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Abstract

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# Table of Contents

Preface ............................................................................................................................................... vii  
1 Configuring Oracle VM Server After Installation ......................................................................... 1  
   1.1 Installing Oracle VM Storage Connect plug-ins ................................................................. 1  
   1.2 Enabling Multipath I/O Support ......................................................................................... 1  
   1.3 Configuring Software RAID for Storage ........................................................................... 2  
       1.3.1 Removing Software RAID Devices ............................................................................ 4  
   1.4 Diagnostic Tools for Oracle VM Server ............................................................................. 5  
       1.4.1 Working with the OSWatcher Utility on Oracle VM Server .................................... 5  
       1.4.2 Manually Configuring kdump for Oracle VM Server ................................................ 6  
   1.5 Disabling Paravirtualized Guests on Oracle VM Server ..................................................... 10  
   1.6 Changing the Memory Size of the Management Domain ................................................... 11  
   1.7 Configuring Oracle VM Server for SPARC ....................................................................... 12  
       1.7.1 Creating ZFS Volumes .............................................................................................. 12  
       1.7.2 Configuring a Secondary Service Domain ............................................................... 14  
2 Configuring Oracle VM Manager After Installation ................................................................. 29  
   2.1 Configuring Oracle VM Manager Web Interface Session Timeout ..................................... 29  
   2.2 Setting Up SSL ................................................................................................................... 30  
       2.2.1 Oracle VM Key Tool .................................................................................................. 31  
       2.2.2 Showing the Certificate Configuration .................................................................... 33  
       2.2.3 Validating the Certificate Configuration .................................................................. 34  
       2.2.4 Exporting the CA Certificate ................................................................................... 35  
       2.2.5 Generating a New SSL Key ....................................................................................... 35  
       2.2.6 Changing the Default SSL Certificate ..................................................................... 36  
       2.2.7 Changing the Keystore Password ............................................................................. 38  
3 Administering Oracle VM Manager .......................................................................................... 39  
   3.1 Oracle VM Manager Administrator Tool (ovm_admin) ......................................................... 39  
       3.1.1 Listing Users ............................................................................................................ 40  
       3.1.2 Creating Users .......................................................................................................... 41  
       3.1.3 Deleting Users .......................................................................................................... 42  
       3.1.4 Changing User Passwords ......................................................................................... 42  
       3.1.5 Configure Account Locking ...................................................................................... 43  
       3.1.6 Unlocking User Accounts ......................................................................................... 44  
       3.1.7 Listing Data Sources ................................................................................................ 45  
       3.1.8 Modifying the Oracle VM Manager Database Schema ............................................. 45  
       3.1.9 Rotating Log Files ..................................................................................................... 47  
       3.1.10 Changing the Password for the MySQL Root User .................................................. 48  
   3.2 Working with the MySQL Instance ..................................................................................... 50  
4 Managing Oracle VM Manager Authentication ........................................................................ 51  
   4.1 Default Oracle VM Manager Users ..................................................................................... 51  
   4.2 Changing the Oracle VM Manager User Password ............................................................. 52  
   4.3 Restricting User Authentication to Oracle WebLogic Server Groups ................................ 52  
   4.4 Enabling LDAP and Active Directory Authentication ........................................................ 53  
5 Monitoring Oracle VM Server with SNMP .............................................................................. 55  
   5.1 Installed SNMP Packages .................................................................................................... 55  
   5.2 Adding the Oracle VM Server Object Module ................................................................... 55  
   5.3 Enabling the SNMP Service ............................................................................................... 56  
   5.4 How to Retrieve MIB Objects ............................................................................................. 56  
6 Updating Oracle VM Server with Oracle Ksplice ...................................................................... 59  
   6.1 What Is Oracle Ksplice? ........................................................................................................ 59  
   6.2 Prerequisites for Ksplice on Oracle VM Server ................................................................... 60  
   6.3 Accessing ULN Channels ..................................................................................................... 60
6.4 Configuring Yum for Oracle Ksplice .................................................. 61
6.5 Installing the Ksplice Enhanced Client ............................................. 63
6.6 Installing Oracle Ksplice Updates on Oracle VM Server ...................... 66
7 Provisioning ISO Files for PVM Guest Installations ............................. 71
8 Installing and Using the Oracle VM Guest Additions ........................... 73
  8.1 Features of the Oracle VM Guest Additions .................................... 73
  8.2 Oracle VM Guest Additions Packages ........................................... 73
  8.3 Downloading the Oracle VM Guest Additions Packages .................... 76
  8.4 Installing the Oracle VM Guest Additions ..................................... 77
  8.5 Upgrading the Oracle VM Guest Additions .................................... 77
  8.6 Using the Oracle VM Guest Additions (ovmd) ................................. 78
    8.6.1 Using the Oracle VM Guest Additions Daemon to Enable First-Boot Configuration ................................................................. 79
    8.6.2 Sending Messages to Virtual Machines ................................... 80
    8.6.3 Configuring the Oracle VM Guest Additions Daemon to Run as a Service ................................................................. 80
  8.7 Using the Oracle VM Guest Additions with Microsoft Windows (ovmcmd) ................................................................. 81
  8.8 The Oracle VM Template Configuration Script and Modules ................ 83
    8.8.1 Template Configuration Script (ovm-template-config) .................. 83
    8.8.2 Enabling and Disabling Configuration Modules (ovm-chkconfig) ...... 84
    8.8.3 Key-Value Pairs Used By Available Configuration Modules .......... 86
    8.8.4 Triggering Configuration Changes ........................................ 86
    8.8.5 Developing Oracle VM Template Configuration Modules ............... 87
  9 Using the Oracle VM Utilities ......................................................... 93
    9.1 Oracle VM Virtual Machine Control (ovm_vmccontrol) .................... 93
    9.2 Oracle VM Retrieve Disk (ovm_vmdisks) ...................................... 96
    9.3 Oracle VM Hostd For Metrics Messaging (ovm_vmhostd) .................. 97
    9.4 Retrieving Host Metrics from Virtual Machines (vm-dump-metrics) ..... 98
  10 Converting Physical Hosts to Virtual Machines ................................ 101
    10.1 Introduction to the P2V Utility ................................................ 101
    10.2 Converting Hosts in Interactive Mode ..................................... 101
    10.3 Converting Hosts Silently with a Kickstart File ......................... 104
    10.4 Importing Guests as Virtual Machine Templates to Oracle VM Manager ................................................................. 108
  11 Backing up and Restoring Oracle VM Components ................................ 111
    11.1 Backing up and Restoring Oracle VM Manager .............................. 111
      11.1.1 Backing up the Oracle VM Manager Configuration File ............... 111
      11.1.2 Backing up the MySQL Database Repository .......................... 112
      11.1.3 Oracle VM Manager Backup and Restore Troubleshooting .......... 114
      11.1.4 Restoring Oracle VM Manager ......................................... 114
      11.1.5 Restoring Oracle VM Manager If You Have No Database Backup ...... 117
      11.1.6 Oracle WebLogic Server Backup and Restore ......................... 118
    11.2 Backing up Virtual Machines ................................................. 118
  12 Troubleshooting Oracle VM ............................................................ 121
    12.1 Capturing Diagnostic Information for Oracle VM .......................... 121
    12.2 Troubleshooting Oracle VM Server .......................................... 122
      12.2.1 Oracle VM Server Debugging Tools .................................. 122
      12.2.2 Using DHCP on Oracle VM Servers ................................... 123
      12.2.3 Cannot Use Certain Key Combinations When Connecting to Dom0 Console ................................................................. 124
      12.2.4 Storage Array LUN Remapping on Oracle VM Servers ............... 124
      12.2.5 Tuning ISCSI Settings on Oracle VM Servers ......................... 124
      12.2.6 Troubleshooting Clustered Server Pools Oracle VM Server for x86 ................................................................. 125
      12.2.7 Allocating Memory for Multiple Infiniband HCAs ................. 126
      12.2.8 Resolving Issue Where NIC Fails to Get IP Address if Configured for DHCP ................................................................. 126
    12.3 Troubleshooting Oracle VM Manager ......................................... 126
      12.3.1 Oracle VM Manager Log Files ........................................ 126
      12.3.2 Oracle VM Manager Web Interface Database Synchronization ........ 128
Preface

The Oracle VM Administrator’s Guide explains how to manage Oracle VM and perform administrative tasks, such as configuring the system configuration, using Oracle VM Guest Additions, backing up and restoring components, troubleshooting common issues.

Audience

This document is intended for Oracle VM administrators with privileged access to the physical and virtual resources of the Oracle VM environment. This guide assumes that you have a detailed knowledge of Oracle VM and that you are familiar with Oracle Linux system administration and Linux command line operation.

Related Documents

For more information, see the following documents in the Oracle VM documentation set:

- Oracle VM Release Notes
- Oracle VM Installation and Upgrade Guide
- Oracle VM Concepts Guide
- Oracle VM Manager Getting Started Guide
- Oracle VM Manager User’s Guide
- Oracle VM Manager Command Line Interface User’s Guide
- Oracle VM Administrator’s Guide
- Oracle VM Paravirtual Drivers for Microsoft Windows Guide
- Oracle VM Web Services API Developer’s Guide
- Oracle VM Security Guide
- Oracle VM Licensing Information User Manual

You can also get the latest information on Oracle VM by going to the Oracle VM Web site:


Note

Information on performance optimization goals and techniques for Oracle VM Server for x86 can be found in the Oracle Technical White Paper entitled Optimizing Oracle VM Server for x86 Performance, which can be downloaded from the Oracle Technology Network: http://www.oracle.com/technetwork/server-storage/vm/ovm-performance-2995164.pdf

Command Syntax

Oracle Linux command syntax appears in monospace font. The dollar character ($), number sign (#), or percent character (%) are Oracle Linux command prompts. Do not enter them as part of the command. The following command syntax conventions are used in this guide:
### Conventions

<table>
<thead>
<tr>
<th>Convention</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>backslash \</td>
<td>A backslash is the Oracle Linux command continuation character. It is used in command examples that are too long to fit on a single line. Enter the command as displayed (with a backslash) or enter it on a single line without a backslash:</td>
</tr>
<tr>
<td>braces {}</td>
<td>Braces indicate required items:</td>
</tr>
<tr>
<td>brackets []</td>
<td>Brackets indicate optional items:</td>
</tr>
<tr>
<td>ellipses ...</td>
<td>Ellipses indicate an arbitrary number of similar items:</td>
</tr>
<tr>
<td>italics</td>
<td>Italic type indicates a variable. Substitute a value for the variable:</td>
</tr>
<tr>
<td>vertical line</td>
<td>A vertical line indicates a choice within braces or brackets:</td>
</tr>
<tr>
<td>forward slash /</td>
<td>A forward slash is used to escape special characters within single or double quotes in the Oracle VM Manager Command Line Interface, for example:</td>
</tr>
</tbody>
</table>

### Conventions

The following text conventions are used in this document:

<table>
<thead>
<tr>
<th>Convention</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>boldface</td>
<td>Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.</td>
</tr>
<tr>
<td>italic</td>
<td>Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.</td>
</tr>
<tr>
<td>monospace</td>
<td>Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.</td>
</tr>
</tbody>
</table>

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### Access to Oracle Support

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Chapter 1 Configuring Oracle VM Server After Installation

After you successfully install Oracle VM Server, you can perform configuration tasks to customize your environment. These configuration tasks include installing vendor-specific Oracle VM Storage Connect plug-ins, enabling multipathing, optionally installing and configuring diagnostics tools, and changing the memory size of the management domain. If you are using Oracle VM Server for SPARC, you can also create local ZFS volumes or configure a secondary service domain.

1.1 Installing Oracle VM Storage Connect plug-ins

Vendor-specific (non-generic) Oracle VM Storage Connect plug-ins are available directly from your storage vendor. Generic Oracle VM Storage Connect plug-ins are already installed by default during the installation of Oracle VM Server and no further action is required if you select to use only the generic plug-ins. Vendor-specific Oracle VM Storage Connect plug-ins usually facilitate additional management functionality that you can take advantage of from within Oracle VM Manager.

You can find more information about Oracle VM Storage Connect plug-ins at:

https://www.oracle.com/virtualization/storage-connect-partner-program.html

Oracle VM Storage Connect plug-ins are delivered as an RPM, usually a single RPM, but your storage vendor may provide multiple RPMs. When you have the Oracle VM Storage Connect plug-in RPM from your storage vendor, install the RPM on your Oracle VM Servers. You must install the RPM on all the Oracle VM Servers that will use the particular storage.

To install the Oracle VM Storage Connect plug-in RPM, on the command line of the Oracle VM Server, enter

```
# rpm -ivh filename.rpm
```

If you are upgrading an existing Oracle VM Storage Connect plug-in, use the RPM upgrade parameter:

```
# rpm -Uvh filename.rpm
```

If you are installing or upgrading an Oracle VM Storage Connect plug-in on an Oracle VM Server already managed by Oracle VM Manager, rediscover the Oracle VM Server to update the database repository with the latest configuration information about the Oracle VM Server.

Read the install and configuration documentation for the Oracle VM Storage Connect plug-in from your storage vendor before you install and use it. There may be extra configuration required that is not documented here.

1.2 Enabling Multipath I/O Support

In case user action is required to enable multipathing, this sections explains how to do so. The required steps depend on the storage hardware implemented. Consequently, the steps below are intended as a guideline and priority should be given to the SAN hardware documentation. Note that some guidelines have already been provided for the configuration of multipathing on SPARC hardware in Storage Requirements in the Oracle VM Installation and Upgrade Guide. Not all steps apply to your environment. Consult the SAN hardware vendor documentation for a complete list of steps, the order in which to run them, and their relevance to your specific environment.

General steps to configure multipathing:

1. Design and document the multipathing configuration you intend to apply to the SAN hardware used in your Oracle VM environment.
2. Ensure that the drivers for your Host Bus Adapters (HBAs) are present. If not, install the drivers.

3. Configure the appropriate zoning on the fibre channel switches.

4. Configure LUN masking on the storage arrays.

5. Configure path optimization features (ALUA or similar) on your disk subsystem, if so instructed by your vendor's documentation.

6. Check the fabric information on each Oracle VM Server that has access to the SAN hardware. Use `multipath -ll` and related commands.

7. Make the necessary changes to the file `/etc/multipath.conf` on the Oracle VM Servers.

   **Note**
   You must make the exact same changes to the multipath configuration file on all Oracle VM Servers in your environment.

   **Important**
   It is critical that the configuration parameter `user_friendly_names` remain set to `no` within the `/etc/multipath.conf` configuration file.

   **Important**
   Under the `multipath` section, the `multipaths` configuration subsection is not supported within the `/etc/multipath.conf` configuration file.

8. Restart the multipath daemon, `multipathd`.

9. Check the fabric information again to verify the configuration.

10. If instructed by the vendor documentation, rebuild `initrd`.

11. Reboot the Oracle VM Servers to verify that the SAN and multipathing configuration come up after a restart.

For detailed information and instructions, consult the SAN hardware vendor documentation.

   **Note**
   Booting from a multipath SAN is supported.

### 1.3 Configuring Software RAID for Storage

You can use software RAID devices for storage repositories or virtual disks. However, you must first configure these devices on Oracle VM Server before Oracle VM Manager can discover the array for storage.

   **Important**
   As a best practice, you should use software RAID devices as storage repositories in a deployment environment before using them in a production environment.

   In environments where you use software RAID devices as storage repositories for server pools, unexpected behavior can occur with certain virtual machine migration operations. For example, if you clone a virtual machine and then attempt to live
To configure software RAID devices as storage, do the following:

1. Connect to Oracle VM Server as the root user.

2. Ensure the local disks or multipath LUNs you want to configure as software RAID devices are available as mapped devices.

   ```bash
   # ls /dev/mapper
   ```

3. Run the `multipath -ll` command to find the WWIDs for the devices, as follows:

   ```bash
   # multipath -ll
   
   device1-WWID dm-0 LSI,MR9261-8i
   size=558G features='1 queue_if_no_path' hwhandler='0' wp=rw
   `+-+ policy='round-robin 0' prio=1 status=active
   `-+ 2:2:1:0 sdb 8:16 active ready running
   
   device2-WWID dm-1 LSI,MR9261-8i
   size=558G features='1 queue_if_no_path' hwhandler='0' wp=rw
   `+-+ policy='round-robin 0' prio=1 status=active
   `-+ 2:2:2:0 sdc 8:32 active ready running
   ```

   **Note**

   The multipathing service, `multipathd`, uses the underlying devices to create a single device that routes I/O from Oracle VM Server to those underlying devices. For this reason, you should not use the `udev` device names to create a software RAID, such as `/dev/sdb`. You should only use the WWIDs of the devices to create a software RAID. If you attempt to use a `udev` device name, an error occurs to indicate that the device is busy.

4. Create a software RAID configuration with the devices.

   ```bash
   # mdadm --create --verbose /dev/md0 --level=1 --raid-devices=2 /dev/mapper/device1-WWID /dev/mapper/device2-WWID
   ```

5. Open `/etc/mdadm.conf` for editing.

6. Comment out the `DEVICE /no/device` line.

7. Specify each device to include in the software RAID configuration on separate `DEVICE` lines, as in the following example:

   ```bash
   DEVICE /dev/mapper/device1-WWID
   DEVICE /dev/mapper/device2-WWID
   ```

8. Save and close `/etc/mdadm.conf`.

9. Run the following command to scan for software RAID devices and include them in `mdadm.conf`:

   ```bash
   # mdadm --detail --scan >> /etc/mdadm.conf
   ```

   **Note**

   This command is optional. However, including the software RAID devices in `mdadm.conf` helps the system assemble them at boot time.
Removing Software RAID Devices

If any software RAID devices already exist, this command creates duplicate entries for them in `mdadm.conf`. In this case, you should use a different method to include the new software RAID device, as in the following example:

```
# mdadm --detail --scan
ARRAY /dev/md0 metadata=1.2 name=hostname UID=RAID1_UUID
ARRAY /dev/md1 metadata=1.2 name=hostname UID=RAID2_UUID
ARRAY /dev/md2 metadata=1.2 name=hostname UID=RAID3_UUID

# cp /etc/mdadm.conf /etc/mdadm.conf.backup
# echo "ARRAY /dev/md2 metadata=1.2 name=hostname UID=RAID3_UUID" >> /etc/mdadm.conf
```

10. Confirm that the configuration includes the software RAID device.

```
# cat /etc/mdadm.conf
# For OVS, don't scan any devices
#DEVICE /no/device
DEVICE /dev/mapper/device1-WWID
DEVICE /dev/mapper/device2-WWID

ARRAY /dev/md0 metadata=1.2 name=hostname UID=RAID_UUID
```

11. Check the status of the software RAID device.

```
# mdadm --detail /dev/md0
/dev/md0:
  Version : 1.2
  Creation Time : time_stamp
  Raid Level : raid1
  Array Size : 55394112 (52.83 GiB 56.72 GB)
  Used Dev Size : 55394112 (52.83 GiB 56.72 GB)
  Raid Devices : 2
  Total Devices : 2
  Persistence : Superblock is persistent
  Update Time : time_stamp
  State : clean
  Active Devices : 2
  Working Devices : 2
  Failed Devices : 0
  Spare Devices : 0

  Name : hostname:0
  UUID : RAID_UUID
  Events : 17

   Number   Major   Minor   RaidDevice State
     0     251       0       0 active sync /dev/dm-0
     1     251       1       1 active sync /dev/dm-1
```

You can find more information about software RAID in the Oracle Linux documentation at:


1.3.1 Removing Software RAID Devices

You cannot use Oracle VM Manager to remove software RAID devices. You must manually remove these devices on Oracle VM Server as follows:

1. Connect to Oracle VM Server as the root user.
2. Stop the software RAID device.
3. Remove the software RAID superblock from the devices.

    # mdadm --zero-superblock /dev/mapper/device1-WWID /dev/mapper/device2-WWID

4. Remove the software RAID device from /etc/mdadm.conf.

5. Remove the software RAID device from Oracle VM Manager.

   Note
   After you remove the software RAID device, Oracle VM Manager displays an event with a severity of warning. The event message is similar to the following:

   Warning time_stamp storage.device.offline. Physical disk is Offline
   No Description: OVMEVT_007005D_001 Rescan storage layer on server [hostname] did not return physical disk [md-UUID] for storage array [Generic Local Storage Array]

   You can ignore this warning.

1.4 Diagnostic Tools for Oracle VM Server

As an optional post-installation step, Oracle recommends that you also install and configure diagnostics tools on all Oracle VM Servers. These tools can be used to help debug and diagnose issues such as system crashes, hanging, unscheduled reboots, and OCFS2 cluster errors. The output from these tools can be used by Oracle Support and can significantly improve resolution and response times.

Obtaining a system memory dump, vmcore, can be very useful when attempting to diagnose and resolve the root cause of an issue. To get a useful vmcore dump, a kdump service configuration is required. See Section 1.4.2, “Manually Configuring kdump for Oracle VM Server” below for more information on this.

In addition, you can install netconsole, a utility allowing system console messages to be redirected across the network to another server. See the Oracle Support Document, How to Configure "netconsole" for Oracle VM Server 3.0, for information on how to install netconsole.

https://support.oracle.com/

Additional information on using diagnostic tools is provided in the Oracle Linux documentation. See the chapter titled Support Diagnostic Tools in the Oracle Linux Administrator's Solutions Guide.


1.4.1 Working with the OSWatcher Utility on Oracle VM Server

OSWatcher (oswbb) is a collection of shell scripts that collect and archive operating system and network metrics to diagnose performance issues with Oracle VM Server. OSWatcher operates as a set of background processes to gather data with standard UNIX utilities such as vmstat, netstat and iostat.

By default, OSWatcher is installed on Oracle VM Server and is enabled to run at boot. The following table describes the OSWatcher program and main configuration file:

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/usr/sbin/OSWatcher</td>
<td>The main OSWatcher program. If required, you can configure certain parameters for statistics collection. However, you should do so only if Oracle Support advises you to change the default configuration.</td>
</tr>
</tbody>
</table>
### 1.4.2 Manually Configuring kdump for Oracle VM Server

While Oracle VM Server uses the robust UEK4 kernel which is stable and fault-tolerant and should rarely encounter errors that crash the entire system, it is still possible that a system-wide error results in a kernel crash. Information about the actual state of the system at the time of a kernel crash is critical to accurately debug issues and to resolve them. The kdump service is used to capture the memory dump from dom0 and store it on the filesystem. The service does not dump any system memory used by guest virtual machines, so the memory dump is specific to dom0 and the Xen hypervisor itself. The memory dump file that is generated by kdump is referred to as the `vmcore` file.

A description of the actions required to manually configure Oracle VM Server so that the kdump service is properly enabled and running is provided here, so that you are able to set up and enable this service after an installation. The Oracle VM Server installer provides an option to enable kdump at installation where many of these steps are performed automatically. See Kdump Setting in the Oracle VM Installation and Upgrade Guide for more information on this.

#### Checking Pre-requisite Packages

By default, the required packages to enable the kdump service are included within the Oracle VM Server installation, but it is good practice to check that these are installed before continuing with any configuration work. You can do this by running the following command:

```
# rpm -qa | grep kexec-tools
```

If the `kexec-tools` package is not installed, you must install it manually.

#### Updating the GRUB2 Configuration

Oracle VM Server makes use of GRUB2 to handle the boot process. In this step, you must configure GRUB2 to pass the `crashkernel` parameter to the Xen kernel at boot. This can be done by editing the `/etc/default/grub` file and modifying the `GRUB_CMDLINE_XEN` variable by appending the appropriate `crashkernel` parameter.

The `crashkernel` parameter specifies the amount of space used in memory to load the crash kernel that is used to generate the dump file, and also specifies the offset which is the beginning of the crash kernel.
Manually Configuring kdump for Oracle VM Server

region in memory. The minimum amount of RAM that may be specified for a crash kernel is 512 MB and this should be offset by 64 MB. This would result in a configuration that looks similar to the following:

```
GRUB_CMDLINE_XEN="dom0_mem=max:6144M allowsuperpage dom0_vcpus_pin \ 
dom0_max_vcpus=20 crashkernel=512M@64M"
```

This setting is sufficient for the vast majority of systems, however on systems that make use of a significant number of large drivers, the crash kernel may need to be allocated more space in memory. If you force a dump and it fails to generate a core file, you may need to increase the amount of memory allocated to the crash kernel.

**Important**

While UEK4 supports the `crashkernel=auto` option, the Xen hypervisor does not. You must specify values for the RAM reservation and offset used for the crash kernel or the kdump service is unable to run.

When you have finished modifying `/etc/default/grub`, you must rebuild the system GRUB2 configuration that is used at boot time. This is done by running:

```
# grub2-mkconfig -o /boot/grub2/grub.cfg
```

### Optionally Preparing a Local Filesystem to Store Dump Files

Kdump is able to store vmcore files in a variety of locations, including network accessible filesystems. By default, vmcore files are stored in `/var/crash/`, but this may not be appropriate depending on your disk partitioning and available space. The filesystem where the vmcore files are stored must have enough space to match the amount of memory available to Oracle VM Server for each dump.

Since the installation of Oracle VM Server only uses as much disk space as is required, a 'spare' partition is frequently available on a new installation. This partition is left available for use for hosting a local repository or for alternate use such as for hosting vmcore files generated by kdump. If you opt to use it for this purpose, you must first correctly identify and take note of the UUID of the partition and then format it with a usable filesystem.

The following steps serve as an illustration of how you might prepare the local spare partition.

- Identify the partition that the installer left 'spare' after the installation. This is usually listed under `/dev/mapper` with a filename that starts with `OVM_SYS_REPO_PART`. If you can identify this device, you can format it with an ext4 filesystem:

  ```
  # mkfs.ext4 /dev/mapper/OVM_SYS_REPO_PART_VBd64a21cf-db4a5ad5
  ```

  If you don't have a partition mapped like this, you may need to use a utilities like `blkls`, `parted`, `fdisk` or `gdisk` to identify any free partitions on your available disk devices.

- Obtain the UUID for the filesystem. You can do this by running the `blkid` command:

  ```
  # blkid /dev/mapper/OVM_SYS_REPO_PART_VBd64a21cf-db4a5ad5
  /dev/mapper/OVM_SYS_REPO_PART_VBd64a21cf-db4a5ad5
  UUID="51216552-2807-4f17-ab27-b8135f69896d" TYPE="ext4"
  ```

  Take note of the UUID as you will need to use this later when you configure kdump.

### Modifying the kdump Configuration

System configuration directing how the kdump service runs is defined in `/etc/sysconfig/kdump`, while specific kdump configuration variables are defined in `/etc/kdump.conf`. Changes may need to be made to either of these files depending on your environment. However, the default configuration should
be sufficient to run kdump initially without any problems. The following list identifies potential configuration changes that you may wish to make:

- On systems with lots of memory (e.g. over 1 TB), it is advisable to disable the IO Memory Management Unit within the crash kernel for performance and stability reasons. This is achieved by editing `/etc/sysconfig/kdump` and appending the `iommu=off` kernel boot parameter to the `KDUMP_COMMANDLINE_APPEND` variable:

```
KDUMP_COMMANDLINE_APPEND="irqpoll maxcpus=1 nr_cpus=1 reset_devices cgroup_disable=memory mce=off selinux=0 iommu=off"
```

- If you intend to change the partition where the vmcore files are stored, using the spare partition on the server after installation for instance, you must edit `/etc/kdump.conf` to provide the filesystem type and device location of the partition. If you followed the instructions above, it is preferable that you do this by specifying the UUID that you obtained for the partition using the `blkid` command. A line similar to the following should appear in the configuration:

```
ext4 UUID=51216552-2807-4f17-ab27-b8135f69896d
```

- You may edit the default path where vmcore files are stored, but note that this path is relative to the partition that kdump is configured to use to store vmcores. If you have configured kdump to store vmcores on a separate filesystem, when you mount the filesystem, the vmcore files are located in the path specified by this directive on the mounted filesystem:

```
path /var/crash
```

- If you are having issues obtaining a vmcore or you are finding that your vmcore files are particularly large using the `makedumpfile` utility, you may reconfigure kdump to use the `cp` command to copy the vmcore in sparse mode. To do this, edit `/etc/kdump.conf` to comment out the line containing setting the `core_collector` to use the `makedumpfile` utility and uncomment the lines to enable the `cp` command:

```
# core_collector makedumpfile -EXd 1 --message-level 1 --non-cyclic
core_collector cp --sparse=always
extra_bins /bin/cp
```

Your mileage with this may vary, and the `makedumpfile` utility is generally recommended instead.

### Enabling the kdump Service

You can enable the kdump service to run at every boot by running the following command:

```
# chkconfig kdump on
```

You must restart the kdump service at this point to allow it to detect the changes that have been made to the kdump configuration and to determine whether a kdump crash kernel has been generated and is up to date. If the kernel image needs to be updated, kdump does this automatically, otherwise it restarts without any attempt to rebuild the crash kernel image:

```
# service kdump restart
Stopping kdump:          [ OK ]
Detected change(s) the following file(s):
   /etc/kdump.conf
Rebuilding /boot/initrd-4.1.12-25.el6uek.x86_64kdump.img
Starting kdump:          [ OK ]
```

### Confirming that kdump is Configured and Working Correctly

You can confirm that the kernel loaded for dom0 is correctly configured, by running the following command and checking that output is returned to show that your crashkernel parameter is in use:
# xl dmesg|grep -i crashkernel
(XEN) Command line: placeholder dom0_mem=max:6144M allowsuperpage dom0_vcpus_pin
dom0_max_vcpus=20 crashkernel=512M@64M

You can also check that the appropriate amount of memory is reserved for kdump by running the following:

# xl dmesg|grep -i kdump
(XEN) Kdump: 512MB (524288kB) at 0x4000000

or alternately:

# kexec --print-ckr-size
536870912

You can check that the kdump service is running by checking the service status:

# service kdump status
Kdump is operational

If there are no errors in /var/log/messages or on the console, you can assume that kdump is running correctly.

To test that kdump is able to generate a vmcore and store it correctly, you can trigger a kernel panic by issuing the following commands:

# echo 1 > /proc/sys/kernel/sysrq
# echo c > /proc/sysrq-trigger

**Note**

These commands cause the kernel on the Oracle VM Server to panic and crash. If kdump is working correctly, the crash kernel should take over and generate the vmcore file which is copied to the configured location before the server reboots automatically. If kdump fails to load the crash kernel, the server may hang with the kernel panic and requires a hard-reset to reboot.

After you have triggered a kernel panic and the system has successfully rebooted, you may check that the vmcore file was properly generated:

- If you have not configured kdump to use an alternate partition, you should be able to locate the vmcore file in /var/crash/127.0.0.1-date-time/vmcore, where `date` and `time` represent the date and time when the vmcore was generated.

- If you configured kdump to use an alternate partition to store the vmcore file, you must mount it first. If you used the spare partition generated by a fresh installation of Oracle VM Server, this can be done in the following way:

  # mount /dev/mapper/OVM_SYS_REPO_PART_V8d64a21cf-db4a5ad5 /mnt

  You may then find the vmcore file in /mnt/var/crash/127.0.0.1-date-time/vmcore, where `date` and `time` represent the date and time when the vmcore was generated, for example:

  # file /mnt/var/crash/127.0.0.1-2015-12-08-16:12:28/vmcore
  /mnt/var/crash/127.0.0.1-2015-12-08-16:12:28/vmcore: ELF 64-bit LSB core file x86-64, version 1 (SYSV), SVR4-style

  Remember to unmount the partition after you have obtained the vmcore file for analysis, so that it is free for use by kdump.

  If you find that a vmcore file is not being created or that the system hangs without automatically rebooting, you may need to adjust your configuration. The most common problem is that there is insufficient memory
allocated for the crash kernel to run and complete its operations. Your starting point to resolving issues with kdump is always to try increasing the reserved memory that is specified in your GRUB2 configuration.

1.5 Disabling Paravirtualized Guests on Oracle VM Server

Paravirtualization (PVM) is considered a less secure guest domain type. To keep your virtualized environment safe and secure, you should prevent paravirtualized guest VMs from starting and running within Oracle VM.

As of Release 3.4.5, the Xen hypervisor allows you to disable PVM guests through a configuration file setting. After you upgrade your servers to Oracle VM Server Release 3.4.5, PVM guests are not disabled by default, because that would cause a variety of problems in existing PVM guests. Oracle recommends that you switch to PV-HVM guests and disable PVM guests as described in this section.

As of Release 3.4.6, support for PVM guests is removed. With the removal of PVM guest support, the following new behavior restrictions exist:

• A new virtual machine cannot be created of the PVM domain type from the Oracle VM Manager Web Interface, Oracle VM Manager Command Line Interface, or Oracle VM Web Services API.

• An existing virtual machine of the PVM domain type can be converted to a supported type from the Oracle VM Manager Web Interface, Oracle VM Manager Command Line Interface, or Oracle VM Web Services API.

• During server discovery, warnings are raised for each virtual machine of the PVM domain type. The warnings appear of type "vm.unsupported.domain" on the Error Conditions subtab of the Health tab. The error event cannot be acknowledged by the user.

Note

Existing virtual machines of the PVM domain type continue to work as before; however, the error event that is raised goes away only after the PVM domain type issue is resolved.

• After editing the domain type to a supported type, the event is then acknowledged.

Tip

If you have existing PVM guests, you should convert them to HVM with PV drivers before you disable PVM on your Oracle VM Servers. For details about changing the guest virtualization mode, please consult the Support Note with ID 2247664.1.

Disabling PVM Guests on Oracle VM Server

1. Using SSH, log into the Oracle VM Server.

2. Open the file xend-config.sxp and locate the entry "xend-allow-pv-guests".

   vi /etc/xen/xend-config.sxp
   # -*- sh -*-
   # Xend configuration file.
   [...]  
   # By default allow PV guests to be created
   # (xend-allow-pv-guests 1)

3. Uncomment the line by removing the "#" and set the parameter to "0" to disable PV guests. Save the changes to the file.
Changing the Memory Size of the Management Domain

1.6 Changing the Memory Size of the Management Domain

When you install Oracle VM Server, the installer sets a default memory size for dom0. The algorithm used is:

\[(768 + 0.0205 \times \text{Physical memory (MB)})\] round to 8

You can use this calculation to determine memory allocation for the Oracle VM Server installation. However, you should not make the memory allocation for dom0 smaller than the calculated value. You can encounter performance issues if the dom0 memory size is not set appropriately for your needs on the Oracle VM Server.

Example sizes are set out in table **Table 1.1**.

<table>
<thead>
<tr>
<th>Physical Memory</th>
<th>Dom0 Memory</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 GB</td>
<td>816 MB</td>
</tr>
<tr>
<td>4 GB</td>
<td>856 MB</td>
</tr>
<tr>
<td>8 GB</td>
<td>936 MB</td>
</tr>
<tr>
<td>16 GB</td>
<td>1104 MB</td>
</tr>
<tr>
<td>32 GB</td>
<td>1440 MB</td>
</tr>
<tr>
<td>64 GB</td>
<td>2112 MB</td>
</tr>
<tr>
<td>128 GB</td>
<td>3456 MB</td>
</tr>
<tr>
<td>256 GB</td>
<td>6144 MB</td>
</tr>
<tr>
<td>512 GB</td>
<td>11520 MB</td>
</tr>
<tr>
<td>1024 GB</td>
<td>22264 MB</td>
</tr>
<tr>
<td>2048 GB</td>
<td>32768 MB</td>
</tr>
</tbody>
</table>
### 1.7 Configuring Oracle VM Server for SPARC

This section describes configuration tasks for Oracle VM Server for SPARC only.

#### 1.7.1 Creating ZFS Volumes

Local ZFS volumes are supported as local physical disks on Oracle VM Server for SPARC. While Oracle VM Manager does not provide tools to create or manage ZFS volumes, it does detect ZFS volumes as local physical disks that can either be used for virtual disks by the virtual machines hosted on the Oracle VM Server where the volume resides, or for use as a local repository to store virtual machine resources. In this section, we describe the steps required to manually create ZFS volumes on a SPARC-based Oracle VM Server and how to detect these within Oracle VM Manager.

**Note**

See [Creating ZFS Volumes on NVMe Devices](#) if you plan to create a ZFS volume on an NVMe device, such as an SSD.

In the control domain for the Oracle VM Server where you wish to create the ZFS volumes that you intend to use, use the `zfs create` command to create a new ZFS volume:

```
# zfs create -p -V XG pool/OVS/volume
```

The size of the volume, represented by `XG` can be any size that you require as long as your hardware supports it. The `pool`, that the volume belongs to can be any ZFS pool. Equally, the `volume` name can be of your choosing. The only requirement is that the volume resides under `OVS` within the pool, so that Oracle VM Manager is capable of detecting it. The following example shows the creation of two ZFS volumes of 20 GB in size:

```
# zfs create -V 20G rpool/OVS/DATASET0
# zfs create -V 20G rpool/OVS/DATASET1
```

Once you have created the ZFS volumes that you wish to use, you must rediscover your server within Oracle VM Manager. See [Discover Servers](#) in the Oracle VM Manager User's Guide for more information on how to do this. Once the server has been rediscovered, the ZFS volumes appear as physical disks attached to the server in the Physical Disks perspective within the Oracle VM Manager Web Interface.
Creating ZFS Volumes

See Physical Disks Perspective in the Oracle VM Manager User’s Guide for more information on this perspective.

As long as a ZFS volume is unused and Oracle VM Manager is able to detect it as a local physical disk attached to the server, you can create a repository on the ZFS volume by selecting to use this disk when you create the repository. See Create New Repository in the Oracle VM Manager User’s Guide for more information on creating repositories.

Using this feature, you can use a single SPARC server to create virtual machines without any requirement to use an NFS repository or any additional physical disks.

Creating ZFS Volumes on NVMe Devices

If you plan to create a ZFS volume on an NVM Express (NVMe) device, use the following procedure:

1. Determine the LUN of the NVMe device with the `format` command, as in the following example:

   ```bash
   # format
   ....
   5. c1t1d0 <INTEL-SSDPE2ME016T4S-8DV1-1.46TB>
   /pci@306/pci@1/pci@0/pci@4/nvme@0/disk0
   /dev/chassis/SYS/DBP/NVME0/disk
   ...
   ```

   In the preceding example, the NVMe device has the following LUN: `c1t1d0`.

   **Note**

   In most cases, NVMe devices have the following path: `/SYS/DBP/NVME[0..n]`.

2. Create a ZFS pool with the NVMe device, as follows:

   ```bash
   # zpool create pool_name c1t1d0
   ```

   Where:

   - `pool_name` is any valid ZFS pool name.
   - `c1t1d0` is the LUN of the NVMe device.

3. Create a ZFS volume on the ZFS pool, as follows:

   ```bash
   # zfs create -p -V sizeG pool_name/OVS/volume_name
   ```

   Where:

   - `size` is an integer value that specifies the size of the ZFS volume in Gigabytes. Ensure that the size of the ZFS pool is not greater than the size of the NVMe disk.
   - `pool_name` is the name of the ZFS pool on which you are creating the volume.
   - `volume_name` is the name of the ZFS volume.

   **Important**

   The first path element of the ZFS pool must be `/OVS/` as in the preceding example. This path element ensures that Oracle VM Manager discovers the ZFS volume as a local physical disk.
4. Repeat the preceding step to create additional ZFS volumes, as required.

5. From Oracle VM Manager, discover, or re-discover, the instance of Oracle VM Server for SPARC that has the NVMe device attached to it.

After the discovery process completes, the Oracle VM Manager Web Interface displays each ZFS volume as a physical disk attached to Oracle VM Server for SPARC in the Physical Disks perspective. See Physical Disks Perspective in the Oracle VM Manager User's Guide.

