Oracle RAC/Oracle VM
Automated Provisioning with Oracle Enterprise Manager 11g

Kai Yu, Sr. System Engineer Consultant
Dell Global Solutions Engineering

Akanksha Sheoran
Senior Product Manager, Oracle Corporation
About Authors

• Kai Yu
  Senior System Engineer, Dell Oracle Solutions Lab
  ▪ 15 years Oracle DBA and Solutions Engineering
  ▪ Specialized in Oracle RAC, OVM and Oracle EBS
  ▪ Oracle ACE Director, Oracle papers author/presenter
  ▪ IOUG Oracle RAC SIG President (2009-2010)

• Akanksha Sheoran
  Senior Product Manager, Oracle Corporation
Agenda

- Introduction to Oracle Enterprise Manager and Oracle VM
- POC Project and its Infrastructure Configuration
- Provisioning Oracle 11g R2 RAC using Oracle Enterprise Manager
- Extending Oracle 11g RAC using Oracle Enterprise Manager
- Oracle 11g R2 RAC on Oracle VM Demo
- QA
Introduction to Oracle Enterprise Manager and Oracle VM

• New Challenges for IT Organization
  • Quick deployment of Oracle service at low cost
  • Deploy using tested and patched gold images
  • An ability to response demand in short order
  • Server consolidation and partitioning

• Solutions for the new challenges
  • Oracle Enterprise Manager Grid Control
    o Life cycle management of the entire IT stack
    o Oracle Database/ RAC Provisioning and Patching

• Oracle VM
  o Provides an abstract underlying physical computing resources
  o Partition hardware to multiple independent virtual machines
  o Applications easily failover to different physical servers
Introduction to Oracle Enterprise Manager and Oracle VM

- Automated provisioning, patching, lifecycle management
- *Gold images based & reference based deployment*
Introduction to Oracle Enterprise Manager and Oracle VM

RAC Provisioning

- Provisioning RAC Clusters from Gold Images or Installation Media
- Installs and configures Clusterware, ASM and Database in one shot
- Extensive Prerequisites and automated fix up’s
- Clone Production systems to create Test environments based on Production Images
- Scale out/Extend RAC Clusters On demand
- Scale back/Delete Clusters
- Convert Single Instance to RAC
Introduction to Oracle Enterprise Manager and Oracle VM

- Oracle VM Server: Xen Hypervisor, management domain dom0 Linux kernel with support of devices, IO, networking, etc.
- VM Server Pool: an autonomous region of VM servers
- VM: guest OS with applications running on domU
Introduction to Oracle Enterprise Manager and Oracle VM

Oracle VM and Oracle RAC

- Oracle VM
- Partitioning single server
- Consolidation
- Development/Test RAC

Oracle RAC on Oracle VM

- Server partitioning and clustering
- Scale-up and scale-out
- Production RAC

** for Dev/Test only, not supported configuration
Introduction to Oracle Enterprise Manager and Oracle VM

- VM Management Pack feature
- Lifecycle Automation for Guest Virtual Machines
Infrastructure Implementation

- Dell/Oracle Joint POC Project:
  - Enterprise Manager manages the whole system stack including virtual infrastructure
  - Automating the provisioning and management complex infrastructure
  - Provision Oracle 11g R2 RAC on virtual environment
- POC server and shared storage infrastructure
  - Dell blade server for running Oracle VM server
  - Server consolidation and reduction in complexity
  - Offer 'plug and play' servers for server farms
  - Reduce the space constraints
  - Scalable, high performance
Infrastructure Implementation

Dell EqualLogic storage as the storage solution for VM and RAC
- A feature-rich iSCSI based enterprise storage solution
- Design for high availability and load balancing
- Built-in features such as Auto Replication and Auto-Snapshot
- Linear scalability, latest 10GbE offers even higher performance
- Complementary performance with Oracle ASM
- EqualLogic’s snapshot works with RMAN database backup
- Ideal choice for deploying Oracle VM and RAC
Infrastructure Implementation

- Configure EM Grid Control 11gR1
  - Prerequisites: JDK, rpms, 11gR2 database, Weblogic server 10.2.0.3 with Patch WDJ7
  - Install EM Grid Control 11gR1
  - Configured Software library

Add Software Library Location

Add a new Software Library by specifying directory location. In case of normal preferred credentials for each host running OMS,

- Software Library Directory Location: `/opt/oracle/softlib`

- Load the Oracle 11g R2 RAC shipped software to the software library
## Infrastructure Implementation

11g R2 Grid Infrastructure: linux.x64_11gR2_grid.zip, 11g R2 RAC: linux.x64_11gR2_database_1of2.zip, linux.x64_11gR2_database_2of2.zip

**Components**

Define and configure the set of Software Components that may be included in an Image.

