

# OMNM 6.5.3 Installation Guide



## Notes and Cautions



A NOTE indicates important information that helps you make better use of your computer.



A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

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# Introduction

This section provides a high-level understanding of the tasks required to install or upgrade OpenManage Network Manager and the order in which to complete the tasks.

[In This Guide – 10](#)

[Intended Audience – 10](#)

[Installation Overview – 11](#)

[Related Documents – 11](#)

## In This Guide

This guide covers the following topics related to the OpenManage Network Manager (OMNM) product installation:

- [Introduction](#) provides the guide content, intended audience, installation overview, and any related documents required.
- [Preparing for Installation](#) provides the tasks needed before you start the installation to ensure that you have all the system requirements in place to ensure a smooth installation.
- [Installing Single-Server Deployment](#) provides steps to install the product on a single server, verify the installation, upgrade an existing installation, and uninstall the application.
- [Installing Virtual Appliance](#) provides steps to install the OMNM Virtual Appliance, or virtual machine (VM).
- [Installing Distributed and HA Deployments](#) provides steps to install OMNM in a distributed or HA environment.
- [Completing Post-Installation Tasks](#) provides the post installation setup tasks.
- [Troubleshooting Installation Issues](#) provides a list of issues that could occur during the installation process and how to resolve them.
- [Installation User Interface](#) describes all wizard fields and options where you need to input, select, or modify settings related to the installation process.
- [Upgrading/Patching from Previous Versions](#) provides reference material related to OMNM upgrade tasks.
- [Clustering](#) provides more details and reference material related to a clustering installation.
- [Database Management](#) provides more details and reference material related to the MySQL database.
- [Oracle Database Management](#) provides reference material for Oracle database management as it relates to the OMNM product.

## Intended Audience

This guide is intended for a system administrator, database administrator, and/or anyone else responsible for the installation and migration of the OpenManage Network Manager product.

The preparing for installation and preparing for migration information in this guide is useful for those responsible for planning a migration project or upgrading their system.

# Installation Overview

The installation process installs the OpenManage Network Manager (OMNM) application, including its foundation class software. See [Preparing for Installation](#) on page 13 for system requirements and other prerequisites.

The OMNM application is not compatible with other software using the standard SNMP ports (such as 162), or other raw sockets. Either stop the conflicting application before starting the OMNM installation, or stop the OMNM application when you want to use the conflicting application. You may need to reboot your system to close conflicted sockets. If upgrading, you may need to stop the OMNM application, close the Web client and stop the Application server (see [Stopping Servers](#) on page 68).

## Related Documents

Here are the OpenManage Network Manager (OMNM) and third-party documents containing additional information related to the OMNM installation and migration tasks.

**OMNM Guides.** The following OMNM product documents contain additional information needed during OMNM installation:

- *OpenManage Network Manager Release Notes*
- *OpenManage Network Manager User Guide*
- *OpenManage Network Manager Quick Start Guide*

**Other Guides.** You need not consult any third-party documents to install the OMNM product.



## Preparing for Installation

This section provides what you need to prepare for OpenManage Network Manager installation or upgrade and how to start the applications used to do the preparation tasks.

[Preparing for Installation – 14](#)

[Preparing for Upgrade – 14](#)

[Verifying System Requirements – 15](#)

[Recommended Linux Install Preparation – 17](#)

[Recommended Windows Install Preparation – 19](#)

[Understanding Installation Types – 19](#)

[Understanding Best Practices – 26](#)

[Understanding Best Practices – 26](#)

[Ports Used – 26](#)

[Linux Disk Partition Information – 27](#)

Paths throughout this document are often written as Linux represents them, with slashes (/) rather than Windows backslashes (\). The `oware` shell command makes any shell subsequently emulate the bash shell. That means either a slash or backslash accurately represents path separators as they may appear, depending on whether the `oware` command has set the environment to bash emulation. Most shell commands for this application are available in Windows equivalents structured to call the emulator, then a bash script. If you have difficulty using a command line script in Windows, then try it after you have run `oware`. In a Linux environment, you can run the following command before executing any command line scripts:

```
. /etc/.dsienv
```

Run command line scripts using `-?` to see their parameters.

 CAUTION:

**Do not** install to paths with spaces in their names. If you do, the application may not work as expected.

# Preparing for Installation

Before installing the OpenManage Network Manager (OMNM) application, there are a few things you need to do to ensure a quick and successful installation.

**Table 2-1. Preparing for Installation or Upgrade Checklist**

Item	Task	Done
1	Obtain the installer (media/download).	
2	Recommendation: Review device and OMNM release notes.	
3	Make sure that you have a user account with administrative privileges on the target installation server. <b>Note:</b> The user name cannot be root (Linux) or have spaces (Windows). Any of these conditions prevent the installer from running.	
4	Close all other applications to eliminate port conflicts that prevent the installer from completing properly. For example, some applications use common ports for FTP, TFTP, Trap services, and Syslog services. Also, anti-virus software and a running SNMP service can cause port conflicts.	
5	Recommendation: Make sure that the source and target installation directories <b>are not</b> the same.	

# Preparing for Upgrade

Before upgrading the OpenManage Network Manager (OMNM) application, there are a few things you need to do to ensure a quick and successful upgrade.

**Table 2-2. Preparing for Installation or Upgrade Checklist**

Item	Task	Done
1	Obtain the installer (media/download).	
2	Recommendation: Review device and OMNM release notes.	
3	Close all other applications to eliminate port conflicts that prevent the installer from completing properly. For example, some applications use common ports for FTP, TFTP, Trap services, and Syslog services. Also, anti-virus software and a running SNMP service can cause port conflicts. <b>Note:</b> Any bash or cmd sessions left open may halt the installer.	
4	Close and stop any additional OMNM processes before upgrading.	
5	Backup up your existing database and any other configuration files, such as the installed.properties file before upgrading. If using a virtual machine, perform and snapshot and export to a suitable location.	

# Verifying System Requirements

System requirements depend on how you use the application and the operational environment. Your specific network and devices may require something different from the recommendations for typical installations.

Base the minimum configuration of any system on its expected peak load. Optimally, your installation should spend 95% (or more) of its time idle and 5% of its time trying to keep pace with the resource demands.

Refer to the *OpenManage Network Manager User Guide* for sizing guidelines.



## NOTE:

System requirements ([software/hardware](#)) vary depending on how you plan to use the OMNM application. Use the information in this section **only** as a guide.

## Software Requirements

You must have the following software installed and operational before installing or upgrading the OpenManage Network Manager (OMNM) application. Refer to the product *Release Notes* for any last minute changes that occurred after this guide was released.

Table 2-3. OMNM Software Requirements (Sheet 1 of 2)

Software	Requirements
Operating Systems	<ul style="list-style-type: none"> <li>Linux 64-bit versions 6.5, 6.6, 6.7, and 7.2 for Red Hat (Enterprise versions) or CentOS</li> <li>Microsoft Windows Server 2008 R2, Windows Server 2012, or Windows Server 2016</li> </ul> <p><b>Note:</b> The OMNM installer validates operating system requirements during installation.</p>
Web Browsers	<ul style="list-style-type: none"> <li>Chrome (V59 and above)</li> <li>Safari (V10 and above)</li> <li>Firefox (V54 and above)</li> <li>Internet Explorer (V11 and above)</li> </ul> <p><b>Note:</b> A browser is not required to install OMNM. However, to test your installation by starting the Web client, you do need a browser.</p>
Databases	<p>Unless you have purchased an HA or Custom package, the standard OMNM software is a single-server installation and the MySQL database installs automatically. If you are doing an HA or distributed installation where you provide the database, make sure that it is one of these:</p> <ul style="list-style-type: none"> <li>MySQL 5.7.19</li> <li>Oracle 9i (9.2.0.5) up to Oracle 12c R1 (12.1.0.2.0)</li> </ul> <p><b>Note:</b> Oracle 12c does not support the multitenant feature. Oracle databases are recommended for distributed, clustered, or highly available installations.</p> <ul style="list-style-type: none"> <li>Oracle 10g RAC or later for High Availability installations</li> <li>Oracle database requires that the ORACLE_HOME environment variable be set to the local Oracle installation's home directory where the bin and jdbc directories reside</li> </ul>

**Table 2-3. OMNM Software Requirements (Sheet 2 of 2)**

Software	Requirements
Virtualization	OMNM may be installed on virtual servers. Supported hypervisors include: VMware, HyperV, and KVM. <b>Note:</b> System requirements for virtual machines are the same as physical machines, except the hardware must have the capacity for its own requirements and the virtual machine.
Protocols	<ul style="list-style-type: none"> <li>• TCP/IP</li> <li>• SNMP</li> <li>• HTTP/HTTPS</li> </ul>

## Hardware Requirements

Optimally, base the minimum configuration of your system on expected peak load. Typically a configuration running all elements of a system on a single server spends 95% of its time idle and 5% of its time trying to keep pace with the resource demands. If you expect your system to perform an operation that creates, modifies, or deletes rules on tens or hundreds of thousands of business objects, your real system needs could be higher.

Hardware requirements vary depending on whether you have a [single server](#) installation or a [distributed server](#) installation.

Screen resolution must equal or exceed 1280 x 1024 pixels. Your screen must be at least 1250 pixels wide. Even in these circumstances, some cosmetic aberrations may occur (duplicate forms for one example). You can safely ignore such aberrations.



# Recommended Linux Install Preparation

If you are installing on Linux, you **must log in as a non-root user**. The Linux installation prompts you to run some additional scripts as root during the installation process.

## CAUTION:

**Do not** log in as root and su to a non-root user. Make sure your login automation does not do this either. This causes problems, particularly with upgrades.

Make sure that you are installing as a user with the correct permissions, and are in the correct group. You must configure the installation directory so this user and group have all permissions (770, at least). You may install without any universal permissions. However, you must create a home directory for the installing user.

## NOTE:

All files created during installation respect a umask of 007. All files from the *operatingSystem.jar* file are 770. Files from *ocpinstall -x* are set for 660. Bin scripts from *ocpinstall -x* are 770.

Best practice is to install as the user designated as DBA. If necessary, create the appropriate user and login as this user for running the install program. The installing user must have create privileges for the target directory. By default, this directory is:

```
/dell EMC/openmanage/networkmanager
```

## CAUTION:

Before you install this application, remove any MySQL if it exists. Make sure to remove or rename the *my.cnf* file for that previous installation. If it is on the path, it can interfere with the correct operation of the OpenManage Network Manager application. See [MySQL Server Configuration File Examples](#) on page 158 for more about configuring MySQL.

## NOTE:

To set the environment correctly for command line functions, after installation, type `. /etc/.dsienv` in Linux—`[dot][space]/etc/[dot]dsienv` before running the specified command.

**Also:** This application can run on any Linux desktop environment (CDE, KDE, Gnome, and so on) but the installer will only install shortcuts for CDE.

Prepare your Linux system for OpenManage Network Manager installation as follows.

- 1 Add your IP and hostname to the */etc/hosts* file for proper name resolution.

For example, add the following for the *Test.localdomain* host:

```
10.18.0.241 Test Test.localdomain
```

Verify that */etc/hosts* file points to the new name. Use the `cat` command to see output with the correct IP Address/hostname pairs.

```
[qa@Test Desktop]$ cat /etc/hosts
```

```
10.18.0.241 Test Test.localdomain
```

Remember that the OpenManage Network Manager application requires a fixed IP address for its host.

- 2 Login as `root`, create a new user with a home directory, set the password, and add the user to the proper group.

For example, here are the commands to configure the `test` user:

```
useradd -m test
passwd abcxyz
usermod -aG wheel test
```

The wheel user group allows password-less `sudo`.

- 3 Copy the installation files to the local system on which you plan to install the OMNM application.
- 4 Make sure that the installation script has permission to execute:

```
chmod +x linux_install.bin
```

- 5 Create the target installation directory and set permissions as the root user.

The following are examples, not defaults:

```
sudo mkdir -p /installPath
sudo chown :test /installPath
chmod 770 /installPath
```

If the target install directory does not exist or it does not have write permission, an error message is displayed during installation. You must resolve this issue before continuing with the installation.

- 6 Activate the Network Interface Card (NIC) as follows.

By default, some Linux distributions do not activate the NIC during startup.

```
nano /etc/sysconfig/network-scripts/ifcfg-eth0
```

Change `ONBOOT=no` to `ONBOOT=yes`

- 7 Set SELINUX to disabled in the `/etc/selinux/config` file.

```
SELINUX=disabled
```

- 8 Reboot your system from the command line.

```
reboot
```

This is required for step 6 and step 7 to take effect.

## Recommended Windows Install Preparation

Although it is not always necessary, during installation or uninstallation a suggested option is to disable any virus protection software, and any other running applications. Some applications have additional services (like Norton Unerase) that prevent correct installation on some systems. Stop these in Services in Control Panel's Administrative Tools.

This application cannot co-exist with other installations of Cygwin on the same Windows computer. Do not install it where Cygwin is already installed, either separately or as part of another application. If Cygwin is already installed, remove it before installing this application.

If they are present, turn off Microsoft Windows SNMP Services and Traps.

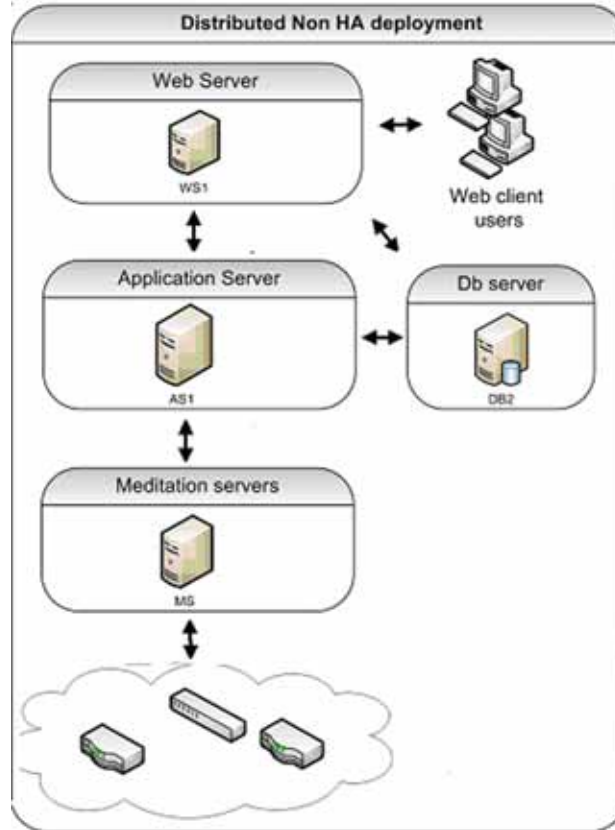
## Understanding Installation Types

The OpenManage Network Manager (OMNM) product supports many installation and configuration options to fit the network environment it manages. The following installation and configuration models are available:

- [Distributed Model](#)
- [High Availability and Clustering Model](#)
- [Db High Availability Model](#)

## Distributed Model

The Distributed model is suitable for most larger network environments in service providers and Enterprises. The Web server, Application server, and Mediation server are installed on separate servers without clustering. This model helps achieve better performance and helps when the minimum hardware is not available for a single-server (standalone) installation.



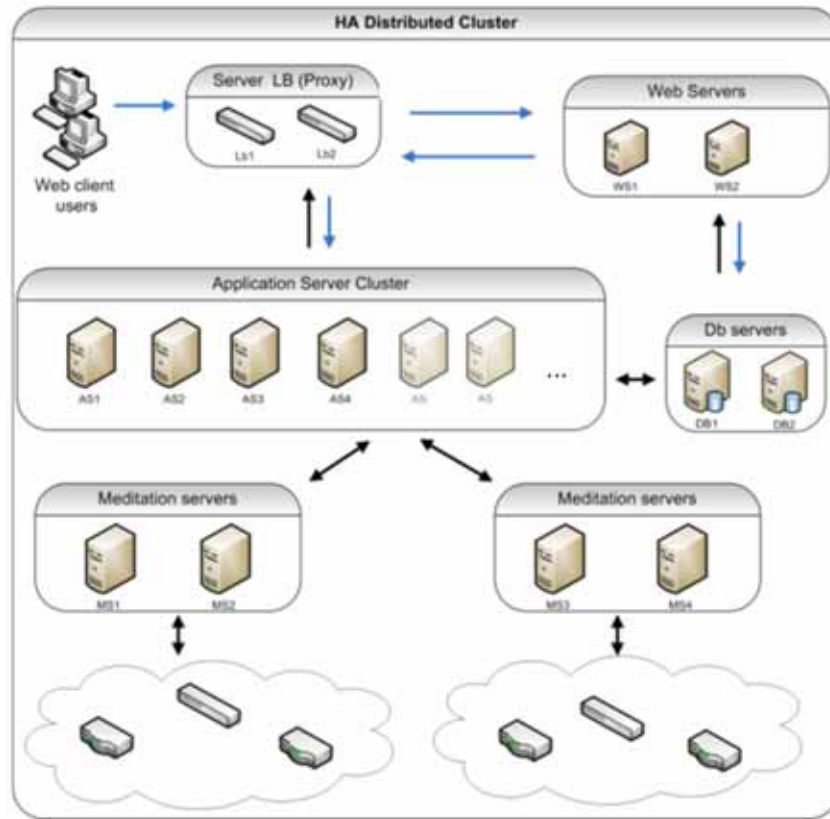
You may also distribute the Database server if more than one database is required for redundancy (that is, RAC, MHA, or Replication).

## High Availability and Clustering Model

The Clustered model is suitable for best performance and high availability. If you cluster components (in addition to distributing them), OpenManage Network Manager lets you use the following features:

- Application server clustering (for redundancy and improved performance)
- Mediation server load balancing (with the Application server round robin process)
- Redundant Web servers
- Paired Database servers for database redundancy and failover

Clustered servers process using a round-robin method so that systems are protected from server failure. With distributed Mediation servers (also called mediation agents), the system handles a larger number and volume of traps and events. This is usually used with even larger systems, or when the server will be processing a lot of traps.



## Db High Availability Model

The optional Db High Availability (Db HA) model installs automatically and makes the Application server clustered and load balanced. This option is used in carrier-class or very large deployments. You can also configure Oracle or Mysql database installations for failover.

### NOTE:

You can test failover by stopping a server process.

In the Db High Availability model, primary and secondary **paired Mediation servers** use configurable heartbeats to monitor each others status. If the secondary Mediation server detects that the primary is down, it takes over. The Application server also monitors the Mediation server and generates an event/alarm if the primary Mediation server goes down. Configurable trap buffers reduce trap loss during failover. Use configurable heartbeats to monitor each others status. If the secondary Mediation server detects that the primary is down, it takes over. The Application server also monitors the Mediation server and generates an event/alarm if the primary Mediation server goes down. Configurable trap buffers reduce trap loss during failover.

Primary and secondary **clustered Application** servers also use configurable heartbeats to monitor each others status. If the primary fails, the secondary takes over and generates an event/alarm. Clients and Mediation servers identify Applications server by partition name. This is the same for

the primary and secondary Application server, so that the failover is transparent to the clients and Mediation servers. Servers also use configurable heartbeats to monitor each others status. If the primary fails, the secondary takes over and generates an event/alarm. Clients and Mediation servers identify Applications server by partition name. This is the same for the primary and secondary Application server, so that the failover is transparent to the clients and Mediation servers.

If you want to extend this to the database, Oracle Real Application Clusters (RAC) handle database replication, synchronization and failover. Application servers identify Oracle by Service Name, which is the same for all Oracle hosts, so failover between Oracle hosts is transparent to this application.

You can also have a form of Db HA at the application level with transaction management. For example, Db HA installations support the following:

- Application server clustering
- Mediation server load balancing (with the Application server round robin process)
- Mediation server failover
- Database redundancy (must have Oracle Parallel Server, Oracle's Real Application Cluster [RAC], Mysql replication or MHA or equivalent database).

Additional details are discussed in:

- [Clustered Mediation Servers](#)
- [Web Portal Installation](#)
- [Application Server Installation](#)
- [Mediation Server Subnets](#)
- [Routing Behavior](#)
- [Compatibility with Previous Versions](#)
- [Configuration Options](#)

## Clustered Mediation Servers

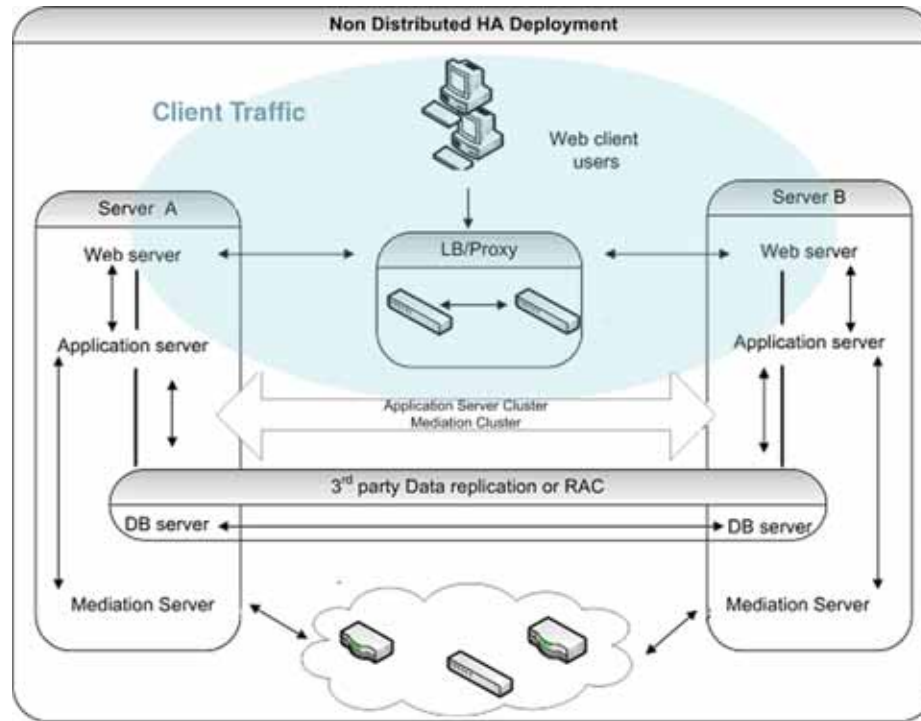
For reliability, paired Mediation servers can fail over when they transmit SNMP traps and/or Network Element-initiated Syslog Messaging to Application servers. For failover to work, you must enable multicast between the cluster's Mediation servers.

Each server in the cluster has a primary and a secondary role, and uses keep-alives heartbeats to verify the other Mediation server's operational state. Based on the operational state, only one Mediation server (the primary) forwards messages to the Application servers for processing.

Refer to the *OpenManage Network Manager User Guide* for more specifics on configuring mediation clustering.

The simplest **high availability (HA)** installation is to configure your system with the full application on two machines. In this scenario, the Application servers are clustered and Mediation servers are configured for redundancy. Oracle RAC or replication produces database redundancy.

Paired load-balancers/proxy servers direct Web users to an available Web server, and distribute Web server traffic to an available Application server, and Mediation servers communicate with managed devices.



## Web Portal Installation

By selecting one of the custom installation options during the installation process, you can install OpenManage Network Manager's Web server on a separate machine. This is particularly desirable if you plan to support a larger number of web clients (see [Verifying System Requirements](#) on page 15 for sizing information).

When you install a separate Web server, installation assumes you have already installed the Application server, and can supply its IP Address/Hostname, a port where Web server communicates with Application server, and a heap size for this server. The default heap is 1G, but you can configure a larger heap to support more clients. The default port is 8089. Make sure that no firewall restricts communication between Application server and Web server on this port. See the *OpenManage Network Manager User Guide* for information about installing with SSL.

Since the web portal needs a database, installing the Web portal also means you must select the database type (MySQL or Oracle) and location host and port number. The port default: 3306.

As in the Complete installation, the Web server starts automatically once installation is complete. In Windows, right-click the Apache Web server icon to Configure it (heap size, for example), Start and Stop this service.

You can change the appserver IP reference in the `portal-ext.properties` (location: `\oware\synergy\tomcat-x.x.xx\webapps\ROOT\WEB-INF\classes`).

The URL for the portal itself on port 8080 on any IP address where it is installed, including 127.0.0.1 if you access it from the host where the Web server itself is installed.

## Application Server Installation

To install only the Application server, select that option in the *Choose Install Set* screen that appears in the installer. As in most installations, and as is essential for distributed installations, you must select a partition name, whether the server starts automatically on host startup, the heap size, database type and location (host and port).

## Mediation Server Subnets

For other Mediation server-initiated OpenManage Network Manager functions like provisioning, configuration, backup, restoration, compliance monitoring, and so on, you can optionally assign Mediation servers to a management subnet on an installation screen.

When OpenManage Network Manager initiates communication to a Network Element in the assigned subnet, the Application server attempts to use the Mediation server for that subnet. Application servers update their list of active Mediation servers every 15 seconds. When OpenManage Network Manager needs to communicate to a device that is on a subnet without an assigned Mediation server, it uses the first Mediation server on the Active Mediation server list. If for some reason a device does not respond to a Mediation server, the Application server try the next Mediation server on the Active list. During installation Accept or alter the subnet mask for this agent. By default the subnet mask is 255.255.255.0. This mask represents the portion of the network serviced by this agent.

If you want to change this subnet later, the `installed.properties` file (in `owareapps\installprops\lib\`) has a `oware.mediation.subnet.mask` property that you can re-make. You must then restart the Mediation server.

Mediation request routing supports explicit configuration of device scope managed per Mediation server partition.

## Routing Behavior

Each mediation request made by the application is routed to a server for execution. The routing is based on the IP address of the device to be communicated with. The logic of this routing is as follows:

- Is the target IP already in a Mediation server's device list?
  - yes - Is the same Mediation server still available?
  - yes - Use the same agent
- If no agent yet determined
  - For each available Mediation server...
    - For each `ip;mask` pair (default and additional config),
      - calculate network address from IP and mask
      - calculate network address from device IP and mask
      - Do they match?
        - yes - add Mediation server to preferred agent list
    - Were any preferred agents found?
      - yes - use the least loaded agent from preferred list
        - add device IP to the agent's device list (use same server next time)
        - replicate agent device list within Application server cluster



—If no agent yet determined

Is the local Application server configured to do mediation?

yes - use the local server (not “sticky”)

no - execution of mediation request will fail

## Compatibility with Previous Versions

The impact of the above behavior on previous mediation versions occurs only where no preferred Mediation server is available. Before such behavior was available, the application made an arbitrary selection from any available Mediation servers, possibly using the same server every time. Now, only the local Application server can handle the request. If you have configured the Application server to perform mediation (true by default), then the system should continue to execute these requests as it had in the past. If the Application server is not configured to perform mediation, then requests may fail with `no mediation` errors instead of being routed to the wrong Mediation server possibly resulting false `device not available` errors.

## Configuration Options

By default, each Mediation server has a single network mask established during installation. Each Mediation server in a cluster or HA Pair should yield the same network address when the default mask is applied to the Mediation server’s IP address. Here is an example of a default mask setting on a Mediation server:

```
oware.mediation.subnet.mask=255.255.255.0
```

In addition to the default mask, you can define additional routing configurations as Application server properties. Each Application server in a cluster should have the same settings. You can add more IP Addresses and/or masks to the default configuration made locally on the Mediation server for each Mediation server partition. The property name is `com.dorado.mediation.routing` with a mediation partition name appended. Here is an example of routing requests for any device IP address starting with 10.10 to a Mediation server named `foo-medPartition`:

```
com.dorado.mediation.routing.foo-medPartition=10.10.0.0;255.255.0.0
```

This appends `Partition` to the partition name. For example:

```
com.dorado.mediation.routing.rcellmedPartition=172.16.0.0;255.255.0.0
```

The syntax for routing configuration values is as follows:

```
ipAddress;mask[ , ipAddress;mask]
```

Basically, you can add more IP and mask pairs as comma delimited values. If you omit the mask, then the OpenManage Network Manager (OMNM) installer assumes it is 255.255.255.255. If you omit the IP address, then the OMNM installer assumes the address is the Mediation server’s IP address. If an IP address or mask is not valid, a warning appears once in the Application server log when the properties load. If one of several values for a single property is not valid, the OMNM installer still applies the other setting.

The Application server itself performs mediation when no agents are available. This is required unless your deployment includes at least one Mediation server. All Application servers in a cluster must have the same configuration. To disable mediation services on an Application server after you configured a distributed Mediation server elsewhere, add the following property on the Application server (preferably in `installed.properties`):

```
oware.appserver.mediation.setup=false
```

## Understanding Best Practices

Here is a list of best practices related to OpenManage Network Manager (OMNM) installation.

**Table 2-4. Installation Best Practices**

System/Component	Best Practice
Single Server Hardware	<ul style="list-style-type: none"> <li>Review and understand the different deployment options and requirements</li> <li>Choose expandable hardware for future expansion</li> <li>Use a single server for ease of management and deployment</li> </ul>
High Availability (HA) Hardware	<ul style="list-style-type: none"> <li>Use as few as two servers for ease of management</li> </ul>
IP Address	<ul style="list-style-type: none"> <li>Have a permanent IP address for your system</li> <li>Refer to the “Fixed IP Address” instructions in the <i>OpenManage Network Manager User Guide</i> if your system uses DHCP and the IP address changes after a completed installation</li> </ul>

## Ports Used

The OpenManage Network Manager (OMNM) application uses the following ports. Make sure that your firewalls or other network security measures do not block these ports.

Port Number	Used by...
1098	Naming service (JNDI)
1099	Naming service (JNDI)
3100	HA Naming Service (JNDI)
3200	HA Naming Service (JNDI RMI)
4444	JRMP invocation (RMI)
4445	Pooled JRMP invocation (RMI)
6500 to 6510	Mediation cut-through
8080	HTTP
8443	HTTPS
8093	JMS

The client HTTP cut-through goes directly to the device from the client. So, you must get to devices through port 8080 to cut-through to the embedded Web server. Telnet cut-through goes directly to the Application server as a proxy on ports 6500-6510.

The following ports are seldom required, but are listed here in case present or future functionality requires them:

Port	Used by...
23	Telnet
1103	JNP Discovery
1123	JNP REPLY

# Linux Disk Partition Information

Suggested partitioning includes separation into several partitions including `/`, `swap`, `/usr`, `/opt`, and `/export/home`.

Partition	Description
<code>/ (root)</code>	The root partition contains everything that is not specifically placed on a slice/partition. The rule of thumb here is: Do not put data on this partition that is likely to grow significantly (logs, applications, data, and so on). This partition can be as little as 200MB, however best practice indicates as much as 2GB if space is available.
<code>swap</code>	<p>The space allocated for the operating system to use as part of its virtual memory to augment physical memory. If something in memory has not been used for a while, the operating system will move it to disk temporarily. Recommendations for this are typically for two to three times the physical memory, however we usually determine the amount available based on physical memory. If you have 512MB, specify 1.5-2.0GB. As physical memory increases, still specify 1-2 times the physical memory so you have enough disk space for the operating system. The following are instructions about setting swap:</p> <ol style="list-style-type: none"> <li>1 Check your current swap space setting with <code>swap -l</code> <code>su</code> to root (if not already).</li> <li>2 Issue <code>mkfile (size required) (filename)</code></li> <li>3 Execute <code>swap -a (pathname)</code>. This adds the swap file. You <i>must</i> use an absolute path name</li> <li>4 Check with <code>swap -l</code> to confirm the new swap addition.</li> </ol>
<code>/usr</code>	Typically holds operating system commands and utilities related to the operating system. <code>/usr</code> can also contain the documentation associated with these commands. This partition should be a minimum of 1.5GB for a full installation. Best practice is to specify 2GB and potentially more if you know you will be adding operating system utilities.
<code>/etc</code>	We recommend this be located on the root partition, not on its own partition. The data here may change from time to time, but the typically does not grow significantly.
<code>/var</code>	Best practice is to create a partition for <code>/var</code> . This contains the syslog data, print spool, mail, and so on. This partition could grow significantly from the required amount of disk space depending on the applications running on the system. We recommend you allow at least 2GB.
<code>/opt</code>	The <code>/opt</code> partition holds application software that is added to the system. OpenManage Network Manager would be an application that should be installed here. The size of this partition should depend on the required disk space for applications including OpenManage Network Manager. Both the application's software and data reside in the same directory structure, however, so you can add more volumes to another partition.
<code>/export/home</code>	<code>/export/home</code> is typically for user data. Most systems have user home drives specified in this space (for example: <code>/export/home/auser</code> ). This should have enough space for all user data.
<code>/<code>&lt; some_partition_name &gt;</code></code>	With a RAID configuration, you can specify a large amount of disk space for data purposes.



## Installing Single-Server Deployment

Before installing the OpenManage Network Manager product, make sure that you have performed all the pre-installation tasks discussed in [Preparing for Installation](#) on page 13.

For a description of the installation wizard and the different fields and options, see [Single-Server Installer](#) on page 84.

This section covers the following single-server installation information and tasks:

[Single-Server Hardware Requirements](#) – 30

[Installing on Windows](#) – 32

[Installing on Linux](#) – 34

[Installing OMNM Silently](#) – 36

[Installing from the Command Line](#) – 37

[Upgrading an Existing Installation](#) – 39

[Uninstalling the Application](#) – 45

See [Completing Post-Installation Tasks](#) on page 65 for setup tasks, such as [Getting Started Tasks](#) and [Changing Default Passwords](#) that you perform after installation.

# Single-Server Hardware Requirements

The single server hardware guidelines provide suggested sizing for your OpenManage Network Manager system (Table 3-1).



## CAUTION:

These hardware requirements assume you have a host dedicated to **only** the OpenManage Network Manager application. Other applications may compete for ports or other resources and can impair the system's performance.

When estimating the size of a deployment, it is important to understand the applications configurations in the target environment. For example, the most resource-intensive, demanding applications are Traffic Flow Analyzer (TFA), Event Management, and Performance Monitoring.

The **minimum hardware required** is 8-GB RAM, dual core CPU (2.8-GHz or better), 200-GB 10,000-RPM disk, which supports:

- Standalone single-server installations with **minimal** use of high-resource demanding applications
- Distributed installation of a single component server, such as Application server only, Mediation server only, Database server only, or Web server only.

The **minimum hardware recommended** is 10-GB RAM, four-core or more CPU (2.8-GHz or better), 400-GB 10,000-RPM disk, which supports:

- Standalone

If the network you manage exceeds these parameters, or your system monitors more devices than your hardware can handle, consult your sales representative about upgrading to a more robust or multi-server OpenManage Network Manager version.

Table 3-1. Single Server Hardware Requirement Guidelines (Sheet 1 of 3)

Max. Managed Devices	64-bit Operating System: Disks/RAM/Hardware/Core (CPU)	Max. Concurrent Users	Performance Monitor Max. Targets	Max. Traffic Flow Exporters	Suggested Heap Memory Settings
25	8GB RAM, single disk, consumer level PC/2-4 Core	5	2500	5	Use defaults: (3GB Application server heap, 512M database, 2GB Synergy Web server)
50	10GB RAM, single disk, consumer level PC/2-4 Core	8	5000	5	3-6GB Application server heap, 512M database buffer, 2G Synergy Web server
100	12GB RAM, single disk, consumer level PC/2-6 Core	10	10000	10	4-7GB Application server heap, 1GB database buffer, 3GB Synergy Web server
175 - 250	14GB RAM, single disk, business level PC/4-6 Core	15	25000	25	4-9GB Application server heap, 1GB database buffer, 3GB Synergy Web server
300 - 500	16GB RAM, single disk, business level PC/4-6 Core	25	50000	50	5-10GB Application server heap, 2GB database buffer, 3GB Synergy Web server

Table 3-1. Single Server Hardware Requirement Guidelines (Sheet 2 of 3)

Max. Managed Devices	64-bit Operating System: Disks/RAM/Hardware/Core (CPU)	Max. Concurrent Users	Performance Monitor Max. Targets	Max. Traffic Flow Exporters	Suggested Heap Memory Settings
1000	18GB RAM, multi-disk, server level PC /6-8 Core	50	100000	100	8-12GB Application server heap, 3GB database buffer, 5GB Synergy Web server
2000	32GB RAM, multi-disk, server level PC. Recommend fast disk array or SSD drive array for the large number of database actions. /6-8 Core	100	200000	100	10-14GB Application server heap, 8GB database buffer, 8GB Synergy Web server
2500	40GB RAM, multi-disk, server level PC. Recommend fast disk array or SSD drive array for the large number of database actions. /6-8 Core	125	250000	125	12-16GB Application server heap, 10GB database buffer, 12GB Synergy Web server
3000	48GB RAM, multi-disk, server level PC. Recommend fast disk array or SSD drive array for the large number of database actions. /8-12 Core	150	400000	150	14-16GB Application server heap, 10GB database buffer, 12GB Synergy Web server
5000	64GB RAM, multi-disk, server level PC. Recommend fast disk array or SSD drive array for the large number of database actions. /10-14 Core	175	600000	200	20-24GB Application server heap, 16GB database buffer, 16GB Synergy Web server
7500	80GB RAM, multi-disk, server level PC. Recommend fast disk array or SSD drive array for the large number of database actions.	200	850000	250	28-32GB Application server heap, 20GB database buffer, 20GB Synergy Web server
10000	128GB RAM, multi-disk, server level PC. Recommend fast disk array or SSD drive array for the large number of database actions. 14+ Core	225	1000000	300	38-44GB Application server heap, 24GB database buffer, 24GB Synergy Web server

Table 3-1. Single Server Hardware Requirement Guidelines (Sheet 3 of 3)

Max. Managed Devices	64-bit Operating System: Disks/RAM/Hardware/Core (CPU)	Max. Concurrent Users	Performance Monitor Max. Targets	Max. Traffic Flow Exporters	Suggested Heap Memory Settings
Unlimited/HA	OMNM can support an unlimited RTM (device count) license where there is no limit on the number of managed devices in inventory. There are many factors to consider when sizing with an unlimited license. High Availability (HA) deployment options are also available. Environments managing over 5000 elements should consider an HA deployment. Custom sizing can be provided if you are considering an HA license or the unlimited license. See <a href="#">Verifying System Requirements</a> on page 15 for more information on sizing.				

