Automating Oracle RAC Deployment and Implementing MegaGrid Using Oracle EM Provisioning Pack

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Agenda

- Introduction
- Automate RAC Deployment
- Easy Scale up and Down RAC
- MegaGrid Implementation POC
- QA

Introduction

Kai Yu

Senior System Engineer Consultant
Dell Database Solutions Engineering

Specialized in architecting and engineering solutions on Oracle RAC and Oracle E-Business Suite

Dell Oracle Database Solutions Engineering: Integrating, validating, bundling, and sustaining Dell's Oracle DB and RAC solutions, based on Dell PE servers, and Dell | EMC storage.

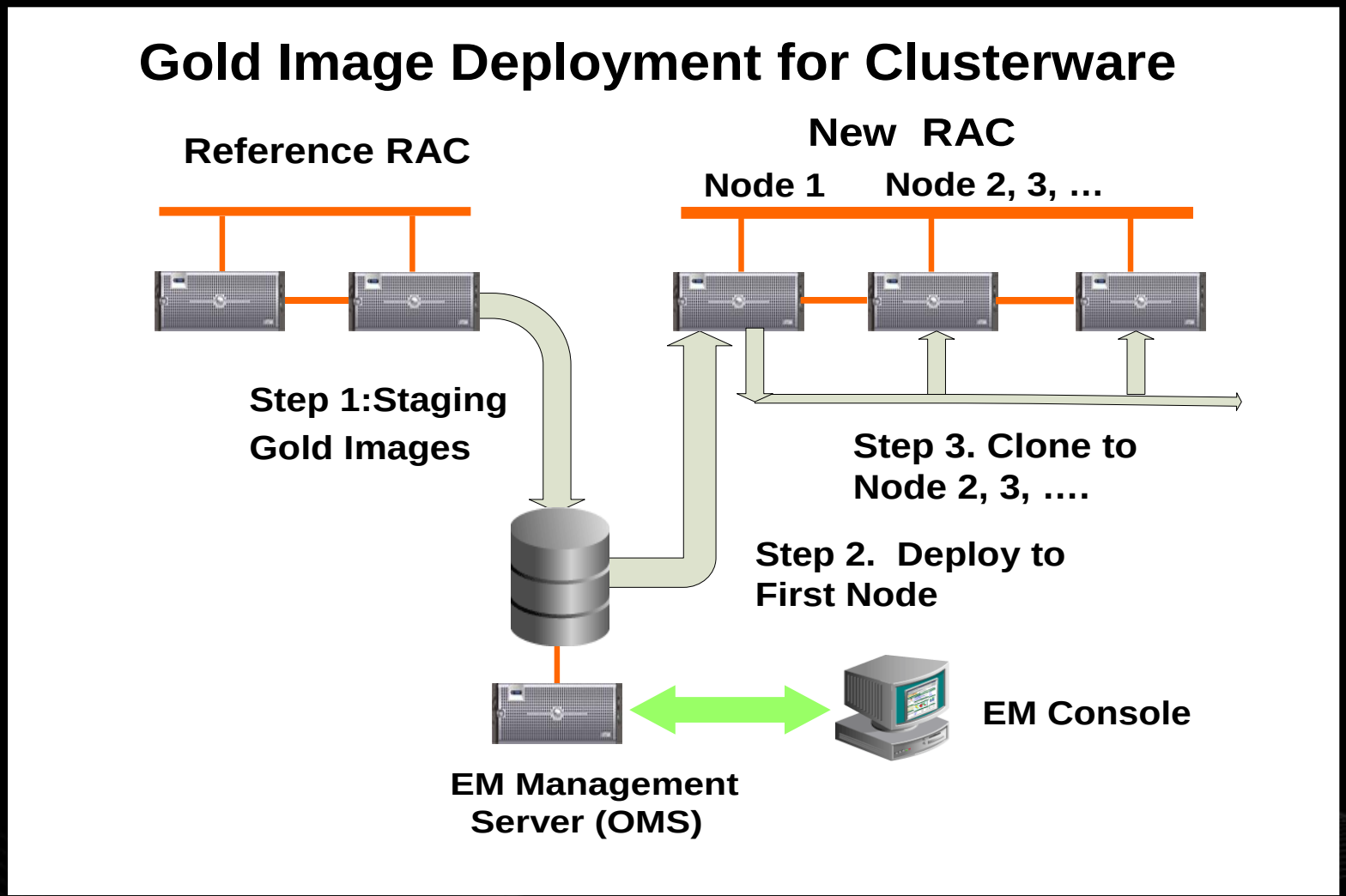
Automate RAC Deployment

- **New Challenges for Deployment and Provisioning**
  - **Quick deployment of Oracle service at low cost**
  - **Deploy using tested and patched gold images**
  - **An ability to response demands in short order**
- **EM Grid Control Provisioning Pack**
  - **Deployment procedures for provisioning and patching**
  - **A Gold Images Based Deployment Method:**
    - **Provision RAC from gold images**
    - **Gold images are staged from a tested and patched reference RAC**
  - **Provide the ability to simply scale up and scale down the cluster**

Automate RAC Deployment

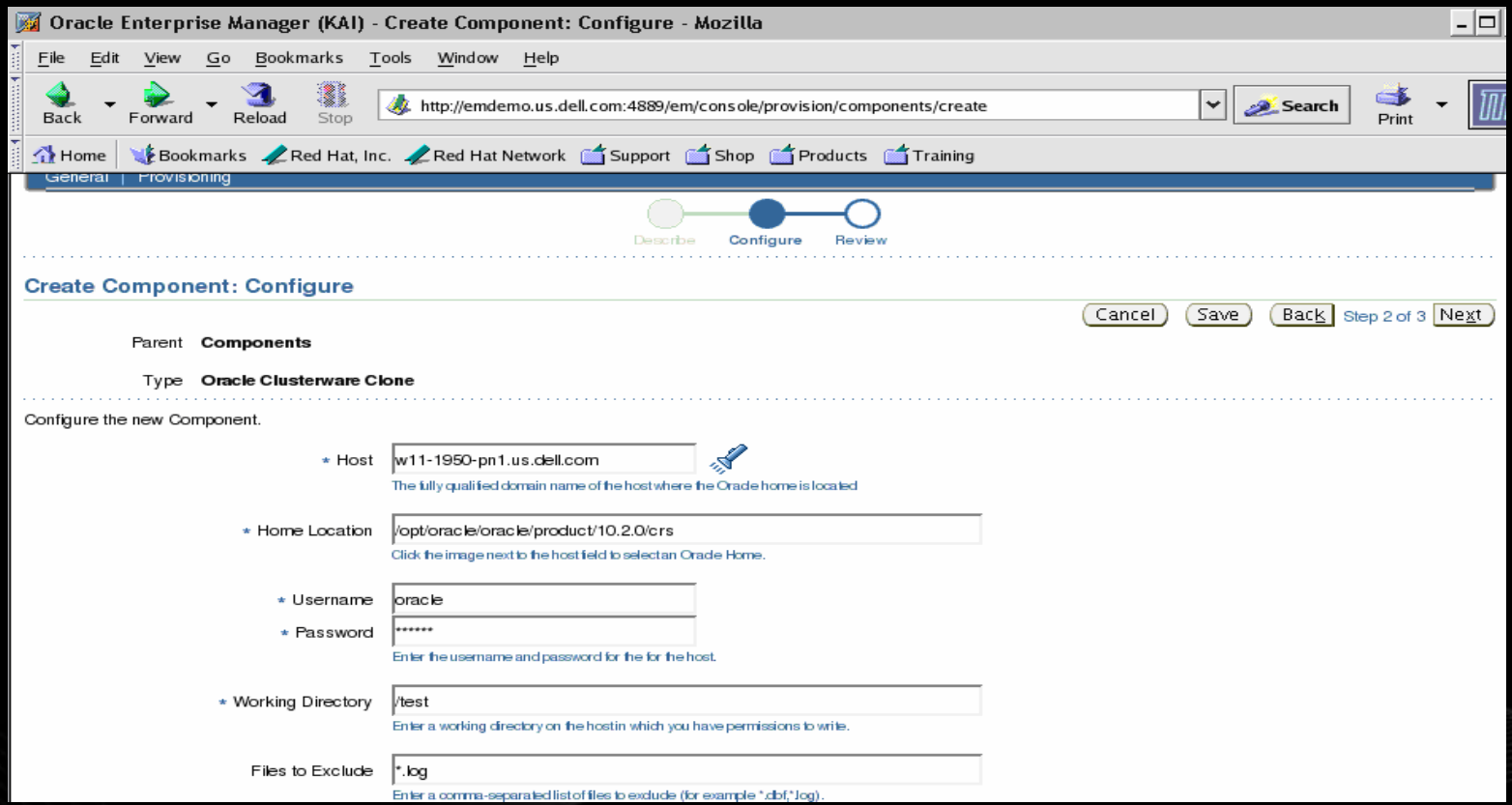
- **A Gold Image Based Deployment Method**
  - **Software Images:Oracle DB, Clusterware, OS and others third part softwares**
  - **Software Library : a repository to store certified software images**
  - **Out-box deployment procedures:**
    - **Best practices to accomplish provisioning and patching**
    - **A set of steps that are orchestrated by EM**
    - **Licensed under EM provisiong pack**
    - **Provisioning procedures**
    - **Patching procedures**
    - **Can be copied and then customized**
  - **RAC deployment: CRS and RAC Software**