1.7.2 Configuring a Secondary Service Domain

The default configuration of the Oracle VM Agent uses a single service domain, the primary domain, which provides virtual disk and virtual network services to guest virtual machines (guest domains). To increase the availability of guest domains, you can configure a secondary service domain to provide virtual disk and virtual network services through both the primary and the secondary service domains. With such a configuration, guest domains can use virtual disk and virtual network multipathing and continue to be fully functional even if one of the service domains is unavailable.

The primary domain is always the first service domain and this is the domain that is discovered by Oracle VM Manager. The second service domain, named secondary, is a root domain that is configured with a PCIe root complex. The secondary domain should be configured similarly to the primary domain; it must use the same operating system version, same number of CPUs and same memory allocation. Unlike the primary domain, the secondary service domain is not visible to Oracle VM Manager. The secondary domain mimics the configuration of the primary service domain and is transparently managed by the Oracle VM Agent. In the case where the primary service domain becomes unavailable, the secondary service domain ensures that guest domains continue to have access to virtualized resources such as disks and networks. When the primary service domain becomes available again, it resumes the role of managing these resources.

From a high level, the following tasks should be performed to configure the Oracle VM Agent to use a secondary service domain:

1. Install the Oracle VM Agent as described in Installing Oracle VM Server on SPARC Hardware in the Oracle VM Installation and Upgrade Guide.

2. Create the secondary service domain.

3. Install the secondary service domain.

4. Configure the Oracle VM Agent to use the secondary service domain.

Note

If you have a secondary service domain already configured and you have successfully updated your system to Oracle Solaris 11.3 on the primary domain, the secondary service domain can also be upgraded using the same Oracle Solaris IPS repository as the primary domain. To upgrade the secondary service domain, you should upgrade from the Oracle Solaris command line using the following command:

```bash
# pkg update --accept
```

Reboot the system after the upgrade completes, as follows:

```bash
# init 6
```

For detailed install and upgrade instructions for Oracle Solaris 11.3, see http://docs.oracle.com/cd/E53394_01/.
1.7.2.1 Requirements

To configure the Oracle VM Agent with a secondary service domain, your SPARC server must meet the minimum requirements listed in this section, in addition to the standard installation requirements described in Preinstallation Tasks and Requirements in the Oracle VM Installation and Upgrade Guide.

Hardware

Use a supported Oracle SPARC T-series server, M-series, or S-series server. See Supported Platforms in the Oracle VM Server for SPARC Installation Guide. The SPARC server must have at least two PCIe buses, so that you can configure a root domain in addition to the primary domain. For more information, see I/O Domain Overview in the Oracle VM Server for SPARC Administration Guide.

Both domains must be configured with at least one PCIe bus. The PCIe buses that you assign to each domain must be unique. You cannot assign the same PCIe bus to two different domains.

By default, after a fresh installation, all PCIe buses are assigned to the primary domain. When adding a new service domain, some of these PCIe buses must be released from the primary domain and then assigned to the secondary domain.

For example, a SPARC T5-2 server with two SPARC T5 processors has 4 PCIe buses. This server can be configured with a primary domain and a secondary domain. You can assign two PCIe buses to the primary domain, and two PCIe buses to the secondary domain.

Network

The network ports used by the primary domain must all be connected to the PCIe buses that are assigned to the primary domain.

Similarly the network ports used by the secondary domain must all be connected to the PCIe buses that are assigned to the secondary domain.

In addition, the primary and secondary domains must have the same number of network ports. Each network port in the primary domain must have a corresponding network port in the secondary domain, and they must be connected to the same physical network.

For example, a SPARC T5-2 server with two SPARC T5 processors has 4 PCIe buses (pci_0, pci_1, pci_2, and pci_3). The server also has 4 onboard network ports. Two network ports are connected to pci_0, and the other two are connected to pci_3. You can assign 2 PCIe buses (pci_0 and pci_1) to the primary domain, and 2 PCIe buses (pci_2 and pci_3) to the secondary domain. That way, both domains have two ports configured. You must ensure that each port is connected to the same physical network as the port in the corresponding domain.

Storage

Physical disks or LUNs used by the primary domain must all be accessible through one or several host bus adapters (HBAs) connected to the PCIe buses that are assigned to the primary domain. The primary domain requires at least one disk for booting and hosting the operating system. The primary domain usually has access to all, or a subset of, local SAS disks present on the server through an onboard SAS HBA connected to one of the PCIe buses of the server.

Similarly, physical disks or LUNs used by the secondary domain must all be accessible through one or several HBAs connected to the PCIe buses assigned to the secondary domain. The secondary domain needs at least one disk for booting and hosting the operating system. Depending on the server used, the secondary domain might not have access to any local SAS disks present on the server, or it might have
access to a subset of the local SAS disks. If the secondary domain does not have access to any of the local SAS disks then it must have an HBA card on one of its PCIe buses and access to an external storage array LUN that it can use for booting.

**Warning**

If the boot disk of the secondary domain is on a storage array shared between multiple servers or multiple domains, make sure that the boot disk is accessible by the secondary domain only. Otherwise the disk might be used by mistake by another server or domain, which can corrupt the boot disk of the secondary domain. Depending on the storage array and the storage area network, this can usually be achieved using zoning or LUN masking.

In addition, if a Fibre Channel (FC) storage area network (SAN) is used, then the primary and the secondary domains must have access to the same FC disks. So one or more FC HBAs must be connected to the FC SAN and to the PCIe buses that are assigned to the primary domain. And, one or more FC HBAs must be connected to the FC SAN and to the PCIe buses that are assigned to the secondary domain.

**Note**

The primary and the secondary domain do not need to have access to same SAS or iSCSI disks. Only the SAS or iSCSI disks accessible from the primary domain are visible to Oracle VM Manager. Oracle VM Manager does not have visibility of any SAS or iSCSI disks accessible only from the secondary domain. If a virtual machine is configured with SAS or iSCSI disks, then the corresponding virtual disks in the virtual machine have a single access path, through the primary domain. If a virtual machine is configured with FC disks, then the corresponding virtual disks in the virtual machine have two access paths: one through the primary domain; and one through the secondary domain.

For example, a SPARC T5-2 server with two SPARC T5 processors has 4 PCIe buses (pci_0, pci_1, pci_2, pci_3). The server also has 2 onboard SAS HBAs to access the 6 internal SAS disks. One SAS HBA is connected to PCIe bus pci_0 and accesses 4 internal disks. The other SAS HBA is connected to PCIe bus pci_4 and accesses the 2 other internal SAS disks. You can assign 2 PCIe buses (pci_0 and pci_1) to the primary domain, and 2 PCIe buses (pci_2 and pci_3) to the secondary domain. That way, both domains have access to internal SAS disks that can be used for booting. The primary domain has access to four SAS disks, and the secondary domain has access to two SAS disks.

If you want to connect the server to an FC SAN, then you can add an FC HBA to the primary domain (for example on PCIe bus pci_1) and an FC HBA to the secondary domain (for example, on PCIe bus pci_2). Then you should connect both FC HBAs to the same SAN.

### 1.7.2.2 Limitations

While using secondary service domains can improve the availability of guest virtual machines, there are some limitations to using them with Oracle VM. The following list outlines each of these limitations:

- **Clustering:** Clustering cannot be used with a secondary service domain. If a server is configured with a secondary service domain then that server cannot be part of a clustered server pool.

- **Network Configuration:** Network bonds/aggregation and VLANs are not automatically configured on the secondary domain. If you configure bonds/aggregation or VLANs on the primary domain using Oracle VM Manager, then corresponding bonds/aggregation or VLANs are not automatically configured on the secondary domain. To use any such bond/aggregation or VLANs with virtual machines, the corresponding bonds/aggregation or VLANs must be manually configured on the secondary domain.
• **Storage:** NFS, SAS, iSCSI, and ZFS volumes accessible only from the secondary domain cannot be used or managed using Oracle VM Manager.

  **Important**

  Secondary service domains cannot access NFS repositories. For this reason, virtual machine I/O to virtual disks is served by the control domain only. If the control domain stops or reboots, virtual machine I/O to virtual disks is suspended until the control domain resumes operation. Use physical disks (LUNs) for virtual machines that require continuous availability during a control domain reboot.

• **Virtual Machine Disk Multipathing:** When assigning a disk to a virtual machine, only fibre channel (FC) disks are configured with disk multipathing through the primary and the secondary domains. NFS, SAS, iSCSI or ZFS disks assigned to a virtual machine are configured with a single path through the primary domain.

• **Virtual Machine Network Port:** When assigning a network port to a virtual machine, two network ports are effectively configured on the virtual machine: one connected to the primary domain, and one connected to the secondary domain. The network port connected to the primary domain is configured with a MAC address that can be defined from within Oracle VM Manager. The MAC address must be selected in the range [00:21:f6:00:00:00, 00:21:f6:0f:ff:ff]. The network port connected to the secondary domain is configured with a MAC address derived from the MAC address of the network port connected to the primary domain. This MAC address starts with 00:21:f6:8.

  For example, if the MAC address defined in Oracle VM Manager is 00:21:f6:00:12:34 then this MAC address is used on the network port connected to the primary domain. The derived MAC address is then 00:21:f6:80:12:34 and should be used on the network port connected to the secondary domain. Oracle VM Manager uses a default dynamic MAC address range of [00:21:f6:00:00:00, 00:21:f6:ff:ff:ff]. When using a secondary service domain, this range must be reduced to [00:21:f6:00:00:00, 00:21:f6:0f:ff:ff]. See the *Virtual NICs* section in the Oracle VM Manager Online Help for more information on changing the default range of MAC addresses within the Oracle VM Manager Web Interface.

• **Live Migration:** A virtual machine cannot be live migrated to a server configured with a different number of service domains. In other words, you cannot migrate a virtual machine running on a server with a secondary service domain to a server without a secondary service domain; and you cannot migrate a virtual machine running on a server without a secondary service domain to a server with a secondary service domain.

### 1.7.2.3 Creating a Secondary Service Domain

The following requirements apply to secondary service domains within an Oracle VM context:

• No domain, other than the primary domain, must exist before you start to set up a secondary domain. You can see all existing domains in the output of the `ldm list` command.

• No virtual switch must exist before you start to set up a secondary domain. You can see all virtual switches in the VSW section in the output of the `ldm list-services` command.

• The name of the secondary service domain must be **secondary**.

• The secondary service domain should be a root domain.

• The secondary service domain should be configured with 1 CPU core.

• The secondary service domain should be configured with 8 GB of memory.

• The secondary service domain should have virtual disk service (VDS) with the name **secondary-vds0**.
• The secondary service domain should be completely independent of any other domain, in particular of
the primary domain. For this reason, the secondary domain should have no virtual disks and no virtual
network interfaces, and use only physical disks and physical network interfaces.

For more information about creating a root domain, see Creating a Root Domain by Assigning PCIe Buses
in the Oracle VM Server for SPARC Administration Guide.

Use the `ovs-agent-secondary` command to make sure that you meet these requirements, and to
simplify the process of setting up and configuring the secondary service domain. See Section 1.7.2.6,
“Automatically Creating and Setting Up a Secondary Domain”.

The following instructions describe how to create a secondary service domain manually:

**Manually Creating a Secondary Service Domain**

1. Create the service domain and set the core CPU and memory requirements using the following
commands:

   ```
   # ldm add-domain secondary
   # ldm set-core 1 secondary
   # ldm set-memory 8g secondary
   ```

2. Assign the PCI buses that you wish the secondary service domain to use. For each bus, issue the
following command, substituting `pci_2` with the correct bus identifier:

   ```
   ldm add-io pci_2 secondary
   ```

3. Add the secondary virtual disk service to the secondary domain, using the following command:

   ```
   ldm add-vds secondary-vds0 secondary
   ```

4. Remove any PCI buses that you added to the secondary service domain from the primary domain. To
begin reconfiguring the primary domain, enter the following command:

   ```
   # ldm start-reconf primary
   ```

   For each bus that you added to the secondary domain, enter the following command to remove it from
the primary domain, substituting `pci_2` with the correct bus identifier:

   ```
   # ldm remove-io pci_2 primary
   ```

5. When you have finished reconfiguring the primary domain, you must reboot it:

   ```
   # reboot
   ```

**1.7.2.4 Installing the Secondary Service Domain**

After the secondary service domain has been created and the primary domain has finished rebooting, start
the secondary service domain using the following commands in the control domain:

```
# ldm bind-domain secondary
# ldm start-domain secondary
```

Once the secondary service domain has been started, you can access its console by obtaining the console
port using the following command:

```
# ldm list secondary
```

<table>
<thead>
<tr>
<th>NAME</th>
<th>STATE</th>
<th>FLAGS</th>
<th>CONS</th>
<th>VCPU</th>
<th>MEMORY</th>
<th>UTIL</th>
<th>NORM</th>
<th>UPTIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>secondary</td>
<td>active</td>
<td>t--v--</td>
<td>5000</td>
<td>8</td>
<td>8G</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0s</td>
</tr>
</tbody>
</table>

Note that the console port is listed in the CONS column. You can open a telnet connection to this port as
follows:
Now you must install the Oracle Solaris 11 operating system into the secondary domain. This can be achieved by following the instructions provided in the Oracle Solaris 11.3 documentation available at:


Do **not** attempt to install either the Oracle VM Agent or the Logical Domains Manager into the secondary service domain. Only the Oracle Solaris 11 operating system is required.

Make sure that the secondary service domain is properly configured so that it can boot automatically. In particular, the OpenBoot PROM (OBP) variables of the domain must be correctly set. For instance, the `auto-boot?` parameter should be set to **true**, and `boot-device` parameter should contain the device path of the boot disk that is configured for the secondary domain.

### 1.7.2.5 Manually Configuring the Oracle VM Agent to Support the Secondary Domain

You can use the `ovs-agent-secondary` command to assist you with the process of setting the Oracle VM Agent to support the secondary domain, see Section 1.7.2.6, "Automatically Creating and Setting Up a Secondary Domain". The instructions that follow describe how to configure the Oracle VM Agent manually.

1. Create a configuration file in `/etc/ovs-agent/shadow.conf` on the primary domain. This configuration file is in JSON format and, at absolute minimum, should contain the following content to enable support for the secondary domain:

   ```json
   {   "enabled": true
   }
   ```

   **Note**

   Ensure that the JSON file is correctly formatted as defined at [http://json.org/](http://json.org/).

   - Each network link in the primary domain should have a corresponding network link in the secondary domain connected to the same physical network. By default, a network link in the primary domain is associated with the network link with the same name in the secondary domain. If a network link in the primary domain should be associated with a network link in the secondary domain with a different name, then you need to define a network link mapping. To define a network mapping, you need to add a `nic-mapping` entry in `/etc/ovs-agent/shadow.conf`. Typically, entries of this sort look similar to the following:

   ```json
   {
   "enabled": true,
   "nic-mapping": [
   ["^net4$", "net2" ],
   ["^net5$", "net3" ]
   ]
   }
   ```

   In the above example, `net4` is a network interface in the primary domain and is connected to the same physical network as the network interface named `net2` in the secondary domain. Equally, `net5` is a network interface in the primary domain and is connected to the same physical network as
Configuring a Secondary Service Domain

the network interface named net3 in the secondary domain. Note that network interface names in the primary domain are encapsulated with the regular expression characters caret (^) and dollar ($) to ensure an exact match for the network interface name in the primary domain.

- Each Fibre Channel (FC) disk accessible from the primary domain domain should also be accessible from the secondary domain. By default, a FC disk is accessed using the same device path in the primary domain and in the secondary domain. In particular, each disk is accessed using the same disk controller name. If a disk controller in the primary domain should be associated with a disk controller in the secondary domain with a different name, then you need to define a disk controller mapping.

It is recommended that Solaris I/O multipathing is enabled in the primary and in the secondary domain on all multipath-capable controller ports, in particular on all FC ports. In that case, all FC disks appear under a single disk controller (usually c0), and disk controller mapping is usually not needed in that case.

To define a disk controller mapping, add a 'disk-mapping' entry in the /etc/ovs-agent/shadow.conf file. For example:

```json
{
  "enabled": true,
  "disk-mapping": [
    [ "c0t", "c1t" ]
  ]
}
```

In the preceding example, c0t is a disk controller in the primary domain that is connected to the same FC disk as the disk controller named c1t in the secondary domain.

- An example of an /etc/ovs-agent/shadow.conf file that requires both network interface and disk controller mapping follows:

```json
{
  "enabled": true,
  "nic-mapping": [
    [ "net4$", "net2" ],
    [ "net5$", "net3" ]
  ],
  "disk-mapping": [
    [ "c0t", "c1t" ]
  ]
}
```

2. Save the logical domain configuration with the secondary service domain to the service processor.

**Warning**

Before saving the configuration, ensure that the secondary service domain is active. If the configuration is saved while the secondary service domain is not active, then the secondary service domain won't start automatically after a power-cycle of the server.

```
# ldm add-spconfig ovm-shadow
```

3. To complete the configuration, reconfigure the Oracle VM Agent by running the following command:

```
# ovs-agent-setup configure
```

The configuration values that are used for this process map onto the values that you entered for the configuration steps when you first configured Oracle VM Agent for your primary control domain, as
Configuring a Secondary Service Domain

When the Oracle VM Agent configuration has completed, the secondary domain is running and Oracle VM Agent is able to use it in the case that the primary domain becomes unavailable.

1.7.2.6 Automatically Creating and Setting Up a Secondary Domain

The `ovs-agent-secondary` command can be used to automatically create and setup a secondary domain. In particular, the command indicates whether the server is suitable for creating a secondary service domain, and which PCIe buses are available for the secondary service domain.

**Note**

A system reboot is not equivalent to powering off the system and restarting it. Furthermore, you should ensure that the system does not power off until you complete each step in the procedure to create a secondary service domain.

To create a secondary service domain, run the following command on the control domain:

```bash
# ovs-agent-secondary create
```

**Important**

The `ovs-agent-secondary` command is a helper script that is provided as is. This command might not work with some servers or configurations. If the command does not work, create the secondary service domain manually, as described in Section 1.7.2.3, "Creating a Secondary Service Domain".

### Listing PCIe Buses Present on the Server

The list of all PCIe buses present on the server is displayed, with information indicating whether or not they are available for creating a secondary service domain. Example output from the `ovs-agent-secondary` command, for this step, is displayed below:

```
Gathering information about the server...
The server has 2 PCIe buses.
----------------------------------------------------------------------
This is the list of PCIe buses present on the server, and whether or not they are available for creating a secondary service domain
Bus    Available   Reason
---    ---------   ------
pcl_0  no         Bus is assigned and used by the primary domain
pci_1  yes        Bus is assigned to the primary domain but it is not used
Enter + or - to show or hide details about PCIe buses.
+) Show devices in use
Or select one of the following options.
0) Exit and do not create a secondary service domain
1) Continue and select PCIe buses to create a secondary service domain
Choice (0-1): 1
```

Use this information to figure out which PCIe buses are available, and which buses you want to use for the secondary service domain. You can display more or less information about the PCIe buses by entering "+" or "-".

A PCIe bus is not available for creating a secondary service in the following cases:

- The PCIe bus is assigned to a domain other than the primary domain.
If you want to use such a PCIe bus for the secondary service domain then you must first remove it from the domain it is currently assigned to.

- **The PCIe bus is assigned to the primary domain and devices on that bus are used by the primary domain.**

If you want to use such a PCIe bus for the secondary service domain then you must reconfigure the primary domain so that it stops using devices from that bus.

**Warning**

When a PCIe bus is assigned to the primary domain, the tool may not always be able to figure out if devices from the bus are used by the primary domain. Furthermore, the tool only identifies common devices (such as network interfaces and disks) and the common usage of these devices (including link aggregation, IP configuration or ZFS pool). If you want to create a secondary domain with a PCIe bus that is currently assigned to the primary domain, make sure that this bus is effectively not used by the primary domain at all.

### Selecting PCIe Buses for the Secondary Service Domain

The next step provided by the `ovs-agent-secondary` command allows you to actually select the PCIe buses that are to be used for the secondary service domain. Typically, this step may appear as follows:

```
The following PCIe buses can be selected for creating a secondary service domain.
Bus        Selected   Slot                 Devices Count
---        --------   ----                 -------------
pci_1            no
/SYS/MB/PCIE5
/SYS/MB/PCIE6
/SYS/MB/PCIE7    ETH(2)
/SYS/MB/PCIE8    FC(2)
/SYS/MB/SASHBA1  DSK(2)
/SYS/MB/NET2     ETH(2)

Enter + or - to show or hide details about PCIe buses.
+) Show devices
-) Hide PCIe slots
Or enter the name of one or more buses that you want to add to the selection of PCIe buses to create a secondary service domain.
Or select one of the following option.
    0) Exit and do not create a secondary service domain
    1) Add all PCIe buses to the selection
    2) Remove all PCIe buses from the selection
Choice (0-2): pci_1
adding bus pci_1 to selection
```

Enter + or - to show or hide details about PCIe buses.
+) Show devices
-) Hide PCIe slots
Or enter the name of one or more buses that you want to add to the selection of PCIe buses to create a secondary service domain.
Or select one of the following option.
    0) Exit and do not create a secondary service domain
    1) Add all PCIe buses to the selection
    2) Remove all PCIe buses from the selection
Choice (0-2): pci_1
adding bus pci_1 to selection

Note that in addition to the menu options, which allow you to add all available PCIe buses to the secondary service domain, you can also manually specify a space separated list of PCIe buses by bus name to individually add particular buses to the secondary service domain.

As soon as at least one PCIe bus is marked as selected, the menu options change to allow you to create the secondary service domain with the selected PCIe buses:

```
The following PCIe buses can be selected for creating a secondary service domain.
Bus        Selected   Slot                 Devices Count
---        --------   ----                 -------------
pci_1           yes
/SYS/MB/PCIE5
```

As soon as at least one PCIe bus is marked as selected, the menu options change to allow you to create the secondary service domain with the selected PCIe buses:
Configuring a Secondary Service Domain

Enter + or - to show or hide details about PCIe buses.

+) Show devices
-) Hide PCIe slots

Or enter the name of one or more buses that you want to add to the selection of PCIe buses to create a secondary service domain.

Or select one of the following option.

0) Exit and do not create a secondary service domain
1) Add all PCIe buses to the selection
2) Remove all PCIe buses from the selection
3) Create a secondary services domain with the selected buses

Choice (0-3): 3

Confirming the Selection of PCIe Buses for the Secondary Service Domain

A final confirmation screen displays the buses selected for the secondary service domain, before you can proceed to create the secondary service domain. This confirmation screen looks as follows:

You have selected the following buses and devices for the secondary domain.

<table>
<thead>
<tr>
<th>Bus</th>
<th>Current Domain</th>
<th>Slot</th>
<th>Devices Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>pci_1</td>
<td>primary</td>
<td>----</td>
<td>--------------</td>
</tr>
<tr>
<td>/SYS/MB/PCIE5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>/SYS/MB/PCIE6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>/SYS/MB/PCIE7</td>
<td>ETH(2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>/SYS/MB/PCIE8</td>
<td>PC(2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>/SYS/MB/SASHBA1</td>
<td>DSK(2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>/SYS/MB/NET2</td>
<td>ETH(2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Verify that the selection is correct.

0) Exit and do not create a secondary service domain
1) The selection is correct, create a secondary domain with pci_1
2) Go back to selection menu and change the selection

Choice (0-2): 1

Creating the Secondary Service Domain

After the selection of PCIe buses for the secondary service domain has been confirmed, the secondary domain is created and instructions for configuring the secondary service domain are displayed. The output from the tool looks similar to the following:

```bash
ldm add-domain secondary
ldm set-core 1 secondary
ldm set-memory 8G secondary
ldm add-vds secondary-vds0 secondary
ldm add-io pci_1 secondary
ldm start-reconf primary
ldm remove-io pci_1 primary
```

The secondary service domain has been created. Next, you need to install Solaris on that domain. Then you can configure the Oracle VM Agent to run with the secondary domain.

Once the secondary service domain is up and running with Solaris, run the following command to configure the Oracle VM Agent to run with the secondary domain:

```bash
# ovs-agent-secondary configure
```
Configuring a Secondary Service Domain

If a reboot is required to complete the creation of the secondary service domain then a corresponding menu is displayed, otherwise the tool terminates and the creation of secondary service domain is already finished. The following menu is displayed if a reboot is required:

```
To complete the configuration of the Oracle VM Agent, the system has to be rebooted.
Do you want to reboot the system now?
  1) Yes, reboot the system now
  2) No, I will reboot the system later
Choice (1-2): 1
Server Reboot

!!! WARNING !!!
You are not connected to the system console. Rebooting the server will close this connection with the server.

!!! WARNING !!!
Are you sure that you want to continue?
  1) Yes, continue and reboot the system now
  2) No, cancel the reboot, I will reboot the system later
Choice (1-2): 1
Rebooting the system...
```

Installing the Service Domain

When you have finished creating the new service domain, you need to install it. Complete the instructions in Section 1.7.2.4, “Installing the Secondary Service Domain”.

Configuring the Oracle VM Agent for the Secondary Domain

Once the secondary service domain is correctly installed, you must configure the Oracle VM Agent to use it by running the `ovs-agent-secondary` command on the control domain, as follows:

```
# ovs-agent-secondary configure
```

Checking the Installation of the Secondary Service Domain

The first step in the configuration process requires you to confirm that the secondary domain is installed and running. This step is displayed as follows:

```
The secondary service domain exists and is active. It should be up and running Solaris 11.3.

Confirm that the secondary service domain is up and running Solaris 11.3
  1) Yes, the secondary service domain is up and running Solaris 11.3.
  2) No, the secondary service domain is not running Solaris 11.3
Choice (1-2): 1
```

Removing Virtual Switches

The configuration process notifies you if virtual switches are defined.

```
The secondary domain can only be configured when no virtual switches are defined. Remove any virtual switch, and restart the configuration.
```
Configuring a Secondary Service Domain

The following virtual switches are defined: 0a010000

You must remove any virtual switches defined in the secondary service domain before you can configure it, as in the following example:

```bash
# ldm list-services
VCC
  NAME           LDOM           PORT-RANGE
  primary-vcc0   primary       5000-5127
VSW
  NAME             LDOM             MAC               NET-DEV   ID   DEVICE
  0a010000         primary          00:14:4f:fb:53:0e net0      0    switch@0
  LINKPROP   DEFAULT-VLAN-ID   PVID VID   MTU   MODE   INTER-VNET-LINK
  1                 1          1500         on
VDS
  NAME             LDOM         VOLUME     OPTIONS      MPGROUP    DEVICE
  primary-vds0     primary
  secondary-vds0   secondary

# ldm remove-vsw 0a010000

Restart the configuration of the secondary service domain after you remove the virtual switch.

```bash
# ovs-agent-secondary configure

The secondary service domain exists and is active. It should be up and running Solaris 11.3.

Confirm that the secondary service domain is up and running Solaris 11.3

1) Yes, the secondary service domain is up and running Solaris 11.3.
2) No, the secondary service domain is not running Solaris 11.3.

Choice (1-2): 1

Mapping Network Interfaces Between the Primary and the Secondary Domain

Each network link in the primary domain should have a corresponding network link in the secondary domain connected to the same physical network. By default, a network link in the primary domain is associated with the network link with the same name in the secondary domain. If a network link in the primary domain should be associated with a network link in the secondary domain with a different name, then you need to define a network link mapping. This is achieved in the next step of the configuration process, which is displayed as follows:

Each network link in the primary domain should have a corresponding network link in the secondary domain connected to the same physical network. By default, a network link in the primary domain will be associated with the network link with the same name in the secondary domain.

Network links in the primary domain and corresponding link in the secondary domain:

<table>
<thead>
<tr>
<th>Primary</th>
<th>Secondary</th>
</tr>
</thead>
<tbody>
<tr>
<td>net0</td>
<td>net0</td>
</tr>
<tr>
<td>net1</td>
<td>net1</td>
</tr>
<tr>
<td>net4</td>
<td>net4</td>
</tr>
<tr>
<td>net5</td>
<td>net5</td>
</tr>
<tr>
<td>net6</td>
<td>net6</td>
</tr>
<tr>
<td>net7</td>
<td>net7</td>
</tr>
</tbody>
</table>

If a network link in the primary domain should be associated with a network link in the secondary domain with a different name, then you need to define a network link mapping.
Do you need to define a network link mapping?

1) Yes, I need to map a network link in the primary domain to a network link in the secondary domain with a different name.
2) No, each network link in the primary domain has a corresponding network link in the secondary domain with the same name.

Choice (1-2): 1

Ideally, you should be able to select option 2 here to continue. However, it is possible that network link names may not correspond correctly. In this case, you should select option 1 and redefine the mapping as follows:

Enter the mapping for net0 [net0]:
Enter the mapping for net1 [net1]:
Enter the mapping for net4 [net4]: net2
Enter the mapping for net5 [net5]: net3
Enter the mapping for net6 [net6]:
Enter the mapping for net7 [net7]:

Network links in the primary domain and corresponding link in the secondary domain:

<table>
<thead>
<tr>
<th>Primary</th>
<th>Secondary</th>
</tr>
</thead>
<tbody>
<tr>
<td>net0</td>
<td>net0</td>
</tr>
<tr>
<td>net1</td>
<td>net1</td>
</tr>
<tr>
<td>net4</td>
<td>net2</td>
</tr>
<tr>
<td>net5</td>
<td>net3</td>
</tr>
<tr>
<td>net6</td>
<td>net6</td>
</tr>
<tr>
<td>net7</td>
<td>net7</td>
</tr>
</tbody>
</table>

Is the mapping correct?

1) Yes, the mapping is correct.
2) No, the mapping is not correct, redo the mapping.

Choice (1-2): 1

Note that you are prompted for the mapping for each network link in the primary domain. If you enter a blank line, the existing default mapping is used. If you need to change a mapping, you must specify the network link name in the secondary domain that is connected to the same physical network as the network link listed in the primary domain.

When you have finished redefining the mappings, you should select option 1 to continue to the next step in the configuration process.

Mapping Fibre Channel Disk Controllers Between the Primary and the Secondary Domain

Each Fibre Channel (FC) disk accessible from the primary domain should also be accessible from the secondary domain. By default, a FC disk is accessed using the same device path in the primary domain and in the secondary domain. In particular, each disk is accessed using the same disk controller name. If a disk controller in the primary domain should be associated with a disk controller in the secondary domain with a different name, then you must define a disk controller mapping.

It is recommended that Solaris I/O multipathing is enabled in the primary and in the secondary domain on all multipath-capable controller ports, in particular on all FC ports. In this case, all FC disks appear under a single disk controller (usually c0), and disk controller mapping is usually not needed.

The following screen is displayed for this step in the configuration process:
domain should also be accessible from the secondary domain. By default, a FC disk will be access using the same device path in the primary domain and in the secondary domain. In particular, each disk will be accessed using the same disk controller name.

FC disk controllers in the primary domain and corresponding controller in the secondary domain:

<table>
<thead>
<tr>
<th>Primary</th>
<th>Secondary</th>
</tr>
</thead>
<tbody>
<tr>
<td>c0</td>
<td>c0</td>
</tr>
</tbody>
</table>

If a disk controller in the primary domain should be associated with a disk controller in the secondary domain with a different name, then you need to define a disk controller mapping.

Do you need to define a disk controller mapping?

1) Yes, I need to map a disk controller in the primary domain to a disk controller in the secondary domain with a different name.
2) No, each disk controller in the primary domain has a corresponding disk controller in the secondary domain with the same name.

Choice (1-2): 1

Ideally, you should be able to select option 2 to continue. However, it is possible that disk controller names might not correspond correctly. In this case, you should select option 1 and redefine the mapping as follows:

Enter the mapping for c0 [c0]: c1

FC disk controllers in the primary domain and corresponding controller in the secondary domain:

<table>
<thead>
<tr>
<th>Primary</th>
<th>Secondary</th>
</tr>
</thead>
<tbody>
<tr>
<td>c0</td>
<td>c1</td>
</tr>
</tbody>
</table>

Is the mapping correct?

1) Yes, the mapping is correct.
2) No, the mapping is not correct, redo the mapping.

Choice (1-2): 1

Note that you are prompted for the mapping for each FC disk controller in the primary domain. If you enter a blank line, the existing default mapping is used. If you need to change a mapping, you must specify the FC disk controller name in the secondary domain that is connected to the same FC disk listed in the primary domain.

When you have finished redefining the mappings, you should select option 1 to continue to the next step in the configuration process.

**Saving the Oracle VM Agent Configuration for the Secondary Service Domain**

The Oracle VM Agent uses a configuration file to access and configure itself for resources in the secondary service domain. In this step of the configuration process, the configuration file is created and saved to disk within the primary control domain:

Creating configuration file
Saving configuration ovm-shadow on the service processor

The secondary service domain is configured. Continuing with the configuration of the Oracle VM Agent.
Reconfiguring the Oracle VM Agent

Finally, the Oracle VM Agent is automatically reconfigured to use the secondary service domain and the Oracle VM Agent is enabled:

| Network Configuration OK          | Storage Configuration OK          |
| Network Configuration OK          | OVS Agent Configuration OK        |
| Storage Configuration OK          | OVS Agent Configuration OK        |
| OVS Agent Configuration OK        | Cluster Configuration            |
| Cluster Configuration            | LDoms Manager Configuration OK    |
| LDoms Manager Configuration OK    | Virtual I/O Services Configuration OK |
| Virtual I/O Services Configuration OK | LDoms Configuration            |
| LDoms Configuration              | LDoms Configuration OK            |

Enabling Oracle VM Agent Services

The configuration values that are used for this process map onto the values that you entered for the configuration steps when you first configured Oracle VM Agent for your primary control domain, as described in Configuring Oracle VM Agent for SPARC in the Oracle VM Installation and Upgrade Guide.

When the process is complete, the Oracle VM Agent is enabled and your environment is configured to use both a primary and a secondary service domain.
Chapter 2 Configuring Oracle VM Manager After Installation

After you successfully install Oracle VM Manager, you can perform several configuration tasks to customize your environment. These configuration tasks include setting the session timeout period for the Oracle VM Manager Web Interface, and configuring SSL.

2.1 Configuring Oracle VM Manager Web Interface Session Timeout

You can change the amount of time that an Oracle VM Manager session can remain inactive before a timeout occurs through the Oracle WebLogic Server Administration Console.

To configure Oracle VM Manager Web Interface session timeout, do the following:

1. Open the Oracle WebLogic Server Administration Console at:

   https://hostname:7002/console

   Where hostname is the Oracle VM Manager hostname or IP address.

2. Log in as the weblogic user.

3. Locate the Domain Structure pane on the left and then click Deployments.

4. Click Next in the list of deployed applications until you locate the ovm_console application.

5. Click "+" to expand the ovm_console application and then click ovm/console.

   The settings for ovm_console are displayed.

6. Click the Configuration tab and then click Lock and Edit in the Change Center pane to modify the settings.

7. From the Configuration tab, locate the General subtab and then edit the value of the Session Timeout field. The default setting is half an hour (1800 seconds).

   When you are finished with your changes, click Save.

   **Note**

   If you receive a permissions related error, you might need to change the permissions or ownership on the file located at /u01/app/oracle/ovm-manager-3/weblogic/deploy/ovm_console/plan/plan.xml. Use the following command:

   ```bash
   chown oracle:dba /u01/app/oracle/ovm-manager-3/weblogic/deploy/ovm_console/plan/plan.xml
   ```

   After you change permissions on the file, you must edit and save the value of the Session Timeout field again.

8. Click Deployments in the Domain Structure pane on the left to return to the list of deployed applications.

9. Locate and select the ovm_console check box and then click Update to redeploy the application.

10. Change the source and deployment plan paths as appropriate and then click Finish.

11. To activate the changes, click Activate Changes in the Change Center.
Important

Due to the nature of some pages served within Oracle VM Manager, the client browser auto-refreshes regularly to poll for changes. This is particularly apparent on the Health page. Since the client is constantly refreshing, UI timeout may not behave as expected. Therefore, a configuration parameter for ADF has been set to timeout automatic polling after a default period of 20 minutes where there has been no mouse or keyboard interaction within Oracle VM Manager. This means that for these pages, the UI timeout value only becomes effective after the polling timeout has been effected.

Changes to the polling timeout are not directly configurable. If you require this facility to be modified contact Oracle Support.

2.2 Setting Up SSL

By default, Oracle VM Manager provides its own SSL certificates stored in a custom keystore. The certificates that are provided are signed using an internal Certificate Authority (CA). Oracle VM uses SSL certificates:

- For the authentication of Oracle VM Manager to each Oracle VM Server that it has discovered and for the encryption of communications between Oracle VM Manager and the Oracle VM Agent running on each Oracle VM Server.

- For the authentication and encryption of some tools that make use of the Oracle VM Manager web-services API.

- For the encryption of communications between a web-browser and the Oracle VM Manager web-based user interface.

Certificates are generated automatically during the installation of Oracle VM Manager. To avoid SSL validation issues in client web-browsers, you can obtain the internal CA certificate used by Oracle VM Manager and install it into each web-browser that is used to access the Oracle VM Manager web user interface. See Section 2.2.4, “Exporting the CA Certificate”.

Alternatively, if you already have an SSL certificate that is signed by an external CA, you can change the SSL certificate that is used for the encryption of communications between the web-browser and the Oracle VM Manager web-based user interface. See Section 2.2.6, “Changing the Default SSL Certificate”.

Finally, if you need to generate a new SSL key that is signed by the internal CA, you can follow the instructions provided in Section 2.2.5, “Generating a New SSL Key”.

Important

Changing the Oracle VM Manager CA certificate impacts authentication between Oracle VM Manager and various internal components. Changing the CA certificate also impacts authentication between Oracle VM Manager and each Oracle VM Server instance and other external applications such as web browsers.

If you plan to change the CA certificate, you should do so before you begin any other Oracle VM Manager configuration to avoid authentication and communication issues between components.

Oracle VM Manager uses the following 2048-bit keystores instead of the default Oracle WebLogic Server keystore:
Oracle VM Key Tool

- /u01/app/oracle/ovm-manager-3/domains/ovm_domain/security/ovmca.jks
- /u01/app/oracle/ovm-manager-3/domains/ovm_domain/security/ovmclient.jks
- /u01/app/oracle/ovm-manager-3/domains/ovm_domain/security/ovmssl.jks
- /u01/app/oracle/ovm-manager-3/domains/ovm_domain/security/ovmtrust.jks

The passwords for these keystores are randomized at installation. If you need to update a keystore, such as the CA keystore, to add mutually trusted CAs to the keystore, you may need to change the keystore password using the Oracle VM Key Tool. For instructions on changing the keystore password, see Section 2.2.7, “Changing the Keystore Password”.

2.2.1 Oracle VM Key Tool

Oracle VM Manager includes a key management utility to help manage SSL certificates. You use the Oracle VM Key Tool in conjunction with the Java keytool in the Java Development Kit (JDK) that is installed on the Oracle VM Manager host. These utilities are located on the Oracle VM Manager host as follows:

- Oracle VM Key Tool: /u01/app/oracle/ovm-manager-3/ovm_upgrade/bin/ovmkeytool.sh
- Java keytool: /u01/app/oracle/java/bin/keytool

Important

Using key management utilities incorrectly can cause authentication issues between Oracle VM Manager, internal components, and external systems and applications. In some cases, authentication issues can result in complete loss of service. You should carefully plan any changes before using a key management utility and consider the impact those changes have on your environment.

