conditions please clear the failed install and try again. Sections 5 details the steps to clean up the host.

5. Cleaning up a machine with previous Oracle Clusterware/RAC installs on Unix

The Oracle Clusterware/RAC install/clone operation may fail because of a previously unfinished install that was not cleared out from the system.

The following steps need to be executed to clean up such a machine before commencing a Oracle Clusterware/RAC install/clone operation. **The examples here use command line interfaces on the target host, it may be possible to execute this from Enterprise Manager using the job subsystem.**

- **Steps to Clean up RAC Install on a Linux Machine:**

Scenario is that a RAC home is installed on node1 and node2. The database home on node2 needs to be deleted. Say $ORACLE_HOME represents the location of this home on the nodes.

On node1 run DBCA to remove any database instances on node2, if required.

If one uses ASM and this is the home from which the ASM instance runs, one needs to clean up ASM.

3) If this is the ORACLE_HOME from which the node-specific listener runs, then one should use NETCA to remove the listener and its Oracle Clusterware resources. If necessary recreate this listener in other homes.

On the node to be deleted (node2 in this case), run the following command from $ORACLE_HOME/oui/bin

```
./runInstaller -updateNodeList ORACLE_HOME=<Oracle Home location> "CLUSTER_NODES={node2}" -local
```

On the node to be deleted (node2 in this case),

If non-shared home then de-install the database installation using runInstaller from $ORACLE_HOME/oui/bin.

If shared home then de-install should not be done. However detach home is required on node2. Run the following command from $ORACLE_HOME/oui/bin

```
./runInstaller -detachHome ORACLE_HOME=<Oracle Home Location>
```

On node1 (or in case of multiple node install, on any node other than the one to be deleted), run the following command from $ORACLE_HOME/oui/bin

```
./runInstaller -updateNodeList ORACLE_HOME=<Oracle Home location> "CLUSTER_NODES={comma separated list of nodes that still are part of the RAC install}"
```

5.2 Steps to Clean up Oracle Clusterware Install on a Linux machine

This is the case where Oracle Clusterware home is installed on node1 and node2. node2 needs to be deleted from the cluster.

For node2, perform DeleteNode for database homes as mentioned in the section above.

From node1 $CRS_HOME/bin run

```
./racgons remove_config node2:<remote_port>
```

The remote port can be obtained using the following from $CRS_HOME/opmn/conf

cat ons.config

The port is optional here.

On node2, run rootdelete.sh as root from $CRS_HOME/install. In case of multiple nodes to be deleted, do the same on the other nodes to be deleted.

```
./rootdelete.sh remote nosharedvar nosharedhome
```

On node1 (or any node that is not being deleted), run the following command from $CRS_HOME/install, as root

```
./rootdeletenode.sh node2,node2-number,node3,node3-number…..
```

Here node2, node3,.. are the nodes to be deleted. The node numbers can be found using the following command

```
$CRS_HOME/bin/olsnodes -n
```

On the node(s) to be deleted (node2 in this case), run the following command from $CRS_HOME/oui/bin

```
./runInstaller -updateNodeList ORACLE_HOME=<Oracle Clusterware
Home location> "CLUSTER_NODES={node2}" CRS=TRUE -local
```

If the ORACLE_HOME is non-shared, then de-install the Oracle Clusterware installation using runInstaller from $CRS_HOME/oui/bin.

If the ORACLE_HOME is shared, then de-install should not be done. However detach home is required on node2. Run the following command from $CRS_HOME/oui/bin on node2

```
./runInstaller -detachHome -silent ORACLE_HOME=<Oracle Home
Location>
```

On node1 (or in case of multiple node install, on any node other than the one to be deleted), run the following command from $Oracle Clusterware_HOME/oui/bin

```
./runInstaller -updateNodeList ORACLE_HOME=<Oracle Clusterware
Home location> "CLUSTER_NODES={comma separated list of nodes
that still are part of the Oracle Clusterware install}"
CRS=TRUE
```

6. Oracle Clusterware cloning (10.2.0.1) on Windows 32 bit host

6.1 Creating a new cluster on Windows

6.1.1. Running the pre cloning script

A user is required to create a response file and pass the same to the cloning scripts. This may be done either by invoking the 'updateCSProps.pl' pre cloning script or by updating cs.properties.

Using the 'updateCSProps.pl' pre cloning script: This script causes user-specified key-value pairs to be appended to the OUI command-line executed during the install. The values should preferably be specified in a response file. Required key/value pairs for the response-file are:

* RESPONSEFILE_VERSION
* sl_OHPartitionsAndSpace_valueFromDlg - specifies the split-up of disk-partitions for OCR/VDisk locations)
* ret_PrivIntrList - specifies the interconnects to use

Brief description of values for keys above:

sl_OHPartitionsAndSpace_valueFromDlg consists of 6 values for each location:

1. Disk no.
2. Partition no.
3. Partition Size (MB)
4. Format Type
    * 0 None/RAW
    * 1 CFS for Data
    * 2 CFS for Software
5. Drive Letter
    * N/A if RAW,
    * "Available" drive letter if CFS
6. Usage Type
    * 0 - Data/Software use ONLY
    * 1 - OCR Primary ONLY
    * 2 - Voting disk ONLY

* 3 - OCR Primary and Voting Disk on the same CFS partition
* 4 - OCR mirror ONLY
* 5 - OCR mirror and VDSK on the same CFS partition

Entries in ret_PrivIntrList should be specified as a comma-separated list of interfaces. Each entry should be a colon-separate string with three fields. The fields should be specified as follows:

1. The first field should be the interface name.
2. The 2nd field should be the subnet mask of the interface
3. The 3rd field should indicate how Oracle Clusterware should use the interface - as a public interface, private interface, or whether it should not be used at all by the clusterware. This field should be specified as a number - 0, 1, or 2. These numbers represent the following values:
    * 1 = Public
    * 2 = Private
    * 3 = Do Not Use

Sample response file

Case:

OCR and VDisk will need to be on Partition-2 of Disk-1 (Partition-2 has size 10002 MB). The partition must be CFS formatted. Both OCR and VDisk will reside on the same partition. The drive letter for the partition must be 'G:'. There is only data-storage, and no software-storage.