## Installing on Windows

Install the OpenManage Network Manager (OMNM) application on a single-server Windows system as follows.

- 1 Log in with administrative permissions on the Windows host where you want to install the software.
- 2 Download the OMNM package to your local host in a temporary location.
- 3 Navigate to the win\_install.exe file and then run it.  
The Security Warning window is displayed.
- 4 Click Run.  
A confirmation message is displayed.
- 5 Click Yes.  
The installation wizard automatically launches. If the installer does not start automatically or if you disabled autorun, navigate to the install directory and then run win\_install.exe using a file manager.
- 6 Read and navigate through the Introduction and Software Requirements information.
- 7 Accept the license agreement.  
You must accept the license agreement to continue.
- 8 Select the Express Install or Custom Install type.  
If you selected an **express installation**, continue with step 9. If you selected a **custom installation**, continue with step 11.
- 9 Provide the following information if prompted:
  - Number of managed devices
  - Network Interface  
If multiple network interfaces were detected on your local machine, select the network address to be used by this software. If your Windows version does not support the installer finding the host's IP address, you are prompted for an IP address and Partition Name for your installation.

After your selections, your system is scanned for database or port conflicts. If you receive any errors, resolve them before continuing. For example, an existing MySQL service displays an error or the following running processes could cause a port conflict:

- SNMP service (161)



- Anti-Virus application (25)
- 10 Continue with step 12.
- 11 Provide the following information if prompted:
- Installation Folder
  - Network Interfaces
- If multiple network interfaces were detected on your local machine, select the network address to be used by this software. If your Windows version does not support the installer finding the host's IP address, you are prompted for an IP address and Partition Name for your installation.
- Heap Settings
  - MySQL Setup
  - Windows Firewall Access
- After your selections, your system is scanned for database or port conflicts. If you receive any errors, resolve them before continuing. For example, an existing MySQL service displays an error or the following running processes could cause a port conflict:
- SNMP service (161)
  - Anti-Virus application (25)
- 12 Click Install.
- If you select Yes, the Server Status Console displays the Application server, Web server, and Database server initialization status so you know when all the servers are running.
- If you select No, you need to verify that the appserver status shows ready by doing one of the following:
- Roll over the appserver tool in the system tray.
  - Enter `pmgetstatus` from the command line.
- 13 Click Done.
- By default, the servers automatically start after the installation successfully completes.
- 14 Verify your installation as follows.
- a. Start the application by doing one of the following:
    - Click Launch Web Port from the Server Status Console window.
    - Enter the following URL from your browser:  
`http://hostID:8080/login`  
 For the host ID, enter either the IP address or host name.
  - b. Sign in with the default credentials:  
`username=admin`  
`password=admin`
  - c. Set a password reminder.
  - d. Click Save.
- The OpenManage Network Manager Home page is displayed and you are ready to start [Completing Post-Installation Tasks](#) on page 65 for use. Otherwise, resolve issues before continuing.

## Installing on Linux

### △ CAUTION:

If your Linux package already installed a version of the MySQL database, uninstall that database before proceeding. **Also:** Do not configure and/or install a database larger than the available disk space.

Install the OpenManage Network Manager (OMNM) application on a single Linux information system as follows.

- 1 Log in as a non-root user from an ssh terminal window or GNOME desktop.  
The non-root user must have permission to create directories in the selected installation path. Installing to a directory that requires root-level access fails.

- 2 Start the installer using one of the following methods:

- Download the OMNM package to your local host in a temporary location and then enter the following commands on Linux:

```
cd /MyInstallPath/  
./linux_install.bin
```

If you want to run the installer from the command line, see [Installing from the Command Line](#) on page 37.

- Mount the network drive containing the OMNM package and then run:

```
/mounted directory/linux_installer.bin
```

The installation wizard starts.

- 3 Read and navigate through the Introduction and Software Requirements information.
- 4 Accept the license agreement.  
You must accept the license agreement to continue.
- 5 Select the Express Install or Custom Install type.  
If you selected an **express installation**, continue with step 6. If you selected a **custom installation**, continue with step 8.
- 6 Provide the following information if prompted:

- Number of managed devices
- Network Interface

If multiple network interfaces were detected on your local machine, select the network address to be used by this software. If your Windows version does not support the installer finding the host's IP address, you are prompted for an IP address and Partition Name for your installation.

After your selections, your system is scanned for database or port conflicts. If you receive any errors, resolve them before continuing. For example, an existing MySQL service displays an error or the following running processes could cause a port conflict:

- SNMP service (161)
- Anti-Virus application (25)

- 7 Continue with step 12.

8 Provide the following information if prompted:

- Installation Folder
- Network Interfaces

If multiple network interfaces were detected on your local machine, select the network address to be used by this software. If your Windows version does not support the installer finding the host's IP address, you are prompted for an IP address and Partition Name for your installation.

- Heap Settings
- MySQL Setup
- Windows Firewall Access

After your selections, your system is scanned for database or port conflicts. If you receive any errors, resolve them before continuing. For example, an existing MySQL service displays an error or the following running processes could cause a port conflict:

- SNMP service (161)
- Anti-Virus application (25)

9 Click Install.

If you are installing on Linux, you must run a setup script in a separate shell, logged in as root user. The installer prompts you to run a generated script after the install phase finishes. This script records information in case you need technical assistance and installs some files as root. Open a new shell, log in as root, and run the listed script:

```
installPath/install/root/setup.sh
```

This script installs some essential environment files. It does not check for patches (the installation does that).

If you select Yes, the Server Status Console displays the Application server, Web server, and Database server initialization status so you know when all the servers are running.

If you select No, you need to verify that the appserver status shows ready by doing one of the following:

- Roll over the appserver tool in the system tray.
- Enter `pmgetstatus` from the command line.

10 Click Done.

By default, the servers automatically start after the installation successfully completes.

11 Verify your installation as follows.

a. Start the application by doing one of the following:

- Click Launch Web Port from the Server Status Console window.
- Enter the following URL from your browser:

```
http://hostID:8080/login
```

For the host ID, enter either the IP address or host name.

b. Sign in with the default credentials:

```
username=admin
```

```
password=admin
```

- c. Set a password reminder.
- d. Click Save.

The OpenManage Network Manager Home page is displayed and you are ready to start [Completing Post-Installation Tasks](#) on page 65. Otherwise, resolve issues before continuing.

## Installing OMNM Silently

Linux systems support OpenManage Network Manager (OMNM) silent installation where the installer runs without any user interaction. A near-silent mode is also possible on a Windows system. Set installer and user-defined variables in a response (properties) file. The installer automatically creates a sample properties file during a normal installation and saves it in your installation's root directory. For example:

```
/installPath/sample_installer.properties
```

Install OMNM silently from a command line as follows.

- 1 Navigate to an existing installation you wish to recreate.
 

```
cd /openmanage/networkmanager/
```
- 2 Copy the sample\_installer.properties file into your installer's directory.
 

```
cp sample_installer.properties /homeDir/install/Disk1/InstData/
```
- 3 Rename the sample\_installer.properties file to installer.properties.
 

```
mv sample_installer.properties installer.properties
```
- 4 Edit the properties file as needed using a text editor.
- 5 Start the silent installer by entering one of the following commands:

```
installername -i silent
```

The installer automatically checks the current directory for a file called installer.properties or *installername.properties* and then executes the silent installation.

```
installername -f properties file
```

Calls the properties file and then executes the installation. You may use the direct or the relative path to the properties file.



### NOTE:

If you specify the properties file, it must include the following property to trigger silent mode.

```
INSTALLER_UI=silent
```

By default, the servers automatically start after the installation successfully completes.

- 6 Verify your installation as follows.
  - a. Enter the following URL from your browser:
 

```
http://hostID:8080/login
```

For the host ID, enter either the IP address or host name.
  - b. Sign in with the default credentials:
 

```
username=admin
```

```
password=admin
```

- c. Set a password reminder.
- d. Click Save.

The OpenManage Network Manager Home page is displayed and you are ready to start [Completing Post-Installation Tasks](#) on page 65. Otherwise, resolve issues before continuing.

## Installing from the Command Line

### Installing from the Command Line

You can execute the OpenManage Network Manager (OMNM) installation from the command line. Respond to each prompt to proceed to the next step in the installation. If you want to change something on a previous step, enter `back`. Cancel this installation at any time by entering `quit`.

The text prompts are equivalent to the graphic interface prompts. If you need detailed information on the different installer options, see [Installation User Interface](#) on page 83.

The installation process installs program files, does setup functions, and performs the initial database load.

The instructions are the same for Linux and Windows systems except where noted.

The following system files may be modified during root installation on a Linux system:

```
/etc/.dsienv - installed
/etc/init.d/oware - installed
/etc/init.d/owaredb - installed
/etc/init.d/synergy - installed
```

Install OMNM in console mode from the command line as follows.

- 1 Navigate to the installer's executables.
 

```
cd /userDir/install/
```
- 2 Enter the following command appropriate for your operating system:
 

```
win_install.exe -i console
./linux_install.bin -i console
```

 The command line installer starts.
 

```
Launching installer...
...
PRESS <ENTER> TO CONTINUE:
```

 Informational content shows, such as minimum system requirements.
- 3 Press Enter through the informational content.
- 4 Enter whether you want an Express Install (1) or Custom Install (2).
- 5 Follow the remaining prompts for your selected installation.

When the installation is complete, a successful/unsuccessful message is displayed. If successful, press Enter to exit. Otherwise, follow the instructions provided for an unsuccessful installation. Also see, [Troubleshooting Installation Issues](#) on page 79.

If you installed a MySQL database to a separate host in console mode, you must run `loaddb`, `loaddb -s`, and then run `ocpinstall -s`, all from the Application server installation console.

By default, the servers automatically start after the installation successfully completes.

6 Verify your installation as follows.

a. Enter the following URL from your browser:

```
http://hostID:8080/login
```

For the host ID, enter either the IP address or host name.

b. Sign in with the default credentials:

```
username=admin
```

```
password=admin
```

c. Set a password reminder.

d. Click Save.

The OpenManage Network Manager Home page is displayed and you are ready to start [Completing Post-Installation Tasks](#) on page 65. Otherwise, resolve issues before continuing.

# Upgrading an Existing Installation

For a description of the installation user interface and the different fields and options, see [Installation User Interface](#) on page 83.

- [Upgrading from a Previous Version](#)
- [Backing Up the Database](#)
- [Restoring Databases](#)
- [Upgrading on Windows](#)
- [Upgrading on Linux](#)
- [Importing the OMNM MySQL Database](#)

## Upgrading from a Previous Version

When you upgrade your OpenManage Network Manager installation from a previous version, keep the following topics in mind, as they apply:

- [User Validation](#)
- [Upgrading Your Operating System](#)
- [General Upgrade Advice/Information](#)

### User Validation

The installer in recent versions prevents installation as `root` user in Linux.

### Upgrading Your Operating System

If the OpenManage Network Manager version you plan to install does not support your operating system version, upgrade to a supported operating system before the OpenManage Network Manager upgrade. Upgrade your operating system as follows.

- 1 Back up the database.
  - For instructions about backing up all databases, see [Backing Up the Database](#) on page 40.
- 2 Upgrade the operating system.
- 3 Install the original OpenManage Network Manager version on the new operating system.
- 4 Restore the database.
- 5 Proceed with the OpenManage Network Manager upgrade.

See [Restoring Databases](#) on page 41 for instructions about restoring databases.

### General Upgrade Advice/Information

- Make sure that you log out of the operating system between installations.
- Make sure that you have a new license, which is required to activate new features.
- Close and re-open browsers when upgrading.
- The following require manual migration (export, then import) from previous versions: SMTP settings, some Scheduler items, Custom Adaptive CLIs. Some schedules may require deletion/re-making. If you open them and they are blank, use this method.
- You must re-create topologies.
- User Names/Passwords, and User Groups (Roles) are not automatically reassigned and must be created again manually.
- The default password policy has no restrictions on password length.

- Adaptive CLI with Perl scripts must contain valid Perl under the “strict” pragma (use `strict ;`). If you import or migrate from a previous version a Perl script that does not pass this “strict” criterion, you must rewrite it for “strict” compliance before you can successfully edit or copy it.
- Any configured color changes to the portal may not persist and must be re-made manually. Similarly, customized page layouts or page order may not persist and you must typically re-arrange them manually.
- After upgrade or installing new features or module you may need to reset newly available permissions. New permissions permit no access by default. To see them, any administrator user can look in the Permissions in Control panel. If you select the administrator role and see an enabled *Add* button, then upgrading added new permissions. View and change any permissions not assigned after clicking *Add*.
- If you upgrade, some device information may not appear. If this occurs, delete and rediscover the device after upgrading. This is true of the population of Groups. When upgrading, to get the correct population of device groups some times, you must delete the Group (for example: Dell PowerConnect) before doing the upgrade.
- If upgrade, or any installation, has difficulties, troubleshoot by searching for “error” in `[installation root]\install.log`.
- Upgrading to a different path than the default may cause path/shortcut errors.
- Upgrade may require resetting Config File portlet permissions.
- Expect first Application server restart after upgrade to be slower than usual.
- When vendors re-brand their devices, previously supported devices may appear with 6027 as vendor. Essentially, you must delete the 6027 vendor, re-seed the relevant driver, re-start Application server and re-discover the devices to remedy this.
- Note that some OpenManage Network Manager components may trigger virus detection. You can either ignore such warnings or turn off your virus checker before installing.
- Make sure that you know how the old dashboard is setup before upgrading. Some upgrades require you to re-create performance dashboards.
- Note that any time you cancel an installation in progress, remnants of the installation may remain. Uninstall can leave remnants too.
- Run the `dbpostinstall` script on the (primary) Application server too whenever you upgrade your system and your database is on a separate server.
- Log out and log back in to OpenManage Network Manager for any permission change to take effect.

## Backing Up the Database

To back up your database, open a command shell (*Start > Run cmd*, in Windows), and then type the following at the prompt replacing USERNAME and owbusdb. By default, the database is owbusdb, user name is root and password is dorado.

```
mysqldump -a -u USERNAME --password=[name] owbusdb > FILENAME.mysql
```

If you have Performance monitors or Traffic Flow Analyzer, you must also back up your stored procedures otherwise they do not get restored when you restore the database. The command line here adds `--routines`. For example:

```
mysqldump -a -u root --password=dorado --routines owbusdb > owbusdb.mysql
```

This writes the owbusdb to a plain-text file called `FILENAME.mysql` (`owbusdb.mysql` in our examples). This file is a full backup with which you can fully restore your database in case of problems.



Defaults for the database are `oware` (login) and `dorado` (password). These are typically different from the login/password for the application.



#### NOTE:

To get a rough estimate of a database's size, looking at the size of the directory [installation root]\oware3rd\mysql\data.

Here are the backup commands for all the databases:

```
mysqldump -a -u root --password=dorado owbusdb > owbusdb.mysql
mysqldump -a -u root --password=dorado owmetadb > owmetadb.mysql
mysqldump -a -u root --password=dorado lportal > lportal.mysql
mysqldump -a -u root --password=dorado synergy > synergy.mysql
```

To backup stored procedures too:

```
mysqldump -a -u oware --password=dorado --routines owbusdb > owbusdb.mysql
```

## Restoring Databases

Restore your MySQL database from the *filename.mysql* file from the command line as follows.

- 1 Drop the database using one of the following commands:

```
mysqladmin -u USERNAME -p drop owbusdb
mysqladmin -u USERNAME --password=[password] drop owbusdb
```

- 2 Recreate the database using one of the following commands:

```
mysqladmin -u USERNAME -p create owbusdb
mysqladmin -u USERNAME --password=[password] create owbusdb
```

- 3 Import the backup data using one of the following commands:

```
mysql -u USERNAME -p owbusdb < FILENAME.mysql
mysql -u USERNAME --password=[password] owbusdb < FILENAME.mysql
```

Here are restoration commands for all the databases:

```
mysql -u root --password=dorado owmetadb < owmetadb.mysql
mysql -u root --password=dorado owbusdb < owbusdb.mysql
mysql -u root --password=dorado lportal < lportal.mysql
mysql -u root --password=dorado synergy < synergy.mysql
```

Whenever you upgrade your system and your database is on a separate server, you must run the `dbpostinstall` script on the (primary) Application server too.

## Upgrading on Windows

This section provides the steps for [preparing](#) your Windows system for an upgrade and then [running the installer](#).

### Preparing to Upgrade on Windows

As with a standard install, make sure that you can communicate with the network.

If the Application server automatically starts during installation, the Web and Application servers start as a service. Programs that run as a service **do not** trigger a Windows Firewall notification that allows you to grant firewall access to the program. Additionally, MySQL always runs as a service.

If you are running a domain profile that implements the firewall setting with a Group Policy, the rules added by the OMNM installer may be overridden.

Prepare to upgrade your OMNM version on a Windows system as follows.

- 1 Back up the database to another machine and any other resources that need manual installation. The backup is stored in the *installPath*/backup.sql directory. See [Upgrading from a Previous Version](#) on page 39 for more specifics.
- 2 Make sure that you export the system settings if you modified the default settings.
- 3 End SNMP service from the Task Manager if it is running.  
This service causes a port 161 conflict during installation, which must be resolved before continuing.

Now you are ready to get started [Running the Installer](#).

## Running the Installer

Run the installer as follows.



### NOTE:

The installer automatically stops the Application and Web servers during an upgrade.

- 1 Download the OMNM package to your local host in a temporary location.

- 2 Start the installer:

```
win_install.exe
```

The install files are automatically extracted and the installation wizard begins.

- 3 Accept the license agreement to start the upgrade process.

- 4 Answer each prompt appropriately.

If you did not backup your database before starting the update, you are given one more chance to do so. The database backup is stored in the *installPath*/backup.sql file. For example:

```
installPath\OpenManage\Network Manager\backup.sql
```

If you elect not to rebuild the database, the update still re-seeds the system settings.

If you encounter port conflicts, resolve them before continuing.

The servers automatically start when the update finishes. You may need to reboot the server if your performance monitor information does not appear.

If you are running either MySQL or Oracle as your database on a separate server, you must also run `dbpostinstall` on the (primary) Application server before starting your system.

If your upgrade fails, see the `db_setup.log`, `install.log`, or `app_setup.log` file in the destination directory for messages that may help fix the failure.

## Upgrading on Linux

This section provides the steps for [preparing](#) your Linux system for an upgrade and then [running the installer](#).

## Preparing to Upgrade on Linux

This section summarizes the steps to take to prepare for an OpenManage Network Manager (OMNM) application upgrade on a Linux system.

Prepare to upgrade your OMNM version on a Linux system as follows.

- 1 Back up the database to another machine and any other resources that need manual installation. The backup is stored in the *installPath*/backup.sql directory. See [Upgrading from a Previous Version](#) on page 39 for more specifics.

For example, backup your OMNM MySQL database to another machine or network drive with the following commands:

```
mysqldump -a -u root --password=dorado --routines owbusdb > owbusdb.mysql
mysqldump -a -u root --password=dorado owmetadb > owmetadb.mysql
mysqldump -a -u root --password=dorado lportal > lportal.mysql
```

The password may be different than the default (dorado).

- 2 Upgrade your operating system if needed before upgrading the OMNM application. Make sure that the Linux upgrade does not include the MySQL database. If it does, remove it after the upgrade and then import the OMNM MySQL database (see [Importing the OMNM MySQL Database](#) on page 44 for instructions).
- 3 Make sure that you export the system settings if you modified the default settings.
- 4 Verify that the current installation's Application server starts without exceptions.

Now you are ready to get started [Running the Installer](#).

## Running the Installer

These instructions assume that you have already backed up your database and other necessary configurations requiring a manual backup. If you have not already done the backups or prepared your system for an upgrade, see [Preparing to Upgrade on Linux](#) on page 43 before continuing.

Run the installer as follows.



### NOTE:

The installer automatically stops the Application and Web servers during an upgrade.

- 1 Login as a non-root user, such as synergy.
- 2 Upload the OMNM package to your home directory, such as /home/synergy.
- 3 Modify the linux\_install.sh and linux\_install.bin permissions to allow their execution.

```
cd version/install
chmod +x linux_install.bin
cd Disk1/InstData
chmod +x linux_install.bin
```

- 4 Start the installer:
 

```
./linux_install.bin
```
- 5 Accept the license agreement to start the upgrade process.

A message that an existing installation was detected and this will be an upgrade. Also noted are the installed features. Click Enter to continue. Otherwise, enter quit to cancel the upgrade.

- 6 Answer each prompt appropriately.

If you did not backup your database before starting the update, you are given one more chance to do so. The database backup is stored in the *installPath/backup.sql* file by default.

If you elect not to rebuild the database, the update still re-seeds the system settings.

If you encounter port conflicts, resolve them before continuing.

The servers automatically start when the update finishes. You may need to reboot the server if your performance monitor information does not appear.

If you are running either MySQL or Oracle as your database on a separate server, you must also run `dbpostinstall` on the (primary) Application server before starting your system.

If your upgrade fails, see the `install.log`, `db_setup.log` or `app_setup.log` file in the destination directory for messages that may help fix the failure.

## Importing the OMNM MySQL Database

Upgrades sometimes fail, operating system upgrades could cause database issues, and you may need to revert back to the database before the upgrade. Make sure that you back up your database before doing any kind of an upgrade.

Import the OMNM MySQL database as follows.

- 1 Shutdown the Application server and Web server.

- 2 Confirm no running java process exists.

```
ps-ef | grep java
```

- 3 Kill any existing java processes.

- 4 Drop the database with the following command lines:

```
mysqladmin -u root --password=dorado drop owmetadb
```

```
mysqladmin -u root --password=dorado drop owbusdb
```

```
mysqladmin -u root --password=dorado drop lportal
```

- 5 Create a new database with the following command lines:

```
mysqladmin -u root --password=dorado create owmetadb
```

```
mysqladmin -u root --password=dorado create owbusdb
```

```
mysqladmin -u root --password=dorado create lportal
```

- 6 Import the backed up database:

```
mysql -u root --password=dorado owmetadb < owmetadb.mysql
```

```
mysql -u root --password=dorado owbusdb < owbusdb.mysql
```

```
mysql -u root --password=dorado lportal < lportal.mysql
```

- 7 Start the Application server by entering the `#service oware start` command.

- 8 Enter `service oware status` to verify that the Application server is ready.

- 9 Start the Web server by entering the `#service synergy start` command.

- 10 Enter `service synergy status` to verify that the Web server is ready.

- 11 Login to the Web client and confirm that the data imported correctly.

# Uninstalling the Application

Use Control Panel to uninstall in Windows. Uninstall by running the following on Linux:

```
$OWARE_USER_ROOT/uninstall
```

No graphic wizard appears, and you must respond to the command-line prompts as they appear.

You can uninstall the software by using Windows' control panel's *Add/Remove programs* feature (or from a Windows command prompt with %OWARE\_USER\_ROOT%\uninstall.lnk), or by running one of the following on Linux:

```
$OWARE_USER_ROOT/_uninst/linux_uninstall
```

For console mode, run one of the following

```
$OWARE_USER_ROOT/uninstall -I console
```



## NOTE:

If you uninstall in a shell rather than using the graphic uninstaller, uninstaller cannot uninstall its own directory. This produces some errors you can safely ignore in a console uninstallation. Use `cd /opt` and then `rm -rf [installation target directory]` to do final cleanup.

In graphic uninstallation, as in installation, click *Next* to continue through the screens as they appear. One such screen appears listing what you want to uninstall. Confirm that you want to remove all the listed installed components. You can optionally delete all the applications' files and directories (complete removal).



## CAUTION:

Uninstallation on MySQL servers may delete the database and any application directories. The applications' directories also contains any installed application components and device drivers.

The option to delete directories is primarily to support application developers having to uninstall and re-install the basic application platform without losing component files (like device drivers) on disk that were not part of the installation.

Deletion is recommended, but not required. It removes files created after installation; temp files, database files, cache files, and files extracted from OCP/DDP files. Overall, it is the best way to get a clean uninstallation.



## NOTE:

You can back up your `oware/lib/*.properties` files or overrides before uninstalling if you want to preserve them. An alternative is overriding properties. Refer to the *OpenManage Network Manager User Guide* for more on overriding properties.

When the software has been completely uninstalled on Windows, if prompted, you must reboot your computer to complete deletion of any locked files. Best practice is to reboot right away.

Uninstalling removes all installed files and files created by using the installed system (that it has permission to delete). It does *not* remove directories that were not created by this application's installation or runtime. User-created directories in the product's directory path remain after product removal.



## NOTE:

Uninstaller may freeze on hosts with inadequate resources. **Also:** The uninstaller deletes `uninstall.exe`, if you press the cancel button. After the canceling uninstallation, several directories and files remaining on disk that require manually deletion to completely uninstall.



# Installing Virtual Appliance

The OpenManage Network Manager (OMNM) Virtual Appliance, or virtual machine (VM) is a single .ova file, compatible with VMware® products including VMWare ESX®, VMware Workstation and VMware Player.



## NOTE:

This section assumes that the user has in depth Linux and VMware administration knowledge.

The section assumes that the VM is a standalone server and client access comes from a client browser from another host. If you need client access directly on the VM, you must install a compatible browser on the VM.

For best experience and use of time, allocate sufficient resources during the trial period so that you can evaluate the full set of features. Use the many online resources available.

For more about resource requirements, see [Single-Server Hardware Requirements](#) on page 30 in this guide for a conventional installation. You may also get additional information, videos, and access to support and a knowledge base from the website where you downloaded the software.

The OMNM application is already installed on the Virtual Appliance. This section describes the process to configure the OMNM application as a virtual appliance for your environment. The instructions assume you installed and configured the hypervisor that will be the host for the Virtual Appliance. For additional information about installing and configuring the ESX products, or other VMware hypervisors, consult your VMware documentation.

The [Quick Start the Virtual Appliance](#) steps should be enough to get the VM up and running in your environment. If you encounter issues or need more detailed steps, see the following sections:

[Quick Start the Virtual Appliance – 48](#)

[Detail Steps to Start OMNM Virtual Appliance – 49](#)

[Upgrading the VM – 53](#)

[Troubleshooting VM Installation – 54](#)

Read the entire section before you start your Virtual Appliance (VM) installation. Once you complete VM installation, see the [Getting Started Tasks](#) on page 66 and [Upgrading the VM](#) on page 53 post-installation tasks.

## Quick Start the Virtual Appliance

Get started quickly by importing and starting the Virtual Appliance as follows.

- 1 Import the .OVA file and power on.

We recommend you review [Understanding Prerequisites](#) on page 49.

- 2 Start the VM and login with:

```
user= synergy  
password=synergyP@$
```

- 3 Run the ./setup command.

- 4 Select Option #1 for initial VM configuration.

This configures the VM's static IP address and installs the 30 day trial license.

- 5 Restart the VM.

- 6 Go to the ./setup menu.

- 7 Run the "Check server status option" from the ./setup menu.

This allows you to confirm server startup.

- 8 Enter the following URL from your browser:

```
http://yourIP:8080
```

- 9 Sign in with the default credentials:

```
username=admin  
password=admin
```

Your VM environment should be up and running.

- 10 Complete the [common setup tasks](#).

If you encounter issues or need more detailed steps, see the following sections:

- [Detail Steps to Start OMNM Virtual Appliance](#)
- [Upgrading the VM](#)
- [Troubleshooting VM Installation](#)



## Detail Steps to Start OMNM Virtual Appliance

This section provides detailed steps for importing/configuring and starting the Virtual Appliance. The [Quick Start](#) section shows you how to get the appliance up and running quickly with no issues. This section is intended for users that are experiencing issues during the quick start or if more information is needed regarding the process.

To configure the OpenManage Network Manager (OMNM) application as a virtual appliance, follows these step:

- 1 [Understanding Prerequisites](#)
- 2 [Deploying the OVA Template](#)
- 3 [Starting the Virtual Machine](#)
- 4 [Completing the Initial VM Host Configuration](#)
- 5 [Starting the Application](#)
- 6 [Getting Started Tasks](#) (this is a post-installation setup task)

Before putting the OMNM Virtual Appliance into a production environment, make sure that you change the MySQL. See [Securing MySQL Passwords](#) on page 67 for detailed instructions.

### Understanding Prerequisites

The VM is intended and sized to support trial/evaluation of the OpenManage Network Manager (OMNM) software for up to 100 devices. Other deployments may be supported and may require additional VM configuration. Many factors affect the VM performance. The underlying hardware resources must be able to support the desired deployment configuration. Reconfiguration may require more RAM, hard drives, faster hard drives, CPU/cores, or storage allocated to the VM. Refer to the *OpenManage Network Manager User Guide* for sizing details.

The virtual machine file (.ova) was created with the VMware workstation 9.0.1 and is compatible with following VMware products:

- Fusion 5.0
- Workstation 9.0
- ESX

If the Virtual Appliance requires reconfiguration, you are limited to these maximum resource settings:

- 64 GB memory limit
- 8 processor limit
- 10 network adapter limit
- 2 TB disk size limit

If you need resources in excess of these constraints, you will need to create your own VM by performing a package installation on your new VM. If you need to expand an existing system beyond these limits, you need to follow the database migration procedures to backup the mysql database, re-install the same software version on your target VM, and then restore the database files to the target VM.

Make sure that you have the following:

- A downloaded OpenManage Network Manager.ova file
- The IPv4 address identified for the VM appliance
- The VM host has a connectivity to the target managed devices

- Neither Firewalls nor other restrictions block communication for ICMP, SNMP, FTP, TFTP, SCP, SSH, Telnet, HTTP
- SMTP and internet access are required for notification from OMNM by e-mail as well as for license/subscription renewal
- The following system requirements:

Requirement	Description
Virtual Machine	<p>VM is configured with 1 processor and 4 cores. 6-8 cores are recommended for Production/Non-trial environments with 500-1000 devices.</p> <p>Adjusted the number of cores needed based on the application performance by right-clicking the imported VM and selecting a settings option for adjusting a VM's resources.</p>
CPU	Speed exceeds 3.0 Ghz.
Memory	Minimum 12 GB RAM allocated to the VM.
Disk Space	<p>Minimum 120 GB allocated to the VM.</p> <p>The OMNM VM is pre-set to installation defaults and dynamically grows up to 85 GB. If the VM is used beyond a trial evaluation, you may need more space depending on your specific usage and needs. For example, higher data retention policies for performance, TFA, audit logs, and events increase the database space needs. Allocate more space by increasing the:</p> <ul style="list-style-type: none"> <li>• Space allocated to the VM from the hypervisor (Hypervisor &gt; select the VM &gt; settings)</li> <li>• OMNM mysql database size</li> </ul> <p>Refer to the <i>OpenManage Network Manager User Guide</i> for detailed steps on how to extend the Mysql database size. Consult your VM and/or Linux administrator before adjusting the VM size.</p> <p>The database should consist of 1 or more 10-15K RPM disk, or the equivalent solid state disk for better performance.</p> <p>Make sure that the VMware virtual disk runs on adequately performing physical disk infrastructure. Heavy performance monitoring and TFA requires disk IO speeds that support this configuration.</p> <p>If you plan to use the VM beyond the initial trial configuration, consider some configuration changes to ensure proper system sizing. Refer to the <i>OpenManage Network Manager User Guide</i> for sizing recommendations before converting the trial VM to a production usage. You may need to:</p> <ul style="list-style-type: none"> <li>• Expand the storage capacity to accommodate the workload data and retention preferences.</li> <li>• Allocate additional memory to support a production environment</li> </ul>
Virtual Appliance Software	<p>OMNM runs as a virtual appliance. It requires the following Hypervisors:</p> <ul style="list-style-type: none"> <li>• VMware Workstation v8 or higher</li> <li>• vSphere® Hypervisor (ESXi) 4.1 and higher (must meet virtual appliance, port access, and listening port requirements)</li> </ul>
Ports Use	All necessary ports and firewall settings are pre-configured on this VM. Refer to the <i>OpenManage Network Manager User Guide</i> for ports details.
Browser	<p>This OMNM version supports the latest browser versions:</p> <ul style="list-style-type: none"> <li>• Chrome (V59 and above)</li> <li>• Safari (V10 and above)</li> <li>• Firefox (V54 and above)</li> <li>• Internet Explorer (V11 and above)</li> </ul>

Requirement	Description
Adobe	VM does not come with graphics capabilities to view PDF or run Flash. Remote access is required using a Web browser and there you need: <ul style="list-style-type: none"> <li>Flash Player (32-bit or 64-bit)</li> <li>Reader</li> </ul>
Java	<ul style="list-style-type: none"> <li>1.6 or later</li> </ul>
Screen	<ul style="list-style-type: none"> <li>Screen resolution must equal or exceed 1280 x 1024 pixels. Your screen must be at least 1250 pixels wide.</li> </ul>

Now that all the prerequisites are in place, you are ready to get started [Deploying the OVA Template](#).

## Deploying the OVA Template

You can deploy the Open Virtualization Format (OVA) template with VMware workstation, VMware Player, or ESX. High Availability Deployment options are available for the OpenManage Network Manager (OMNM) software that you can deploy with or without VMs. Contact your sales representative if you are interested in these options. The trial version is not intended to support conversion to a HA platform.



### NOTE:

If you see an error message about in-compatibility or OVF specifications, make sure that you have sufficient disk space and are using a local drive (not a share).

Deploy the OVA template as follows.

- 1 Deploy the OVA template from the VMware Workstation.
  - a. Select File > Open menu.
  - b. Select the Ova File.
  - c. Power on the VM.
- 2 Deploy the OVA Template from the VMware Player.
  - a. Select File > Open Virtual Machine.
  - b. Right-click and then select Play Virtual machine.
- 3 Deploy the OVA Template from the vSphere/ESX server.
  - a. Start the VMware vSphere client.  
The vSphere client is displayed.
  - b. Select File > Deploy OVA Template.
  - c. Select the Deploy from file option and then browse to where you copied the OpenManage Network Manager OVA file.
  - d. Select the OpenManage Network Manager.ova file and then click the Next button.

Continue with [Starting the Virtual Machine](#).

## Starting the Virtual Machine

After you have completed the above steps, you can start the OpenManage Network Manager (OMNM) application in the VM console.



### NOTE:

Before you start the VM console, make sure that you make any needed VM setting modifications by right-clicking the Image to get the menu of options.

- 1 Start the VM by clicking on its name and then selecting Power > Power On.
- 2 Open the VM Console.
- 3 Log in with the default credentials (synergy user).

Username: synergy

Password: synergyP@\$

The synergy user has passwordless sudo privileges.

Continue with [Completing the Initial VM Host Configuration](#).

## Completing the Initial VM Host Configuration

A user setup menu script simplifies VM initialization. Complete the initial VM host configuration from the command line as follows.

- 1 Log in as the synergy user (synergy/synergyP@\$).
- 2 Enter the following command:

```
./setup
```

- 3 Select 1) VM Configuration Menu and follow the prompts.

If the setup is not successful, resolve any issues and then repeat step 3.



### NOTE:

The VM initialization is designed to detect all available ethernet interfaces. Typically this is eth0 or ens32. Make sure eth<zero> is entered when asked. ethO (oh) is not a valid Linux interface and interface configuration will not be successful. If no interfaces are listed, **do not** proceed and **do not** make up an interface name. Contact your VM administrator.

If a customized VM configuration is required to support alternate interfaces, DNS, or other environments, contact your Linux and network administrator.

- 4 Reboot the VM.
- 5 Enter `./setup` and then select the Check Server Status option.

This continuously checks the server status until the servers start successfully. If startup is successful, the following message is displayed.

```
=====
Application server status:---- appserver: ready
Web server Status:----- synergy is running synergy is ready
Database server status:----- owaredb is running
=====
```

Once the VM setup is complete, continue with the configuration by [Starting the Application](#).