Syntax

ovmkeytool.sh [--help] [--overwrite] [--quiet] [--verbose] [--propertyFile filename] [-D property=value] --noWebLogic [{{show} | {check} | {setup} | {setupWebLogic} | {gencakey} | {setcakey} | {gensslkey} | {setsslkey} | {changepass} | {exportca}}]

Options

The following table shows the available options for this tool.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>--help</td>
<td>Display the ovmkeytool.sh command parameters and options.</td>
</tr>
<tr>
<td>--overwrite</td>
<td>Allow existing keystores to be overwritten if user interaction is disabled.</td>
</tr>
<tr>
<td>--quiet</td>
<td>Run with no user interaction using property values exclusively.</td>
</tr>
<tr>
<td>--verbose</td>
<td>Output extra information while running.</td>
</tr>
<tr>
<td>--propertyFile filename</td>
<td>The specified file can be used to provide properties to the tool.</td>
</tr>
<tr>
<td>-D property=value</td>
<td>Sets a property to a given value.</td>
</tr>
<tr>
<td>--noWebLogic</td>
<td>Do not attempt to configure Oracle WebLogic Server or verify Oracle WebLogic Server settings.</td>
</tr>
</tbody>
</table>
Commands

The following table shows the available commands for this tool. Only one command can be run at a time.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>show</td>
<td>Displays SSL configuration details such as the CA and SSL keystore files, certificate key aliases, and certificate details.</td>
</tr>
<tr>
<td>check</td>
<td>Validates the current SSL configuration and provides information if any errors exist.</td>
</tr>
<tr>
<td>setup</td>
<td>Sets up all of the keystore files and configures Oracle WebLogic Server.</td>
</tr>
<tr>
<td>setupWebLogic</td>
<td>Configures existing keystore settings in Oracle WebLogic Server.</td>
</tr>
<tr>
<td>gencakey</td>
<td>Generates a new certificate authority (CA) key and puts the key into the trust store.</td>
</tr>
<tr>
<td></td>
<td>You should not run this command if you have already configured Oracle VM Manager</td>
</tr>
<tr>
<td>setcakey</td>
<td>Sets the CA key to use an existing key from an existing keystore file.</td>
</tr>
<tr>
<td></td>
<td>You should not run this command if you have already configured Oracle VM Manager</td>
</tr>
<tr>
<td>genssslkey</td>
<td>Generates a new SSL key.</td>
</tr>
<tr>
<td>setsslkey</td>
<td>Sets the SSL key to use an existing key from an existing keystore file.</td>
</tr>
<tr>
<td>changepass</td>
<td>Allows the passwords for existing keystore files and keys to be configured or changed.</td>
</tr>
<tr>
<td>exportca</td>
<td>Exports the CA certificate in PEM format.</td>
</tr>
</tbody>
</table>

Command Prompts

Depending on the command you run, the Oracle VM Key Tool prompts you for the following information:

- **Oracle WebLogic Server Middleware directory**
  
  You can set the `MW_HOME` environment variable to point to the location of the Oracle WebLogic Server Middleware directory. Otherwise you must specify the default directory each time you run the Oracle VM key tool. The default directory is `/u01/app/oracle/Middleware`.

  Run the following command to set the `MW_HOME` environment variable:

  ```bash
  # export MW_HOME=/u01/app/oracle/Middleware
  ```

- **Oracle WebLogic Server domain directory**
  
  The default directory is `/u01/app/oracle/ovm-manager-3/domains/ovm_domain`.

- **Oracle WebLogic Server name**
  
  The default server name is AdminServer.

- **Oracle WebLogic Server credentials**
2.2.2 Showing the Certificate Configuration

Use the `show` command to view details about the current Certificate Authority (CA) and SSL configuration.

The following is an example of the `show` command:

```sh
./ovmkeytool.sh show

time_stamp oracle.security.jps.jpsStartUp start
INFO: Jps initializing.
time_stamp oracle.security.jps.jpsStartUp start
INFO: Jps started.
CA Keystore File: /u01/app/oracle/ovm-manager-3/domains/ovm_domain/security/ovmca.jks
CA Key Alias: ca
Certificate details:
  Algorithm: SHA256withRSA
  Subject: CN=OVM CA 0004fb00000100007c08b684bd203388, OU=Oracle VM Manager,
          O=Oracle Corporation, L=Redwood City, ST=California, C=US
  Issuer: CN=OVM CA 0004fb00000100007c08b684bd203388, OU=Oracle VM Manager,
          O=Oracle Corporation, L=Redwood City, ST=California, C=US
  Serial number: 83605355564701558078039808469637637312169403
  Valid from day mm dd hh:mm:ss CET yyyy to day mm dd hh:mm:ss CET yyyy
This is a valid Certificate to be used as a CA.

Full Certificate:
-----BEGIN CERTIFICATE-----
MIID/DCCAuSgAwIBAgIVAJJx8CLgw6Wuds5XyS7Lxzq27MA0GCSqGSIb3DQEB
CuUAMIKgMQwCQQDQgoJvZhETMBeGA1UECBMgQzFsaW2cm5pYVEVMBKGAUUE
BxMMUwv9d29vCDBOy5RbSawQYDVQQEEXJPCmFjSGUGQ29ycG9yYXRpb24xGjAY
BqNVbAsTEU9yFRAus25SMTsBNY5h2ZzYyMTAwLgYVQZDQYEDVVK80QEqMAwNGzI
MDA0MDAxMDAwNDIjMDNhLjyOImQyMDMsODgwNhcNMTUwNzIyMTY5MTlWhcMWJ0w
MzIsMTYxMTItNjIjCgUpDLMAkGA1UEBhMEbHh0MQswCQYDVQQGEwJVUzETMBEGA1UE
BxMMUmVkd29vZCBDaXR5MRswGQYDVQQKExJPcmFjbGUgQ29ycG9yYXRpb24xGjAY

CA Keystore File: /u01/app/oracle/ovm-manager-3/domains/ovm_domain/security/ovmssl.jks
CA Key Alias: ovmm
Certificate details:
  Algorithm: SHA256withRSA
  Subject: CN=ovmm.virtlab.info, OU=Oracle VM Manager,
          O=Oracle Corporation, L=Redwood City, ST=California, C=US
  Issuer: CN=OVM CA 0004fb00000100007c08b684bd203388, OU=Oracle VM Manager,
          O=Oracle Corporation, L=Redwood City, ST=California, C=US
  Serial number: 94293536820195586469637637312169403
  Valid from day mm dd hh:mm:ss CET yyyy to day mm dd hh:mm:ss CET yyyy
This is a valid Certificate to be used as a CA.

Full Certificate:
-----BEGIN CERTIFICATE-----
MIID/DCCAuSgAwIBAgIVAJJx8CLgw6Wuds5XyS7Lxzq27MA0GCSqGSIb3DQEB
CuUAMIKgMQwCQQDQgoJvZhETMBeGA1UECBMgQzFsaW2cm5pYVEVMBKGAUUE
BxMMUwv9d29vCDBOy5RbSawQYDVQQEEXJPCmFjSGUGQ29ycG9yYXRpb24xGjAY
BqNVbAsTEU9yFRAus25SMTsBNY5h2ZzYyMTAwLgYVQZDQYEDVVK80QEqMAwNGzI
MDA0MDAxMDAwNDIjMDNhLjyOImQyMDMsODgwNhcNMTUwNzIyMTY5MTlWhcMWJ0w
MzIsMTYxMTItNjIjCgUpDLMAkGA1UEBhMEbHh0MQswCQYDVQQGEwJVUzETMBEGA1UE
BxMMUmVkd29vZCBDaXR5MRswGQYDVQQKExJPcmFjbGUgQ29ycG9yYXRpb24xGjAY

SSL Keystore File: /u01/app/oracle/ovm-manager-3/domains/ovm_domain/security/ovmssl.jks
SSL Key Alias: ovmm
Certificate details:
  Algorithm: SHA256withRSA
  Subject: CN=ovmm.virtlab.info, OU=Oracle VM Manager,
          O=Oracle Corporation, L=Redwood City, ST=California, C=US
  Issuer: CN=OVM CA 0004fb00000100007c08b684bd203388, OU=Oracle VM Manager,
          O=Oracle Corporation, L=Redwood City, ST=California, C=US
  Serial number: 84293536820195586469637637312169403
  Valid from day mm dd hh:mm:ss CET yyyy to day mm dd hh:mm:ss CET yyyy
This is a valid Certificate to be used as a CA.

Full Certificate:
-----BEGIN CERTIFICATE-----
MIID/DCCAuSgAwIBAgIVAJJx8CLgw6Wuds5XyS7Lxzq27MA0GCSqGSIb3DQEB
CuUAMIKgMQwCQQDQgoJvZhETMBeGA1UECBMgQzFsaW2cm5pYVEVMBKGAUUE
BxMMUwv9d29vCDBOy5RbSawQYDVQQEEXJPCmFjSGUGQ29ycG9yYXRpb24xGjAY
BqNVbAsTEU9yFRAus25SMTsBNY5h2ZzYyMTAwLgYVQZDQYEDVVK80QEqMAwNGzI
MDA0MDAxMDAwNDIjMDNhLjyOImQyMDMsODgwNhcNMTUwNzIyMTY5MTlWhcMWJ0w
MzIsMTYxMTItNjIjCgUpDLMAkGA1UEBhMEbHh0MQswCQYDVQQGEwJVUzETMBEGA1UE
BxMMUmVkd29vZCBDaXR5MRswGQYDVQQKExJPcmFjbGUgQ29ycG9yYXRpb24xGjAY

Subject Alternative Names:

Hostnames:
myserver.example.com
myovmm

Full Certificate:

```plaintext
-----BEGIN CERTIFICATE-----
MIID6TCCAtGgAwIBAgIVAKUqryxHow/khR23pDPtibBMdMA0GCSqGSIb3DQEBAUwA
MBIGkMQswCQYDVQQGEwJVUzETMBEGA1UECBMKQ2FsaWZvcm5pYTEVMBMGA1UEBxM
JzMTYNTM5wijCBiJSkdeGAAUUEhMVVKhxiAAABQgT5BQqkTckhnhb11ab3JuaWEx
FTATkqNybacciTCjZIdbVq2q210eTEhMkCAUHECmST3jH2z1lENvcn5BvcmF0
aw9uMRowGAYDVQQLExFPcmeFjBqGvKk0qTWFwy1dcJEmAqGnUEAmRbZ3hSs5
axAj06GBF1lmu2ZbqgElMA0GCSqGSIb3DQEBAUQAAA4IBAwgEkAIA0IAQH
iY68g/36ymy212PyO21a7jGohnRxeDFYHRcfdmdw/5C9XZXY7rEtPx1wDlRrg0
DFDf1Qjcy3IdJ40Demyui1doAkJ7g0Uo6i6iBi6h00wviyjGr3xQ/TbDywy04ppn
mcCGsHs/7ivm2haMM5xRocOFv2beI/CmJseN59fLmu0U201be/6UNZVoMoOy0
GZm4Dc8GNCWXI20j5yj21pmnkJLr4z3BTJ7Q5uxzRDXWjUANps0N/XeLeHzLYY
hBuK63DQG70Gm0gGq14jxWchEds/zQ33h6IFK399HsVQ8p3eYJjbNEUKKlzc
36Q4d7bUqQPXM3AqMBAG5jJAKMCIGA1UeDQOBWM6mC0r2W05umyd32xhV15p
hMLv2vqRvdnlMAOOGGSSg5B13DGECBwUAdA1BQAqAEQsxBGQq0QPigz0/gYY4G
CLZp+7BvscTtCdMDyPrFxpuefVweE6GvuyTF1XZK/FPBZQGQDr3n/-hD9f9ccV
MHFSaK0N471iDokui87Jn8a/EMI12/FEU4UbgH575cU9b3j1qzDZ11800gPM6Ex
1ShwZy0KRktrPf4KkqH6n750/J1N46J+8AgRuwB6/e5ch7wAL2hp0O3Wey7V0/1cB
FJleej1pejXMv50xQxkFM1d3vyA8KON0MJK262100W7TJEmnnBj6U1btNQDqjuJL
anJ0GhjsLh3oOsIrbYb3M+SmezvV42kAPLdD8c/aAnnXzC4m5sceEW/Gpyd
-----END CERTIFICATE-----
```

SSL Trust Keystore File: /u01/app/oracle/ovm-manager-3/domains/ovm_domain/security/ovmtrust.jks
Trusted certificates:

CN=OVM CA 0004fb0001000007c08b684bd203388, OU=Oracle VM Manager,
O=Oracle Corporation, L=Redwood City, ST=California, C=US
CA certificate found in SSL Trust-Store

Oracle Middleware Home (MW_HOME): [/home/u01/app/oracle/Middleware]
WebLogic domain directory: [/u01/app/oracle/ovm-manager-3/domains/ovm_domain]
WebLogic server name: [AdminServer]
WebLogic username: [weblogic]
WebLogic password: [********]
WLST session logged at: /tmp/wlst-session17846105146984067.log

WebLogic SSL Key Alias: ovmm
WebLogic SSL Key Store File: /u01/app/oracle/ovm-manager-3/domains/ovm_domain/security/ovmssl.jks
WebLogic SSL Key Issuance Alias: ovmm

2.2.3 Validating the Certificate Configuration

Use the `check` command to verify the current CA and SSL configuration. If any issues exist with the configuration, the command displays information to help you resolve them.

The following is an example of the `check` command:

```bash
# ./ovmkeytool.sh check
time_stamp oracle.security.jps.StatsStart start
INFO: Jps initializing.
time_stamp oracle.security.jps.StatsStart start
INFO: Jps started.
Oracle Middleware Home (MW_HOME): [/u01/app/oracle/Middleware]
WebLogic domain directory: [/u01/app/oracle/ovm-manager-3/domains/ovm_domain]
Oracle WebLogic Server name: [AdminServer]
WebLogic username: [weblogic]
WebLogic password: [********]
WLST session logged at: /tmp/wlst-session17846105146984067.log
```
2.2.4 Exporting the CA Certificate

Oracle VM Manager contains an internal CA that performs certificate-based authentication and signs the default SSL certificate. Use the `exportca` command to export the CA certificate in PEM format. You can then add it as a trusted CA in a browser or use as required.

The following is an example of the `exportca` command:

```
# ./ovmkeytool.sh exportca
```

```
-----BEGIN CERTIFICATE-----
MIID+zCCAuOgAwIBAgIUamdPKrCAl4O1yD8QlywkYmhb018wDQYJKoZIhvcNAQEL
BQAwegQx5CdJNzRqNBYAT1VTRMVwEQQVQGIExOEPYxkZmYxZmlkMrM4wIwYDQYB
VQFh0oDQYBCQYDMwYUwEwEDOQYDKgYBQAwFQAgAIAQBDgQSBQQGgCyY02kMwAe
-----END CERTIFICATE-----
```

2.2.5 Generating a New SSL Key

By default, Oracle VM Manager generates and signs an SSL certificate that is valid for ten years from the date of installation. If necessary, you can use the `genssl` command to generate a new SSL certificate that is signed by the Oracle VM Manager internal CA.

The following is an example of the `genssl` command:

```
# ./ovmkeytool.sh gensslkey
```

```
-----BEGIN CERTIFICATE-----
MIID+zCCAuOgAwIBAgIUamdPKrCAl4O1yD8QlywkYmhb018wDQYJKoZIhvcNAQEL
BQAwegQx5CdJNzRqNBYAT1VTRMVwEQQVQGIExOEPYxkZmYxZmlkMrM4wIwYDQYB
VQFh0oDQYBCQYDMwYUwEwEDOQYDKgYBQAwFQAgAIAQBDgQSBQQGgCyY02kMwAe
-----END CERTIFICATE-----
```
2.2.6 Changing the Default SSL Certificate

You can change the default SSL certificate that Oracle VM Manager serves for authentication. For example, you can configure Oracle VM Manager to use an SSL certificate that has been signed by a third-party CA.

This section describes how to use the Java keytool and the Oracle VM Key Tool to change the default SSL certificate.

Note
You should modify the example commands for the Java keytool to suit your business needs. Refer to the appropriate Java keytool documentation for more information.

Creating a Keystore on Oracle VM Manager

If you do not already have a third-party CA certificate and SSL certificate, you can create a new keystore on Oracle VM Manager. The keystore you create contains one entry for a private key. After you create the keystore, you generate a certificate signing request (CSR) for that private key and submit the CSR to a third-party CA. The third-party CA then signs the CSR and returns a signed SSL certificate and a copy of the CA certificate. You then import the CA certificate and SSL certificate into the keystore and configure Oracle VM Manager to use it as the SSL keystore.

1. Create a new keystore.

   ```bash
   # keytool -genkeypair -alias alias -keyalg RSA -keysize key_size 
   -dname distinguished_name -keypass private_key_password 
   -storetype jks -keystore keystore.jks -storepass keystore_password
   ```

2. Generate a certificate signing request (CSR).

   ```bash
   # keytool -certreq -alias alias -file certreq.csr -keypass private_key_password 
   -storetype jks -keystore keystore.jks -storepass keystore_password
   ```

3. Submit the CSR file to the relevant third-party CA for signing.

4. Import the CA certificate into the keystore.

   ```bash
   # keytool -importcert -trustcacerts -noprompt -alias alias -file ca_cert_file 
   -storetype jks -keystore keystore.jks -storepass keystore_password
   ```

5. Import the SSL certificate into the keystore.

   ```bash
   # keytool -importcert -trustcacerts -noprompt -alias alias -file ssl_cert_file 
   ```
Changing the Default SSL Certificate

6. Use the `setsslkey` command to configure Oracle VM Manager to use the new keystore.

```bash
# ./ovmkeytool.sh setsslkey
Path for SSL keystore: [/u01/app/oracle/ovm-manager-3/domains/ovm_domain/security/ovmssl.jks]
/path/to/keystore.jks
Keystore password:
Alias of key to use as SSL key: alias
Key password:
Updating keystore information in WebLogic
Oracle MiddleWare Home (MW_HOME): [/u01/app/oracle/Middleware]
WebLogic domain directory: [/u01/app/oracle/ovm-manager-3/domains/ovm_domain]
Oracle WebLogic Server name: [AdminServer]
WebLogic username: [weblogic]
WebLogic password: [********]
WLST session logged at: /tmp/wlst-session5820685079094897641.log
```

7. As the root user, configure the client certificate login.

```bash
# su -c "/u01/app/oracle/ovm-manager-3/bin/configure_client_cert_login.sh /path/to/cacert"
```

Where `/path/to/cacert` is the absolute path to the CA certificate. You must provide the path to the CA certificate if you used a CA other than the default Oracle VM Manager CA to sign the SSL certificate.

**Importing a Keystore into Oracle VM Manager**

If you already have a CA certificate and SSL certificate, use the SSL certificate to create a keystore. You can then import that keystore into Oracle VM Manager and configure it as the SSL keystore.

1. Import the keystore into Oracle VM Manager.

```bash
keytool -importkeystore -noprompt -srckeystore source_keystore \
-srclistype source_format -srcstorepass source_keystore_password \
-destkeystore destination_keystore.jks -deststoretype JKS \
-deststorepass destination_keystore_password
```

2. Use the `setsslkey` command to configure Oracle VM Manager to use the new keystore.

```bash
# ./ovmkeytool.sh setsslkey
Path for SSL keystore: [/u01/app/oracle/ovm-manager-3/domains/ovm_domain/security/ovmssl.jks]
/path/to/keystore.jks
Keystore password:
Alias of key to use as SSL key: alias
Key password:
Updating keystore information in WebLogic
Oracle MiddleWare Home (MW_HOME): [/u01/app/oracle/Middleware]
WebLogic domain directory: [/u01/app/oracle/ovm-manager-3/domains/ovm_domain]
Oracle WebLogic Server name: [AdminServer]
WebLogic username: [weblogic]
WebLogic password: [********]
WLST session logged at: /tmp/wlst-session5820685079094897641.log
```

3. As the root user, configure the client certificate login.

```bash
# su -c "/u01/app/oracle/ovm-manager-3/bin/configure_client_cert_login.sh /path/to/cacert"
```

Where `/path/to/cacert` is the absolute path to the CA certificate. You must provide the path to the CA certificate if you used a CA other than the default Oracle VM Manager CA to sign the SSL certificate.
2.2.7 Changing the Keystore Password

In some scenarios, you may also want to configure Oracle WebLogic Server's SSL truststore to provide additional trusted CAs. To do this you may use the `changepass` command to change the truststore password, since the default password for the keystore is randomized and it would not be possible to modify the keystore without the correct password. Once you have reset the password, you can modify the keystore using the Java `keytool`, as required. It is imperative that the existing internal Oracle VM Manager CA certificate is not removed from the keystore.

An example of setting the keystore password and then accessing trust information using the Java keytool command is shown below:

```
# ./ovmkeytool.sh changepass
You may either specify passwords or use random passwords.
If you choose to use a random password, only WebLogic, the Oracle VM Manager,
and this application will have access to the information stored in this
keystore.
Use random passwords? [yes] no
Change CA Keystore and Key passwords? [yes] no
Change SSL Keystore and Key passwords? [yes] no
Change SSL Trustore password? [yes]
SSL Trust Keystore password:
Verify SSL Trust Keystore password:
Updating trust-store information in WebLogic
Oracle MiddleWare Home (MW_HOME): [/u01/app/oracle/Middleware]
WebLogic domain directory: [/u01/app/oracle/ovm-manager-3/domains/ovm_domain]
Oracle WebLogic Server name: [WLS1] AdminServer
WebLogic username: [weblogic]
WebLogic password: [********]
WLST session logged at: /tmp/wlst-session6297528751781822860.log

# keytool -list -keystore /u01/app/oracle/ovm-manager-3/domains/ovm_domain/security/ovmtrust.jks
Enter keystore password:

Keystore type: JKS
Keystore provider: SUN

Your keystore contains 1 entry

ovmmgr_ca_key_entry, Nov 7, 2013, trustedCertEntry,
```
Chapter 3 Administering Oracle VM Manager

Administering Oracle VM Manager involves creating, deleting, and working with user accounts, modifying database schema, rotating log files, and capturing diagnostic information for troubleshooting.

3.1 Oracle VM Manager Administrator Tool (ovm_admin)

The Oracle VM Manager Administrator Tool, which can be invoked on the command line using the `ovm_admin` command, is used to perform administrative actions specific to Oracle VM Manager. These actions allow you to manage users that have access to the Oracle VM Manager data store, and control log rotation for the `AdminServer.log` file. To perform any action using the Oracle VM Manager Administrator Tool, you must use the password that is configured for the `weblogic` user.

The Oracle VM Manager Administrator Tool provides you with the ability to perform various user management functions directly from the command line. By default, the Oracle VM Manager installation process only creates and configures a single Oracle VM Manager administrative user. While this is often sufficient for many customers, creating separate administrative user accounts may be useful for security and auditing purposes.

The Oracle VM Manager Administrator Tool is installed as part of the default Oracle VM Manager installation process. The full path to the Oracle VM Manager Administrator Tool is:

```
/u01/app/oracle/ovm-manager-3/bin/ovm_admin
```

Syntax

```
```

Options

The following table shows the available options for this command.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>--help</td>
<td>Display the <code>ovm_admin</code> command parameters and options.</td>
</tr>
<tr>
<td>--listconfig</td>
<td>Displays Oracle VM Manager configuration details.</td>
</tr>
<tr>
<td>--listusers</td>
<td>List the Oracle VM Manager users.</td>
</tr>
<tr>
<td></td>
<td>For an example of how to list users, see Section 3.1.1, “Listing Users”.</td>
</tr>
<tr>
<td>--createuser</td>
<td>Create new Oracle VM Manager admin user.</td>
</tr>
<tr>
<td></td>
<td>For an example of how to create a user, see Section 3.1.2, “Creating Users”.</td>
</tr>
<tr>
<td>--deleteuser</td>
<td>Delete an Oracle VM Manager admin user.</td>
</tr>
<tr>
<td></td>
<td>For an example of how to delete a user, see Section 3.1.3, “Deleting Users”.</td>
</tr>
<tr>
<td>--modifyuser</td>
<td>Modify an Oracle VM Manager user password.</td>
</tr>
</tbody>
</table>
### Listing Users

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>--lockusers tries</td>
<td>Set the maximum login tries before locking accounts. This setting is global. For an example of how to change account locking, see Section 3.1.5, “Configure Account Locking”.</td>
</tr>
<tr>
<td>--unlockuser admin</td>
<td>Unlock a user account. For an example of how to unlock a user account, see Section 3.1.6, “Unlocking User Accounts”.</td>
</tr>
<tr>
<td>--listds</td>
<td>List Oracle VM Manager data sources. For an example of how to list data sources, see Section 3.1.7, “Listing Data Sources”.</td>
</tr>
<tr>
<td>--modifyds</td>
<td>Modify an Oracle VM Manager database schema. Typically used if the password for the MySQL database has been changed directly within MySQL. For an example of how to modify database schema, see Section 3.1.8, “Modifying the Oracle VM Manager Database Schema”.</td>
</tr>
<tr>
<td>--rotatelogsdaily HH:MM</td>
<td>Rotate the Oracle VM Manager application logs daily (HH:MM). For examples of rotating log files, see Section 3.1.9, “Rotating Log Files”.</td>
</tr>
<tr>
<td>--rotatelogsbsysize KB</td>
<td>Rotate the Oracle VM Manager application logs by size (KB). For examples of rotating log files, see Section 3.1.9, “Rotating Log Files”.</td>
</tr>
<tr>
<td>--updatemysqlroot</td>
<td>Change the password for the MySQL root user. The Oracle VM Manager Administrator Tool connects to the MySQL database as the root user. This option changes the password that the Oracle VM Manager Administrator Tool uses for the root user but does not change the password in the database itself. For this reason, you must first change the password with the Oracle VM Manager Administrator Tool and then manually change the password in the database. You should review the best practices and considerations for this option before you change the password, see Section 3.1.10, “Changing the Password for the MySQL Root User”.</td>
</tr>
</tbody>
</table>

### 3.1.1 Listing Users

Obtain a list of users that have access to Oracle VM Manager with the following command:

```
# ./ovm_admin --listusers
```

The tool prompts you for the Oracle WebLogic Server password and returns output similar to the following:
Creating Users

Some users stored within Oracle WebLogic Server are critical to your Oracle VM Manager environment, such as the following:

- **OracleSystemUser**: Used by Oracle Web Services Manager (OWSM). OWSM is part of the standard Oracle Fusion Middleware (FMW) Infrastructure, that includes ADF.

- **weblogic**: The default Oracle WebLogic Server administrative user.

The default admin user account is also typically listed. Any other user accounts listed, such as the ovmsuser account, have been added to the system after installation.

For more information about default user accounts, see Section 4.1, “Default Oracle VM Manager Users”.

### 3.1.2 Creating Users

Create new Oracle VM Manager users with the following command:

```
# ./ovm_admin --createuser
```

The tool returns the following output:

```
Oracle VM Manager Release version Admin tool
/u01/app/oracle/ovm-manager-3/ovm_wlst
Initializing WebLogic Scripting Tool (WLST) ...
Welcome to Oracle WebLogic Server Administration Scripting Shell
Type help() for help on available commands

weblogic, admin, ovmsuser
```

At this point you must enter the password for the Oracle WebLogic Server. If you have not changed the Oracle VM Manager admin user's password, this password is usually the same as your default Oracle VM Manager admin user's password.

```
Please enter the username: ovmsuser
Please enter a new password for ovmsuser, this password must be at least 8 characters long and must contain at least one non-alphabetic character: Please re-enter the password:
```
3.1.3 Deleting Users

Delete Oracle VM Manager administrative users with the following command:

```bash
# ./ovm_admin --deleteuser ovmuser
```

You are prompted for the Oracle WebLogic Server password. This is the password for the Oracle WebLogic Server as it was set up during installation. If you have not changed the Oracle VM Manager admin user’s password, this password is usually the same as your default Oracle VM Manager admin user’s password. Typical output is presented below:

```
Oracle VM Manager Release version Admin tool
/u01/app/oracle/ovm-manager-3/ovm_wlst
Initializing WebLogic Scripting Tool (WLST) ...
Welcome to Oracle WebLogic Server Administration Scripting Shell
Type help() for help on available commands
```

```
[main] INFO  ovm.wlst.commands - Connecting using URL t3://localhost:7001
Please enter the password for weblogic:
```

```
Location changed to serverRuntime tree. This is a read-only tree with DomainMBean as the root.
For more help, use help('domainConfig')
```

```
[main] INFO  ovm.wlst.domainbuilder.Domain - Deleted the user named ovmuser
```

**Important**

Some users stored within Oracle WebLogic Server are critical to your Oracle VM Manager environment. Do not attempt to delete either of the following users:

- **OracleSystemUser**
- **weblogic**

You should also keep the default admin user account so that there is always at least one administrative account that can access Oracle VM Manager.

3.1.4 Changing User Passwords

Change any Oracle VM Manager administrative user's password with the following command:

```bash
# ./ovm_admin --modifyuser
```

The tool returns the following output:

```
Oracle VM Manager Release version Admin tool
```

Note

The must conform to the password requirements suggested by the Oracle VM Manager Administrator Tool or the creation of the user fails in the final step.
Configure Account Locking

At this point you must enter the password for the Oracle WebLogic Server. If you have not changed the Oracle VM Manager admin user's password, this password is usually the same as your default Oracle VM Manager admin user's password.

Please enter the username: ovmuser
Please enter the password for ovmuser:

Note
You must provide the user's current password to modify the user account.
If you need to reset an account due to a lost password, you should first delete the user account and then create a new account.

Please enter a new password for ovmuser, this password must be at least 8 characters long and must contain at least one non-alphabetic character:
Please re-enter the password:

Note
The password must conform to the password requirements suggested by the Oracle VM Manager Administrator Tool or the creation of the user fails in the final step.

Location changed to serverRuntime tree. This is a read-only tree with DomainMBean as the root. For more help, use help('domainConfig')

3.1.5 Configure Account Locking

To protect unauthorized access to Oracle VM Manager you can configure an account locking facility that is triggered after a number of failed attempts to log in.

Configure the account locking facility with the following command:

# ./ovm_admin --lockusers [3]

Note
Account locking is enabled by default according to the base Oracle WebLogic Server configuration. After you exceed the maximum number of invalid login attempts, the account is locked for 30 minutes before it is automatically unlocked again.

To change the lock period, you must edit the Oracle WebLogic Server configuration. For more information on configuring the Oracle WebLogic Server lockout parameters, refer to the appropriate Oracle WebLogic Server documentation.
Unlocking User Accounts

**Important**

This is a global parameter that applies to all users. Setting this parameter on an instance of Oracle VM Manager that makes use of a single administrator account can result in this account being locked for 30 minutes before anybody can use it again. To recover from this, it is possible to unlock the account. See Section 3.1.6, "Unlocking User Accounts".

You are prompted to enter the Oracle WebLogic Server password in order to apply this setting. Typical output from the command follows:

```
Oracle VM Manager Release version Admin tool
/u01/app/oracle/ovm-manager-3/ovm_wlst
Initializing WebLogic Scripting Tool (WLST) ...
Welcome to Oracle WebLogic Server Administration Scripting Shell
Type help() for help on available commands

date_time [main] INFO ovm.wlst.commands - Connecting using URL t3://localhost:7001
Please enter the password for weblogic:
Location changed to edit tree. This is a writable tree with
DomainMBean as the root. To make changes you will need to start
an edit session via startEdit().
For more help, use help('edit')

Starting an edit session ...
Started edit session, please be sure to save and activate your
changes once you are done.
date_time [main] INFO ovm.wlst.domainbuilder.Domain - Set lockout threshold to 3 tries
Saving all your changes ...
Saved all your changes successfully.
Activating all your changes, this may take a while ...
The edit lock associated with this edit session is released
once the activation is completed.

The following non-dynamic attribute(s) have been changed on MBeans
that require server re-start:
MBean Changed : Security:Name=myrealmUserLockoutManager
Attributes changed : LockoutThreshold
Activation completed
```

You must restart Oracle VM Manager for the changes to the account locking facility to take effect, as follows:

```
# service ovmm restart
```

### 3.1.6 Unlocking User Accounts

When account locking is enabled (see Section 3.1.5, "Configure Account Locking"), it is possible for Oracle VM Manager user accounts to become locked for up to 30 minutes if a user fails to authenticate after the number of attempts that has been configured for this facility. When a user's account has become locked and the user enters the correct username and password combination, an error appears when the user attempts to authenticate:

```
Unexpected error during login (javax.security.auth.login.LoginException),
```
An investigation of the AdminServer.log reveals:

>BEA-090078< >User ovuser in security realm myrealm has had 3 invalid login attempts, locking account for 30 minutes.<

You can override the 30 minute lock on an account with the following command:

```
# ./ovm_admin --unlockuser ovuser
```

You are prompted for the Oracle WebLogic Server account password in order to complete the operation.

### 3.1.7 Listing Data Sources

Use this command option to check data sources before using the `--modifyds` option or to validate the result of a `--modifyds` operation.

Obtain a list of data sources that Oracle VM Manager uses with the following command:

```
# ./ovm_admin --listds
```

The tool prompts you to enter the MySQL user that should be used to query the database and then provides output similar to the following:

```
Please enter the name of a MySQL user: [appfw, ovs] ovs
Listing Oracle VM Manager Data Source 'ovm-jpa-ds'...
DriverName                              com.mysql.jdbc.Driver
Url                                     jdbc:mysql://localhost:49500/ovs
DatabaseName                            ovs
Listing Oracle VM Manager Data Source 'ovm-jpa-ds' successfully
Listing Oracle VM Manager Data Source 'ovm-odof-ds'...
DriverName                              com.mysql.jdbc.Driver
Url                                     jdbc:mysql://localhost:49500/ovs
DatabaseName                            ovs
Listing Oracle VM Manager Data Source 'ovm-odof-ds' successfully
```

### 3.1.8 Modifying the Oracle VM Manager Database Schema

You can use the Oracle VM Manager Administrator Tool to handle database schema changes within MySQL. The most typical use case for this is where the password for the Oracle VM Manager database...
Modifying the Oracle VM Manager Database Schema

has been changed directly within MySQL, without using any of the tools provided with Oracle VM. An alternative use case would be where the Oracle VM Manager database has been renamed within MySQL.

The `--modifyds` option is used to update Oracle VM Manager for changes made directly to the MySQL database:

```
# ./ovm_admin --modifyds
```

The tool prompts you for the Oracle VM Manager database schema password and the Oracle WebLogic Server password, and returns output similar to the following:

```
Oracle VM Manager Release version: Admin tool
/u01/app/oracle/ovm-manager-3/ovm_wlst
Initializing WebLogic Scripting Tool (WLST) ...
Welcome to Oracle WebLogic Server Administration Scripting Shell
Type help() for help on available commands
date_time [main] INFO ovm.wlst.commands - Connecting using URL t3://localhost:7001
Please enter the password for weblogic:

At this point you must enter the password for the Oracle WebLogic Server. If you have not changed the Oracle VM Manager admin user's password, this password is usually the same as your default Oracle VM Manager admin user's password.

Please enter the name of a MySQL user: [appfw, ovs] ovs
Please enter the password for MySQL user ovs:
Please enter the new password for ovs user:
Please re-enter the password:
Location changed to edit tree. This is a writable tree with DomainMBean as the root. To make changes you will need to start an edit session via startEdit().
For more help, use help('edit')
Starting an edit session ...
Started edit session, please be sure to save and activate your changes once you are done.
Saving all your changes ...
Saved all your changes successfully.
Activating all your changes, this may take a while ...

......
The following non-dynamic attribute(s) have been changed on MBeans that require server re-start:
MBean Changed : com.bea:Name=ovm-odof-ds,
  Type=weblogic.j2ee.descriptor.wl.JDBCDriverParamsBean,Parent=[ovm_domain]
/JDBCSystemResources[ovm-odof-ds],Path=JDBCRessource[ovm-odof-ds]/JDBCDriverParams
Attributes changed : PasswordEncrypted

Activation completed

Note that there is a second database schema, usually named `appfw`, that is also used by Oracle VM Manager. If the password for this database has also been changed, then the same command must be run again, as follows:

```
Oracle VM Manager Release version: Admin tool
/u01/app/oracle/ovm-manager-3/ovm_wlst
```

46
At this point you must enter the password for the Oracle WebLogic Server. If you have not changed the Oracle VM Manager admin user's password, this password is usually the same as your default Oracle VM Manager admin user's password.

Starting an edit session ...
Started edit session, please be sure to save and activate your changes once you are done.

Saving all your changes ...
Saved all your changes successfully.
Activating all your changes, this may take a while ...

......
The following non-dynamic attribute(s) have been changed on MBeans that require server re-start:
MBean Changed : com.bea:Name=ovm-qrtz-ds,
Type=weblogic.j2ee.descriptor.wl.JDBCDriverParamsBean,Parent=[ovm_domain]/JDBCSystemResources[ovm-qrtz-ds],Path=JDBCResource[ovm-qrtz-ds]/JDBCDriverParams
Attributes changed : PasswordEncrypted

Activation completed

When you have finished running this command, you must restart Oracle VM Manager as follows:

```
# service ovmm restart
# service ovmcli restart
```

## 3.1.9 Rotating Log Files

The Oracle VM Manager Administrator Tool allows you to control how and when log files are rotated. There are two options available:

- **--rotatelogsdaily**: Set the logs to be rotated on a daily basis at an allocated time.
- **--rotatelogsbysize**: Set the logs to be rotated when they reach a specified size.

In both cases, you are prompted for the Oracle WebLogic Server password to update the configuration.

### Rotating Oracle VM Manager logs daily

To set the logs to rotate daily at an allocated time, run the Oracle VM Manager Administrator Tool as follows:
Changing the Password for the MySQL Root User

# ./ovm_admin --rotatelogsdaily [00:30]

The time provided is specified in the format **HH:MM**.

Typical output from the command follows:

**Oracle VM Manager Release** version **Admin tool**

Please enter the password for weblogic :

Initializing WebLogic Scripting Tool (WLST) ...

Welcome to Oracle WebLogic Server Administration Scripting Shell

Type help() for help on available commands

Connecting to Oracle WebLogic Server ...

Connected ...

Configure log rotation setting to rotate daily at [00:30] ...

Modified log rotation setting successfully ...

Exiting...

Rotating Oracle VM Manager logs by size

To set the logs to rotate when they reach a specified size, run the Oracle VM Manager Administrator Tool as follows:

# ./ovm_admin --rotatelogsbysize [1024]

The size provided is specified according to the number of kilobytes before rotation.

Typical output from the command follows:

**Oracle VM Manager Release** version **Admin tool**

Please enter the password for weblogic :

Initializing WebLogic Scripting Tool (WLST) ...

Welcome to Oracle WebLogic Server Administration Scripting Shell

Type help() for help on available commands

Connecting to Oracle WebLogic Server ...

Connected ...

Configure log rotation setting to rotate the logs based on size ([1024] KB) ...

Modified log rotation setting successfully ...

Exiting...

3.1.10 Changing the Password for the MySQL Root User

You can change the password for the MySQL root user that the Oracle VM Manager Administrator Tool uses to connect to the MySQL database instance.

<table>
<thead>
<tr>
<th>Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Oracle VM Manager Administrator Tool connects to the MySQL server as the root user. This option changes the password that the Oracle VM Manager Administrator Tool uses for the root user but does not change the password in the database itself. For this reason, you must first change the password with the Oracle</td>
</tr>
</tbody>
</table>
Changing the Password for the MySQL Root User

VM Manager Administrator Tool and then manually change the password in the database.

Change the password for the MySQL root user as follows:

1. Run the Oracle VM Manager Administrator Tool with the `--updatemysqlroot` option.

```
# ./ovm_admin --updatemysqlroot
```

The tool returns the following output:

```
Oracle VM Manager Release version Admin tool
Initializing WebLogic Scripting Tool (WLST) ...
Welcome to OracleWebLogic Server Administration Scripting Shell
Type help() for help on available commands
date_time [main] INFO ovm.wlst.commands - Connecting using URL t3://localhost:7001
Please enter the password for weblogic:
```

2. Enter the password for the Oracle WebLogic Server. If you have not changed the Oracle VM Manager admin user's password, this password is usually the same as your default Oracle VM Manager admin user's password.