Two Interconnects are to be used – one public and one private: 'Local Area Connection' (public) and 'Local Area Connection 2' (private).

The above case will need a response file like:

RESPONSEFILE_VERSION=2.2.1.0.0

sl_OHPartitionsAndSpace_valueFromDlg={"1","2","10002","1","G:","3"}

ret_PrivIntrList={"Local Area Connection:123.45.67.0:1","Local Area Connection 2:123.45.89.0:2"}

Example:

```
cd  %emd_root%\sysman\dmin\cripts\loning\samples
%perlbin%\perl  updateCSProps.pl  -oraclehome  %oracle_home%  -
responseFile <location of pre-populated response-file>
```

If one chooses not to run the above-mentioned scripts then the %ORACLE_HOME%\clone\config\cs.properties file in the source Oracle Home can be updated to pass in these options to OUI. Update the clone_command_line variable to include the following
-responseFile <location of pre-populated response-file>

6.1.2. Running the post cloning script

Please note that we recommend users run the 'runAsBat.pl' post cloning script. This script creates and runs the necessary batch file for running post-install config tools at the end of the clone operation. These config tools are required for cluster-creation to be complete.

Example:

```
cd  %emd_root%\sysman\admin\scripts\cloning\samples
%perlbin%\perlrunAsBat.pl
%oracle_home%\cfgtoollogs\configToolAllCommands
```

Note: If it is required that the user specify his/her own post cloning script then a user would need to include the above script invocation in his/her own script and also take care of variable substitution.

6.2 Extending an existing cluster on Windows

When an installed Oracle Clusterware Oracle Home is used as a source, then no Pre or post cloning scripts are required when extending the exisiting cluster.

However, if the source is a gold image (Oracle Clusterware Software Library Component) then, the following key/value pairs need to be specified using the 'updateCSProps.pl' pre cloning script. (see Section 6.1.1 for more details)

* sl_OHPartitionsAndSpace_valueFromDlg - specifies the split-up of disk-partitions for OCR/VDisk locations)
* ret_PrivIntrList - specifies the interconnects to use
* s_clustername - specifies the name of the cluster

The values should be specified in a response file.

Bug 4668273 is tracking the above issue. The issue here is that the install process does not pick up all values from the existing nodes in the cluster if the gold image is in a different cluster.

6.3 Cleaning up a RAC install on Windows 32 bit host

The examples here use command line interfaces on the target host, it may be possible to execute this from Enterprise Manager using the job subsystem.

Case: The RAC home is installed on node1 and node2, and the home on node2 needs to be deleted.

Say %ORACLE_HOME% represents the location of this home on the nodes.

1) On node1 run DBCA to remove any database instances on node2, if required.

2) If you use ASM and this is the home from which the ASM instance runs, clean up ASM.

3) If this is the home from which the node-specific listener runs, then use NETCA to remove the listener and its Oracle Clusterware resources. If necessary recreate this listener in other homes.

4) On the node to be deleted (node2 in this case), run the following command from %ORACLE_HOME%\oui\bin:

```
setup.exe -updateNodeList ORACLE_HOME=<Oracle Home location>
"CLUSTER_NODES={node2}" -local
```

5) On the node to be deleted (node2 in this case), de-install the database installation using setup.exe from %ORACLE_HOME%\oui\bin:

```
setup.exe
```

6) On node1 (or in case of multiple node install, on any node other than the one to be deleted), run the following command from %ORACLE_HOME%\oui\bin:

```
setup.exe -updateNodeList ORACLE_HOME=<Oracle Home location>
"CLUSTER_NODES={comma separated list of nodes that still are
part of the RAC install}"
```

6.4 Cleaning up a Oracle Clusterware install on Windows 32 bit host

The examples here use command line interfaces on the target host, it may be possible to execute this from Enterprise Manager using the job subsystem.

Case: The Oracle Clusterware home is installed on node1 and node2, and node2 needs to be deleted from the cluster.

Say %CRS_HOME% represents the location of this home on the nodes.

- For node2, perform DeleteNode for database homes as mentioned in the RAC/DB cleanup section.

2) On node1 (or any node that is not being deleted), run the following command from %CRS_HOME%\bin:

```
cssetup del -nn node-name,node number
```

(Here node-name is the node to be deleted, and node number is its number as obtained from olsnodes –n.)

3) On the node(s) to be deleted (node2 in this case), run the following command from %CRS_HOME%\oui\bin:

```
setup.exe -updateNodeList ORACLE_HOME=<Oracle Clusterware Home
location> "CLUSTER_NODES={node2}" CRS=TRUE -local
```

4) On node2, de-install the Oracle Clusterware installation using setup.exe from %CRS_HOME%\oui\bin.

```
setup.exe
```

5) On node1 (or in case of multiple node install, on any node other than the one to be deleted), run the following command from %CRS_HOME%\oui\bin:

```
setup.exe -updateNodeList ORACLE_HOME=<Oracle Clusterware Home
location> "CLUSTER_NODES={comma separated list of nodes that
still are part of the Oracle Clusterware install}" CRS=TRUE
```

7. Known issues with cloning with Grid Control 10.2.0.1

7.1 AS 9.0.4 Cloning (9.0.4.0, 9.0.4.1, 9.0.4.2)

If the Oracle Home has been patched with any one-off patch then cloning will fail. Please execute the following steps to get cloning to work -

- Update the OPatch version (the default version in the Oracle Home is 1.0.0.0.45, which does not support the pre-scripts feature) by downloading patch 2617419 from metalink and unzip it. Update $ORACLE_HOME/OPatch(OPatch Version: 1.0.0.0.45) with the latest OPatch distribution from Metalink (2617419). The updated OPatch version needs to be 1.0.0.0.53 or higher.
- From Metalink download and apply patch 4386413 for the appropriate AS release.