## Starting the Application

Follow these steps to start the application.

- 1 Restart the VM if you have not already done so as follows:
  - a. Shut down the Web and Application servers using one of the following:
    - Use option 6 from the `./setup` menu.
    - Use the following commands:
 

```
oware stop
synergy stop
```
  - b. Shutdown the database as follows:
 

```
sudo service owaredb stop
```
  - c. Restart the VM as follows:
 

```
sudo shutdown -r now
sudo service
```



### NOTE:

By default the OpenManage Network Manager servers are configured to automatically start. After restarting the VM, all of the servers should come up and the application is ready soon after startup.

- 2 Confirm that the server is up and running by selecting option 5 from the `./setup` menu.
- 3 Open a browser and enter the following URL:
 

```
http://hostIPAddress:8080
```
- 4 Sign in using the default credentials:
 

```
Username: admin
Password: admin
```

The initial login prompts for a Password reminder for the admin user. This supplies the information for the `Forgot password` link in the login page.
- 5 Set a password reminder and then click Save.
 

The OpenManage Network Manager Home page is displayed. Continue with [Getting Started Tasks](#) on page 66 post-installation setup task.

## Upgrading the VM

Upgrade the OpenManage Network Manager (OMNM) Virtual Appliance/VM similar to a standard Linux upgrade. Upgrade the OMNM Virtual Appliance/VM installation from the command line as follows.

- 1 Transfer the unzipped OMNM installation package to the VM using FTP or mount a share on the VM with access to the OMNM install files.
- 2 Log in as a non-root user, such as synergy.
- 3 Modify the `linux_install.sh` and `linux_install.bin` permissions to allow their execution.
 

```
cd version/install
chmod +x linux_install.sh
cd Disk1/InstData
chmod +x linux_install.bin
```

- 4 Start the installer:

```
./linux_install.bin
```

- 5 Accept the license agreement to start the upgrade process.

A message is displayed indicating that an existing installation was detected and this will be an upgrade. Also noted are the installed features. Click Enter to continue. Otherwise, enter quit to cancel the upgrade.

- 6 Answer each prompt appropriately.

If you did not backup your database before starting the update, you are given a chance to do so. The database backup is stored in the *installPath/backup.sql* file by default.

If you elect not to rebuild the database, the update still re-seeds the system settings.

If you encounter port conflicts, resolve them before continuing.

The servers automatically start when the update finishes. You may need to reboot the server if your performance monitor information does not appear.

If you are running either MySQL or Oracle as your database on a separate server, you must also run `dbpostinstall` on the (primary) Application server before starting your system.

If your upgrade fails, see the `install.log`, `db_setup.log` or `app_setup.log` file in the destination directory for messages that may help fix the failure.

## Troubleshooting VM Installation

In addition to the troubleshooting section in your application's guides, you may want to try the following if the application server does not start:

- 1 Check the server status (option 5) to see if there is a license expired error.
- 2 Verify that your system has the minimum hardware requirements. If there are not enough RAM, the servers cannot start.
- 3 Contact support if your server still fails to start.

Upon reboot or system restart, by default, the Application, Web, and Database servers are configured to automatically start (autostart). If you need to stop or start a server without rebooting the VM, use the following commands:

- Stop or start the Application server:  
`sudo service oware start | stop`
- Stop or start the Synergy server (web server service):  
`sudo service synergy start | stop`

The startup process takes a few minutes, and depends on the host speed. The application server needs to be fully up before the Web server can provide full client access. The Web server should be fully functional within five minutes of the Application server being up.

## Installing Distributed and HA Deployments

Before installing the OpenManage Network Manager product, make sure that you have performed all the necessary tasks discussed in [Preparing for Installation](#) on page 13.

For a description of the installation wizard and the different fields and options, see [Distributed and HA Servers Installer](#) on page 87.

This section covers the following installation tasks. If you are upgrading an existing system, see [Upgrading/Patching from Previous Versions](#) on page 93:

[Distributed/HA Hardware Requirements](#) – 58

[Installing Distributed/HA Deployments](#) – 59

## General Information

This section includes some general information about:

- [Distributed Installation](#)
- [Databases on Separate Servers](#)
- [Adding Mediation Servers](#)
- [High Availability and Clustering](#)

### Distributed Installation

A distributed installation requires the HA installer for your operating system. When you start the installer, select the Custom installation option, and point to the same partition (by default named for the Application server's hostname concatenated with the word "partition").



#### NOTE:

In distributed installations, by default, installing an Application server by itself means that the Mediation server process (ordinarily included in stand-alone installations) is turned off. To turn on the Mediation server, add the following property to the `\owareapps\installprops\lib\installed.properties` file:

```
oware.appserver.mediation.setup=true
```

### Databases on Separate Servers

You can run `loaddb` after installing it and then run `dbpostinstall` to seed the components. Run `loaddb -s` when the Web server is on a different host.

If your system's Web server and Database server are on different machines, you must run `loaddb -s` on the Web server host to create the Synergy/portal database.

### Adding Mediation Servers

Often, such distributed installations use multicast to discover components. The command line (`startappserver` or `startmedserver`) `-m` parameter specifies that multicast address, or you can specify it in the `\owareapps\installprops\lib\installed.properties` file with the following property for autostart installations:

```
oware.application.servers=[Host IP address]
```

Multicast is optional. However, you can disabled it using the `oware.application.servers` property in the `\owareapps\installprops\lib\installed.properties` file if, for example, a firewall blocks multicast between components. For example:

```
oware.application.servers=appserver_A_IPaddress,appserver_B_IPaddress
```

See [Disabling Multicast](#) on page 111 to disable multicast and for a way to configure the alternative (a non-clustered Mediation server setup example also appears in [Installing Distributed and HA Deployments](#) on page 55).



#### NOTE:

You can elect to ping Mediation servers before attempting to call a rule. This avoids the long timeout that can occur when the Mediation server's network cable gets unplugged. To enable this, add a property (`com.dorado.ping.medserver=true`) to `installed.properties` for each Application server. Ping incurs some additional overhead incurred, so by default, the property is not set and no ping occurs before rules.



To **enable Mediation server** portal, modify and rename the following properties file:

```
oware/synergy/conf/server-overrides.properties.sample
```

Uncomment the `medserver.support=true` property, and rename this file to omit the `.sample` extension.

## High Availability and Clustering

When you are installing a **high availability** system, the installation includes a setup for the Config Server (the primary server in a cluster). The cluster's multicast address is configured automatically. Fill in these values if you are installing a clustered or high availability system.

Here are some **clustering considerations**. For additional details on clustering, refer to the *OpenManage Network Manager User Guide*.

- Clustering does not require DNS entries for all servers.
  - Servers (Application or Mediation) in a cluster need to share the following pieces of information:
    - **Partition Name** is a unique string for this cluster, beginning with a letter. For clustering, configure this name one of several ways:
      - Command line, typical for testing
      - `installed.properties`, the command line overrides this property file
      - `pmstartup.dat`, settings used by automatic server startup (*i.e.*, Windows Service)
- See [Installing Distributed and HA Deployments](#) on page 55 for a real-world example of such an installation.
- **Mediation Listeners as Redundant Peers** for Mediation server clusters, you can also elect to either send redundant messages to each server, or to have each server process messages independently. Select the former for a high availability mediation pair.

# Distributed/HA Hardware Requirements

The distributed server hardware guidelines are based on average OpenManage Network Manager application use on your managed network (Table 5-1). These guidelines include number of users, number of devices managed, Traffic Flow Analysis (TFA), Performance Management (PM), and Event Management (EM) as the most demanding elements.

Distributed installations consist of separate servers for separate functions within the OpenManage Network Manager system. Web server (WS), Application server (AS), Mediation server (MS), and Database server (DB) are on separate hosts. The RAM, CPU and hard drive (HD) sizes for these are provided. All CPUs and/or cores should be 3.0GHz or faster.

For sizing recommendations not covered here, contact your sales representative.

**Table 5-1. Distributed Server Hardware Guidelines**

OpenManage Network Manager Use	Web Server (WS)			Application Server (AS)			Mediation Server (MS)			Database Server (DB)			Memory Allocation (Changes to default heap settings)			
	RAM (GB)	CPU	HD (GB)	RAM (GB)	CPU	HD (GB)	RAM (GB)	CPU	HD (GB)	RAM (GB)	CPU	HD	WS (GB)	AS (GB)	MS (GB)	DB (GB)
10 users 500 devices TFA <sup>1</sup> PM <sup>4</sup> EM <sup>5</sup>	4	Dual Core	40	4	Dual Core	40	4	Dual Core	40	4	Dual Core	1x 200 GB 7200RPM	2	3	3	3
50 users 1000 Devices TFA <sup>2</sup> PM <sup>4</sup> EM <sup>5</sup>	8	Quad Core	40	8	Quad Core	40	6	Dual Core	40	8	Quad Core	2x100GB 10K RPM RAID 0 or better striping or SSD	6	6	4	6
150 users 5000 Devices TFA <sup>3</sup> PM <sup>4</sup> EM <sup>5</sup>	16+	8 core	40	16+	8 core	40	6	5 x Dual Core <sup>6</sup>	40	16+	8 core	High Perf Disk Array 4 x 100GB 10K RPM or better. RAID 0 or better or SSD	14	14	4	14
150 users 10000 Devices TFA <sup>3</sup> PM <sup>4</sup> EM <sup>5</sup>	64+	8 Core	200	64+	8 Core	200	32	4 Core	200	32	8 Core	High Perf Disk Array 4 x 100GB 10K RPM or better. RAID 0 or better or SSD	20	20	6	20

<sup>1</sup> <2Mbs Internet egress and a 1:1000 sample rate.

<sup>2</sup> <10Gbs Internet egress and a 1:1000 sample rate.

<sup>3</sup> <200 Gbs Internet egress and a 1:1000 sample rate.

<sup>4</sup> PM supports 600 inserts per second using a single disk (SSD) Drive. 1 insert = 1 monitored attribute. Performance improves as you add drives and worsens with slower drives.

<sup>5</sup> EM supports a sustained 200 traps per second using a single (SSD) drive. Performance improves as you add drives and worsens with slower drives.

<sup>6</sup> Mediation recommendations assume managing <1000 devices per host.

# Installing Distributed/HA Deployments

The following describes an installation to a cluster. In a production environment, such installations must take account of the network security settings and firewalls.

Here are a few things to check before your installation:

- Synchronize clocks on all hosts where you install OMNM.
- Ensure any time (NTP) server processes are running.
- Ping all hosts from each other to ensure connectivity exists. Ping with fully-qualified domain name and with the hostname alone.
- Ensure that the installing user has admin privileges on any Oracle database. See [Oracle Database Management](#) on page 165 for more about setting up Oracle.
- Refer to the ports used in the *OpenManage Network Manager User Guide* for a list of ports that must be open on the firewall for components to communicate with each other. Open the appropriate ports (bidirectionally).



## NOTE:

It is often easiest to disable firewalls completely while initially installing and testing distributed installations with firewalls between components.

- Add the following line to the application user's Linux.profile file:

```
. /etc/.dsienv
```

This means the user sources the environment on login. On Windows, running the `oware` command on clients creates a bash emulation with the same environment.

This section provides some general instructions to install OMNM in a distributed and HA environment.

Install OMNM in a distributed and HA environment as follows.

- 1 Make the appropriate Custom installations to all affected hosts (Application servers, Mediation servers, clients). You must know the following that you configure:

- Cluster name can be any string less than 40 characters

For example: `my_omnm_cluster` is the OMNM Application server cluster.

- Database information: `@[Server_name]:[port]:[database name]`

For example: `@my_server:1521:MYDB`.

- Config server if you are clustering servers

For example: `my_server`

You may want these to autostart in a production system. If so, select that option when installing.

- 2 Install to Oracle as the installing user.

- a. Configure the `$ORACLE_HOME/network/admin/tnsnames.ora` file on your Application server. This is required for `loaddb` to work. Here is an example configuration:

```
MYDB =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = TCP)(HOST = [Server_name])(PORT = 1521))
    )
    (CONNECT_DATA =
```

```

        (SERVER = DEDICATED)
        (SERVICE_NAME = MYDB)
    )
)

```

- b. Run the following commands on the primary Application server:

```

loaddb -u [dba user] -w [dba password] -s -g
dbpostinstall

```



**NOTE:**

If you have a MySQL database on a separate host, you must also run `dbpostinstall` on the primary Application server.

- c. Test DATABASE connectivity from the Application server (appserver):

```
pingdb -u <username> -p <password>
```

For example, use the following for MySQL:

```
pingdb -u root -p dorado
```

- d. Enable Oracle RAC on all Application servers by adding the following to the `/owareapps/installprops/lib/installed.properties` file:

```

Addcom.dorado.oracle.rac.connect.url=@(DESCRIPTION=(ADDRESS_LIST=\
  (ADDRESS=(PROTOCOL=TCP)(HOST=[hostname1])(PORT=1521))\
  (ADDRESS=(PROTOCOL=TCP)(HOST=[hostname2])(PORT=1521))\
  (FAILOVER=on)(LOAD_BALANCE=on)(CONNECT_DATA=(SERVER=DEDICATED)\
  (SERVICE_NAME=[Oracle service name])))

```

- 3 Add the following property to the `owareapps/installprops/lib/installed.properties` file on each Application server (appserver) if you are clustering the appserver.

```
oware.config.server=primaryAppserver
```

For the primaryAppserver, use either the fully qualified primary appserver name or its IP address. For example:

```
oware.config.server=10.10.0.1
```

Here is the appserver portion in the `installed.properties` file:

```

#####
# The following properties override those found in          *
# oware/lib/*.properties in order to establish valid        *
# properties for this installation.                          *
#####

```

```

oware.config.server=my_server
oware.installed.package.name=RedCell
...
oware.client.partition.name=my_redcell_cluster
oware.local.ip.address=193.35.184.175
oware.mediation.subnet.mask=255.255.255.0
com.dorado.bom_dbms.name=oracle

```

```
com.dorado.jdbc.user=redcell
com.dorado.jdbc.password=mypwd
com.dorado.jdbc.database_name.oracle=@my_server:1521:MYDB
...
```

**NOTE:**

If you plan to change the database name, you must change the relevant portion of your Application servers' installed.properties files. Similarly, if you use a database tool to change the default user's password, you must change that password in the com.dorado.jdbc.password property.

- 4 Add the Mediation server (medserver) cluster config server to the installprops/medserver/lib/installed.properties file on all Mediation servers if you are clustering Mediation servers.

The following example installation does not cluster Mediation servers. However, to bypass multicast communication with Application servers, configure this file with the oware.application.servers property. Multicast may be restricted by a firewall,

```
/installprops/medserver/lib/installed.propertes

#*****
# The following properties override those found in      *
# oware/lib/*.properties and                            *
# oware/medserver/lib/*.properties in order to establish *
# valid mediation properties for this installation.      *
#*****

## This property defines whether mediation listeners should make use
## of high availability or not.
## Possible values true - Listener come up in high availability
mode(Forwarding/Standby)
## false - Listener come up independently.
com.dorado.mediation.listener.use.high.availability=false
##
##multicast message communication between agents for working in a peer
environment.
com.dorado.mediation.listener.multicast.intercomm.address=226.0.0.26
oware.application.servers=193.35.184.175,193.35.184.170

This modification is typical for secure environments where multicast is restricted by a firewall.
```

**NOTE:**

If you are using the oware.application.servers property, you must (comma-separated) list all available servers wherever you use it to bypass multicast. For example:

```
oware.application.servers=appserver_A_IPaddress,appserver_B_IPaddress
```

Refer to the *OpenManage Network Manager User Guide* for more details on disabling multicast.

An HA cluster consists of only two Mediation servers. You can have more than two, but that just means more than one standby server exists. If you set the HA property to false, all clustered Mediation servers are active at the same time, and any number of Mediation servers can be in the same cluster.

- 5 Disable the Mediation server on the appserver host by not configuring it during installation. Otherwise, add the following property to the `\owareapps\installprops\lib\installed.properties` file:  

```
oware.appserver.mediation.setup=false
```
- 6 Configure autostarting in the `owareapps/installprops/installed.properties` file if you installed autostarting. See [Startup Properties](#) on page 74 for a list of potentially configurable properties.

## Verifying Your Installation

Once you complete the OpenManage Network Manager (OMNM), verify that the applications starts. The following startup sequences is recommended for complex installations:

- 1 Start the database.
- 2 Start the config server (the primary Application server for a cluster).
- 3 Start the remaining Application servers.
- 4 Start the Mediation servers, one at a time.
- 5 Start the Web servers.
- 6 Start the Web client.

Once you have successfully completed the above with single servers, start the rest of the cluster of Application servers. To test that each Mediation server works, start and stop them one at time. Running discovery is a good test of connectivity.

Here are a few things to remember after installation while performing the following tasks.

Task	Remember
Starting OMNM (After installation)	<p>Make sure that your <b>database is running</b>. MySQL installs automatically as a service (daemon), Oracle must be started separately. Make sure that your database connects to the Application server if it is on a separate host.</p> <p>Start the Application server if you installed this software as a service and the it is down.</p> <p>Default OMNM <b>login</b> is <i>admin</i>, password <i>admin</i>.</p> <p><b>Note:</b> The first time you start the application after installation, you may have to wait for the Application server to completely start. If the Application server startup is not complete, portlets do not display when you start the Web client.</p>
Discovery (After startup)	<p>For a successful discovery after startup, make sure that the Application server has <b>connectivity</b> to devices to discover using one of the following methods:</p> <ul style="list-style-type: none"> <li>• Ping the discovery target from the Application server host.</li> <li>• Right-click a discovered device and then select Direct Access.</li> </ul>
Backup/Restore/Deploy (After device discovery)	<p>Make sure that an external <b>FTP/TFTP server</b> or process is running and has network access to the target devices.</p> <p>Typically FTP/TFTP must be on the same side of firewalls as managed devices. OMNM's internal FTP/TFTP server is for testing only. If FTP and TFTP are separate processes, configure them so they write to the same directory.</p>

Task	Remember
Alarms/Monitoring	<p><b>Minimize network traffic</b> by configuring “chatty” devices to quiet down. Use Suppress Alarms to keep performance at acceptable levels, and configure database archiving so the database does not fill up.</p> <p><b>Caution:</b> Some OMNM features, such as Maps, do not work without internet access. The maps that the OMNM application uses needs internet access to retrieve maps and plot locations. If you do not need functioning map portlets, running OMNM without internet access works well as long as the network is properly configured and resolves the localhost name to the Application server’s IP address.</p>





## Completing Post-Installation Tasks

This section provides what you need to prepare for OMNM installation or upgrade and how to start the applications used to do the preparation tasks.

[Post-Install Checklist – 66](#)

[Getting Started Tasks – 66](#)

[Changing Default Passwords – 66](#)

[Securing MySQL Passwords – 67](#)

[Installing Third-Party Software – 67](#)

[Stopping Servers – 68](#)

[Starting Servers – 69](#)

[Installing Server Manager – 72](#)

[Auto Starting Servers – 70](#)

[Installing Server Manager – 72](#)

After installing the third-party software, the remaining tasks depend on the options you selected during installation and/or options you want to change.

## Post-Install Checklist

The post-install checklist provides information to collect and recommended steps to complete post-install tasks.

**Table 6-1. Post-Install Checklist**

Item	Task	Done
1	Obtain inventory of devices (IP addresses) and ports to monitor.	
2	Obtain an IP address for the OMNM server and then configure the IP address as a management station and receiver of SNMP traps on each device.	
3	Determine IP range of devices being discovered.	
4	Determine if OMNM used SNMP V1, V2 or V3 to communicate with the device.	
5	Determine telnet or SSH credentials for devices being discovered.	
6	Determine HTTP/HTTPS credentials for devices being discovered (if supported).	
7	Determine WMI credentials for server discovery.	
8	Configure devices with SNMP and telnet/ssh user name and password credentials for the devices. OMNM uses these credentials to discover and manage the devices.	
9	Make sure you have an FTP/TFTP server for production systems. The OMNM internal FTP/TFTP server is for testing only.	

## Getting Started Tasks

Once the Web portal is up, you must perform some initial setup and validation tasks. The Home page contains the Getting Started portlet. Walk through each step to configure the primary features for managing and monitoring your network. You can remove the portlet once you complete the setup tasks. If you need to make changes later, add the portlet using the Add > Application option. This section provides some information on the file server and some example steps to create a file server entry.

## Changing Default Passwords

Before putting OpenManage Network Manager (OMNM) into a production environment, change the default passwords noted in this guide, such as the Linux OS login (user = synergy) and the FTP account (user= ftpuser). Change the MySQL database root password as well (see [Securing MySQL Passwords](#) on page 67).



### CAUTION:

If credentials are not updated correctly, other processes may stop working. For example, the pre-installed File servers use the ftpuser account. You can change the ftpuser password from the Linux operating system. However, the backup/restore operation fails if you do not change the password within the OMNM software too.

The default user (admin) initially has the password admin. Application administrators can reset any passwords in the Web portal's Control Panel, Users and Organizations application. The database stores all passwords in encrypted form.

## Securing MySQL Passwords

Secure MySQL passwords for all OMNM versions using the following steps to change the MySQL root and application passwords. These procedures also prevent the MySQL root password from being stored in configuration files and obviates MySQL root access by the application.

- 1 Stop web and application servers.
- 2 Change the MySQL root password.

This password is **not** stored in any application configuration files.

Example MySQL commands:

```
SET PASSWORD FOR 'root'@'%' = PASSWORD('SecretRootPassword');
SET PASSWORD FOR 'root'@'localhost' = PASSWORD('SecretRootPassword');
```

- 3 Create a MySQL user “synergy” with access to “synergy” and “lportal” databases.

Example MySQL commands:

```
CREATE USER 'synergy'@'%' IDENTIFIED BY 'SecretAppPassword';
GRANT ALL ON synergy.* TO 'synergy'@'%';
GRANT ALL ON lportal.* TO 'synergy'@'%';
```

- 4 Change the MySQL password used for application access by “oware” and “owmeta” users.

Example MySQL commands:

```
SET PASSWORD FOR 'oware'@'%cd2' = PASSWORD('SecretAppPassword');
SET PASSWORD FOR 'owmeta'@'%' = PASSWORD('SecretAppPassword');
```

- 5 Store the MySQL application credentials in the portal-ext.properties configuration file.

- a. Open the following file:

```
.../oware/synergy/tomcat-7.0.40/webapps/ROOT/WEB-INF/classes/portal-ext.properties
```

- b. Update the following properties:

```
jdbc.default.username=synergy
jdbc.default.password=SecretAppPassword
```

- 6 Store MySQL application credentials in installed.properties configuration file.

- a. Open the following file:

```
.../owareapps/installprops/lib/installed.properties
```

- b. Add/update the following property:

```
com.dorado.jdbc.password=SecretAppPassword
```

- 7 Start web and application servers

## Installing Third-Party Software

This section includes the installation of some third-party software used with the OpenManage Network Manager (OMNM) application, such as:

- [Installing Acrobat Reader](#)
- [Installing Perl](#)

## Installing Acrobat Reader

After you complete the installation, you may want to install Adobe Acrobat Reader. You can download a free copy from [www.adobe.com](http://www.adobe.com). This application requires Acrobat to successfully print reports.

## Installing Perl

The OpenManage Network Manager (OMNM) Linux installation does not include the Perl package. The Windows installation includes Perl as part of the installed Cygwin component. The Virtual Appliance also includes Perl on the Linux operating system. If you want to take advantage of the OMNM application's use of Perl scripting capabilities on other Linux platforms, make sure that you install the Perl package on the Application server and the Mediation server host.

Before installing OMNM, install Perl to take advantage of OMNM's scripting capabilities. For some of those capabilities. See [Upgrading Perl in this version](#).

You must install it on the path on the Application server/Mediation server host. Best practice is to restart the server so it recognizes the path, and to use Perl version 5.10 or later (however not 5.16). Some functions also require Perl as well as the Perl module `Net::Telnet`, so make sure that whatever Perl you install includes that module. If it is not installed, `Net::Telnet` and other modules are available at [www.perl.com/CPAN](http://www.perl.com/CPAN).



### NOTE:

Running `perldoc [package name]` (for example `perldoc Net::Telnet`) lets you know whether your system has the relevant package.

Because it is freely available on the internet, Perl is not included in OMNM's installation. You can find information about Perl at [www.perl.com](http://www.perl.com). Follow the downloads link to find the recommended distribution for your specific platform. One recommended Perl package is from ActiveState, accessible at: [www.activestate.com/activeperl/](http://www.activestate.com/activeperl/)

### *Upgrading Perl in this version*

Perl v. 5.14 deprecates the `switch` module. After this update if you still have `switch` cases/scripts using `switch` statements, then you must install `switch.pm` manually.

You can use the `switch.pm` file from an older Perl installation or look online for it.

If you see an error saying `Can't locate Net/Telnet.pm` in Linux environments, you can resolve this issue by installing `Net::Telnet` with the following steps:

- 1 Log in as root user
- 2 Execute `#perl -MCPAN -e'shell'`
- 3 `Cpan> install Net::Telnet`

## Stopping Servers

To stop the Application server, you can either use the Application server tool in the Windows system tray, or stop the server from a command line. The command line to stop a server is `pmstopall`.

Sto

If you have not automated server startup, then you can use the `stopappserver` and `stopmedserver` scripts to stop these servers, even remotely. Single server platforms are set to Auto start by default. These commands do not apply.

Here is the syntax:

```
stopappserver <hostname>:1099 -u <username> -p <password>
stopmedserver <hostname>:1099 -u <username> -p <password>
```

Both `-u` and `-p` are optional parameters. If you omit `username`, the application assumes OWAdmin is the user. If you omit a password, the application assumes a blank password.



#### CAUTION:

Using Ctrl+C in the Application server shell may stop the Application server, but processes can linger that you must stop manually before you can successfully restart the Application server.

If you have not logged in and changed the password for OWAdmin with the application's login screen, the login to stop the server fails. By default, OWAdmin and the installing user have the role OWServerAdmin. Any user assigned this role can stop the appserver. Blank passwords are valid if they are defined for the user.

If you used `startappserver` in a shell to start the Application server, you can stop the server by either interrupting that shell with Ctrl+C or by closing the shell. Ultimately, you can kill the Java processes on your machine to halt a server.

See [Uninstalling the Application](#) on page 45 for additional notes about shutting down processes and services.

## Starting Servers

In Windows, use the shortcuts in the *Start* button menu to start an Application server or Mediation server, and (after the Application server has had time to start) the application itself. Right-clicking an Apache icon lets you start and stop the Web server.

Start Linux applications after logging out, and logging back in either from the installed icon on the desktop, or from a command line.

Single server platform are set to Auto start by default. The following commands do not apply.

These command lines assume you run `oware` or `. /etc/.dsienv` before running them, to set the environment correctly. The commands:

```
startappserver
startmedserver
```

Both `stopappserver` and `startappserver` scripts may require username/passwords as parameters, if you have an installation that requires a password. To see the syntax of either of these scripts, append `-?` to them on a command line. Here is the help output from `stopappserver`:

```
~/:stopappserver -?
Usage(1): stopappserver server_url [-u username] [-p password]
Usage(2): stopappserver server_url password
example - stopappserver localhost:1099 -u OWAdmin -p secret
example - stopappserver localhost:1099 secret
```

If omitted, username will be assumed to be OWAdmin.

If omitted, password will be assumed to be blank.

If no arguments are provided, `server_url` will be assumed to be `localhost:1099`.

By default, these scripts assume the *OWAdmin* user and a blank password, so if you have changed the default password for OWAdmin, you must pass it to stopappserver.

## Starting Linux Installations

Servers on standalone installation will have auto start enabled and reboot or restart of the OS will auto start the servers. For manual start of the service, the operating system prompts user for the root password for the following command lines (no such prompt appears for root user):

Application server:

```
$service oware start
```

Portal Server:

```
$service synergy start
```

In `/etc/init.d`, you can run the following:

```
#!/oware start
```

```
#!/synergy start
```

When you have autostart enabled, to start appserver and process monitor:

```
$startpm &
```

To stop appserver and process monitor

```
$stoppm
```

When process monitor is running, you can check the appserver status

```
$pmgetstatus
```

To stop the Application server process only

```
$pmstopall
```

To start the appserver again when process monitor is already running:

```
$pmstartall
```

To open a web client, go to this URL: [host IP address]:8080.

## Auto Starting Servers

This section only applies to custom package for Distributed or HA installs. If you are installing Mediation or Application servers, an option appears during installation to configure the server to autostart when the server boots. The final installation screen asks whether you want to start the Application server, so you do not need to start the server immediately after installation.

The startup sequence: Database server starts first, then Application server. Mediation server can start any time before or after this sequence, and waits for Application server. See [Stopping Servers](#) on page 68 for instructions on stopping the Application server.

You can stop, start, and monitor the autostarted Application server, with command lines (`pmstopall`, `pmstartall`, and `pmgetstatus`), or use a system tray tool for controlling the Application server in Windows. As always, run `oware` (Windows) or `./etc/.dsienv` (Linux) before running the command lines.

For security reasons, `pmstopall` has security requirements similar to `stopappserver`. Here is an example command line:

```
pmstopall <hostname>:1099 -u <username> -p <password>
```

Both `-u` and `-p` are optional parameters. If you omit `username`, the application assumes `OWAdmin` is the user. If you omit a password, the application assumes a blank password.

While you can always run the `startappserver` command-line script, a second Application server on the same port fails. Also, the Windows Start Application Server shortcut does not appear in the Start menu when you elect `autostart`, assuming your installation offers that as an option.

If you select **no autostart**, then no autostart service installs, and you **must** manually start the Application server either from the Start menu (in Windows), or from a command line with the `startappserver` script. (See [Starting Servers](#) on page 69.)

If you want to install the service (daemon) after you have already installed the rest of the application, you must run the `installprocman` script from a command line. See [Installing Server Manager](#) on page 72 for details.

`Autorun` is useful for production server installations. However, if you do not select this option, then you must manually start the Application server and Mediation server yourself (using the `startappserver` and `startmedagent` command lines or the item in the Windows *Start* button menu).

For Oracle/Windows installations with `autostart` selected for a server, the last step in the installation may prompt you about whether to start process monitor immediately. This potentially lets you defer `appserver` startup until the next reboot for Oracle's sake.

**NOTE:**

Autostart takes some time for the initial load. You cannot see progress for the process unless you tail the `server.log` file.

## Installing Server Manager

This section only applies to Distribute, HA or custom installations where Server control was not initially installed during installation. You can install the service post installation.

The `installprocman` script is in `$OWARE_USER_ROOT/oware/bin`. The script takes several parameters.

Usage:

```
-i      install service"
-r      remove service"
-d      set dependency on MySQL service (-i only)"
-n Name assign a custom display name (-i only)"
```

If you are installing the service on a host which houses both the MySQL database and Application server, you should execute the script with the `-i` and `-d` flags (`installprocman -i -d`).

If you are installing the service on a host that has only the Application server (MySQL is distributed to another host) the script should be executed with only the `-i` flag (`installprocman -i`).

The `-n` flag allows you to define a Custom display name for the service.

## Installation of Process Monitor System Tray Icon

To ensure the Process Monitor System Tray icon appears each time the system is restarted simply add the `%OWARE_USER_ROOT/oware/bin/pmtray.exe` binary to the *all users* startup folder (`C:\Documents and Settings\All Users\Start Menu\Programs\Startup`).

## Update pmstartup.dat

Finally, modify the `application.server.active=` property in `%OWARE_USER_ROOT/oware/lib/pmstartup.dat` and change the default value from `false` to `true`. Once complete, reboot the system and the Application server automatically starts and the system tray icon automatically appears in the user's startup folder.

## pmgetstatus Script

If you elect to autostart your Application server, you can run the `pmgetstatus` script from a command line to see the status of Application servers. If you run `oware` first (or `etc/.dsienv` for Linux) in the shell where you run `pmgetstatus`, this script is automatically on the path. Here is its usage (produced by typing the script name followed by `-?`):

```
Usage: pmgetstatus [-h <Server IP>] [-p <Server Port>] [-i <Iterations>]
[-r <Refresh Rate>]]
```

Oware utility for reporting status on managed server processes. By default, the local host is queried for 1 iteration.

Options:

```
-h <Server IP>      -- Server host IP. Defaults to local host
(127.0.0.1).
-p <Server Port>   -- Process monitor command port.
                    Default loaded from
```



```

c:/work/oware/lib/pmstartup.dat
  -i <Iterations>      -- Number of times to repeat command, -1 is
infinite (requires Ctl-C).
  -r <Refresh Rate>   -- Refresh rate of iterative command in seconds.
Default is 5.

                          Requires -i option.
  -?                   -- Show this help.

```

## Windows Server Monitor

When you install your application as a service on Windows, you also install a server monitor. This monitor is a client to the server manager which controls starting and stopping of an application or Mediation server.

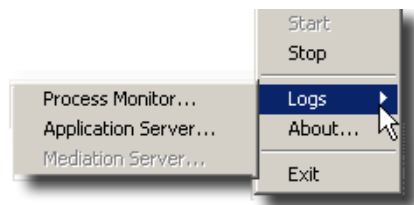


Double click the tray icon to display the about panel. *OK* closes this dialog, but maintains the icon in the tray, while *Exit* ends the Server Manager (client and tray icon).

The tray icons themselves indicate the current service condition.

Icon	Status
	Offline (no status available, or not controlled by server manager)
	Running (initializing, or shutting down)
	Ready
	Stopped

You can also right-click the icon to see the client menu.



The logs item let you view logged items for Server Manager, Application server or Mediation server. You can *Start* or *Stop* the service(s) running on your host.



**NOTE:**

System changes can make the server monitor system tray icon disappear while the process is still running. If you cannot make your icon reappear, try running `pmtray -r` from a command line.

## Web Server Parameters

When you install OMNM, installation also includes an Apache Web server. Its monitor appears in the Windows tray, but you can also configure memory parameters for the Web server in the `setenv.*` files under `oware/synergy/tomcat*/bin`. Web server Memory values may need to be modified when the web server requires more memory. Many concurrent user may require more memory on the web server.

For example:

- Linux
 

```
-Xmx1024m -XX:MaxPermSize=256m
```
- Windows
 

```
set "PORTAL_MAX_MEM=1024"
set "PORTAL_32BIT_MAX_MEM=768"
set "PORTAL_INIT_MEM=128"
```

Set only MAX\_MEM and the INIT\_MEM. Higher values permit better performance and more users, especially on 64bit machines. Do not change the other settings.

Best practice on a 64bit system: 2048 for the MAX\_MEM and 256 for the INIT\_MEM. If you have a lot of extra ram then specify more.

Any database parameters for Web server installation refer to the system's existing database.



**NOTE:**

The Web server starts automatically with installation. If it does not, you can right-click the Synergy Network Management icon in Windows and select Start Service, or in Linux type the following in a shell: `/etc/init.d/synergy start` (or `stop`). In Linux systems, `startportal.sh` and `startportal.sh stop` accomplish the same thing, with additional checks.

## Startup Properties

This file generally requires no additional changes post installation. When specific system setting need to be configure and a property setting is required, this file is the central overriding property file. The values in `installed.properties` now set most properties for the process monitor to pass when starting a server. All command-line options for the `startappserver` script are now in `installed.properties` (see [Starting Servers](#) on page 69 and refer to the *OpenManage*

*Network Manager User Guide* for more on overriding properties). These are active for each execution of the server (even a Mediation server) on the machine where the override exists. Command line arguments override these properties.

The following are properties you can set in `owareapps\installprops\lib\installed.properties` to configure servers:

- Default server partition name also used by client and mediation to locate a server  
`oware.client.partition.name=demo1`
- Default interface used by servers and direct access cut-thru sessions.  
`oware.local.ip.address=192.168.0.10` [for example]

The IP address also appears in database connection properties:

```
com.dorado.meta_database.name=//192.168.0.10:3306/owmetadb
com.dorado.jdbc.database_name.mysql=//192.168.0.10:3306/owbusdb
```

To change the IP address, stop the server, set these properties to the new IP address and delete the content of the `oware/temp` directory. Then restart the server.

### *ipaddresschange*

If the server or VM IP address changes, the Software also requires an update so the application server can bind out the new address. It is recommended to use the `ipaddresschange` script. If you were to install this application on a machine on one network, then move your machine to another network, the IP address from your original network remains hard-coded. You must change the application's IP address to reflect the new network for the software to function correctly. Here is how to do it, once you have connected the Application server machine to the new network:

- First, shut down the Oware Server Manager. Open a command shell (*Start > Run* cmd, in Windows) then type: `net stop owprocman`
- Next, find out what your new IP address is. To do this type `ipconfig` in the command shell you just opened, and make note of the IP Address that appears. You will need that number in a subsequent step.
- Type `oware` at the command line. This sets the environment.
- In the same shell, type `ipaddresschange -n [the IP address discovered in b]`
- Restart Oware Server Manager by typing: `net start owprocman`. Also restart the web service by typing: `net stop synergy` followed by: `net start synergy`.