The Oracle VM Manager Administrator Tool prompts you with the following:

```
Please enter the current password for MySQL user root:
```

3. Enter the current password for the MySQL root user.

The Oracle VM Manager Administrator Tool prompts you with the following:

```
Please enter the new password for MySQL user root:
Please re-enter the password:
```

4. Enter the new password for the MySQL root user and then confirm the password.

The command provides the following output:

```
date_time [main] INFO ovm.wlst.domainbuilder.Domain - Updated MySQL root password successfully in WebLogic!
```

Please note that you must separately update the password in the database

5. Stop Oracle VM Manager.

```
# /etc/init.d/ovmm stop
```

6. Manually change the password in the database so that it matches the password that you set with the Oracle VM Manager Administrator Tool, as follows:

   a. Connect to the MySQL server.

      ```
      # mysql -S /u01/app/oracle/mysql/data/mysqld.sock -u root -p
      ```

   b. When prompted, enter the previous password for the root user, not the new password that you set with the Oracle VM Manager Administrator Tool.

   c. Ensure you are using the MySQL database.

      ```
      $ mysql> use mysql;
      ```
d. Change the password for the root user.
   $ mysql> update user set password=PASSWORD("new_password") where User='root';

e. Flush privileges.
   $ mysql> flush privileges;

f. Disconnect from the MySQL server.
   $ mysql> quit

7. Restart the MySQL service for Oracle VM Manager.
   # /etc/init.d/ovmm_mysql restart

8. Start Oracle VM Manager.
   # /etc/init.d/ovmm start

3.2 Working with the MySQL Instance

Oracle VM Manager uses an instance of MySQL Enterprise Edition for storing configuration and other data. Database files reside at /u01/app/oracle/mysql/data.

Starting, Stopping, and Checking Status of the MySQL Server

Note
Oracle VM Manager depends on a running instance of the MySQL server. You should not stop the MySQL server while Oracle VM Manager is running unless you are troubleshooting issues or configuring the MySQL server.

To start, stop, restart and obtain the status of the MySQL server, you can use the /etc/init.d/ovmm_mysql init script as follows:

# /etc/init.d/ovmm_mysql restart

Alternatively, you can use the service command as follows:

# service ovmm_mysql start

MySQL Configuration and Event Logs

Configuration for the Oracle VM Manager MySQL server is contained in: /u01/app/oracle/mysql/data/my.cnf.

Warning
Editing the configuration file might break your Oracle VM Manager installation. Do not edit the configuration file unless an Oracle Support representative instructs you to do so.

MySQL server events are logged in: /u01/app/oracle/mysql/data/mysqld.err.
Chapter 4 Managing Oracle VM Manager Authentication

Managing Oracle VM Manager authentication includes changing the password for the administration user, restricting user authentication to specific groups, and configuring LDAP and Active Directory authentication providers.

4.1 Default Oracle VM Manager Users

During installation, several user accounts are created in Oracle WebLogic Server. These users allow you to log in to Oracle VM Manager or to perform various administration tasks. Some user accounts are created to enable internal functions within Oracle VM Manager.

<table>
<thead>
<tr>
<th>User</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>admin</td>
<td>Oracle VM Manager user</td>
</tr>
<tr>
<td></td>
<td>The password for this user is specified during installation of Oracle VM Manager. To change the password, use the Oracle VM Manager Administrator Tool.</td>
</tr>
<tr>
<td>weblogic</td>
<td>Oracle WebLogic Server administration user</td>
</tr>
<tr>
<td></td>
<td>The password for this user is specified during installation of Oracle VM Manager. To change the password, use the Oracle VM Manager Administrator Tool.</td>
</tr>
<tr>
<td>OracleSystemUser</td>
<td>Internal user account that is part of the Oracle Fusion Middleware (FMW) infrastructure.</td>
</tr>
<tr>
<td></td>
<td>The password for this user is specified during installation of Oracle VM Manager. To change the password, use the Oracle VM Manager Administrator Tool.</td>
</tr>
<tr>
<td>ovs</td>
<td>Internal user account that connects to the Oracle MySQL database user instance for Oracle VM Manager.</td>
</tr>
<tr>
<td></td>
<td>The password for this user is specified during installation of Oracle VM Manager. To change the password, use the Oracle VM Manager Administrator Tool.</td>
</tr>
<tr>
<td>appframework</td>
<td>Internal user account that establishes connection between the Oracle VM Manager Web Interface and the Oracle VM Web Services API.</td>
</tr>
<tr>
<td></td>
<td>This user is created with a randomly generated 128 character password that consists of mixed case letters, digits, and special characters. The password is used only once to register an SSL client certificate that the Oracle VM Manager Web Interface uses to connect to the Oracle VM Web Services API.</td>
</tr>
<tr>
<td></td>
<td>To change the password for this user account, use the Oracle WebLogic Server Administration Console.</td>
</tr>
</tbody>
</table>

Note

- During an upgrade of Oracle VM Manager this user is replaced with a new account with a new randomly generated password.
Changing the Oracle VM Manager User Password

<table>
<thead>
<tr>
<th>User</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• You must not delete this user account. Deleting the user account breaks the internal connection between the Oracle VM Manager Web Interface and the Oracle VM Web Services API and requires you to re-install Oracle VM Manager.</td>
</tr>
</tbody>
</table>

**Related Information.**

- For details about the Oracle VM Manager Administrator Tool, see Section 3.1, “Oracle VM Manager Administrator Tool (ovm_admin)”.
- For an example of how to change passwords with the Oracle VM Manager Administrator Tool, see Section 3.1.4, “Changing User Passwords”.
- For instructions on changing the Oracle VM Manager user password, see Section 3.1.4, “Changing User Passwords”.
- For details about changing user passwords in the Oracle WebLogic Server Administration Console, navigate to the *Modify users* topic in the Oracle WebLogic Server online help.

### 4.2 Changing the Oracle VM Manager User Password

The Oracle VM Manager user lets you log in to the Oracle VM Manager Web Interface. The default username is `admin`. You set the password for this user when you install Oracle VM Manager. By default, the Oracle VM Manager user has the same password as the `OracleSystemUser` and the `weblogic` users. To secure your environment, you should change the password for the Oracle VM Manager user if you intend to share the Oracle VM Manager user credentials.

To change the password for the Oracle VM Manager user, do the following:

1. Start an ssh session to the Oracle VM Manager *host computer* as the *root* user.
2. Change to the following directory: `/u01/app/oracle/ovm-manager-3/bin`
3. Run the following command: `# ./ovm_admin --modifyuser`
4. Follow the prompts to change the user password.

This procedure involves using the Oracle VM Manager Administrator Tool to modify the user password. Refer to Section 3.1, “Oracle VM Manager Administrator Tool (ovm_admin)” for more information about the Administrator Tool. For an example of changing user passwords, see Section 3.1.4, “Changing User Passwords”.

### 4.3 Restricting User Authentication to Oracle WebLogic Server Groups

Configure Oracle VM Manager to restrict authentication to users in specific Oracle WebLogic Server groups, such as administrative groups, as follows:

1. Start an ssh session to the Oracle VM Manager *host computer*.
2. Open the following file for editing: `/etc/sysconfig/ovmm`.

52
3. Specify the Oracle WebLogic Server user group that can authenticate to Oracle VM Manager as the value for the `AUTHORIZED_GROUPS` entry.

   Enclose the value in double quotes and use a comma to separate multiple values, for example:

   `AUTHORIZED_GROUPS="group1,group2,group3"

4. Save and close `/etc/sysconfig/ovmm`.

5. Restart Oracle VM Manager to apply the changes.

Only users who belong to the groups that you specify can authenticate to Oracle VM Manager. If the `AUTHORIZED_GROUPS` entry does not exist, or has no value, then all Oracle WebLogic Server users can authenticate to Oracle VM Manager.

For more information about working with users and groups, navigate to the `Manage users and groups` topic in the Oracle WebLogic Server online help.

### 4.4 Enabling LDAP and Active Directory Authentication

Oracle VM Manager is an application that runs on Oracle WebLogic Server. For this reason, Oracle VM Manager supports any authentication providers that Oracle WebLogic Server supports.

To configure Oracle VM Manager to authenticate against an LDAP or Active Directory service, you must add the directory service as an authentication provider in Oracle WebLogic Server, as follows:

**Note**

The Oracle VM Manager upgrade process does not save and restore any configurations you create for external authentication providers. If you enable LDAP or Active Directory authentication and then upgrade Oracle VM Manager, you must complete the following steps after the upgrade to re-enable authentication.

1. Open the Oracle WebLogic Server Administration Console at:

   `https://hostname:7002/console`

   Where `hostname` is the Oracle VM Manager hostname or IP address.

2. Log in as the `weblogic` user.

3. Click **Lock & Edit** to modify the domain.

4. From the **Domain Structure** pane, select **Security Realms**, and then select `myrealm`.

   The settings page for the security realm displays.

5. Select the **Providers** tab and locate the **Authentication Providers** table.

6. Click **New** to create an authentication provider.

7. Specify a name for the authentication provider, select `LDAPAuthenticator` as the type of authentication provider, and then click **OK**.

   The new authentication provider displays in the **Authentication Providers** table.

8. Change the authentication sequence so that the LDAP authentication provider takes priority over other authentication providers.
a. Click **Reorder** from the **Authentication Providers** table.

b. Move the LDAP authentication provider to the top of the list and then click **OK**.

9. Select the LDAP authentication provider you created from the **Authentication Providers** table.

   The settings page displays.

10. On the **Common** tab, select **SUFFICIENT** as the value for **Control Flag** and then click **Save**.

11. Select the **Provider Specific** tab, configure the authentication provider as appropriate, and then click **Save**.

12. Click **Activate Changes** to apply your changes.

13. Restart the Oracle VM Manager service as root:

    ```
    # service ovmm restart
    ```

   Verify that the LDAP authenticator is configured and that the LDAP users and groups are populated in Oracle WebLogic Server, as follows:

   1. Log in to the Oracle WebLogic Server Administration Console.

   2. From the **Domain Structure** pane, select **Security Realms**, and then select **myrealm**.

   3. Select the **Users and Groups** tab.

   4. Verify that the LDAP users and groups are populated as appropriate.
Chapter 5 Monitoring Oracle VM Server with SNMP

Oracle VM Server provides support for Simple Network Management Protocol (SNMP) monitoring. Find out what SNMP applications are installed by default and learn how to get started with SNMP.

5.1 Installed SNMP Packages

The default installation of Oracle VM Server includes the NET-SNMP suite of applications. These applications allow you to use the SNMP protocol to monitor Oracle VM Server.

The following SNMP packages are installed by default:

<table>
<thead>
<tr>
<th>Package</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>net-snmp</td>
<td>SNMP agent daemon and documentation.</td>
</tr>
<tr>
<td>net-snmp-libs</td>
<td>Runtime libraries and management information bases (MIBs).</td>
</tr>
<tr>
<td>net-snmp-utils</td>
<td>Network management utilities such as snmpget and snmpwalk.</td>
</tr>
<tr>
<td>ovs-snmp</td>
<td>SNMP shared object module that lets you monitor Oracle VM Server.</td>
</tr>
</tbody>
</table>

The Oracle VM Server management information base (MIB) defines several objects that provide information about the server and the virtual machines running on the server. The base OID for this MIB is 1.3.6.1.4.1.111.57.1. You can find more information about the objects that this MIB defines in the following file on Oracle VM Server: /usr/share/snmp/mibs/ORACLE-OVS-MIB.txt.

**Note**
- This package is installed by default. However, you must manually add the object module to snmpd.conf, see Section 5.2, “Adding the Oracle VM Server Object Module”.
- The Oracle VM Server object module applies to x86 systems only. This object module does not apply to Oracle VM Server for SPARC.

Check the installed packages as follows:

```
# rpm -qa | grep snmp
net-snmp-5.5-xx.x.x.xxx_x.x.x86_64
net-snmp-libs-5.5-xx.x.x.xxx_x.x.x86_64
net-snmp-utils-5.5-xx.x.x.xxx_x.x.x86_64
ovs-snmp-xx.x.x.el6.x86_64
```

See the NET-SNMP documentation for more information.

5.2 Adding the Oracle VM Server Object Module

To monitor Oracle VM Server configuration with the ovs-snmp shared object module, you must add the following line to /etc/snmp/snmpd.conf:

```
load ovs /usr/lib64/ovs-snmp/ovs.so
```
Enabling the SNMP Service

Note
The default `snmpd.conf` on Oracle VM Server provides an example configuration that you should modify to suit your business needs. It is beyond the scope of this documentation to describe a complete configuration for `snmpd.conf`. Refer to the `snmpd.conf` man page for more information.

From a high level, the steps to add the `ovs-snmp` shared object module to `snmpd.conf` are as follows:

1. Connect to the appropriate instance of Oracle VM Server.
2. Open `/etc/snmp/snmpd.conf` for editing.
3. Add the following line:
   ```
   dlmod ovs /usr/lib64/ovs-snmp/ovs.so
   ```
4. Ensure that you have read access rights in `snmpd.conf`.
5. Save and close `/etc/snmp/snmpd.conf`.
6. Restart the SNMP service, if it is running.
   ```
   # service snmpd restart
   ```

5.3 Enabling the SNMP Service

The SNMP daemons are disabled by default, and should be enabled if you intend to use SNMP to monitor an Oracle VM Server. You can check your configuration to determine whether the service has been enabled as follows:

```
# chkconfig --list |grep snmp
snmpd           0:off   1:off   2:off   3:off   4:off   5:off   6:off
snmptrapd       0:off   1:off   2:off   3:off   4:off   5:off   6:off
```

To enable the SNMP service, you can start it manually by issuing the following command:

```
# service snmpd start
```

To enable the SNMP service permanently, you can issue the following command:

```
# chkconfig --level 2345 snmpd on
```

Note
The Oracle VM Server MIB does not define any SNMP traps. You should start the `snmptrapd` service only if you require it for other purposes.

5.4 How to Retrieve MIB Objects

When the SNMP service is running, you can use NET-SNMP applications to retrieve MIB objects directly from the command line on Oracle VM Server. You can also use other applications, such as Oracle Enterprise Manager, to retrieve MIB objects.
How to Retrieve MIB Objects

This section provides examples for demonstration purposes only. You should refer to the manpages for NET-SNMP applications or the appropriate documentation for your NMS to determine how you should retrieve MIB objects to suit your business needs.

**Note**

The examples in this section:

- Assume that you have configured the `public` community for read access.
- Use a lower security level, SNMP v2c, for access. You should configure SNMP v3 to ensure that you restrict access control to authorized users. Refer to the appropriate documentation for information on access control and security levels as well as instructions on configuring SNMP v3.

**Tip**

If the last line of the output contains `No more variables left in this MIB View (It is past the end of the MIB tree)`, then you might not have read access rights in `snmpd.conf`. To resolve this issue, you can temporarily add `rocommunity public` to the start of `/etc/snmp/snmpd.conf` to allow read access from all computers on the network.

The following example uses the `snmpwalk` application to return values for all objects in the MIB tree:

```bash
# snmpwalk -v2c -c public localhost
SNMPv2-MIB::sysDescr.0 = STRING: Linux FQDN 3.8.13-68.2.2.el6uek.x86_64
  #2 SMP time_stamp x86_64
SNMPv2-MIB::sysObjectID.0 = OID: NET-SNMP-MIB::netSnmpAgentOIds.10
DISMAN-EVENT-MIB::sysUpTimeInstance = Timeticks: (2654) 0:00:26.54
SNMPv2-MIB::sysContact.0 = STRING: Root <root@localhost>
  (configure /etc/snmp/snmp.local.conf)
SNMPv2-MIB::sysName.0 = STRING: FQDN
SNMPv2-MIB::sysLocation.0 = STRING: Unknown (edit /etc/snmp/snmpd.conf)
SNMPv2-MIB::sysORLastChange.0 = Timeticks: (18) 0:00:00.18
SNMPv2-MIB::sysORID.1 = OID: SNMP-MPD-MIB::snmpMPDMIBObjects.3.1.1
SNMPv2-MIB::sysORID.2 = OID: SNMP-USER-BASED-SM-MIB::usmMIBCompliance
SNMPv2-MIB::sysORID.3 = OID: SNMP-FRAMEWORK-MIB::snmpFrameworkMIBCompliance
SNMPv2-MIB::sysORID.4 = OID: SNMPv2-MIB::snmpMIB
SNMPv2-MIB::sysORID.5 = OID: TCP-MIB::tcpMIB
SNMPv2-MIB::sysORID.6 = OID: IP-MIB::ip
SNMPv2-MIB::sysORID.7 = OID: UDP-MIB::udpMIB
SNMPv2-MIB::sysORID.8 = OID: SNMP-VIEW-BASED-ACM-MIB::vacmBasicGroup
SNMPv2-MIB::sysORDescr.1 = STRING: The MIB for Message Processing and Dispatching.
SNMPv2-MIB::sysORDescr.2 = STRING: The MIB for Message Processing and Dispatching.
SNMPv2-MIB::sysORDescr.3 = STRING: The SNMP Management Architecture MIB.
SNMPv2-MIB::sysORDescr.4 = STRING: The MIB module for SNMPv2 entities
SNMPv2-MIB::sysORDescr.5 = STRING: The MIB module for managing TCP implementations
SNMPv2-MIB::sysORDescr.6 = STRING: The MIB module for managing IP and ICMP implementations
SNMPv2-MIB::sysORDescr.7 = STRING: The MIB module for managing UDP implementations
SNMPv2-MIB::sysORDescr.8 = STRING: View-based Access Control Model for SNMP.
SNMPv2-MIB::sysORUpTime.1 = Timeticks: (17) 0:00:00.17
SNMPv2-MIB::sysORUpTime.2 = Timeticks: (17) 0:00:00.17
SNMPv2-MIB::sysORUpTime.3 = Timeticks: (17) 0:00:00.17
SNMPv2-MIB::sysORUpTime.4 = Timeticks: (17) 0:00:00.17
SNMPv2-MIB::sysORUpTime.5 = Timeticks: (18) 0:00:00.18
SNMPv2-MIB::sysORUpTime.6 = Timeticks: (18) 0:00:00.18
SNMPv2-MIB::sysORUpTime.7 = Timeticks: (18) 0:00:00.18
SNMPv2-MIB::sysORUpTime.8 = Timeticks: (18) 0:00:00.18
...
```

The following example uses the `snmpwalk` application to load `ORACLE-OVS-MIB` and return values for objects in the Oracle VM Server MIB tree:
# snmpwalk -v2c -c public localhost -Qm +ORACLE-OVS-MIB .1.3.6.1.4.1.111.57.1
ORACLE-OVS-MIB::ovsType.0 = Oracle VM Server
ORACLE-OVS-MIB::ovsVersion.0 = version
ORACLE-OVS-MIB::ovsClusterState.0 = DLM_Ready
ORACLE-OVS-MIB::ovsClusterType.0 = nfs
ORACLE-OVS-MIB::ovsClusterStorage.0 = hostname:/nfs/clusterfs/path
ORACLE-OVS-MIB::ovsManagerUUID.0 = 0004fb0000010000af78ad71a2719608
ORACLE-OVS-MIB::ovsServerpoolName.0 = my-pool
ORACLE-OVS-MIB::ovsAgentState.0 = Running
ORACLE-OVS-MIB::ovsFreeMemory.0 = 12766
ORACLE-OVS-MIB::vmIndex.0 = 0
ORACLE-OVS-MIB::vmIndex.1 = 1
ORACLE-OVS-MIB::vmIndex.2 = 2
ORACLE-OVS-MIB::vmType.0 = 0004fb00000600002eb4165c672efe28
ORACLE-OVS-MIB::vmType.1 = 0004fb0000060000959d078c46ec4268
ORACLE-OVS-MIB::vmType.2 = Domain-0

The following example uses the `snmptable` application to retrieve the running virtual machines on Oracle VM Server from the `ORACLE-OVS-MIB::vmTable` SNMP table:

```
# snmptable -v 2c -c public localhost ORACLE-OVS-MIB::vmTable
SNMP table: ORACLE-OVS-MIB::vmTable

<table>
<thead>
<tr>
<th>vmIndex</th>
<th>vmType</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0004fb00000600002eb4165c672efe28</td>
</tr>
<tr>
<td>1</td>
<td>0004fb0000060000959d078c46ec4268</td>
</tr>
<tr>
<td>2</td>
<td>Domain-0</td>
</tr>
</tbody>
</table>
```

The `ORACLE-OVS-MIB::vmTable` SNMP table contains a cached value that expires after 60 seconds.
Chapter 6 Updating Oracle VM Server with Oracle Ksplice

Oracle VM Premier Support customers can use Oracle Ksplice to update Oracle VM Server with kernel, Xen, and user space patches. Oracle Ksplice allows you to apply security updates and bug fixes for your systems' kernel, the hypervisor, and certain user space libraries without having to schedule downtime and reboot machines.

Ksplice is freely available for Oracle customers who subscribe to Oracle Linux Premier Support, and to Oracle Cloud Infrastructure services. If you are an Oracle Linux Basic, Basic Limited, or Network Support subscriber, contact your sales representatives to discuss a potential upgrade of your subscription to a Premier Support plan.

Regular updates to the Oracle VM Servers are performed through Oracle VM Manager. However, the execution of Ksplice operations has not been integrated into Oracle VM Manager. Part of the Ksplice setup, such as configuring Server Update Repositories, does occur through Oracle VM Manager. Please review and understand the steps below before proceeding.

This chapter explains how to access the appropriate channels on ULN (Unbreakable Linux Network), set up the Ksplice client, and install Ksplice updates and patches on your Oracle VM Servers.

6.1 What Is Oracle Ksplice?

Linux kernels typically receive security updates and bug fixes on a regular basis. Applying these critical updates to your systems normally requires scheduled downtime, which is a costly operation because hosted services and applications become temporarily unavailable.

With Oracle Ksplice, however, systems can be updated without rebooting. As a result, access to services and applications is not interrupted, and your systems remain secure and up to date. Oracle Ksplice downloads patch updates from Oracle and applies these patches directly to running processes in memory. This provides an update to the running process without requiring it to restart. After this has been done, the package containing the binary update can be updated using the Unbreakable Linux Network (ULN) so that if the process is restarted later, the update is already applied.

Oracle Ksplice is available to customers with an Oracle Premier Support account, who have registered their systems with ULN. For additional information, refer to the Oracle Linux Ksplice User's Guide.

**Warning**

Use the Oracle Linux Ksplice User's Guide only as a reference for comprehensive background information about what Ksplice is and how it works. The instructions apply to generic Oracle Linux installations, while the procedures described in this Oracle VM Administrator's Guide contain different steps specific to Oracle VM Server. Use only the procedures in this Oracle VM Administrator's Guide to install and configure Ksplice for Oracle VM Server.

Ksplice updates are applied using a client application. Because Oracle VM Server takes advantage of user space updates as well as kernel updates, it requires the Ksplice Enhanced Client. Do not use the Ksplice Uptrack Client on Oracle VM Server. For additional information, refer to Working With the Ksplice Enhanced Client in the Oracle Linux Ksplice User's Guide.
6.2 Prerequisites for Ksplice on Oracle VM Server

Important

Ksplice is available for Oracle Premier Support customers. You require a valid Customer Support Identifier (CSI) to be able to install and use Ksplice for Oracle VM Server.

Starting with release 3.4.5 (build 1919), Oracle VM Server can use Ksplice to update the Xen hypervisor, the kernel and any user space packages. If your servers are running an earlier version of Oracle VM Server, you must upgrade and reboot first. To qualify for hypervisor patching, the servers must be running Xen 4.4.4-196 or newer.

To make sure that your servers meet the prerequisites for Ksplice, run the following checks:

1. Log in to the server.
2. From the Oracle Linux command line, check the current version of Oracle VM Server. It must be release 3.4.5 build 1919 or newer.

   ```bash
   # cat /etc/ovs-info | head -n 4
   OVS summary
   release: 3.4.5
   date: 201805301526
   build: 1919
   ```

3. From the Oracle Linux command line, check the current version of Xen. It must be version 4.4.4-196 or newer.

   ```bash
   # rpm -qa | grep "xen.*4.4.4"
   xen-4.4.4-196.el6.x86_64
   xen-tools-4.4.4-196.el6.x86_64
   ```

4. If the current versions of Oracle VM Server or Xen do not meet the minimum requirements, upgrade to the latest version of Oracle VM 3.4 before proceeding.

5. Repeat these steps on all Oracle VM Servers with which you intend to use Ksplice.

6.3 Accessing ULN Channels

The packages that are required to use Ksplice are hosted on ULN. However, because Oracle VM Server does not provide the tools that are required for ULN registration, it cannot connect to ULN by using Internet access. To install the required packages you must set up a local ULN Mirror that Oracle VM Servers can use to obtain the packages.

Note

Because Ksplice updates are cumulative, you can configure your local ULN mirror to store only the latest packages, which can improve synchronization time and storage requirements dramatically. To ensure that your local ULN mirror stores only the latest packages, edit the `/etc/sysconfig/uln-yum-mirror` file and set the `ALL_PKGS` parameter to 0 (`ALL_PKGS=0`). For more information, refer to ULN Mirror Configuration in the Oracle Linux Ksplice User's Guide.

The ULN Mirror can also be used to provide access to the most recent package updates so that patches can also be applied to on-disk binaries, as well as the processes that are patched in-memory by Ksplice.
Configuring Yum for Oracle Ksplice

The system hosting the mirrored ULN channels requires ULN registration and should be installed on a standard Oracle Linux 6 or Oracle Linux 7 host. You can install the ULN mirror on the same host as Oracle VM Manager.

Generic instructions to set up a local ULN mirror, and also configure it as a Ksplice mirror, are available in the following documentation resources:

- Creating and Using a Local ULN Mirror
- Configuring a Local ULN Mirror to Act as a Ksplice Mirror

When registering the system to be configured as ULN mirror, you must subscribe to the channels listed below, and make sure that the mirror provides the Oracle VM Servers access to those mirrored channels.

- Oracle VM 3.4 Latest (x86_64): ovm34_x86_64_latest
- Ksplice client and user space updates for Oracle VM (x86_64): ovm34_x86_64_ksplice
- Ksplice for Oracle Linux 6 (x86_64): ol6_x86_64_ksplice

6.4 Configuring Yum for Oracle Ksplice

To install the Ksplice Enhanced Client, and obtain the updates and patches for your environment, you need to configure Yum through Oracle VM Manager to enable access to the appropriate server update repositories. Provided you use the global server update settings, all discovered Oracle VM Servers take over the Yum repository configuration defined through the Oracle VM Manager.

The instructions in this section are based on the Oracle VM Manager Command Line Interface. For background information, usage instructions, and the command reference, consult the Oracle VM Manager Command Line Interface User’s Guide.

Set up the server update repositories in Oracle VM Manager as follows:

1. Log in to the Oracle VM Manager Command Line Interface.

```bash
$ ssh -l admin ovmmgr.example.com -p 10000
admin@ovmmgr.example.com's password:
OVM>
```

2. Verify that you are running Oracle VM Manager release 3.4.5 (build 1919) or newer.

```bash
OVM> showversion
3.4.5.1919
```

3. Discover any Oracle VM Servers that have not yet been discovered with which you intend to use Ksplice, and take ownership of them.

The example shows the CLI command and output using ovmsvr01. Execute this command for each of your servers, using either the fully qualified domain name or IP address.

```bash
Note
The password parameter is the Oracle VM Agent password on the Oracle VM Server in question. It is a required parameter for the discoverServer command.
```

```bash
OVM> discoverServer ipAddress=ovmsvr01.example.com password=****** takeOwnership=yes
Command: discoverServer ipAddress=ovmsvr01.example.com password=****** takeOwnership=yes
Status: Success
```
4. Add these server update repositories to the Yum configuration:

- `uln_mirror_ovm34_x86_64_latest`
- `uln_mirror_ovm34_x86_64_ksplice`
- `uln_mirror_ol6_x86_64_ksplice`

**Note**

For the `create serverupdaterepository` command, the following parameters are required:

- the package signature key (GPG key)
- the path to they GPG key file
- the Yum repository URL

```
OVM> create serverupdaterepository repositoryname=uln_mirror_ovm34_x86_64_latest enabled=yes pkgsignaturetype=GPG pkgsignaturekey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY name=uln_mirror_ovm34_x86_64_latest on serverupdategroup name=GlobalX86ServerUpdateConfiguration
```

Command: create serverupdaterepository repositoryname=uln_mirror_ovm34_x86_64_latest enabled=yes [...]
Status: Success
Time: 2018-06-03 19:47:43,093 PDT
JobId: 1528080450197
Data:
  id:0004fb0000310000e12a4dfe28933022  name:uln_mirror_ovm34_x86_64_latest

```
OVM> create serverupdaterepository repositoryname=uln_mirror_ovm34_x86_64_ksplice enabled=yes pkgsignaturetype=GPG pkgsignaturekey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY name=uln_mirror_ovm34_x86_64_ksplice on serverupdategroup name=GlobalX86ServerUpdateConfiguration
```

Command: create serverupdaterepository repositoryname=uln_mirror_ovm34_x86_64_ksplice enabled=yes [...]
Status: Success
Time: 2018-06-03 19:47:52,880 PDT
JobId: 1528080465622
Data:
  id:0004fb0000310000f522e7d0ee1911dc  name:uln_mirror_ovm34_x86_64_ksplice

```
OVM> create serverupdaterepository repositoryname=uln_mirror_ol6_x86_64_ksplice enabled=yes pkgsignaturetype=GPG pkgsignaturekey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY name=uln_mirror_ol6_x86_64_ksplice on serverupdategroup name=GlobalX86ServerUpdateConfiguration
```

Command: create serverupdaterepository repositoryname=uln_mirror_ol6_x86_64_ksplice enabled=yes [...]
Status: Success
Time: 2018-06-13 23:36:54,637 PDT
JobId: 1528958205006
Data:
  id:0004fb00003100003c4d3d4c252ee126  name:uln_mirror_ol6_x86_64_ksplice

5. Verify the Yum repository configuration on the Oracle VM Servers.

a. Log in to the server.

b. From the Oracle Linux command line, check the content of the directory `/etc/yum.repos.d`.
c. Run this check on all Oracle VM Servers with which you intend to use Ksplice.

6.5 Installing the Ksplice Enhanced Client

To update Oracle VM Server using Ksplice, you must use the Ksplice Enhanced Client. It is capable of updating certain shared libraries for user space processes – such as glibc, openssl and xen-tools – in addition to the Xen hypervisor and kernel updates.

The Ksplice Enhanced Client requires a direct connection to the Internet, so that it is able to connect to the Oracle Ksplice update server at https://updates-ksplice.oracle.com/ksplice/request. If your Oracle VM Servers are unable to connect directly to the Internet or your security policy restricts access, you can consider using an offline version of the client to apply updates from your locally configured ULN mirror. See Using the Ksplice Offline Enhanced Client for more information.

Since the Ksplice Enhanced Client package and its dependencies are only available on ULN and ULN registration is not possible on current versions of Oracle VM Server, the Oracle VM Servers on which you install the Ksplice Enhanced Client must have access to a host that is running a local ULN mirror, and to the ULN channels residing on that mirror. See Section 6.3, “Accessing ULN Channels” and Section 6.4, “Configuring Yum for Oracle Ksplice” for more information.

If you have configured a ULN Mirror and set up your yum configuration within Oracle VM Manager according to the instructions provided at Section 6.4, “Configuring Yum for Oracle Ksplice”, the Ksplice Enhanced Client and Ksplice-aware user space packages for Oracle VM Server are available in the ULN channel uln_mirror_ovm34_x86_64_ksplice.

To install the Ksplice Enhanced Client, proceed as follows:

1. Log in to the Oracle VM Server as root.

2. Revert all prelinked binaries and dependent libraries to their original state, then use the yum command to remove the prelink package.

   ```
   # prelink -au
   # yum remove -y prelink
   ```

3. Install the ksplice package.
Installing the Ksplice Enhanced Client

```
# yum install -y ksplice
```

Setting up Install Process

[...]

Dependencies Resolved

```
Package Arch Version Repository Size
===============================================================================================================
Installing:
ksplice x86_64 1.0.32-1.el6 uln_mirror_ovm34_x86_64_ksplice 5.
Installing for dependencies:
boost-filesystem x86_64 1.41.0-28.el6 uln_mirror_ovm34_x86_64_latest 4.
boost-python x86_64 1.41.0-28.el6 uln_mirror_ovm34_x86_64_latest 12.
boost-regex x86_64 1.41.0-28.el6 uln_mirror_ovm34_x86_64_latest 47.
ksplice-core0 x86_64 1.0.32-1.el6 uln_mirror_ovm34_x86_64_ksplice 25.
ksplice-tools x86_64 1.0.32-1.el6 uln_mirror_ovm34_x86_64_ksplice 10.
uptrack noarch 1.2.47-0.el6 uln_mirror_ovm34_x86_64_ksplice 50.
uptrack-PyYAML x86_64 3.08-4.el6 uln_mirror_ovm34_x86_64_ksplice 14.
uptrack-libyaml x86_64 0.1.3-1.el6 uln_mirror_ovm34_x86_64_ksplice 4.
```

Transaction Summary

```
Install 9 Package(s)
Total download size: 1.7 M
Installed size: 6.0 M
Downloading Packages:
[...]
Retrieving key from file:///etc/pki/rpm-gpg/RPM-GPG-KEY
Importing GPG key 0xEC551F03:
Userid: customer_user_id <customer@example.com>
Package: ovs-release-3.4-7.773.23.el6.x86_64 (@anaconda-OracleVMServer-201805301600.x86_64/3.4.5)
From: /etc/pki/rpm-gpg/RPM-GPG-KEY
[...]
Installed:
ksplice.x86_64 0:1.0.32-1.el6
```

4. Edit `/etc/uptrack/uptrack.conf` to provide the client with the label of the local user space channel. If you followed the instructions in Section 6.4, "Configuring Yum for Oracle Ksplice" the channel should have the label `uln_mirror_ovm34_x86_64_ksplice`. Edit the file to include the lines:

```
[User]
yum_userspace_ksplice_repo_name = uln_mirror_ovm34_x86_64_ksplice
```

Also edit to add any other required configuration options. For example, to enable automatic installation updates, change the `autoinstall` option from `no` to `yes`:

```
autoinstall = yes
```

For more information on these options, see Configuring a Ksplice Client in the Oracle Linux Ksplice User's Guide at https://docs.oracle.com/cd/E37670_01/E39380/html/ol_ksplice_config.html.

Note that some options, such as `upgrade_on_reboot` may not apply to user space packages.

5. Update the system to install the Ksplice-aware versions of user space libraries. For example:
Using the Ksplice Offline Enhanced Client

If your Oracle VM environment resides in a highly secure data center where it is not possible to maintain a permanent Internet connection for the Oracle VM Servers that you wish to patch for security updates, you can use the Ksplice Offline Enhanced Client (`ksplice-offline`) as an alternative. Ksplice kernel, user space and Xen updates are bundled into RPM packages, specific for a particular version, and are updated within 48 hours after a new Ksplice patch becomes available. These updates are made available on ULN.

At regular intervals, you download the latest Ksplice update packages for your systems, and update your local ULN mirror. Once the Ksplice Offline Enhanced Client is installed on your Oracle VM Servers, they can connect to the local ULN mirror to retrieve updates.

The disadvantages of using the offline client include the delay after a patch becomes available and the requirement to manage and refresh the ULN mirror. However, since the ULN mirror must be maintained to apply on-disk binary updates for the Ksplice packages and other patch updates, this may be the preferred approach. Although there is a delay in patching, this delay also offers some further assurance of stability and further testing.

For installation, configuration, and usage instructions, refer to Installing and Configuring the Ksplice Offline Enhanced Client in the Oracle Linux Ksplice User’s Guide. Note that the instructions provided in the Oracle Linux Ksplice User’s Guide are generic Oracle Linux instructions.

Caution

If you want to switch between the online and offline version of the Ksplice Enhanced Client, you must first remove the installed Ksplice client software, and then install the new Ksplice client version. For example, to switch from the online client to the offline client, run the following commands:

    # yum remove ksplice
    # yum install ksplice-offline

To install and configure for Oracle VM Server:

1. Configure the ULN mirror as described in Section 6.3, “Accessing ULN Channels”

2. Configure the required yum repositories within Oracle VM Manager, as described in Section 6.4, “Configuring Yum for Oracle Ksplice”.

3. On each Oracle VM Server, revert prelinked binaries and remove prelink:

    # prelink -au
    # yum remove prelink

4. On each Oracle VM Server, install the Ksplice Offline Enhanced Client:

    # yum install ksplice-offline

5. On each Oracle VM Server, edit the `/etc/uptrack/uptrack.conf` file to provide the client with the label of the local user space channel. If you followed the instructions in Section 6.4, “Configuring Yum for Oracle Ksplice” the channel should have the label `uln_mirror_ovm34_x86_64_ksplice`. Edit the file to include the lines:
Also edit to add any other required configuration options. For example, to enable automatic installation updates, change the autoinstall option from no to yes:

```
autoinstall = yes
```

For more information on these options, see Configuring a Ksplice Client in the Oracle Linux Ksplice User’s Guide at https://docs.oracle.com/cd/E37670_01/E39380/html/ol_ksplice_config.html.

Note that some options, such as upgrade_on_reboot may not apply to user space packages.

6. To install offline update packages, you must install the relevant packages for your system. When installing offline update packages you must specify the release in the command. For example, if you are installing the offline updates package for the Xen hypervisor, specify the release in the command as follows.

```
# yum install ksplice-updates-xen-$RELEASE
```

where $RELEASE is the update package that corresponds to the version of the hypervisor that is currently running, as shown in this example:

```
# yum install ksplice-updates-xen-4.4.4-196.0.10.el6
```

7. From this point, the Ksplice Offline Enhanced Client behaves similarly to the standard online version of the Ksplice Enhanced Client.

### 6.6 Installing Oracle Ksplice Updates on Oracle VM Server

The Ksplice Enhanced Client can be used to apply updates and patches to the running Xen hypervisor, the running kernel, as well as certain Ksplice-aware user space libraries, including xen-tools. To install and manage the Ksplice patches on your system, use the ksplice command on the Oracle Linux command line.

To display the running user space, kernel and xen processes that the client can patch, use the ksplice all list-targets command. For each Ksplice-aware library, the command reports the running processes that would be affected by an update.

```
# ksplice all list-targets
User-space targets:

glibc-libpthread-2.12.1.209.0.3.ksplice1.el6_9.2:
  - multipathd (1582)
  - auditd (2077)
  - rsyslogd (2111)
  - rpcbind (2155)
  [...]

glibc-libutil-2.12.1.209.0.3.ksplice1.el6_9.2:
  - sshd (2447)
  - xenconsoled (2533)
  - qemu-system-i38 (2537)
  - xend (2844)
  [...]

xen-tools-tools_xenstore_xenstored-4.4.4.155.0.27.ksplice1.el6:
  - xenstored (2526)

xen-tools-tools_console_xenconsoled-4.4.4.155.0.27.ksplice1.el6:
```

```
# ksplice all list-targets
Kernel targets:

glibc-libpthread-2.12.1.209.0.3.ksplice1.el6_9.2:
  - multipathd (1582)
  - auditd (2077)
  - rsyslogd (2111)
  - rpcbind (2155)
  [...]

glibc-libutil-2.12.1.209.0.3.ksplice1.el6_9.2:
  - sshd (2447)
  - xenconsoled (2533)
  - qemu-system-i38 (2537)
  - xend (2844)
  [...]

xen-tools-tools_xenstore_xenstored-4.4.4.155.0.27.ksplice1.el6:
  - xenstored (2526)

xen-tools-tools_console_xenconsoled-4.4.4.155.0.27.ksplice1.el6:
```

```
# ksplice all list-targets
Xen targets:

glibc-libpthread-2.12.1.209.0.3.ksplice1.el6_9.2:
  - multipathd (1582)
  - auditd (2077)
  - rsyslogd (2111)
  - rpcbind (2155)
  [...]

glibc-libutil-2.12.1.209.0.3.ksplice1.el6_9.2:
  - sshd (2447)
  - xenconsoled (2533)
  - qemu-system-i38 (2537)
  - xend (2844)
  [...]

xen-tools-tools_xenstore_xenstored-4.4.4.155.0.27.ksplice1.el6:
  - xenstored (2526)

xen-tools-tools_console_xenconsoled-4.4.4.155.0.27.ksplice1.el6:
```
Installing Oracle Ksplice Updates on Oracle VM Server

To display the updates that are available for installation, use the `ksplice all show --available` command. If you want to restrict the scope of the command to a particular category, use these alternatives instead:

- To display the available user space updates: `ksplice -n user upgrade`
- To display the available kernel updates: `ksplice -n kernel upgrade`
- To display the available xen updates: `ksplice -n xen upgrade`

To install the available Ksplice updates, use the `ksplice -y all upgrade` command. If you want to restrict the scope of the command to a particular category, use these alternatives instead:

- To install all user space updates: `ksplice -y user upgrade`
- To install all kernel updates: `ksplice -y kernel upgrade`
- To install all xen updates: `ksplice -y xen upgrade`
Installing Oracle Ksplice Updates on Oracle VM Server

The following steps will be taken:
Install [d71xqwov]: update.
Install [ion5usqz]: update 3.
Install [0323dejx]: update 2.
100% |###########################################################################################|
Done!