This patch will resolve the issues introduced by the application of previous one-off patches and will prevent the occurrence of similar issues with the application of one-off patches going forward.

If one is cloning AS 9.0.4.1 on Unix, one would need to download from Metalink and apply patch 4386413. This patch resolves an issue with ChangeIP scripts that cloning calls internally.

7.2 AS 10.1.2 Cloning (10.1.2.0.0, 10.1.2.0.2)

(i) If the Oracle Home has been patched with any one-off patch then cloning will fail. Please execute the following steps to get cloning to work -

- From Metalink download and apply patch 4386413 for the appropriate AS release.

This patch will resolve the issues introduced by the application of previous one-off patches and will prevent the occurrence of similar issues with the application of one-off patches going forward.

ii) When cloning an instance that is not a Standalone instance to a different host the instance name specified needs to be different from what it is at the source. This is done because instance name comparision between the source and the destination is not done with the fully qualified instance name.

This is being tracked in bug 4685577.

7.3 Oracle Clusterware

(i) Extend case to more than one node (10.2.0.1)

Due to bug 4567879 one will only able to extend Oracle Clusterware one node at a time. This is being fixed in 10.2.0.2.

(ii) Extending a clusterware using as a software library component as a source, which was not created from a node in the cluster being extended to.

Due to bug 5036894 one will not be able to extend Oracle Clusterware using a software library component, which was not created from a reference node in the cluster being extended to. The workaround would be to create a software library component from a node in the cluster, which is being extended.

7.4 Cloning from Enterprise Manager 10.2

When creating a component in the Provisioning workspace, only the first 25 Oracle Homes are displayed. One will have to narrow the search criteria to retrieve only the homes one is interested in.

- While cloning from a RAC and Oracle Clusterware software library gold image, the user needs to select the "Source is clustered" checkbox to trigger cloning in cluster mode. RAC and Oracle Clusterware should be cloned in cluster mode for the expected cloning steps to follow.
- DBControl does not start up from a DB created from a cloned 10.2.0.1 Database Home.

  This can happen only when a 10.2 Enterprise Manager Software (Agent or OMS) is installed in the same host of the target Database This will be fixed in the future patchset of the database. Alternately, one can request a standalone OUI from Support that has the fix and install that in the database ORACLE_HOME.

  This issue is being tracked by bug 4665198.

  Note: This issue will not occur if the source 10.2.0.1 Database Oracle Home is installed after the 10.2 Agent is installed.
- If one is creating an AS Component in the Software Library there will be an issue if the AS Instance is connected to an infrastructure.

  The following workaround can however be used to successfully create the AS Component if the instance is connected to an infrastructure

(this will only work if the AS install type does not include the 'Wireless' Component)

In the source Oracle Home replace the following line in the $ORACLE_HOME/clone/bin/prepare_clone.pl script -

```
##########################################
validate_user( $OID_ADMIN, $OID_OBF_PASSWORD, $OID_HOST, $OID_PORT ,"-obf");
##########################################
```

with the following lines

```
##########################################
if ($WIRELESS_LAUNCHED eq "true")
{
        validate_user( $OID_ADMIN, $OID_OBF_PASSWORD, $OID_HOST, $OID_PORT ,"-obf");
}
##########################################
```

This issue is being tracked by bug 4689868.

- A 10.1.0.3 RAC DB Oracle Home installed from the re-release Shiphome will not show up as a clonable Oracle Home. This issue is being tracked by bug 4623766.
- When selecting a multi hosts for Oracle Clusterware target on "Search and Select" page which is invoked by clicking "Add multiple hosts" button at destination Node Specification, if hosts are sorted on the "Search and Select" page by name or oracle home, wrong host will be added as a destination host. The workaround is not to sort these entries.

  This is being tracked by bug 4764108.

7.5 Cloning from EMCLI

- If there are more than 25 Oracle Homes registered on an OMS, then cloning using as a source any one of those Oracle Homes may fail. This is being tracked in bug 4642023.
- EMCLI Help text is errorneous. Please refer to section 10 in this document for various command options. This is being tracked in bug 4576421.
- One cannot clone an AS J2EE Instance that is connected to a DB Repository (DCM Schema password specified at install). This is being tracked by bug 4688890.

  Please note that the above issue is not applicable if the instance is connected to IM. It is only applicable if the installed instance needed the DCM Schema password specified at install time.

On Windows:

- Components from Software Library only can be used for cloning. Source homes cannot be used. Oracle Clusterware cloning (create cluster) cannot be done, as an additional argument needed in windows for Oracle Clusterware create jobs is not present.

  This is being tracked by bug 4692544.
- Path-names provided on the command-line as values for keys must always be within quotes. If not, the characters in the path may be interpreted differently.

7.6 Cloning 10.2.0.1 RAC Database Oracle Homes when there are no sudo privileges

If one is cloning the 10.2.0.1 RAC Database Oracle Home to create or extend a cluster and one does not have sudo privilegess one would need to uncheck the 'Execute' checkbox for root.sh in the 'Clone Oracle Home: Pre/Post Scripts' screen and then run root.sh on the target nodes as root after the clone job completes.

8. EMCLI: Initial setup

In 10.2 Enterprise Manager EMCLI comes already installed with the OMS (the EMCLI client is installed in $ORACLE_HOME/bin of the 10.2 OMS). The client install kit (emclikit.jar) is found in $ORACLE_HOME/sysman/jlib of the 10.2 OMS. You can also download the emclikit.jar directly from the 10.2 OMS using:

http(s):// <OMS Hostname>:<OMS Port>/em/console/emcli/download

After extracting the contents of emclikit.jar execute the following command

```
./emcli setup -url="http(s)://<OMS Hostname>:<OMS Port>/em/" -
username=<username>
```

After executing the above command a user would need to enter the password to connect to the OMS. If the https protocol is specified then a user would also need to accept the Certificate sent across from the OMS end.