Your machine should then be able to connect to other devices on this network and function correctly.

- Set to true when there is no graphics adaptor available for server  
`java.awt.headless=false`
- Primary cluster member (must be running for members to join) (HA installs only)  
`oware.config.server=localhost`
- Cluster peer to peer multicast address (HA installs only)  
`oware.cluster.multicast.address=226.10.20.30`
- Subnet mask for mediation device coverage (HA installs only)  
`oware.mediation.subnet.mask=255.255.255.0`

- To change the default HTTP/HTTPS port numbers for web services, add the following properties to `owareapps/installprops/lib/installed.properties`:  

```
oware.appserver.web.http.port=[default port number:8080]
oware.appserver.web.https.port=8443
```

You may then change the port values for these property entries and restart the Application server. Special setup (outside the scope of this document) is necessary to run a Web server on port numbers lower than 1024 on many operating systems.

**CAUTION:**

Do not change the system time while the Application server is running. If you must change the system time, shut down the server before the change, and restart it afterwards.

*Web Portal Properties*

If you do not use the [ipaddresschange](#) script, you will also have to change the IP address for the sake of the web portal. Change this in `portal-ext.properties` in  
`\oware\synergy\tomcat-7.0.70\webapps\ROOT\WEB-INF\classes`

Change property: `jdbc.default.url=jdbc:mysql://[IP address]/portal?useUnicode=true&characterEncoding=UTF-8&useFastDateParsing=false`

and

```
oware.appserver.ip=[IP address]
```

So these reflect the correct IP address, then restart the web service.

## Proactive Runtime Management

To insure OMNM continues to run smoothly long after you have installed it, best practice is to take the following precautions. For more about this, see [Troubleshooting Installation Issues](#).

- Make sure you configure database archiving policies (DAPs) to suit your system, particularly if you have device messaging (typically alarms and syslog) that threaten to fill your database.
- Occasionally check the Audit Trails to ensure DAPs are running properly.
- Configure your syslog and alarm events to only catch significant ones.
- Configure devices to suppress their own messages if these messages are unimportant.

## Using Two Interfaces

While installation accommodates selecting between two interfaces, some rare occasions require communicating with both. When that occurs you must add the additional IP address, not selected during installation, to the Application server's `tomcat-server.xml` listener so it can communicate with the webserver on the other IP. The following changes make this work:

Add to `/dorado/oware/synergy/conf/server-overrides.properties` on fresh installation:

```
oware.appserver.ip=192.197.95.2
```

(The address above is an example of IP address not selected during installation.)

Add to `/dorado/oware/jboss-5.1/owareconf/tomcat-server.xml` on fresh or update installation:

```
<Connector      scheme="http"
    address="192.197.95.2"
    port="@http.port.num@"
    maxThreads="150"
    minSpareThreads="5"
    maxSpareThreads="75"
    enableLookups="false"
    redirectPort="@https.port.num@"
    acceptCount="100"
    connectionTimeout="20000"
    disableUploadTimeout="true"
    debug="0"/>
```



## Troubleshooting Installation Issues

This section provides a list of actions that created issues during OpenManage Network Manager (OMNM) installation and the steps to resolve the issue.

Action/Symptom	Error	Resolution
Login	Credentials are needed to access this application.	Modify the portalex.properties file in the /oware/synergy/tomcat-xxx/webapps/ROOT/WEB-INF/class directory to include: <code>oware.appserver.ip=[appServerIPAddress]</code>
Run SOAP the first time	SOAP Service Manager: Unable to read 'DeployedServices.ds: assuming fresh start'	This is just an informational warning, not an error. The file referenced does not exist but is created for you.
	HeapDumpOnOutOfMemoryError	This is not an error, and is not logged at ERROR level. This is a Java VM option that enables creating a heap dump when the VM encounters and OutOfMemoryError. This dump is useful when diagnosing memory issues.
Restoring MySQL	Access Denied. Invalid Role for this device Applications fail with an error indicating that it cannot connect to the device after a network change	Possible DNS resolution issue. Test server connectivity using hostname to confirm or rule out a DNS problem. Fix the name resolution in your environment. Or, deselect Manage by Hostname from the Resource Manager.
Upgrading OMNM	Missing user/role associations	Go to one of the following Control Panel screens and then click Update associations: <ul style="list-style-type: none"> <li>• Roles &gt; Administrator &gt; Actions &gt; Assign members</li> <li>• Roles &gt; Power users &gt; Actions &gt; Assign members</li> <li>• Roles &gt; [ROLENAME] &gt; Actions &gt; Assign members</li> </ul> Otherwise, go the Control Panel > Server Administration and then click Execute to Reindex all search indexes.
Application server does not start		<ol style="list-style-type: none"> <li>1 Check if the license has expired. If so, resolve.</li> <li>2 Verify minimum hardware requirements. If there are not enough RAM resources, the servers cannot start.</li> <li>3 Contact support if your server still fails to start.</li> </ol>
Too many open file errors on Linux		<p>High volume/activity systems may need tuning by configuring file handle maximums in the /etc/security/limits.conf file and making sure that the following are at minimum 65535:</p> <pre>test soft nofile 65536 test hard nofile 65536 test soft nproc 65536 test hard nproc 65536</pre> <p>Here, test is the installing user login.</p> <p>Set these limits higher for more heavily used systems. You can check/set file handles temporarily using the ulimit -H/Sn command. For example:</p> <pre>\$ ulimit -Hn \$ ulimit -Snoing.</pre> <p><b>Caution:</b> If you enter ulimit -a in a shell, open files should <b>not</b> be 1024, and User Processes should <b>not</b> be 1024. These are defaults that <b>must</b> be changed. If you do not have enough file handles, an error appears saying not enough threads are available for the application.</p>



Action/Symptom	Error	Resolution
Mediation server fails to start with an ENetworkFailure		Manually delete all files in the oware\temp directory to successfully start the Mediation server.
Application server or Mediation server fails to start after service interruption, such as a power failure.		Delete the following director's content and then start the servers: oware\jobss*\server\oware\data
Application server startup on Windows	FAILED TO LISTEN ON TRAP PORT 162...	Use task manager to stop WMIBeam and WMINotification processes. If such processes do not exist in task manager, reboot your Windows system before starting the Application server.
Application server startup fails due to expired or not available license		Consult the <i>OpenManage Network Manager User Guide</i> for licensing information, registration, or renewal.





# Installation User Interface

While running the OpenManage Network Manager (OMNM) installation wizard (installer) or the command line installer, the options that are displayed vary depending on the choices you make and the options you purchased. This section describes the windows and command line prompts where you input or change setting for the following installers:

[Single-Server Installer – 84](#)

[Distributed and HA Servers Installer – 87](#)

# Single-Server Installer

This section shows the single-server installer options:

Window/Prompt	Field/Option	Description
Software Requirements		Displays some minimum system requirements and provides: <ul style="list-style-type: none"> <li>• A link to access the <i>OpenManage Network Manager User Guide</i> from the user interface</li> <li>• The <i>OpenManage Network Manager User Guide</i> location from the command line</li> </ul>
License Agreement		Allows you to install the product when selected. If this is a new installation, the next step is to choose the <a href="#">installation types</a> . If this is an upgrade, the next step is to choose the <a href="#">database backup options</a> .
Installation Types	Express Install	Installs the most common program features to their default locations. This option is recommended for most users. When selected, the next option is to select <a href="#">Managed Devices</a> . The express install asks for the target RTM and completes the install based on current sizing guidelines.
	Custom	Installs the program features you select to the location you specify, and allows you to specify how they are configured. When selected, the next option is to <a href="#">Choose Install Folder</a> followed by: <ul style="list-style-type: none"> <li>• <a href="#">Network Interfaces/Network Address</a></li> <li>• <a href="#">Heap Settings</a></li> <li>• <a href="#">MySQL Setup</a></li> </ul>
Choose Install Folder	Directory Name	Provides the default directory. Optionally specify a different directory. This option shows only if you selected a Custom Install installation type and the next option is <a href="#">Heap Settings</a> .
Managed Devices	Number of Managed Devices	Provides a list of managed device ranges from which to select. The default is less than 50. <ul style="list-style-type: none"> <li>• less than 50 (8GB RAM)</li> <li>• 50 to 200 (12 GB RAM)</li> <li>• 200 to 500 (16 GB RAM)</li> <li>• 500 to 100 (24 GB RAM)</li> <li>• 1000 to 5000 (64 GB RAM)</li> </ul> <p><b>Note:</b> Selecting a higher range increases system memory requirements.</p> <p>If you selected Express installation and multiple network interfaces were detected on your local host, the next option is <a href="#">Network Interfaces/Network Address</a>.</p>

Window/Prompt	Field/Option	Description
Network Interfaces/ Network Address	Address	Lists the network interfaces detected on the local machine. Select or enter which address to use for the OMNM application.  If you selected <b>Express</b> installation, your system is scanned for port conflicts. If conflicts are found, the <a href="#">Warning! Possible port conflicts</a> window is displayed. Otherwise, the installation starts. If you did not create the install folder before starting the installer, you will get an <a href="#">Invalid Install Folder</a> error.  If you selected <b>Custom</b> installation, the next option is <a href="#">Heap Settings</a> .
Heap Settings	Max	Allows you to customize the number of devices monitored by the OMNM application and the number of concurrent OMNM users by setting the maximum values for: <ul style="list-style-type: none"> <li>• Application Server Heap Settings (Gigabytes)</li> <li>• Synergy Web Services Heap Settings (Gigabytes)</li> </ul> The default values are 3 for the application server and 2 for the Web service. By default, these settings support 100 devices or less and 25 concurrent users. Refer to the <i>OpenManage Network Manager Quick Start Guide</i> and the <i>User Guide</i> for additional Heap settings supported.
MySQL Setup	Data Path	Specifies the database location. The default location is: <i>installPath/OpenManager/Network Manager/oware3rd/mysql</i>
	Initial Size	Is the database capacity allocated during database creation.
	Max Size	Controls the database growth. If left blank, the growth is unlimited as needed until the disk is full. If a maximum is specified, the capacity grows as needed up to the maximum size specified.  Best practice is to configure Database Archiving Policies (DAPs) to prevent a full disk. See <a href="#">Database Management</a>  If a firewall was not detected, there were no port conflicts, or both, the installation starts.
		The installer checks for a running third-party MySQL instance. If there is a MySQL service running, a conflicting software found warning is displayed. Continue with the installation and the OMNM installer stops the running MySQL service and then creates and starts its own service named MySQL. <b>Note:</b> The pre-existing third-party MySQL instance and any of its related databases are not deleted. Only the service is deleted and recreated.
Windows Firewall Detected - Allow Access?	Allow/Do not allow firewall access	Specifies whether to allow firewall access when a firewall is detected.  If you allow firewall access, rules are automatically added to the Windows Firewall Inbound Rules list.  If you do not allow the firewall, the OMNM application does not perform as intended. A list of programs requiring firewall access is displayed after installation so that you can manually configure the firewall.  The default is to allow firewall access.

Window/Prompt	Field/Option	Description
Monitor Server Startup Now?	Yes/No	Specifies whether to run the Server Status Console now (Yes) or not (No). The default is Yes. The console monitors the startup progress of you servers and allows you to start the application. If you selected Yes, the console is displayed after the installation completes and you click Done. <b>Note:</b> This option is not available when you run the installer from the command line.
Warning! Possible port conflicts		Indicates that the installer detected port conflicts and shows which ports are used by other applications. Resolve these conflicts before continuing with the OMNM installation. If not resolved, the OMNM application may not function.
Invalid Install Folder		Displays a message when installing on a Linux system and the target install directory does exist or have write permissions. <code>/installPath/openmanage/networkmanager</code> Create this directory as root: <pre>mkdir -p /installPath/openmanage/networkmanager chown :synergy /installPath/openmanage/networkmanager chmod 770 /installPath/openmanage/networkmanager</pre>
Root privileges required		Requires you to run a configuration script as root before the installation can continue. This is only for a Linux installation. Run the \$OWARE_USER_ROOT/install/root/setup.sh setup script in a separate shell, as root. This step installs essential environment files. It does not check for patches (the installation does that).
Database Backup Options	Yes/No	Performs a full backup of date before proceeding when you select Yes (1).
Database Backup Path		Displays the default backup directory. Press Enter to accept. Otherwise, enter the full path for the backup and then press Enter. <b>Note:</b> You must have write permissions to the backup directory location. The database backup is stored in the backup.sql file in the specified directory.
Database Migration	Yes/No	Specifies whether to apply any required schema changes and automate possible data migration tasks (No) or rebuild database content (Yes). The default is No (2).

# Distributed and HA Servers Installer

This section shows the distributed and HA installer options.

Window/Prompt	Field/Option	Description
Software Requirements		Displays some minimum system requirements and provides: <ul style="list-style-type: none"> <li>• A link to access the <i>OpenManage Network Manager User Guide</i> from the user interface</li> <li>• The <i>OpenManage Network Manager User Guide</i> location from the command line</li> </ul>
License Agreement		Allows you to install the product when selected. If this is a new installation, the next step is to choose the <a href="#">installation types</a> . If this is an upgrade, the next step is to choose the <a href="#">database backup options</a> .
Installation Types	Express Install	Installs the most common program features to their default locations. This option is recommended for most users. When selected, the next option is to select <a href="#">Managed Devices</a> . The express install asks for the target RTM and completes the install based on current sizing guidelines.
	Custom	Installs the program features you select to the location you specify, and allows you to specify how they are configured. When selected, the next option is to <a href="#">Choose Install Folder</a> .
Choose Install Folder	Directory Name	Provides the default directory. Optionally specify a different directory.
Managed Devices	Number of Managed Devices	Provides a list of managed device ranges from which to select. The default is less than 50. <ul style="list-style-type: none"> <li>• less than 50 (8GB RAM)</li> <li>• 50 to 200 (12 GB RAM)</li> <li>• 200 to 500 (16 GB RAM)</li> <li>• 500 to 100 (24 GB RAM)</li> <li>• 1000 to 5000 (64 GB RAM)</li> </ul> <p><b>Note:</b> Selecting a higher range increases system memory requirements.</p> <p>If multiple network interfaces were detected on your local host, the next option is <a href="#">Network Interfaces/Network Address</a>.</p>
Network Interfaces/ Network Address	Address	Lists the network interfaces detected on the local machine. Select or enter which address to use for the OMNM application. If you selected <b>Express</b> installation, your system is scanned for port conflicts. If conflicts are found, the <a href="#">Warning! Possible port conflicts</a> window is displayed. Otherwise, the installation starts. If you did not create the install folder before starting the installer, you will get an <a href="#">Invalid Install Folder</a> error. If you selected <b>Custom</b> installation, the next option is <a href="#">Heap Settings</a> .

Window/Prompt	Field/Option	Description
Choose Install Set	<i>instType</i>	<p>Select one of the installation types:</p> <ul style="list-style-type: none"> <li>• <b>Complete</b> installs all features and recommended for most users. This is the default. The next option is to <a href="#">Choose Shortcut Folder</a>.</li> <li>• <b>Application Server</b> installs only the core server required to support Mediation servers and Web portal servers. The next option is to <a href="#">Choose Shortcut Folder</a>.</li> <li>• <b>Web Portal</b> installs only the server that hosts the Web-based user interface. This option requires an existing remote Application server. The next option is to <a href="#">Choose Shortcut Folder</a>.</li> <li>• <b>Custom</b> allows you to customize which features are installed. The next option is to <a href="#">Choose Install Set</a>.</li> </ul>
Choose Install Set		Allows you to choose which servers to install. By default, the Application, Web Portal, and Database servers are selected.
Choose Shortcut Folder	<i>location</i>	<p>Select where would you like to create product icons?</p> <ul style="list-style-type: none"> <li>• In a new Program Group (default is installPath)</li> <li>• In the Start Menu</li> <li>• On the desktop</li> <li>• In the Quick Launch Bar</li> <li>• Other is the default and the default location is:  <pre>C:\ProgramData\Microsoft\Windows\Start Menu\Programs\Dell EMC OpenManage Applications\Network Manager</pre> </li> <li>• Don't create icons</li> </ul> <p>If you select program group, Start menu, or Desktop, select whether to do this for all users.</p> <p>If you selected Complete or Application install, the <a href="#">Partition Name/ Auto Start</a> options are displayed. If you are installing only the Web server, the <a href="#">Application Server IP Address</a> Server IP Address options are displayed.</p>
Application Server IP Address	Host/Port	Specifies the host name or IP address and the port for the Application server.
Partition Name/ Auto Start	Partition, Auto Start	<p>Specifies a partition name for the server and whether the Application server automatically starts.</p> <p>If you choose <b>not to</b> automatically start the Application server, then no autostart service installs, and you <b>must manually</b> start the Application server either from the Start menu (in Windows), or from a command line with <code>startappserver</code>. (see <a href="#">Auto Starting Servers</a> on page 70).</p> <p>If you want to install the service (daemon) after you have already installed the rest of the application, you <b>must</b> run the <code>installprocman</code> script from a command line. See <a href="#">Installing Server Manager</a> on page 72 for details.</p>



Window/Prompt	Field/Option	Description
Heap Settings	Max	<p>Allows you to customize the number of devices monitored by the OMNM application and the number of concurrent OMNM users by setting the maximum values for:</p> <ul style="list-style-type: none"> <li>• Application Server Heap Settings (Gigabytes)</li> <li>• Synergy Web Services Heap Settings (Gigabytes)</li> </ul> <p>The default values are 3 for the application server and 2 for the Web service. By default, these settings support 100 devices or less and 25 concurrent users. Refer to the <i>OpenManage Network Manager Quick Start Guide</i> and the <i>User Guide</i> for additional Heap settings supported.</p> <p>If you selected Web server only installation, the <a href="#">Database Client Selection</a> options are displayed.</p>
Cluster Configuration	Config server IP	<p>Specifies the same config server IP address for each Application server.</p> <p><b>Note:</b> For a valid cluster configuration, this address must be the same for each Application server.</p> <p>If you selected Complete install, the <a href="#">MySQL Setup</a> options are displayed. If you selected Application server install type, the <a href="#">Database Client Selection</a> options are displayed.</p>
MySQL Setup	Data Path	<p>Specifies the database location. The default location is:</p> <p><i>installPath/OpenManager/Network Manager/oware3rd/mysql</i></p>
	Initial Size	Is the database capacity allocated during database creation.
	Max Size	<p>Controls the database growth. If left blank, the growth is unlimited as needed until the disk is full. If a maximum is specified, the capacity grows as needed up to the maximum size specified.</p> <p>Best practice is to configure Database Archiving Policies (DAPs) to prevent a full disk. See <a href="#">Database Management</a></p> <p>If a firewall was not detected, there were no port conflicts, or both, the installation starts.</p>
		<p>During a fresh install or upgrade, the installer checks for a running third-party MySQL instance. If there is an existing service named MySQL, a conflicting software found warning is displayed. Here are your options:</p> <ul style="list-style-type: none"> <li>• Continue with the installation and the OMNM installer stops the running MySQL service and then creates and starts its own service named MySQL.</li> </ul> <p>Note that the preexisting third-party MySQL instance and any of its related databases are not deleted. Only the service is deleted and recreated.</p> <ul style="list-style-type: none"> <li>• Return to previous windows and select an installation option that does not include the database.</li> </ul>
Database Client Selection	MySQL/Oracle	<p>Specifies which database type you plan to use.</p> <p>If you selected MySQL, the <a href="#">MySQL Setup</a> options are displayed. If you selected Oracle, the <a href="#">Oracle Setup</a> options are displayed.</p>
MySQL Setup	Host/Port	Provides the database host name or IP address and the port. The default port is 3306.
Oracle Setup	<i>dbOptions</i>	Provides the Oracle user and password, host IP address or name, the port, and the SID. The default port is 1521.

Window/Prompt	Field/Option	Description
Windows Firewall Detected - Allow Access?	Allow/Do not allow firewall access	<p>Specifies whether to allow firewall access when a firewall is detected.</p> <p>If you allow firewall access, rules are automatically added to the Windows Firewall Inbound Rules list.</p> <p>If you do not allow the firewall, the OMNM application does not perform as intended. A list of programs requiring firewall access is displayed after installation so that you can manually configure the firewall.</p> <p>The default is to allow firewall access.</p>
Start Server	Yes/No	<p>Specifies whether to start the server automatically when you boot your system. Yes is the default.</p> <p>If you select, the <a href="#">Monitor Server Startup Now?</a> option is displayed.</p>
Monitor Server Startup Now?	Yes/No	<p>Specifies whether to run the Server Status Console now (Yes) or not (No). The default is Yes.</p> <p>The console monitors the startup progress of you servers and allows you to start the application.</p> <p>If you selected Yes, the console is displayed after the installation completes and you click Done.</p> <p><b>Note:</b> This option is not available when you run the installer from the command line.</p>
Warning! Possible port conflicts		<p>Indicates that the installer detected port conflicts and shows which ports are used by other applications.</p> <p>Resolve these conflicts before continuing with the OMNM installation. If not resolved, the OMNM application may not function.</p>
Invalid Install Folder		<p>Displays a message when installing on a Linux system and the target install directory does exist or have write permissions.</p> <p><code>/installPath/openmanage/networkmanager</code></p> <p>Create this directory as root:</p> <pre>mkdir -p /installPath/openmanage/networkmanager chown :synergy /installPath/openmanage/networkmanager chmod 770 /installPath/openmanage/networkmanager</pre>
Root privileges required		<p>Requires you to run a configuration script as root before the installation can continue. This is only for a Linux installation.</p> <p>Run the <code>\$OWARE_USER_ROOT/install/root/setup.sh</code> setup script in a separate shell, as root.</p> <p>This step installs essential environment files. It does not check for patches (the installation does that).</p>
Database Backup Options	Yes/No	<p>Performs a full backup of date before proceeding when you select Yes (1).</p>
Database Backup Path		<p>Displays the default backup directory. Press Enter to accept. Otherwise, enter the full path for the backup and then press Enter.</p> <p><b>Note:</b> You must have write permissions to the backup directory location.</p> <p>The database backup is stored in the backup.sql file in the specified directory.</p>

Window/Prompt	Field/Option	Description
Database Migration	Yes/No	Specifies whether to apply any required schema changes and automate possible data migration tasks (No) or rebuild database content (Yes). The default is No (2).



# B

## Upgrading/Patching from Previous Versions

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[Patches – 95](#)

[Upgrading from OMNM 6.2 SP3 to 6.5 – 98](#)

[Upgrading from OMNM 4.4 to 6.x – 98](#)

[Upgrading OMNM 5.x – 100](#)

# Upgrade Overview

Upgrading is a process for migrating data, converting database content to be compatible with updated software. Please review any release notes for your new version before assuming migration is necessary or possible. Not all upgrades require migration tasks, and migration is not possible from/to all versions.

New software is not always capable of using data from older versions. Some data may be lost to the application or cause system errors if not properly upgraded. This migration process is designed to extract legacy data while the old software is operational and then transform this data to be compatible with the new software. You may follow the steps outlined here to preserve existing data when upgrading. Since migration addresses the entire application's database, you only need to do this once for the entire system.

## CAUTION:

When upgrading, you must upgrade all servers since they all need to run the same version of code. If your operating system is not supported in the upgrade version, you must upgrade to a supported operating system before upgrading OpenManage Network Manager. See [Compatible Operating Systems/Databases/Browsers](#) on page 96.

### *Restart / Resync Between Version Upgrades*

After each migration stage, restart the OpenManage Network Manager application server and web portal, and resync discovered devices. This is especially true for multi-staged upgrades (5.3.8 to 6.0.4 to 6.1.2, for example).

### *Unicast and Upgrades*

Unicast for intra-cluster communication depends on configuring `/oware/jboss-X.X/server/oware/deploy/cluster/jgroups-channelfactory.sar/META-INF/jgroups-channelfactory-stacks.xml`. Upgrade overwrites this file. If you upgrade, copy the file configured as you might like to a separate location, then return it to its correct location after the upgrade.

### *Licenses and Upgrades*

If you are upgrading your software, you must install licenses for any new functionality (refer to the *OpenManage Network Manager User Guide* for instructions). If you have downloaded a standard package, but are upgrading from a previous system with upgraded capabilities—for example, the rights to manage more than the standard number of devices—you may also need to upgrade that standard package's licenses.

**Recovering licenses**—Dorado Software can provide licenses to replace any lost or misplaced on request.

**Updating license keys before upgrade**—Use the same channel to get the upgraded license.

You can contact the Sales rep that provided the license, contact Dorado Software or call the Dorado Software help desk, or submit a trouble ticket requesting a license upgrade.

When you license new features, you must log out, then re-log in for the new license to take effect. On rare occasions, you must restart the application server.

## CAUTION:

Upgrading from previous versions may change device Model numbers. You may need to change any pre-existing features (for example: filters) that refer to model numbers.

# Patches

Patches are, in effect, upgrades to an existing package to either fix a bug or install a requested enhancement. To install a patched driver, the following are the recommended steps:

## *Check Status*

When upgrading, check the status of any running processes with the following command(s):

```
service oware status
```

..and for the web portal

```
service synergy status
```

## *Stop Processes*

Before you upgrade, stop running processes:

```
service oware stop
```

```
service synergy stop
```

If you are installing to Linux, make sure the installation script has execute permissions:

```
chmod + x linux_install.bin
```

Then run the installation.

## *Primary application server:*

- 1 Shut down OpenManage Network Manager's Application and Web servers.
- 2 Copy any patched drivers (for example ddbase.ddp and ciscodd.ddp) to \$OWAREAPPS.
- 3 Open a shell or command prompt.
- 4 Source the oware environment (Windows: oware, Linux: . /etc/.dsienv)
- 5 cd \$OWAREAPPS
- 6 ocpinstall -x [filename].ddp
- 7 ocpinstall -u [filename].ddp
- 8 ocpinstall -s [filename].ddp



### NOTE:

Often benign errors appear during seeding. As long as the installed driver or feature works, you can safely ignore these.

- 9 Repeat for all patched drivers.

## *Secondary application server, mediation server or client*

- 1 Shut down OpenManage Network Manager's Application and Web servers.
- 2 Copy the files (for example ciscodd.ddp) to \$OWAREAPPS.
- 3 Open a shell or command prompt.
- 4 Source the oware environment as described above. in [Primary application server:](#)
- 5 cd \$OWAREAPPS
- 6 ocpinstall -x [filename].ddp
- 7 Repeat for any other files.

## Compatible Operating Systems/Databases/Browsers

Sometimes upgrading OpenManage Network Manager (OMNM) requires an operating system upgrade on the host(s) where you install it. Such an upgrade typically follows these steps:

- 1 Back up the OMNM database.
- 2 Upgrade the operating system.
- 3 Install the OMNM version from which you were upgrading (again) on the newly updated (supported) operating system.
- 4 Restore the database
- 5 Upgrade to the new version of OMNM.

Refer to the *OpenManage Network Manager User Guide* for more detailed instructions.

Operating Systems status is either active (x), announced end of life or compatibility (AEOL), end of engineering support (EOES) or end of life or compatibility (EOL).

Here is the matrix of supported installations and migrations.

		Release Number:	5.0	5.1	5.2	5.2SP1	5.3	6.0	6.1	6.2SP3	6.5.x	
OS Support (all 64 bit except Windows 2003)	Windows	2000				EOL	EOL	EOL	EOL	EOL	EOL	
		XP SP3	x	AEOL	EOES	EOL	EOL	EOL	EOL	EOL	EOL	
		2003 Server R2	x (32-bit)	AEOL	EOES	EOL	EOL	EOL	EOL	EOL	EOL	
		2008 <sup>1</sup> Server	x	x	x	x	x	x	x	x	x	
		Vista	x	x	x	x	x	x	EOL	EOL	EOL	
		Win 7	x	x	x	x	x	x	x	x	x	
		2008R2					x	x	x	x	x	
		2012 Server						x	x	x	x	
		2016 Server									x	x
	Linux	Red Hat	5.5	AEOL	x	x	EOES	EOL	EOL	EOL	EOL	EOL
			6.0	x	AEOL	x	EOES	EOL	EOL	EOL	EOL	EOL
			6.2			x	x	x	x	x	x	x
			6.4				x	x	x	x	x	x
			6.5							x	x	x
		CentOS	6.2			x	x	x	x	x	x	x
			6.4					x	x	x	x	x
			6.5							x	x	x
	Unix	Solaris	10	x	AEOL	EOES	EOL	EOL	EOL	EOL	EOL	



Release Number:		5.0	5.1	5.2	5.2SP1	5.3	6.0	6.1	6.2SP3	6.5.x
Database	MySQL				5.0.51-64	5.0.51-64	5.0.51-64	5.0.51-64	5.0.51-64	5.7.16-64
	Oracle	9.2.0.5 - 11	9.2.0.5 - 11	9.2.0.5 - 11	9.2.0.5 - 11	9.2.0.5 - 11	9.2.0.5 - 11	9.2.0.5 - 11	9,10,11, 12c	9,10,11, 12c
Browser Version	IE	9	9	9	9	9	9	11	11	11
	Firefox	3.6	3.6	3.6	12	12	12	54	54	54
	Chrome	6	6	6	22	22	22	59	59	63
	Safari	5	5	5	5	5	5	5	5	5

1. To install on Windows 2008 server, right-click the `win_install.exe` file (not the shortcut, but the file it refers to), and select the Compatibility tab. Check Run this program in compatibility mode for and then select either Windows 7 or Vista. OMNM supports command line installations without compatibility issues.

**NOTE:**

If you are running either MySQL or Oracle as your database on a separate server, you must also run `dbpostinstall` before starting your system.

Oracle databases are recommended for distributed, clustered, or highly available installations.

Oracle 10g RAC or later is required for High Availability installations.

Oracle database requires that the `ORACLE_HOME` environment variable be set to the local Oracle installation's home directory where the `bin` and `jdbc` directories reside.

Other recommended software:

Adobe Flash (latest version)

Java (latest version for the browser)

Perl (Active Perl, with `Net::Telnet` classes) on the application server.

See the Software Announcements / EOL release note for more about operating system and other application end of life (EOL) or announced end of life (AEOL) information.

## Upgrading Linux and OpenManage Network Manager

- 1 For Redhat 5.5, if you are upgrading from the previous OpenManage Network Manager version, back up the MySQL database.
- 2 Install Redhat Linux 6.2
- 3 Install the previous OpenManage Network Manager version on the newly installed Linux 6.2.
- 4 Restore the backed up database(s).
- 5 Log out and log back in to your operating system.
- 6 Upgrade to this version of OpenManage Network Manager.

The *OpenManage Network Manager User Guide* offers more guidance for Linux installation and tuning, refer to it for essential information about what works on Linux.

## Upgrading an Oracle Installation

Upgrading an installation with an Oracle database follows the steps outlined in the following sections. Read them, and the rest of this section first.

Make sure the version of OpenManage Network Manager supports your Oracle version. See [Software Requirements](#) on page 15 for specifics about what's supported. If your Oracle is not compatible, upgrade it first.

You must run you must run the following on the (primary) application server:

```
loaddb -u system -w password -s
loaddb -u system -w password
and
dbpostinstall
```

The order does not matter.

## Upgrading from OMNM 6.2 SP3 to 6.5

When Upgrading from OMNM 6.2 SP3 to 6.5, the 6.5 installation package is simply executed just like a fresh installation. The installer will detect the upgrade and perform the necessary steps. The 6.5 version will perform an in place upgrade of the Mysql db. This included migration of data and may take from 20 minutes to several hours depending on the size of your db. Once completed, a complete system reboot is recommended.

## Upgrading from OMNM 4.4 to 6.x

The following steps describe upgrading from OMNM versions 4.4 to 6.x. Notice that these are suggested steps that may not comprehensively cover your particular system needs; modify these steps to accommodate your system's setup. See [Manual Migration](#) on page 102 for an abbreviated list of what appears below.

 **NOTE:**

Best practice is to perform these steps in a lab, then modify them to suit your system's needs, before upgrading a production system.

- 1 Make any changes to the hardware needed to accommodate your system. See [Software Requirements](#) on page 15 for suggestions.
- 2 On your 6.1.17 installation, before upgrading:
  - a. Export the following custom objects to files on disk:
    - All custom Service Templates
    - All custom Adaptive CLI Scripts
  - b. Create and run a report listing any custom Adaptive CLI scripts installed currently that have associated *Negate Command* Adaptive CLIs. Include the name of the Negate Command Adaptive CLIs as a column of the report to list the existing Adaptive CLIs.

- c. Note or take screen shots of the following that must be manually recreated after upgrading:
  - Existing User Records and Associated User Group Membership
  - Existing Permissions for each User Group
  - Any configured, enabled Scheduled Items
  - Any Group Operations
  - Groups of Adaptive CLIs (for batch execution)
  - File Backup Actions
  - OpenManage Network Manager Change Management Actions
- 3 Do a full backup of your database. (See [MySQL Backup/Restore](#) on page 154 or refer to your database's backup instructions)
- 4 Optional: Back up the host to which you are installing.
- 5 Optional (but recommended): stop all running OpenManage Network Manager processes.
- 6 Perform the 6.x Upgrade Installation (see [Upgrading an Existing Installation](#) on page 39 for more about this). You must run the `loaddb -s` command line as part of this installation.
- 7 You may need to look through the portal properties to see the web server is on the correct address. It defaults to the application server's IP address, which would be incorrect if web server is not on that machine. Correct
- 8 Manually recreate the following in 6.x using its Web Portal:
  - a. Recreate previous User Groups named exactly the same as they were in 4.4.

**NOTE:**

As long as you use the same name for new User Groups (Roles) created in the upgrade as existed in 6.1.17, the previously assigned functional permissions associated with each Group are automatically linked in the upgrade. No need to reassign the functional permissions for each group.

- b. Recreate previous Users with proper assigned User Group Membership (Roles) and Passwords in the Web Portal.

To validate this, test, log in with each of the configured User Logins to ensure they have the previously assigned permissions.

After upgrading, Users may not initially appear associated to their roles, but you can work around this apparent failure by clicking *Update Associations*. This is in the Roles portion of the Control Panel. Click *Actions > Assign Members*, then click the *Update Associations* button on the following screen. Alternatively, you can go to the Server Administration portion of the Control Panel and click *Execute* to Reindex all search indexes.

- c. Recreate File Backup actions against defined group(s) of target devices.
- d. Regroup and test ACLI Actions that were previously grouped together as a Task Groups in 4.4.

The task group feature was not supported in 4.4, but 6.x lets you group execution of tasks in sequence.

- e. Recreate Scheduled Items, taking into account any new actions configured for items above.
  - f. Review previously Scheduled Items that appear in the upgraded installation. Recreate any missing Scheduled items to ensure proper visibility and execution of the associated scheduled activity.
- 9 Review / augment and retest Adaptive CLIs that had negate commands previously tied to them (both positive and negative/error use cases). Ensure these require no negate scripts.



**NOTE:**

Negate scripts are typically not used/needed for Juniper JUNOS devices because of the JunOS's transaction control and semantics.

- 10 Test any custom Adaptive CLI Scripts migrated from 4.4 on your updated installation.
- 11 Create a Production Upgrade Plan to follow once Lab upgrade testing is successfully completed.

### *Port Issue*

When upgrading from an earlier version 4.4 in a Windows environment, you may have to handle a port issue. In early version 6 OpenManage Network Manager, the default application server port was 80; later the default was changed to 8089. During web portal installation by itself, the installer asks for the application server port. This screen defaults to 8089. The installing user must verify that their original application server installation is running on port 8089; and if not enter the appropriate port number your previous installation uses.

You can also change this after installing by updating the `portal-ext.properties` file located in directory `oware/synergy/tomcat-7.0.40/webapps/ROOT/WEB-INF/classes`.

## Upgrading OMNM 5.x

To enhance performance, OMNM 5.x includes a 64-bit application with 64-bit JDK and MySQL. Except for Windows, where you can still install and upgrade 32-bit versions, other operating systems support 64-bit only for fresh installations.



**NOTE:**

If you upgrade from one version of OpenManage Network Manager to another, make sure you clear your browser's cache if you have difficulties seeing the upgraded version.

Best practice is to re-index after upgrading. To re-index go to Control Panel > Server Administration and then click on the Reindex all search indexes. This panel is visible to administrators only, and contains helpful information about the server.



**How To:**

**Perform Patch Upgrades**

The patch process for patching the web portal is as follows:

- 1 Copy the \*.ddp and \*.ocp files to the installation root directory.
- 2 Copy the patched NetViewFactory.war and synergy-tomcat-xxxxx.zip to the installation root. These must replace any old files in the installation package that are not on the installed instance.
- 3 Re-run the installation.