# ksplice -y user upgrade
Updating on-disk packages for new processes
Setting up Update Process
uln_mirror_ovm34_x86_64_ksplice | 2.5 kB 00:00
Resolving Dependencies
...

Package | Arch | Version | Repository | S
Updating:
glibc | i686 | 2:2.12-1.209.0.3.ksplice1.el6_9.2 | uln_mirror_ovm34_x86_64_ksplice | 4

glibc | x86_64 | 2:2.12-1.209.0.3.ksplice1.el6_9.2 | uln_mirror_ovm34_x86_64_ksplice | 3

Installing for dependencies:
ksplice-helper | x86_64 | 1.0.32-1.el6 | uln_mirror_ovm34_x86_64_ksplice | 4

Transaction Summary
Install 1 Package(s)
Upgrade 8 Package(s)
Total download size: 34 M

To display the updates that have been applied to the system, use the ksplice all show command.
If you want to restrict the scope of the command to a particular category, specify user, kernel or xen instead of all.

# ksplice all show
Ksplice user-space updates:
No Ksplice user-space updates installed

Ksplice kernel updates:
Installed updates:
None
Installing Oracle Ksplice Updates on Oracle VM Server

Effective kernel version is 4.1.12-124.14.5.el6uek

Ksplice xen updates installed:
[ion5usqz]: update 3.
[0323dejx]: update 2.
[d71xqwov]: update.

Note

After Ksplice has applied updates to a running kernel, the kernel has an effective version that is different from the original boot version displayed by the `uname -a` command. Use the `ksplice kernel uname -r` command to display the effective version of the kernel.

To remove Ksplice updates from the system, use the `remove` subcommand. You can choose to remove Ksplice updates for the category `user, kernel` or `xen`.

```
# ksplice -y xen remove --all
The following steps will be taken:
Remove [d71xqwov]: update.
Remove [ion5usqz]: update 3.
Remove [0323dejx]: update 2.
100% |#####################################################################|
Done!
```

For more information about using the `ksplice` command, see the `ksplice(8)` manual page.
Chapter 7 Provisioning ISO Files for PVM Guest Installations

Important

As of Oracle VM Release 3.4.6, support for PVM guests is removed. For more information, Section 1.5, “Disabling Paravirtualized Guests on Oracle VM Server”.

When you create a PVM guest from an ISO file, you cannot use an ISO file from a repository to install the operating system. Oracle VM requires that the ISO file is mounted so that its internal file system contents are available during the installation of the operating system for a PVM guest. The mounted ISO file can be made available via an NFS, HTTP or FTP server. The following examples show how to create and use mounted ISO files on an NFS share, and on an HTTP server.

Example 7.1 Creating an installation tree on an NFS share

This example creates an installation tree for paravirtualized guest by mounting an ISO file. The installation tree is made available via an NFS share. On the NFS server, enter:

```
# mkdir -p /isos/EL5u6-x86_64
# mount -o ro,loop /path/Enterprise-R5-U6-Server-x86_64-dvd.iso /isos/EL5u6-x86_64
# exportfs *:/isos/EL5u6-x86_64/
```

When you create the virtual machine using the Oracle VM Manager Web Interface, enter the installation location in the Network Boot Path field in the Create Virtual Machine wizard as:

```
nfs:example.com:/isos/EL5u6-x86_64
```

Example 7.2 Creating an installation tree on an HTTP server

This example creates an installation tree from an ISO file that can be accessed via HTTP. On the HTTP server, enter:

```
# cd /var/www/html
# mkdir EL5u6-x86_64
# mount -o ro,loop /path/Enterprise-R5-U6-Server-x86_64-dvd.iso EL5u6-x86_64
```

When you create the virtual machine using the Oracle VM Manager Web Interface, enter the installation location in the Network Boot Path field in the Create Virtual Machine wizard as:

```
http://example.com/EL5u6-x86_64
```

Tip

If you have multiple ISO files, you can mount each ISO file and copy the contents into a single directory. All the ISO files are then available from the same location.
Chapter 8 Installing and Using the Oracle VM Guest Additions

The Oracle VM Guest Additions allow bi-directional communication between Oracle VM Manager and the guest operating system of a virtual machine running in the Oracle VM environment. The Oracle VM Guest Additions provide fine-grained control over the configuration and behavior of components running within the virtual machine directly from Oracle VM Manager.

8.1 Features of the Oracle VM Guest Additions

The Oracle VM Guest Additions allow direct integration between guest software and the virtualization layer, to assist in orchestration and automation of complex, multi-virtual machine deployments. This integration can be used between Oracle Solaris, Microsoft Windows, and Oracle Linux running the Oracle Unbreakable Enterprise Kernel (UEK).

The Oracle VM Guest Additions allow you to:

• Send key-value pairs to a virtual machine, or guest, and to retrieve messages from the guest.
• More easily get information about virtual machines within Oracle VM Manager, such as reporting on IP addressing.
• Use the template configuration facility to automatically configure virtual machines as they are first started.
• Trigger programmed events by sending messages directly to a virtual machine from Oracle VM Manager.
• Query virtual machines to obtain information pertaining to previous messages.
• Interact with the Oracle VM Utilities ovm_vmmessage command.

Virtual Machine IP Address

When you install the Oracle VM Guest Additions, the IP address of the virtual machine displays in the Networks subtab of the Virtual Machines perspective in the Oracle VM Manager Web Interface.

8.2 Oracle VM Guest Additions Packages

To install the Oracle VM Guest Additions, you first download a set of packages from a yum repository to the virtual machine. You can download the packages from the Unbreakable Linux Network (ULN) or the Oracle Linux Yum Server. After you download the required packages, you use the yum install to install them.

The following table lists the packages for the Oracle VM Guest Additions:

<table>
<thead>
<tr>
<th>Package</th>
<th>Description</th>
<th>Required or Optional</th>
</tr>
</thead>
<tbody>
<tr>
<td>libovmapi</td>
<td>Library that adds support for the Oracle VM API.</td>
<td>Required</td>
</tr>
<tr>
<td>Package</td>
<td>Description</td>
<td>Required or Optional</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>libovmapi-devel</td>
<td>Library that adds developer support for the Oracle VM API.</td>
<td>Optional</td>
</tr>
<tr>
<td>ovmd</td>
<td>Daemon that handles configuration events and enables sending and receiving of messages between the virtual machine and Oracle VM Manager.</td>
<td>Required</td>
</tr>
<tr>
<td>python-simplejson</td>
<td>JSON encoder and decoder for Python.</td>
<td>Required</td>
</tr>
<tr>
<td>xenstoreprovider</td>
<td>Library that communicates with the Oracle VM API kernel infrastructure.</td>
<td>Required</td>
</tr>
<tr>
<td>ovm-template-config</td>
<td>Basic operating system configuration scripts.</td>
<td>Required</td>
</tr>
<tr>
<td>ovm-template-config-</td>
<td>Script for configuring virtual machine authentication.</td>
<td>Optional</td>
</tr>
<tr>
<td>authentication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ovm-template-config-datetime</td>
<td>Script for configuring virtual machine datetime settings.</td>
<td>Optional</td>
</tr>
<tr>
<td>ovm-template-config-firewall</td>
<td>Script for configuring virtual machine firewall.</td>
<td>Optional</td>
</tr>
<tr>
<td>ovm-template-config-network</td>
<td>Script for configuring virtual machine network settings.</td>
<td>Optional</td>
</tr>
<tr>
<td>ovm-template-config-selinux</td>
<td>Script for configuring virtual machine selinux settings.</td>
<td>Optional</td>
</tr>
<tr>
<td>ovm-template-config-ssh</td>
<td>Script for configuring virtual machine ssh settings.</td>
<td>Optional</td>
</tr>
<tr>
<td>ovm-template-config-system</td>
<td>Script for configuring virtual machine system settings.</td>
<td>Optional</td>
</tr>
<tr>
<td>ovm-template-config-user</td>
<td>Script for configuring virtual machine user settings.</td>
<td>Optional</td>
</tr>
</tbody>
</table>

**Microsoft Windows Guests**

For Microsoft Windows guests, the Oracle VM Guest Additions are included in the Oracle VM Paravirtual Drivers. The implementation of the guest additions consists of these components:

- **vmapi.dll**: a dynamic link library that exposes callable interfaces
- **ovmsvc**: the service that receives and sends events and messages
- **xenpci**: the driver that interacts with the hypervisor
- **ovmcmd**: the command used to invoke the guest additions

**vmapi.dll**

The `vmapi.dll` exposes interfaces to functions for communication between Windows applications and the `xenpci` driver in the Windows guest operating system. Applications load this library and call the exported functions to access `xenpci`. Normally device I/O controls (IOCTLS) are used to communicate with the `xenpci` driver. The following table shows function names and their descriptions:

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OVMAPI_Register</td>
<td>initializes OVMAPI and optionally registers a callback</td>
</tr>
<tr>
<td>OVMAPI_ParamGetValue</td>
<td>retrieves name-value pairs stored within the OVMAPI engine</td>
</tr>
</tbody>
</table>
### Function | Description
---|---
OVMAPI_ParamSetValue | creates or modifies a name-value pair
OVMAPI_Subscribe | receives particular events in the application registered event handler
OVMAPI_UnSubscribe | blocks particular events in the application registered event handler
OVMAPI_EventComplete | completes the event with a finalizing status code at a later time
OVMAPI_ParamGetValueSize | retrieves the size, in bytes, of a parameter value
OVMAPI_GetSessionFileDescriptors | retrieves the internal file descriptor for use in making special calls to the driver
OVMAPI_UserEventPublish | sends application-specific events to the management server and to other OVMAPI-enabled applications running on the same VM
OVMAPI_ParamGetAllNames | browses for existing parameters that may be of interest to the application
OVMAPI_ParamGetCount | retrieves the number of existing parameters
OVMAPI_UnRegister | terminates OVMAPI usage

**ovmsvc**

The ovmsvc service starts automatically by default when the Windows VM is booted. The command to install or uninstall this service is `ovmsvc install` or `ovmsvc uninstall` respectively. The ovmsvc service monitors messages sent from Oracle VM Manager, and sends Windows VM specific information, such as the operating system version and the VM's IP address. It uses the `vmapi.dll` to implement communication between the Windows guest and Oracle VM Manager. The following figure shows ovmsvc running inside a Windows VM.

When ovmsvc is started, it opens the xenpci device and registers a callback function where messages are processed. A thread is created to monitor events corresponding with vmapi messages. The current callback function of ovmsvc processes VM shutdown messages; other messages, for example "snapshot", could be implemented as additional features.

**xenpci**

Applications exchanging messages with Oracle VM Manager use the xenpci driver, which implements several IOCTLs to process messages. The xenpci driver directly accesses xenstore, a memory area shared by Xen domains. The ovmsvc calls API functions to send or read VM messages to or from xenstore.

The xenpci driver uses the xenbus_watch function to monitor incoming messages. The xenpci driver initialization registers a watch function on the xenstore key "control/oracle-vmapi/to-guest/last-write". Messages sent by Oracle VM Manager are set in this xenstore key. The watch function of
xenpci is triggered when this xenstore key changes. The watch function checks and sends out events, a
monitor thread acknowledges events, and a callback function processes API messages.

The ovmsvc sends Windows VM messages during its startup process, and uses an IOCTL in xenpci
to write the xenstore key "control/oracle-vmapi/from-guest/%d/%s". The ovmsvc updates the
message periodically to synchronize the information, such as guest IP address, from the guest to Oracle
VM Manager.

Oracle Solaris

The Oracle VM Guest Additions are also available for Oracle Solaris, both on SPARC and x86. They can
be optionally installed from a Solaris IPS repository: pkg://solaris/system/management/ovm-
guest-additions.

8.3 Downloading the Oracle VM Guest Additions Packages

The Oracle VM Guest Additions packages are available for download from the addons channel for the
guest operating system on the Unbreakable Linux Network (ULN) or the Oracle Linux Yum Server. For
example, if the guest operating system is Oracle Linux 7, you download the packages from the Oracle
Linux 7 Add ons (x86_64) channel.

Downloading from ULN

To download the Oracle VM Guest Additions packages from ULN, subscribe your system to the addons
channel.

Alternatively, you can create a yum server that acts as a local mirror of the ULN addons channel.

See the following Oracle Linux documentation for more information:

Oracle Linux Release 7:

• Managing ULN Channel Subscription by Using the ULN Web Interface
• Creating and Using a Local ULN Mirror

Oracle Linux Release 6:

• Managing ULN Channel Subscription by Using the ULN Web Interface
• Creating and Using a Local ULN Mirror

Downloading from the Oracle Linux Yum Server

By default, the yum repository configuration file on Oracle Linux contains a section that defines the addons
channel on the Oracle Linux Yum Server.

To download the Oracle VM Guest Additions packages from the public yum repository, you need to enable
the addons channel in the yum configuration file.

See the following Oracle Linux documentation for instructions:

Oracle Linux Release 7:

• Yum Repository Configuration
Oracle Linux Release 6:

- *Yum Repository Configuration*

**Microsoft Windows Guests**

For Microsoft Windows guests, the Oracle VM Guest Additions are included in the Oracle VM Paravirtual Drivers. Refer to the Oracle VM Paravirtual Drivers for Microsoft Windows documentation library. Follow the download instructions for the selected release of the paravirtual drivers.

**Oracle Solaris**

For Oracle Solaris, both on SPARC and x86, the Oracle VM Guest Additions can be downloaded from a Solaris IPS repository: [http://pkg.oracle.com/solaris/release](http://pkg.oracle.com/solaris/release), or [https://pkg.oracle.com/solaris/support](https://pkg.oracle.com/solaris/support) with your support contract access.

### 8.4 Installing the Oracle VM Guest Additions

To install the Oracle VM Guest Additions, do the following:

1. Download the required packages for the Oracle VM Guest Additions.
2. Run the `yum install` command to install the packages; for example,

```sh
# yum install libovmapi xenstoreprovider ovmd python-simplejson xenstoreprovider
```

**Microsoft Windows Guests**

For Microsoft Windows guests, the Oracle VM Guest Additions are included in the Oracle VM Paravirtual Drivers. Refer to the Oracle VM Paravirtual Drivers for Microsoft Windows documentation library. Follow the installation instructions for the selected release of the paravirtual drivers.

**Oracle Solaris**

To install the Oracle VM Guest Additions on Oracle Solaris, do the following:

1. Ensure that an appropriate 'solaris' repository publisher is configured.
2. Run the IPS command to install the package; for example,

```sh
# pkg install ovm-guest-additions
```

### 8.5 Upgrading the Oracle VM Guest Additions

You should update the Oracle VM Guest Additions packages regularly to ensure they function correctly. You should update the packages after you create a new virtual machine from an Oracle VM template on which the Oracle VM Guest Additions are installed.

To update the Oracle VM Guest Additions, do the following:

1. Ensure your virtual machine is connected to a yum repository that contains the packages for the Oracle VM Guest Additions.
2. Run the `yum update` command to install the packages; for example,

```sh
# yum update libovmapi xenstoreprovider ovmd python-simplejson xenstoreprovider
```
**Microsoft Windows Guests**

For Microsoft Windows guests, the Oracle VM Guest Additions are included in the Oracle VM Paravirtual Drivers. Refer to the Oracle VM Paravirtual Drivers for Microsoft Windows documentation library. Follow the upgrade instructions for the selected release of the paravirtual drivers. Silent upgrade is available in case you need to upgrade a large number of Windows guests.

**Oracle Solaris**

To upgrade the Oracle VM Guest Additions on Oracle Solaris, do the following:

1. Ensure that an appropriate 'solaris' repository publisher is configured.
2. Run the IPS command to update the package; for example,

   `# pkg update ovm-guest-additions`

**8.6 Using the Oracle VM Guest Additions (ovmd)**

The Oracle VM Guest Additions daemon, ovmd, facilitates a bi-directional messaging channel between Oracle VM Manager and the guest. It allows first-boot installation configuration, and is capable of sending and receiving messages consisting of key-value pairs.

In previous releases you could use the ovmd utility to send key/value messages to a virtual machine. This feature is now included directly in Oracle VM Manager. Although this section mentions the options available to send messages to a virtual machine using ovmd, you should instead use the Oracle VM Manager Web Interface or Oracle VM Manager Command Line Interface to send key/value messages. The virtual machine must have the Oracle VM Guest Additions daemon installed and running. See Send VM Messages in the Oracle VM Manager User’s Guide, or the Oracle VM Manager Command Line Interface User's Guide for more information.

Used in conjunction with the ovm-template-config script, the ovmd utility can be used to remotely configure system and application configuration parameters within a virtual machine as it boots. See Section 8.8, “The Oracle VM Template Configuration Script and Modules” for more information on this facility.

Oracle VM Manager makes use of ovmd in order to obtain IP addressing information from the guest to include in the Oracle VM Manager Web Interface when displaying detailed virtual machine information. See Virtual Machine IP Address.

You can run ovmd directly from the command line to perform actions outside of ovmd's function as a daemon or system service. Running ovmd using the --help parameter provides you with a breakdown of the options supported when run directly from the command line.

```bash
ovmd[{-p --set-param=} param][{-g --get-param=} key][{-r --delete-param=} key] [{-x --delete-params}][{-l --list-params}][{-e --event=} event][{-s --script=}
```

**Note**

On Oracle Solaris, the command options and script names may differ from those presented for Oracle Linux. For details, please refer to the ovmd(1M) man page, which is installed along with the ovm-guest-additions package on Oracle Solaris.

**Syntax**

```bash
ovmd[{-p --set-param=} param][{-g --get-param=} key][{-r --delete-param=} key] [{-x --delete-params}][{-l --list-params}][{-e --event=} event][{-s --script=}
```
Options

The following table shows the available options for this command:

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>{-p</td>
<td>--set-param=} param</td>
</tr>
<tr>
<td>{-g</td>
<td>--get-param=} key</td>
</tr>
<tr>
<td>{-r</td>
<td>--delete-param=} key</td>
</tr>
<tr>
<td>{-x</td>
<td>--delete-params}</td>
</tr>
<tr>
<td>{-l</td>
<td>--list-params}</td>
</tr>
<tr>
<td>{-e</td>
<td>--event=} event</td>
</tr>
<tr>
<td>{-s</td>
<td>--script=} script</td>
</tr>
<tr>
<td>{-d</td>
<td>--debug=} {0</td>
</tr>
<tr>
<td>{-f</td>
<td>--pid-file=} filename</td>
</tr>
<tr>
<td>{-t</td>
<td>--time-period=} seconds</td>
</tr>
<tr>
<td>{-v</td>
<td>--version}</td>
</tr>
<tr>
<td>{-h</td>
<td>--help}</td>
</tr>
</tbody>
</table>

Examples

Example 8.1 Showing the ovmd script version

```bash
# ovmd -v
```

Example 8.2 Running a script on a virtual machine

```bash
# ovmd --script=/scripts/cleanup
```

Example 8.3 Sending a message from a virtual machine to Oracle VM Manager

```bash
# ovmd -p key1=value1
```

See Section 8.6.2, “Sending Messages to Virtual Machines” for more information on sending and receiving messages using the ovmd script.

Example 8.4 Listing messages sent from Oracle VM Manager on a virtual machine

```bash
# ovmd -l-list
{"key1":"value1"}
{"key2":"value2"}
```

Example 8.5 Deleting a message on a virtual machine

```bash
# ovmd -r key1
```

8.6.1 Using the Oracle VM Guest Additions Daemon to Enable First-Boot Configuration

If you are configuring a virtual machine to act as a template, or if you intend to clone it, you can enable a first-boot configuration. This configuration causes the virtual machine to behave as if it is booting for the
Sending Messages to Virtual Machines

first time each time it boots. As a result, the virtual machine prompts for configuration input either by the VM API or on the virtual machine console. This can be achieved by running the following commands as root within the virtual machine:

```
# ovmd -s cleanup
# service ovmd enable-initial-config
# shutdown -h now
```

On next boot, the virtual machine acts as if it is performing a first-time boot.

If you have configured ovmd to run as a service, you can configure it remotely using the messaging facility and the ovm-template-config script.

See the example Section 8.6.2, “Sending Messages to Virtual Machines” for more information on using the messaging channel. Also see Section 8.8, “The Oracle VM Template Configuration Script and Modules” for information about the ovm-template-config script.

8.6.2 Sending Messages to Virtual Machines

This section gives an example of a message exchange between Oracle VM Manager and a running Oracle Linux virtual machine with Oracle VM Guest Additions installed.

Example 8.6 Sending a message from the guest to Oracle VM Manager

Using ovmd, you send information from within the virtual machine to your Oracle VM Manager using the following syntax:

```
# ovmd -p key1=value1
```

The message appears in the Oracle VM Manager user interface, as a Virtual Machine API Incoming Message event for the virtual machine in question. When you expand the event, the description shows the key-value pair and the date and time when the information exchange took place.

Example 8.7 Sending a message from Oracle VM Manager to a virtual machine

Using ovmd from within the guest, you can retrieve the message sent from Oracle VM Manager using the following syntax:

```
# ovmd -\-list
{"key1":"value1"}
{"key2":"value2"}
```

The ovmd -\-list command retrieves all messages, both sent and received. You can identify the specific message you are looking for by its key. To remove obsolete messages, use the following syntax:

```
# ovmd -r key1
# ovmd -\-list
{"key2":"value2"}
```

8.6.3 Configuring the Oracle VM Guest Additions Daemon to Run as a Service

To enable ovmd to run as a service on Oracle Linux, run the chkconfig command as root:

```
# chkconfig ovmd on
```

To start the ovmd service, run the following as root:

```
# service ovmd start
```

When configured as a service, ovmd listens for message requests sent from Oracle VM Manager.
8.7 Using the Oracle VM Guest Additions with Microsoft Windows (ovmcmd)

The Oracle VM Guest Additions provide a command line tool named `ovmcmd` for interacting with their functions, similar to the `ovmd` command in Linux. The command line tool is distributed during installation of the Oracle VM Paravirtual Drivers, and is located in the folder: C:\Program Files (x86)\Oracle Corporation\Oracle VM Windows PV Drivers.

The Shell

The executable binary file `ovmcmd` is used with 32-bit Windows, while `ovmcmd_64` is used with 64-bit Windows. You can run `ovmcmd` directly by using the Windows command line. The `ovmcmd` command provides its own shell mode, which is convenient for setting multiple variables. Enter `ovmcmd` without any parameter to display the list of supported interfaces.

Enter one of these commands to run ovmcmd in shell mode:

- 32-bit Windows: `ovmcmd ovmapishell`
- 64-bit Windows: `ovmcmd_x64 ovmapishell`

This example shows the ovmcmd shell on a 64-bit Windows:

![ovmcmd shell example]

The Commands

In shell mode, `ovmcmd` sets up a session and connects an event handler. The user can enter commands at the `OVMAPIShell` shell prompt without having to re-issue `ovmcmd`. This is optional, as individual commands can be specified on the Windows command line executing `ovmcmd`. Shell mode can be used to send and receive messages containing parameter values, or to display the contents of the xenstore. Commands for sending and receiving messages are illustrated under Conversation Between Guest and Oracle VM Manager. Command names in `ovmcmd` are not case sensitive.

The `Xenstore` commands should only be used by people with substantial knowledge of the internals of Xen. Those commands are:

- **XenstoreRead**: reads the value of a xenstore key. The parameter following the subcommand is the xenstore key to read.

  ```
  OVMAPIShell>XenstoreRead /local/domain/708/device/vif/0/state 4
  OVMAPIShell>
  ```

- **XenstoreWrite**: writes a value to a xenstore key or creates a new xenstore key. The parameters are the xenstore key and the value to be written. If the xenstore key is read-only, an error message appears.
• **XenstoreDir**: lists a xenstore directory. The parameter is the xenstore directory to display.

```
OVMAPIShell>XenstoreDir /local/domain/0
vm
device
control
error
memory
guest
hvmpv
data
cpu
  1
    availability
  2
    availability
[...]
OVMAPIShell>
```

The **SendMessage** command is used to send messages. However, messages sent this way are not saved.

```
OVMAPIShell>SendMessage value 1
Operation Succeeded
OVMAPIShell>
```

To send a message and at the same time save the parameter key/value pair, use the **ParamSetValue** command.

```
OVMAPIShell>ParamSetValue guestparam1 guestval 1
ParamSetValue returned 0
OVMAPIShell>OVMCmdEventHandler: Received Event type 64, size 12, ID 6
ParamSetValue returned 0
```

To retrieve the value of a specified parameter, use the **ParamGetValue** command.

```
OVMAPIShell>ParamGetValue guestparam1 guestval
ParamGetValue returned 0, guestparam1 = guestval (len = 9)
```

---

**Conversation Between Guest and Oracle VM Manager**

Conversations between the guest VM and Oracle VM Manager are based on sending and receiving messages.

From the Windows VM side of the conversation: use the ovmcmd command **ParamSetValue** to set a parameter and send a message from the guest VM to Oracle VM Manager. For example **ParamSetValue mykey myval** sets the value of key "mykey" to "myval", and sends a message to Oracle VM Manager.

```
C:\Program Files (x86)\Oracle Corporation\Oracle VM Windows PV Drivers>OVMCmd_64 ParamSetValue mykey myval
ParamSetValue returned 0
```

The **SendMessage** command can also be used.

```
C:\Program Files (x86)\Oracle Corporation\Oracle VM Windows PV Drivers>OVMCmd_64 SendMessage foo bar
Operation Succeeded
```

Use the ReadParameter command as shown below to read messages from Oracle VM Manager. Output can optionally be piped to a file for later processing.
C:\Program Files (x86)\Oracle Corporation\Oracle VM Windows PV Drivers>OVCMd_64  ReadParameter sesame
Success: sesame = street (7)

For the Oracle VM Manager side of the conversation: to display the message from the Oracle VM Manager user interface, select the VM in the Servers and VMs tab, right click, and select Display Events.


Alternatively, send a message to the guest with the Oracle VM CLI sendVmMessage command.

OVMD> sendvmmessage vm name=VMNAME key=managerparam message=managerval log=no

See sendVmMessage in the Oracle VM Manager Command Line Interface User's Guide for more information.

8.8 The Oracle VM Template Configuration Script and Modules

The Oracle VM Guest Additions include a set of packages that can help with the automatic configuration of virtual machine as they are created from a template and booted for the first time. The master package for this facility is known as ovm-template-config. The Oracle VM template configuration script can be used to configure a virtual machine remotely using the Oracle VM messaging facility via ovmd.

8.8.1 Template Configuration Script (ovm-template-config)

The Oracle VM Template Configuration Script, ovm-template-config works in conjunction with a set of modular configuration scripts that function in a manner very similar to the standard Linux System V, init.d and chkconfig, script model. Control over how configuration modules are run is handled within the /etc/template.d directory on the guest virtual machine. The configuration module scripts are stored in /etc/template.d/scripts.

The ovm-template-config script is the master script that is used to control all enabled modules. Running ovm-template-config with the --help parameter provides a usage breakdown.

For remote configuration, ovm-template-config is used in conjunction with ovmd to capture configuration parameters that have been sent to the guest using the Oracle VM messaging facility. When this is the case, ovm-template-config targets are presented to ovmd as --script parameters:

```bash
# ovmd -s cleanup
# ovmd -s configure
```

Important

When performing remote configuration, using ovmd to process messages containing configuration keys, the authentication module must be enabled. Processing of messages can only be completed if the final message contains the root user password. See Section 8.8.2, "Enabling and Disabling Configuration Modules (ovm-chkconfig)" for more information on this module.

See Section 8.8.4, "Triggering Configuration Changes" for more information on calling this script directly.

Syntax

```
ovm-template-config [-e|--enumerate][--human-readable][{-i|--input= input }[{-o|--output= output ][--stdin][--console-input][--ovf-transport-iso][{-s|--script= script }][--logfile= logfile][--loglevel= loglevel][--version][{-h|--help}][target
```
Enabling and Disabling Configuration Modules (ovm.chkconfig)

Where target is:

{ configure | unconfigure | reconfigure | cleanup | suspend | resume | migrate | shutdown }

Options

The following table shows the available options for this command.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>[-e</td>
<td>--enumerate]</td>
</tr>
<tr>
<td>--human-readable</td>
<td>Print in human readable format when enumerate parameters.</td>
</tr>
<tr>
<td>{ -i</td>
<td>--input=} input</td>
</tr>
<tr>
<td>{ -o</td>
<td>--output=} output</td>
</tr>
<tr>
<td>--stdin</td>
<td>Build parameters from stdin.</td>
</tr>
<tr>
<td>--console-input</td>
<td>Build parameters from the console input.</td>
</tr>
<tr>
<td>--ovf-transport-iso</td>
<td>Build parameters from the OVF transport ISO.</td>
</tr>
<tr>
<td>{ -s</td>
<td>--script=} script</td>
</tr>
<tr>
<td>--logfile= logfile</td>
<td>Set the name of the log file.</td>
</tr>
<tr>
<td>--loglevel= loglevel</td>
<td>Set the logging level.</td>
</tr>
<tr>
<td>--version</td>
<td>Show the ovm-template-config script version number and exit.</td>
</tr>
<tr>
<td>{ -h</td>
<td>--help}</td>
</tr>
</tbody>
</table>

Examples

Example 8.8 Listing the key pairs in configuration modules

# ovm-template-config --enumerate configure

Example 8.9 Listing the key pairs specific to the network configuration module

# ovm-template-config --enumerate --script network configure

Example 8.10 Passing configuration information to the script from STDIN

# ovm-template-config --stdin configure

Example 8.11 Passing configuration information from the command line prompt (prompting for values)

# ovm-template-config --console-input configure

Example 8.12 Passing configuration information from an OVF transport mounted on a CDROM device

# ovm-template-config --ovf-transport-iso configure

8.8.2 Enabling and Disabling Configuration Modules (ovm.chkconfig)

When a module is enabled, symlinks to the module script are made to other subdirectories within /etc/template.d based on the type of target the module provides, in much the same way that the System
Enabling and Disabling Configuration Modules (ovm-chkconfig)

When a module gets added, the header of the module script is read to verify the name, priority and targets and then a symlink is made to the corresponding subdirectories under /etc/template.d.

Enabling and disabling targets for any module is handled using the ovm-chkconfig script. Usage of this command is outlined using the --help parameter.

Syntax

.ovm-chkconfig [--list [name]] [--add name] [--del name] [--target= target ... name { on | off }] [--version] [{--h | --help}]

Where target is:

{ configure | unconfigure | reconfigure | cleanup | suspend | resume | migrate | shutdown }

Options

The following table shows the available options for this command.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>[--list [name]]</td>
<td>Lists the status of the script name.</td>
</tr>
<tr>
<td>[--add name]</td>
<td>Add a new script name.</td>
</tr>
<tr>
<td>[--del name]</td>
<td>Delete a script name.</td>
</tr>
</tbody>
</table>
| [--target= target ... name { on | off }] | Specify the targets in a comma separated list, for example: --target="configure,unconfigure"
| --version               | Show the ovm-chkconfig script version number and exit.|
| {--h | --help}            | Show help on the ovm-chkconfig command options.      |

Examples

**Example 8.13 Listing available modules and their target runtime status**

```
# ovm-chkconfig --list
name            configure unconfigure reconfigure cleanup suspend resume migrate shutdown
authentication  on:90     off         off         off     off     off    off     off
datetime        on:50     off         off         off     off     off    off     off
firewall        on:41     off         off         off     off     off    off     off
network         off       off         off         off     off     off    off     off
selinux         off       off         off         off     off     off    off     off
ssh             off       off         off         off     off     off    off     off
system          off       off         off         off     off     off    off     off
user            off       off         off         off     off     off    off     off
```

**Example 8.14 Enabling all targets supported by a module**

```
# ovm-chkconfig --add authentication
```

**Example 8.15 Disabling all targets supported by a module**

```
# ovm-chkconfig --del datetime
```

**Example 8.16 Disabling particular targets for a module**

```
# ovm-chkconfig --target=cleanup user off
```
8.8.3 Key-Value Pairs Used By Available Configuration Modules

To obtain a full listing of all of the key pairs that are used to trigger configuration changes through the `ovm-template-config` configuration modules, run the following command on the guest system where `ovm-template-config` is installed:

```
# ovm-template-config --human-readable --enumerate configure
```

The output from this command is printed as a Python data structure, that is easy to parse and understand. Content can be limited to the information specific to a configuration module by using the `--script` parameter as presented below:

```
# ovm-template-config --human-readable --enumerate configure --script datetime

[('50',
 'datetime',
 [{u'description': u'System date and time in format year-month-day-hour-minute-second, e.g., "2011-4-7-9-2-42".',
  u'hidden': True,
  u'key': 'com.oracle.linux.datetime.datetime'},
 {u'description': u'System time zone, e.g., "America/New_York".',
  u'hidden': True,
  u'key': 'com.oracle.linux.datetime.timezone'},
 {u'description': u'Whether to keep hardware clock in UTC: True or False.',
  u'hidden': True,
  u'key': 'com.oracle.linux.datetime.utc'},
 {u'description': u'Whether to enable NTP service: True or False.',
  u'hidden': True,
  u'key': 'com.oracle.linux.datetime.ntp'},
 {u'description': u'NTP servers separated by comma, e.g., "time.example.com,0.example.pool.ntp.org".',
  u'hidden': True,
  u'key': 'com.oracle.linux.datetime.ntp-servers'},
 {u'description': u'Whether to enable NTP local time source: True or False.',
  u'hidden': True,
  u'key': 'com.oracle.linux.datetime.ntp-local-time-source'}])
```

From the output, it becomes clear as to which configuration modules are triggered at which runlevel and what keys and values they accept. Note that all key names are structured so that they are prefixed with `com.oracle`, to avoid conflicts with any custom modules that you may intend to develop for your own purposes.

Key value pairs are actually passed to `ovm-template-config` in JSON format:

```
{"com.oracle.linux.datetime.ntp":"True"}
{"com.oracle.linux.datetime.ntp-servers":"0.pool.ntp.org,1.pool.ntp.org,2.pool.ntp.org"}
{"com.oracle.linux.root-password":"mysecret"}
```

8.8.4 Triggering Configuration Changes

There are a variety of approaches that can be used to trigger a configuration change using `ovm-template-config`. Most commonly, this is done by setting the `ovmd` service to run using in `enable-initial-config` mode. This causes the virtual machine to wait to be provided with configuration parameters either on via the console, or via the `ovmd` messaging facility, after the next boot. This is the usual approach when configuring a virtual machine to act as a template.

To manually force `ovmd` to pass messages to the `ovm-template-config` script, simply run `ovmd` with the `--script` parameter set to point to one of the `ovm-template-config` targets:

```
# ovmd --list
{"com.oracle.linux.datetime.ntp":"True"}
{"com.oracle.linux.datetime.ntp-servers":"0.pool.ntp.org,1.pool.ntp.org,2.pool.ntp.org"}
```
Developing Oracle VM Template Configuration Modules

Note

To perform an action using messaging parameters and `ovm-template-config`, the `authentication` module must be enabled and your final message should include an authentication request in the form of a key-value message:

```
{"com.oracle.linux.root-password": "password"}
```

When running `ovmd` like this, `ovmd` prepares two pipes (`infd` and `outfd`) and calls the `ovm-template-config` script transparently in the background in the following way:

```
# ovm-template-config --input <infd> --output <outfd> configure
```

During testing, it may be useful to simply pass configuration information directly to the script from STDIN on the command line. This can be achieved by calling the script directly with the `--stdin` parameter:

```
# ovm-template-config --stdin configure <<EOF
> {"com.oracle.linux.selinux.mode": "disabled"}
> {"com.oracle.linux.root-password": "ovsroot"}
EOF
```

Configuration can also be achieved directly from the console by running the script using the `--console-input` option. Doing this will prompt you for values for each of the keys that need to be defined for any enabled modules:

```
# ovm-template-config --console-input configure
```

8.8.5 Developing Oracle VM Template Configuration Modules

The provided module scripts are developed in Python. Theoretically, it is possible to develop module scripts in a different language, as long as the input, output and argument handling remains the same. The example provided in this section makes use of the Python programming language.

Each module script consists of two main parts:

1. The script header, which contains information like script name, targets, priorities and description.
2. The actual script, which handles a small set of parameters.

For examples of functional module scripts, refer to the existing modules in the `/etc/template.d/scripts` directory.

Module Script Header

Module script headers require a very specific comment block in order for `ovm-chkconfig` to handle enabling and disabling your script functionality. The format for the script header is as follows:

```
### BEGIN PLUGIN INFO
# name: [script name]
# [target]: [priority]
# description: a description that can cross multiple lines.
### END PLUGIN INFO
```

When developing your own module script, you must include a header following the exact same format. Provide your own script name, which will be used when calling `ovm-chkconfig`, the targets that your
script will support, and the priority for your script. The priority will specify in what order the script gets executed. You do not have to implement all targets. If you have a configure target but no cleanup target, this is still acceptable. The configure target gets called when a first boot/initial start of the virtual machine happens. The cleanup target happens when you manually initiate a cleanup in your virtual machine or when you want to restore the virtual machine to its original state. An example of the network module script header is provided below:

```plaintext
### BEGIN PLUGIN INFO
# name: network
# configure: 50
# cleanup: 50
# description: Script to configure template network.
### END PLUGIN INFO
```

### Module Script Body

The main requirement for the module script body is that it accepts at least one target parameter. Target parameters that might get presented by the `ovm-template-configure` script include:

- configure
- unconfigure
- reconfigure
- cleanup
- suspend
- resume
- migrate
- shutdown

Your script can handle any other arguments that you require. There is one optional parameter which is useful to implement and this is `-e` or `--enumerate`. `ovm-template-config` uses this to be able to enumerate or list the parameters for a target supported by your script.

A very basic template to use for your script body follows:

```python
try:
    import json
except ImportError:
    import simplejson as json
from templateconfig.cli import main

def do.enumerate(target):
    param = []
    if target == 'configure':
        param += []
    elif target == 'cleanup':
        param += []
    return json.dumps(param)

def do.configure(param):
    param = json.loads(param)
    return json.dumps(param)
```
def do_clean_up(param):
    param = json.loads(param)
    return json.dumps(param)

if __name__ == '__main__':
    main(do_enumerate, {'configure': do_configure, 'cleanup': do_clean_up})

This script supports the configure and cleanup targets.