9. EMCLI: Setting up Oracle Home Credentials

Before executing a clone operation using EMCLI one would need to setup the source and target Oracle Home Credentials.

Execute the following command to set the Oracle Home Crerdentials for a particulat Host + Oracle Home combination:

```
./emcli set_credential -target_type=host -target_name=val1 -
credential_set=OHCreds
-column="OHUsername:val2;OHPassword:val3"
-oracle_homes="val4"
```

where:

val1 = Hostname

val2 = Oracle Home user name. This is the host username that owns the Oracle Home.

val3 = Oracle Home password. This is the password of the host username that owns the Oracle Home.

val4 = Oracle Home location

You can also set credentials for multiple Oracle Homes on the same host using the following command:

```
./emcli set_credential -target_type=host -target_name=val1 -
credential_set=OHCreds                                      -
column="OHUsername:val2;OHPassword:val3"
-oracle_homes="val4;val5"
```

where

val1 = Hostname

val2 = Oracle Home user name. This is the host username that owns the Oracle Home.

val3 = Oracle Home password. This is the password of the host username that owns the Oracle Home.

val4 = Oracle Home location 1

val5 = Oracle Home location 2

Please refer to the set_OH_credentials.pl script in Appendix section 11.1 if you require to set multiple host and Oracle Home Credentials at the same time.

10. EMCLI: Example commands (Unix)

After setting up EMCLI on a box one can submit clone jobs via EMCLI. The following section details commands to be executed to clone various Oracle Products. Please note that the EMCLI help with the current 10.2 Enterprise Manager Release is inaccurate (bug 4576421) – do follow the commands mentioned in this doc instead.

Please note that the following optional parameters can be added for all EMCLI verbs -

[-prescripts="script name to execute"]

Specify the path to a pre cloning script that needs to be run.

[-run_prescripts_as_root= true/false"]

Specify if the above-mentioned pre cloning script needs to be run as root or not.

Do ensure that the –prescripts and -run_prescripts_as_root options are always passed in pairs.

[-postscripts="script to execute"]

Specify the path to a post cloning script that needs to be run.

[-run_postscripts_as_root=true/false"]

Specify if the above-mentioned post cloning script needs to be run as root or not.

Do ensure that the –postscripts and -run_postscripts_as_root options are always passed in pairs.

[-rootscripts="script name to execute"]

Specify the path to the root script to be run.

[-jobdesc="description"]

Specify a desciption for the job.

10.1 Cloning a 10.2.0.1 Database (non RAC) Oracle Home from an installed Oracle Home

- Setup Oracle Home Credentials for the source and destination Oracle Home.
- Create a file 'clone_dests.txt' with the following contents:

Destination Host Name;Destination Home Loc;Home Name;Scratch Location;

Sample Content of the clone_dests.txt file is:

clone.oracle.com;/scratch/clones/oracle_home;oh_name;/tmp;

- Execute the following command to submit the clone job:

```
./emcli clone_database_home
 -input_file="dest_properties:<location of clone_dests.txt>"
 -list_exclude_files="*.log,*.dbf,*.ora ,oratab"
 -isSwLib=false
 -tryftp_copy=true
 -jobname=<Job name>
 -isRac=false
 -rootscripts="%oracle_home%/root.sh"
 -source_params="TargetName:<Source   Hostname>;HomeLoc:<Source
ORACLE_HOME>;HomeName:<Source
ORACLE_HOME_NAME>;ScratchLoc:<temp location at the source>
```

10.2 Cloning a 10.2.0.1 Database (non RAC) Oracle Home from a Software Library Component

- Setup Oracle Home Credentials for the destination Oracle Home.
- Create a file 'clone_dests.txt' with the following contents:

Destination Host Name;Destination Home Loc;Home Name;Scratch Location;

Sample Content -

clone.oracle.com;/scratch/clones/oracle_home;oh_name;/tmp;

- Assuming the Software Library Component has already been created, execute the following command:

```
./emcli clone_database_home
 -input_file="dest_properties:<location of clone_dests.txt>"
 -list_exclude_files=""
 -isSwLib=true
 -tryftp_copy=false
 -jobname=<Job name>
```

```
 -isRac=false
 -rootscripts="%oracle_home%/root.sh"
 -swlib_component="path:<Complete path to the
component>;version:<Version of the component>"
<Complete path to the component, Components/dbcomp_nt for
example>
<Version of the component , .1 for example>
```

Note that it is mandatory to pass in the '-list_exclude_files' option even when cloning from a software library. Bug 4695560 is tracking this.

10.3 Cloning a 10.2.0.1 RAC Database Oracle Home from an installed Oracle Home to create a new cluster

- Setup Oracle Home Credentials for the source and destination Oracle Home.
- Create a file 'clone_dests.txt' with the following entry for each destination node:

hostname;node-name;work directory;

Sample Content -

clone.oracle.com;clone;/tmp;

- Execute the following command to submit the clone job:

```
./emcli clone_database_home
-input_file="dest_properties:<location of clone_dests.txt>"
-list_exclude_files=""
-isSwLib="false"
-isRac="true"
-tryftp_copy="true"
-jobname="<job name>"
-home_name="<homename>"
-home_location="<location of RAC home>"
-rootscripts="%oracle_home%/root.sh"
-source_params="TargetName:<Source Hostname>;HomeLoc:<Source
ORACLE_HOME>;HomeName:<Source
ORACLE_HOME_NAME>;ScratchLoc:<temp location at the source>"
```

10.4 Cloning a 10.2.0.1 RAC Database Oracle Home from a Software Library Component to create a new cluster

- Setup Oracle Home Credentials for the source destination Oracle Home.
- Create a file 'clone_dests.txt' with following entry for each destination node:

hostname;node-name;work directory;

Sample Content -

clone.oracle.com;clone;/tmp

- Execute the following command to submit the clone job:

```
./emcli clone_database_home
-input_file="dest_properties:<location of clone_dests.txt>"
-list_exclude_files=""
-isSwLib="true"
-isRac="true"
-tryftp_copy="true"
-jobname=”<job name>”
-home_name=”<homename>"
-home_location="<location of RAC home>"
-rootscripts="%oracle_home%/root.sh"
-swlib_component="path:<Complete path to the component>
;version:<Version of the
component>"
```

10.5 Cloning a 10.2.0.1 Database (RAC) Oracle Home from an installed Oracle Home to extend an existing cluster

- Setup Oracle Home Credentials for the source destination Oracle Home.