If you know there were no changes to the user interface side and only the backend bridge (NetViewFactory) then you can shut down your application server and replace the NetViewFactory.war in the `oware/jboss-x.x/./deploy` directory and then restart the application server.



**NOTE:**

OpenManage Network Manager changes the port for Web Services from 80 to 8089.

## Operating System Recommendations for v.5.x

OS (Operating System)	OS Bit 32/64 (bits)	Application bit architecture	Supported in previous versions?	Upgrade/Migrate to OMNM 64-bit	OMNM 5.xFresh install
Windows 32	32	32	Not Supported	NA	NA
	64	32	Currently supported	NO	NO
Windows 64	64	32	Currently supported	YES (OPTION for 32- or 64-bit)	YES
	64	64	OMNM 5 (64 bit JDK and MySQL)	YES	YES
Red Hat Linux 32	32	32	Only in previous versions	NA	NO
	64	32	Only in previous versions	NO	NO
Red Hat / CentOS Linux 64	64	32	Currently supported	YES (FORCE 64-bit upgrade, no 32-bit)	YES - 64-bit
	64	64	OMNM 5 (64 bit JDK and MySQL)	YES	YES

(See [Compatible Operating Systems/Databases/Browsers](#) on page 96, too.)

### Upgrading on Linux

The following are best practices for upgrading from a previous a version of OpenManage Network Manager on a Linux machine:

- 1 Ensure you have installed the 32-bit Linux Libraries, as described earlier in this guide.
- 2 Verify your previous version’s installation application server starts without exceptions
- 3 Back up the database, and any other resources that need manual installation. Consult Release notes for a list of these.
- 4 Proceed with the upgrade.

## Manual Migration

The following requires manual migration (typically, export, then import) from 6.x versions:

**Discovery Profiles**—Version 5+ no longer supports multiple networks in the profile, so migrating from previous versions whose profiles support multiple networks means those profiles are not well formatted.

**SMTP Settings**—re-make these in the Quick Navigation portlet.

**Saved topologies / visualization**—Since this is completely re-designed, you must re-make any topologies. Plan ahead; take screenshots.

**Command monitors**—Commands have a different reference structure. You must install external scripts to a referenced location rather than loading them in the database, then configure the monitors to refer to them.

**Group Operations**—Deprecated, replaced by Adaptive CLI, Adaptive CLI groups and Managed Resource Groups.

**Scheduled items**—Some must be re-scheduled.

**User Names / Passwords, and User Groups (Roles)**—These are not automatically re-assigned, and must be manually re-created.

**Custom Adaptive CLIs**—Re-make these.

**Associating Adaptive CLIs as destructors**—The “Negate” commands for configuration ACLs are no longer supported in 6.x. Naming ACLs so the “constructors” and “destructors” sort together is a suggested alternative.

**Details and Adaptive CLI**—These replace Discrete Configuration which does not migrate.

**Performance**—These capabilities have been completely reconfigured. You must re-create dashboards from scratch.

# Clustering

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## Introducing Clustering

Clustering transparently balances the computing load for this application's EJB components—rule engine, scheduler, logger, Business Object Manager (BOM), workspaces and mediation. This is especially beneficial for the applications' communication with the database storing its business data.

By default, this application supports the distribution of its processes. It distributes the load per client (not per request). Except for Mediation clustering functionality, fail-over or high availability clustering is an optional add-on. To make a genuine highly available system, you must cluster application servers, mediation servers, and database servers (Oracle RAC). Consult your sales representative for the licensing requirements for fail-over, or high availability clustering.

The following are some of the benefits of clustering:

- Elimination of bottlenecks and single-point failures—Clustering several servers distributes computing tasks, and enhances performance. You can even dynamically add a server to the cluster to meet increasing user demand. Replication protects your application and users' state to ensure that the failures—like server crashes—can be fully masked from the user and application.
- Transparency to your applications and application developers—developers do not have to deal with intricacies of replication and load balancing. This means developers do not have to modify their application components to run in a clustered environment.
- Hardware and OS independence—You can use clustering across disparate hardware and operating system platforms.

## OMNM Deployment Architecture

OpenManage Network Manager (OMNM) supports three primary deployment models:

**Single-Server**—The full application is installed on one server.

**Distributed-Server**—One or more servers are distributed.

**Clustered/HA**—multiple servers of each type may be used for performance gains or to achieve High Availability.

The OMNM platform software architecture consists of the following principal run-time software components:

**Web Server**—Eliminates the need for a separate Java client interface. Deployments that have more than one web server or application server also require a load balancer.

**Application Server**—The system's central processing unit. It executes application business logic. You can deploy it in both fault tolerant (Master/Slave) and cluster configurations to limit downtime and optimize performance.

Upgrading application server first, if you are using the embedded database, also upgrades the database, if necessary. It's often easiest to install application server first simply because this upgrade impacts any other application servers too, if they are clustered.

**Database Server**—Like the Application Server, you can deploy the Database Server in a fault tolerant configuration to eliminate data loss during a system failure and to ensure data integrity. This configuration typically uses Mysql replication or Oracle RAC. You can cluster the Oracle database servers. See [Installing Oracle](#) on page 166. References to database servers below apply to all supported databases.



**Mediation Server**—Mediation Server manages the communication between the OpenManage Network Manager and the network elements. Like the application and database servers, you can deploy mediation servers in a fault tolerant master/slave configuration to maintain constant communication with the network elements. You can make mediation servers highly available. See [Mediation Clustering](#) on page 129.



**NOTE:**

If Mediation Servers or clients are outside a firewall from the Application Server, you must disable multicast connections to Application Servers. See [Disabling Multicast](#) on page 111.

**Load Balancer (Proxy)**—Deployments where many users access the system concurrently may require a Load Balancer, also known as a Proxy, to manage traffic to multiple Web Servers. If one web server is overloaded or un-responsive, the Load Balancer directs users to a responsive Web server. Single-server installations do not require a Load Balancer.

All deployments with multiple application servers require an additional load balancer for application servers too. This ensures that active web servers always direct traffic to an available application server in the cluster. If the current application server is unresponsive, the load balancer re-directs the web server to another application server.

With the proper configuration the same load balancer can serve both web server and application server. See [Using Load Balancers](#) on page 116 for more.

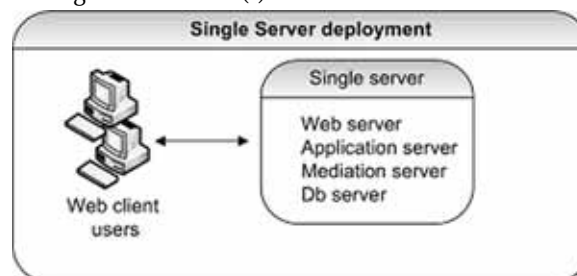
## Data Flow

Clients access the OpenManage Network Manager system through a web browser. The system routes requests to web server(s) to a proxy device (load balancer [LB]) that routes traffic to a suitable application server. Application server returns data retrieved from the database. If an application needs to communicate with managed devices, a mediation server handles the task. The mediation server retrieves the data from the device, and sends it to the application server. Application server processes, then stores the data in the database.

The images below show the most common deployment architectures:

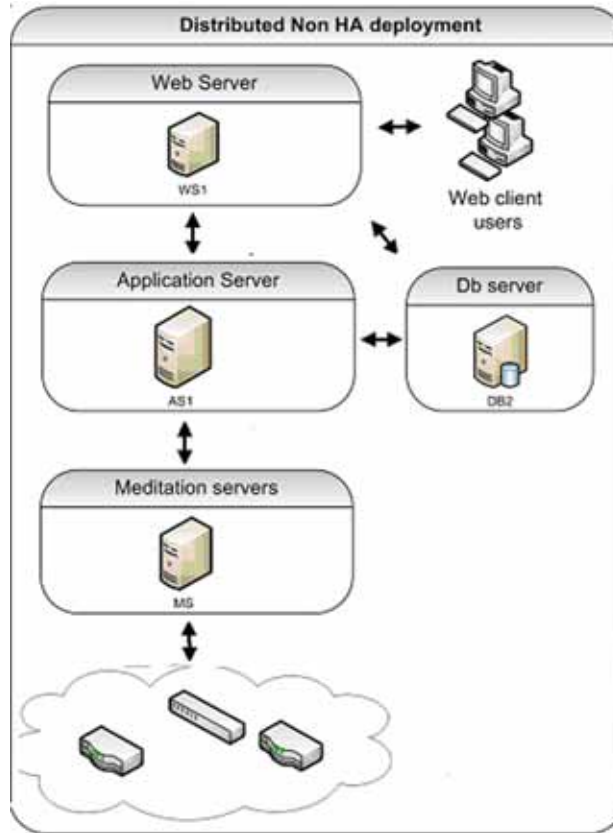
### Single Server

This deployment is the simplest installation. The entire application resides on a single machine. User / client access is through web browser(s).



## Distributed Non-HA

This deployment distributes servers to separate machines. You can use distribution to achieve better performance by allocating dedicated servers. You may have to install to distributed servers when the minimum hardware is not available for a single server (standalone) installation.



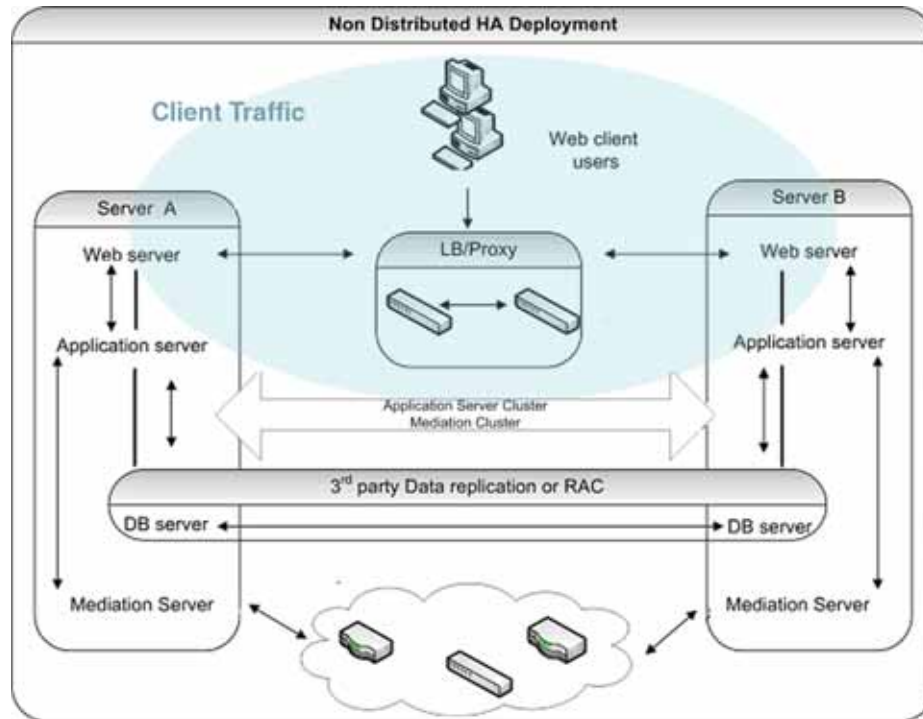
### NOTE:

For distributed installations best practice is to make all links connecting hosts 10GB or faster.

## Non-Distributed HA

This is the simplest high availability (HA) installation. To configure your system like this, install the full application on two machines. In this scenario the application servers are clustered and mediation servers are configured for redundancy. Oracle RAC or replication produces database

redundancy. Paired load-balancers / proxy servers direct web users to an available web server, and distribute web server traffic to an available application server, and mediation servers communicate with managed devices.



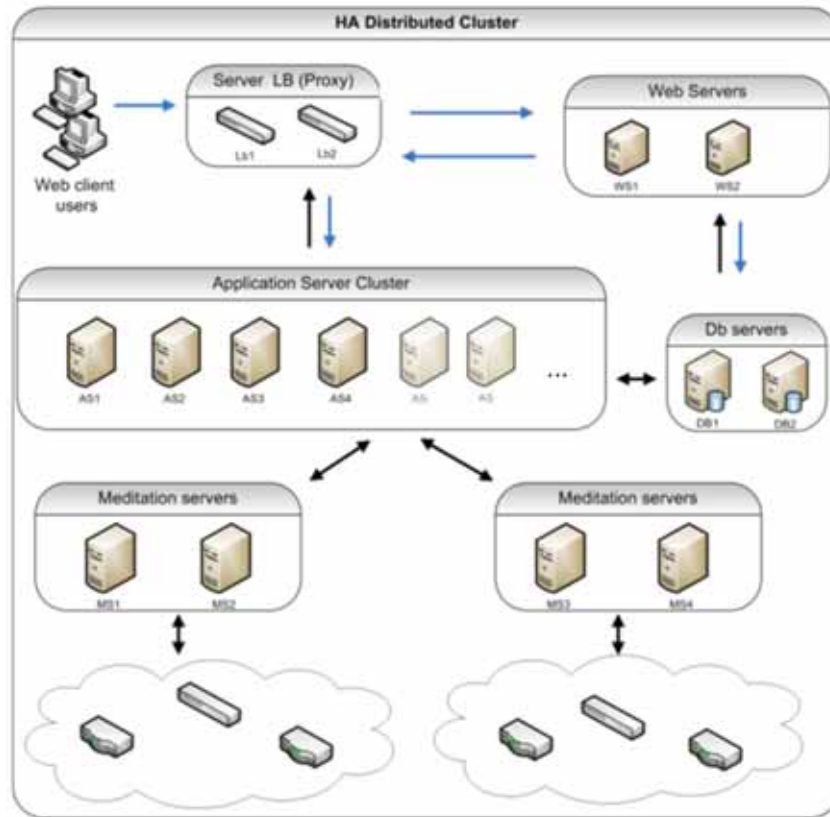
## HA Distributed Cluster

Deploy in this arrangement for best performance and high availability. This setup includes the following:

- Paired load balancers for redundancy
- Redundant web servers
- Clustered application servers for both improved performance and redundancy.
- Paired database servers for database redundancy and failover.

OpenManage Network Manager (OMNM) application servers in a cluster will talk to a database's floating IP. The floating IP is managed by the database cluster. Floating IP can be achieved through Oracle RAC or MHA and OMNM is compatible with both of them.

- Paired, redundant mediation servers to handle traffic between OpenManage Network Manager and managed devices.



## Cluster Constraints

This section describes the constraints within which a cluster configuration must work.

- All servers in a cluster must be on the same local area network (LAN), be reachable for IP v4 multicast, and must have unique names. Clustering is *not* designed for servers in different time zones (however, you can have mediation agents send data from distant locations). For an exception to the multicast requirement, and for managing servers and clients outside firewalls, see [Disabling Multicast](#) on page 111. You will need to use unicast instead of multicast when cluster member nodes are on different IP subnet.

To ensure that application server nodes do not miss server-to-server heartbeats that may erroneously initiate fail-over processes, you must connect clustered application servers via a LAN with maximum latency of 100ms. That said, you can put clustered server nodes several miles/kilometers apart, as long as the connection does not exceed the maximum latency (using Fibre ethernet, for example). WAN connectivity is not recommended.

### NOTE:

Although high-speed interconnects may be able to increase the distance of application server nodes to over 5km, the High-Availability solution is not designed for disaster recovery situations. Dorado Software recommends the use of a separate OpenManage Network Manager deployment located at the disaster recovery location to be used as a cold standby system. The database of the primary system should be

copied to the disaster recovery standby system on Real-time or on regularly scheduled intervals(Database Dump). Application servers can be replicated by software like VEEAM, Avamar etc. database Server to be replicated by oracle data guard(Real-time) or MySQL Replication(Real-time)

- All cluster members must run the same version of the application and listen on the same port.



**NOTE:**

The heartbeat between mediation and application servers now contains the software version information. If the versions do not match, then OpenManage Network Manager generates an event/ alarm to indicate the issue.

- You must identically configure all servers running Enterprise JavaBeans (EJBs) with Java Database Connectivity (JDBC) connection pools.
- For clusters using database connection pools, each cluster member must have an identical connection pool. See [Database Connections](#) on page 110 for more details.
- The Access Control Lists (ACLs) and servlets must be identical for every machine serving servlets.
- All cluster members must have identical service configurations. You cannot, for example, turn on mediation services in some cluster application servers and not others.
- Support exists for only a single application server cluster per system, but you can have several mediation server clusters.
- Database servers can always be separate, no matter how you configure the other machines. You can make a database machine part of an application server cluster/partition, but this is not recommended.



**NOTE:**

For non-embedded database installations (Oracle) best practice is keeping the database server(s) separate from the other machines.

- Although application servers process more than just mediation, any application server can also run mediation services. Stand-alone mediation servers themselves run *only* mediation services. You can also turn mediation on and off on any host running an application server. If you cluster application servers, one or more distributed mediation servers typically handle mediation, and the clustered application servers have mediation turned off.

As stated above, you can also run both the application server and mediation services on a single machine. A cluster of such combined application / mediation machines is also possible—minimally two servers each running an application server with mediation services.

One caveat: Mediation processes have an impact on application server performance. This is why best practice for larger deployments is to distribute mediation services to dedicated mediation servers. Once you distribute mediation, you can ensure better performance by disabling mediation on application servers in the application server cluster.

- SNMP Mediation agents can back each other up as primary/secondary for any subnet (any range of IP addresses). A mediation agent which is primary for one subnet can be secondary for a different one. Such subnets may not overlap.

## Database Connections

By default each deployed application server has 60 database pool connections available. In distributed systems, size connections by multiplying the number of application servers deployed in the system by 60 to get a starting point for the total number of required database connections.



### NOTE:

This is just a general starting point and as demand on the system grows, various web and OpenManage Network Manager components requiring connections naturally increase.

The database connection pools configuration file locations for Oracle and MySQL appear below with their default max connection pool sizes. These numbers determine the overall pool requirements per application server.

### *Oracle database file locations:*

#### Oware connection pools

```
/oware/jboss-5.1/owareconf/oracle-ds.xml
    corepool uses default max-pool-size (5)
    jobpool uses default max-pool-size (10)
    userpool uses default max-pool-size (25)
```

#### Performance connection pools

```
/owareapps/performance/server/conf/pm-oracle-ds.xml
    pmpool uses default max-pool-size (10)
```

#### OpenManage Network Manager connection pools

```
/owareapps/dellemc/server/conf/rc-oracle-ds.xml
    eventhistory pool uses default max-pool-size (10)
```

### *MySQL database file locations:*

#### Oware connection pools

```
/oware/jboss-5.1/oware/conf/mysql-ds.xml
    corepool uses default max-pool-size (5)
    jobpool uses default max-pool-size (10)
    userpool uses default max-pool-size (25)
```

#### Performance connection pools

```
/owareapps/performance/server/conf/pm-mysql-ds.xml
    pmpool uses default max-pool-size (10)
```

#### OpenManage Network Manager connection pools

```
/owareapps/dellemc/server/conf/rc-mysql-ds.xml
    eventhistory pool uses default max-pool-size (10)
```

#### To calculate total number of connections:

Add the number of pool connections per server times the number of deployed servers. That equals the total number of maximum database connections

For example, if your cluster has 12 servers, the suggested total is  $12 \times 60 = 720$  connections. Again, this is just a general starting point and to account for a natural increase in database connections. Best practice here would be to increase that number by at least a factor of at 5 for a total of 3600 connections.

MySQL's online support suggests that you can create as many as 10,000 connections depending on the amount of RAM available: "Linux should be able to support at 500 to 1000 simultaneous connections routinely and as many as 10,000 connections if you have many gigabytes of RAM available and the workload from each is low or the response time target undemanding."

### *Oracle Database Connections*

You may need more connections for Oracle since it can recursively consume database connections internally. Refer to the following for more about this: <http://tech.e2sn.com/oracle/oracle-internals-and-architecture/recursive-sessions-and-ora-00018-maximum-number-of-sessions-exceeded>

### *Notifying Users of Lost Database Connection*

In the `owareapps\installedprops\installed.properties` file, you can configure the application server to send e-mail when it loses connection to the database. Here are the properties to insert:

```
redcell.smtp.host=mail_server.com
redcell.smtp.authentication.enabled=true
redcell.smtp.authentication.username=user@company.com
redcell.smtp.authentication.password=password
redcell.smtp.recipients=user_1@company.com
redcell.smtp.subject.message=Lost DB connection ### optional
redcell.smtp.message=Call 911!!!! ### optional
```

The contents specified above are examples.

## Disabling Multicast

### Disabling Multicast for a Standalone Server

Multicast is enabled to facilitate communication between servers in distributed, multi-server installations. If your system is a standalone server, it may be useful to disable this feature to reduce performance delay. Follow these steps to disable multicast.

- 1 Stop appserver.
- 2 Add the property `oware.unicast=true` to `installed.properties` file located in `../dorado/owareapps/installprops/lib` directory
- 3 Locate `../oware/jboss/server/oware/deploy/cluster/jgroups-channelfactory.sar/META-INF/jgroups-channelfactory-stacks.xml`
- 4 In the TCP section (you can search by `< stack name="tcp"`), comment this portion:

```
<!--Alternative 1: multicast-based automatic discovery.-->
< MPING timeout="3000"
num_initial_members="3"
mcast_addr="${jboss.partition.udpGroup:230.11.11.11}"
mcast_port="${jgroups.tcp.mping_mcast_port:45700}"
ip_ttl="${jgroups.udp.ip_ttl:2}"/>
```

- 5 And Uncomment
- ```
<!-- Alternative 2: non multicast-based replacement for MPING. Requires
a static configuration of *all* possible cluster members.>
<TCPPING timeout="3000"
initial_hosts="${jgroups.tcpping.initial_hosts:localhost[7600],local
host[7600]}"
port_range="1"
num_initial_members="3"/-->
```

**CAUTION:**

Make sure you modify stack "tcp" section, not "tcp-sync" section

**Example:**

```
<!--Alternative 1: multicast-based automatic discovery.
<MPING timeout="3000"
num_initial_members="3"
mcast_addr="${jboss.partition.udpGroup:230.11.11.11}"
mcast_port="${jgroups.tcp.mping_mcast_port:45700}"
ip_ttl="${jgroups.udp.ip_ttl:2}"/>
-->
```

Alternative 2: non multicast-based replacement for MPING. Requires a static configuration of \*all\* possible cluster members.>

```
<TCPPING timeout="3000"
initial_hosts="${jgroups.tcpping.initial_hosts:localhost[7600],local
host[7600]}"
port_range="1"
num_initial_members="3"/
```

- 6 Start appserver

## Disabling Multicast within a Cluster

Disabling multicast may be useful if a firewall exists between Java clients, application servers or mediation servers that must discover each other. (See also [Configuring the Cluster's Multicast Address](#) on page 196.) Application-to-mediation server communication does not use multicast, although mediation-to-application server does, unless disabled.

To disable multicast communication between application and mediation servers, define the property `oware.application.servers` in the `installedprops/medserver/lib/installed.properties` file and the property should point to the application server ip address and should be in the following format:

```
oware.application.servers=<application server ip address>
```



If the mediation server is communicating to a cluster of application servers then the value should define all the application servers separated by a comma. For example:

```
oware.application.servers=<application server A ip address>,<application
server B ip address>
```

Define this property on all mediation servers.

This configuration change is only for application and mediation server communication. The mediation servers in a cluster still use multicast between themselves. If you use `oware.application.servers`, you must (comma-separated) list all available servers wherever you use it to bypass multicast.

OpenManage Network Manager If you make a mistake in installing portions of your cluster, remember you must either re-source the Oware environment, or delete all files in `oware/temp` (and restart the process in question) before changes can be effective.

 CAUTION:

Multicast is still required between the cluster mediation servers, or application servers in a cluster unless you follow the instructions in the next section.

You can disable Multicast and using Unicast within a cluster. To do that, you must add this line to the `installprops\lib\installed.properties` file:

```
oware.unicast=true
```

And in file `jgroups-channelfactory-stacks.xml` in `$OWARE_ROOT/jboss-x.x/server/oware/deploy/cluster/jgroups-channelfactory.sar/META-INF/` change the following:

 CAUTION:

Make sure you modify stack "tcp" not "tcp-sync"

*Comment this portion:*

```
<stack name="tcp"
<!--Alternative 1: multicast-based automatic discovery.
<MPING timeout="3000"
num_initial_members="3"
mcast_addr="{jboss.partition.udpGroup:230.11.11.11}"
mcast_port="{jgroups.tcp.mping_mcast_port:45700}"
ip_ttl="{jgroups.udp.ip_ttl:2}"/>
-->
```

*Uncomment this portion:*

```
<!-- Alternative 2: non multicast-based replacement for MPING. Requires a
static configuration of *all* possible cluster members.>
<TCPPING timeout="3000"
initial_hosts="{jgroups.tcpping.initial_hosts:localhost[7600],localhos
t[7600]}"
port_range="1"
num_initial_members="3"/-->
```

*Example:*

```

<!-- Alternative 1: multicast-based automatic discovery.
<MPING timeout="3000"
  num_initial_members="3"
  mcast_addr="${jboss.partition.udpGroup:230.11.11.11}"
  mcast_port="${jgroups.tcp.mping_mcast_port:45700}"
  ip_ttl="${jgroups.udp.ip_ttl:2}"/>
-->
Alternative 2: non multicast-based replacement for MPING. Requires a
static configuration of *all* possible cluster members.-->
<TCPPING timeout="3000"

  initial_hosts="${jgroups.tcpping.initial_hosts:192.168.53.15[7600],192.
168.53.16[7600],192.168.53.17[7600]}"
  port_range="1"
  num_initial_members="3"/>

```

**CAUTION:**

Unicast depends on configuring this file. Upgrade overwrites it. If you upgrade, copy the file configured as you might like to a separate location, then return it to its correct location.

## Synergy Web Server Clustering

If your system deploys multiple web servers, cluster them to work more efficiently. Enabling clustering keeps events, indexes and documents in sync between servers in case of a Node failure. Configure the following to have a successful clustered environment:

- Point all nodes to the same Portal Database or database cluster.
- Make Documents and Media repositories accessible to all nodes within the cluster.
- Configure search for replication.
- Replicate cache across all nodes of the cluster.
- Synergy versions should be the same since they share a database and the schemas must match the runtime environment for each node.
- Each server should be within the same network and able to access each other without restrictions. Disable any firewall between nodes. You will need to use unicast instead of multicast when webserver cluster member nodes are on different IP subnet.
- Use a load balancer to delegate traffic through out the clustered nodes allowing web browsers to point to a single host/ip (load balancer). See [Using Load Balancers](#) on page 116.

Most of these settings are properties to set within the `server-overrides.properties` file in the `synergy/conf` directory. This file preserves property overrides on upgrade.

**NOTICE**

Online colleagues only appear when they are connected to same web server in a load-balanced situation when clustering is incorrectly configured.

## Web Server Clustering Setup

The following describes tasks needed to move existing files to the common share and basic properties which you must enable to turn on clustering. You must shut down OpenManage Network Manager during this process.

### Common Documents and Media Share Setup

- 1 Set up a network share location dedicated to store the documents and media. If you are unsure how to do this consult with your network administrator and ask him/her to setup a share that can be mounted across the clustered nodes. Each operating system type is different and this is standard network setup, not covered in this document.
- 2 Mount the new share on each node within the cluster.
- 3 If you used a single server setup previously or multiple servers without clustering, locate the original or first node in the previous setup and do the following:
  - a. Navigate to the nodes `<installdir>/oware/synergy/data` directory and copy the `document_library` to the share. If an `images` directory exists, copy that too.
  - b. If other nodes were previously running then do the previous step (a), but copy/merge the contents to produce a merged view

You should now have a directory structure of `SHARE/document_library` and (if it existed during the steps above, `SHARE/images`).

### Property Configuration

Do the steps below on each node within the cluster. Start with the first node and repeat the same steps until complete.

#### *Edit the Property File*

- 1 Navigate to the `<installdir>/oware/synergy/conf` directory
- 2 If you have an existing `server-overrides.properties` file then you can edit it here. If not rename or copy the `server-overrides.properties.sample` to `server-overrides.properties`. Edit the new `server-overrides.properties` file.
- 3 Locate the Clustering section within this file. If you do not have a clustering section or some of the properties mentioned below do not exist, you can edit the `.sample` file and copy the updated section into the `.properties` file. You can also add the properties mentioned below. Installation updates the sample file with the most current comments and newer properties. The `server-overrides.properties.sample` file is a reference template.

### Turn on Clustering and Index Replication

- 1 Turn on Clustering: Uncomment or add the `cluster.link.enabled` and make sure its value is `true`.
- 2 Turn on Index Replication: Uncomment or add the `lucene.replicate.write` property, and make sure its value is `true`.

## Set the Share Path

- 1 *Document Library Share*: Uncomment or add the `dl.store.file.system.root.dir` property. The value should point to the `/path/to/share/document_library` or, for Windows, if your share was drive G: then this entry would be `G:/document_library`
- 2 *Legacy Images Share*: Uncomment or add the `image.hook.file.system.root.dir` property. The value should point to the `/path/to/share/images`, or, for Windows, if your share was drive G: then `G:/images`. Even if you had no `images` directory copied previously, you still need this property and the system creates the directory when needed.

Your property setup is now complete. Save the file and do the same for each Node within the cluster.

## Start the Nodes

You have now mounted the common share on all server nodes. Each server should have clustering and Lucene replication enabled along with the share paths for the document library and legacy images within the `server-overrides.properties` file for each server. You can now start each server. Start the nodes one after the other so each node has time to adapt to the new setup. During the startup extra log entries should appear referring to members joining or other nodes found.

## Disable Multicast and using Unicast within a webserver cluster

- 1 Create or copy the `unicast.xml` to  
`$OWARE_ROOT/synergy/tomcat-7.0.40/webapps/ROOT/WEB-INF/classes`  
 The `unicast.xml` can be found at <https://web.liferay.com/web/fimez/blog/-/blogs/configuring-a-liferay-cluster-and-make-it-use-unicast>
- 2 Add following to `$OWARE_ROOT/synergy/conf/server-overrides.properties`  
`cluster.link.channel.properties.control= unicast.xml`  
`cluster.link.channel.properties.transport.0= unicast.xml`  
`ehcache.bootstrap.cache.loader.factory= com.liferay.portal.cache.ehcache.JGroupsBootstrapCacheLoaderFactory`  
`ehcache.cache.event.listener.factory= net.sf.ehcache.distribution.jgroups.JGroupsCacheReplicatorFactory`  
`ehcache.cache.manager.peer.provider.factory= net.sf.ehcache.distribution.jgroups.JGroupsCacheManagerPeerProviderFactory`  
`net.sf.ehcache.configurationResourceName.peerProviderProperties= file= /unicast.xml`  
`ehcache.multi.vm.config.location.peerProviderProperties= file= /unicast.xml`

## Using Load Balancers

OpenManage Network Manager's web server(s) is (are) between application servers and clients. To add high availability-like capabilities a web served application system, you may use an open-source load balancer like HAProxy either between the web servers and application servers, or between clients and web servers (as in [Non-Distributed HA](#) on page 106 or [HA Distributed Cluster](#) on page 107).

For high availability (HA) installations, systems typically use pairs of load balancers. OpenManage Network Manager needs at least one load balancer pair to distribute loads among web servers. The load balancer IP is what clients connect to. If webserver and appserver are on same machines, all web servers can point to 127.0.0.1 to use their own local appserver. If webserver and appserver are on different machines, they must have another load balancer pair to distribute loads among app servers. All web servers then point to the appserver load balancer IP.

### *Load Balancer recommended hardware (or equivalent)*

Configure your minimum hardware based on the expected number of connection per second:

- Less than 10000 connection/ sec 1 GB RAM, 2GB HD, Atom processor
- Up to 20000 connections/sec 4 GB ram, 10GB HD, Core DUO processor.

Deployments vary based on application usage, system availability and redundancy needs. Deployment recommendations depend on system sizing factors discussed in the Sizing section.

Refer to [Single-Server Hardware Requirements](#) on page 30 for hardware recommendations.

## Preparation for Clustering

The following prepares for clustering.

- See [Distributed/HA Hardware Requirements](#) on page 58 for hardware recommendations.
- Cluster licenses.
- As in any distributed system, you must ensure all servers' system time is synchronized. Application server cluster and mediation server cluster have significant problems operating until time is in sync with NTP.

An example of such problems: the job status messages does not appear when backing up devices. The start time is later than the finish time.

NTP is unnecessary with a standalone server. Otherwise, you must use it when you distribute computing in clusters or when you just distribute Meditation.

Here is a sample ntp client configuration file:

```
# @(#)ntp.client      1.2      96/11/06 SMI
#
# /etc/inet/ntp.client
#
# An example file that could be copied over to /etc/inet/ntp.conf; it
# provides a configuration for a host that passively waits for a server
# to provide NTP packets on the ntp multicast net.
#
#multicastclient 224.0.1.1

driftfile /var/ntp/driftfile

server apollo
```

- The partition names for servers in a cluster must be the same, and they must use the same multicast address for inter-cluster communication. You can set these for application servers with an the cluster installation screen that appears whenever you do a *Custom* installation in the installation wizard.

A similar screen asks for the partition name for mediation server installations (one partition for application server, another for mediation server), and lets you select whether to have mediation servers send redundant messages to the cluster or process messages independently. Choose the former for a high availability mediation cluster.

**NOTE:**

The application and mediation clusters are separate entities, and therefore need different partition names. The cluster name can be an arbitrary string, but must be unique for each cluster.

If you are adding mediation servers after you have created the application server, you can find the partition name in the application server shell with each report on application server status.

To set the partition name and intra-cluster multicast address at the command line, use the `-p` and `-m` options, respectively. For example:

```
startappserver -p appcluster -m 225.0.0.1
```

or

```
startmedagent -p medcluster -m 225.0.0.2
```

Notice the mediation server cluster and multicast address are different from the application server's. Notice also that the address should avoid the 224.0.0.1 to 225.0.0.0 range. Use 225.0.0.1 and above. See [Disabling Multicast](#) on page 111 for an explanation of how to set up that exception.

One further note, you must add `-c <Config Server host name>` to the command line above if you do not modify or override the `oware.config.server` property as in the instructions in [Step-By-Step Application Server Clustering](#) on page 120.

**NOTE:**

Installation now automatically sets the intra-cluster multicast address, so the `-m` parameter is strictly optional (and must be consistent between hosts, if used). Command lines always override property file settings.

You can also set the partition name during installation or by setting the `oware.client.partition.name` property in the `installed.properties` file. For example:

```
oware.client.partition.name=appcluster
```

**CAUTION:**

If the Config Server goes down, the cluster can continue, but you cannot add more hosts to the cluster (although recovering hosts can re-add themselves).

- If you are changing existing installations to clusters, you must revise the database settings (if you are doing this with a fresh installation, the installer does it for you). Set the `com.dorado.jdbc.database_name.mysql=//localhost:3306/owbusdb` property to the same host (not localhost) for all members of a cluster in the `owareapps/installprops/lib/installed.properties` file.

With Oracle, the property to change is

```
com.dorado.jdbc.database_name.oracle=@mydbserver1:1521:mydb1sid.
```

See below for more information about Oracle's cluster-related properties.

## Config Server Functionality

Clusters' JMS implementations require ConfigServers. Configuration servers act as the coordinator for other servers joining the cluster. It must run for other servers to join the cluster. This is true for either an application server cluster or a mediation server cluster.

When the config server has an error and does not work, depending on the error and how early it occurs in the startup sequence it may prevent other servers from joining the cluster.

If a fatal hardware issue occurs with the ConfigServer you can always define another host as the ConfigServer, making clustering possible, and allowing other cluster members to join.

## Planning Clustering

This overview section describes how to configure your cluster setup. See also the [Mediation Clustering](#) on page 129 for additional advice about high availability mediation servers. For the initial installation and setup, follow these steps:

- 1 Plan your server/partition layout.
  - Identify the server providing database services.
  - Identify the application servers that are members of the cluster.
  - Identify the mediation agent(s) that connect to the cluster.
- 2 Ensure you have a permanent, static IP address for each server that is to be a member of the cluster.
- 3 Create your cluster name. You must also assign an IP multicast address to the cluster for communication between the servers. The IP multicast address must be in the range from 225.0.0.1 - 239.255.255.255. The assignment of the IP multicast should be coordinated through your system administrator so that conflicts do not occur with other applications. See [Configuring the Cluster's Multicast Address](#) on page 131.
- 4 Set up an entry in the DNS with the server name and the IP address for each server to be a member of the cluster. Minimally, you must map the server name and IP address in the `hosts` file. (In Windows this is in `C:\windows\System32\drivers\etc\`, in Linux / `etc/hosts`)
- 5 Ensure that the Server installation is on each machine that is a member of the cluster. If you have not installed the application, install it now, using the *Custom* installation to configure various hosts as Application Servers, Mediation Servers, Database Servers, and Web Servers.



### CAUTION:

Clustered servers must be on the same subnet. Clustered application servers can, however, be on a different subnet than clustered mediation servers (which must, themselves, be on the same subnet).