You can fill out the script with your own code. For instance, for the do_enumerate function, you would populate the parameters that are supported for each target in the script. An example from the firewall module is presented below:

def do_enumerate(target):
    param = []
    if target == 'configure':
        param += [{'key': 'com.oracle.linux.network.firewall',
                    'description': 'Whether to enable network firewall: True or False.',
                    'hidden': True}]
    return json.dumps(param)

Each target function begins by reading the JSON parameters passed to the script, using the param = json.loads(param) statement. From this point, code can be written to perform actions based on the values of the keys that the script expects to receive. Once again, the example provided below is from the firewall module:

def do_configure(param):
    param = json.loads(param)
    firewall = param.get('com.oracle.linux.network.firewall')
    if firewall == 'True':
        shell_cmd('service iptables start')
        shell_cmd('service ip6tables start')
        shell_cmd('chkconfig --level 2345 iptables on')
        shell_cmd('chkconfig --level 2345 ip6tables on')
    elif firewall == 'False':
        shell_cmd('service iptables stop')
        shell_cmd('service ip6tables stop')
        shell_cmd('chkconfig --level 2345 iptables off')
        shell_cmd('chkconfig --level 2345 ip6tables off')
    return json.dumps(param)

Module Script Packaging

Once you have written one or more configuration module scripts, you may want to package them as RPMs that can be deployed on other systems. In order to install and configure template configure scripts, they have to be packaged in an RPM, with a specific naming convention. Package the script as ovm-template-config-[scriptname]. Ideally in the post install of the RPM you should add the script automatically by executing # /usr/sbin/ovm-chkconfig --add scriptname. When uninstalling a script/RPM, remove it at uninstall time using # /usr/sbin/ovm-chkconfig --del scriptname. This is illustrated in the following example of an RPM spec file that can be used:

Name: ovm-template-config-example
Version: 3.0
Release: 1%{?dist}
Summary: Oracle VM template example configuration script.
Group: Applications/System
License: GPL
URL: http://www.oracle.com/virtualization
Source0: %{name}-%{version}.tar.gz
BuildRoot: %{mktemp -ud %{_tmppath}/%{name}-%{version}-%{release}-XXXXXX}
BuildArch: noarch
Requires: ovm-template-config
%description
Oracle VM template example configuration script.

%prep
%setup -q
%install
rm -rf $RPM_BUILD_ROOT
make install DESTDIR=$RPM_BUILD_ROOT
%clean
rm -rf $RPM_BUILD_ROOT
%post
if [ $1 = 1 ]; then
   /usr/sbin/ovm-chkconfig --add example
fi
%preun
if [ $1 = 0 ]; then
   /usr/sbin/ovm-chkconfig --del example
fi
%files
%defattr(-,root,root,-)
%{_sysconfdir}/template.d/scripts/example
%changelog
* Tue Mar 22 2011 John Smith - 3.0-1
  - Initial build.

Edit the example spec file to reference your own script name.

In order to create RPMs, you must install rpmbuild:

# yum install rpm-build

The following is an example Makefile that you might assist in automating the build process:

You must edit this Makefile to reference your own script.

DESTDIR=
PACKAGE=ovm-template-config-example
VERSION=3.0

help:
@echo 'Commonly used make targets:'
@echo ' install - install program'
@echo ' dist - create a source tarball'
@echo ' rpm - build RPM packages'
@echo ' clean - remove files created by other targets'

dist: clean
dir $(PACKAGE)-$(VERSION)
tar -cSnp --to-stdout --exclude .svn --exclude .hg --exclude .hgignore \
   --exclude $(PACKAGE)-$(VERSION) * | tar -x -C $(PACKAGE)-$(VERSION)
tar -czSp $(PACKAGE)-$(VERSION).tar.gz $(PACKAGE)-$(VERSION)
rm -rf $(PACKAGE)-$(VERSION)
install:
install -D example $(DESTDIR)/etc/template.d/scripts/example

rpm: dist
rpmbuild -ta $(PACKAGE)-$(VERSION).tar.gz
clean:
rm -fr ${PACKAGE}-${VERSION}
find . -name '*.py[cdo]' -exec rm -f '{}' ';'
rm -f *.tar.gz

.PHONY: dist install rpm clean

Create a working directory, copy over your script, the spec file and the Makefile. Run the following command to create a src tarball of your code:

```bash
# make dist
```

Run the following command to generate an RPM file:

```bash
# make rpm
```

The preceding command generates an RPM in the `RPMS/noarch` directory within your working directory, for example: `RPMS/noarch/ovm-template-config-test-3.0-1.el6.noarch.rpm`.
Chapter 9 Using the Oracle VM Utilities

The Oracle VM Utilities are a collection of command line scripts that allow you to perform certain tasks in an Oracle VM environment, such as collecting metrics about the Oracle VM Server host on which virtual machines run and configuring CPU pinning, which is also referred to as hard partitioning.

The Oracle VM Utilities communicate directly with Oracle VM Manager using a Oracle VM API. The Oracle VM Utilities connect to the Oracle VM API with an Oracle VM Manager administrative user name and password. Oracle VM Manager listens for the Oracle VM Utilities on port 7002 (HTTPS).

**Note**

- The Oracle VM Utilities version 2.1 and later work with Oracle VM Manager Release 3.4. Additionally, only the `ovm_vmdisks`, `ovm_vmhostd`, `vm_dump_metrics`, and `ovm_vmcontrol` scripts are intended for use with Oracle VM Manager Release 3.4. All other scripts are either obsolete or deprecated by the Oracle VM Manager Command Line Interface. See the [Oracle VM Manager Command Line Interface User's Guide](http://www.oracle.com/technetwork/server-storage/vm/downloads/index.html) for details on how you can perform management tasks in an Oracle VM environment.

- The Oracle VM Utilities are provided as-is and are not supported by Oracle. However, Oracle provides support for the Oracle VM Utilities in the following cases:
  - The `ovm_vmhostd` and `vm_dump_metrics` scripts are supported when running SAP applications on Oracle Linux guests in an Oracle VM environment.
  - The `ovm_vmcontrol` script is supported only when configuring hard partitioning, which is also referred to as CPU pinning. For more information, see [Setting Hard Partitioning for Virtual Machine CPUs](http://www.oracle.com/technetwork/server-storage/vm/downloads/index.html) in the [Oracle VM Concepts Guide](http://www.oracle.com/technetwork/server-storage/vm/downloads/index.html).

**Downloading and Installing the Oracle VM Utilities**

To install the Oracle VM Utilities, do the following:

1. Download the Oracle VM Utilities as a `.zip` file from the Oracle VM downloads page:
   
   ```
   ```

2. Extract the contents of the `.zip` file to the system. Refer to the `readme` file for specific instructions.

**9.1 Oracle VM Virtual Machine Control (ovm_vmcontrol)**

The `ovm_vmcontrol` script lets you configure CPU pinning, which is also referred to as hard partitioning, on virtual machines.

**Note**

- The `ovm_vmcontrol` script supports CPU pinning for virtual machines running on x86-based Oracle VM Servers only. You cannot configure CPU pinning for virtual machines running on Oracle VM Server for SPARC.

- If you are using Oracle VM Release 3.4.1 or Release 3.4.2, after you configure CPU pinning for a virtual machine, you must stop and then start the virtual
machine for the configuration to take effect. Restarting the virtual machine does not load the configuration changes for CPU pinning.

• As of Oracle VM Release 3.4.3, support for dynamic CPU pinning is available. As a result, after you configure CPU pinning for a virtual machine, there is no longer a requirement to stop and then start the virtual machine for the configuration to take effect.

Syntax

ovm_vmcontrol{-u username}{-p password|-E}{-h hostname}{-c command}{-v vm_name|-U vm_uuid}{-s cpu_thread_list ...}

Where command is:

{ setvcpu | getvcpu | rmvcpu }

Options

The following table shows the available options for this command.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-u username</td>
<td>Username of an Oracle VM Manager admin user. This option is required.</td>
</tr>
<tr>
<td>{-p password</td>
<td>-E}</td>
</tr>
<tr>
<td></td>
<td>• Do not set an option for the password in the command line. The Oracle VM Utilities then prompt you to specify it. You should use this method to set the password.</td>
</tr>
<tr>
<td></td>
<td>• Set the password as an environment variable and then use the –E option. It is best practice to remove the environment variable when it is no longer required.</td>
</tr>
<tr>
<td></td>
<td>You must use the OVMUTIL_PASS environment variable with the –E option. Set this variable for a single session as follows:</td>
</tr>
<tr>
<td></td>
<td># export OVMUTIL_PASS=password</td>
</tr>
<tr>
<td>{-h hostname}</td>
<td>Hostname of the server running Oracle VM Manager.</td>
</tr>
<tr>
<td>-c { setvcpu</td>
<td>getvcpu</td>
</tr>
</tbody>
</table>
### Examples

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>-v vm_name</code></td>
<td>Virtual machine name.</td>
</tr>
<tr>
<td><code>-U vm_uuid</code></td>
<td>Virtual machine UUID. If you do not specify the virtual machine name with the <code>-v vm_name</code> option, you must specify the UUID of the virtual machine.</td>
</tr>
<tr>
<td><code>-s cpu_thread_list ...</code></td>
<td>List of physical thread numbers to which you can bind virtual CPUs. You can set the value as follows:</td>
</tr>
<tr>
<td></td>
<td>• One or more numbers separated by a comma. For example, 0,1,2,3,4.</td>
</tr>
<tr>
<td></td>
<td>• A range of numbers. For example, 0-4 is equal to 0,1,2,3,4.</td>
</tr>
<tr>
<td></td>
<td>• A range of numbers that excludes one number. For example, 0-4,^2 is equal to 0,1,3,4.</td>
</tr>
<tr>
<td></td>
<td>• A combination of comma-separated numbers and ranges. For example, 0-2,4,6-8 is equal to 0,1,2,4,6,7,8.</td>
</tr>
</tbody>
</table>

**Note**

You must not set a number as the value for the `-s` option that is greater than the physical CPU count for the server. For example, if a server has 8 physical CPUs then you can set 0 to 7. Setting 8 or higher is not valid.

You must use this command in combination with:

```
-c setvcpu
```

### Examples

**Example 9.1 Setting CPU pinning for a virtual machine**

This example binds the virtual CPUs of the virtual machine to threads 0, 1, 3, 5, and 7.

```
# ./ovm_vmcontrol -u admin -h localhost -v MyVM01 -c setvcpu -s 0-3,^2,5-7,^6
Oracle VM VM Control utility 2.1.
Connecting to OVM Manager using Web Service.
Connected.
OVM Manager version: version
Command : setvcpu
Pinning vCPU '0-3,^2,5-7,^6' to VM 'MyVM01'
Pin vCPU succeed.
```

**Example 9.2 Checking CPU pinning for a virtual machine**

This example shows the virtual CPUs of the virtual machine are bound to threads 0, 1, 3, 5, and 7.

```
# ./ovm_vmcontrol -u admin -h localhost -v MyVM01 -c getvcpu
Oracle VM VM Control utility 2.1.
Connecting to OVM Manager using Web Service.
Connected.
OVM Manager version: version
Command : getvcpu
```
Oracle VM Retrieve Disk (ovm_vmdisks)

9.2 Oracle VM Retrieve Disk (ovm_vmdisks)

The ovm_vmdisks script retrieves details about virtual disks. This script lists every virtual disk for a given virtual machine, as well as the virtual machine configuration (vm.cfg) file. If the virtual disks are physical devices directly attached to the virtual machine, this script lists the device mapper entry on the Oracle VM Server to which the virtual machine is assigned. If the virtual disks are files on an NFS server, the utility lists the NFS server name, mount point, and file name and location.

Syntax

ovm_vmdisks { -u username } { -p password | -E } { -h hostname } { -v vm_name | -U vm_uuid }

Options

The following table shows the available options for this command.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-u username</td>
<td>Username of an Oracle VM Manager admin user. This option is required.</td>
</tr>
<tr>
<td>{ -p password</td>
<td>-E }</td>
</tr>
<tr>
<td>{ -h hostname }</td>
<td>Hostname of the server running Oracle VM Manager.</td>
</tr>
<tr>
<td>-v vm_name</td>
<td>Virtual machine name.</td>
</tr>
<tr>
<td>-U vm_uuid</td>
<td>Virtual machine UUID. If you do not specify the virtual machine name with the -v vm_name option, you must specify the UUID of the virtual machine.</td>
</tr>
</tbody>
</table>

Examples

Example 9.3 Listing virtual disks for a virtual machine

```
# ./ovm_vmdisks -u admin -p Welcome1 -h localhost -v MyVM01
```
9.3 Oracle VM Hostd For Metrics Messaging (ovm_vmhostd)

The `ovm_vmhostd` script collects metrics about the Oracle VM Server host on which a virtual machine is running. Every 60 seconds, the script checks that the virtual machine is running and then sends the metrics about the host to the virtual machine itself. In other words, the same virtual machine sends and receives the metrics about the Oracle VM Server host.

The virtual machine message that the `ovm_vmhostd` script sends has a key of `vmhost`. The metrics about the Oracle VM Server host are defined as the value of the virtual machine message.

To retrieve the host metrics from the virtual machine, you can use either the Oracle VM Guest Additions daemon, `ovmd`, or the `vm-dump-metrics` script. See Section 9.4, “Retrieving Host Metrics from Virtual Machines (vm-dump-metrics)”.

### Note

The `ovm_vmhostd` script uses the Oracle VM Guest Additions to send and receive the metrics as virtual machine messages. For this reason, the guest virtual machine must be running Oracle Linux with the Oracle VM Guest Additions installed. See Chapter 8, *Installing and Using the Oracle VM Guest Additions*.

#### Syntax

```
ovm_vmhostd {-u username} [-p password] -E {-h hostname} {v vm_name} {U vm_uuid}
```

#### Options

The following table shows the available options for this command.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>-u username</code></td>
<td>Username of an Oracle VM Manager admin user. This option is required.</td>
</tr>
<tr>
<td><code>[-p password] -E</code></td>
<td>Corresponding password for the Oracle VM Manager admin user. You can specify the password as follows:</td>
</tr>
<tr>
<td></td>
<td>• Do not set an option for the password in the command line. The Oracle VM Utilities then prompt you to specify it. You should use this method to set the password.</td>
</tr>
<tr>
<td>Option</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>-------------</td>
</tr>
</tbody>
</table>
| • Set the password as an environment variable and then use the `-E` option. It is best practice to remove the environment variable when it is no longer required. You must use the `OVMUTIL_PASS` environment variable with the `-E` option. Set this variable for a single session as follows:  
  ```bash
  # export OVMUTIL_PASS=password
  ```  
| • Specify the password on the command line with the `-p` option. This option is deprecated as of Oracle VM Release 3.4. |
| `{-h hostname}` | Hostname of the server running Oracle VM Manager. |
| `-v vm_name` | Virtual machine name. The virtual machine name is the name you assign during the creation of the virtual machine. |
| `-U vm_uuid` | Virtual machine UUID. If you do not specify the virtual machine name with the `-v vm_name` option, you must specify the UUID of the virtual machine. |

### Examples

#### Example 9.4 Sending Oracle VM Server details to a virtual machine

```bash
# ./ovm_vmhostd -u admin -h localhost -v MyVM01
Oracle VM Hostd 2.1.
Connecting to OVM Manager using Web Service.
Connected.
Processing VM : 'MyVM01'
VM : 'MyVM01' has status : Running.
Message sent.
Sleeping 60 seconds.
Sleeping 60 seconds.
Sleeping 60 seconds.
```

### 9.4 Retrieving Host Metrics from Virtual Machines (vm-dump-metrics)

The `vm-dump-metrics` script outputs the metrics about the Oracle VM Server host in XML format that an SAP application running on a virtual machine guest can consume.

To collect the host metrics, do the following:

1. Run the `ovm_vmhostd` script to send metrics about the Oracle VM Server host as a virtual machine message.
2. Copy the `vm-dump-metrics` script to the guest virtual machine that received the virtual machine message.
3. Run the `vm-dump-metrics` script. The `vm-dump-metrics` script does not take any commands or options.

The `vm-dump-metrics` script queries `ovmd` to retrieve a message with the `vmhost` key. The script then does one of the following:
• Parses the message and outputs the XML to standard output (stdout).
• Exits with status 1 if a message with the \texttt{vmhost} key does not exist.

The following is an example of XML output from the \texttt{vm-dump-metrics} script:

```xml
<metrics>
  <metric type='real64' context='host'>
    <name>TotalCPUTime</name>
    <value>2694.3596</value>
  </metric>
  <metric type='uint64' context='host'>
    <name>PagedOutMemory</name>
    <value>0</value>
  </metric>
  <metric type='uint64' context='host'>
    <name>PagedInMemory</name>
    <value>0</value>
  </metric>
  <metric type='uint64' context='host'>
    <name>UsedVirtualMemory</name>
    <value>6747</value>
  </metric>
  <metric type='uint64' context='host'>
    <name>FreeVirtualMemory</name>
    <value>9817</value>
  </metric>
  <metric type='uint64' context='host'>
    <name>FreePhysicalMemory</name>
    <value>9817</value>
  </metric>
  <metric type='uint64' context='host'>
    <name>MemoryAllocatedToVirtualServers</name>
    <value>6747</value>
  </metric>
  <metric type='uint32' context='host'>
    <name>NumberOfPhysicalCPUs</name>
    <value>4</value>
  </metric>
  <metric type='string' context='host'>
    <name>HostSystemInfo</name>
    <value>ovm3</value>
  </metric>
  <metric type='string' context='host'>
    <name>VirtProductInfo</name>
    <value>Oracle VM 3</value>
  </metric>
  <metric type='string' context='host'>
    <name>VirtualizationVendor</name>
    <value>Oracle Corporation</value>
  </metric>
  <metric type='uint64' context='host'>
    <name>Time</name>
    <value>1360606566774</value>
  </metric>
  <metric type='string' context='host'>
    <name>HostName</name>
    <value>ovm3</value>
  </metric>
  <metric type='uint64' context='vm' id='0' uuid='0004fb00-0006-0000-d72b-647e20a85939'>
    <name>PhysicalMemoryAllocatedToVirtualSystem</name>
    <value>1024</value>
  </metric>
  <metric type='uint64' context='vm' id='0' uuid='0004fb00-0006-0000-d72b-647e20a85939'>
    <name>ResourceMemoryLimit</name>
    <value>1024</value>
  </metric>
</metrics>

Querying the Oracle VM Guest Additions Daemon Directly

As an alternative to using the `vm-dump-metrics` script, you can query `ovmd` to view the message that contains the metrics about the Oracle VM Server host, as follows:

```bash
# ovmd -g vmhost
com.sap.host.PagedInMemory=0;com.sap.host.PagedOutMemory=0;com.sap.host.PageRates=0;
com.sap.vm.uuid=0004fb00-0006-0000-d72b-647e20a85939;com.sap.host.HostName=ovm3;
com.sap.host.HostSystemInfo=ovm3;com.sap.host.NumberOfPhysicalCPUs=4;com.sap.host.NumCPUs=4;
com.sap.host.TotalPhyMem=16383;com.sap.host.UsedVirtualMemory=6747;
com.sap.host.MemoryAllocatedToVirtualServers=6747;com.sap.host.FreeVirtualMemory=9817;
com.sap.host.FreePhysicalMemory=9817;com.sap.host.TotalCPUTime=381175.97;
com.sap.host.Time=136060687997;com.sap.vm.PhysicalMemoryAllocatedToVirtualSystem=1024;
com.sap.vm.ResourceProcessorLimit=1;
```

For more information about the Oracle VM Guest Additions daemon, `ovmd`, see Chapter 8, *Installing and Using the Oracle VM Guest Additions*. 
Chapter 10 Converting Physical Hosts to Virtual Machines

Converting hosts involves creating *hardware virtualized guest* images from existing physical computers. This chapter explains how to use the Physical to Virtual (P2V) conversion utility to convert hosts.

10.1 Introduction to the P2V Utility

The P2V utility lets you convert the operating system and application software on a computer to an Oracle VM *hardware virtualized guest* image. The P2V utility is included on the Oracle VM Server ISO image.

Requirements for Using the P2V Utility

- The host operating system that you are converting must be supported as a guest operating system by Oracle VM. See the Oracle VM Release Notes for a list of the supported guest operating systems.
- The *host computer* must have a CPU that supports PAE (Physical Address Extension).
- The P2V utility included with Oracle VM Release 3.4 applies to 64-bit operating systems only.

Conversion Process Overview

You can run the P2V utility interactively or as an automated process using a kickstart configuration file.

To use the P2V utility, you boot from the Oracle VM Server ISO on the physical computer you want to convert to a hardware virtualized guest. The P2V utility then creates a *virtual machine* configuration file (*vm.cfg*) and creates raw *virtual disk* images from the disks on the computer.

The first four virtual disk images are created as IDE disks (hda, hdb, hdc, and hdd) on the guest, using the original disk names. Up to seven additional disks are created as SCSI devices (sda, sdb, sdc, and so on).

The following is an example of disk entries in the *vm.cfg* file:

```plaintext
disk = ['file:/System-sda.img,hda,w',
   'file:/System-sdb.img,hdb,w',
   'file:/System-sdc.img,hdc,w',
   'file:/System-sdd.img,hdd,w',
   'file:/System-sde.img,sda,w',
   'file:/System-sdf.img,sdb,w',
   'file:/System-sdg.img,sdc,w',
   'file:/System-sdh.img,sdd,w',
   'file:/System-sdi.img,sde,w',
   'file:/System-sdj.img,sdf,w',
   'file:/System-sdk.img,sdg,w',
]
```

Note

Oracle VM Manager limits virtual machines with the HVM domain type to a maximum of four virtual disks. In this case, if the *vm.cfg* file has more than four disk entries, then Oracle VM Manager imports only the first four virtual disks.

At the end of the conversion process, the P2V utility starts a web server that hosts the *vm.cfg* file and virtual disk file(s). You can then import the hardware virtualized guest into Oracle VM Manager as a virtual machine template.

10.2 Converting Hosts in Interactive Mode

To convert the operating system and applications on a physical computer to a hardware virtualized guest with the P2V utility, complete the following steps:
Converting the Host with the P2V Utility

Before you begin, burn the Oracle VM Server ISO image to bootable physical media, such as a DVD-ROM.

1. Insert the Oracle VM Server installation media into the optical disc drive of the computer you want to image.

2. Change the boot order to start from the optical disc drive in the BIOS or UEFI settings.

3. Boot the computer with the Oracle VM Server installation media.

   The Oracle VM Server boot screen displays.

4. At the **boot**: prompt, enter **p2v** and then press **Enter**.

   Press the **<ENTER>** key to begin the installation process.
   - To perform a physical to virtual conversion type **p2v** and press the **<ENTER>** key.

   The Oracle VM Server installer initializes. The first step in the conversion process is for the network manager to configure the network interface.

   • If the host has one network interface, the network manager automatically configures it.

   • If the host has two or more network interfaces, the network manager prompts you to select one network interface and then automatically configures it.

   • If the network manager cannot successfully configure the network interface, you are prompted to configure TCP/IP settings.

5. If prompted, configure the TCP/IP settings as appropriate.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dynamic IP configuration</td>
<td>Uses the Dynamic Host Configuration Protocol (DHCP) network service to automatically assign an IPv4 address to the hardware virtualized guest and retrieve DNS settings.</td>
</tr>
<tr>
<td>(DHCP)</td>
<td></td>
</tr>
<tr>
<td>Manual configuration</td>
<td>Lets you specify the following:</td>
</tr>
<tr>
<td></td>
<td>• IPv4 address for the hardware virtualized guest.</td>
</tr>
<tr>
<td></td>
<td>• IP address of the gateway server for your network.</td>
</tr>
<tr>
<td>Enable IPv6 support</td>
<td>Enables Internet Protocol Version 6 (IPv6) in the network interface.</td>
</tr>
<tr>
<td>Automatic</td>
<td>Uses the DHCP network service to automatically assign an IPv6 address to the hardware virtualized guest and retrieve DNS settings.</td>
</tr>
<tr>
<td>Automatic, DHCP only</td>
<td>Uses the DHCP network service to automatically assign an IPv6 address for the hardware virtualized guest.</td>
</tr>
<tr>
<td>Manual configuration</td>
<td>Lets you specify the following:</td>
</tr>
<tr>
<td></td>
<td>• IPv6 address for the hardware virtualized guest.</td>
</tr>
</tbody>
</table>
6. After the network interface is configured, you are prompted to test the media for errors. Do one of the following:
   • Select **OK** and then press **Enter** to test the bootable media for errors.

   ![Note]
   **Note**
   You must reboot after the test is complete.

   • Select **Skip** and press **Enter** to continue without testing the bootable media.

   The disk selection screen displays.

7. Select the disk partition(s) on the computer to include in the guest image.

8. Select **OK** and then press **Enter**.

   The virtual machine parameters screen displays.
9. Specify values for each parameter as appropriate.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VM name</td>
<td>Specifies a name for the virtual machine.</td>
</tr>
<tr>
<td>VM Memory (in MB)</td>
<td>Specifies the amount of RAM, in megabytes, to allocate to the virtual machine when it is running. The amount of RAM that you specify will be requested from the host operating system. For this reason, it must be available or made available as free memory on the host when attempting to start the virtual machine and will not be available to the host while the virtual machine is running.</td>
</tr>
<tr>
<td>Virtual CPUs</td>
<td>Specifies the number of CPU cores to allocate to the virtual machine.</td>
</tr>
<tr>
<td>Console Password</td>
<td>Specifies a password for the virtual machine console.</td>
</tr>
<tr>
<td>Confirm console password</td>
<td>Verifies the console password.</td>
</tr>
</tbody>
</table>

10. Select **OK** and then press **Enter**.

A secure web server (HTTPS) starts. The IP address of the computer and port number where the web server is available displays.

```
Starting web server
HTTPS web server is running on 192.168.1.13 port 443...
```

You can now access the `vm.cfg` and virtual disk(s) that the P2V utility created on the web server. Proceed to Section 10.4, “Importing Guests as Virtual Machine Templates to Oracle VM Manager”.

### 10.3 Converting Hosts Silently with a Kickstart File

To convert physical hosts to a **guest** image silently, you use a kickstart file to pass parameters to the P2V utility.

The following steps provide a high-level overview of how to convert hosts silently:
1. Create a P2V kickstart file and copy it to your kickstart server.

2. Insert the Oracle VM Server installation media into the optical disc drive of the computer you want to image.

3. Change the boot order to start from the optical disc drive in the BIOS or UEFI settings.

4. Boot the computer with the Oracle VM Server installation media.

   The Oracle VM Server boot screen displays.

5. At the `boot` prompt, enter the following:

   ```
   # mboot.c32 xen.mb.efi --- vmlinuz p2v ksdevice=9C:B6:54:82:15:AC
   ks=http://example.com/mypath/ks.cfg --- initrd.img
   ```

   Where:
   - `ksdevice` specifies the network interface to use.
   - `ks` is the path to the P2V kickstart file.

   The P2V utility begins the conversion process. If there are any missing parameters in the kickstart file, you are prompted to enter them.

   When the conversion process completes, you can import the hardware virtualized guest into Oracle VM Manager as a virtual machine template. See Section 10.4, “Importing Guests as Virtual Machine Templates to Oracle VM Manager”.

### Considerations for Using a Kickstart File

Before you attempt to convert hosts with a kickstart file, you should consider the following:

- The P2V utility converts disks on the computer to virtual disk images. The virtual disk images are created as IDE disks (hda, hdb, hdc, hdd, and so on) on the guest, using the original disk names. When you use a P2V kickstart file, up to four disks are automatically deployed in the guest. Any extra disks are converted and added to the guest configuration file (`vm.cfg`) but are not deployed in the guest.

   To deploy the additional disks in the guest, edit the guest configuration file to remove the comments from the disk entries and map the additional disks to SCSI device names; for example, sda, sdb, and sdc. The boot disk must always be mapped to device hda. Any files on the guest that contain references to these devices must also be changed; for example, the `/etc/fstab` file might contain references to `/dev/hda1`, `/dev/sda1`, and so on.

- At least one network interface must use DHCP so that the computer on which the P2V utility is running can read the kickstart file over the network.

- If you want the P2V utility web server to listen using a network interface other than the one that initiates the kickstart session, specify the network configuration for that network interface in the kickstart file.

### P2V Kickstart Parameters

To converting hosts with a kickstart file, you must specify parameters at the boot prompt and in a P2V kickstart file.

At the boot prompt, you must specify parameters as follows:

```
# P2V Kickstart Parameters

## Boot Parameters

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>p2v</strong></td>
<td>Loads the P2V conversion utility.</td>
</tr>
<tr>
<td><strong>ks=ksfile</strong></td>
<td>Specifies the name and location of a P2V kickstart file.</td>
</tr>
</tbody>
</table>
| **ksdevice=value** | Specifies the network interface to use. You can set one of the following values:  
- The device name of the interface, for example: *eth0*  
- The MAC address of the interface, for example: *9C:B6:54:82:15:AC*  
- The keyword *link*, which uses the first active network interface found on the system.  
- The keyword *bootif*, which uses the interface that the system used to boot from a PXE server.  
- The keyword *ibft*, which uses the MAC address of the interface specified by the iSCSI Boot Firmware Table (iBFT) in the system BIOS or firmware. |

## Kickstart File Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>p2v</strong></td>
<td>Indicates the kickstart file is intended to automate a P2V conversion. It accepts no parameters.</td>
</tr>
<tr>
<td><strong>target --ovmmanager</strong></td>
<td>Sets the end destination for the guest image. Sets the P2V utility to operate in HTTPS server mode to transfer the guest image to a running instance of Oracle VM Manager.</td>
</tr>
</tbody>
</table>
| **diskimage option ...** | Denotes a disk to be included in the guest image. The P2V utility uses device mapper-based snapshotting to copy the disk as a system-*_.img file on the target computer. There may be multiple diskimage directives in a P2V kickstart file, each resulting in a disk image in the guest image. The --device parameter must always be used with the diskimage directive to indicate which device should be imaged.  
  
The *option* parameter is one or more of the following:  
  
  - **--device path**  
    - The device to image. *path* must be the full path to the device. For example:  
      
      ```bash
      diskimage --device /dev/sda
      ```  
  
  - **--type { IDE | SCSI | LVM | MDRAID }**  
    - Sets the type of disk. Must be one of *IDE, SCSI, LVM, or MDRAID*. Devices /dev/hda, /dev/hdb, /dev/hdc, and /dev/hdd should be *IDE*. Devices /dev/sd[a-zz] should be *SCSI*. A  
  |
P2V Kickstart Parameters

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>logical volume should be LVM. Devices /dev/md[a-zz] should be MDRAID. For example:</td>
<td>diskimage --device /dev/hda --type IDE</td>
</tr>
<tr>
<td>network option ...</td>
<td>Configures network information for the computer.</td>
</tr>
<tr>
<td>The option parameter is one or more of the following:</td>
<td></td>
</tr>
<tr>
<td>--bootproto { dhcp</td>
<td>bootp</td>
</tr>
<tr>
<td>Sets the method by which the network configuration is determined. Must be dhcp, bootp, or static. The default is dhcp. bootp and dhcp are treated as the same.</td>
<td></td>
</tr>
<tr>
<td>dhcp uses a DHCP server to obtain the networking configuration, for example:</td>
<td></td>
</tr>
<tr>
<td>network --bootproto dhcp</td>
<td></td>
</tr>
<tr>
<td>static requires all the necessary networking information. As the name implies, this information is static and is used during and after the installation. The entry for static networking is more complex, as you must include all network configuration information on one line. You must specify the IP address, netmask, gateway, and nameserver, for example:</td>
<td></td>
</tr>
<tr>
<td>network --bootproto static --ip 10.0.2.15 --netmask 255.255.255.0 --gateway 10.0.2.254 --nameserver 10.0.2.1</td>
<td></td>
</tr>
<tr>
<td>The static method has the following restrictions:</td>
<td></td>
</tr>
<tr>
<td>• All static networking configuration information must be specified on one line; you cannot wrap lines using a backslash.</td>
<td></td>
</tr>
<tr>
<td>• You can only specify one nameserver.</td>
<td></td>
</tr>
<tr>
<td>--ip ipaddress</td>
<td></td>
</tr>
<tr>
<td>The IP address for the computer.</td>
<td></td>
</tr>
<tr>
<td>--gateway ipaddress</td>
<td></td>
</tr>
<tr>
<td>The IP address for the default gateway.</td>
<td></td>
</tr>
<tr>
<td>--nameserver ipaddress</td>
<td></td>
</tr>
<tr>
<td>The IP address for the primary nameserver.</td>
<td></td>
</tr>
<tr>
<td>--netmask netmask</td>
<td></td>
</tr>
<tr>
<td>The netmask for the computer.</td>
<td></td>
</tr>
<tr>
<td>vm_options option ...</td>
<td>Sets the configuration options for the guest.</td>
</tr>
<tr>
<td>The option parameter is one or more of the following:</td>
<td></td>
</tr>
</tbody>
</table>
### P2V Kickstart File Example

The following provides an example of a P2V kickstart file:

```bash
p2v
target --ovmmanager
network --device eth0 --bootproto dhcp
diskimage --device /dev/sda --type IDE
vm_options --name myVM --mem 2048 --vcpus 2 --consolepasswd password
```

### 10.4 Importing Guests as Virtual Machine Templates to Oracle VM Manager

After the P2V utility successfully converts a physical host to a hardware virtualized guest, you can import the guest as a virtual machine template into Oracle VM Manager.

You must ensure that the `vm.cfg` file and virtual disk(s) reside at a location where you can import them before you attempt to import the hardware virtualized guest as a virtual machine template.

The web server that hosts the `vm.cfg` and virtual disk(s) uses port 443. You can import the files directly into an Oracle VM repository with Oracle VM Manager. However, you must ensure that the Oracle VM Server that is designated as the administration server for that repository can access the web server on port 443. Alternatively, you can download the `vm.cfg` and virtual disk(s) from the web server and then host them at a location that Oracle VM Server can access.

**Note**

The web server provides a serial HTTP connection. For this reason, multiple requests to import guests as virtual machine templates are issued sequentially. For example, if you start a second download while another download is in progress, the second download does not start until the first download is complete.

1. Open a browser and navigate to the location of the web server that is hosting the `vm.cfg` and virtual disk(s); for example,
Importing Guests as Virtual Machine Templates to Oracle VM Manager

https://192.168.1.13/

The browser displays a directory listing of the files that the P2V utility created.

**Directory listing for /**

- catalog
- cgi-bin/
- MANIFEST
- System-sda.img@
- vm.cfg

2. Copy the URLs for the `vm.cfg` file and `*.img` file(s).

3. Import the files into Oracle VM Manager as a virtual machine template.
   
   a. Log in to Oracle VM Manager.
   
   b. Click the **Repositories** tab and then select the repository in which to store the template.
   
   c. Select **VM Templates** in the navigation tree.
   
   d. Select **Import VM Template** from the toolbar in the management pane.
   
   e. Specify the URLs for the `vm.cfg` file and `*.img` file(s) as separate lines in the **VM Template URLs** pane.
   
   f. Click **OK** to import the files.

Refer to the Oracle VM Manager Online Help for more information about importing virtual machine templates.

The hardware virtualized guest is available in the repository as a virtual machine template.

The hardware virtualized guest must have a unique network configuration. For this reason, you should configure a new network device and ensure that it is detected before you start the virtual machine that you
created with the P2V utility. If you use the same network configuration as the original computer, a network clash might occur because two computers on the network have the same IP and MAC addresses.

After you successfully import the hardware virtualized guest as a virtual machine template, press **Control+C** to interrupt the P2V utility on the host computer. You can then remove the Oracle VM Server bootable media from the drive and restart the computer.
Chapter 11 Backing up and Restoring Oracle VM Components

This chapter gives you the basic information required to back up and restore Oracle VM Manager, the database repository, and virtual machines.

Oracle does not recommend backing up Oracle VM Servers as no critical data is contained on them. Instead of backing up and recovering an Oracle VM Server, in the event of a failure, simply delete it from Oracle VM Manager, reinstall the Oracle VM Server software if required, and rediscover it.

For a more thorough discussion on backing up and restoring the various entities that comprise Oracle VM, see the Oracle VM 3: Backup and Recovery Best Practices Guide at:

http://www.oracle.com/technetwork/server-storage/vm/overview/index.html

11.1 Backing up and Restoring Oracle VM Manager

This section contains information about how to manually back up and restore Oracle VM Manager, including the database repository.

From a high level, the steps to manually backup Oracle VM Manager are as follows:

1. Make a copy of the Oracle VM Manager configuration file.

   See Section 11.1.1, “Backing up the Oracle VM Manager Configuration File” for more information on backing up the Oracle VM Manager configuration file.

2. Back up the Oracle VM Manager database.

   Note that the Oracle VM Manager database is backed up automatically every 24 hours using the MySQL Enterprise Backup utility, but it is also possible to perform a manual backup.

   See Section 11.1.2, “Backing up the MySQL Database Repository” for more information on Oracle VM Manager MySQL database backup and restore facilities.

11.1.1 Backing up the Oracle VM Manager Configuration File

To back up Oracle VM Manager, you should make a copy of the Oracle VM Manager configuration file located at:

/u01/app/oracle/ovm-manager-3/.config

This configuration file contains database connection information, ports, and the Oracle VM Manager UUID. The following is an example of the configuration file structure:

```
DBTYPE=MySQL
DBHOST=localhost
SID=ovs
LSNR=46500
OVSSCHEMA=ovs
APEX=None
WLSADMIN=weblogic
OVSAUTH=_admin
COREPORT=54321
UUID=uuid
BUILDID=x.x.x.xxx
```

The following table describes the properties and values in the configuration file:
### Backing up the MySQL Database Repository

This section describes the Oracle VM Manager MySQL backup facility.

As of Oracle VM Manager Release 3.2.1, backups of the local MySQL database are performed automatically. Backups are stored within `/u01/app/oracle/mysql/dbbackup` by default, and are rotated regularly so that only the most recent backups are stored at any point in time. Backups make use of the MySQL Enterprise Backup utility. See [http://www.mysql.com/products/enterprise/backup.html](http://www.mysql.com/products/enterprise/backup.html) for more information on the MySQL Enterprise Backup utility.

The MySQL Enterprise Backup package is installed as a dependency during the installation of Oracle VM Manager. On Oracle Linux systems this is handled by installing `meb-version_number.x86_64.rpm`.

On x86 systems, backup configuration options are defined in `/etc/sysconfig/ovmm` on the Oracle VM Manager host.

To configure the default path used to store MySQL database backup files, locate the following line:

```
DBBACKUP=/u01/app/oracle/mysql/dbbackup
```

**Note**

This path can be changed to an alternate location if you need to cater to disk space requirements.

The default path for the `mysqlbackup` binary is specified in the following line:

```
DBBACKUP_CMD=/opt/mysql/meb-x.x/bin/mysqlbackup
```

**Warning**

This path is made explicit for the purposes of handling future updates to the MySQL Enterprise Backup package. It should not be changed.

Configuration options such as how frequently the automated database backup facility should run and how many backups should be kept through rotations, are stored within the database itself. These parameters...
can be set using either the Oracle VM Manager Web Interface or the Oracle VM Manager Command Line Interface. For more information on how to set these parameters, please refer to Preferences section in the Oracle VM Manager Online Help and the setDbBackupConfig in the Oracle VM Manager Command Line Interface User's Guide.

11.1.2.1 Contents of the Backup Directory

The MySQL database backup directory has the following naming convention:

AutoFullBackup-MMDDYYYY_hhmmss.

The backup directory contains the following:

- AutoBackup.log, which contains information about the events that took place during the backup process.
- A copy of the MySQL configuration file.
- datadir directory that contains the binary log for the database.
- meta directory that contains files specific to the MySQL Enterprise Backup process.
- MBI image file for the database that is backed up

11.1.2.2 Configuring Backup Interval and Rotation

You can set the frequency of MySQL database backups as well as the number of database backups that Oracle VM Manager retains. See the Preferences section in the Oracle VM Manager Online Help for more information.