- Create a file ‘clone_dests.txt’ with the following entry for each destination node:

hostname;node-name;work directory;

Sample Content -

clone.oracle.com;clone;/tmp

- Execute the following command to submit the clone job:

```
./emcli extend_rac_home
-input_file="dest_properties:<location of clone_dests.txt>"
-list_exclude_files=""
-isSwLib="false"
-tryftp_copy="true"
-jobname="<job name>"
-clusternodes="<existing RAC nodes>"
-srchost="<source node>”
-home_location="<home location>"
-home_name="<home name>"
-rootscripts="%oracle_home%/root.sh"
```

```
-source_params="TargetName:<Source Hostname>;HomeLoc:<Source
ORACLE_HOME>;HomeName:<Source
ORACLE_HOME_NAME>;ScratchLoc:<temp location at the source>"
```

10.6 Cloning a 10.2.0.1 Database (RAC) Oracle Home from a Software Library Component to extend an existing cluster

- Setup Oracle Home Credentials for the source destination Oracle Home.
- Create a file 'clone_dests.txt' with the following entry for each destination node:

hostname;node-name;work directory;

Sample Content -

clone.oracle.com;clone;/tmp

- Execute the following command to submit the clone job:

```
./emcli extend_rac_home
-input_file="dest_properties:<location of clone_dests.txt>"
-list_exclude_files=""
-isSwLib="true"
-tryftp_copy="true"
-jobname="<job name>"
-clusternodes="<existing RAC nodes>"
-srchost="<source node>"
-home_location="<home location>"
-home_name="<home name>"
-rootscripts="%oracle_home%/root.sh"
-swlib_component="path:<Complete path to the
component>;version:<Version of the component>"
```

10.7 Cloning an 10.2.0.1 Oracle Clusterware Home from an installed Oracle Home to create a new cluster with mirror OCR and Vdisk locations

- Setup Oracle Home Credentials for the source and destination Oracle Homes.
- Create a file 'crs.prop' with the following entries for each destination node:

hostname;node-name;work directory;pvt interconnect name;virtual ip;

Sample Content -

clone.oracle.com;clone;/tmp;cloneint;clonevip;

- Execute the following command to submit the clone job:

```
./emcli clone_crs_home
-input_file="dest_properties:<location of crs.prop>"
-list_exclude_files=""
-isSwLib="false"
-tryftp_copy="true"
-jobname=”<job name>”
-home_name="< home_name>"
-home_location="< home_location >"
-clustername="<clustername>"
-ocrLoc=" < ocr Location >"
-vdiskLoc="<Vdisk location>"
-prescripts="%perlbin%/perl
%emd_root%/sysman/admin/scripts/cloning/samples/updateCSProps.p
l      -oraclehome      %oracle_home%       n_storageTypeOCR=1
s_ocrMirrorLocation=<Mirror    Location>    n_storageTypeVDSK=1
s_OcrVdskMirror1RetVal=            <Mirror            Location>
s_VdskMirror2RetVal=<Mirror Location> "
-run_presripts_as_root="false"                                    -
rootscripts="%oracle_home%/root.sh"
-postscripts="%perlbin%/perl
%emd_root%/sysman/admin/scripts/cloning/samples/post_crs_create
.pl ORACLE_HOME=%oracle_home%"
-run_postscripts_as_root="false"
-source_params=”TargetName:<Source    Hostname>;HomeLoc:<Source
ORACLE_HOME>;HomeName:<Source
ORACLE_HOME_NAME>;ScratchLoc:<temp location at the source>”
```

10.8 Cloning a 10.2.0.1 Oracle Clusterware Home from a Software Library Component to create a new cluster with no mirror OCR or Vdisk location

- Setup Oracle Home Credentials for the destination Oracle Homes.

- Create a file ‘crs.prop’ with the following entries for each destination node:

hostname;node-name;work directory;pvt interconnect name;virtual ip;

Sample Content -

clone.oracle.com;clone;/tmp;cloneint;clonevip;

- Execute the following command to submit the clone job:

```
./emcli clone_Oracle Clusterware_home
-input_file="dest_properties:<location of crs.prop>"
-list_exclude_files=""
-isSwLib="true"
tryftp_copy="true"
-jobname=”<job name>”
-home_name="<home name>"
 -home_location="<home location>"
-clustername="<cluster name>"
-ocrLoc=" < ocr Location >" -vdiskLoc="<Vdisk location>"
-postscripts="%perlbin%/perl
%emd_root%/sysman/admin/scripts/cloning/samples/post_crs_create
.pl ORACLE_HOME=%oracle_home%"
-run_postscripts_as_root="true"
-rootscripts="%oracle_home%/root.sh"
-swlib_component="path:<Complete       path       to       the
component>;version:<Version of the component>"
```

10.9 Cloning an 10.2.0.1 Oracle Clusterware Home from a Software Library Component to create a new cluster with mirror OCR and Vdisk locations

- Setup Oracle Home Credentials for the destination Oracle Homes.
- Create a file ‘crs.prop’ with the following entries for each destination node:

hostname;node-name;work directory;pvt interconnect name;virtual ip;