# Step-By-Step Application Server Clustering

The following is an example cluster. It includes application and web server on the same machine, and mediation server on a different machine. Follow these general steps to install the first application server in a cluster (the see [Installing Remaining Application and Web Servers](#) on page 124 for additional servers):

**Step 1: Install Application + Web Server 01 - Primary appserver** (See the steps following this overview.)

**Step 2: Install Mediation Server 01- Primary medserver** (See [Installing Mediation Servers](#) on page 123)

**Step 3: Validate system is operational with above nodes**

**Step 4: Proceed with upgrading remaining Application Servers + Web servers:**

- Application + Web Server 02
- Application + Web Server 03

**Step 5: Proceed with upgrading remaining Mediation Servers:**

- Mediation Server 02
- Mediation Server 03

and so on...

The following are more detailed steps:



#### NOTE:

Best practice for changing properties in the following steps typically assumes that you override the mentioned properties with properties pasted in `owareapps/installprops/lib/installed.properties`, rather than altered in the mentioned properties files. Make sure these `installed.properties` files match, except for variables local to each host.

- 1 When installing, make sure you have permissions to execute the installation script. For Linux, add the execute permission: `chmod +x linux_install.sh`, and then execute `./linux_install.sh`.
- 2 Install the application with the *Custom* method. Often, this means selecting Application Server and Web Portal to install on a single host.<sup>1</sup>
- 3 For Linux, select the Link Folder (where startup links reside). Typically this is the installing user's Home.



#### NOTE:

The primary server is the first one in the *current server view* list. This is the first one join the cluster.

- 4 Specify an application server partition (it defaults to the hostname where you are installing), and check *Auto Start* (a best practice, but not required).<sup>2</sup>
- 5 Specify your server's and portal's heap settings.
- 6 Specify the Config Server's IP address (the lowest address among clustered servers).
- 7 Select Oracle as the database type.

1. For upgrades, in `owareapps/installprops/lib/installed.properties` override the `oware.config.server` ("primary server") setup (originally in `oware/lib/owappserver.properties`). The "primary server" is the server in a cluster which starts first.



- 8 Specify the database access information (User, Password, Host, Port, SID).
- 9 Click the *Install* button.
- 10 For Linux, when prompted, run the command `/opt/dorado/install/root/setup.sh` as root, and then click on *Next*.

**NOTE:**

You may see benign errors during the root portion of the Linux installation. Installation always attempts to find the CWD (current working directory). If another process deleted it, an error appears before the script runs. The error is benign and the script still runs, using a temp location controlled by the operating system.

- 11 If you have elected to autostart, select *No* when asked to start the server now.
- 12 In Linux, run the command `/etc/init.d/synergy stop` as root to shutdown the web server. The web server auto starts with the auto start installation option. The previous step only applied to the application server.
- 13 Test the database connection with pingdb.

```
pingdb -u system -p d0rad0
```

The d0rad0 password is an example in these steps.

- 14 For an installation that upgrades from a previous version (whether Oracle or a separate MySQL host), run `dbpostinstall` on the (primary) application server.

For a fresh installation, create OpenManage Network Manager tablespaces with this command:

```
loaddb -u system -w d0rad0
```

Seed the OpenManage Network Manager tables with this one:

```
ocpinstall -s
```

with the `-s` parameter, the installer will create two new tablespaces for OpenManage Network Manager and portal called `owsynergy01` and `owportal01`. Without `-s` it drops and recreates the OpenManage Network Manager tablespaces called `owdata01` and `owidx01`. Dropping `owdata01` results in the loss of all existing OpenManage Network Manager data.

**NOTE:**

You only need to run `loaddb` commands once, on one database or application server.

If you want to install a cluster of application servers with a MySQL database server, then run `loaddb -s` on that database to create the databases and tables needed for OpenManage Network Manager. See [Preparation for Clustering](#) on page 117 for more about setting up / upgrading MySQL. If you do not do this, you will see the following message:

```
===== Setting up the Remote MySQL Database=====
```

2. If the server does not have to receive traps (typical for a distributed application where the mediation server receives the traps), comment the following properties in `oware/lib/owappserverstartup.properties` file,
 

```
oware.server.startup.class=\
```

```
#com.dorado.core.mediation.snmp.OWSnmpSRTrapListenerMBean, \
#com.dorado.core.mediation.snmp.OWSnmpSRInformListenerMBean, \
```

Insert a blank line between property name and the properties as shown above.

This installation program does not automatically create the database structure required by the application. This is a manual task that may require some initial MySQL database administration.

- 15 Create OpenManage Network Manager and Portal Tablespace: `loaddb -u system -w d0rad0 -s`

- 16 Modify `Portal-ext.properties`

Go to `/opt/dorado/oware/synergy/tomcat-7.0.30/webapps/ROOT/WEB-INF/classes`, and edit the file `portal-ext.properties`.

```
oware.appserver.ip=127.0.0.1
medserver.support=true
```

This tells the web server to use local application server. By default, mediation control is off. Adding `medserver.support=true` enables mediation control in the control panel.

- 17 Start the application server with command `#/etc/init.d/oware start`

This command is equivalent to `startpm`, which starts both application server and its process monitor. The command `pmstartall` only starts application server. See [Starting Clusters Durably](#) on page 132 for more about these.

- 18 Use the tray icons in Windows, or in Linux `/oware status`, to check whether the server is already running.
- 19 When the application server is ready, start the web server (in Windows, right-click the Apache icon, in a Linux shell, type `#etc/init.d/synergy start.`)
- 20 If you are upgrading, reindex all search indexes. Login to the current web server, Go to *Control Panel > Server > Server Administration* and click *Execute* next to *Reindex all search indexes*.



#### NOTE:

Because of an issue with the open source Portal classes, you must reindex every time you upgrade.

- 21 In Control Panel's *Portal Settings* panel, change the Virtual Host field to the IP of the load balancer or to the local server IP if not using load balancer.<sup>1</sup>

Do these steps on all application servers.

## Starting the Cluster

To start the cluster, first start the config server, then *after it has started completely* start another server. Continue to wait until servers are completely started to add others to the cluster. You can start a distributed database server at any time (before or after) this process, but you must start distributed mediation servers and clients after the application server cluster starts. In mediation server clusters, you must also start the primary server first.

If you do not elect to autostart (not recommended), the start command looks something like the following:

```
startappserver -c [Config Server] -p [ClusterName] -m [multicast address]
```

for example:

```
startappserver -c 192.168.6.11 -p appcluster -m 225.0.0.1
```

For an alternative startup, see [Starting Clusters Durably](#) on page 132.

1. Even when using the load balancer, the installer defaults the virtual host IP to the application server IP that we set up in `portal-ext.properties`. However, we want the virtual host IP to be the public facing IP (IP address that end users connect to), which is the load balancer IP.

# Installing Mediation Servers

For clustered mediation servers, first follow these steps to install the Mediation config server, then see [Installing Remaining Mediation Servers](#) on page 125.

- 1 Install by starting the installation wizard, and select *Mediation Server* in the Custom installation screen.
- 2 Enter the Application Server Partition Name.
- 3 Enter Mediation Partition Name and Subnet mask, and select Auto Start.

You can use the default subnet mask if mediation server and application server are all with in the /24 subnet. If they are different, then you must adjust the mediation subnet mask or use unicast to point mediation server directly to the application servers.



#### CAUTION:

You must add file server's IP address to the Mediation Partition's routing entries in distributed environments that have application server's local mediation turned off.

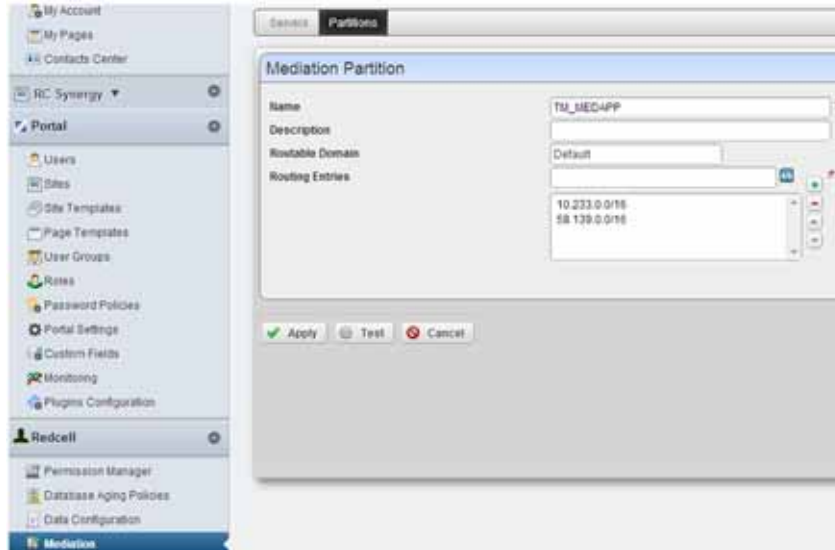
- 4 Specify the Server Heap.
- 5 Specify the Config Server IP. Use the lowest IP address among mediation servers. If you are not clustering mediation servers, select the *No* mediation listener as redundant peers option. See [Mediation Clustering](#) on page 129 for more about the alternative.
- 6 Follow the instructions in [Adding Mediation Servers](#) on page 56 to make the mediation server appear in Control Panel.
- 7 Once the application server is ready, you can click *Yes* for Start the Server Now on the mediation server you have installed.

*Add mediation domain and routing entry*

In the OpenManage Network Manager Control panel, go to *Mediation > Partitions > Add Partition name and Routing Entries*.

**NOTE:**

When specifying a mediation server in Control Panel, add `-medPartition` at the end of mediation Partition name. For example if you specified your mediation partition as MYmeds during installation, when adding partition name to control panel it needs to be MYmeds-medPartition.



Add new mediation server and select the mediation domain and routing entries.<sup>1</sup>

## Installing Remaining Application and Web Servers

Most of the following instructions are the same as those above. Some of those previous steps are unnecessary, and do not appear below.

- 1 Add the execute permission to the installation script:
 

```
chmod +x linux_install.sh
```

 then execute `./linux_install.sh`
  - 2 Select Custom installation.
  - 3 Select Application Server + Web Portal
  - 4 For Linux, choose the Link Folder (use the default)
  - 5 Specify the application server partition previously selected, and select *Yes* for Auto Start.
  - 6 Specify Application Server heap and Portal Heap.
1. The routing entries determine which devices can use the mediation servers within the mediation domain. For example, you can specify individual subnets—10.1.0.0/16, 10.2.0.0/16, 10.3.0.0/16—or just add a 10.0.0.0/8, which covers all the 10.0.0.0 subnet. You can add or delete the routing entries without shutting down web or application servers. The mediation domain requires the `-medPartition` string appended at the end of the mediation domain name.

You can configure the selected application server heap memory size not just during installation, but any time, with the following properties in `\owareapps\installprops\lib\installed.properties`. For example:

```
oware.server.min.heap.size=4096m
oware.server.max.heap.size=4096m
```

To manually change OpenManage Network Manager web portal heap settings, change the `setenv.sh` or `setenv.bat` file:

```
set "PORTAL_PERMGEN=512m"
set "PORTAL_MAX_MEM=3072m"
set "PORTAL_INIT_MEM=768m"
set "PORTAL_32BIT_MAX_MEM=768m"
```

These files are in the `Tomcat***\bin` directory.

For Linux, restart the portal service to apply new memory settings. In Windows, besides updating `setenv.bat` you must run `service.bat update` in that same directory.

- 7 Specify config server IP. Use the lowest IP address among application servers.
- 8 Select Database Type: *Oracle*
- 9 Specify your Oracle database information.
- 10 After reviewing the summary, click on *Install*.
- 11 For Linux, run the command `/opt/dorado/install/root/setup.sh` as root, and then click *Next*.
- 12 Select *No* when installer asks *Start the server now?*
- 13 Run `/etc/init.d/synergy stop` as root to shutdown web server.
- 14 Test the database connection with `pingbd`
- 15 Modify `server-overrides.properties` file and `tomcat-server.xml` as in the original installation.
- 16 Modify `Portal-ext.properties.xml` file as in the original
- 17 Start the application server with the command `#/etc/init.d/oware start`
- 18 When the application server is ready, start the web server with `#/etc/init.d/synergy start`
- 19 Login to the current web server, Go to Control Panel > Server > Server Administration and click *Execute* for *Reindex all search indexes*.

## Installing Remaining Mediation Servers

Most of the following instructions are the same as those above. Some of those previous steps are unnecessary, and do not appear below.

- 1 Start installation, and select Mediation Server in the Custom installation screen.
- 2 Enter the Application server Partition Name.
- 3 Enter Mediation Partition Name and Subnet mask, and select Auto Start
- 4 Specify Server heap

- 5 Specify config server IP. Use the lowest IP among mediation servers.
- 6 Start mediation server when done installing.

 CAUTION:

You must add file server's IP address to the Mediation Partition's routing entries in distributed environments that have application server's local mediation turned off.

## HTTPS Support with Load Balancer

The industry norm is to configure the load balancer to handle SSL Offloading (SSL Termination). In this configuration SSL secures communication from the client browser to the load balancer/firewall, but communication from the load balancer / firewall to the web servers is not. There are a number of benefits to this type of configuration, the most prominent being ease of management, since users only have to purchase and manage one certificate per load balancer instead of one per web server. Performance also improves since the individual web servers are not impacted with encryption/decryption overhead.

To configure Load Balancer to support a secure web connection, additional properties need to instruct the portal that a front end termination point exists. To do this, in the `oware/synergy/conf/server-overrides.properties` add the following:

```
# The HTTPS Port that the load balancer is listening to, Default is 8443
web.server.https.port=8443
# The Protocol used by the load balancer
web.server.protocol=https
# The Port that Synergy is listening on
portal.instance.http.port=8080
```

After setting these properties, restart OpenManage Network Manager. You can fully login and use the Portal in SSL on 8443 even though the server is running on 8080 internally, before it reaches load balancer.

See the *OpenManage Network Manager User Guide* for instructions about implementing HTTPS on a single server installation.

## Verifying Clustered Installations

The following example tests load balancing between servers (web server + application server). Here is the configuration:

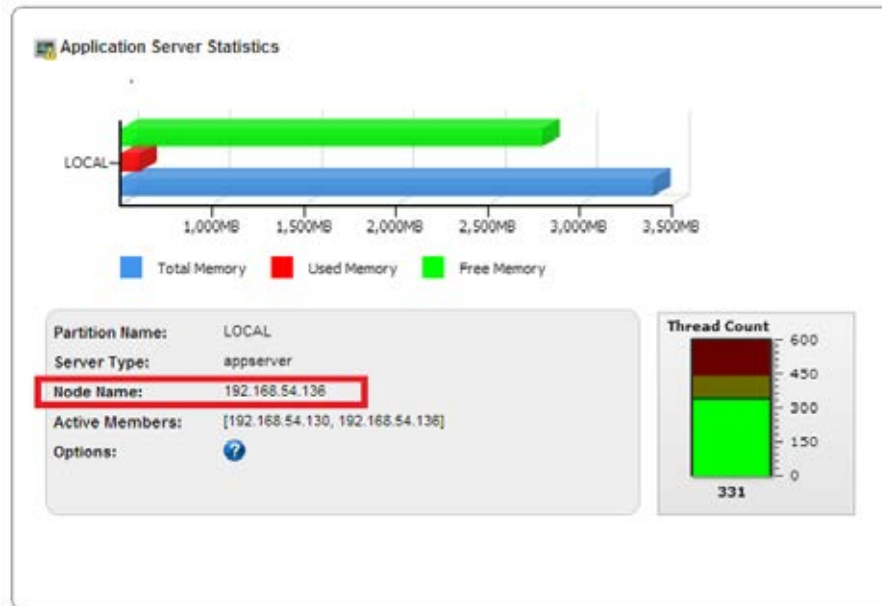
- Server 1 hosts first web server + appserver
- Server 2 hosts second web server + appserver
- User A connects to load balancer from distinct IP and Resyncs a device
- User B connects to load balancer from distinct IP and Resyncs a device

Several verifications are available, including the following:

- [Verifying Application Server](#)
- [Verify Application Server Redundancy Fail Over](#)
- [Validate Mediation Server](#)

## Verifying Application Server

In the Application Server Statistics portlet, you can see to which application server node the logged in user connects.



When different users, for example, resync a device or deploy a service, the expectation is that they would use different web server + appserver hosts. That is, user A connects to server1 and user B connects to server 2 and user C connects to server 3, and so on.

To validate this follow these steps:

- 1 In Managed Resource portlet, right click and resync a device.
- 2 Go to the Event History portlet and maximize it.
- 3 Go to the Columns tab in the *Settings* menu and click on *Show* for Source IP'.
- 4 The Source IP indicates which server did the Resync action.

| Receive Time     | Entity Name      | Event Name          | Entity Type      | Device IP   | Message               | Protocol | Source IP      |
|------------------|------------------|---------------------|------------------|-------------|-----------------------|----------|----------------|
| 10/9/12 10:24 AM | DelSRX240-POE... | recedeEquipmen...   | Managed Equip... | 10.20.1.155 | Result: Success       | System   | 192.168.54.130 |
| 10/9/12 10:01 AM | Redcel           | amsAppServer[1]     | EMS              |             | Application server... | System   | 192.168.54.130 |
| 10/9/12 10:01 AM | Redcel           | amsAppServer[1]     | EMS              |             | Application server... | System   | 192.168.54.130 |
| 10/9/12 10:00 AM | msd_13.35.35.77  | emailedServer[ve... | Medation Server  |             | Medation server L...  | System   | 192.168.54.130 |

## Verify Application Server Redundancy Fail Over

On one of server, go to directory `/opt/dorado/oware/jboss-5.1/server/oware/log`, open a shell, type `/etc/.dsienv` (on Windows type `oware`), and then `tail -f server.log`.

```

admin@rhel130:/opt/dorado/oware/jboss-5.1/server/oware/log
File Edit View Search Terminal Help
39078, 192.168.54.130:57897]
2012-10-08 10:31:47,364 3892245 WARN [org.jgroups.protocols.pbcast.GMS] (Incoming-11,192.168.54.130:57897:~) merge was supposed to be cancelled at merge participant 192.168.54.130:57897 (merge_id={192.168.54.130:57897}[1349739102184]), but it is not since merge ids do not match
2012-10-08 16:32:18,594 3123475 INFO [com.dorado.mbeans.OwClusterPeerActiveImpl] (Timer-6:)
PartitionName = TH REDAPPPartition
Server Type = appserver
NodeName = 192.168.54.130
Current Server View = [192.168.54.130, 192.168.54.136]
Current Primary Server = 192.168.54.130
Total Memory Available = 3113600096
Free Memory Available = 1795404024
Memory In Use = 1318276072
Thread Count = 302
Previous Thread Count = 302
Notifications Processed = 6
Notification Receive Time = Mon Oct 08 15:57:12 PDT 2012
Cluster Multicast = 239.0.54.130
2012-10-08 16:32:18,595 3123476 INFO [com.dorado.mbeans.OwClusterPeerActiveImpl] (Timer-6:) Identified down server:192.168.54.131
Current Server View = [192.168.54.130, 192.168.54.136, 192.168.54.131]
Current Primary Server = 192.168.54.130
Total Memory Available = 3179741184
Free Memory Available = 2443750136
Memory In Use = 735991048
Thread Count = 289
Previous Thread Count = 291
Notifications Processed = 17
Notification Receive Time = Mon Oct 08 18:42:02 PDT 2012
2012-10-08 18:48:33,812 6155736 INFO [com.dorado.mbeans.OwClusterPeerActiveImpl] (Timer-6:) Identified new joined server:192.168.54.131
2012-10-08 18:49:34,095 6216019 INFO [com.dorado.mbeans.OwClusterPeerActiveImpl]

```

Observe changes to the log when one other cluster member goes down/up by unplugging/re-plugging the network cable or (disable/re-enable network connection).

## Validate Mediation Server

On one of server, go to directory `/opt/dorado/oware/jboss-5.1/server/oware/log`, open a shell, type `/etc/.dsienv` (or `oware` in Windows), and then type `tail -f server.log`.<sup>1</sup>

Observe when one other member goes down/up by unplug/re-plug the machine cable or (disable/re-enable network connection).

1. When devices try to use mediation servers, the mediation cluster assigns that mediation server to the device using a round-robin method. The same mediation server handles that device thereafter. To see which medserver the device is using, enable debug on all mediation servers. Refer to the *OpenManage Network Manager User Guide* for instructions about how to do that.



You can also observe medserver status within the Mediation panel in Control Panel. When a mediation server goes down you should see its severity turns to Critical.

| Severity      | Name             | Description | Partition  | IP Address  | Actions |
|---------------|------------------|-------------|------------|-------------|---------|
| Critical      | 194C_13.03.01.70 |             | TM_MEDIAPP | 10.30.30.70 |         |
| Informational | 194C_13.03.01.76 |             | TM_MEDIAPP | 10.30.30.76 |         |
| Informational | 194C_13.03.01.77 |             | TM_MEDIAPP | 10.30.30.77 |         |

## Mediation Clustering

You can configure mediation servers which can fail over SNMP/CLI requests by configuring mediation servers as redundant peers during installation, or with the `com.dorado.mediation.listener.use.high.availability=true/false` property in `installed.properties`. This configures failover for data collection for performance data, traffic flow, traps, syslog and informs.

### NOTE:

Remember: You must configure monitored devices to forward traps to both mediation servers.

The standby server does not forward data unless the active server becomes unavailable. The mediation server that starts first is OpenManage Network Manager's *active* server. When you shut down the active server, or it stops responding, OpenManage Network Manager promotes the standby server to *active*. If a server process shuts down, it is no longer considered *active*. However, if the network connection is lost to the active server, but the server process continues to run, it is still considered *active*, and once the network connection is restored, OpenManage Network Manager considers both servers temporarily *active*.

Both servers can forward data to application server, and application server eliminates duplicates. When OpenManage Network Manager detects that the connection to the disconnected mediation server has been restored, and that both servers are now *active*, the server with the lowest IP address remains *active*, and the other server becomes *standby*. The detection process takes approximately two minutes and then an additional period of seconds for the sorting of *active* / *standby* servers to occur. The standby should hold any data which had not been processed during switchover and that backlog should be processed when it becomes active.

See [Independent and Clustered Mediation Agents](#) on page 130 for the alternative when mediation agents have to communicate with clustered application servers.

### NOTE:

Best practice for changing properties in the following steps assume that you override the mentioned properties with properties pasted in `owareapps/installprops/lib/installed.properties`, rather altered than in the mentioned properties files.

Follow these steps to configure Mediation server clusters:

- 1 (For MySQL installations only) If the installation has not already done so, override the database host name originally specified in `oware/lib/owdatabase.properties`.
- 2 Set `oware.config.server` in `owareapps/installprops/medserver/lib/installed.properties`, setting it to the primary mediation host's name (for example: `aaron`).
- 3 This property needs to be enabled only if the MBeans (Trap / Data Collection) is in Forwarding/Standby Mode so that mediation servers work as peers and have listener failover capability.

```
com.dorado.mediation.listener.use.high.availability=true
```

An HA “cluster” consists of only two mediation servers. You can have more than two, but that just enables more than one standby server (something we do not test). If you set the HAproperty to false, all clustered mediation servers are active at the same time, and any number of mediation servers can be in the same cluster.

- 4 Mediation server peers use a multicast address for communication. If the server requires another mediation server peer setup, change this multicast address for that peer.

```
com.dorado.mediation.listener.multicast.intercomm.address=228.0.0.200
```

For an alternative to multicasting, see [Disabling Multicast](#) on page 111.

- 5 An example of the mediation cluster's start command:

```
startmedagent -c PrimarymedServer (aaron) -a primaryappserver (laika) -p  
ClusterName (qacluster) -m address (228.0.0.200)
```

For an alternative startup, see [Starting Clusters Durably](#) on page 132. Remember, start the primary first. Wait until it has completely started before starting the secondary.



#### NOTE:

When setting up a failover mediation cluster in `owareapps/installprops/medserver/lib/installed.properties`, do not set up an application server cluster for the mediation servers. The config server for these mediation clusters is the same machine the individual mediation server runs on.

## Independent and Clustered Mediation Agents

Mediation clusters can failover for traps. When you have independent or clustered mediation agents that communicate with a cluster of application servers, you must still follow these steps:

- 1 By default `oware.config.server` in `owareapps/installprops/medserver/lib/installed.properties`, is localhost IP address. (This is different for each mediation server, rather than the same for a mediation server cluster.)
- 2 (For MySQL installations only) Modify the database hostname, using `owareapps/installprops/medserver/lib/installed.properties` to override `oware/lib/owdatabase.properties`.

## Mediation Behavior and Polling

When you set up a mediation cluster to do polling, one server in the cluster does all the polling. If the active server goes down, another resumes polling. A High Availability mediation setup duplicates the backlog of collected data that has not been posted to database in this standby server. In this case, installation requires redundant messages from devices to all servers in the cluster.

If the active mediation server goes down, you may lose one interval to re-establish starting values for computations about the changes (deltas) from previous polling. As always, data replication may impact performance.

## Database Server Configuration

Custom installation lets you select the database server from a screen in the installer. When the database resides on its own server, you must remove all enabled startup services from that database server—this includes application server and mediation agent.



NOTE:

Make backups before altering files.

## Configuring the Cluster's Multicast Address

The installation process sets this application's multicast address automatically. Multicast must handle the communication between elements of a cluster—whether application or mediation servers. You can disable multicast discovery of servers (mediation server to application server) or clients (client to application server[s]) as described in [Disabling Multicast](#) on page 111.

The range for multicast as defined by the *Host Extensions for IP Multicasting [RFC1112]* is from 224.0.0.0 to 239.255.255.255. The following is an excerpt from the article *Internet Multicast Addresses* that should be considered when assigning addresses:

“The range of addresses between 224.0.0.0 and 224.0.0.255, inclusive, is reserved for the use of routing protocols and other low-level topology discovery or maintenance protocols, such as gateway discovery and group membership reporting. Multicast routers should not forward any multicast datagram with destination addresses in this range.”

Use an address above 225.0.0.0, like the one cited in the example above.

Application servers in a cluster use multicast to determine when a peer has come up or when one goes down. This communication usually has to be done in a matter of seconds or even milliseconds and should probably be exclusive on the multicast channel chosen. In other words, best practice is to use a multicast address exclusively for a cluster. Do not use the same multicast address for two clusters and do not use the same multicast for other multicast communication.

If a cluster member asks a running peer to respond but the traffic on the channel prevents a response within the designated timeout, then the requesting member concludes the running peer is gone and takes appropriate fail-over action, even if the peer is running without problem. This can be the source of undesirable behavior from your cluster. For example, it could initiate the rule resynchronization process on the cluster.

## Starting Clusters Durably

Clusters provide failover protection for the processes they maintain, or “high availability.” To automate restarting this and other applications’ processes, install the application with process monitor. To configure process monitor to start and stop clusters if you have not installed electing autostart, you must modify the `owareapps/lib/installprops/lib/installed.properties` file with a text editor.

Starting, stopping and managing such installations uses the following scripts:

- `pmstartall` (or `startpm1`)
- `pmstopall`
- `pmgetstatus` (displays the system’s status as process monitor knows it.)

The command line includes the host IP address and port:

```
pmstartall -h <server IP> -p <port>
```

Defaults are for server IP and port are localhost and 54321. (Though you can use the host name, best practice is to use the server IP address.) To see all available command line options, run the above commands with `-?` as a parameter.

You can override the administrative port of Process Monitor (originally in the property file `owmisc.properties`) by setting the property `com.dorado.core.processmonitor.remoteCmdPort` to the desired numeric value. If this port number is changed, all process monitor clients must send requests to the changed port number value.



### CAUTION:

If you start a server in a remote shell, killing the shell can kill the server process.

## pmstartup.dat

The text file `/oware/lib/pmstartup.dat` manages restart frequency if your application server starts automatically. For more information about using this file, consult the comments within the file itself.

## Recovery Procedure

The procedure for recovery from server failure is automated. If something other than server failure is at the root of a cluster’s failure, you must stop any running server the process manager, as follows:

```
pmstopall <hostname> <port>
```

The process manager automatically restarts the failed server.

### Temp Directory Deletion

Starting your application server may be inhibited by corrupted files in `\oware\temp\`. This is identified when the application / mediation server does not start successfully and reports a probable JMS startup failure. Delete the contents of the `oware\temp\` and restart. Unfortunately, when this directory’s contents are deleted and you are using a cluster, you must restart the entire cluster.

1. **Tip:** It’s often helpful to add `nohup` to this command line

# Clustered Server Installation Checklist

The following is a checklist for installing OpenManage Network Manager in a clustered configuration. See [Upgrading Clusters](#) on page 136 for checklists / instructions about upgrading a clustered installation.

## General Prerequisites

Installation Pre-requisites from site upgrading / installing

- 1 Obtain and Validate Root Password credentials for all Servers being Upgraded

*Application Servers:*

| Server Name | IP Address | Root Password |
|-------------|------------|---------------|
|             |            |               |
|             |            |               |
|             |            |               |
|             |            |               |

*Mediation Servers:*

| Server Name | IP Address | Root Password |
|-------------|------------|---------------|
|             |            |               |
|             |            |               |
|             |            |               |
|             |            |               |

- 2 Obtain and Validate OMNM User credentials for all Servers being Upgraded

*Application Servers:*

| Server Name | IP Address | OMNM User ID | OMNM Password |
|-------------|------------|--------------|---------------|
|             |            |              |               |
|             |            |              |               |
|             |            |              |               |
|             |            |              |               |

*Mediation Servers*

| Server Name | IP Address | OMNM User ID | OMNM Password |
|-------------|------------|--------------|---------------|
|             |            |              |               |
|             |            |              |               |
|             |            |              |               |
|             |            |              |               |

3 Obtain and Validate Database SID, User ID and Password

Obtain and validate credentials and Database Instance ID to be able to perform backup and restore of the database instance.

Database Server Name/IP Address:

Database SID:

Database Credentials: User ID Password

4 Copy OpenManage Network Manager Package File to Each of the Servers

For each server, using the assigned OpenManage Network Manager User ID and Password from Above:

- a. FTP the package file to a directory on each server (outside of the OpenManage Network Manager install directory path)
- b. Unzip the files after they are FTPed successfully.



NOTE:

It is important you unzip the package locally on the target server, so that compatible file formats are preserved.

*Application Servers:*

| FTPed | Unzipped | Application Server Name | File Path on Server |
|-------|----------|-------------------------|---------------------|
| q     | q        |                         |                     |
| q     | q        |                         |                     |
| q     | q        |                         |                     |
| q     | q        |                         |                     |

*Mediation Servers:*

| FTPed | Unzipped | Application Server Name | File Path on Server |
|-------|----------|-------------------------|---------------------|
| q     | q        |                         |                     |
| q     | q        |                         |                     |
| q     | q        |                         |                     |
| q     | q        |                         |                     |

5 OPTIONAL: Backup any Adaptive CLIs using OpenManage Network Manager's ACLI portlet.

Select the *Export* action and export all service templates to a single file with a file extension of \*.xml.



CAUTION:

Make sure to save the export file to a directory outside of the OpenManage Network Manager's install directory tree.

Export ACLI Scripts to a file system outside of the OpenManage Network Manager install directory path. Path and File Name of export file:

- 6 OPTIONAL: Backup any Service Templates using OpenManage Network Manager's Services portlet  
 Select the Export action and export all service templates to a single file with a file extension of \*.xml.

**△ CAUTION:**  
 Make sure to save the export file to a directory outside of the OpenManage Network Manager's install directory tree.  
 Export ACLI Scripts to a file system outside of the OpenManage Network Manager install directory path. Path and File Name of export file:

## System Backup

This is typically something the installing customer does:

- 1 Perform a system backup of the following Servers  
 If the OpenManage Network Manager upgrade of the server(s) is not successful, a full system restore will be required. This backup ensures that the system is consistent before any upgrade or patching. Therefore a full system backup is important for each server before the OpenManage Network Manager software upgrade or patching exercise.

*Servers:*

| Backed Up | Application Server Name |
|-----------|-------------------------|
| q         |                         |
| q         |                         |
| q         |                         |
| q         |                         |

| Backed Up | Mediation Server Name |
|-----------|-----------------------|
| q         |                       |
| q         |                       |
| q         |                       |
| q         |                       |

- 2 Perform a system backup of the database Server and Database Instance

*Database Server*

| Backed Up | Database Server Name |
|-----------|----------------------|
| q         |                      |
|           | Database Instance    |
| q         |                      |

See [Oracle Database Management](#) on page 165 for recommended practices. Also refer to your Oracle product documentation.

Insert any Oracle backup process steps specifics to the site here:

### ORACLE Database Backup Steps

| Completed | ORACLE backup steps |
|-----------|---------------------|
| q         |                     |
| q         |                     |
| q         |                     |
| q         |                     |

### MySQL Database Backup Steps

| Completed | MySQL backup steps                                                                                                                  |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------|
| q         | login as the OMNM User ID on the Database Server                                                                                    |
| q         | Navigate to a directory outside of the OMNM installation path with writable access.<br>Example:<br><code>cd \$HOME/dbbackups</code> |
| q         | <code>mysqldump -a -uoware -pdorado owbusdb&gt; ./owbusdb.backup.mysql</code>                                                       |
| q         | <code>mysqldump -a -uoware -pdorado owmetadb&gt; ./owmetadb.backup.mysql</code>                                                     |

## Upgrading Clusters

### 1 Shutdown All Servers and Clients



#### NOTE:

If the site's separate lab system does not share the same database as the production system, it can be kept running while the Production System Servers are brought down and upgraded, and visa versa.

#### Instructions:

- a. Stop the processes: stoppm
- b. Wait a minute
- c. Check if any dorado processes still running:

```
ps -ef | grep <installed dir; default is 'dorado'>
```

- d. Kill any remaining processes running from the installed directory (you might need to be root to kill the processes):

```
su
<password>
kill -9 <process ID>
```



*Application Servers:*

| Completed | Application Server Name |
|-----------|-------------------------|
| q         |                         |
| q         |                         |
| q         |                         |
| q         |                         |

*Mediation Servers:*

| Completed | Mediation Server Name |
|-----------|-----------------------|
| q         |                       |
| q         |                       |
| q         |                       |
| q         |                       |

The follow on steps to upgrade the OMNM nodes are as follows:

Step 2: [Upgrade 1st/Primary Application Server](#)

Step 3: [Upgrade 1st Mediation Server](#)

Step 4: [Verification](#): Validate System is Operational with the above three nodes after upgrade.

Step 5: [Install to Remaining Systems](#)

## Upgrade 1st/Primary Application Server

- 1 Upgrade 1st/Primary Application Server
  - a. Get environment variables set up (here, for Solaris):
 

```
. /etc/.dsienv
```
  - b. Note the current `installed.properties` (database password needs to be given to the appserver installations)
  - c. Install software:
    1. `chmod +x sol_install.sh`
    2. `./sol_install.sh -console`
    3. Then follow OMNM Installer steps.



### NOTE:

When upgrading Application and Mediation Servers using the `./solinstall.sh` step, you must have root password to install the boot scripts and define the `openFD_solaris` file with root ownership and permissions of 4550.

- d. Get updated environment variables:
 

```
. /etc/.dsienv
```
- e. On Primary Application Server Only:
  1. Execute post install script:
 

```
dbpostinstall
```

2. Import new package's license (primary appserver only):

```
licenseimporter license.xml
```

f. Start OpenManage Network Manager processes:

```
startpm&
```

You can routinely check the startup status with the command:

```
pmgetstatus
```

g. Verify installed versions using `showversions` output and capture/save the output to a file for later reference. For example:

```
showeverions > showversions.<Month>.<Day>.<Year>.txt
```

## Upgrade 1st Mediation Server

1 Upgrade 1st Mediation Server

a. Get environment variables set up:

```
./etc/.dsienv
```

b. Install software:

```
1. chmod +x sol_install.sh
```

```
2. ./sol_install.sh -console
```

3. Then follow OMNM Installer steps.

c. Get updated environment variables:

```
./etc/.dsienv
```

d. Start OMNM processes:

```
startpm&
```

You can routinely check the startup status with the command:

```
pmgetstatus
```

e. Verify installed versions using `showversions` output and capture/save the output to a file for later reference. For example:

```
showeverions > showversions.<Month>.<Day>.<Year>.txt
```

2 Initial Verification: Verify the Upgrade is good so far, using the first Application Server, and Mediation Server, with your browser as client.



**CAUTION:**

**IMPORTANT:** INSTALL AND VERIFY THAT OMNM IS WORKING ON PRIMARY APPSERVER AND MEDSERVER IN EACH CLUSTER BEFORE INSTALLING TO THE REST OF THE CLUSTER. If installation has a problem, then you only need to restore database and restore these few machines. You will not need to restore to any of the remaining machines not yet upgraded.