11.1.2.3 Backing Up the MySQL Database Manually

It is possible to manually initiate a backup. This is usually done when performing an upgrade of Oracle VM Manager. While it is possible to invoke the mysqlbackup utility directly, it is recommended that you use the backup script at /u01/app/oracle/ovm-manager-3/ovm_tools/bin/BackupDatabase.

The following is an example of this script:

```bash
#!/u01/app/oracle/ovm-manager-3/ovm_tools/bin/BackupDatabase -w
Enter your OVM Manager username: admin
Enter your OVM Manager password:
INFO: Backup job starting with destination:
   /u01/app/oracle/mysql/dbbackup/ManualBackup-time_stamp
   Job Id = 'Start Backup to: ManualBackup(ID)
   Uri: https://localhost:7002/ovm/core/wsapi/rest/Job/ID'
   Job Name = 'Start Backup to: ManualBackup'
INFO: Backup job finished
```

By default, the backup script stores the backup as a manual backup, to avoid the rotation that takes place for automatic backups.

The preceding example uses the -w command-line switch to force the backup script to wait until the backup job is complete. This option is useful if you need to capture potential error messages, but it also causes the script to wait until the job either completes or exits due to an error. If you do not use the -w command-line switch, you should check the status of the backup job within the Oracle VM Manager Web Interface or Oracle VM Manager Command Line Interface to determine whether or not the job completes successfully. You can get a full list of supported options for this command with the -h command-line switch.
Oracle VM Manager Backup and Restore Troubleshooting

Note

The backup script assumes that you are using a CA-signed SSL certificate within a production environment. Using a self-signed certificate is not recommended and may result in an error when you run the script. It is possible to override SSL verification by using the `--insecure` command-line parameter, however this may compromise the security of the operation and is not recommended. A better approach to resolving any SSL verification error, is to install an SSL certificate signed by a recognized CA, as described in Section 2.2.6, “Changing the Default SSL Certificate”.


11.1.3 Oracle VM Manager Backup and Restore Troubleshooting

If you are experiencing problems with Oracle VM Manager, do the following:

1. Perform a database restore. See Section 11.1.4, “Restoring Oracle VM Manager” for more information.

   Provided that you have a good backup in your archive, you should be able to revert back to it. To check for a recent database backup, on the Oracle VM Manager host, run the following command:

   ```bash
   ls -ltr /u01/app/oracle/mysql/dbbackup/
   ```

   If a backup exists, you can proceed with the steps documented in Section 11.1.4, “Restoring Oracle VM Manager”.

   Note

   You can also refer to [Doc ID 2405023.1](http://support.oracle.com/knowledge/tnQc7NopE7d5wN/owId7NopE7d5wN) in the Oracle Support Knowledge Base for information about restoring the Oracle VM Manager database.

   There is a check completed before each backup is run to determine if the database can be backed up. If the database consistency check fails, automatic backups are no longer generated. For more information, see [Doc ID 2060953.1](http://support.oracle.com/knowledge/tnQc7NopE7d5wN/owId7NopE7d5wN) in the Oracle Support Knowledge Base.

2. If you do not have a good backup of the database or if you have other database corruption issues, rebuild the database. See Section 11.1.5, “Restoring Oracle VM Manager If You Have No Database Backup”

   Also, see [Doc ID 2038168.1](http://support.oracle.com/knowledge/tnQc7NopE7d5wN/owId7NopE7d5wN) in the Oracle Support Knowledge Base for additional information about regenerating the Oracle VM Manager database.

11.1.4 Restoring Oracle VM Manager

To restore Oracle VM Manager, and the Oracle VM Manager database schema from a backup, do the following:

1. First, if you need to reinstall or upgrade Oracle VM Manager, use the Oracle VM Manager installation media to perform an install or upgrade of the software on your server. See [Installing Oracle VM Manager](http://docs.oracle.com/cd/E84363_01/vm.3.2.0.0/install/INSTALL-howto.html) for information on how to perform the installation. See [Upgrading Oracle VM Manager](http://docs.oracle.com/cd/E84363_01/vm.3.2.0.0/upgrade/UPGRADE-howto.html) for information on how to perform the upgrade.

   You should perform the install using the `runInstaller.sh --uuid uuid` command and provide the UUID from the previous manager installation you created a backup from. The UUID can be found in the Oracle VM Manager configuration file.
Restoring Oracle VM Manager

**Note**

The Oracle VM Manager UUID is also persisted in the `/etc/sysconfig/ovmm` file on Oracle Linux, and in the `/etc/opt/ovmm` file on Oracle Solaris. If the system disk of the server on which you are installing or restoring Oracle VM Manager was not wiped entirely, the existing UUID is still present and will be detected when running the installer.

- The `--uuid` option on Oracle Linux overrides this existing UUID. Oracle Solaris users must use the shortened form of this option: `-u`.

- If no UUID is present in `/etc/sysconfig/ovmm`, the `--uuid` option adds the UUID to the file on Oracle Linux. On Oracle Solaris, the `--u` option adds the UUID to `/etc/opt/ovmm` if the UUID is not present in this file.

An example install command syntax for Oracle Linux is as shown in this example:

```
# ./runInstaller.sh --uuid 0004FB000000100002CB7F2DBFA8D8
```

When the Oracle VM Manager installer prompts for installation information, reuse the same usernames for the database schema, Oracle WebLogic Server and Oracle VM Manager administration user, as set out in the backup of the Oracle VM Manager configuration file.

If possible, you should reuse the same passwords that existed for Oracle VM Manager prior to reinstallation, to avoid problems restarting the Oracle VM Manager service after Oracle VM Manager has been restored from backup. If you intend to change these passwords, do so after you have completed the restore operation.

Should you use a new password during reinstallation, you are unable to start the Oracle VM Manager service after the database has been restored. To rectify this situation, you must manually reset the passwords for the `ovs` and `appfw` users in the MySQL database. This can be achieved using the `mysqladmin` tool.

2. After installation, reinstallation or upgrade, stop the Oracle VM Manager Command Line Interface, Oracle VM Manager, and the database before you restore the backup. On Linux:

```
# /sbin/service ovmcli stop
# /sbin/service ovmm stop
# /sbin/service ovmm_mysql stop
```

3. To initiate the database restore, as the `oracle` user, use the `RestoreDatabase` command located in `/u01/app/oracle/ovm-manager-3/ovm_tools/bin`, for example:

```
# su - oracle
$ bash /u01/app/oracle/ovm-manager-3/ovm_tools/bin/RestoreDatabase.sh ManualBackup-time_stamp_ID
```

The `RestoreDatabase` script expects the name of the directory for a particular backup directory as described in Section 11.1.2.1, "Contents of the Backup Directory". You do not need to specify the full path to the backup directory as this is already specified in the `DBBACKUP` variable.

The `RestoreDatabase` script prompts you to remove existing database directories and their contents so that the database restore operation can complete successfully. You must confirm that it is safe to delete this data before the script can proceed. If you opt not to delete this data, the script cannot continue until the data has been removed. It is recommended that you allow the script to perform this action rather than attempting to do this manually:
Before the database can be restored, the following database directories/files must be deleted:
appfw ibdata1 ib_logfile0 ib_logfile1 mysql ovs performance_schema

Are you sure it is safe to delete these directories/files now? [y,n] y
Deleting directory /u01/app/oracle/mysql/data/appfw
Deleting directory /u01/app/oracle/mysql/data/ibdata1
Deleting directory /u01/app/oracle/mysql/data/ib_logfile0
Deleting directory /u01/app/oracle/mysql/data/ib_logfile1
Deleting directory /u01/app/oracle/mysql/data/mysql
Deleting directory /u01/app/oracle/mysql/data/ovs
Deleting directory /u01/app/oracle/mysql/data/performance_schema
INFO: Applying logs to the backup snapshot...
INFO: Restoring the backup...
INFO: Restoring OVM keystores and certificates
INFO: Success - Done!
INFO: Log of operations performed is available at:
/u01/app/oracle/mysql/dbbackup/ManualBackup-time_stamp_ID/Restore.log

IMPORTANT:
As 'root', please start the OVM Manager database and application using:
service ovmm_mysql start; service ovmm start; service ovmcli start

Important
The RestoreDatabase script performs a version check to ensure that the database version matches the version of the database from which the backup was created. If there is a version mismatch, the script exits with a warning, as this action may render Oracle VM Manager unusable.

It is possible to override this version check by using the --skipversionchecks option when invoking the script. This option should be used with care as version mismatches may have undesirable consequences for Oracle VM Manager.

For example, database backups from an earlier 3.4.x release cannot be used in an Oracle VM Manager deployment at release 3.4.5 or later, due to database schema changes.

4. Restart the database and Oracle VM Manager, and the Oracle VM Manager Command Line Interface.
On Oracle Linux:

```
# /sbin/service ovmm_mysql start
# /sbin/service ovmm start
# /sbin/service ovmcli start
```

5. Because the certificates required to authenticate various components, such as the Oracle VM Manager Web Interface and Oracle VM Manager Command Line Interface, are regenerated during the new installation and the mappings for these are overwritten by the database restore, it is necessary to reconfigure the certificates used to authenticate these components.

Run the following script to reconfigure the Oracle WebLogic Server:

```
# export MW_HOME=/u01/app/oracle/Middleware
# /u01/app/oracle/ovm-manager-3/ovm_upgrade/bin/ovmkeytool.sh setupWebLogic
```

For more information on the ovnmkeytool.sh script, see Section 2.2.1, “Oracle VM Key Tool”.
6. If you moved Oracle VM Manager to a new host, you must generate a new SSL key as follows:

```bash
# /u01/app/oracle/ovm-manager-3/ovm_upgrade/bin/ovmkeytool.sh gensslkey
```

For more information on generating a new SSL key, see Section 2.2.5, “Generating a New SSL Key”.

7. Restart Oracle VM Manager and then run the client certificate configuration script, as follows:

```bash
# /sbin/service ovmm restart
# /u01/app/oracle/ovm-manager-3/bin/configure_client_cert_login.sh /path/to/cacert
```

Where `/path/to/cacert` is the absolute path to the CA certificate. You must provide the path to the CA certificate if you used a CA other than the default Oracle VM Manager CA to sign the SSL certificate.

The script requires that Oracle VM Manager is running, and prompts you for the administrator username and password that should be used to access Oracle VM Manager. The script makes changes that may require Oracle VM Manager to be restarted:

```bash
# /sbin/service ovmm restart
```

8. Within Oracle VM Manager go to the **Servers and VMs** tab and perform a **Refresh All** on your existing **server pools**. Refer to the Oracle VM Manager Online Help for more information on these options.

### 11.1.5 Restoring Oracle VM Manager If You Have No Database Backup

**Important**

The instructions provided here should be used as a last resort. You really must ensure that your backup strategy is adequate and that the database backups are available on storage that is suitable for this purpose. Typically, these backups should be stored on some form of network attached storage, preferably with a RAID that provides some form of mirroring. To change the backup path to a suitable location, see Section 11.1.2, “Backing up the MySQL Database Repository”.

If you have reinstalled Oracle VM Manager from scratch, using the `runInstaller.sh --uuid uuid` command and have provided the UUID from the previous manager installation, but you do not have a database backup, a certain level of recovery is possible based on the information stored on the Oracle VM Servers and in your attached storage. It is important that you follow a set order of actions to ensure that the server pools that your Oracle VM Servers are members of are able to be properly recovered. These steps are outlined as follows:

1. Discover one Oracle VM Server from each server pool.

2. Discover the storage that contains the server pool file system. Present it to the newly discovered Oracle VM Server. Refresh the storage.

3. Refresh the file system or physical disks that contain the server pool file system.

4. Refresh the file systems or physical disks that contain the repositories used by server pool. If you get an error, when refreshing a physical disk, similar to the following:

   ```
   OVMAPI_7281E Cannot perform operation on file system...
   ```

   then take ownership of the repositories and try to perform the physical disk refresh again.

5. Present the repositories to the Oracle VM Server.

6. Refresh the repositories.
7. Discover the remaining Oracle VM Servers in the server pool.

8. Refresh all Oracle VM Servers in the server pool to discover the virtual machines.

**11.1.6 Oracle WebLogic Server Backup and Restore**

In general, it is not necessary to perform a separate backup of the Oracle WebLogic Server component used by Oracle VM Manager, however in the instance that you have created separate Oracle WebLogic Server users to facilitate a number of different login credentials that can be used to access Oracle VM Manager you may need to perform your own backup of the Oracle WebLogic Server LDAP directory used for authentication. This is particularly important if you intend to upgrade Oracle VM Manager, as there is a possibility that any user credentials that have been manually configured within Oracle WebLogic Server may be lost during an update process.

Full documentation describing the Oracle WebLogic Server LDAP backup process and how to configure Oracle WebLogic Server LDAP backups can be found at:

http://docs.oracle.com/middleware/1221/wls/START/failures.htm#START162

In the Oracle VM context, LDAP data for Oracle WebLogic Server is stored in:

/u01/app/oracle/ovm-manager-3/domains/ovm_domain/servers/AdminServer/data/ldap

Based on the information provided in the Oracle WebLogic Server documentation, you can perform a full backup of this directory on your own schedule, or you can rely on Oracle WebLogic Server’s automated backups located in:

/u01/app/oracle/ovm-manager-3/domains/ovm_domain/servers/AdminServer/data/ldap/backup

If you choose to use the Oracle WebLogic Server backup service, you can change default backup parameters. See the **Configure backups for embedded LDAP servers** topic in the Oracle WebLogic Server online help.

**11.2 Backing up Virtual Machines**

There are a number of options you can use to take a back up of a virtual machine. This section discusses some of them and the pros and cons for each.

One of the main points that should be considered when backing up a virtual machine, is whether you can shut down the virtual machine during the back up. Backing up a running virtual machine allows the machine to be available for use, but does not allow for a back up that is consistent or easy to restore. Creating a back up of a running virtual machine is similar to taking a back up of a running database without putting the tablespaces in back up or read-only mode. The first couple of blocks you back up from a the virtual machine are likely to be out of sync with the last blocks of your back up. If and when you try to restore a back up taken from a running virtual machine, you may not be able to rebuild the machine due to disk errors.

You can install back up software in the virtual machine, for example Oracle Secure Backup. This allows you to safely back up a running virtual machine. The ease by which you can restore the virtual machine from the back up depends on the software used.

The following table discusses some virtual machine back up options, with some high level benefits and disadvantages of each method. This is not an exhaustive list of all the options that may be available.
## Table 11.1 Virtual Machine Backup Options

<table>
<thead>
<tr>
<th>Backup Option</th>
<th>Benefits</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install back up software in the virtual machine and back up to an external source.</td>
<td>Virtual machine can be running.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fine grained control of files backed up.</td>
<td></td>
</tr>
<tr>
<td>Create a back up of the virtual machine from the storage repository (see Repository Exports Perspective).</td>
<td>Consistent virtual disk status.</td>
<td>Virtual machine must be stopped.</td>
</tr>
<tr>
<td>Create a cold clone of the (stopped) virtual machine (see Clone a Virtual Machine or Template, then back up the clone from the storage repository (see Repository Exports Perspective).</td>
<td>Consistent virtual disk status.</td>
<td>Virtual machine must be stopped.</td>
</tr>
<tr>
<td>Create a hot clone of the (running) virtual machine (see Clone a Virtual Machine or Template, then back up the clone from the storage repository (see Repository Exports Perspective).</td>
<td>Virtual machine can be running.</td>
<td>Inconsistent virtual disk status. Virtual disks may need to be recovered using a disk repair utility. May cause data loss or corruption. Only available on OCFS2-based file systems (iSCSI or fibre channel-based storage). Should not be used for virtual machines running an Oracle Database (instead use the rman utility or similar).</td>
</tr>
<tr>
<td>Create a back up of the entire storage repository (see Repository Exports Perspective).</td>
<td>Back up all virtual machines at once.</td>
<td>Virtual machines must be stopped.</td>
</tr>
<tr>
<td></td>
<td>Consistent virtual disk status.</td>
<td></td>
</tr>
</tbody>
</table>

The two recommended strategies for backing up a virtual machine are to:

- Shut down the virtual machine and create a cold clone, then back up the clone files from the storage repository.
- Shut down the virtual machine and back up the virtual machine files from the storage repository.

These two options create a safe back up, with the virtual disks in a stable and consistent state. To restore the virtual machine, import the virtual machine into the storage repository (see Import Virtual Machine).
Chapter 12 Troubleshooting Oracle VM

This chapter describes how to troubleshoot common issues with Oracle VM.

For more information and support, see the following Oracle sites:

- My Oracle Support, http://support.oracle.com
- Oracle Virtualization Community, https://community.oracle.com/community/server_%26_storage_systems/virtualization
- For additional information on best practices regarding Oracle VM deployments, contact Oracle Support and refer to Document ID 1940756.1.

12.1 Capturing Diagnostic Information for Oracle VM

Oracle Support Services provide a script, vmpinfo3.sh, to collect diagnostic information from your Oracle VM environment for troubleshooting purposes. This script is installed with Oracle VM Manager in the following location:

/u01/app/oracle/ovm-manager-3/ovm_tools/support/vmpinfo3.sh

Syntax

./vmpinfo3.sh { --username=admin } [ listservers | servers=server1,server2,server3 ]

Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>{ --username=admin }</td>
<td>Specifies the user that runs the script. You should not specify a user other than the default Oracle VM Manager user, admin.</td>
</tr>
<tr>
<td>[ listservers ]</td>
<td>Lists all servers for which the script can collect diagnostic information. If you specify this option, the script displays the list of servers that the Oracle VM Manager owns and then exits. You must then run the script again to collect diagnostic information.</td>
</tr>
<tr>
<td>[ servers=server_list ]</td>
<td>Specifies at least one instance of Oracle VM Server for which you want to collect diagnostic information. Use this option to exclude servers in your environment or limit the diagnostic collection to certain servers only. Separate multiple server names with a comma.</td>
</tr>
</tbody>
</table>

Tip

It can take the script several minutes to collect diagnostic information across your Oracle VM environment. To save time, specify this option to include only the instances of Oracle VM Server for which issues might exist, especially if you have a large number of Oracle VM Server deployments.

Examples

To collect diagnostic information for your Oracle VM environment, including Oracle VM Manager and all of the owned Oracle VM Servers in the model, run:
To list the servers for which you can collect diagnostic information, run:

```
# ./vmpinfo3.sh --username=admin listservers
```

To collect diagnostic information for specific servers only, run:

```
# ./vmpinfo3.sh --username=admin servers=myserver1.example.com,myserver2.example.com
```

The script creates a tarball in the `/tmp` directory that contains log files, sosreports, and other diagnostic information such as details about the Oracle VM model.

When the script completes successfully, it displays the filename of the tarball, as in the following example:

```
=======================================================================================
Please send /tmp/vmpinfo3-3.x.y.z-time_stamp.tar.gz to Oracle OVM support
=======================================================================================
```

## 12.2 Troubleshooting Oracle VM Server

This section describes some problems you may encounter when using Oracle VM Server, and explains how to resolve them.

If you need to contact Oracle Support Services, you will be asked to supply the log files mentioned in this section. You may also be required to provide the exact version of each Oracle VM component. To find the version of Oracle VM Manager, click the Help menu, then About. To find the version of Oracle VM Server and Oracle VM Agent, see Control Domains Perspective in the Oracle VM Manager User's Guide.

### 12.2.1 Oracle VM Server Debugging Tools

If virtual machine creation fails, check the Oracle VM Server log files and use the command-line tools to help you find the cause of a problem. There are a number of useful command-line tools, important directories, and log files that you should check when troubleshooting problems with Oracle VM Server. This section discusses these tools and log files.

#### 12.2.1.1 Oracle VM Server Directories

The important Oracle VM Server directories you should check when troubleshooting problems with Oracle VM Server are listed in Table 12.1, “Oracle VM Server directories”.

<table>
<thead>
<tr>
<th>Directory</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>/etc/xen</code></td>
<td>Contains Oracle VM Server configuration files for the Oracle VM Server daemon and virtualized guests.</td>
</tr>
<tr>
<td><code>/etc/xen/scripts</code></td>
<td>Contains networking related scripts.</td>
</tr>
<tr>
<td><code>/var/log</code></td>
<td>Contains the following files:</td>
</tr>
<tr>
<td></td>
<td>• <code>ovs-agent.log</code>, log file for the Oracle VM Agent.</td>
</tr>
<tr>
<td></td>
<td>• <code>ovmwatch.log</code>, logs virtual machine life cycle events.</td>
</tr>
<tr>
<td></td>
<td>• <code>ovm-consoled.log</code>, logs remote VNC console access, and all communication with Oracle VM Manager.</td>
</tr>
</tbody>
</table>
12.2.1.2 Oracle VM Server Log Files

The Oracle VM Server log files you should check when troubleshooting problems with Oracle VM Server are listed in the following table:

Table 12.2 Oracle VM Server log files

<table>
<thead>
<tr>
<th>Log File</th>
<th>Directory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>xend.log</td>
<td>/var/log/xen/</td>
<td>Contains a log of all the actions of the Oracle VM Server daemon. Actions are normal or error conditions. This log contains the same information as output using the <code>xm log</code> command.</td>
</tr>
<tr>
<td>xend-debug.log</td>
<td>/var/log/xen/</td>
<td>Contains more detailed logs of the actions of the Oracle VM Server daemon.</td>
</tr>
<tr>
<td>xen-hotplug.log</td>
<td>/var/log/xen/</td>
<td>Contains a log of hotplug events. Hotplug events are logged if a device or network script does not start up or become available.</td>
</tr>
<tr>
<td>qemu-dm.pid.log</td>
<td>/var/log/xen/</td>
<td>Contains a log for each hardware virtualized guest. This log is created by the <code>qemu-dm</code> process. Use the <code>ps</code> command to find the <code>pid</code> (process identifier) and replace this in the file name.</td>
</tr>
<tr>
<td>ovs-agent.log</td>
<td>/var/log/</td>
<td>Contains a log for Oracle VM Agent.</td>
</tr>
<tr>
<td>osc.log</td>
<td>/var/log/</td>
<td>Contains a log for Oracle VM Storage Connect plug-ins.</td>
</tr>
<tr>
<td>ovm-consoled.log</td>
<td>/var/log/</td>
<td>Contains a log for the Oracle VM virtual machine console.</td>
</tr>
<tr>
<td>ovmwatch.log</td>
<td>/var/log/</td>
<td>Contains a log for the Oracle VM watch daemon.</td>
</tr>
</tbody>
</table>

12.2.1.3 Oracle VM Server Command Line Tools

The following table lists command line tools you can use when troubleshooting problems with Oracle VM Server:

Table 12.3 Oracle VM Server command line tools

<table>
<thead>
<tr>
<th>Command Line Tool</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>xentop</td>
<td>Displays real-time information about Oracle VM Server and domains.</td>
</tr>
<tr>
<td>xm dmesg</td>
<td>Displays log information on the hypervisor.</td>
</tr>
<tr>
<td>xm log</td>
<td>Displays log information of the Oracle VM Server daemon.</td>
</tr>
</tbody>
</table>

12.2.2 Using DHCP on Oracle VM Servers
It is recommended that you install Oracle VM Server on a computer with a static IP address. If you use DHCP to manage the IP address space in your environment, the DHCP server should be configured to map the server interface MAC addresses to specific IP assignments. This makes sure your host always receives the same IP address. The behavior of the Oracle VM Server host is undefined if used in an environment where your IP address may change due to DHCP lease expiry.

### 12.2.3 Cannot Use Certain Key Combinations When Connecting to Dom0 Console

Some server models and some client terminals are not ideally compatible with regard to special key combinations. For instance, on some HP servers, such as the HP DL380G4 (BIOS P51) server, the Alt-F2 key combination required to toggle to the login screen does not work for all terminal clients. Some terminal clients provide alternate key mappings, so it is worth checking the documentation of your selected terminal client to determine whether an alternative mapping is available.

If you are using the Windows PuTTY SSH client, you can press `Alt +` the right arrow key and `Alt +` the left arrow key to toggle the login screen, instead of the printed Alt-F2.

### 12.2.4 Storage Array LUN Remapping on Oracle VM Servers

Storage array LUN remapping is not supported by Oracle VM Servers. An Oracle VM Server must maintain the connections to a storage array's logical drive using the same LUN IDs. If a LUN is remapped, the following error may be printed in the Oracle VM Server's messages log:

```
Warning! Received an indication that the LUN assignments on this target have changed.
The Linux SCSI layer does not automatically remap LUN assignments.
```

To work around this issue:

- For Fibre Channel storage, reboot the Oracle VM Server. The new storage array LUN IDs are used.
- For iSCSI storage, restart the iscsi daemon on the Oracle VM Server to delete and restore all iSCSI target connections, for example:

```bash
# service iscsi restart
```

Alternatively, on the Oracle VM Server, log out and log in again to the target for which the LUN IDs have changed, for example:

```bash
# iscsiadm --mode node --logout ip_address iqn.xyz:1535.uuid

# iscsiadm --mode node --login ip_address iqn.xyz:1535.uuid
```

### 12.2.5 Tuning iSCSI Settings on Oracle VM Servers

In some cases, it is possible to run into limitations or bugs within a particular iSCSI implementation that may require you to tune your iSCSI settings for storage initiators on each of your Oracle VM Servers.

Typically this is required when you experience an IO lock on a LUN and an unexpected change in the kernel workload on the Oracle VM Server. You may also notice a dramatic increase in network traffic between the Oracle VM Server and the storage array. This particular case has been noted to occur on some ZFS appliances running Oracle Solaris 11 and is related to the Sun iSCSI COMSTAR port provider. The problem can usually be resolved by updating package versions, however if this is not an option you may tune your iSCSI settings on each Oracle VM Server that communicates with a SUN.COMSTAR target to enable flow control.

To tune iSCSI, on each Oracle VM Server, perform the following steps:
• Open `/etc/iscsi/iscsid.conf` in a text editor.

• Locate the section titled `iSCSI settings`.

• Change the value of the entry `node.session.iscsi.InitialR2T` to `yes`, and the value of the entry `node.session.iscsi.ImmediateData` to `no`.

• Save the file.

• Restart the iSCSI daemon by issuing the following command:

```
# service iscsid restart
```

**Note**
The preferred resolution to this issue is to update your software. Manual configuration of Oracle VM Server settings is not generally advisable, as changes may be lost during future updates.

### 12.2.6 Troubleshooting Clustered Server Pools Oracle VM Server for x86

There are some situations where removing an Oracle VM Server from a server pool may generate an error. Typical examples include the situation where an OCFS2-based repository is still presented to the Oracle VM Server at the time that you attempt to remove it from the server pool, or if the Oracle VM Server has lost access to the server pool file system or the heartbeat function is failing for that Oracle VM Server. The following list describes steps that can be taken to handle these situations.

• Make sure that there are no repositories presented to the server when you attempt to remove it from the server pool. If this is the cause of the problem, the error that is displayed usually indicates that there are still OCFS2 file systems present. See the `Repositories Perspective` section in the Oracle VM Manager Online Help for more information.

• If a pool file system is causing the remove operation to fail, other processes might be working on the pool file system during the unmount. Try removing the Oracle VM Server at a later time.

• In a case where you try to remove a server from a clustered server pool on a newly installed instance of Oracle VM Manager, it is possible that the file server has not been refreshed since the server pool was discovered in your environment. Try refreshing all storage and all file systems on your storage before attempting to remove the Oracle VM Server.

• In the situation where the Oracle VM Server cannot be removed from the server pool because the server has lost network connectivity with the rest of the server pool, or the storage where the server pool file system is located, a critical event is usually generated for the server in question. Try acknowledging any critical events that have been generated for the Oracle VM Server in question. See the `Events Perspective` section in the Oracle VM Manager Online Help for more information. Once these events have been acknowledged you can try to remove the server from the server pool again. In most cases, the removal of the server from the server pool succeeds after critical events have been acknowledged, although some warnings may be generated during the removal process. Once the server has been removed from the server pool, you should resolve any networking or storage access issues that the server may be experiencing.

• If the server is still experiencing trouble accessing storage and all critical events have been acknowledged and you are still unable to remove it from the server pool, try to reboot the server to allow it to rejoin the cluster properly before attempting to remove it again.

• If the server pool file system has become corrupt for some reason, or a server still contains remnants of an old stale cluster, it may be necessary to completely erase the server pool and reconstruct it from
Allocating Memory for Multiple Infiniband HCAs

12.2.7 Allocating Memory for Multiple Infiniband HCAs

Out of memory errors can occur when using multiple Infiniband host channel adapters (HCA) with the PCIe Scalable Interface (psif) driver for paravirtualized environments on Oracle VM Server. These out of memory errors occur because the psif driver requires a minimum 30 MB of memory for the driver itself in addition to 50 MB of memory for each interface instance. The default memory allocation for dom0 does not provide enough memory to support multiple interfaces.

To resolve the out of memory errors, you should increase the dom0 memory allocation for Oracle VM Server. See Section 1.6, “Changing the Memory Size of the Management Domain”.

The following is an example of an out of memory error that is written to /var/log/messages:

time_stamp hostname kernel: [ 1465.466059] Out of memory: Kill process 8106 (python) score 0 or sacrifice child
Connection to hostname closed.

12.2.8 Resolving Issue Where NIC Fails to Get IP Address if Configured for DHCP

In some cases, when you configure a network interface for Oracle VM Server to retrieve IP addresses via DHCP, and then bring up that interface, it cannot retrieve an IP address and the following error occurs:

Determining IP information for interface_name...
failed; no link present. Check cable?

This issue can be caused when the time it takes the network interface to come up is greater than the time set for the LINKDELAY environment variable.

To resolve this issue, set the value of the LINKDELAY to a value of 10 or higher in the /etc/sysconfig/network-scripts/ifcfg-eth* file, as in the following example:

DEVICE=eth3
BOOTPROTO=dhcp
HWADDR=00:00:00:00:00:00
ONBOOT=yes
LINKDELAY=10

12.3 Troubleshooting Oracle VM Manager

This section describes some problems you may encounter when using Oracle VM Manager, and explains how to resolve them.

12.3.1 Oracle VM Manager Log Files

Oracle VM Manager error messages are displayed in the user interface, in the Jobs tab, in the object's Events list and are also available in log files. Log files are stored in the following directory on the Oracle VM Manager host computer:

/u01/app/oracle/ovm-manager-3/domains/ovm_domain/servers/AdminServer/logs

Oracle VM Manager that you can use for troubleshooting are as follows:
### Oracle VM Manager Log Files

<table>
<thead>
<tr>
<th>Log file</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>access.log</td>
<td>Tracks HTTP access to the Web interface of the Oracle VM Manager and to the underlying Oracle WebLogic Server HTTP interface. This log can be used to track access and HTTP operations within Oracle VM Manager to help debug access issues and to audit access to the Oracle VM Manager.</td>
</tr>
<tr>
<td>AdminServer.log</td>
<td>Tracks events within the underlying Oracle WebLogic Server framework, including events triggered by Oracle VM Manager. This log can be used to track a variety of issues within Oracle VM Manager including TLS/SSL certificate issues, server availability issues, and any actions performed within Oracle VM Manager which are usually identifiable by searching for items containing the string <code>com.oracle.ovm.mgr</code>. Log in failures resulting from locked accounts (as opposed to incorrect credentials) are also in this file.</td>
</tr>
<tr>
<td>AdminServer-diagnostic.log</td>
<td>Tracks exceptions within the underlying Oracle WebLogic Server framework, including particular events triggered by Oracle VM Manager such as log in failures due to incorrect credentials. This log can be used to track Oracle VM Manager behavior that results in an exception or for log in failure, which can be tracked by searching for the string <code>An incorrect username or password was specified</code>.</td>
</tr>
</tbody>
</table>

Because log file format is determined by Oracle WebLogic Server, many of these files may be difficult to read. A log parsing tool is included with Oracle VM Manager to help extract useful information from the actual log files. The log parsing tool is named `OvmLogTool.py` and is located at:

```
/u01/app/oracle/ovm-manager-3/ovm_tools/bin
```

`OvmLogTool.py` can do the following things:

- Convert and combine all the AdminServer log files into one easier-to-read file.
- Create a filtered summary log file that only lists errors.
- Tail the AdminServer log, applying the filtering on the fly.

Usually analysis of the logs starts by generating an error summary log. The summary file can act as an index into the filtered file to investigate and analyze errors, providing you with time stamps an a shortened summary of each error that may need further investigation. To generate a summary log file, do the following:

```
# python OvmLogTool.py -s --o summary
processing input file: /u01/app/oracle/ovm-manager-3/domains/ovm_domain/servers/AdminServer/logs/AdminServer.log00001
processing input file: /u01/app/oracle/ovm-manager-3/domains/ovm_domain/servers/AdminServer/logs/AdminServer.log
```

This generates a file named `summary` in the local directory. You can use this to look for errors that occurred within Oracle VM Manager.

To get a full log of all events and errors within Oracle VM Manager you can do the following:

```
# python OvmLogTool.py --o filteredlog
processing input file: /u01/app/oracle/ovm-manager-3/domains/ovm_domain/servers/AdminServer/logs/AdminServer.log00001
processing input file: /u01/app/oracle/ovm-manager-3/domains/ovm_domain/servers/AdminServer/logs/AdminServer.log
```

This generates a file named `filteredlog` in the local directory. You can use this to look for all events that occurred within Oracle VM Manager.
Finally, you can use `OvmLogTool.py` to filter results on the fly while tailing the log:

```python
# python OvmLogTool.py -t
# tailing log file: /u01/app/oracle/ovm-manager-3/domains/ovm_domain/servers/AdminServer/logs/AdminServer.log
```

Use **Ctrl+C** to exit the program when you have finished tailing the log file.

### 12.3.2 Oracle VM Manager Web Interface Database Synchronization

The Oracle VM Manager Web Interface and the Oracle VM Manager Command Line Interface both use a representation of the Oracle VM data model to more quickly retrieve data objects, which optimizes the performance of Oracle VM Manager. The representation of the data model is saved to a separate database to the primary Oracle VM Manager database. This separate database relies on events from Oracle VM Manager to stay synchronized with the actual data model.

It is possible, in specific cases, for the representation of the data model to become out of sync with the actual data model. As a result, some objects in the Oracle VM Manager Web Interface do not reflect the actual environment. A typical scenario where this may happen is during a virtual machine clone operation that fails. During this process, the virtual machine is actually created within the data model and the database used by the user interface layer. If a part of the whole operation fails, Oracle VM Manager attempts to clean up and roll back, resulting in the virtual machine being removed from the data model. However, in this case, an event is not generated to notify that the clean up has succeeded, and the virtual machine information remains in the user interface database. The result is that the cloned virtual machine is still shown in the Oracle VM Manager Web Interface and the Oracle VM Manager Command Line Interface even though it does not actually exist in the environment.

The user interface database is not resynchronized automatically when the service is restarted, as this can take a long time for large environments. To force database resynchronization, you must create a file on the Oracle VM Manager host before restarting the service. The following instructions explain how to force resynchronization.

**Steps to resynchronize the Oracle VM Manager Web Interface database**

- You must access the shell of the Oracle VM Manager host, either directly or over SSH.
- Change user to the ‘oracle’ user, using `su`.
  ```bash
  # su - oracle
  ```
- Touch a file called `/tmp/.resyncUI` as the oracle user.
  ```bash
  $ touch /tmp/.resyncUI
  ```
  If you are unable to do this as the oracle user, then touch the file as any other user but ensure that its permissions are such that any other user can delete the file:
  ```bash
  # touch /tmp/.resyncUI
  # chmod 666 /tmp/.resyncUI
  ```
- Restart the Oracle VM Manager service as root:
  ```bash
  # service ovmm restart
  ```

### 12.3.3 Increasing the Memory Allocated to Oracle WebLogic Server

In environments that host thousands of virtual machines and where large data sets exist, performance issues can occur with Oracle VM Manager, such as garbage collection taking a long time or out of memory conditions arise. Likewise, Oracle VM Manager can generally be slow to respond and a significant
performance degradation occurs. To resolve these performance issues, you can increase the amount of memory that is allocated to Oracle WebLogic Server.

Note
You should not increase the memory allocation to the maximum limit that is available to the host server. As a guideline, you should leave at least 2GB available memory for the host operating system and other services.

To increase the memory allocated to Oracle WebLogic Server, do the following:

1. Start an ssh session to the Oracle VM Manager host computer as the root user.
2. Open the following file for editing: /etc/sysconfig/ovmm
3. Specify the amount of memory allocated to Oracle WebLogic Server as the value for the JVM_MEMORY_MAX property.

Note
The default is JVM_MEMORY_MAX=4096m.

4. Save and close /etc/sysconfig/ovmm.
5. Restart the Oracle VM Manager service.

```
# service ovmm restart
```

12.3.4 No File Systems Found When Searching a Storage Server

On storage servers that have a very large number of file systems available, the UI may time out while refreshing the list of available file systems, resulting in a No File Systems Available message. This usually means that the time out value is set too low for the number of file systems that the UI needs to refresh. To resolve this, change the settings for the Refresh Timeout Value in the Preferences Pane on the Tools and Resources tab in the Oracle VM Manager Web Interface to increase the timeout value.

See the Preferences section in the Oracle VM Manager Online Help for more information on Oracle VM Manager UI preferences.

12.3.5 Cannot Discover Servers to Oracle VM Manager Due To Time Differences

Oracle VM Manager uses certificate-based authentication to maintain secure communication with the Oracle VM Agent that runs on each Oracle VM Server instance. This means that the system time on each Oracle VM Server must be within the bounds of the certificate valid from and valid to timestamps, or certificate validity is challenged and Oracle VM Manager is unable to authenticate to the Oracle VM Agent.

In most instances, this is not a problem, since servers are automatically configured to use the Oracle VM Manager as an NTP server as soon as ownership is taken. However, during server discovery the Oracle VM Manager uses a password to perform its initial authentication against a server and to provide its certificate for ongoing communication. During this phase of discovery, a check is performed to ensure that the system time on the Oracle VM Server is within the bounds required for certificate authentication to take place. If this is not the case, discovery fails and an error message is returned:

```
OVMAPI_4024E: Cannot take ownership of server myserver5.virtlab.info because the date and time on the server are outside the valid range for the manager's SSL certificate.
```
The certificate is valid from 10/24/13 7:37 PM to 10/25/23 7:37 PM, but server's timestamp is 9/28/13 8:14 PM. Please verify the server's NTP and time settings.

In this situation, it is necessary that you access the affected Oracle VM Server directly and update its system time manually before attempting to rediscover the server using Oracle VM Manager. Once Oracle VM Manager has completed discovery and is able to take ownership of the server, its NTP configuration is updated automatically and it remains synchronized with the Oracle VM Manager host.

**12.3.6 Cannot Create a Clustered Server Pool on a Disk that already has an OCFS2 File System**

If you attempt to create a clustered server pool using a disk located on a storage device that already contains an OCFS2 file system, the Oracle VM Agent on the server detects the file system and refuses to overwrite it. This is normal behavior and protects you from accidentally setting up two OCFS2 file systems with matching UUIDs on the same disk, leading to instability and unexpected behavior.

If you are certain that the existing OCFS2 file system that is already present on the disk is no longer in use by any other server pool or repository, you can clean the disk by connecting to the Oracle VM Server and issuing the following command:

```
$ dd if=/dev/zero of=/dev/mapper/360a98000433468704234786f36394763 bs=1M count=256
```

Replace `/dev/mapper/360a98000433468704234786f36394763` with the correct path to the disk device where you are creating the new server pool cluster.

**Warning**

Using `dd` is data destructive. Make sure you are certain about the disk device name and that the OCFS2 file system that you are deleting is no longer in use. It is advisable to make backups of any data that exists on the disk that you are editing before proceeding. This operation should be performed by a skilled systems administrator.