Sample Content -

clone.oracle.com;clone;/tmp;cloneint;clonevip;

- Execute the following command to submit the clone job:

```
./emcli clone_crs_home
-input_file="dest_properties:<location of crs.prop>"
-list_exclude_files=""
 -isSwLib="true"
-tryftp_copy="true"
-jobname=”<job name>”
-home_name="<home name>"
-home_location="<home location>"
-clustername="<cluster name>"
-ocrLoc=" < ocr Location >"
-vdiskLoc="<Vdisk location>"
-prescripts="%perlbin%/perl
%emd_root%/sysman/admin/scripts/cloning/samples/updateCSProps.p
l      -oraclehome      %oracle_home%       n_storageTypeOCR=1
s_ocrMirrorLocation=<Mirror    Location>    n_storageTypeVDSK=1
```

```
s_OcrVdskMirror1RetVal=            <Mirror            Location>
s_VdskMirror2RetVal=<Mirror        Location>        "        -
run_presripts_as_root="false"
-postscripts="%perlbin%/perl
%emd_root%/sysman/admin/scripts/cloning/samples/post_crs_create
.pl ORACLE_HOME=%oracle_home%" -run_postscripts_as_root="true"
-rootscripts="%oracle_home%/root.sh"
-swlib_component="path:<Complete       path       to       the
component>;version:<Version of the component>"
```

10.10 Cloning an 10.2.0.1 Oracle Clusterware Home from an installed Oracle Home to extend an existing cluster

- Setup Oracle Home Credentials for the source and destination Oracle Homes.
- Create a file 'crs.prop' with the following entries for each destination node:

hostname;node-name;work directory;pvt interconnect name;virtual ip;

Sample Content -

clone.oracle.com;clone;/tmp;cloneint;clonevip;

- Execute the following command to submit the clone job:

```
./emcli extend_crs_home
-input_file="dest_properties:<location of crs.prop>"
-list_exclude_files=""
-isSwLib="false"
-tryftp_copy="true"
-jobname="<job name>"
-clusternodes="<existing nodes>"
-clustername="<cluster name>"
-rootscripts="%oracle_home%/root.sh"
 -postscripts="%perlbin%/perl
%emd_root%/sysman/admin/scripts/cloning/samples/post_crs_extend
.pl ORACLE_HOME=%oracle_home%"
-run_postscripts_as_root="false"
-source_params="TargetName:<Source    Hostname>;HomeLoc:<Source
ORACLE_HOME>;HomeName:<Source
ORACLE_HOME_NAME>;ScratchLoc:<temp location at the source>"
-srchost="<source host name>"
-home_name="<oracle home name>"
-home_location="<source home location>"
```

10.11 Cloning an 10.2.0.1 Oracle Clusterware Home from a Software Library Component to extend an existing cluster

- Setup Oracle Home Credentials for the source and destination Oracle Homes.

- Create a file 'crs.prop' with the following entries for each destination node:

hostname;node-name;work directory;pvt interconnect name;virtual ip;

Sample Content -

clone.oracle.com;clone;/tmp;cloneint;clonevip;

- Execute the following command to submit the clone job:

```
./emcli extend_crs_home
-input_file="dest_properties:<location of crs.prop>"
-list_exclude_files=""
-isSwLib="true"
-tryftp_copy="true"
-jobname="<job name> "
-clusternodes="<existing node names>"
-clustername="<cluster name>"
 -srchost="<source host name>"
-home_name="<oracle home name>"
-home_location="<source home location>"
-postscripts="%perlbin%/perl
%emd_root%/sysman/admin/scripts/cloning/samples/post_crs_extend
.pl ORACLE_HOME=%oracle_home%"
-run_postscripts_as_root="false"
-rootscripts="%oracle_home%/root.sh"
-swlib_component="path:<Complete path to the
component>;version:<Version of the component>"
```

10.12 Cloning a 10.1.2.0.2 AS Oracle Home (J2EE and WebCache Standalone) from an installed Oracle Home

- Setup Oracle Home Credentials for the source and destination Oracle Homes.

- Create a file 'ias.prop' with the following entry for the destination node:

Destination Host Name;Destination Home Loc;Home Name;Scratch Location;

Sample Content -

clone.oracle.com;/scratch/clones/oracle_home;oh_name;/tmp;

- Execute the following command to submit the clone job:

```
./emcli clone_as_home
-input_file="dest_properties:<location of AS.prop>"
-list_exclude_files=""
 -isSwLib=false
```

```
-tryftp_copy=true
-jobname=<job name>
-iasInstance=<ias instance name>
-oldIASAdminPassword="<old passwd>"
-newIASAdminPassword="<new passwd>"
-source_params="TargetName:<Source    Hostname>;HomeLoc:<Source
ORACLE_HOME>;HomeName:<Source
ORACLE_HOME_NAME>;ScratchLoc:<temp location at the source>"
```

10.13 Cloning a 10.1.2.0.2 AS Oracle Home (J2EE and WebCache Standalone) from a Software Library Component

- Setup Oracle Home Credentials for the destination Oracle Home.

- Create a file 'ias.prop' with the following entries for the destination node:

Destination Host Name;Destination Home Loc; Home Name; Scratch Location;

Sample Content -

clone.oracle.com;/scratch/clones/oracle_home;oh_name;/tmp;

- Execute the following command to submit the clone job:

```
./emcli clone_as_home
-input_file="dest_properties:<location of AS.prop>"
-list_exclude_files="centralagents.lst"
-isSwLib=true
-tryftp_copy=false
 -jobname=<job name>
-iasInstance=<instance name>
-oldIASAdminPassword="<password>"
-newIASAdminPassword="<password>"
-swlib_component="path:<Complete       path       to       the
component>;version:<Version of the component>"
```

10.14 Cloning a 10.1.2.0.2 AS Oracle Home (J2EE and WebCache Connected to a DB Repository – require DCM Schema password) from a Software Library Component

This is not possible in Enterprise Manager 10.2.0.1 because of bug 4688890

10.15 Cloning a 10.1.2.0.2 AS Oracle Home (J2EE and WebCache Connected to an Ifrastructure – require OID Admin password) from a Software Library Component

This fails because of bug 4689868. Cannot create an AS Component if it is connected to an Infrastructure.
Please follow the workaround mentioned in Section 7.4.iv to workaround this issue.