Automate RAC Deployment



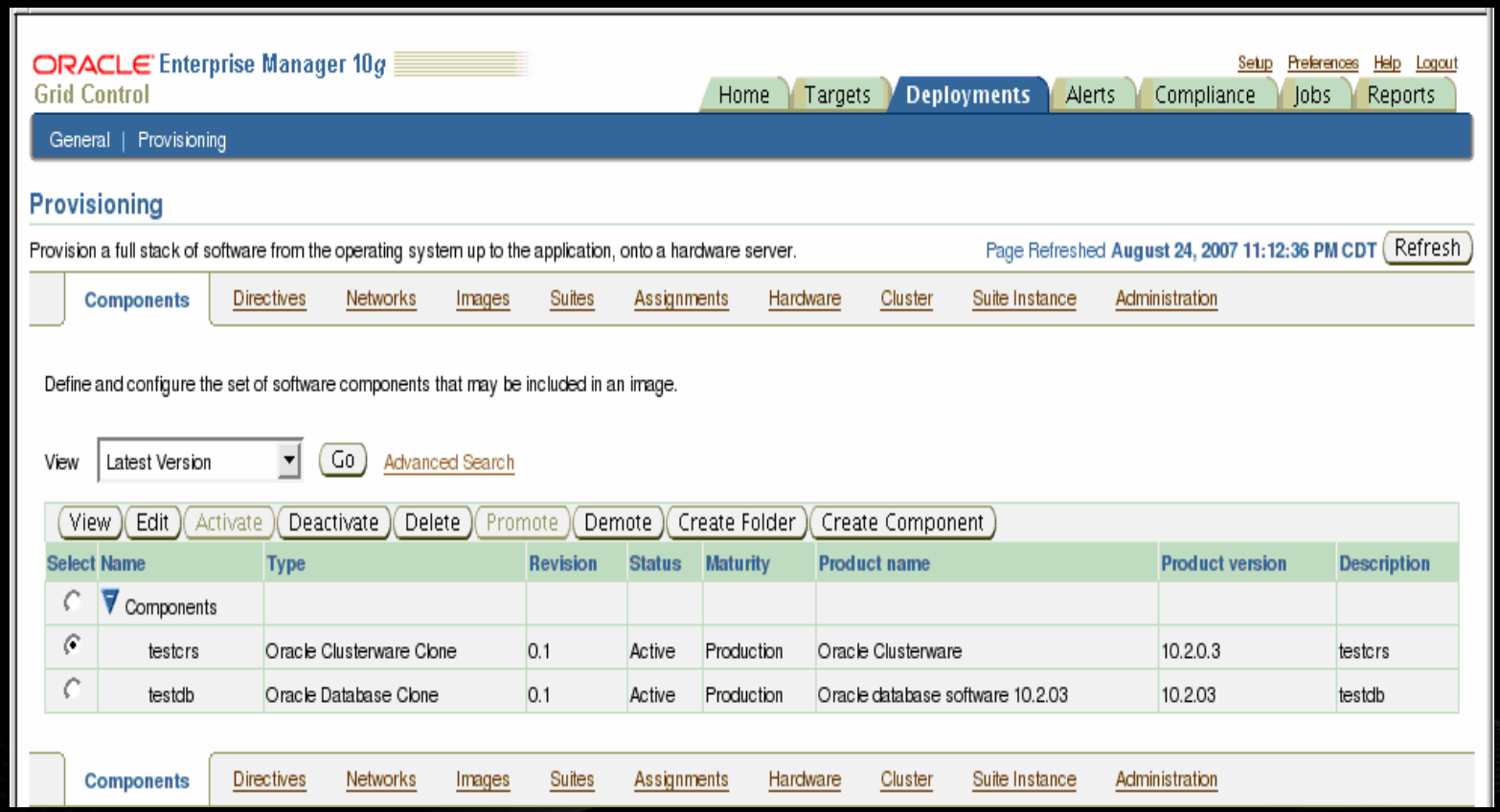
Automate RAC Deployment

- **Upload the Software Images**
  - **Create the software Library**
  - **Create the components from a reference RAC**



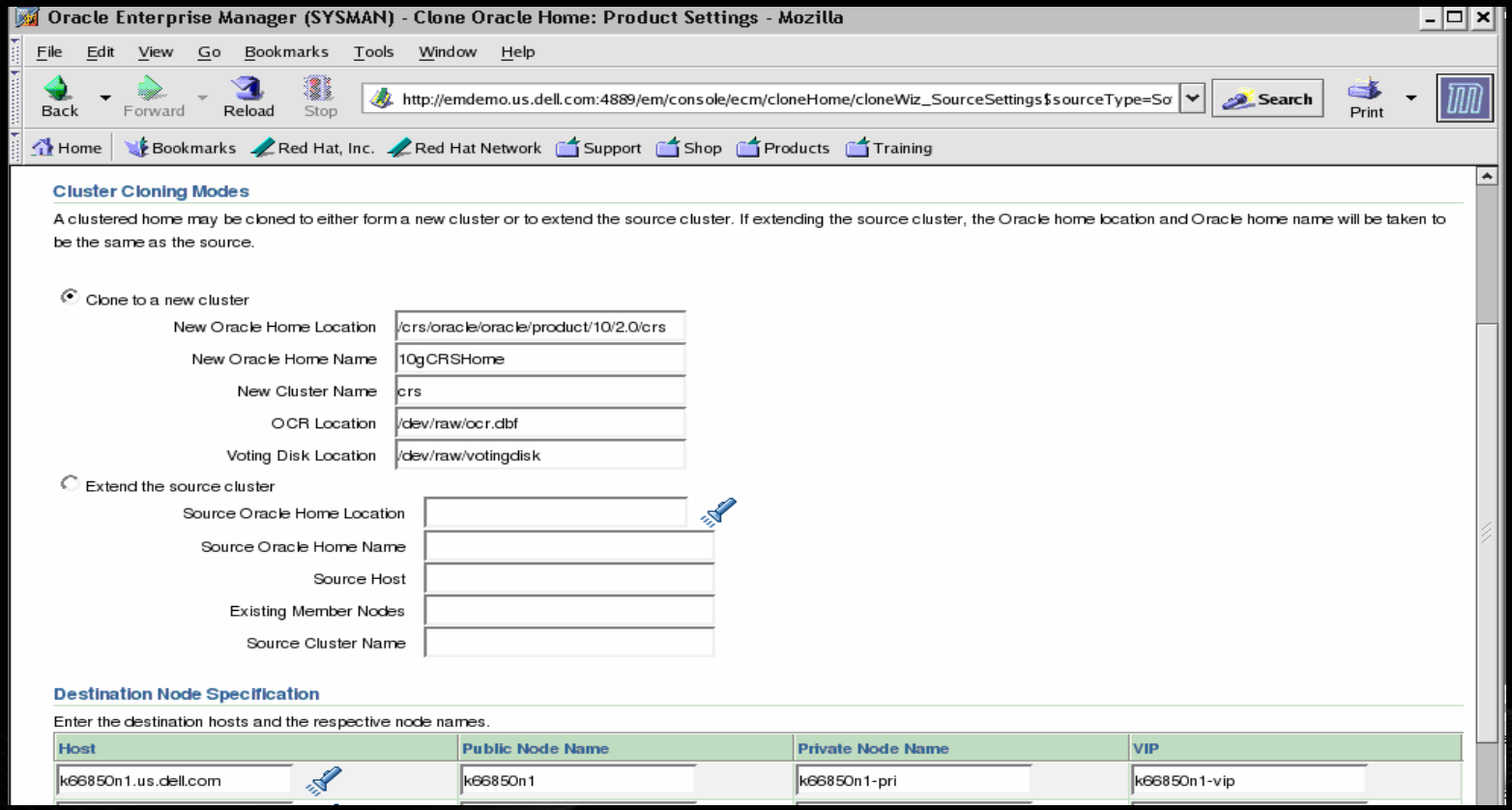
Automate RAC Deployment

- **Upload the Software Images**
  - **CRS software image**
  - **Oracle RAC software images**



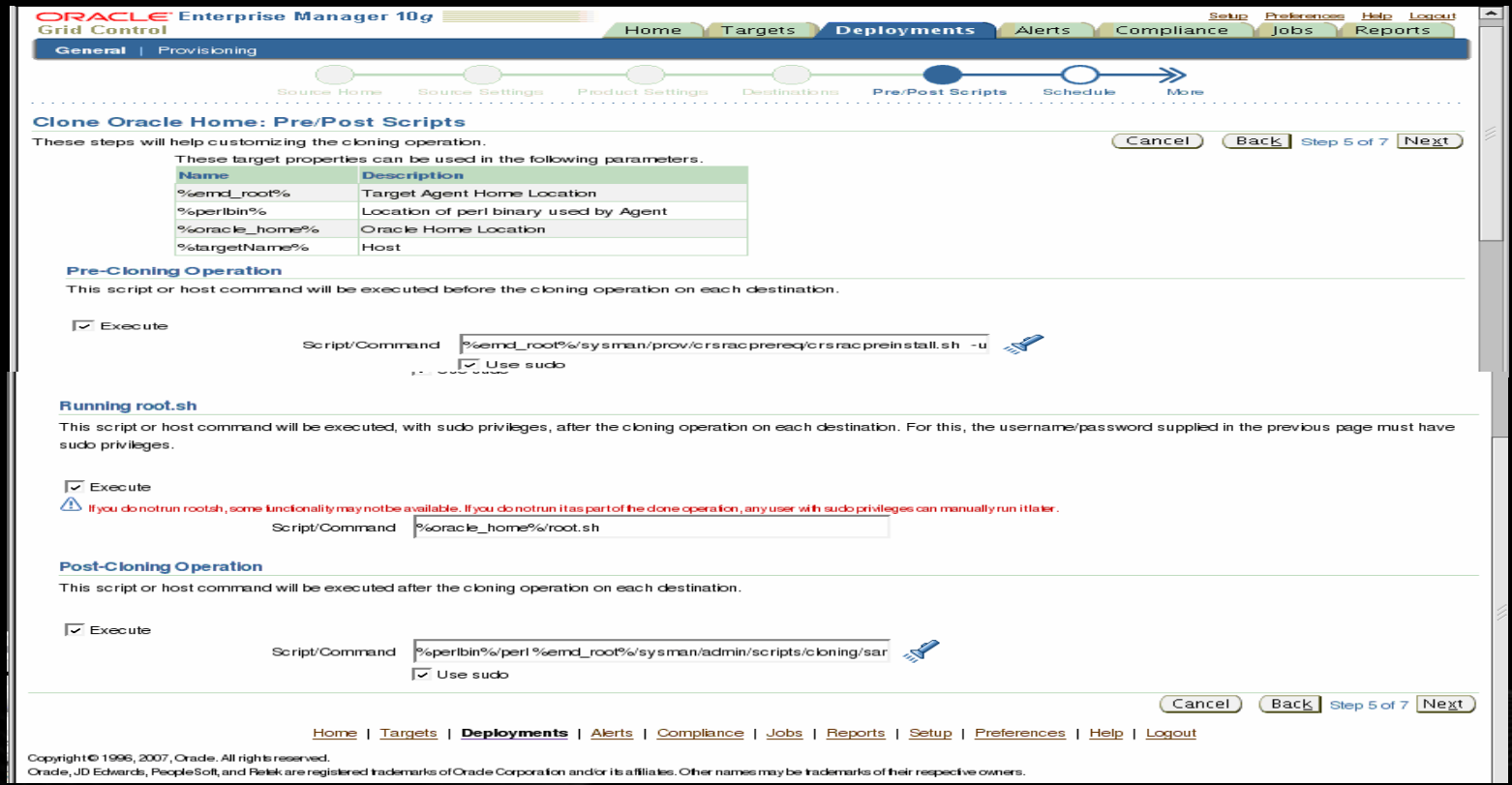
Automate RAC Deployment

- **Deploy the First Node of a New Cluster**
  - **Install Oracle enterprise agent on all nodes**
  - **Clone the CRS to node 1 and establish the RAC**