<table>
<thead>
<tr>
<th>Select Name</th>
<th>Type</th>
<th>Revision</th>
<th>Status</th>
<th>Maturity</th>
<th>Product name/Patch number</th>
<th>Product version</th>
<th>Description</th>
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<tr>
<td>Components</td>
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<td></td>
<td>Oracle Components</td>
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**linux_x64**

<table>
<thead>
<tr>
<th>Oracle Database Install Media</th>
<th>Generic Component</th>
<th>0.2</th>
<th>Incomplete</th>
<th>Production Oracle Database</th>
<th>11.2.0.1.0</th>
<th>RAC Database Shiphone</th>
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<tbody>
<tr>
<td>Oracle Database shiphone</td>
<td>Generic Component</td>
<td>0.7</td>
<td>Ready</td>
<td>Untested Oracle Database</td>
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<td>RAC Database Shiphone</td>
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<td>Ready</td>
<td>Untested Oracle Grid</td>
<td>11.2.0.1.0</td>
<td>Oracle Grid Infrastructure</td>
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</tbody>
</table>

**linux_zseries64**

| Oracle Database Install Media | Generic Component | 0.2 | Incomplete | Production Oracle Database | 11.2.0.1.0 | RAC Database Shiphone       |
Infrastructure Implementation

- Oracle VM server Installation
- Oracle VM server network configuration

- Configure shared storage on EqualLogic Volumes in VM servers
- Configure Enterprise Manage Grid control to manage VM servers
- Create VM server pool on Grid Control, add VM servers
VM Infrastructure Implementation

- Create Guest VMs using OEL5U5template

  ![Create Guest Virtual Machines: Source](image1)

- Configure additional local disks and shared disks to VMs

  ![Disk Configuration Table](image2)

- Create ASM disks on the shared disks.
Infrastructure Implementation

RAC Configure on Guest VMs

Shared Virtual Disks

Guest1 (RAC NODE 1)
- eth0
- xenbr0
- dom0 VM server1
- bond0
- eth1
- eth2
- eth3
- eth4
- eth1

Public
ISCSI
Private Interconnect

Guest2 (RAC NODE 2)
- eth1
- xenbr1
- dom0 VM server2
- bond0
- eth1
- eth4
- eth3
- eth2
- eth0

Public
ISCSI
Infrastructure Implementation
Provision Oracle 11g R2 RAC using EM

- Install/configure Grid control Agent on RAC node VMs
- RAC node are listed on host tab

List on Virtualization Central
Provision Oracle 11g R2 RAC using EM

- Meet Prerequisites of 11g R2 RAC
- Provision Oracle RAC 11g R2 Grid infrastructure

<table>
<thead>
<tr>
<th>Select Procedure</th>
<th>Type</th>
<th>Description</th>
<th>Last Modified By</th>
<th>Version</th>
<th>Last Updated</th>
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<tbody>
<tr>
<td>Oracle Grid Infrastructure / RAC Provisioning</td>
<td>RAC Provisioning</td>
<td>Provisions Oracle Grid Infrastructure 11g Release 2 (11.2) and Oracle Real</td>
<td>Oracle</td>
<td>6.1</td>
<td>May 24, 2010 1:42:21 AM CDT</td>
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<td></td>
<td>Application Clusters 11g Release 2 (11.2) for clustered environments.</td>
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<td>Oracle Clusterware / RAC Provisioning For UNIX</td>
<td>RAC Provisioning</td>
<td>This procedure assists in installing/cloning and configuring a cluster</td>
<td>Oracle</td>
<td>6.1</td>
<td>May 24, 2010 1:42:21 AM CDT</td>
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<tr>
<td></td>
<td></td>
<td>database (a Real Application Cluster - RAC database) on a selection of</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>hosts as specified by the Oracle Database Oracle Clusterware and Oracle</td>
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<td></td>
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<td></td>
<td></td>
<td>Real Application Clusters Installation Guide.</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
Provision Oracle 11g R2 RAC using EM

• Click schedule deployment, specify the following parameters:
   Software source: 11gR2 media in Software library
   Host name of target server (guest VM)
   OS credentials in the target hosts and OS groups for ASM and DB instance
   Software locations: Oracle Base and Oracle Homes for Grid Infrastructure and 11g R2 RAC
   Cluster configuration: cluster name, host name, public IP and privates IP, scan IP, GNS
   Database Info
   Storage for Grid Infrastructure (GI) and Database
   ASM configuration ASM disks and diskgroups for GI and Database
Provision Oracle 11g R2 RAC Using EM