- Setup Oracle Home Credentials for the destination Oracle Home.
- Create a file 'j2ee_infra.txt' with the following entries for the destination node:
Destination Host Name;Destination Home Loc;Home Name;Scratch Location;
Sample Content -
clone.oracle.com;/scratch/clones/oracle_home;oh_name;/tmp;
- Execute the following command to submit the clone job:

```
./emcli clone_as_home
-input_file="dest_properties:<locaton of j2ee_infra.txt>"
-list_exclude_files="centralagents.lst"
-isSwLib=true
-tryftp_copy=false
-jobname=<job name>
-iasInstance=<instance name>
-oldIASAdminPassword="<password>"
-newIASAdminPassword="<password>"
-oiduser="<OID Username. Example: cn=orcladmin>"
-oidpassword="<OID password>"
-rootscripts="%oracle_home%/root.sh"
-swlib_component="path:<Complete path to the
component>;version:<Version of the
component>"
```

10.16 Cloning a 10.1.2.0.2 AS Oracle Home (J2EE and WebCache which is a client of an FBR Host) from a Software Library Component & join a cluster after the clone.

- Setup Oracle Home Credentials for the destination Oracle Home.
- Create a file 'ias.prop' with the following entries for the destination node:
Destination Host Name;Destination Home Loc;Home Name;Scratch Location;
Sample Content -
clone.oracle.com;/scratch/clones/oracle_home;oh_name;/tmp;
- Execute the following command to submit the clone job:

```
./emcli extend_as_home
-input_file="dest_properties:<location of AS.prop>"
```

```
-list_exclude_files="centralagents.lst"
-isSwLib=true
-tryftp_copy=false
-jobname=<job name>
-iasInstance=<instance name>
-clustername="<cluster name>"
-oldIASAdminPassword="<password>"
-newIASAdminPassword="<password>"
-swlib_component="path:<Complete path to the
component>;version:<Version of the component>"
```

10.17 Cloning a 9.0.4 AS Oracle Home (J2EE and WebCache Standalone) from an installed Oracle Home

At the time of writing this document cloning of a 904 Linux Application Server Oracle Home fails because of an issue with the ClonerStage. Bug 4328350 tracks this issue.

Once the above-mentioned bug is resolved the following steps may be followed to clone the mentioned Oracle Home.

- Setup Oracle Home Credentials for the source and destination Oracle Homes.

- Create a file 'ias.prop' with the following entries for the destination node:

Destination Host Name;Destination Home Loc;Home Name;Scratch Location;

Sample Content -

clone.oracle.com;/scratch/clones/oracle_home;oh_name;/tmp;

- Execute the following command to submit the clone job:

```
./emcli clone_as_home
-input_file="dest_properties:<location of AS.prop>"
-list_exclude_files="centralagents.lst "
-isSwLib=false
-tryftp_copy= false
-jobname=<job name>
-iasInstance=<instance name>
-oldIASAdminPassword="<password>"
-newIASAdminPassword="<password>"
-rootscripts="<root script>"
-source_params="TargetName:<Source Hostname>;HomeLoc:<Source
ORACLE_HOME>;HomeName:<Source ORACLE_HOME_NAME>;
ScratchLoc:<temp location at the source>"
```

10.18 Cloning a 9.0.4 AS Oracle Home (J2EE and WebCache Standalone) from a Software Library Component

At the time of writing this document cloning of a 904 Linux Application Server Oracle Home fails because of an issue with the ClonerStage. Bug 4328350 tracks this issue.

Once the above-mentioned bug is resolved the following steps may be followed to clone the mentioned Oracle Home.

- Setup Oracle Home Credentials for the source and destination Oracle Homes.
- Create a file 'ias.prop' with the following entries for the destination node:
Destination Host Name;Destination Home Loc;Home Name;Scratch Location;
Sample Content -
clone.oracle.com;/scratch/clones/oracle_home;oh_name;/tmp;
- Execute the following command to submit the clone job:

```
./emcli clone_as_home
-input_file="dest_properties:<location of AS.prop>"
-list_exclude_files="centralagents.lst"
-isSwLib=true
-tryftp_copy=false
-jobname=<job name>
-iasInstance=<instance name>
-oldIASAdminPassword="<password>"
-newIASAdminPassword="<password>"
-swlib_component="path:<Complete path to the component>;version:<Version of the component>"
```

10.19 Cloning a 9.2.0.6.0 Database Oracle Home from an installed Oracle Home

At the time of writing this document cloning of a 92060 Linux Database Oracle Home fails because of an issue with the ClonerStage. Bug 4555699 tracks this issue.

Once the above-mentioned bug is resolved the following steps may be followed to clone the mentioned Oracle Home.

- Setup Oracle Home Credentials for the source and destination Oracle Homes.

- Create a file 'db.prop' with the following entries for the destination node:

Destination Host Name;Destination Home Loc;Home Name;Scratch Location;

Sample Content -

clone.oracle.com;/scratch/clones/oracle_home;oh_name;/tmp;

- Execute the following command to submit the clone job:

```
./emcli clone_database_home
-input_file="dest_properties:<location of db.prop>"
-list_exclude_files=""
-isSwLib=false
-tryftp_copy=true
-jobname=<jobname>
-isRac=false
-rootscripts="%oracle_home%/root.sh"
-source_params="TargetName:<Source    Hostname>;HomeLoc:<Source
ORACLE_HOME>;HomeName:<Source
ORACLE_HOME_NAME>;ScratchLoc:<temp location at the source>"
```

10.20 Cloning a 9.2.0.6.0 Database Oracle Home from a Software Library Component

At the time of writing this document cloning of a 92060 Linux Database Oracle Home fails because of an issue with the ClonerStage. Bug 4555699 tracks this issue.