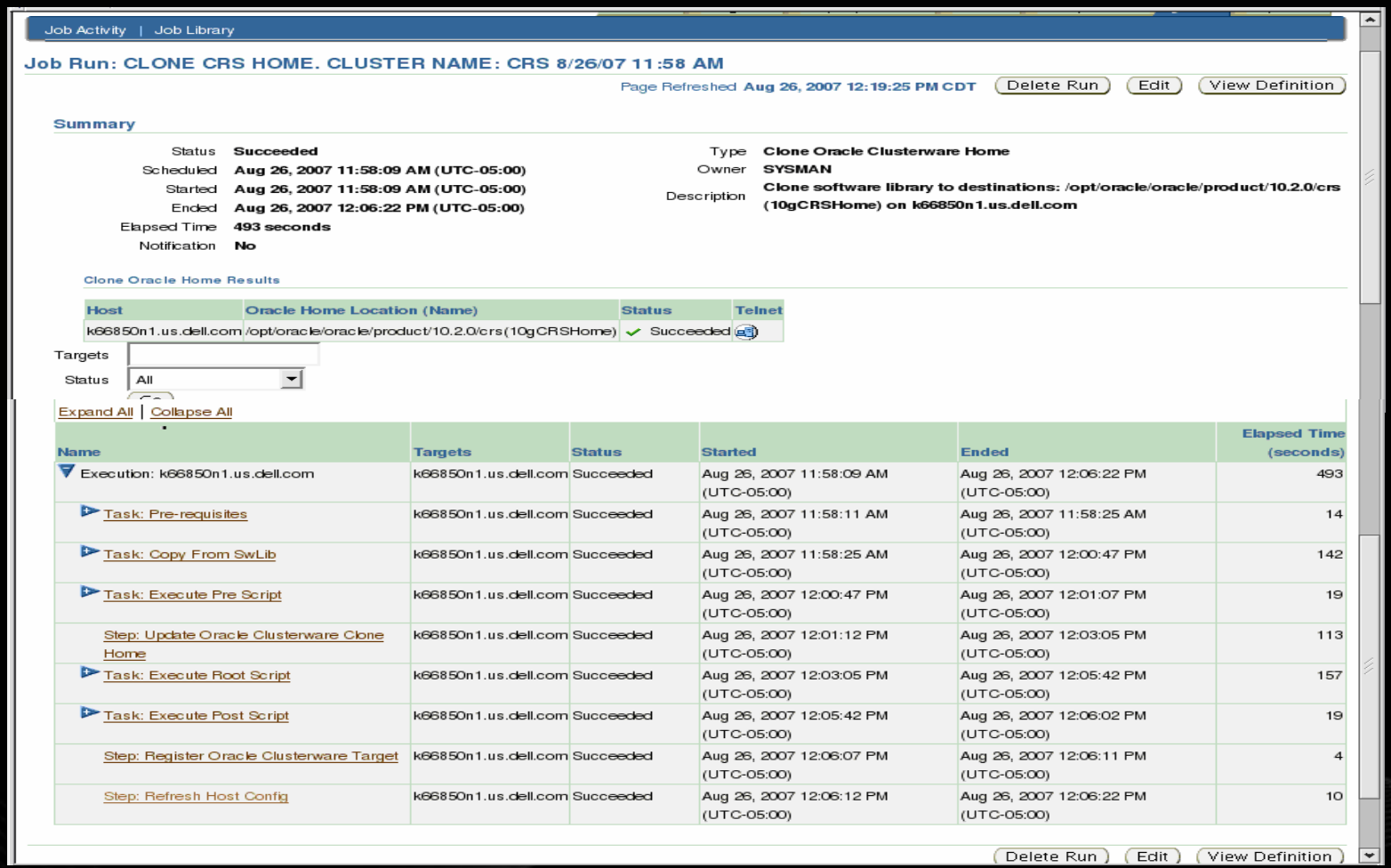
Automate RAC Deployment

- **Deploy the First Node of a New Cluster**
  - **Specify the pre and post clone actions.**
  - **Setup "sudo" for OS user to run root.sh and "pre" and "post" cloning scripts.**



Automate RAC Deployment

- **Deploy the First Node of a New Cluster**
  - **Deployment status check**



Job Activity | Job Library

Job Run: CLONE CRS HOME. CLUSTER NAME: CRS 8/26/07 11:58 AM

Page Refreshed Aug 26, 2007 12:19:25 PM CDT Delete Run Edit View Definition

Summary

Status	Succeeded	Type	Clone Oracle Clusterware Home
Scheduled	Aug 26, 2007 11:58:09 AM (UTC-05:00)	Owner	SYSMAN
Started	Aug 26, 2007 11:58:09 AM (UTC-05:00)	Description	Clone software library to destinations: /opt/oracle/oracle/product/10.2.0/crs (10gCRSHome) on k66850n1.us.dell.com
Ended	Aug 26, 2007 12:06:22 PM (UTC-05:00)		
Elapsed Time	493 seconds		
Notification	No		

Clone Oracle Home Results

Host	Oracle Home Location (Name)	Status	Telnet
k66850n1.us.dell.com	/opt/oracle/oracle/product/10.2.0/crs(10gCRSHome)	Succeeded	

Targets

Status All

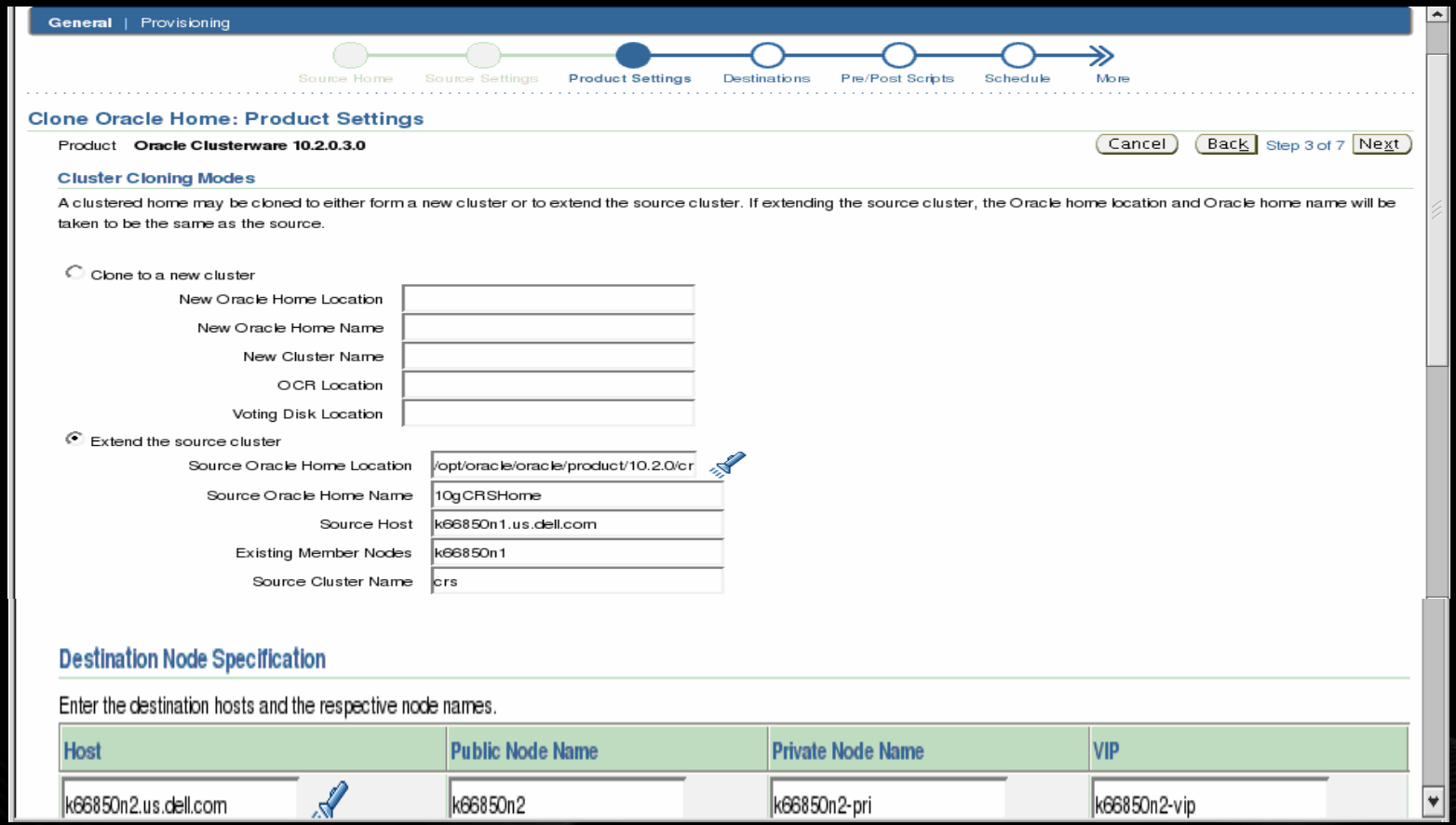
Expand All | Collapse All

Name	Targets	Status	Started	Ended	Elapsed Time (seconds)
Execution: k66850n1.us.dell.com	k66850n1.us.dell.com	Succeeded	Aug 26, 2007 11:58:09 AM (UTC-05:00)	Aug 26, 2007 12:06:22 PM (UTC-05:00)	493
Task: Pre-requisites	k66850n1.us.dell.com	Succeeded	Aug 26, 2007 11:58:11 AM (UTC-05:00)	Aug 26, 2007 11:58:25 AM (UTC-05:00)	14
Task: Copy From SwLib	k66850n1.us.dell.com	Succeeded	Aug 26, 2007 11:58:25 AM (UTC-05:00)	Aug 26, 2007 12:00:47 PM (UTC-05:00)	142
Task: Execute Pre Script	k66850n1.us.dell.com	Succeeded	Aug 26, 2007 12:00:47 PM (UTC-05:00)	Aug 26, 2007 12:01:07 PM (UTC-05:00)	19
Step: Update Oracle Clusterware Clone Home	k66850n1.us.dell.com	Succeeded	Aug 26, 2007 12:01:12 PM (UTC-05:00)	Aug 26, 2007 12:03:05 PM (UTC-05:00)	113
Task: Execute Root Script	k66850n1.us.dell.com	Succeeded	Aug 26, 2007 12:03:05 PM (UTC-05:00)	Aug 26, 2007 12:05:42 PM (UTC-05:00)	157
Task: Execute Post Script	k66850n1.us.dell.com	Succeeded	Aug 26, 2007 12:05:42 PM (UTC-05:00)	Aug 26, 2007 12:06:02 PM (UTC-05:00)	19
Step: Register Oracle Clusterware Target	k66850n1.us.dell.com	Succeeded	Aug 26, 2007 12:06:07 PM (UTC-05:00)	Aug 26, 2007 12:06:11 PM (UTC-05:00)	4
Step: Refresh Host Config	k66850n1.us.dell.com	Succeeded	Aug 26, 2007 12:06:12 PM (UTC-05:00)	Aug 26, 2007 12:06:22 PM (UTC-05:00)	10