## Verification

Do the following to validate the installation you just did:

|   |                                                   |
|---|---------------------------------------------------|
| q | Open OMNM Client in a browser and Test User Login |
| q | Test Network Discovery                            |
| q | Test Device Resync                                |
| q | Upgrade Remaining Application Servers             |

## Install to Remaining Systems

### *Remaining Application Server Installations*

| Application Servers |   |   |   |   | Steps                                                                                                                                                                                    |
|---------------------|---|---|---|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2                   | 3 | 4 | 5 | 6 |                                                                                                                                                                                          |
| q                   | q | q | q | q | a) Get environment variables set up:<br><br>./etc/.dsienv                                                                                                                                |
| q                   | q | q | q | q | Note the current installed.properties (database password needs to be given to the appserver installs)                                                                                    |
| q                   | q | q | q | q | Install software:<br>1. chmod + x sol_install.sh<br>2. ./sol_install.sh -console<br>3. Follow OMNM Installer steps.                                                                      |
| q                   | q | q | q | q | Get updated environment variables:<br><br>./etc/.dsienv                                                                                                                                  |
| q                   | q | q | q | q | Start OMNM processes:<br><br>startpm&                                                                                                                                                    |
| q                   | q | q | q | q | You can routinely check the startup status with the command:<br><br>pmgetstatus                                                                                                          |
| q                   | q | q | q | q | Verify installed versions using “showversions” output and capture/save the output to a file for later reference. For example:<br>showversions ><br>showversions.<Month>.<Day>.<Year>.txt |

### Remaining Mediation Server Installations

| Application Servers |   |   |   |   | Steps                                                                                                                                                                                    |
|---------------------|---|---|---|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2                   | 3 | 4 | 5 | 6 |                                                                                                                                                                                          |
| q                   | q | q | q | q | a) Get environment variables set up:<br><br>./etc/.dsienv                                                                                                                                |
| q                   | q | q | q | q | Note the current installed.properties (database password needs to be given to the appserver installs)                                                                                    |
| q                   | q | q | q | q | Install software:<br>1. chmod + x sol_install.sh<br>2. ./sol_install.sh -console<br>3. Follow OMNM Installer steps.                                                                      |
| q                   | q | q | q | q | Get updated environment variables:<br><br>./etc/.dsienv                                                                                                                                  |
| q                   | q | q | q | q | Start OMNM processes:<br><br>startpm&                                                                                                                                                    |
| q                   | q | q | q | q | You can routinely check the startup status with the command:<br><br>pmgetstatus                                                                                                          |
| q                   | q | q | q | q | Verify installed versions using "showversions" output and capture/save the output to a file for later reference. For example:<br>showversions ><br>showversions.<Month>.<Day>.<Year>.txt |

## Final Clustered System Testing

Perform a full system test as follows with all Application and Mediation Servers being up and running as a cluster.

|   |                                                   |
|---|---------------------------------------------------|
| q | Open OMNM Client in a browser and Test User Login |
| q | Test Network Discovery                            |
| q | Test Device Resync                                |
| q | Upgrade Remaining Application Servers             |

## Test Cluster Failover

Once All Application and Mediation Servers are up and running, perform the following tests:

|   |                                                                                                  |
|---|--------------------------------------------------------------------------------------------------|
| q | Locate the application server designated as 'primary' in the server.log file's heartbeat status. |
| q | Verify that another Application Server becomes primary.                                          |
| q | Connect the primary Application Server's network plug again.                                     |
| q | On the matching Physical machine and pull its network plug.                                      |
| q | Find the active mediation server in a cluster and pull its network plug.                         |
| q | Verify any of the backup Mediation Servers becomes active.                                       |
| q | Connect the previously disconnected Mediation Server's network plug again.                       |

## Do a Second System Backup of the Production Servers

Do a system backup of the production Application and Mediation Server(s) after the upgrade is completed and tested as functioning fine.

*Servers:*

| Backed Up | Application Server Name |
|-----------|-------------------------|
| q         |                         |
| q         |                         |
| q         |                         |
| q         |                         |

| Backed Up | Mediation Server Name |
|-----------|-----------------------|
| q         |                       |
| q         |                       |
| q         |                       |
| q         |                       |

## Clustering with Virtual Machines

The following describes considerations for OpenManage Network Manager run on VMware virtual machines. Installation of the RC 7 Synergy on virtualized platform is support for both standalone and distributed deployments.

This is a high level reference that omits numerous considerations beyond its scope. Evaluate those omitted considerations to correctly plan a virtualization project, particularly for OpenManage Network Manager managing a larger network. Power, performance, expandability, backup, load, connectivity, recovery time objectives (RTO), and so on are all worth evaluating and defining. In

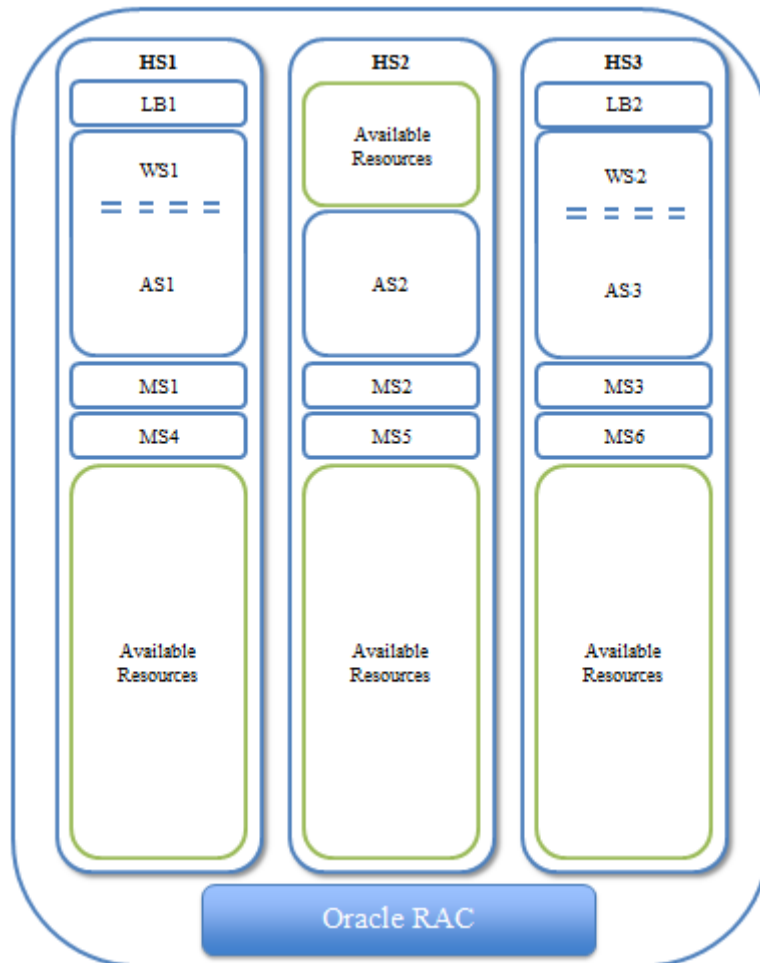
short, this overview is not a fully operational virtualization configuration, it is an example. Refer to the deployment scenarios described in this chapter for more information. The following examples focus on a VMware implementation. Each site requires access to an appropriate database.

- [Primary Site - Virtualized](#)
- [Primary Site - Virtualized - Failover Scenario](#)
- [Primary Site - Virtualized: Expandability](#)
- [Primary Site - Virtualized: Alternate Configuration](#)

See also [Hardware](#) on page 145 for hardware suggestions for these configurations.

## Primary Site - Virtualized

This is what the example system with VMs on three hosts looks like:



The abbreviations are HS1 = Host Server 1, LB1 = Load Balancer 1, WS1 = Web Server 1, AS1 = Application Server 1, MS1 = Mediation Server 1.

The following chart shows the processor assignment-workload association. This distribution is similar to the suggested expansion workload distribution.

| VM-to-Host Processor/Core(s) - 3 Hosts |     |     |     |     |     |     |     |     |     |    |     |     |     |       |
|----------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|-----|-----|-----|-------|
|                                        | LB1 | LB2 | WS1 | WS2 | AS1 | AS2 | AS3 | MS1 | MS2 | M3 | MS4 | MS5 | MS6 | Total |
| HS 1                                   | 2   |     | 4   |     | 8   |     |     | 2   |     |    | 2   |     |     | 20    |
| HS 2                                   |     |     |     |     |     | 8   |     |     | 2   |    |     | 2   |     | 12    |
| HS 3                                   |     | 2   |     | 4   |     |     | 8   |     |     | 2  |     |     | 2   | 20    |

| VM-to-Host RAM - 3 Hosts |      |     |     |     |     |     |     |     |     |    |     |     |     |       |
|--------------------------|------|-----|-----|-----|-----|-----|-----|-----|-----|----|-----|-----|-----|-------|
|                          | LB 1 | LB2 | WS1 | WS2 | AS1 | AS2 | AS3 | MS1 | MS2 | M3 | MS4 | MS5 | MS6 | Total |
| HS1                      | 2    |     | 32  |     | 64  |     |     | 8   |     |    | 8   |     |     | 114   |
| HS2                      |      |     |     |     |     | 64  |     |     | 8   |    |     | 8   |     | 80    |
| HS3                      |      | 2   |     | 32  |     |     | 64  |     |     | 8  |     |     | 8   | 114   |

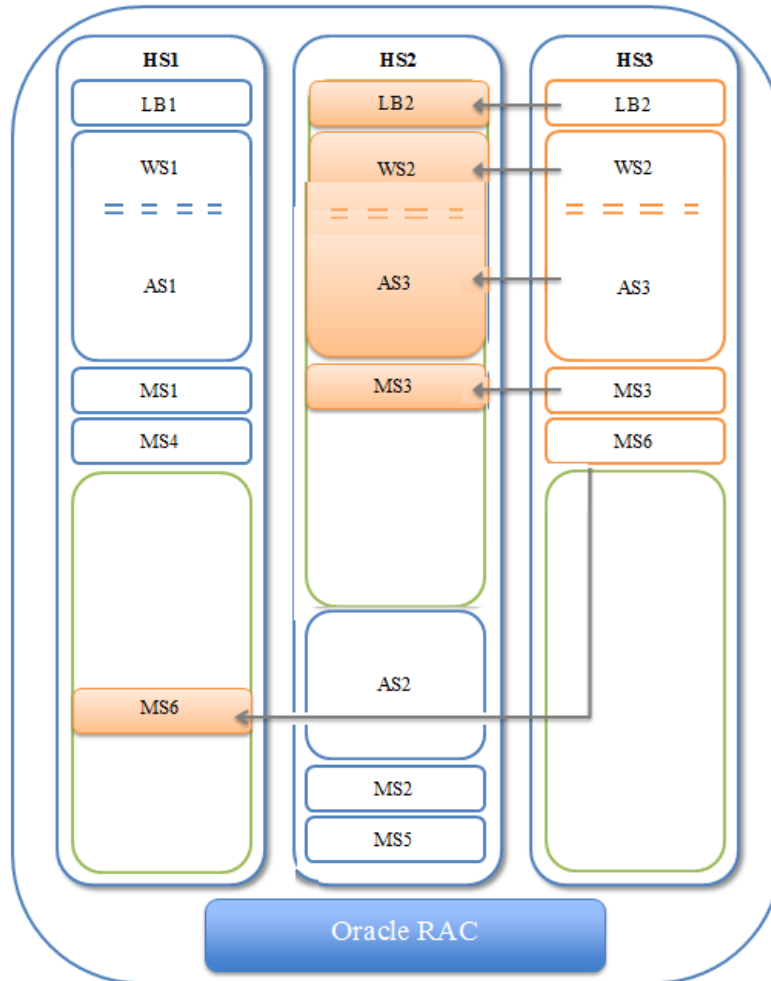


**NOTE:**

The limiting factor in these configurations is the number of processors/cores available for assigning to the appropriate VM workloads. Since these machines have potential capacity to spare, we provide no further specific discussion of RAM requirements.

## Primary Site - Virtualized - Failover Scenario

Among the advantages of virtualization is the redundancy that can be built in to the system. The following diagram reflects a possible failover scenario that remains at full operational capacity while evacuating all workloads from one server from an unplanned outage or planned maintenance windows.



The following chart shows the processor assignment-workload association. This distribution demonstrates maintaining fully operational functionality while one host is offline.

| VM-to-Host Processor/Core(s) - 3 Hosts - Failover Scenario |      |     |     |     |     |     |     |     |     |    |     |     |     |       |
|------------------------------------------------------------|------|-----|-----|-----|-----|-----|-----|-----|-----|----|-----|-----|-----|-------|
|                                                            | LB 1 | LB2 | WS1 | WS2 | AS1 | AS2 | AS3 | MS1 | MS2 | M3 | MS4 | MS5 | MS6 | Total |
| HS1                                                        | 2    |     | 4   | 4   | 8   |     |     | 2   |     |    | 2   |     | 2   | 22    |
| HS2                                                        |      | 2   |     | 4   |     | 8   | 8   |     | 2   | 2  |     | 2   |     | 28    |
| HS3                                                        |      |     |     |     |     |     |     |     |     |    |     |     |     | 0     |



## Primary Site - Virtualized: Expandability

Virtualizing the infrastructure also allows for future workload increases. The following chart demonstrates increasing both application server processor core assignments from eight to twelve and increasing the web server processor core assignments from four to eight.

| VM-to-Host Processor/Core(s) - 3 Hosts - Expanded Resources Scenario |         |     |     |     |     |     |     |     |     |    |     |     |     |       |
|----------------------------------------------------------------------|---------|-----|-----|-----|-----|-----|-----|-----|-----|----|-----|-----|-----|-------|
|                                                                      | LB<br>1 | LB2 | WS1 | WS2 | AS1 | AS2 | AS3 | MS1 | MS2 | M3 | MS4 | MS5 | MS6 | Total |
| HS1                                                                  | 2       |     | 8   |     | 12  |     |     | 2   |     |    | 2   |     |     | 26    |
| HS2                                                                  |         |     |     |     |     | 12  |     |     | 2   |    |     | 2   |     | 16    |
| HS3                                                                  |         | 2   |     | 8   |     |     | 12  |     |     | 2  |     |     | 2   | 26    |

Even with the expanded workload assignments, the infrastructure can still accommodate one machine being offline while still remaining at full operational capacity.

| VM-to-Host Processor/Core(s) - 3 Hosts - Expanded Resources Scenario |         |     |     |     |     |     |     |     |     |    |     |     |     |       |
|----------------------------------------------------------------------|---------|-----|-----|-----|-----|-----|-----|-----|-----|----|-----|-----|-----|-------|
|                                                                      | LB<br>1 | LB2 | WS1 | WS2 | AS1 | AS2 | AS3 | MS1 | MS2 | M3 | MS4 | MS5 | MS6 | Total |
| HS1                                                                  | 2       |     | 8   |     | 12  |     | 12  | 2   |     |    | 2   |     | 2   | 40    |
| HS2                                                                  |         | 2   |     | 8   |     | 12  |     |     | 2   | 2  |     | 2   |     | 28    |
| HS3                                                                  |         |     |     |     |     |     |     |     |     |    |     |     |     | 0     |

## Primary Site - Virtualized: Alternate Configuration

You can host the original virtualized configuration on two hosts though this omits the fully redundant failover capabilities. Several other possible configurations are also possible with specific trade-offs. Without further extensive discussions around operational needs and expectations, the fully redundant configuration above is a recommended scenario.

## Hardware

The following sections describe hardware recommended for the above example.

### Storage

Virtualized environments require shared storage. This example assumes an external storage array that serves this environment. The internal disks on these servers could be used as shared storage with a Virtual Storage Appliance (VSA).

- Dell EqualLogic PS6110 Series Array (requirements would determine model)

While shared storage may be necessary for the example's infrastructure to work, OpenManage Network Manager's heavy reliance on its database might allow for less robust or alternative storage solutions—for example, internal storage with a Virtual Storage Appliance (VSA). This might translate into hardware saving.



### NOTE:

The specific hardware models mentioned here are subject to change without notice.

### *Servers*

The consolidated workloads require higher capacity servers.

- Dell PowerEdge R910
- Processor 4 x Intel E7 (10 core) => 40 threads
- Memory 256 GB (1.5TB Max)
- Storage 2 x 300 GB 15K 6G SAS (depends on external storage)
- Network 2 x 10 GB port + 2 x 1 GB (estimated)

(Specific configuration recommendations are available)

### *Network*

This configuration assumes appropriate network hardware infrastructure for 10 GB connectivity between servers, storage, and so on. Evaluate any available connectivity for its impact on the system.

### *Virtualization Software*

This configuration is based on VMware hypervisor and management software offerings.

# D

## Database Management

- [Introducing Databases – 148](#)
- [Database Timeout – 149](#)
- [Embedded Database Sizing – 150](#)
- [Modifying the MySQL FAT File Systems – 152](#)
- [Database Backup/Restoration – 153](#)
- [Distributed Database Upgrades – 155](#)

# Introducing Databases

This chapter discusses database management procedures. This discussion includes installation with the embedded MySQL database. You must distribute Oracle installations and you can distribute MySQL.

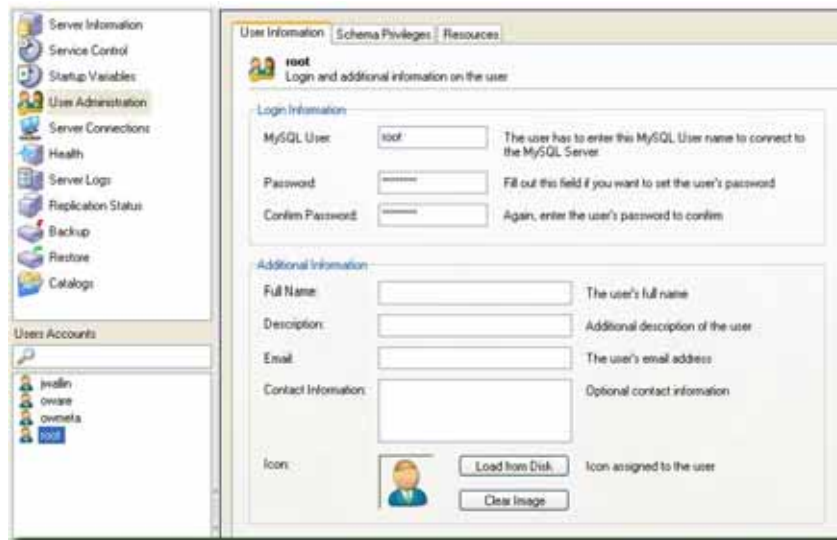
In addition to correctly sizing your database, best practice is to develop a plan to regularly back up the database, including steps to verify this backup with recovery. The frequency of backups depends upon your environment, but you should back up often enough to minimize data loss.

## Administration Basics

You can download the MySQL administrator and, can get its manual online. Use your favorite search engine to locate it. This optional tool has a graphical user interface, and provides an overview of the MySQL settings. It displays performance indicators graphically, making it easier to determine and tune server settings.

Start this tool to view databases. When you install the embedded database, installation creates a database named `owbusdb`. The installation also creates a `root` and `<O/S user>` login (it creates user `oware`, too).

Figure D-1. MySQL Users



Read the tool's instructions for the details about how to use it.

### Database Login / Passwords

The default login/password combinations for database access

For MySQL:

```
owbusdb: oware/dorado
lportal: root/dorado
synergy: root/dorado.
```

For Oracle:

```
owbusdb ( specified during installation)
lportal : netview/dorado
synergy: synadmin/dorado
```

For loaddb, use the system user's password. For the portal databases (lportal, synergy) access, set the password in `oware\synergy\tomcat-X.X\webapps \ROOT\WEB-INF\classes\portal-ext.properties`.

The property `com.dorado.jdbc.password.encrypted` specifies whether the database password is encrypted between OpenManage Network Manager and the database.

## Database Security

The properties that control the default user and password for application server's database are in

```
oware/lib/owdatabase.properties
```

They are these properties with their default values:

```
## Database logon name
com.dorado.jdbc.user=oware
## Database logon password
com.dorado.jdbc.password=dorado
##*****
```

You can change the password after installation, but not the username. If you change the password in a database tool for either Oracle (after setting it to the original during installation) or the embedded database, you must change it in these properties.



### CAUTION:

Best practice is to change the default password. You must change it in both the database and the above properties.

As always, properties in `owareapps/installprops/lib/installed.properties` override those in other property files, and are preserved if you upgrade your software.

## Database Timeout

When managing large networks or equipment with many interfaces, you may have to increase a timeout property: the `com.dorado.bom.lock_timeout` property in `owareapps\installprops\lib\installed.properties` (originally in `owdatabase.properties`).

Copy that property into `installed.properties`, then increase this setting based on the equipment managed. Generally, you should set this value to the maximum number of interfaces you expect your network elements to have. For example, if the element is expected to have 500 logical interfaces then the timeout value should be set to 500. The minimum recommended timeout value is 60 seconds.

## Database Emergency E-mail

To send an e-mail notification to emergency support contacts, if the OpenManage Network Manager database becomes unavailable do the following:

- 1 In the file `owareapps/installprops/lib/installed.properties` add the following property:

```
oware.monitor.database=true
```

- 2 Ensure that the following Email MBean properties are set:

```
SMTPHost
DefaultSenderAddress
EmergencyContacts
```

The `emergencyContacts` attribute is a comma-separated list of e-mail addresses for the recipients of emergency notifications. The following describes where to set these:

Open the file `$OWARE_USER_ROOT/oware/jboss-x.x.x/owareconf/oware-service.xml` in a text editor. The following section contains the configuration for the email MBean:

```
<!-- Email MBean -->
<!-- Change the SMTP Host attribute below to point to the right SMTP
server -->
<mbean code="com.dorado.mbeans.OEmailMBean"
  name="oware:service=OEmailMBean">
  <attribute name="SMTPHost">smtp.hostName.com</attribute>
  <attribute name="Port">25</attribute>
  <attribute name="UserName"></attribute>
  <attribute name="EmergencyContacts"></attribute>
<attribute name="DefaultSenderAddress">ommm@hostName.com</attribute>
  <attribute name="MaxRatePerMinute">200</attribute>
  <depends>jboss:service=@PART_NAME@Partition</depends>
  <depends>oware:service=ClusterPrimaryDesignator</depends>
  <depends>jboss.j2ee:jndiName=RuleEngine,service=EJB</depends>
</mbean>
```

This file's settings override the Graphical User Interface settings for mail described in the *Properties* chapter of the *OpenManage Network Manager User Guide*.

## Embedded Database Sizing

The initially installed Embedded Database is a relatively small instance—possibly too small for your application. This is important because errors can occur when your system reaches the size limit of the database. Therefore, after installing, you may want to resize the Embedded Databases to fit your application. See [Modifying the MySQL FAT File Systems](#) on page 152 [Modifying the MySQL FAT File Systems](#) for instructions about modifying an existing, installed system.



### NOTE:

Table and User limits for the embedded database make Oracle the preferred database for large installations.

Follow these steps to resize your database

*For Windows,*

- 1 Shut down all applications and application server. And, if applicable, disconnect any other processes from MySQL.
- 2 Stop the MySQL service on Windows with the command line: `net stop mysql`.
- 3 Edit the text file `innodb_data_file_path` in `my.ini`.
- 4 Add the new file path to `innodb_data_file_path`, for example:

Original:

```
innodb_data_file_path =d:/data/ibdata/ibdata1:600M:autoextend:max:2000M
```

To add the path `f:/data/ibdata/ibdata2:200M`, the new entry should be:

```
innodb_data_file_path = d:/data/ibdata/ibdata1:600M;f:/data/ibdata/
  ibdata2:200M:autoextend:max:2000M
```



**NOTE:**

Case sensitivity is important here. Be sure to use uppercase "M's". Omitting this prevents your database from restarting

You must remove the `initial`, `max` and `autoextend` parameters from the initial line that includes `ibdata1`. You must also set the file size to what it really is. To find the size of `ibdata1` run this command (in an command shell where you have already run `oware` in Windows):

```
ls -lh /opt/dorado/.../ibdata1
```

In `my.cnf`, using "1G" is acceptable. The line following this description of the original volume describes the additional volume:

```
/opt/dorado/oware3rd/.../ibdata1:1G;
/opt/dorado/.../ibdata2:1024M:autoextend<optional params>
```

The MySQL Reference Manual for adding a data volume to a MySQL database is <http://dev.mysql.com/doc/refman/5.0/en/adding-and-removing.html>. See [MySQL Server Configuration File Examples](#) on page 158 for other examples.

- 5 Save `my.ini`.
- 6 Start MySQL service on Windows by running `net start mysql`!. You should see the following messages,
 

```
The MySql service is starting.
The MySql service was started successfully.
```
- 7 Check the file `f:/data/ibdata/ibdata2` appears, and is the right size.

*For Linux*

- 1 Shut down all applications and application server. And also disconnect any other process connected to MySQL.
- 2 Stop the MySQL server process by running the following command:

```
mysqladmin -h <DBServerName> --user=root --password=<RootUserPassword>
  shutdown'
```

For example, if *DBServerName* is *nova*, *RootUserPassword* is *dorado*:

```
mysqladmin -h nova --user=root --password=dorado shutdown'
```

If that command fails, run the following command:

```
$MYSQL_ROOT/support-files/mysql.server stop
```

- 3 Log on as the root user and use a text editor like vi to open `/etc/my.cnf`.
- 4 Locate the entry `innodb_data_file_path` in `my.cnf`.
- 5 Add the new file path to `innodb_data_file_path`, for example,

Original:

```
innodb_data_file_path = /data1/ibdata/ibdata1:600M:autoextend:max:2000M
```

To add the path `/data2/ibdata/ibdata2:200M`, the new entry should be:

```
innodb_data_file_path = /data1/ibdata/ibdata1:600M;/data2/ibdata/
  ibdata2:200M:autoextend:max:2000M
```

**NOTE:**

Remove the remove the initial, max and autoextend parameters from the initial line that includes `ibdata1`, as described in the Tip for Windows.

- 6 Save `my.cnf`
- 7 Log on as an authorized user to start MySQL server process as `mysqld_safe`.

**NOTE:**

You may need to specify the path for `mysqld_safe`.

You should see messages indicating MySQL server started successfully.

- 8 Check the file `/data2/ibdata/ibdata2` appears, and is the right size.

## Modifying the MySQL FAT File Systems

If you have upgraded from older operating systems you may still have a FAT file system that limits your database size or expansion beyond 2GB. The database is a file as far as the operating system is concerned, and FAT limits file size. There is also a 4GB limit on early versions of NTFS that may linger because of upgrades.

To change the installed database sizes, you must edit the configuration file:

- Windows: `%SystemRoot%\my.ini`

The origin of the configuration in the several `my.cnf` files on Linux is a path like `/opt/dorado/oware3rd/mysql/5.0.51-pc-linux-i686-64/my.cnf`, so be sure to alter that one if you are reconfiguring OpenManage Network Manager's MySQL. The following line controls maximum database size (at end):



```
innodb_data_file_path = d:/work/oware3rd/mysql/ibdata/
ibdata1:600M:autoextend:max:2000M
```

To recreate database after modifying config file, use the following command from the application server:

```
loaddb -q -d -m
```

Syntax details:

```
innodb_data_file_path =
pathtodatafile:sizespecification;pathtodatafile:sizespecification;...
innodb_data_file_path = ...
;pathtodatafile:sizespecification[:autoextend[:max:sizespecification]]
```

If you specify the last datafile with the *autoextend* option, InnoDB will extend the last datafile if it runs out of free space in the tablespace. The increment is 8 MB at a time. An example:

```
innodb_data_file_path = /ibdata/ibdata1:100M:autoextend
```

This instructs InnoDB to create just a single datafile whose initial size is 100 MB and which is extended in 8 MB blocks when space runs out.

If the disk becomes full you may want to add another datafile to another disk, for example. Then you must look at the size of `ibdata1`, round the size downward to the closest multiple of 1024 \* 1024 bytes (= 1 MB), and specify the rounded size of `ibdata1` explicitly in `innodb_data_file_path`. After that you can add another datafile:

```
innodb_data_file_path = /ibdata/ibdata1:988M:/disk2/ibdata2:50M:autoextend
```

Be cautious on filesystems where the maximum file-size is 2 GB. InnoDB is not aware of the operating system's maximum file-size. On those filesystems you might want to specify the max size for the datafile:

```
innodb_data_file_path = /ibdata/ibdata1:100M:autoextend:max:2000M
```

Some additional caveats:

- You must use foreslashes (/) instead of backslashes (\) when you specify the path.
- The subdirectory `iblogs` must be used by MySQL exclusively
- Make sure you enough disk space available on the data path specified
- You can add as many entries as you like. However, you can use `initial`, `max` and `autoextend` only in the last entry, and must change the first entry to reflect the actual size of the database.
- The name of filepath must be valid on the filesystems. However, you must always have your leaf directory in the path as `ibdata`.

## Database Backup/Restoration

The recommended procedures for database backup and restoration for the embedded database follows. Best practice is to develop backup plans using these procedures for the sake of database reliability.

For MySQL (embedded) databases, use this database's native backup/restore utilities, described in the following section, to backup the `owbusdb` database. You can also refer to the MySQL manual available online for instructions about backup and restoration. For instructions about backing up / restoring Oracle databases, refer the Oracle manuals.

## MySQL Backup/Restore

Follow these instructions to back up and restore the embedded MySQL database using native MySQL utilities on a command line.

### Backup

Open a command shell (*Start > Run cmd*, in Windows), and then type the following at the prompt. By default, the primary database is `owbusdb`, and `owmetadb` includes meta-information. For the web server, back up `lportal` and `synergy` too (the latter contains multitenancy information). The example includes defaults for name and password. These are typically different from the login / password for the application.

```
mysqldump -a -u root --password=[password] owbusdb > FILENAME.mysql
```

For example:

```
mysqldump -a -u root --password=dorado owmetadb > owmetadb.mysql
```

If you have Performance monitors or Traffic Analyzer, you must also back up your stored procedures otherwise they do not get restored when you restore the database. The command line here adds `--routines`. For example:

```
mysqldump -a -u oware --password=dorado --routines owbusdb >
owbusdb.mysql
```

This writes the `owbusdb` to a plain-text file called `FILENAME.mysql` (`owbusdb.mysql` in our examples). This file is a full backup with which you can fully restore your database in case of problems.

Here are the backup commands for all the databases:

```
mysqldump -a -u root --password=dorado owbusdb > owbusdb.mysql
mysqldump -a -u root --password=dorado owmetadb > owmetadb.mysql
mysqldump -a -u root --password=dorado lportal > lportal.mysql
mysqldump -a -u root --password=dorado synergy > synergy.mysql
```

### Restoring

Restoring from `FILENAME.mysql` is a three step process. This occurs, again, in a command shell:

- 1 Drop the database:

```
mysqladmin -u USERNAME -p drop owbusdb
```

or

```
mysqladmin -u USERNAME --password=[password] drop owbusdb
```

- 2 Recreate the database

```
mysqladmin -u USERNAME -p create owbusdb
```

or

```
mysqladmin -u USERNAME --password=[password] create owbusdb
```

- 3 Import the backup data

```
mysql -u USERNAME -p owbusdb < FILENAME.mysql
```

or

```
mysql -u USERNAME --password=[password] owbusdb < FILENAME.mysql
```

Here are restoration commands for all the databases:

```
mysql -u root --password=dorado owmetadb < owmetadb.mysql
mysql -u root --password=dorado owbusdb < owbusdb.mysql
mysql -u root --password=dorado lportal < lportal.mysql
mysql -u root --password=dorado synergy < synergy.mysql
```

You can configure the embedded MySQL database with multiple instances that fail over. For a new installation with a distributed mysql db server on the application server machine, follow these steps:

- 1 To create OpenManage Network Manager's database, run `loaddb` (the default user/password is `oware/dorado`).
- 2 To create portal and synergy databases, run `loaddb` (default user password is `root/dorado`), as follows: `loaddb -u root -w dorado -s`
- 3 To seed the database, run `ocpinstall -s`

## Distributed Database Upgrades

For an upgrade with distributed mysql database server, run `dbpostinstall` on the (primary) application server. Despite its name, the needed commands are the same for MySQL in the script `dbpostinstall`. These include:

```
dbevolve -a -x
ocpinstall -s
licenseimporter
```

## MySQL Replication

Install mysql database into 2 servers

master 10.35.35.170

stop OpenManage Network Manager appservers/webservers

slave 10.35.35.174

On master (10.35.35.170) edit `my.cnf` file `...\dorado\oware3rd\mysql\5_0_51-64` directory add under `[mysqld]` section:

```
log-bin= mysql-bin
```

```
server-id= 1
```

restart mysql for changes to take effect.

On slave (10.35.35.174) edit `my.cnf` file `...\dorado\oware3rd\mysql\5_0_51-64` directory change `server-id` from 1 to 2

restart mysql for changes to take effect

log into master mysql server (10.35.35.170) and create users: "mysql -u root --password= dorado"

```
mysql> CREATE USER 'repluser'@'10.35.35.170' IDENTIFIED BY 'slavepass';
```

```
mysql> CREATE USER 'repluser'@'10.35.35.174' IDENTIFIED BY 'slavepass';
```

still on master mysql server, grand privileges for created user:

```
mysql> GRANT ALL PRIVILEGES ON *.* TO 'repluser'@'10.35.35.170';
```

```
mysql> GRANT ALL PRIVILEGES ON *.* TO 'repluser'@'10.35.35.174';
```

on master mysql server (10.35.35.170) grant user permissions for replication:

```
mysql> GRANT REPLICATION SLAVE ON *.* TO 'repluser'@'10.35.35.170';
```

stop adding more information into master database by executing following on master database:

```
mysql> FLUSH TABLES WITH READ LOCK;
```

Copy databases to slave

backup databases in oware prompt on master (10.35.35.170)

```
mysqldump -a -u root --password= dorado --routines owbusdb > owbusdb.mysql
```

```
mysqldump -a -u root --password= dorado owmetadb > owmetadb.mysql
```

```
mysqldump -a -u root --password= dorado lportal > lportal.mysql
```

move \*.mysql files to slave

on slave (10.35.35.174) in oware prompt execute following commands

```
mysqladmin -u root --password= dorado drop owmetadb
```

```
mysqladmin -u root --password= dorado drop owbusdb
```

```
mysqladmin -u root --password= dorado drop lportal
```

```
mysqladmin -u root --password= dorado create owmetadb
```

```
mysqladmin -u root --password= dorado create owbusdb
```

```
mysqladmin -u root --password= dorado create lportal
```

```
mysql -u root --password= dorado owmetadb < owmetadb.mysql
```

```
mysql -u root --password= dorado owbusdb < owbusdb.mysql
```

```
mysql -u root --password= dorado lportal < lportal.mysql
```

To obtain master file position which is required to know, execute following command on master mysql, (in this example it is 73):

```
mysql> show master status;
```

```
+-----+-----+-----+-----+
| File          | Position | Binlog_Do_DB | Binlog_Ignore_DB |
+-----+-----+-----+-----+
| mysql-bin.000001 | 73      |              |                   |
+-----+-----+-----+-----+
```

log into slave mysql server (10.35.35.174) and create users: "mysql -u root --password= dorado

```
mysql> CREATE USER 'repluser'@'10.35.35.170' IDENTIFIED BY 'slavepass';
```

```
mysql> CREATE USER 'repluser'@'10.35.35.174' IDENTIFIED BY 'slavepass';
```

still on slave mysql server, grand privileges for created user:

```
mysql> GRANT ALL PRIVILEGES ON *.* TO 'repluser'@'10.35.35.170';
```

```
mysql> GRANT ALL PRIVILEGES ON *.* TO 'repluser'@'10.35.35.174';
```

setting up master configuration on slave and start replication:

```
mysql> CHANGE MASTER TO
```

```
-> MASTER_HOST='10.35.35.170',
```

```
-> MASTER_USER='repluser',
```

```
-> MASTER_PASSWORD='slavepass',
```

```
-> MASTER_LOG_FILE='mysql-bin.000001',
```

```
-> MASTER_LOG_POS= 73;
```

```
mysql> START SLAVE;
```

unlock tables and restart appserver/webserver on master

log into master mysql database and execute:

```
mysql> UNLOCK TABLES;
```

restart appserver/webserver

To verify that replication is functioning execute

on master: mysql> show master status;

on slave: mysql> show slave status\G;

both instances should have file position growing and it should be identical.

## MySQL Server Configuration File Examples

The `my.cnf` files optimize MySQL installations for the database size you configure at installation time. Refer to the *OpenManage Network Manager User Guide* for more suggestions about re/sizing your MySQL database, as well as starting, stopping and performance tuning it.