Once the above-mentioned bug is resolved the following steps may be followed to clone the mentioned Oracle Home.

- Setup Oracle Home Credentials for the destination Oracle Home.

- Create a file 'db.prop' with the following entries for the destination node:

Destination Host Name;Destination Home Loc;Home Name;Scratch Location;

Sample Content -

clone.oracle.com;/scratch/clones/oracle_home;oh_name;/tmp;

- Execute the following command to submit the clone job:

```
./emcli clone_database_home
-input_file="dest_properties:<location of db.prop>"
-list_exclude_files=""
-isSwLib=true
```

```
-tryftp_copy=true
-jobname=<jobname>
-isRac=false
-rootscripts="%oracle_home%/root.sh"
-swlib_component="path:<Complete path to the
component>;version:<Version of the component>"
```

11. Sample Scripts

11.1 set_OH_credentials.pl

```
#!usr/bin/perl
use strict;
use English qw(-no_match_vars);
if(validate_arguments() != 0)
{
    exit 255;
}
if (set_credentials($ARGV[0], $ARGV[1]) != 0)
{
    print "\nSetting for credentials failed for some homes.\n";
    exit 255;
}
print "\nCredentials set successfully for all homes.\n";
exit 0;

################################################################
#################
# Sub-routine to validate command-line arguments.
# params: none.
# return: 0 if command-line arguments are valid, -1 if not.
################################################################
#################
sub validate_arguments
{
    # no arguments? invalid.
    if (scalar(@ARGV) != 2)
    {
        print_usage_and_exit();
    }

    my $emcli = $ARGV[0];
    my $input_file = $ARGV[1];

    # if EMCLI path is not executable or input file not
readable, invalid args.
    if (! (-f $emcli && -x $emcli))
    {
        print "The EMCLI path provided is not executable.\n";
        return -1;
    }
```

```
    if (! (-f $input_file && -r $input_file))
    {
        print "The input file provided is not readable.\n";
        return -1;
    }

    # valid arguments.
    return 0;
}

#################################################################
#################
# Sub-routine to set credentials of multiple Oracle Homes.
# params: Path to EMCLI executable, Path to input-file referred
for credentials.
#         Input file is of format:
#         Hostname: <val1>
#         <val2>,<val3>,<val4>
#         <val2>,<val3>,<val4>
#         <val2>,<val3>,<val4>
#         ....
#         Hostname: <val1>
#         <val2>,<val3>,<val4>
#         <val2>,<val3>,<val4>
#         <val2>,<val3>,<val4>
#         ....
#         where
#         val1 = Hostname
#         val2 = Oracle Home user name
#         val3 = Oracle Home password
#         val4 = Oracle Home location 1
# return: 0 if credentials for all homes are set,
#          -1 if credentials could not be set for at least one
Oracle Home.
#################################################################
#################
sub set_credentials
{
    my ($emcli, $input_file) = @_;
    my $flag_all_cred_set = 0;

    # Parse input file and set OH credentials.
    open (CRED_INPUT_FILE, $input_file) || die "Cannot open
file $input_file for read. Reason: $!\n";
```

```
    my @input = <CRED_INPUT_FILE>;
    close (CRED_INPUT_FILE);

    my $hostname = "";
    my $value = "";

    print "Setting Oracle home credentials...\n\n";

    foreach $value (@input)
    {
        chomp($value);

        # ignore blanks.
        next if ($value =~ /^\s*$/);

        # new hostname specified?
        if ( $value =~ /Hostname:/ )
        {   # retrieve trimmed hostname.
            $hostname = $value;
            $hostname =~ s/.*Hostname:\s*(.*)?\s*/$1/g;
            next;
        }

        # no processing if no hostname yet.
        next if ($hostname eq "");

        # get OraHome and its credentials.
        my @entry= split(",", $value);
        print_usage_and_exit() if (scalar(@entry) !=3);

             my ($uname, $passwd, $oraHomeLoc) = @entry;

        print "$hostname: $oraHomeLoc ...\n";
        # use EMCLI to set credentials for current host.
        my    $ret    =    system("$emcli    set_credential    -
target_type=host          -target_name=\"$hostname\"          -
credential_set=OHCreds                                        -
column=\"OHUsername:$uname;OHPassword:$passwd\"               -
oracle_homes=\"$oraHomeLoc\"");

        # if something went wrong, set flag to false.
        ($flag_all_cred_set = -1) if ($ret != 0);
    }
```

```
    return $flag_all_cred_set;
}

#################################################################
#################
# Sub-routine to print the usage of this script and exit from
the script.
# params: none.
# return: none.
#################################################################
#################
sub print_usage_and_exit
{
    print "Usage: $0 <Complete path to EMCLI executable>
<Complete path to Input file containing credential-details>\n";
    print "Input file is of format:\n";
    print "Hostname: <val1>\n";
    print "<val2>,<val3>,<val4>\n";
    print "<val2>,<val3>,<val4>\n";
    print "<val2>,<val3>,<val4>\n";
    print "....\n";
    print "Hostname: <val1>\n";
    print "<val2>,<val3>,<val4>\n";
    print "<val2>,<val3>,<val4>\n";
    print "<val2>,<val3>,<val4>\n";
    print "....\n";
    print "where\n";
    print "val1 = Hostname\n";
    print "val2 = Oracle Home user name\n";
    print "val3 = Oracle Home password\n";
    print "val4 = Oracle Home location 1\n";

    exit 255;
}
```

Provisioning RAC and AS environments using Enterprise Manager 10gR2 based cloning
January 2006
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