Delete Run Edit View Definition

Automate RAC Deployment

- **Clone CRS to other nodes**
  - **Clone CRS from node1 to other nodes**



Automate RAC Deployment

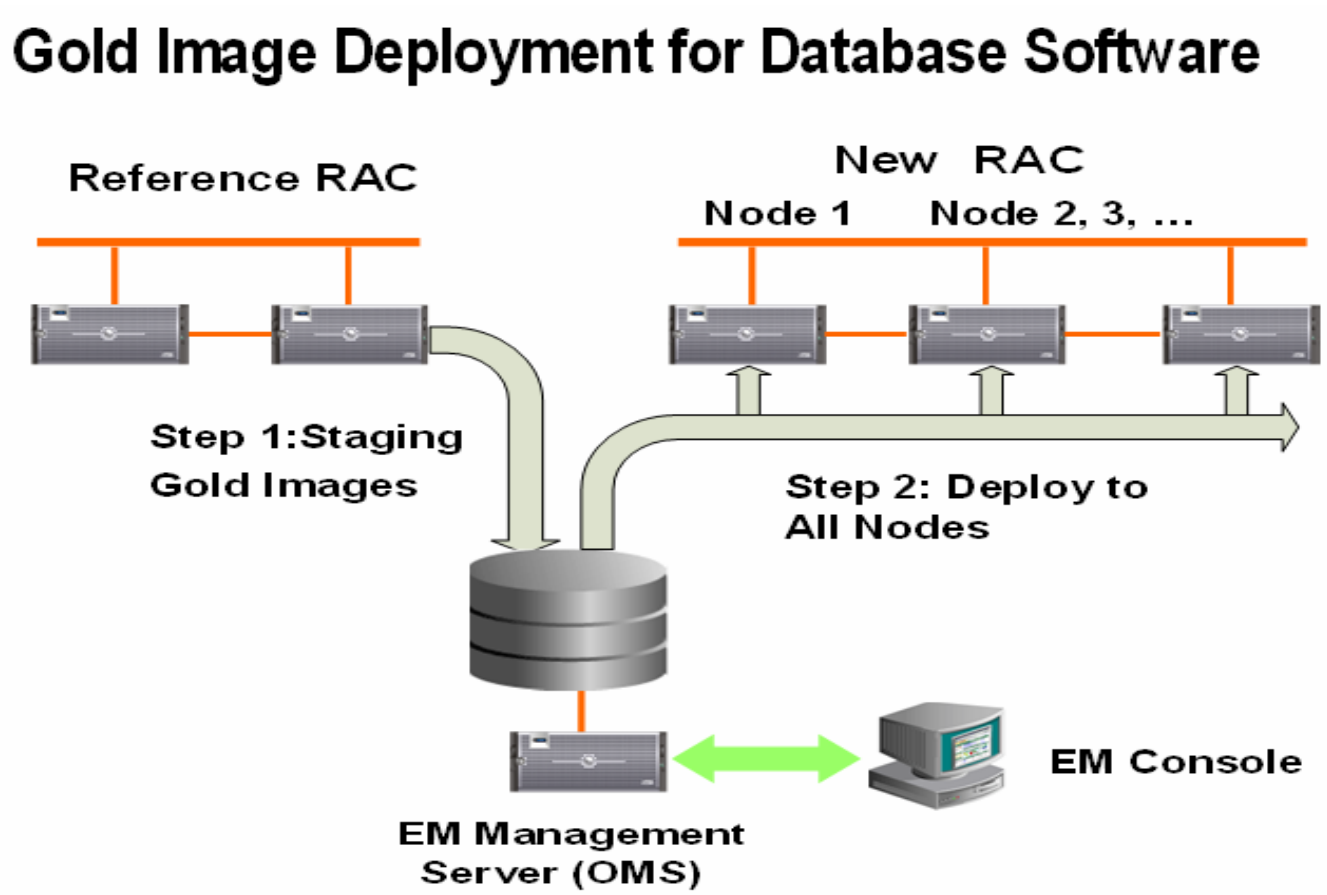
- **RAC CRS verification:**
  - **crsctrl check crs**

    CSS appears healthy
    CRS appears healthy
    EVM appears healthy
  - **./olsnode**

    k66850n1
    k66850n2

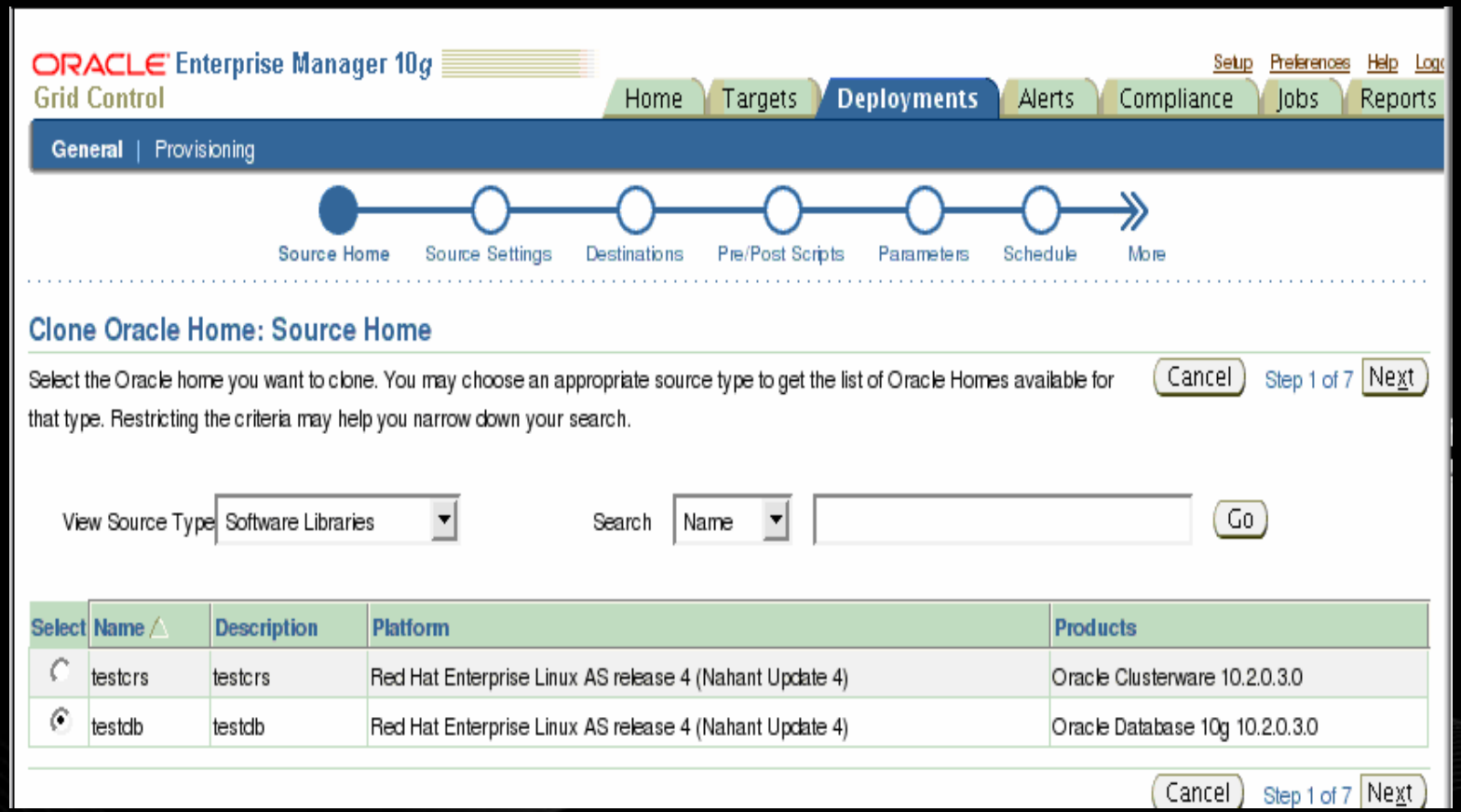
```
oracle@k66850n1:/opt/oracle/oracle/product/10.2.0/crs/bin
[oracle@k66850n1 bin]$ ./crs_stat -t
Name           Type           Target    State     Host
------------------------------------------------------------
ora....0n1.gsd application    ONLINE    ONLINE    k66850n1
ora....0n1.ons application    ONLINE    ONLINE    k66850n1
ora....0n1.vip application    ONLINE    ONLINE    k66850n1
ora....0n2.gsd application    ONLINE    ONLINE    k66850n2
ora....0n2.ons application    ONLINE    ONLINE    k66850n2
ora....0n2.vip application    ONLINE    ONLINE    k66850n2
[oracle@k66850n1 bin]$ srvctl status nodeapps -n k66850n1
VIP is running on node: k66850n1
GSD is running on node: k66850n1
PRKO-2016 : Error in checking condition of listener on node: k66850n1
ONS daemon is running on node: k66850n1
[oracle@k66850n1 bin]$ srvctl status nodeapps -n k66850n2
VIP is running on node: k66850n2
GSD is running on node: k66850n2
PRKO-2016 : Error in checking condition of listener on node: k66850n2
ONS daemon is running on node: k66850n2
[oracle@k66850n1 bin]$
```