**12.3.7 Cannot Create a Repository on a Device that has Partitions**

A repository cannot be hosted on a physical disk that has pre-existing partitions. If you attempt to create a repository on a disk that already has a partition, an error is generated notifying you that the backing device is not allowed to contain partitions. If you are intent on creating a repository on the selected disk, you must delete any pre-existing partitions. This may require you to directly access the Oracle VM Server where the disk is mounted and to manually remove the partition objects on the disk using the `fdisk` command. For example:

```
# fdisk /dev/sdb
```

```
WARNING: DOS-compatible mode is deprecated. It's strongly recommended to switch off the mode (command 'c') and change display units to sectors (command 'u').

Command (m for help): p
```

```
Disk /dev/sdb: 500.1 GB, 500107862016 bytes
255 heads, 63 sectors/track, 60801 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x0001e791

Device Boot Start End Blocks Id System
```

```
Device Boot Start End Blocks Id System
/dev/sdb0 0 0 0 0
```

```
Device Boot Start End Blocks Id System
/dev/sdb1 0 0 0 0
```

Replace `/dev/sdb0` and `/dev/sdb1` with the correct partition paths on the disk device where you are creating the new repository.
Removing Oracle VM Template Configuration Packages on Oracle Linux 5 Hosts

### 12.3.8 Removing Oracle VM Template Configuration Packages on Oracle Linux 5 Hosts

If you are running Oracle VM Manager on an Oracle Linux 5 host, removing all ovm-template-config related RPM packages in a single command results in an error and some packages are not successfully removed.

To resolve this, you must use two yum erase operations and ensure that ovm-template-config is removed last, as follows:

```bash
# yum erase ovm-template-config-authentication
  ovm-template-config-datetime
  ovm-template-config-firewall
  ovm-template-config-network
  ovm-template-config-selinux
  ovm-template-config-ssh
  ovm-template-config-system
  ovm-template-config-user
# yum erase ovmd libovmapi xenstoreprovider ovm-template-config
```

### 12.3.9 Unable to Manage Oracle VM Server for x86 at Release 3.2.10 or 3.2.11, and Oracle VM Agent for SPARC at Release 3.3.1

As of Oracle VM Release 3.4.5, Oracle VM Manager uses the TLS version 1.2 (TLSv1.2) protocol for all connections for security reasons. As a result, management of Oracle VM Server for x86 at Release 3.2.10 or 3.2.11, and Oracle VM Agent for SPARC at Release 3.3.1, is not possible by default. As a workaround, you must enable the TLSv1 protocol, which is less secure.

For instructions on how to do this, see **Enabling the TLS Version 1 Protocol**.

### 12.4 Troubleshooting Virtual Machines

The section contains information on known issues you may encounter when creating or using virtual machine, and explains how to resolve them.

#### 12.4.1 Setting the Guest’s Clock

---

/dev/sdb1               1        6528    52428800   83  Linux

Command (m for help): d
Partition number (1): l
Command (m for help): w

**Warning**

Using fdisk is data destructive. Make sure you are certain about the disk device name and partitions that you are deleting. It is advisable to make backups of any data that exists on the disk that you are editing before proceeding. This operation should be performed by a skilled systems administrator.

Usually, restarting the affected Oracle VM Server after performing these operations is advisable. In the case of an iSCSI disk, connections to targets need to be re-initiated. In all cases, the storage needs to be refreshed. Simply restarting the Oracle VM Server ensures that all necessary actions are performed.

Once the Oracle VM Server has restarted, you may attempt to recreate the repository.
Wallclock Time Skew Problems

Paravirtualized guests may perform their own system clock management, for example, using the NTPD (Network Time Protocol daemon), or the hypervisor may perform system clock management for all guests.

You can set paravirtualized guests to manage their own system clocks by setting the xen.independent_wallclock parameter to 1 in the /etc/sysctl.conf file. For example:

```
xen.independent_wallclock = 1
```

If you want to set the hypervisor to manage paravirtualized guest system clocks, set xen.independent_wallclock to 0. Any attempts to set or modify the time in a guest will fail.

You can temporarily override the setting in the /proc file. For example:

```
echo 1 > /proc/sys/xen/independent_wallclock
```

Note
This setting does not apply to hardware virtualized guests.

12.4.2 Wallclock Time Skew Problems

Additional parameters may be needed in the boot loader (grub.conf) configuration file for certain operating system variants after the guest is installed. Specifically, for optimal clock accuracy, Linux guest boot parameters should be specified to ensure that the pit clock source is utilized. Adding clock=pit ntp noupdate noptimer for most guest will result in the selection of pit as the clock source for the guest. Published templates for Oracle VM include these additional parameters.

Proper maintenance of virtual time can be tricky. The various parameters provide tuning for virtual time management and supplement, but do not replace, the need for an ntp time service running within guest. Ensure that the ntpd service is running and that the /etc/ntp.conf configuration file is pointing to valid time servers.

12.4.3 Mouse Pointer Tracking Problems

If your mouse pointer fails to track your cursor in a VNC Viewer session in a hardware virtualized guest, add the following to the Oracle VM Server configuration file located at /etc/xen/xend-config.sxp to force the device model to use absolute (tablet) coordinates:

```
usbdevice='tablet'
```

Restart the Oracle VM Server for the changes to take effect. You may need to do this for each Oracle VM Server in the server pool.

12.4.4 Cloning Virtual Machine from Oracle VM 2.x Template Stuck in Pending

When creating a virtual machine from an Oracle VM 2.x template, the clone job fails with the error:

```
That server pool has no servers that can run the VM.
```

This is caused by a network configuration inconsistency with the vif = ['bridge=xenbr0'] entry in the virtual machine's configuration file.

To resolve this issue, remove any existing networks in the virtual machine template, and replace them with valid networks which have the Virtual Machine role. Start the clone job again and the virtual machine clone is created. Alternatively, remove any existing networks in the template, restart the clone job, and add in any networks after the clone job is complete.
12.4.5 Hardware Virtualized Guest Stops

When running hardware virtualized guests, the QEMU process (qemu-dm) may have its memory usage grow substantially, especially under heavy I/O loads. This may cause the hardware virtualized guest to stop as it runs out of memory. If the guest is stopped, increase the memory allocation for dom0, for example from 512 MB to 768 MB. See Section 1.6, “Changing the Memory Size of the Management Domain” for information on changing the dom0 memory allocation.

12.4.6 Migrating Virtual Machines

You cannot migrate virtual machines on computers with hardware that is not identical. To migrate virtual machines, you must have hardware that is the same make and model and the CPU must be in the same CPU family.

Virtual machines can be live migrated between instances of Oracle VM Server that are at the same release or later. For virtual machines running on an x86 platform, a rule exception is generated if you attempt to live migrate a virtual machine to an Oracle VM Server with an earlier release than the Oracle VM Server where the virtual machine is running.

12.4.7 Recovering From A Failed Local Virtual Machine Migration

In the event where a virtual machine hosted on a local repository is live migrated and the migration source, or target, Oracle VM Server becomes unavailable during the migration, Oracle VM Manager attempts to perform a rollback of the operation. This rollback process brings the original version of the virtual machine back online on the source Oracle VM Server and then performs a cleanup operation on the target Oracle VM Server when it becomes available again. This cleanup process involves killing the paused virtual machine that may have been copied to the target Oracle VM Server and then cleaning the target repository of virtual disks, virtual machine configurations and temporary files. Finally a repository refresh is performed on the repository on the source server to ensure that everything is in order.

Before the cleanup operation is triggered, an event is created within Oracle VM Manager to indicate that the migration job has failed or been aborted and to track the rollback process. When the event is generated within Oracle VM Manager, it is set with a ‘WARNING’ status. The rollback process is generated as a set of up to three different jobs that are each given a timeout period of 15 minutes, and which are triggered to attempt to run every 10 seconds. If these jobs succeed, Oracle VM Manager acknowledges the event. If the jobs all timeout, Oracle VM Manager still acknowledges the event, but a second user-acknowledgeable event is created with ‘WARNING’ status to indicate that the rollback failed. Depending on the cause of the rollback failure, Oracle VM Manager might also create user-acknowledgeable events with ‘CRITICAL’ status.

Because jobs are usually performed sequentially, it may take a total of 45 minutes before the entire rollback process times out and the new event indicating rollback failure is generated. The rollback failure event is also logged in the log file /u01/app/oracle/ovm-manager-3/domains/ovm_domain/servers/AdminServer/logs/AdminServer.log on the Oracle VM Manager host.

The information in the rollback failure event contains the rollback plan that Oracle VM Manager attempted to follow to cleanup a failed virtual machine migration. This event can be viewed using the getEventsForObject command with the Oracle VM Manager Command Line Interface, by viewing the events associated with the virtual machine within the Oracle VM Manager Web Interface or via the Oracle VM Web Services API.

The following content represents the typical output displayed within the description field for a rollback failure event:

Live VM Migration With Storage, started at 2015-11-04 09:51:13,205
Recovering From A Failed Local Virtual Machine Migration

VM: [VirtualMachineDbImpl] 0004fb0000060000c71d489702c240b3<978> (MyVM)
Source repository: [RepositoryDbImpl] 0004fb000030000c4fca9a963e2706c<479> (r216)
Target repository: [RepositoryDbImpl] 0004fb000030000f9ba13d5063e330a<382> (r215)
Source vDisks to be migrated:
/OVS/Repositories/0004fb000030000c4fca9a963e2706c/VirtualDisks/0004fb000012000005213553a5bba24f.img
Migration job has failed or was aborted.
VM's server has been set back to: (ovs216)
Source vDisk files have been retained.

Constructed the following post-migration completion plan at 2015-11-04 09:51:36,686
VM to be killed on server: (ovs215)

To be deleted on target server (ovs215):
  vDisk: /OVS/Repositories/0004fb000030000f9ba13d5063e330a/VirtualDisks/0004fb000012000005213553a5bba24f.img
  tmp file: /OVS/Repositories/0004fb000030000f9ba13d5063e330a/VirtualDisks/tmp_dest.0004fb000012000005213553a5bba24f.img

Also to be deleted on target server (ovs215):
  cfg file: /OVS/Repositories/0004fb000030000f9ba13d5063e330a/VirtualMachines/0004fb000060000c71d489702c240b3/vm.cfg
  directory: /OVS/Repositories/0004fb000030000f9ba13d5063e330a/VirtualMachines/0004fb000060000c71d489702c240b3
  tmp file: /OVS/Repositories/0004fb000030000f9ba13d5063e330a/VirtualMachines/tmp_dest.0004fb000060000c71d489702c240b3

Source repository (r216) must be refreshed.

Note that the description of the event provides detailed information about the migration process and indicates that the migration job has failed. The message explains that the virtual machine is set back to run on the source server and that the source virtual disks have been retained. This means that the virtual machine may either be running or stopped on the source server, but from the perspective of Oracle VM Manager, the location of the virtual machine has been reverted. Most significantly, the output contains a 'post-migration completion plan'. This plan provides a full breakdown of the steps that must be performed to roll the environment back to its original state.

If an event like this appears for a failed migration of a locally hosted virtual machine, you must manually perform the rollback steps on the target server when it next becomes available. It is very important that you ensure that the rollback steps are performed on the systems indicated in the post-migration completion plan. Performing any of these steps on another server could have detrimental effects and could result in virtual machine corruption.

Kill the Virtual Machine on the Indicated Oracle VM Server

The first step in this plan involves killing the virtual machine on the indicated Oracle VM Server or servers. Depending on the state of the migration at the time that the target Oracle VM Server became unavailable, this may require an action on either the target Oracle VM Server or both the target and source Oracle VM Servers. In some cases you may not need to perform this action on either Oracle VM Server. The appropriate action is logged in the event description.

During the migration, the virtual machine enters into a paused state as it is copied from the source Oracle VM Server to the target Oracle VM Server. Once the copy is complete, the virtual machine on the target Oracle VM Server is not indicated within Oracle VM Manager in any way, as this would conflict with the virtual machine with the identical UUID that is located on the original source Oracle VM Server. This transition is performed within Oracle VM Manager when the migration is complete. As a result two virtual machines with identical UUIDs may exist within the environment for the period of the migration. If the target server goes offline at any point during the migration, it is frequently the case that at least one of these
virtual machines must be killed off to prevent conflict. Since the representation of the virtual machine within Oracle VM Manager is not reliable until the rollback has been completed, it is necessary that you must perform the kill operation directly on the indicated Oracle VM Server. This is usually done over SSH as the root user, using the following command:

```
ovs-agent-rpc stop_vm "''" "'0004fb0000060000c71d489702c240b3'" "True"
```

Note that `0004fb0000060000c71d489702c240b3` should match the UUID of the virtual machine that you were originally migrating. Also pay attention to the quotes in each of the arguments presented here. The first argument for this command is empty, so a pair of single quotes are enclosed in a pair of double-quotes. The second argument is the UUID of the virtual machine that you intend to kill and is represented as enclosed in a pair of single quotes within a pair of double-quotes. Finally, the last argument is used to force the action and contains the text `True` enclosed in a pair of double-quotes.

Note that you should use this command to stop the virtual machine because it helps to identify the correct virtual machine domain to destroy, it maintains the integrity of your environment and logs any actions carried out on the virtual machine. Do not attempt to use Xen hypervisor tools to perform any actions on the virtual machine directly without explicit instruction from an Oracle Support representative.

Remove any Virtual Disks from the Repository on the Target Oracle VM Server

A live migration of a virtual machine that is hosted on local storage also requires that any virtual disks are copied from the repository hosted on the source server across to the repository of the target server. Therefore, it is necessary that you manually delete any of these files from the repository hosted on the target Oracle VM Server to clean the environment. To do this, you must SSH to the target Oracle VM Server and delete the files listed in the plan returned in the event description. For example:

```
rm -f /OVS/Repositories/0004fb0000030000f9ba13d5063e330a/VirtualDisks/0004fb00001200005213553a5bba24f.img
rm -f /OVS/Repositories/0004fb0000030000f9ba13d5063e330a/VirtualDisks/tmp_dest.0004fb00001200005213553a5bba24f.img
```

Remove the Virtual Machine Configuration from the Repository on the Target Oracle VM Server

The virtual machine configuration for the virtual machine is also copied from the repository hosted on the source server across to the repository of the target server during the migration. Therefore, it is necessary that you manually delete any of these files and directories from the repository hosted on the target Oracle VM Server to clean the environment. To do this, you must SSH to the target Oracle VM Server and delete the files listed in the plan returned in the event description. For example:

```
rm -f /OVS/Repositories/0004fb0000030000f9ba13d5063e330a/VirtualMachines/0004fb00001200005213553a5bba24f.vm.cfg
rm -rf /OVS/Repositories/0004fb0000030000f9ba13d5063e330a/VirtualMachines/0004fb00001200005213553a5bba24f
rm -f /OVS/Repositories/0004fb0000030000f9ba13d5063e330a/VirtualMachines/tmp_dest.0004fb00001200005213553a5bba24f.vm.cfg
```

Refresh the Repository on the Source Oracle VM Server

During the migration process, Oracle VM Manager updates its model of the source and target repositories hosted on each Oracle VM Server to match the environment as it would be after the migration is complete. It does not revert this representation unless an automated rollback is achieved. If the rollback has failed and you have performed manual steps to revert your environment to its original state, you must also refresh the repository within Oracle VM Manager so that the model accurately reflects the state of the repository. You can either do this using the Oracle VM Manager Web Interface or you can use the Oracle VM Manager Command Line Interface directly. For example:

```
ssh -l admin localhost -p 10000 refresh repository name="r216"
```

At this point, your environment should be completely reverted.
12.4.8 Migrating Large Hardware Virtualized Guest Results in CPU Soft Lock

On some hardware, such as the SUN FIRE X4170 M2 Server, migration of very large virtual machines using hardware virtualization can result in a soft lockup causing the virtual machine to become unresponsive. This lock is caused when the migration causes the virtual machine kernel to lose the clock source. Access to the console for the virtual machine shows a series of error messages similar to the following:

```
BUG: soft lockup - CPU#0 stuck for 315s! [kstop/0:2131]
```

To resolve this, the virtual machine must be restarted and the `clocksource=jiffies` option should be added to the HVM guest kernel command line, before rebooting the virtual machine again.

**Important**

This option should only be used on HVM guest systems that have actually resulted in a CPU soft lock.

12.4.9 Hardware Virtualized Guest Devices Not Working as Expected

Some devices, such as sound cards, may not work as expected in hardware virtualized guests. In a hardware virtualized guest, a device that requires physical memory addresses instead uses virtualized memory addresses, so incorrect memory location values may be set. This is because DMA (Direct Memory Access) is virtualized in hardware virtualized guest.

Hardware virtualized guest operating systems expect to be loaded in memory starting somewhere around address 0 and upwards. This is only possible for the first hardware virtualized guest loaded. Oracle VM Server virtualizes the memory address to be 0 to the size of allocated memory, but the guest operating system is actually loaded at another memory location. The difference is fixed up in the shadow page table, but the operating system is unaware of this.

For example, a sound is loaded into memory in a hardware virtualized guest running Microsoft Windows™ at an address of 100 MB may produce garbage through the sound card, instead of the intended audio. This is because the sound is actually loaded at 100 MB plus 256 MB. The sound card receives the address of 100 MB, but it is actually at 256 MB.

An IOMMU (Input/Output Memory Management Unit) in the computer's memory management unit would remove this problem as it would take care of mapping virtual addresses to physical addresses, and enable hardware virtualized guests direct access to the hardware.

12.4.10 Paravirtualized Guest Disk Devices are Not Recognized

If you opt to create a PVHVM or PVM, you must ensure that all disks that the virtual machine is configured to use are configured as paravirtual devices, or they may not be recognized by the virtual machine. If you discover that a disk or virtual cdrom device is not being recognized by your virtual machine, you may need to edit the `vm.cfg` file for the virtual machine directly. To do this, determine the UUID of the virtual machine, and then locate the configuration file in the repository, for example on an Oracle VM Server:

```
# vi /OVS/Repositories/UUID/vm.cfg
```

Locate each `disk` entry that contains a hardware device such as `hda`, `hdb`, or `hdc` and replace with an `xvd` mapping, such as `xvda`, `xvdb`, `xvdc` etc.

Restart the virtual machine with the new configuration, to check that it is able to discover the disk or virtual cdrom device.
12.4.11 Cannot Create a Virtual Machine from Installation Media

When creating a virtual machine, the following message may be displayed:

```
Error: There is no server supporting hardware virtualization in the selected server pool.
```

To resolve this issue, make sure the Oracle VM Server supports hardware virtualization. Follow these steps to check:

a. Run the following command to check if hardware virtualization is supported by the CPU:

```
# cat /proc/cpuinfo | grep -E 'vmx|smx'
```

If any information that contains `vmx` or `smx` is displayed, it means that the CPU supports hardware virtualization. Here is an example of the returned message:

```
flags : fpu tsc msr pae mce cx8 apic mtrr mca cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe nx lm constant_tsc pni monitor ds_cpl vmx est tm2 cx16 xtpr lahf_lm
```

**Note**
The `/proc/cpuinfo` command only shows virtualization capabilities starting with Linux 2.6.15 (Intel®) and Linux 2.6.16 (AMD). Use the `uname -r` command to query your kernel version.

b. Make sure you have enabled hardware virtualization in the BIOS.

c. Run the following command to check if the operating system supports hardware virtualization:

```
# xm info | grep hvm
```

The following is an example of the returned message:

```
xen_caps : xen-3.0-x86_64 xen-3.0-x86_32p hvm-3.0-x86_32 hvm-3.0-x
```

If the CPU does not support hardware virtualization, use the paravirtualized method to create the virtual machine. See the Servers and VMs Tab section in the Oracle VM Manager Online Help for information on creating a paravirtualized virtual machine.

12.4.12 Cannot Change CD in the Virtual Machine

To change the CD in a virtual machine:

a. Unmount the first CD:

```
# umount mount-point
```

b. Select the second ISO file, and click Change CD.

c. Mount the second CD:

```
# mount /dev/cdrom mount-point
```

12.4.13 Generating Guest Dump Files on Oracle VM Server (x86)

The Xen hypervisor makes it possible to generate a core dump file for a virtual machine in the case that it crashes. This file can be useful for debugging and support purposes. Core dump files can be large and to avoid overwriting files, each file is named uniquely. When this facility is enabled, core dump files are saved to `/var/xen/dump` on the Oracle VM Server where the virtual machine was running when it crashed. This
can rapidly use up available disk space on the dom0 system partition. If you enable this facility, you must ensure that enough disk space is available at this path on the Oracle VM Server, either by mounting an additional disk at this path, or by creating a symbolic link for this path to point to an alternate location with plenty of available disk space.

By default, this facility is disable at a system-wide level. It is possible to change this behavior by editing /etc/xen/xend-config.sxp directly and changing the lines:

```plaintext
# Whether to enable core-dumps when domains crash.
#(enable-dump no)
```

to:

```plaintext
# Whether to enable core-dumps when domains crash.
(enable-dump yes)
```

After making this change, you must reboot the Oracle VM Server for the change to take effect. Manually editing the global Xen configuration parameters on an Oracle VM Server is not supported by Oracle.

It is possible to override the system-wide behavior by setting this parameter directly in the vm.cfg for each individual virtual machine. This is the preferred approach to generating dump files, as it allows you to limit core dumps to only those virtual machines that you are interested in debugging. Therefore, this configuration option can be controlled for each virtual machine from within Oracle VM Manager. You can set this option by configuring the **Restart Action On Crash** option for a virtual machine. See the **Servers and VMs Tab** section in the Oracle VM Manager Online Help for more information on this parameter.

If you change the **Restart Action On Crash** option for a virtual machine, you must stop the virtual machine and then start it again before the change takes effect. This is different to restarting the virtual machine, as the vm.cfg configuration file for the virtual machine is only read by the Xen hypervisor when the virtual machine is started. If you have made the configuration change but have not properly restarted the virtual machine, a crash and reboot does not automatically cause the configuration option to take effect.

To test whether or not the core dump facility is working properly for a virtual machine, you may be able to directly trigger a crash by logging into the virtual machine and obtaining root privileges before issuing the following command:

```plaintext
# echo c >/proc/sysrq-trigger
```

This command assumes that the operating system on the virtual machine is Linux-based and that the System Request trigger is enabled within the kernel. After you have triggered the crash, check /var/xen/dump on the Oracle VM Server where the virtual machine was running to view the dump file.

### 12.4.14 Tuning a Linux-based Virtual Machine for Handling Storage Migration

When a virtual machine is hosted in a repository using local storage on the Oracle VM Server where it is running, migration of that virtual machine to another Oracle VM Server and repository requires that I/O on affected disks is not excessively high. If you are running an application that has high I/O during a migration, it may cause the guest or the application to hang. Steps can be taken to mitigate against this on guests that are running a Linux operating system by tuning virtual memory caching parameters within the guest kernel and by reducing the ext4 journaling commit frequency on any guests that may be running file systems that are formatted with ext4.

**Tuning virtual memory caching.** On the guest command line, as the root user, you can tune the cache by using the `sysctl` command to set a number of kernel parameters. Oracle recommends that you reduce the cache size to 5% of the system memory (the default value is 10) and reduce the time that a memory
page can remain dirty until it is flushed to around 20 seconds (the default is 30 seconds). You can do this temporarily by running the following commands:

```bash
# sysctl -w vm.dirty_background_ratio=5
# sysctl -w vm.dirty_expire_centisecs=2000
```

Alternatively edit `/etc/sysctl.conf` and add these lines:

```
vm.dirty_background_ratio=5
vm.dirty_expire_centisecs=2000
```

When you have done this, you can load these values into the kernel by running `sysctl -p`.

**Tuning ext4 journaling.** If the guest is using any filesystems that are formatted to use ext4, the journaling commit process may be affected by a migration. To protect against this, decrease the amount of time between journal commits and ensure that commits are performed asynchronously. To do this, you should tune your mount parameters for any ext4 filesystem that you have mounted within the guest. For example when mounting an ext4 formatted filesystem you might use the following options:

```bash
# mount -o commit=5,journal_async_commit /dev/xvdd /vdisk3
```

To perform this effectively for all ext4 mounts, you may need to edit your `/etc/fstab`. 
Glossary

C

clone
The action or result of making an exact copy of an object. The object may be a virtual machine, virtual machine template, ISO file, or virtual disk. Cloning is similar to copying and maintains the integrity of the original object, while creating a new object based on the original. A clone customizer may be used to define cloning options to specify details of where the object components may reside when cloned, such as in a different storage repository.

D

dom0
An abbreviation for domain zero. The management domain with privileged access to the hardware and device drivers. Dom0 is the first domain started at boot time. Dom0 has more privileges than domU. It can access the hardware directly and can manage the device drivers for other domains. It can also start new domains.

See Also: control domain

domU
An unprivileged domain with no direct access to the hardware or device drivers. Each domU is started by dom0.

E

events
Events are used to register status information of “objects” within Oracle VM Manager for future reference or to make problems easier to trace back. Events are often, though not always, related to jobs that are initiated within Oracle VM Manager. For instance, when a job fails, an event is generated. Events can also be triggered through changes in the environment such as server crashes or storage disconnects. Therefore, events are used to alert you to potential problems that may need your attention.

Events are categorized by severity. Most events will be informational, but they can also be warnings or errors. If an event has an error level severity, you need to acknowledge the error event to clear the error and to perform further operations on the object that generated the error.

See Also: jobs

G

guest
A guest operating system that runs within a domain in Oracle VM Server. A guest may be paravirtualized or hardware virtualized. Multiple guests can run on the same Oracle VM Server.

H

hard partitioning
Hard partition, or CPU pinning, is the act of binding a virtual machine to one or more physical CPUs or cores. This prevents software within the virtual machine from running on any cores other than those specified for the virtual machine. By default, Oracle VM takes advantage of distributed resource scheduling, which allows a virtual machine to use all cores on an Oracle VM Server as required. In some situations, such as the requirement to conform with Oracle licensing policies for partitioned environments, it may be desirable to implement hard partitioning.
Hard partitioning can result in restrictions on live migration, DRS and DPM.

host computer
The physical computer on which the software is installed. Typically used to refer to either the computer on which Oracle VM Server or Oracle VM Manager is running.

hypervisor
A hypervisor, also called a monitor or Virtual Machine Manager (VMM), is a layer which abstracts the virtual hardware from the real hardware. As such it is the only privileged entity in the system which has full access to real hardware resources. It controls only the most basic resources of the system, including CPU and memory usage, privilege checks, and hardware interrupts.

Hosted hypervisors are designed to run within a traditional operating system. In other words, a hosted hypervisor adds a distinct software layer to the host operating system, and the guest operating system becomes a third software level above the hardware and the host-based hypervisor. A well-known example of a hosted hypervisor is Oracle VM VirtualBox. Others include VMware Server and Workstation, Microsoft Virtual PC, KVM, QEMU, and Parallels.

Native hypervisors are software systems that run directly on the host's hardware to control the hardware, and to monitor the guest operating systems. The guest operating system runs on a separate level above the hypervisor. Examples of this type of virtualization architecture are Oracle VM, Microsoft Hyper-V, VMware ESX, and Xen.

messaging
Oracle VM supports a messaging system that enables communication between the Oracle VM Manager and a guest running within a virtual machine on any Oracle VM Server, as long as the guest has the Oracle VM Guest Additions installed. This messaging system works by sending key/value pairs between the guest and Oracle VM Manager via a secured connection. Messaging allows greater administrative control over virtual machines and facilitates remote and automated configuration of virtual machines as they are started.

migrate
The act of moving a virtual machine from one Oracle VM Server to another, or to the Unassigned Virtual Machines folder. Technically, a migration can only be performed on a running virtual machine, however the Oracle VM Manager Web Interface and Oracle VM Manager Command Line Interface may combine multiple operations to make it appear that you can perform a migration on either a running or a stopped virtual machine.

multipath
The technique of creating more than one physical path between the server CPU and its storage devices. It results in better fault tolerance and performance enhancement. Oracle VM supports multipath I/O out of the box. Oracle VM Servers are installed with multipathing enabled because it is a requirement for SAN disks to be discovered by Oracle VM Manager.

OCFS2
Oracle Cluster File System (OCFS2) is a general-purpose shared-disk cluster file system for Linux capable of providing both high performance and high availability. OCFS2 is developed by Oracle and is integrated within the mainstream Linux kernel. OCFS2 is used within Oracle VM to facilitate clustered server pools, storage of virtual machine images and for the purpose of allowing guests to share the same file system.

A clustered server pool always uses an OCFS2 file system to store the cluster configuration and to take advantage of OCFS2's heartbeat facility. There are two types of heartbeats used in OCFS2 to ensure high availability:
- The disk heartbeat: all Oracle VM Servers in the cluster write a time stamp to the server pool file system device.

- The network heartbeat: all Oracle VM Servers communicate through the network to signal to each other that every cluster member is alive.

These heartbeat functions exist directly within the kernel and are fundamental to the clustering functionality that Oracle VM offers for server pools. The server pool file system should be stored on a separate NFS server or on a small LUN if possible, as OCFS2's heartbeat facility can be disturbed by intensive I/O operations taking place on the same physical storage.

A storage repository configured on a LUN-based repository must be linked to a clustered server pool due to the nature of the OCFS2 file system. As a result, LUN-based repositories cannot be shared between multiple server pools, although it is possible to move an OCFS2 repository from one server pool to another.

For more information on OCFS2, please refer to https://oss.oracle.com/projects/ocfs2/.

Oracle VM Agent
An application installed with Oracle VM Server. The Oracle VM Agent receives and processes management requests, and provides event notifications and configuration data to the Oracle VM Manager. Oracle VM Manager manages the virtual machines running on Oracle VM Server by communicating with Oracle VM Agent. It contains three components: master Oracle VM Server, Utility Server, and Virtual Machine Server.

Oracle VM Manager
Oracle VM Manager is the management platform, which offers an easy-to-use, web-browser interface as well as a command-line interface (CLI). Oracle VM Manager tracks and manages the resources available in your virtual environment and allows you to easily manage Oracle VM Server pools. Oracle VM Manager lets you manage the virtual machine life cycle, including creating virtual machines from templates or from installation media, deleting, powering off, uploading, deployment and live migration of virtual machines. Oracle VM Manager also lets you manage resources including ISO files, templates and shared virtual disks.

Oracle VM Server
A self-contained virtualization environment designed to provide a lightweight, secure, server-based platform for running virtual machines. The Oracle VM Server comprises a hypervisor and a privileged domain (called dom0) that allow multiple domains or guest operation systems (such as Linux, Solaris, and Windows) to run on one physical machine. Includes Oracle VM Agent to enable communication with Oracle VM Manager.

The Oracle VM Server for x86 incorporates an open source Xen hypervisor component, which has been customized and optimized to integrate into the larger, Oracle - developed virtualization server. The Oracle VM Server for x86 is also responsible for access and security management and generally acts as the server administrative entity, because the hypervisor’s role is limited.

On Oracle VM Server for SPARC systems, the SPARC hypervisor is built into the SPARC firmware and is generally referred to as the Logical Domains Manager. As with the Xen hypervisor, each virtual machine is securely executed on a single computer and runs its own guest Oracle Solaris operating system.

paravirtualized machine (PVM)
A virtual machine with a kernel that is recompiled to be made aware of the virtual environment. Runs at near native speed, with memory, disk and network access optimized for maximum performance.

Paravirtualized guests use generic, idealized device drivers, which are part of the guest’s OS. The I/O operations using these generic device drivers are mapped to the real device drivers in dom0. The generic, abstracted drivers in the guest seldom change and provide excellent guest stability. The dom0 domain, alternatively, can use the native hardware vendor drivers, and the guests can safely migrate to another dom0 with slightly different drivers.
For other resources such as CPU and memory, paravirtualized kernels make special “hypercalls” to the Xen hypervisor. These hypercalls provide better performance by reducing the number of instructions and context switches required to handle an incoming request. By contrast, on an emulated (hardware virtualized) guest, driver requests engage the guest’s interrupt handler, increasing the I/O operation overhead.

Q

QEMU
Also referred to as qemu-dm, which is the process name. The virtualization process which allows full virtualization of a PC system within another PC system.

S

server pool
Server pools logically organize one or more Oracle VM Servers into groups where virtual machines can run.

Each server pool can have up to 32 physical servers. Each Oracle VM Server can be a member of only one server pool. The server pool is the operational unit of Oracle VM. Policies are configured and enforced at the server pool level.

A minimum cluster of three Oracle VM Server nodes in each server pool is strongly recommended for high availability. If one node in the cluster experiences a hardware failure or is shut down for maintenance, failover redundancy is preserved with the other two nodes. Having a third node in the cluster also provides reserve capacity for production load requirements.

V

virtual disk
A file or set of files, usually on the host file system although it may also be a remote file system, that appears as a physical disk drive to the guest operating system.

virtual machine (VM)
A guest operating system and the associated application software that runs within Oracle VM Server. May be paravirtualized or hardware virtualized machines. Multiple virtual machines can run on the same Oracle VM Server.

virtual machine template
A template of a virtual machine. Contains basic configuration information such as the number of CPUs, memory size, hard disk size, and network interface card (NIC). Create virtual machines based on a virtual machine template using Oracle VM Manager.

W

WebLogic
Oracle WebLogic Server is a platform that includes an application server that can run java applications within a web-based framework. Oracle VM Manager runs as an application within Oracle WebLogic Server, taking advantage of many of Oracle WebLogic Server's many features to deliver a robust web UI through which Oracle VM can be fully managed.

The installation process behind Oracle VM Manager automatically installs and configures Oracle WebLogic Server on the system where Oracle VM Manager is installed. During this process, a weblogic user is set up within Oracle WebLogic Server to manage Oracle WebLogic Server configuration and to administer the underlying system. An admin user is also set up within Oracle WebLogic Server and is given permission to access the
Oracle VM Manager application. A typical setup uses the same password for both of these users, although this is not always the case and it is possible to configure a different password for each user depending on your requirements.

In general, users of the Oracle VM Manager application should avoid attempting to access the underlying Oracle WebLogic Server, or to change any configuration parameters here without guidance from Oracle Support.
Index

A
Active Directory authentication
Oracle VM Manager, 53
admin
   delete user, 42
   lock Oracle VM Manager account, 43
   Oracle VM Manager administration tool, 39
   unlock Oracle VM Manager account, 44
admin user
   change password, 52
authentication
   limit, 52
      Oracle VM Manager, 51
      Oracle WebLogic Server, 52
   restrict, 52

B
backup
   MySQL, 112
   Oracle VM Manager, 111
   Oracle WebLogic Server LDAP, 118
BIOS
   setting hardware virtualization, 137

C
CA certificate, 30
CD
   change in virtual machine, 137
   certificate installation, 30
   clock, 132
      set, 131
command line tools
   Oracle VM Server, 123
configuration
   MySQL, 50
   Oracle VM Manager, 29
   Oracle VM Server, 1
configuration file
   Oracle VM Manager, 111
convert
   Linux hosts, 101
   VMWare virtual machine, 101

D
data sources
   list Oracle VM Manager users, 45
delete
   Oracle VM Manager user, 42
   DHCP, 123
diagnostic tools, 5, 5, 6
dom0
   memory, 11, 126
driver
   psif, 126

F
file systems unavailable (timeout)
   Oracle VM Manager, 129

G
guest clock
   set, 131

H
hardware virtualization
   setting in BIOS, 137

I
installing
   Oracle VM Utilities, 93
ISCSI
   tuning, 124

J
JVM memory setting
   Oracle WebLogic Server, 128

K
kdump, 5, 6
keystore, 30
Ksplice
   Oracle VM Server, 59
   Xen update, 59

L
LDAP authentication
   Oracle VM Manager, 53
limit
   authentication, 52
Linux host
   convert, 101
list
   Oracle VM Manager data sources, 45
   Oracle VM Manager users, 40
lock
   Oracle VM Manager user account, 43
log
   Oracle VM Agent, 123
   Oracle VM Manager, 126
   Oracle VM Server, 123
   Oracle WebLogic Server, 126
logs
MySQL, 50
Oracle VM Manager, 47
rotate, 47
LUN remapping, 124

M
memory
dom0, 11, 126
memory allocation
Oracle WebLogic Server, 128
monitoring tools
SNMP, 55
mouse
tracking problems, 132
multipath, 1
MySQL
backup, 112
collection, 50
logs, 50
password, 45
start, 50
stop, 50
MySQL root password
Oracle VM Manager, 48
update, 48

N
netconsole, 5
NTP
Oracle VM Manager, 129

O
Oracle VM Agent
log, 123
Oracle VM Guest Additions, 73
installing, 77
ovmcmd, 81
ovmd, 78
packages, 73
upgrading, 77
Oracle VM Manager
Active Directory authentication, 53
administration tool ovm_admin, 39
authentication, 51
backup, 111
change user password, 42
collection, 29
configuration file, 111
create user, 41
database schema, 45
file systems unavailable (timeout), 129
LDAP authentication, 53
list data sources, 45
list users, 40
lock user, 43
log, 126
logs, 47
MySQL root password, 48
restore, 114
server discovery failed, 129
synchronization, 128
unlock user, 44
Oracle VM Manager database
password, 45
Oracle VM Server
command line tools, 123
configuration, 1
disable PVM guests, 10
Ksplice update, 59
log, 123
SNMP monitoring tools, 55
SNMP service, 55
Oracle VM Server for SPARC, 12
Oracle VM Utilities, 93
installing, 93
Oracle WebLogic Server
authentication, 52
change admin password, 52
change password, 42
create user, 41
delete user, 42
JVM memory setting, 128
list data source, 45
list users, 40
lock user, 43
log, 126
memory allocation, 128
unlock user, 44
Oracle WebLogic Server LDAP
backup, 118
OS Watcher, 5, 5
osc.log, 123
OSWbb, 5, 5
ovm-consoled.log, 123
ovmcmd
Oracle VM Guest Additions, 81
Windows guest, 81
ovmd
Oracle VM Guest Additions, 78
syntax, 78
ovmwatch.log, 123
ovm_admin
Oracle VM Manager administration tool, 39
syntax, 39
ovm_vmcontrol
syntax, 93
ovm_vmdisks
syntax, 96
ovm_vmhostd, 97
ovs-agent.log, 123

P
P2V, 101
paravirtualization
disabling, 10
password
change admin password, 52
change Oracle VM Manager user password, 42
password reset
Oracle VM Manager database, 45
psif
driver, 126
PVM
disabling, 10

Q
QEMU, 133
qemu-dm.pid.log, 123

R
restore
Oracle VM Manager, 114
restrict
authentication, 52
rotate
logs, 47

S
SAP support, 97
security, 30
service domains
SPARC, 14
session
timeout, 29
shadow domain
SPARC, 14
Simple Network Management Protocol
monitoring tools, 55
SNMP
monitoring tools, 55
SNMP service
Oracle VM Server, 55
software RAID
storage, 2
SPARC
service domains, 14
SSL encryption, 30
start
MySQL, 50
stop
MySQL, 50
storage
software RAID, 2
Storage Connect
plug-in installation, 1
syntax
ovmd, 78
ovm_admin, 39
ovm_vmcontrol, 93
ovm_vmdisks, 96
system clock
set, 131

T
timeout
UI session, 29
troubleshooting
ISCSI, 124

U
UI
timeout, 29
UI synchronization
Oracle VM Manager, 128
unlock
Oracle VM Manager user account, 44
update
MySQL root password, 48
user
change Oracle VM Manager user password, 42
create Oracle VM Manager user, 41
delete, 42
list Oracle VM Manager users, 40
lock Oracle VM Manager account, 43
unlock Oracle VM Manager account, 44

V
virtual machine
change CD, 137
disable PVM, 10
dump files, 137
virtual machine dump files, 137
vm-dump-metrics, 97
vmcore, 5
VMware virtual machine
convert, 101

W
Wallclock Time Skew, 132
Windows guest
Oracle VM Guest Additions, 81
ovmcmd, 81
X
xen-hotplug.log, 123
xen.independent_wallclock
   set, 131
xend-debug.log, 123
xend.log, 123

Z
ZFS, 12