Start the provisioning procedure and check the status

<table>
<thead>
<tr>
<th>Name</th>
<th>Status</th>
<th>Type</th>
<th>Description</th>
<th>Run Privilege Delegation</th>
<th>Run Privilege Command/Privilege Delegation</th>
<th>Error Handling Mode</th>
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<tbody>
<tr>
<td>Oracle Grid Infrastructure / RAC Provisioning</td>
<td>Running</td>
<td>Running</td>
<td>Provisions Oracle Grid Infrastructure 11g Release 2 (11.2) and Oracle Real Application Clusters 11g Release 2 (11.2) for clustered</td>
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<td></td>
<td>Stop On Error</td>
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</tbody>
</table>
Provision Oracle 11g R2 RAC Using EM

Start the provisioning procedure and check the status

### Status

#### General Information
- **Run Procedure**: Oracle_GI_RAC_Provisioning_vmrac-cluster_vmracdb_2010-08-04_10-35
- **Procedure Version**: 6.1
- **Error Handling Mode**: Stop On Error
- **Status**: Succeeded
- **Owner**: SYSMAN

#### Status Detail

<table>
<thead>
<tr>
<th>Steps</th>
<th>Job Details</th>
<th>OMS Log</th>
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<table>
<thead>
<tr>
<th>Name</th>
<th>Status</th>
<th>Type</th>
<th>Description</th>
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<tr>
<td>Oracle Grid Infrastructure / RAC Provisioning</td>
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<td></td>
<td>Provisions Oracle Grid Infrastructure 11g Release 2 (11.2) and Oracle Real Application Clusters 11g Release 2 (11.2) for clustered environments.</td>
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</tbody>
</table>
Extend Oracle 11g RAC using EM

- Prepare the guest VM for the new node
- Schedule the provisioning procedure to extend the RAC

### Deployment Procedure Manager

<table>
<thead>
<tr>
<th>Getting Started with Deployment Procedure Manager</th>
<th>Procedure Completion Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deployment Procedures</td>
<td>Application Server Provisioning Procedures</td>
</tr>
<tr>
<td>Database Provisioning Procedures</td>
<td>RAC Provisioning Procedures</td>
</tr>
<tr>
<td>Extend Cluster Database</td>
<td>Download Deployment Procedures</td>
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</table>

<table>
<thead>
<tr>
<th>Select Procedure</th>
<th>Type</th>
<th>Description</th>
<th>Last Modified By</th>
<th>Version</th>
<th>Last Updated</th>
</tr>
</thead>
<tbody>
<tr>
<td>One Click Extend Cluster Database</td>
<td>Provisioning</td>
<td>This procedure will extend an existing cluster database to a set of new nodes. Oracle Clusterware and Oracle Database will be extended and configured by the procedure.</td>
<td>Oracle</td>
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</table>
Provision Oracle 11g R2 RAC using EM

- Click schedule deployment, specify the following parameters:
  - Select which RAC database to extend
  - Use the existing RAC node as the reference host
  - Specify the new node information
  - Specify new node OS credentials (owners of the Oracle Homes)
  - Specify ASM instance login credential
  - Execute the deployment procedure and check the status
Oracle RAC on Oracle VM Demo

Recorded Demo:

1. Oracle VM Server Configuration

2. Enterprise Manager VM for VM management

3. Guest VMs as the RAC nodes:
   - Network Shared storage
   - 11g R2 Grid Infrastructure,
   - 11g R2 ASM
   - 11g R2 RAC Database and EM agent

4. Enterprise Manager manages 11g R2 RAC running on guest VMs
Summary

- Use Grid Control 11g to manage the virtual servers
- Use Grid Control 11g Provisioning pack to provision 11g R2 RAC on VM and extend the RAC to additional VM node.
- Oracle OpenWorld 2010 Presentations
  - S316318: Oracle RAC/Oracle VM Automated Provisioning with Oracle Enterprise Manager 11g
  - S316263: Monitoring and Diagnosing Oracle RAC Performance with Oracle Enterprise Manager 11g
- Dell Oracle Whitepapers: www.dell.com/oracle
  - Efficient Deployment of Oracle RAC in a Virtualized Environment Using Enterprise Manager Provisioning Pack
  - Building an Oracle® Grid with Oracle VM on Dell™ Blade Servers and Dell EqualLogic™ iSCSI Storage
Thank you and QA
Thank You and Visit Kai Yu’s Oracle Blog at http://kyuoracleblog.wordpress.com/