Automate RAC Deployment



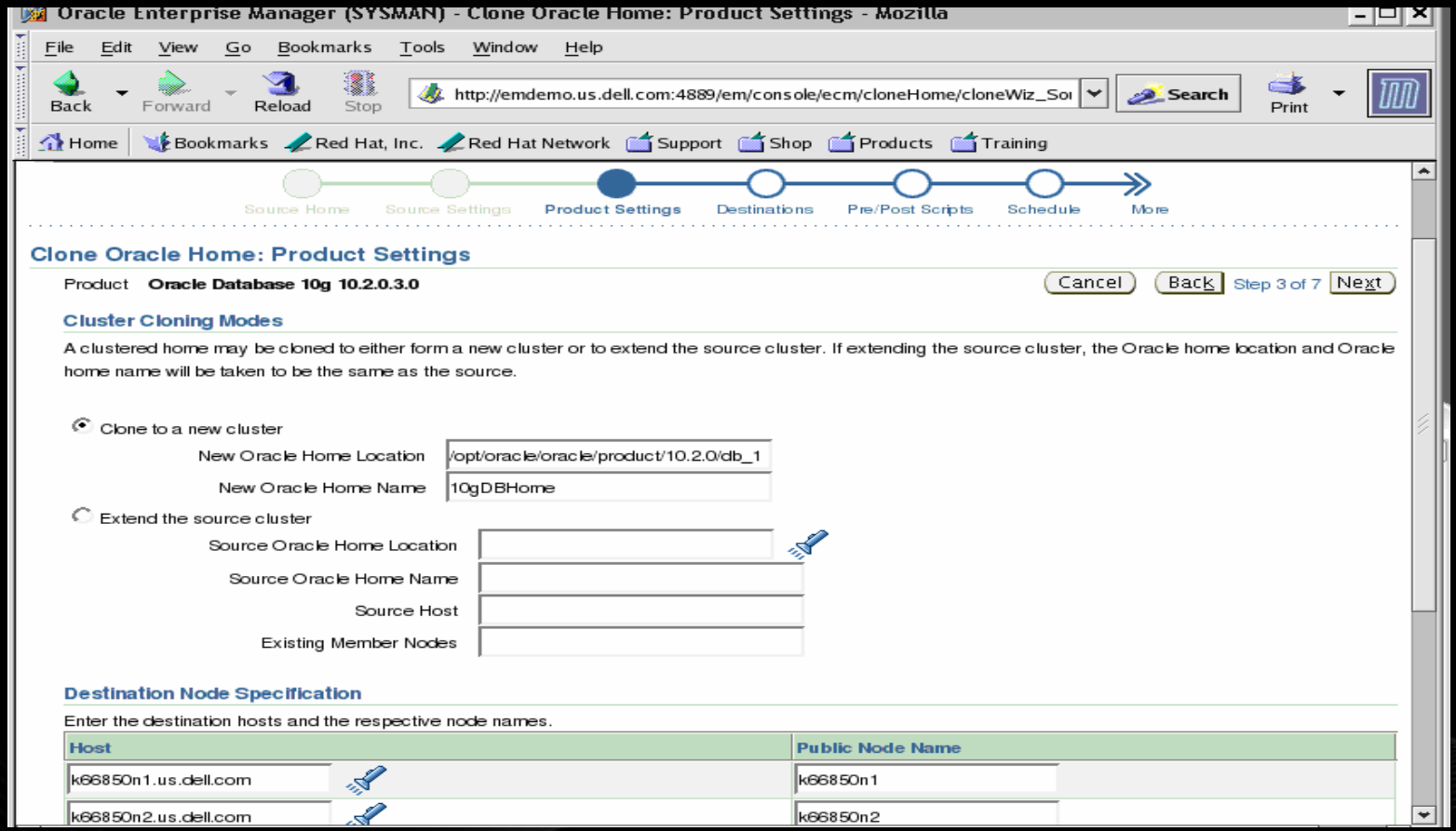
Automate RAC Deployment

- **Deploy RAC Database Software**
  - **Clone RAC Oracle Home from Software Library to RAC nodes**



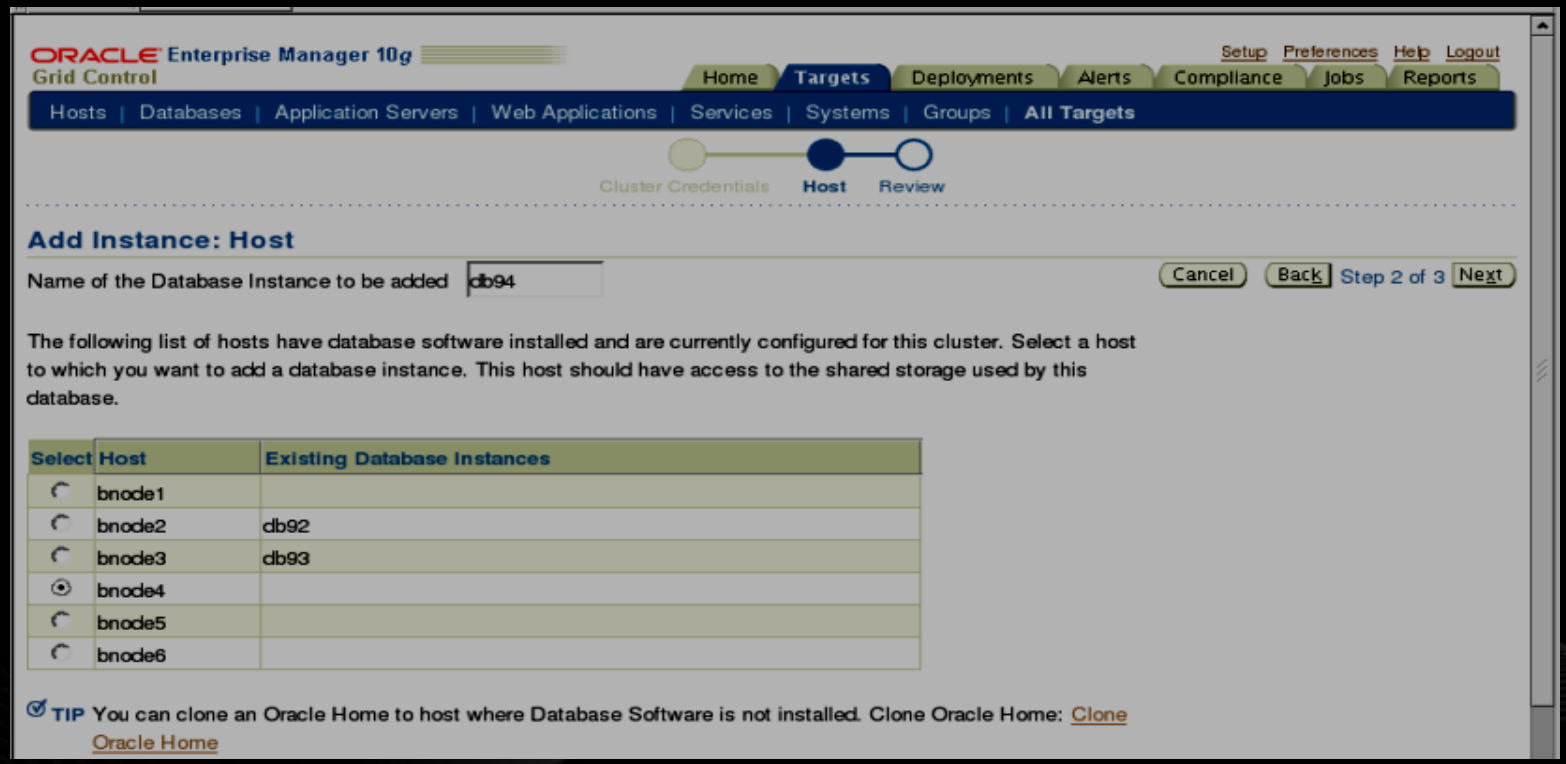
Automate RAC Deployment

- **Deploy RAC Database Software**
  - **Specify the target servers information**



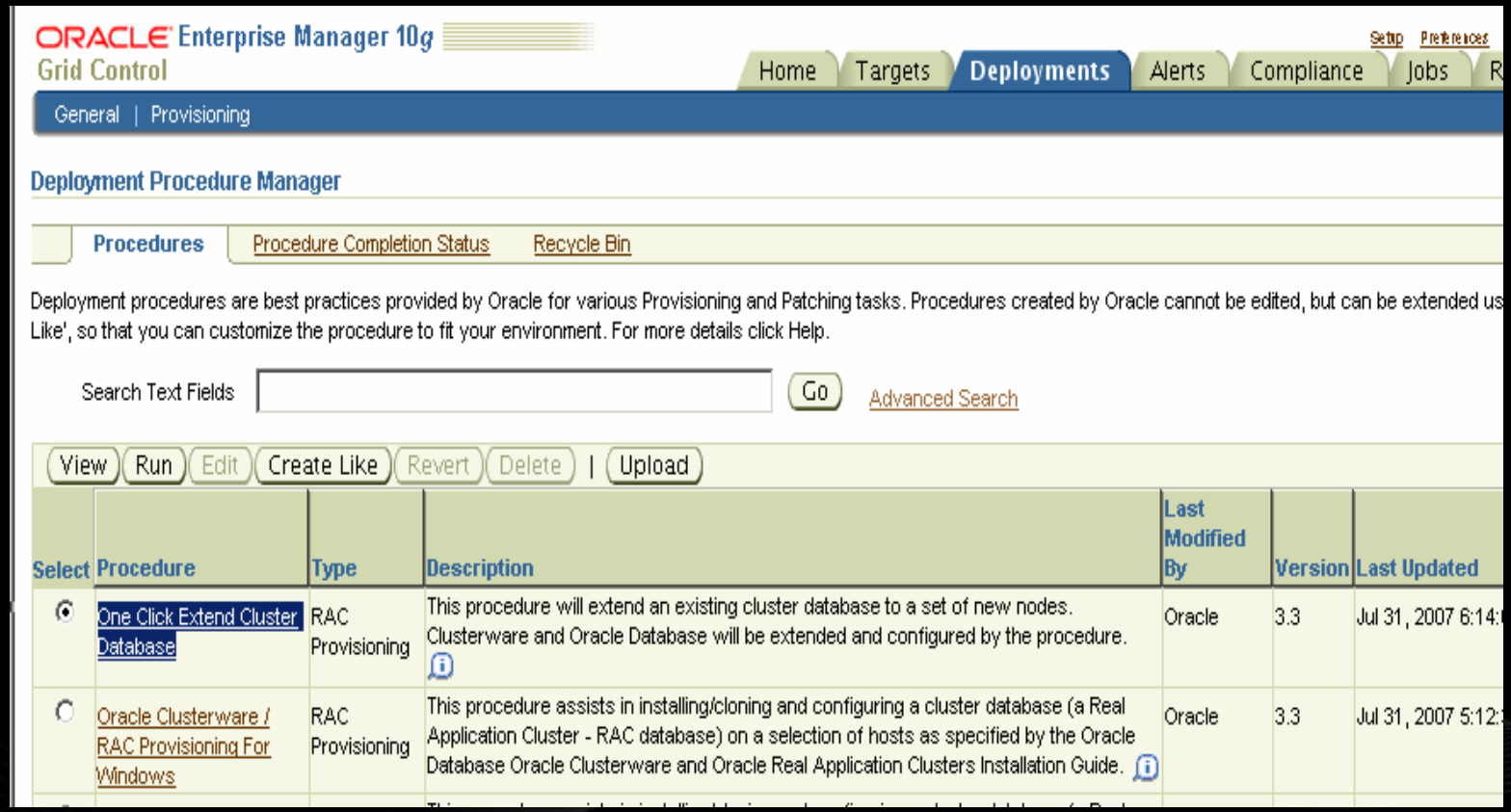
Easy Scale up and Down RAC

– **Scale up by extending a cluster: Option 1**
  - **Install enterprise manager agent on the new server**
  - **Clone CRS to the new server**
  - **Clone Oracle database software to the new server**
  - **Add an instance to the database:**