Several `my.cnf` files and example `*.ini` files (`my-small.ini`, `my-large.ini`, and so on) accompany standard installations, but the origin of the configuration on Linux is `/opt/dorado/oware3rd/mysql/[version number]/my.cnf`, and on Windows is `\oware3rd\mysql\[version number]\my.cnf` so be sure to alter that file if you are optimizing MySQL. The following are examples of `my.cnf` files for the configurations described above:

- [6GB example \(default\):](#)
- [8GB example:](#)
- [12GB example:](#)
- [16GB example:](#)
- [32GB example:](#)

### CAUTION:

Some Linux distributions have MySQL installed by default. Remove any previous MySQL installation, and make sure to remove or rename the `my.cnf` file for that previous installation. If it is on the path, it can interfere with the correct operation of OpenManage Network Manager.

Refer to the *OpenManage Network Manager User Guide* for additional advice about `my.cnf` configuration.

### 6GB example (default):

```
# The MySQL server
[mysqld]
port=3306
#socket=MySQL
skip-locking
set-variable      = connect_timeout=10
set-variable      = key_buffer=384M
set-variable      = max_allowed_packet=32M
set-variable      = table_cache=1024
set-variable      = sort_buffer=2M
set-variable      = record_buffer=2M
set-variable      = thread_cache=8
# Try number of CPU's*2 for thread_concurrency
set-variable      = thread_concurrency=8
set-variable      = myisam_sort_buffer_size=64M
server-id         = 1
transaction-isolation = READ-COMMITTED

# Uncomment the following if you want to log updates
#log-bin
innodb_locks_unsafe_for_binlog=1
```

```

set-variable = innodb_mirrored_log_groups=1
set-variable = innodb_log_files_in_group=3
set-variable = innodb_log_file_size=256M
set-variable = innodb_log_buffer_size=8M
innodb_flush_log_at_trx_commit=1
innodb_log_archive=0
set-variable = innodb_buffer_pool_size=512M
set-variable = innodb_additional_mem_pool_size=20M
set-variable = innodb_file_io_threads=4
set-variable = innodb_lock_wait_timeout=30

```

### 8GB example:

```

# The MySQL server
[mysqld]
port=3306
#socket=MySQL
skip-locking
query_cache_type=1
#caches often used queries. 32-512M, depending on how big the commonly
  cached queries need to be, limit per and overall size
query_cache_limit=12M
query_cache_size=128M
set-variable      = connect_timeout=10
#This is for myISAM tables, not needed for appserver
set-variable      = key_buffer=384M
set-variable      = max_allowed_packet=32M
set-variable      = table_cache=1024
set-variable      = sort_buffer=2M
set-variable      = record_buffer=2M
set-variable      = thread_cache=8
# Try number of CPU's*2 for thread_concurrency
set-variable      = thread_concurrency=8
set-variable      = myisam_sort_buffer_size=64M
server-id         = 1
transaction-isolation = READ-COMMITTED

# Uncomment the following if you want to log updates
#log-bin
innodb_locks_unsafe_for_binlog=1

set-variable = innodb_buffer_pool_size=1024M
#larger sizes help with write intensive workloads and large data sets, but
  usually not needed above 512M
set-variable = innodb_log_file_size=256M

```

```

#set high enough for 1 second worth of operations; maybe 1% of total (8M
  for 8G, 16 for 16, etc)
set-variable = innodb_log_buffer_size=8M
#default of 1 is slow. 2 uses the OS cache so only lose data on OS crash
  (power outage, etc). MUCH FASTER.
innodb_flush_log_at_trx_commit=2
innodb_thread_concurrency=8
#Increase based on number of concurrent users; assume each user hits about
  100 tables and uses 1 thread (plus app overhead; 6 for overhead plus 1
  per user)
table_cache=1024
thread_cache=16

set-variable = innodb_mirrored_log_groups=1
set-variable = innodb_log_files_in_group=3
innodb_log_archive=0
# set a smidge high each step; doesn't make a huge difference
set-variable = innodb_additional_mem_pool_size=20M
set-variable = innodb_file_io_threads=4
set-variable = innodb_lock_wait_timeout=30

```

### 12GB example:

```

# The MySQL server
[mysqld]
port=3306
#socket=MySQL
skip-locking
query_cache_type=1
#caches often used queries. 32-512M, depending on how big the commonly
  cached queries need to be, limit per and overall size
query_cache_limit=12M
query_cache_size=256M
set-variable = connect_timeout=10
#This is for myISAM tables, not needed for appserver
set-variable = key_buffer=384M
set-variable = max_allowed_packet=32M
set-variable = table_cache=1024
set-variable = sort_buffer=2M
set-variable = record_buffer=2M
set-variable = thread_cache=8
# Try number of CPU's*2 for thread_concurrency
set-variable = thread_concurrency=8
set-variable = myisam_sort_buffer_size=64M
server-id = 1
transaction-isolation = READ-COMMITTED

```



```

# Uncomment the following if you want to log updates
#log-bin
innodb_locks_unsafe_for_binlog=1

set-variable = innodb_buffer_pool_size=2048M
#larger sizes help with write intensive workloads and large data sets, but
  usually not needed above 512M
set-variable = innodb_log_file_size=256M
#set high enough for 1 second worth of operations; maybe 1% of total (8M
  for 8G, 16 for 16, etc)
set-variable = innodb_log_buffer_size=12M
#default of 1 is slow. 2 uses the OS cache so only lose data on OS crash
  (power outage, etc). MUCH FASTER.
innodb_flush_log_at_trx_commit=2
innodb_thread_concurrency=8
#Increase based on number of concurrent users; assume each user hits about
  100 tables and uses 1 thread (plus app overhead; 6 for overhead plus 1
  per user)
table_cache=1536
thread_cache=24

set-variable = innodb_mirrored_log_groups=1
set-variable = innodb_log_files_in_group=3
innodb_log_archive=0
# set a smidge high each step; doesn't make a huge difference
set-variable = innodb_additional_mem_pool_size=20M
set-variable = innodb_file_io_threads=4
set-variable = innodb_lock_wait_timeout=30

```

### 16GB example:

```

# The MySQL server
[mysqld]
port=3306
#socket=MySQL
skip-locking
query_cache_type=1
#caches often used queries. 32-512M, depending on how big the commonly
  cached queries need to be, limit per and overall size
query_cache_limit=12M
query_cache_size=256M
set-variable = connect_timeout=10
#This is for myISAM tables, not needed for appserver
set-variable = key_buffer=384M
set-variable = max_allowed_packet=32M

```

```

set-variable      = table_cache=1024
set-variable      = sort_buffer=2M
set-variable      = record_buffer=2M
set-variable      = thread_cache=8
# Try number of CPU's*2 for thread_concurrency
set-variable      = thread_concurrency=8
set-variable      = myisam_sort_buffer_size=64M
server-id         = 1
transaction-isolation = READ-COMMITTED

# Uncomment the following if you want to log updates
#log-bin
innodb_locks_unsafe_for_binlog=1

set-variable = innodb_buffer_pool_size=3072M
#larger sizes help with write intensive workloads and large data sets, but
  usually not needed above 512M
set-variable = innodb_log_file_size=256M
#set high enough for 1 second worth of operations; maybe 1% of total (8M
  for 8G, 16 for 16, etc)
set-variable = innodb_log_buffer_size=16M
#default of 1 is slow. 2 uses the OS cache so only lose data on OS crash
  (power outage, etc). MUCH FASTER.
innodb_flush_log_at_trx_commit=2
innodb_thread_concurrency=8
#Increase based on number of concurrent users; assume each user hits about
  100 tables and uses 1 thread (plus app overhead; 6 for overhead plus 1
  per user)
table_cache=2048
thread_cache=64

set-variable = innodb_mirrored_log_groups=1
set-variable = innodb_log_files_in_group=3
innodb_log_archive=0
# set a smidge high each step; doesn't make a huge difference
set-variable = innodb_additional_mem_pool_size=20M
set-variable = innodb_file_io_threads=4
set-variable = innodb_lock_wait_timeout=30

```

### 32GB example:

```

# The MySQL server
[mysqld]
port=3306
#socket=MySQL
skip-locking

```

```

query_cache_type=1
#caches often used queries. 32-512M, depending on how big the commonly
  cached queries need to be, limit per and overall size
query_cache_limit=12M
query_cache_size=512M
set-variable      = connect_timeout=10
#This is for myISAM tables, not needed for appserver
set-variable      = key_buffer=384M
set-variable      = max_allowed_packet=32M
set-variable      = table_cache=1024
set-variable      = sort_buffer=2M
set-variable      = record_buffer=2M
set-variable      = thread_cache=8
# Try number of CPU's*2 for thread_concurrency
set-variable      = thread_concurrency=8
set-variable      = myisam_sort_buffer_size=64M
server-id         = 1
transaction-isolation = READ-COMMITTED

# Uncomment the following if you want to log updates
#log-bin
innodb_locks_unsafe_for_binlog=1

set-variable = innodb_buffer_pool_size=6144M
#larger sizes help with write intensive workloads and large data sets, but
  usually not needed above 512M
set-variable = innodb_log_file_size=372M
#set high enough for 1 second worth of operations; maybe 1% of total (8M
  for 8G, 16 for 16, etc)
set-variable = innodb_log_buffer_size=32M
#default of 1 is slow. 2 uses the OS cache so only lose data on OS crash
  (power outage, etc). MUCH FASTER.
innodb_flush_log_at_trx_commit=2
innodb_thread_concurrency=16
#Increase based on number of concurrent users; assume each user hits about
  100 tables and uses 1 thread (plus app overhead; 6 for overhead plus 1
  per user)
table_cache=10240
thread_cache=128

set-variable = innodb_mirrored_log_groups=1
set-variable = innodb_log_files_in_group=3
innodb_log_archive=0
# set a smidge high each step; doesn't make a huge difference
set-variable = innodb_additional_mem_pool_size=20M

```

```
set-variable = innodb_file_io_threads=4  
set-variable = innodb_lock_wait_timeout=30
```



**NOTE:**

Best practice is to archive the modified database sizing file somewhere safe. Upgrading or patching your installation may overwrite your settings, and you can simply copy the archived file to the correct location to recover any configuration you have made if that occurs.

# E

## Oracle Database Management

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# Installing Oracle

Before running this application's Oracle setup, you must first install Oracle and create the database instance. The following is a set of basic guidelines for installing Oracle. This may not describe the optimum configuration for every environment, but it provides a simple example of how to install Oracle in a basic configuration. Best practice is to employ a trained Oracle DBA to either assist or manage the installation and ongoing maintenance required to keep your application performing properly.

The Oracle site containing Oracle's Installation guide, covering settings, creating database instances, operating system support, and so on is <https://docs.oracle.com/en/database/>

## *Username / Password Considerations*

We do not support using `sys` or `system` user as the user for the OpenManage Network Manager application. If you entered one of these during installation, modify the `$OWARE_USER_ROOT/owareapps/installprops/installed.properties` file. Before running `loaddb`, change the following parameters:

```
com.dorado.jdbc.user=<user>
com.dorado.jdbc.password=<password>
```

The following assumes that a database instance has been created and configured properly. If you wish to use Oracle RAC for high availability of, then consult your Oracle resource for proper practices on configuring the RAC environment. See also [Encrypting the Oracle Password](#) on page 170.

## *An Outline of Installation Steps*

Before installing OpenManage Network Manager, your Oracle DBA needs to do the following tasks:

- 1 Install Oracle according to its installation instructions.
- 2 Perform Initial Configuration of Oracle Settings as required by the application.
- 3 Perform the [Initial Oracle Installation Testing](#) on page 168.

The OpenManage Network Manager installer does the following:

- 4 Install OpenManage Network Manager, selecting Oracle as the database, and filling in the user, password, IP address of the server, and so on. Note that the following steps may be useful in installing OpenManage Network Manager:
  - a. Open command prompt/terminal and source environment using `oware` (Windows) or `./etc/.dsienv` (Linux).
  - b. Test database connectivity with the command: `pingdb -u <dba user> -p <dba password>` to test connectivity. For example: `pingdb -u system -p manager`. Without these parameters, `pingdb` consults the `installed.properties` file for the user / password.



### NOTE:

With Oracle 11G, the parameter `sec_case_sensitive_logon` defaults to `TRUE` when you install the database. You must change this to `FALSE` for `loaddb` and `pingdb` to work if you have upper case characters in the login / password for your Oracle database.

The multitenant option introduced in Oracle Database 12c allows a single container database (CDB) to host multiple separate pluggable databases (PDB). If you installed the application database as a pluggable database (PDB), there are two properties that must be set as following.

In the `portal-ext.properties` file located in `../oware/synergy/tomcat-7.0.40/webapps/ROOT/WEB-INF/classes`, search for `jdbc.default.url` and set the property in this format `jdbc:oracle:thin:@address:port/pdbname`.

In the `installed.properties` file located in `../owareapps/installprops/lib`, search for `com.dorado.jdbc.database_name.oracle` and set the property in this format `@address:port/pdbname`.

Where `address` is the ip address or hostname of the database server, `port` is the listener port, and `pdbname` is the pluggable database name.

For examples:

```
jdbc.default.url=jdbc:oracle:thin:@192.168.54.58:1521/pdborcl
com.dorado.jdbc.database_name.oracle=@192.168.54.58:1521/pdborcl
```

- 5 Run the following on a fresh installation to create the database schema and users (`system / manager` are the database user and password for this example).

```
loaddb -u system -w manager
loaddb -u system -w manager -s.
```

Run this only with the Oracle system user (See [Running Loaddb](#) on page 169). This creates and loads the portal database. The user running this must have `dba` privileges—more specifically, this user must have permission to create or delete users, roles, tablespaces, tables, and so on.

- 6 Run `dbpostinstall` on the (primary) application server. (See [Running dbpostinstall](#) on page 170)
- 7 Restart application server.

The following steps only apply if you did not choose the option for the server to start automatically:

- 8 Open a shell and set the environment with `oware` (Windows) or `. /etc/.dsienv` (Linux). Enter `pmstartall` to start the application server.



#### NOTE:

In a clustered application server environment, you need to run this only once from one application server. Mediation servers do not need to have database connectivity, so you do not have to run this on distributed mediation servers.

## Important Hardware Considerations

Refer to the Oracle Installation guides for minimum requirements. Note that OpenManage Network Manager uses the Oracle database in a highly transactional way. This means that there will be significant IO to the Redo logs. Some basic recommendation to optimize IO for the Oracle server would be to increase the number of physical disks available to the server which will help to eliminate lock contentions.

## Initial Oracle Settings Configuration

Run the following as the Oracle system user before running `loaddb` and before starting the application server to configure Oracle settings required by the OpenManage Network Manager:

- 1 Login to Oracle system:
 

```
sqlplus system/<system password>
```

- 2 Increase Oracle's default processes limit:

```
SQL> alter system set processes=300 scope=spfile;
System altered.
```

If you do not set this limit to 300, you may get the following error while running the dbpostinstall command.

```
ORA-12519, TNS:no appropriate service handler found
```

- 3 Set Oracle to use case insensitive passwords:

```
SQL> alter system set SEC_CASE_SENSITIVE_LOGON = FALSE;
System altered.
```

- 4 Change Oracle's default HTTP port:

```
SQL> call dbms_xdb.sethttpport('8081');
Call completed.
```

- 5 Log out of Oracle:

```
SQL> exit
Disconnected from Oracle Database
```

- 6 Restart Oracle database service for changes to take effect.

For example, on Windows:

```
net stop OracleServiceXE
net start OracleServiceXE
```

## Initial Oracle Installation Testing

Run the following as `system` before running `loaddb`, and as the OpenManage Network Manager user before starting the application server to validate the success of `loaddb`'s user creation:

- Verify your application server can access the Oracle server. Use the following command to do this:  

```
pingdb -u <username> -p <password>
```
- Although Oracle's installation offers options to select replication in one of the Oracle trees in addition to Default, this application's installation supports only Default. Any Oracle database's high availability feature support is outside this application's JDBC connection to the database (you must use Oracle's RAC technology or equivalent).

## Initial Database Setup

Creating an Oracle user for the application server is unnecessary. OpenManage Network Manager's installation scripts create all required schema objects for the application server. Follow these steps to configure your database for use with OpenManage Network Manager.

- 1 After the OpenManage Network Manager Installer finishes, source the `oware` environment in a shell to execute the following commands.

Windows: `oware`

Linux: `. /etc/.dsienv`



- To successfully install against an Oracle server running on a Windows *Server* Operating System you must create a user with DBA privileges on the Oracle server:

```
sqlplus system/<system password>
create user foo identified by foo;
grant dba to foo;
exit
```

You can then run `loaddb` from application server as described below.

### Running Loaddb

- Before running the `loaddb` script, you can optionally replace the occurrences of the literal values `OWARE_DEFAULT_SIZE` and `OWARE_ORADATA_PATH` in the tablespace creation script with your desired tablespace size and location. If you do not modify this script, your data files will be created under your `$ORACLE_HOME` directory. The tablespace creation script is in:

```
$OWARE_USER_ROOT/oware/dbscript/oracle/owaredba/
create_oware_tablespaces.sql
```



#### NOTE:

You must modify this script if you are running Oracle RAC, otherwise altering it is optional.

You will need your DBA password to run the `loaddb` script. The user and password you select must be able to perform user, role, and tablespace creation tasks. You must run this as a user with DBA privileges or the `system` user. The `-w` option is required for the password.

The `-d` option creates the database user specified during installation and the `-s` option creates the OpenManage Network Manager tablespace: `OWSYNERGY01` and the portal tablespace. Without `-s` it creates OpenManage Network Manager tablespaces: `owdata01` and `owidx01`. Here are the options:

```
loaddb -u system -w <system password> -d
```

Creates:

- tablespace `owdata01`
- tablespace `owidx01`
- role `owrole`
- user `omnm`

(assuming you specify the user “omnm” during installation or in the `install.properties` file)

```
loaddb -u system -w <system password> -s
```

Creates:

- tablespace `OWSYNERGY01`—Includes user credentials, multitenancy information.
- role `OWSYNERGYROLE`
- user `SYNADMIN`
- tablespace `OWPORTAL01` (portal information)
- role `OWPORTALROLE`
- user `NETVIEW`

*Running dbpostinstall*

- 4 After running `loaddb`, you must seed the database with all required information. This is based on what software is installed with your package. Running the `dbpostinstall` command on the (primary) application server examines your package and seeds all appropriate information. To see options available with this script, run `dbpostinstall -?`  
If you get an “ORA-12519, TNS:no appropriate service handler found” error, set the Oracle processes limit to 300. See [Initial Oracle Settings Configuration](#) on page 167.

*Encrypting the Oracle Password*

- 5 By default, the JDBC username and password are stored in clear text, during installation, in the following file:

```
<install_root>/owareapps/installprops/lib/installed.properties
```

The username and password properties must be clear text to run the `loaddb` script. This script creates/re-creates the database schema. Once the schema is created, you may encrypt the database password stored in the `installed.properties` file.

A utility script, `owjdbcutil`, supports changing the username and/or password used for database access. This script also supports encryption of the database password:

```
owjdbcutil -u <database user> -p <database password> -e
```

## Oracle Server Settings and Parameters

The following are general recommendations for Oracle installations:

### Oracle Server Initialization Parameters Recommendations

The following sections describe how to configure the application's initialization parameters with an Oracle database. Modifying Oracle initialization parameters in the `init< InstanceSid>.ora` file. Refer to recommendations provided with your Oracle installation's default `init.ora` (located in `$ORACLE_HOME/srvm/admin/` typically)

```
Shared_pool_size Minimum size 150M
Shared_pool_reserved_size Minimum size 15M
Open_cursors Minimum 1500
Processes Minimum 100
Job_queue_processes Minimum 2
Sort_area_size = 1048576
Sort_area_retained_size= 1048576
```

*Other Best Practices*

- Set `CURSOR_SHARING=FORCE` reduces CPU use.
- Increased log size from 3 groups of 52M, to 4 groups of 500M apiece. This definitely decreased the `log_file_sync` wait event, improving throughput.

## Oracle Database Sizing

Sizing an Oracle database is part of its installation. Even before installing Oracle you should consult your DBA to estimate how big your data is going to be and size the database accordingly.

**△ CAUTION:**

Size your database server's disk based on anticipated traffic. Oracle's archive logs can grow rapidly. (In one test these archive logs grew to 12 GB in two weeks). If the file system fills up with the archives, Oracle stops, and may need to be restarted to clear an archive error.

Installation of Oware-based products produces files like the following:

`load_{product_name}_sizing.sql`

For example: `load_prodName_sizing.sql`. The `sql` extension for this file has no significance (you cannot run this file in a SQL tool).

Here is an excerpt from the sizing file generated for Oware service classes:

```
REM #####
REM #
REM # Script Name   : load_oware_svc_sizing.sql
REM # Creation Date: Fri Jul 05 16:17:29 PDT 2002
REM #
REM # Columns:
REM # sql Prompt, Classname, tablename, Tablesize, Blob size (0/1024)
REM #####
```

This is a comma-delimited file. The comma-separated columns are as follows:

| Column # | Definition                                                    |
|----------|---------------------------------------------------------------|
| 1        | n/a                                                           |
| 2        | class name                                                    |
| 3        | tablename                                                     |
| 4        | Tablesized (non-blob fields)                                  |
| 5        | Blob size (0 if table does not contain a blob 1024 otherwise) |

To use this sizing file, do the following:

- 1 Import this file into a spreadsheet, choosing comma-delimited formatting.
- 2 Once imported, you can see the record sizes (in bytes) for the application.
- 3 Multiply these record size amounts by the number of rows expected for those tables/classes.

- 4 Calculate number of bytes for each class.
- 5 Sum calculated byte count to determine total datafile size (convert to mega- or gigabytes, if needed)

### NOTICE

Best practice is to size your database at least 20% larger than calculated above.

## Oracle Backup/Restore

For Oracle fault tolerance, back up your Oracle database. To do this, we recommend using Oracle's Recovery Manager (RMAN) backup utility. This is an Oracle tool that lets you back up, copy, restore, and recover data files, control files, and archived redo logs. It is included with Oracle server and does not require a separate installation. For details about using RMAN, see the *Recovery Manager User's Guide* provided by Oracle.

The next section describes backup and restoration in a little more detail. By default, the primary database is `owbusdb`. For the web server, back up `lportal` and `synergy` too.

### Backup with exp and imp

Although best practice is to use RMAN, Oracle's backup utility, you can also use `imp` and `exp` export and import a schema in Oracle.

Installing OpenManage Network Manager creates two new user schemas: `netview` is the owner for the database (or tablespace) `owportal01`, `synadmin` is the owner for the database `owsynergy01`, the default password for these two user is: `dorado`. (See [Database Login / Passwords](#) on page 148)

Installation asks for an oracle user, and this example uses `netmgr`. This selection also appears in the `installed.properties` file.

User `netmgr` is the owner for the database `owdata01` (`loaddb` creates tablespace `owdata01` under user `netmgr`) as follows:

```
loaddb -u system -w companyName
```

Executing this command creates `owportal01` and `owsynergy01`

```
loaddb -u system -w companyName -s
```

so the complete backup/restore should includes

In this example `dorado` is the database administrator's password, and `sample61` is the SID:

#### *Backup*

```
exp system/companyName@sample61 owner=netmgr file=netmgr.dmp
exp system/companyName@sample61 owner=netview file=netview.dmp
exp system/companyName@sample61 owner=synadmin file=synadmin.dmp
```

#### *Restore*

```
imp system/companyName@sample61 fromuser=netmgr touser=netmgr ignore=y
file=netmgr.dmp
imp system/companyName@sample61 fromuser=netview touser=netview ignore=y
file=netview.dmp
imp system/companyName@sample61 fromuser=synadmin touser=synadmin
ignore=y file=synadmin.dmp
```

You may encounter an ORACLE 2291 error when using command line `imp`.

For example:

```
. importing table "RCC_TASK_USAGE_ENTITY"
IMP-00019: row rejected due to ORACLE error 2291
IMP-00003: ORACLE error 2291 encountered
ORA-02291: integrity constraint (REDCELL.FKE609020E14863754) violated -
parent key not found
```

The workaround for this is to find the foreign key reference table and import the parent table first then re-import the problematic table. For example:

```
imp system/companyName fromuser=netmgr touser=netmgr ignore=y
constraints=n
file=netmgr_17012013.dmp tables=rcc_task_usage_entity
```



#### NOTE:

There is no substitute for having a DBA. Such an administrator could tell you how Oracle has improved on its previous import/export utility with RMAN and Data Pump. Oracle's manuals explain the use of these utilities.

## On-line/Off-line Backup (OS)

You can back up your database using Operating System (OS) commands along with Oracle system views. Although OS backups allow database recovery, the recovery process may be more complex than using RMAN. We recommend OS backups as an interim backup strategy until RMAN is in place.

A cold backup is a backup performed when the database is completely shut down. A hot backup is one performed when the database is open and possibly in use. An Instance is a synonym for an Oracle database.

Off-line backups, or cold backups, require database shutdown before making a backup. Restored cold backups resolve any kind of database failure, as long as the backed up files are intact.

On-line backups, or hot backups, do not require database shutdown. Active transactions can be running while the backup occurs. On-line backups can recover from many failures, but some types of failures may require restoring to an off-line backup and then recovering from there. See the Oracle manuals for instructions about how to do hot and cold backups.

## Oracle Export/Import (Oracle utilities)

Oracle's export and import utilities back up the data contained within an Oracle database. The RMAN/OS Oracle backups back up the entire database at the datafile/tablespace level whereas export/import backup/restore at the user/table level. An export is a good supplement to any of the above backups.

Oracle's export/import can backup/restore a Database (all users), a particular user, or a set of tables. See Oracle's manuals for details about Oracle's Export and Import.

## Database Recovery Procedures

You can recover Oware's backed up databases if your system fails. The quality of recovery naturally depends on the frequency and integrity of the database backups. The more frequent the backups, the less data loss occurs. Since Oware supports multiple database types, the method used to recover the databases differs according to type.

If RMAN is in place, use it for recovery. If it is not in place, and you have used the OS backups ([On-line/Off-line Backup \(OS\)](#) on page 173), consult Oracle's manuals for their recovery procedures.

## Oracle Failover

Oracle RAC is a clustering solution from Oracle that allows this application to communicate with a database cluster using one service name. This also provides failover and load balancing.

- Oracle versions that support RAC: 9.2.0.5 or newer. In an RAC configuration, all nodes access a single database. Dorado Software applications built with Oware 6.0.2 and later support Oracle RAC. See [Software Requirements](#) on page 15.
- RAC requires specific hardware and Cluster Manager software to run. Refer to Oracle's instructions for installing this feature.
- You need apply any schema changes only once for RAC regardless of the number of nodes accessing the database.

To support RAC, you must manually configure the property `com.dorado.oracle.rac.connect.url` listed in the `owdatabase.properties` file, in addition to all existing oracle properties. See [Oracle RAC installation.properties File](#) on page 175 for information about that file.

The property `com.dorado.oracle.rac.connect.url` defines a database connection URL used by the JBoss connection pool at application server startup. This property defines the following configurable attributes:

**Address List**—A list of database servers in the RAC cluster.

**Failover**—*On/Off*

**Load Balancing**—*On/Off*

**Dedicated Server**—*On/Off*

**Service Name**—This is a Global Database Name and not a SID.

The Oracle 10g jdbc jar is included in the Oware classpath by default (in `oware/lib3rd`). This is backward compatible with Oracle 9i. Modify the RAC property by overriding it in the `owareapps/installprops/installed.properties` file. Make sure the URL is well-formed, with the brackets that appear in the sample property in the `oware/lib/owdatabase.property` file. See [Software Requirements](#) on page 15 for more about the JDBC driver.

## Oracle RAC installation.properties File

The following differs slightly for each Oracle versions. For example, 10G RAC uses VIP; 11G RAC uses Scan (and can also use VIP). Therefore, the `installation.properties` file needs to be like one of the following options:

### Option 1

```
com.dorado.oracle.rac.connect.url=@(DESCRIPTION=(ADDRESS_LIST=\
(ADDRESS=(PROTOCOL=TCP)(HOST=vip1)(PORT=1521))\
(ADDRESS=(PROTOCOL=TCP)(HOST=vip2)(PORT=1521))\
)\
(FAILOVER=on)(LOAD_BALANCE=on)(CONNECT_DATA=(SERVER=DEDICATED)\
(SERVICE_NAME=orcl)))
```

### Option 2

```
com.dorado.oracle.rac.connect.url=@(DESCRIPTION=(ADDRESS_LIST=\
(ADDRESS=(PROTOCOL=TCP)(HOST=orascan)(PORT=1521))\
)\
(CONNECT_DATA=(SERVER=DEDICATED)\
(SERVICE_NAME=orcl)))
```



#### NOTE:

Check the DNS server to make sure it is configured correctly.

Installation also needs the following to install OpenManage Network Manager device drivers:

```
com.dorado.jdbc.database_name.oracle=@ServerIP:1521:Service_Name
```

Enable Oracle RAC on all OpenManage Network Manager Application Servers by adding the following property to the `/owareapps/installprops/lib/installed.properties` file:

```
Add com.dorado.oracle.rac.connect.url=@(DESCRIPTION=(ADDRESS_LIST=\
(ADDRESS=(PROTOCOL=TCP)(HOST=[hostname1])(PORT=1521))\
(ADDRESS=(PROTOCOL=TCP)(HOST=[hostname2])(PORT=1521))\
(FAILOVER=on)(LOAD_BALANCE=on)(CONNECT_DATA=(SERVER=DEDICATED)\
(SERVICE_NAME=[Oracle service name])))
```

## Performance Tuning RAC

If you experience performance issues with your Oracle system, the following are some performance changes and reports you might try:

- Increase portion of SGA (System Global Area) memory dedicated to the data buffer rather than shared buffer pool.
- Change `cluster_interconnects` parameter used in RAC interconnection from the default MTU of 1500 bytes to 9000 bytes (jumbo frames).
- Investigate and analyze AWR & RDA reports against RAC Nodes.

Setting the MTU to Jumbo Frames may reveal issues with any switch (or switches) between hosts. You often must set older switches to accept them. You can also adjust the properties on the physical NICs, but if the switch is not configured to accept them CRS will not start. Most newer switches do this automatically, but some may not.

## Example Tune-up

Example setup:

```
10.17.7.10 cbj-ip-do-orac01-priv
10.17.7.11 cbj-ip-do-orac02-priv
g2: flags=1000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4> mtu 1500 index 4
inet 10.17.7.10 netmask ffff0000 broadcast 10.17.255.255
```

Tasks before making the change to jumbo frames for example servers g1 and g2:

*Verify:*

- 1 Check all devices between databases support jumbo frames.
- 2 Identify if failover/bonding/teaming is active for your g2 (g1, for example). Modify these as appropriate.
- 3 Check with network engineering and system administrators who have activated jumbo frames before to see if they have any other suggestions.

*Steps:*

- 1 Modify `MaxFramSize` in `/kernel/drv/g.conf` to 3 as described below on the man page for g1 or g2.

Set the upper limit on the maximum MTU size the driver allows. All Intel gigabit adapters (except the 82542-based Intel PRO/1000 adapter) allow the configuration of jumbo frames.

For an Intel PRO/1000 adapter that is later than 82571, (including 82571), the maximum MTU accepted by the MAC is 9216. For others, the maximum MTU accepted by the MAC is 16128. Use `ifconfig(1M)` to configure jumbo frames. Use `ifconfig` with the adapter instance and the MTU argument (`ifconfig g0 mtu 9216`) to configure adapter g0 for the maximum allowable jumbo frame size.

Allowed values are:

0 Standard ethernet frames with a MTU equal to 1500.

1 Jumbo frames with a maximum MTU of 4010.

2 Jumbo frames with a maximum MTU of 8106.

3 Jumbo frames with a maximum MTU of 16298.

- 2 Shut down Oracle and CRS with `crsctl stop` on both nodes.
- 3 Modify the MTU and test on both nodes.

```
ifconfig g2 mtu 9194
```

From opposing nodes:

```
ping -c 2 -M do -s 8972 cbj-ip-do-orac01-priv
ping -c 2 -M do -s 8972 cbj-ip-do-orac02-priv
```

- 4 Set the MTU in the `/etc/hostname.g2` file on both nodes

```
existing options "mtu 9194"
```

- 5 Verify setting with `ifconfig -a` after reboots on both nodes, making certain the public interface and VIPs remain at MTU 1500
- 6 Restart CRS and services on both nodes.



## Using SSL Certificate

[Enabling HTTPS Using a Self-Signed SSL Certificate – 178](#)

[Enabling HTTPS Using a CA-Issued SSL Certificate – 179](#)

Place SSL Certificates in the following location:

`%OWARE_USER_ROOT%\aware\synergy\tomcat-7.0.70\bin\certs`

They will be backed up during future upgrades from this location.

## Enabling HTTPS Using a Self-Signed SSL Certificate

- 1 Edit script: 'makecert.sh'  
(in directory: <INSTALL\_DIR>\oware\synergy\tomcat-7.0.70\bin\certs)
  - a. Edit the group of lines starting with 'KT\_' and set appropriate values for:  
'KT\_HOSTNAME' and 'KT\_IPADDRESS'
  - b. Changing values of other 'KT\_' variables is optional
- 2 Edit script: 'setenv.bat' (Windows) or 'setenv.sh' (Linux)  
(in directory: <INSTALL\_DIR>\oware\synergy\tomcat-7.0.70\bin)
  - a. Change line FROM: "ENABLE\_SSL= false" TO: "ENABLE\_SSL= true"
  - b. Change line with 'SSL\_PASSWORD=' to match 'KT\_PASSWORD' value, if changed in step 1.
  - c. Change line with 'SSL\_CERTKEYFILE=' to match 'KT\_FILENAME' value, if changed in step 1.
- 3 Execute script: 'makecert.sh'  
(in directory: <INSTALL\_DIR>\oware\synergy\tomcat-7.0.70\bin\certs)
  - a. [Windows ONLY] Open a Windows command prompt, execute: oware
  - b. [Linux ONLY] Open a Terminal window
  - c. Execute: cd "\$OWARE\_USER\_ROOT/oware/synergy/tomcat-7.0.70/bin/certs"
  - d. Execute: ./makecert.sh
  - e. Script will generate three files: 1) 'selfsigned.cer' 2) 'selfsigned.jks' 3) 'selfsigned-csr.txt'
- 4 Edit file: 'web.xml'  
(in directory: <INSTALL\_DIR>\oware\synergy\tomcat-7.0.70\conf)
  - a. Copy and paste contents of file: 'web-ssl-addition.xml'
  - b. Into file: 'web.xml' just BEFORE the last line that contains: "< /web-app> "
- 5 Stop, Update & Restart Web Server Service  
(Execute from directory: <INSTALL\_DIR>\oware\synergy\tomcat-7.0.70\bin) [Windows ONLY]
  - a. From an Administrative command prompt, execute: net stop synergy
  - b. From an Administrative command prompt, execute: service.bat update
  - c. From an Administrative command prompt, execute: net start synergy [Linux ONLY]
  - d. From a root terminal, execute: service synergy stop
  - e. From a root terminal, execute: service synergy start
- 6 Install certificate on all client machines that access the application. [Windows ONLY]
  - a. Open Windows File Explorer to directory:  
%OWARE\_USER\_ROOT%\oware\synergy\tomcat-7.0.70\bin\certs
  - b. Open file: 'selfsigned.cer' and choose "Install Certificate..."
  - c. Choose "Local Machine" as the Store Location

- d. Click “Browse...” button to place certificate in store: “Trusted Root Certification Authorities”
  - e. Click “Finish” to install the certificate [Linux ONLY].
  - f. Consult Linux specific instructions to install the certificate file located in directory:  
`$OWARE_USER_ROOT/oware/synergy/tomcat-7.0.70/bin/certs/selfsigned.cer`
- 7 Close ALL open browser windows BEFORE opening application.  
 All HTTP requests should now redirect to HTTPS on port 8443

## Enabling HTTPS Using a CA-Issued SSL Certificate

- 1 Execute steps 1 through 4 in the first section above, which will generate a Certificate Signing Request (CSR) file: ‘selfsigned-csr.txt’
- 2 Provide this generated CSR file to your CA provider
- 3 Obtain your SSL certificate and ALL required Root and Intermediate certificates from your CA provider
- 4 Copy all certificate files into the directory:  
`<INSTALL_DIR> \oware\synergy\tomcat-7.0.70\bin\certs`
- 5 Edit script: ‘importcerts-EXAMPLE.sh’
  - a. Edit values for: ‘KT\_PASSWORD’ and ‘KT\_FILENAME’, if changed in step 1.
  - b. Modify the script to match the specific alias names, files names and number of certificates issued by your CA provider.



### NOTE:

The alias ‘server’ **must** be used when importing the Domain certificate.

- 6 Execute script: ‘importcerts-EXAMPLE.sh’
- 7 Execute step 5 in the first section above to update/restart the Web Server.
- 8 Close ALL open browser windows BEFORE opening application.  
 All HTTP requests should now redirect to HTTPS on port 8443



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