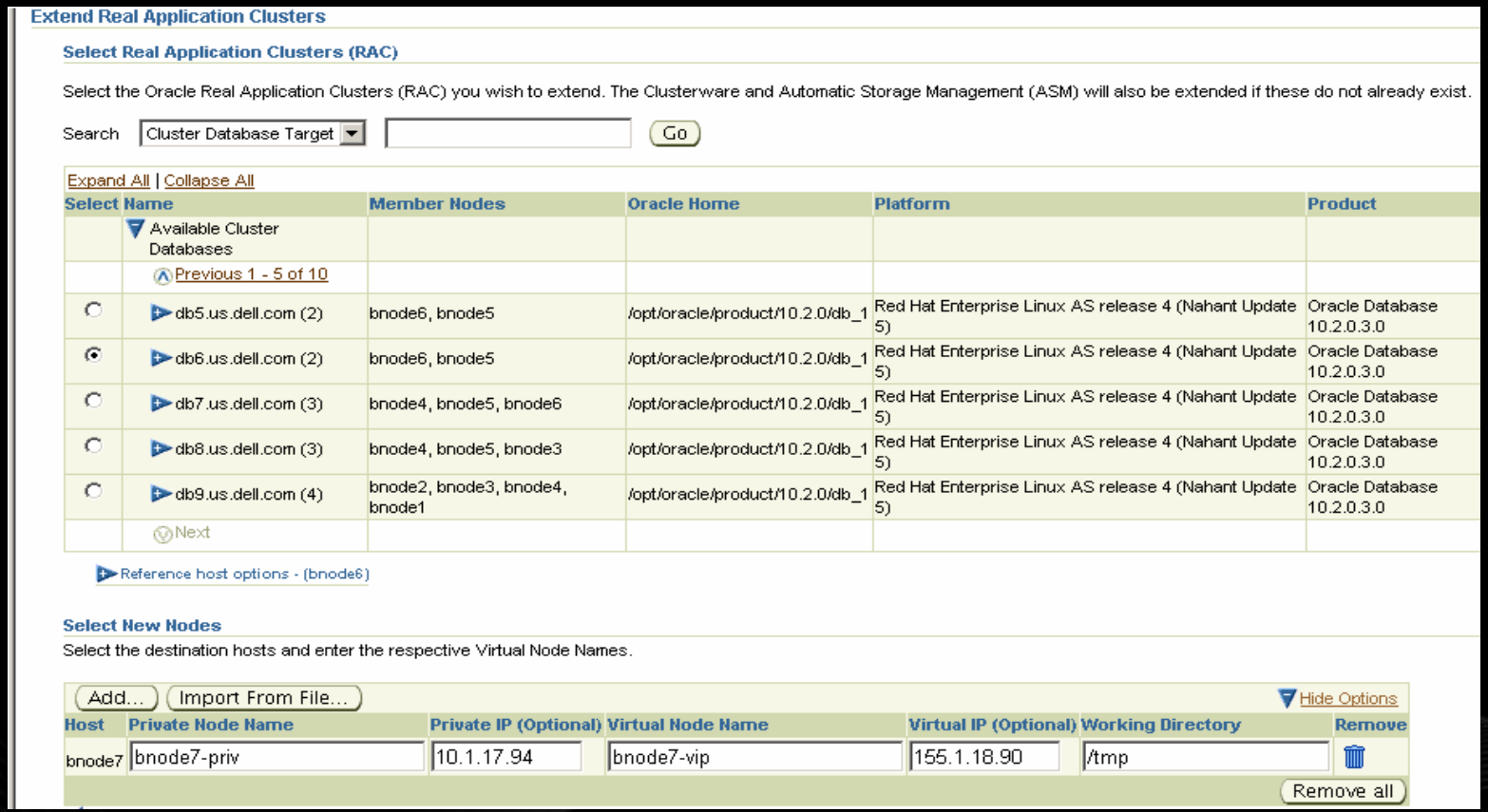
Easy Scale up and down RAC

- **Scale up RAC Database, Option 2:**
  - **Deployments Tab→Deployment Procedure Manager: RAC Provisioning Procedure → One Click Extend Cluster Database:**



Easy Scale up and down RAC

- **Scale up RAC Database, Option 2:**
  - **Select the database to be extended**
  - **Select the new server and fill the server information**
  - **Submit the RAC extend Job**



Extend Real Application Clusters

Select Real Application Clusters (RAC)

Select the Oracle Real Application Clusters (RAC) you wish to extend. The Clusterware and Automatic Storage Management (ASM) will also be extended if these do not already exist.

Search: Cluster Database Target | Go

Expand All | Collapse All

Select	Name	Member Nodes	Oracle Home	Platform	Product
	Available Cluster Databases				
	Previous 1 - 5 of 10				
○	db5.us.dell.com (2)	bnode6, bnode5	/opt/oracle/product/10.2.0/db_1	Red Hat Enterprise Linux AS release 4 (Nahant Update 5)	Oracle Database 10.2.0.3.0
◉	db6.us.dell.com (2)	bnode6, bnode5	/opt/oracle/product/10.2.0/db_1	Red Hat Enterprise Linux AS release 4 (Nahant Update 5)	Oracle Database 10.2.0.3.0
○	db7.us.dell.com (3)	bnode4, bnode5, bnode6	/opt/oracle/product/10.2.0/db_1	Red Hat Enterprise Linux AS release 4 (Nahant Update 5)	Oracle Database 10.2.0.3.0
○	db8.us.dell.com (3)	bnode4, bnode5, bnode3	/opt/oracle/product/10.2.0/db_1	Red Hat Enterprise Linux AS release 4 (Nahant Update 5)	Oracle Database 10.2.0.3.0
○	db9.us.dell.com (4)	bnode2, bnode3, bnode4, bnode1	/opt/oracle/product/10.2.0/db_1	Red Hat Enterprise Linux AS release 4 (Nahant Update 5)	Oracle Database 10.2.0.3.0
	Next				

Reference host options - (bnode6)

Select New Nodes

Select the destination hosts and enter the respective Virtual Node Names.

Add... | Import From File... | Hide Options

Host	Private Node Name	Private IP (Optional)	Virtual Node Name	Virtual IP (Optional)	Working Directory	Remove
bnode7	bnode7-priv	10.1.17.94	bnode7-vip	155.1.18.90	/tmp	

Remove all

Easy Scale up and down RAC

- **Scale down RAC Database :**
  - **Deployments Tab→ Deployment Procedure Manager: RAC Provisioning Procedure → Delete/Scale down Oracle Real Application Clusters**
  - **Select the node name to delete**

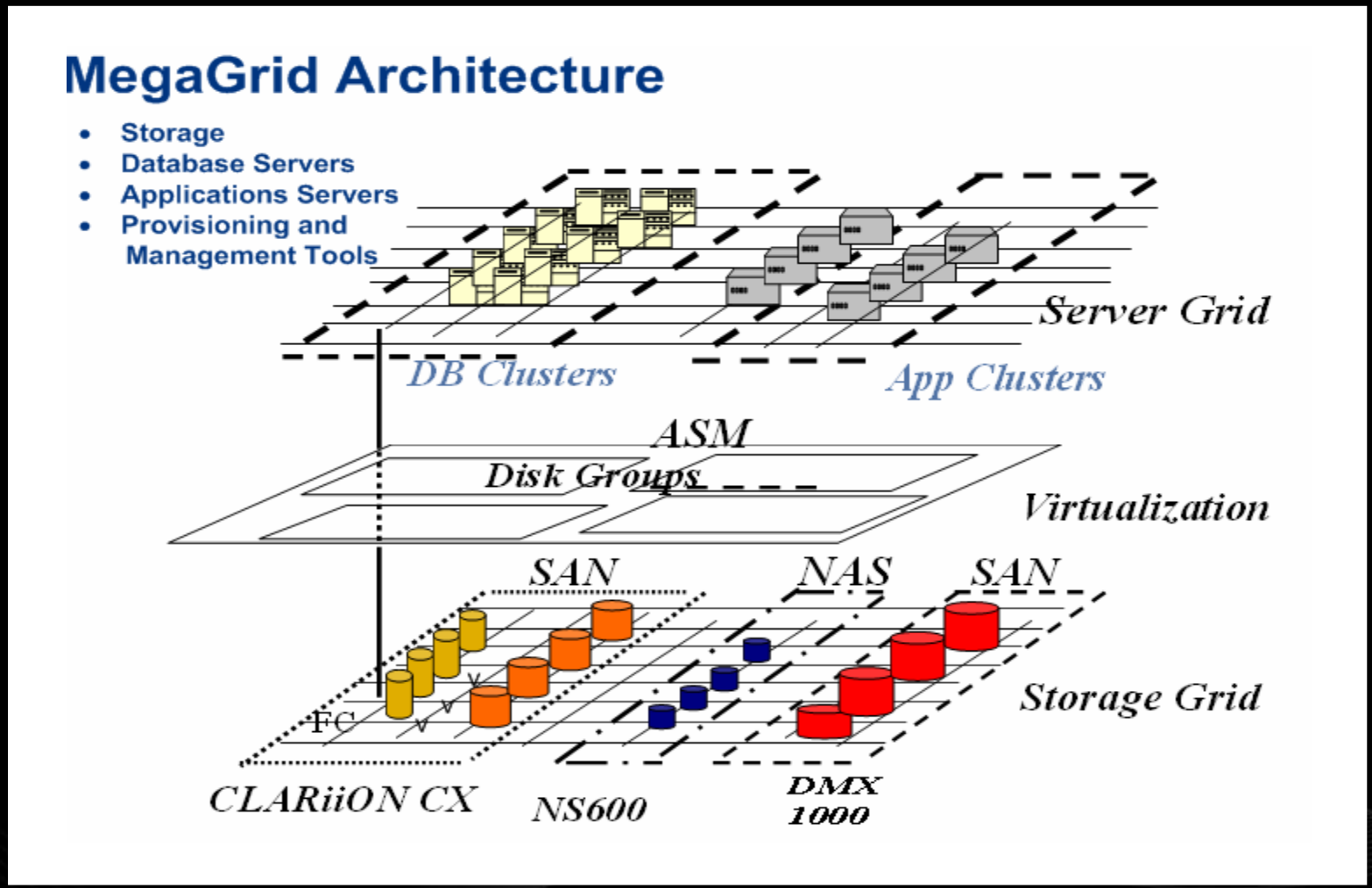
Select	Procedure	Type	Description	Modified By	Version	Last Updated
◉	One Click Extend Cluster Database	RAC Provisioning	This procedure will extend an existing cluster database to a set of new nodes. Clusterware and Oracle Database will be extended and configured by the procedure.	Oracle	3.3	Jul 31, 2007 6:14:07 AM
○	Oracle Clusterware / RAC Provisioning For Windows	RAC Provisioning	This procedure assists in installing/cloning and configuring a cluster database (a Real Application Cluster - RAC database) on a selection of hosts as specified by the Oracle Database Oracle Clusterware and Oracle Real Application Clusters Installation Guide.	Oracle	3.3	Jul 31, 2007 5:12:32 AM
○	Oracle Clusterware / RAC Provisioning For UNIX	RAC Provisioning	This procedure assists in installing/cloning and configuring a cluster database (a Real Application Cluster - RAC database) on a selection of hosts as specified by the Oracle Database Oracle Clusterware and Oracle Real Application Clusters Installation Guide.	Oracle	3.3	Jul 31, 2007 5:12:31 AM
◉	Delete/Scale down Oracle Real Application Clusters	RAC Provisioning	This procedure deletes nodes from Oracle Real Application Clusters in order to scale down the cluster or completely delete the cluster.	Oracle	3.3	Jul 31, 2007 5:12:29 AM
○	Oracle Clusterware / RAC Provisioning For Windows	RAC Provisioning	This procedure assists in installing/cloning and configuring a cluster database (a Real Application Cluster - RAC database) on a selection of hosts as specified by the Oracle Database Oracle Clusterware and Oracle Real Application Clusters Installation Guide.	Oracle	2.0	Dec 29, 2006 8:34:25 A
○	Oracle Clusterware / RAC Provisioning For UNIX	RAC Provisioning	This procedure assists in installing/cloning and configuring a cluster database (a Real Application Cluster - RAC database) on a selection of hosts as specified by the Oracle Database Oracle Clusterware and Oracle Real Application Clusters Installation Guide.	Oracle	2.0	Dec 29, 2006 8:34:18 A
○	One Click Extend Cluster	RAC	This procedure will extend an existing cluster database to a set of new nodes.	Oracle	2.0	Dec 29, 2006 8:34:14 A

MegaGrid Implementation POC

- **MegaGrid: Deploy Large Clusters of Grid**
  - **Concept from an Oracle, Dell , EMC joint project**
  - **Provide various server, storage resources as services**
  - **Allow provisioning on demand**
  - **A POC project in Dell DB/Apps Lab: 8 nodes, 10 different applications/10 DBs**

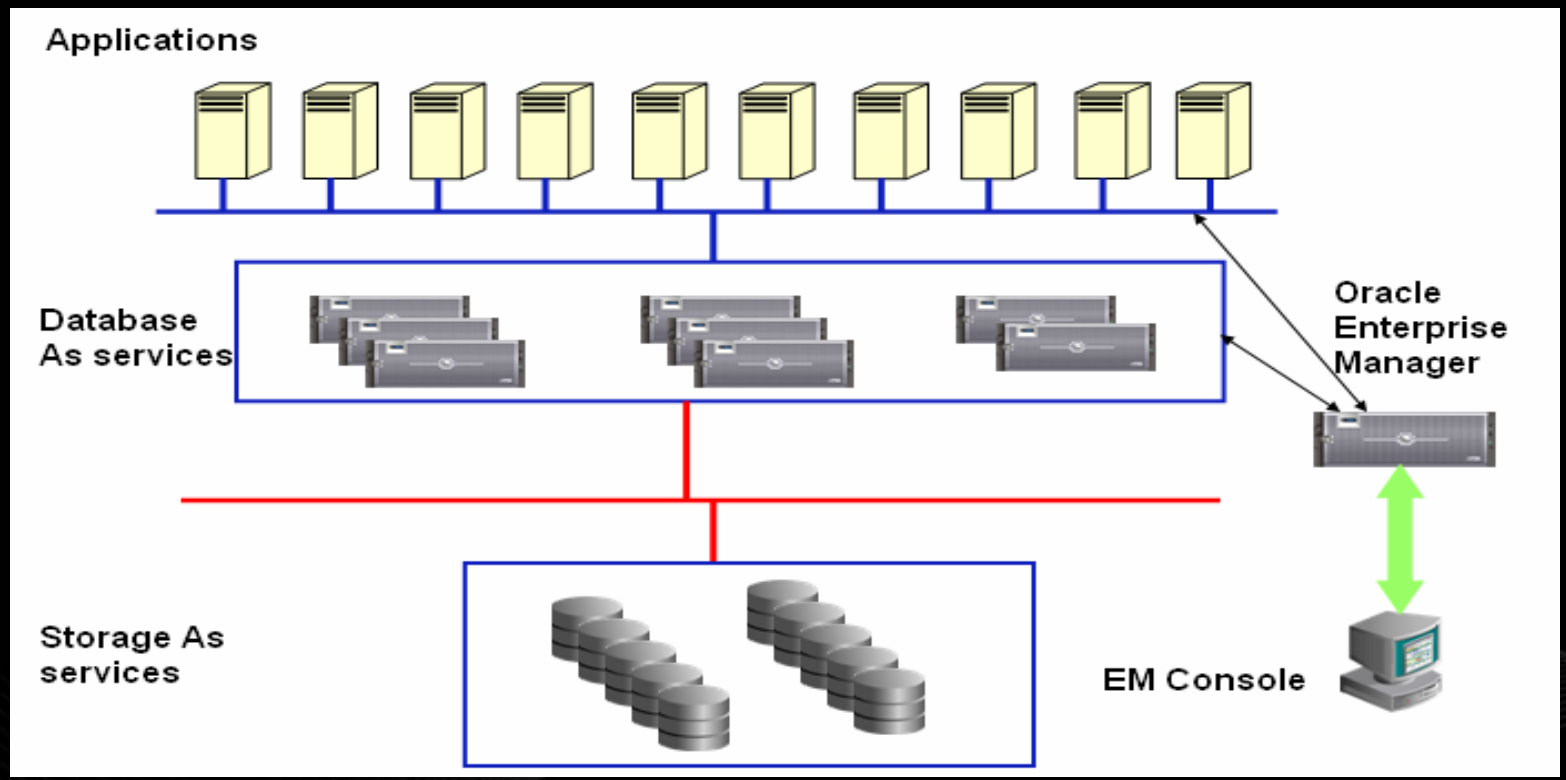
- **Oracle 10g Features for Grid Computing**
  - **Clustering technology**
  - **Database services**
  - **Automatic Storage Management**
  - **Oracle Enterprise Manager Grid Control**
  - **Load balancing**

MegaGrid Implementation POC



MegaGrid Implementation POC

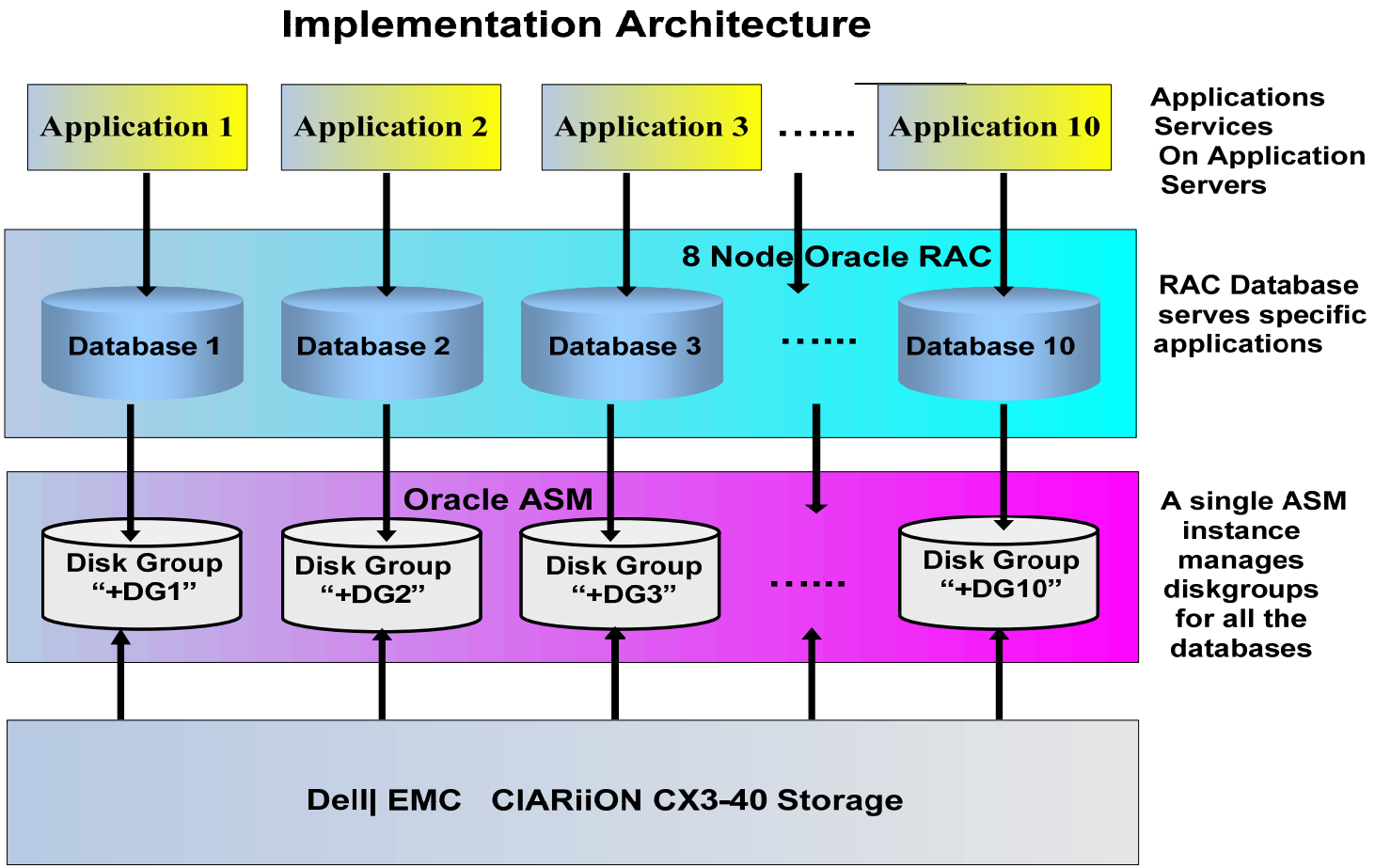
- **Goal: Deploy Large Clusters of Grid**
  - **Deploy 10 databases on a single 8 node RAC**
  - **Provides database as a services for 10 Applications running on 20 Applications servers**
  - **Allow provisioning of additional nodes on demand**



MegaGrid Implementation POC

- **Implementation Architecture**
  - **A single 10g RAC cluster on 8 Dell PE servers**
  - **10 databases share a single RAC**
  - **Number of Instances per database by demand**
  - **All databases access the shared EMC CX3-40 storage through ASM; each database has its own diskgroup**
  - **Each RAC node has a full access on all the shared LUNs**
  - **RAC Deployment/extension by EM Provisioning Pack**
    - **Prepare a new server (OS, network, access to the shared storage, EM agent)**
    - **Scale up the RAC to a new server**
  - **DB Instance relocation, addition and deletion by EM**
    - **Add instance to a RAC database**
    - **Drop instance from a RAC database**

MegaGrid Implementation POC

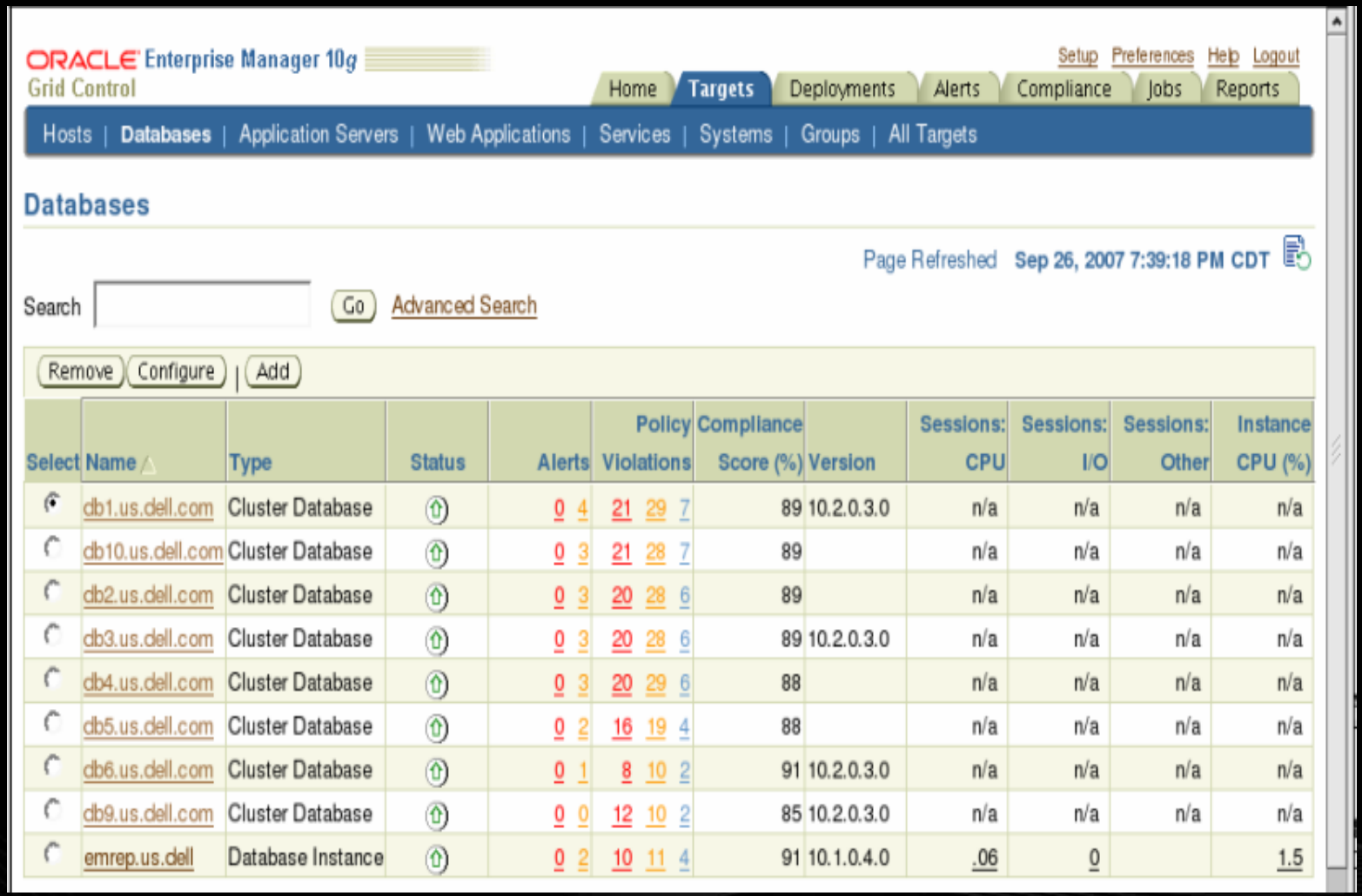


MegaGrid Implementation POC

MegaGrid Database Instance Map

DB name	NODE1	NODE2	NODE3	NODE4	NODE5	NODE6	NODE7	NODE8
DB1	1	2	3					
DB2		1	2	3				
DB3			1	2	3			
DB4				1	2	3		
DB5						1	2	3
DB6	3						1	2
DB7	2	3						1
DB8		1	2	3				
DB9					3	3	3	
DB10					1	2	3	

MegaGrid Implementation POC



ORACLE Enterprise Manager 10g
Grid Control

Setup | Preferences | Help | Logout

Home | Targets | Deployments | Alerts | Compliance | Jobs | Reports

Hosts | Databases | Application Servers | Web Applications | Services | Systems | Groups | All Targets

Databases

Page Refreshed Sep 26, 2007 7:39:18 PM CDT

Search [ ] Go Advanced Search

Remove | Configure | Add

Select	Name	Type	Status	Alerts	Policy Violations	Compliance Score (%)	Version	Sessions: CPU	Sessions: I/O	Sessions: Other	Instance CPU (%)
◉	db1.us.dell.com	Cluster Database	⇧	0 4	21 29 7	89	10.2.0.3.0	n/a	n/a	n/a	n/a
○	db10.us.dell.com	Cluster Database	⇧	0 3	21 28 7	89		n/a	n/a	n/a	n/a
○	db2.us.dell.com	Cluster Database	⇧	0 3	20 28 6	89		n/a	n/a	n/a	n/a
○	db3.us.dell.com	Cluster Database	⇧	0 3	20 28 6	89	10.2.0.3.0	n/a	n/a	n/a	n/a
○	db4.us.dell.com	Cluster Database	⇧	0 3	20 29 6	88		n/a	n/a	n/a	n/a
○	db5.us.dell.com	Cluster Database	⇧	0 2	16 19 4	88		n/a	n/a	n/a	n/a
○	db6.us.dell.com	Cluster Database	⇧	0 1	8 10 2	91	10.2.0.3.0	n/a	n/a	n/a	n/a
○	db9.us.dell.com	Cluster Database	⇧	0 0	12 10 2	85	10.2.0.3.0	n/a	n/a	n/a	n/a
○	emrep.us.dell	Database Instance	⇧	0 2	10 11 4	91	10.1.0.4.0	.06	0		1.5

MegaGrid Implementation POC

Instances

Name	Status	Alerts	Policy Violations	Compliance Score (%)	ADDM Findings	ASM	Sessions: CPU	Sessions: I/O	Sessions: Other	Instance CPU (%)
db1.us.dell.com_db11	↑	0 3	4 9 2	91	0	+ASM1_bnode1	.03	0	0	.43
db1.us.dell.com_db12	↑	1 2	4 9 2	91	0	+ASM2_bnode2	.02	0	0	.3
db1.us.dell.com_db13	↑	0 1	4 9 2	91	7	+ASM3_bnode3	0	0	0	0

Instances

Name	Status	Alerts	Policy Violations	Compliance Score (%)	ADDM Findings	ASM	Sessions: CPU	Sessions: I/O	Sessions: Other	Instance CPU (%)
db2.us.dell.com_db21	↑	0 1	4 9 2	91	0	+ASM2_bnode2	0	0	0	.02
db2.us.dell.com_db22	↑	0 1	4 9 2	91	0	+ASM3_bnode3	0	0	0	.01
db2.us.dell.com_db23	↑	0 1	4 9 2	91	0	+ASM4_bnode4	0	0	0	.01

Instances

Name	Status	Alerts	Policy Violations	Compliance Score (%)	ADDM Findings	ASM	Sessions: CPU	Sessions: I/O	Sessions: Other	Instance CPU (%)
db3.us.dell.com_db31	↑	0 2	4 9 2	91	0	+ASM3_bnode3	0	0	0	.01
db3.us.dell.com_db32	↑	0 1	4 9 2	91	0	+ASM4_bnode4	0	0	0	.01
db3.us.dell.com_db33	↑	0 2	4 9 2	91	0	+ASM5_bnode5	0	0	0	0

References

1. Provisioning RAC and AS environments using Enterprise Manager 10gR2 based on cloning, An Oracle White Paper.
   http://www.oracle.com/technology/products/oem/pdf/rac_as_clone.pdf

2. Oracle Enterprise Manager Advanced Configuration, 10g Release 3, B40002-02
   http://download.oracle.com/docs/cd/B19306_01/em.102/b40002.pdf

3. Project MEGAGRID Capacity Planning for Large Commodity Clusters An Oracle, Dell, EMC, Intel Joint White Paper, December 2004
   http://www.oracle.com/technology/products/database/clustering/pdf/project_megagrid_capacity-planning-for-large-commodity-clusters.pdf

4. Using Deployment Procedures to Scale-Up or Scale-down Oracle RAC, An Oracle White Paper, October 2007
   http://www.oracle.com/technology/products/database/clustering/pdf/emgcdeployproc.pdf

Q & A

THANK YOU