Citrix® XenServer™ 5.5 Dell™ Edition

Solution Guide

Notes and Cautions

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

CAUTION: A CAUTION indicates potential damage to hardware or loss of data if instructions are not followed.

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Overview

Citrix® XenServer™ Dell™ Edition with its 64-bit open-source Xen hypervisor at the core, is a powerful virtualization solution that enables efficient resource consolidation, utilization, dynamic provisioning, and integrated systems management. XenServer Dell Edition has a small footprint and is optimized to run from an internal flash storage in Dell PowerEdge™ systems. For added flexibility, you can also install XenServer Dell Edition on a hard drive.

Dell and Citrix have partnered to bring pre-qualified and virtualization-ready platforms for dynamic and growing data centers. This guide provides information about XenServer Dell Edition features, supported hardware, reference configurations, and best practices.

Citrix XenServer Dell Edition Features

This section describes the features of the XenServer Dell Edition.

- Factory installed from Dell — XenServer Dell Edition is factory installed on select PowerEdge and blade systems. This reduces the installation and deployment time required to get your XenServer-based infrastructure ready to run virtual machines (VMs).
- Integrated systems management and monitoring — XenServer Dell Edition comes pre-installed with Dell OpenManage™ Server Administrator. This enables systems management without any additional need to install an agent on the host.
- XenServer Local Console — XenServer Dell Edition includes a XenServer Local Console user interface to enable local administration of the host. XenServer Local Console enables you to configure and view host-specific properties such as management network configuration, local storage for VMs, etc. XenCenter®, the standard Microsoft® Windows® management console for XenServer, is also available.

- High Availability — XenServer Dell Edition supports several features to guarantee service uptime in the event of infrastructure failure. You can configure resource pools for automated high availability. For example, in the case of individual host failures, you can move VMs running on the failed hosts to the next available system in the resource pool and restart them.
- Optimized footprint and controlled environment — XenServer Dell Edition is optimized for a smaller disk footprint and writes to flash storage. Most of the XenServer Dell edition file system is Read Only and thus provide a tighter control over the XenServer operating environment. The XenServer Dell Edition host agent software is significantly optimized to minimize the number of write cycles. XenServer writes to flash storage only when something important has changed and must be recorded. Write minimization helps improve the life of the storage device.
- Improved reliability and diskless configurations — Running XenServer Dell Edition on the internal flash storage of a system provides improved reliability over running on traditional hard disk drives. Flash storage does not have mechanical parts.

  Since XenServer can reside on the internal flash storage of a system, there is no need for local hard drives on the system. XenServer hosts can connect to remote internet small computer system interface (iSCSI) or Network File System (NFS) storage and take advantage of features such as Citrix XenMotion™ to minimize VM downtime and workload migration. For more information on the current support policy for diskless configurations, see the *XenServer Dell Edition Release Notes* available on the Citrix XenServer Dell Edition website at **citrix.com/xenserver/dell.**

- Improved XenServer updates — To improve reliability of software upgrades, the XenServer Dell Edition image contains a primary and secondary copy of the XenServer file system. At any time when an update is applied, only the secondary copy is updated, leaving the primary copy in a known good state. The secondary copy now becomes the primary image. You can update the XenServer host by using the XenServer local console or XenCenter.

  NOTE: You can upgrade the XenServer host to release 5.5. For instructions on upgrading XenServer Dell Edition, see the *XenServer Dell Release Notes* available on the Citrix XenServer Dell Edition website located at citrix.com/xenserver/dell.

- Pre-certified and supported configurations — XenServer Dell Edition is certified and supported by Dell for select system and storage configurations.

Citrix XenServer Dell Edition Licensing Options

Dell provides the following licensing options for XenServer Dell Edition:

- **Citrix XenServer Dell Edition** supports XenServer Hosts with up to four sockets, up to 128 GB of physical RAM, and no limit on the number of concurrent VMs. The number of VMs is determined by the resources available on the XenServer host. It also supports the following features:
  - Live relocation (XenMotion) of VMs within the same resource pool
  - Multi-host management using a single XenCenter console.
- **Citrix Essentials for XenServer Dell Enterprise Edition** offers the following features:
  - Clustering of XenServer Hosts into resource pools.
  - Support for NFS, iSCSI, and Serial Attached SCSI (SAS) shared storage repositories.
  - Additional Quality of Service (QoS) control for VMs.

Citrix XenServer Dell Edition is pre-installed on PowerEdge systems. You require a license key to enable Citrix Essentials for XenServer Dell Enterprise Edition.

If you purchased Citrix Essentials for XenServer Dell Enterprise Edition, you must redeem the activation code from the license card you received with your system. You must redeem your authorization code(s) for Enterprise license files from the Citrix Dell Edition Product Gallery website at **citrix.com/xenserver/dell.** You need to register in this website.

NOTE: To purchase a Citrix Essentials for XenServer Dell Enterprise Edition license key, visit the Virtualization with Dell and Citrix website at **dell.com/xenserver** or contact your Dell sales representative.

NOTE: If you lose the license card you received with your system, Dell cannot issue another one. Register the product immediately and ensure that you keep the license card in a safe location.

You may apply your Enterprise license file(s) from the XenServer local console or XenCenter.

VM Operating System Support

XenServer VMs are created from templates. A template is a file that contains the configuration settings to instantiate a specific VM. XenServer Dell Edition ships with a base set of templates—some that can boot an operating system installation media, and others that run an installation from a network repository. For a list of supported operating systems and installation methods, see Table 1-1.

For more information on creating VMs of the supported types, see the *XenServer Virtual Machine Installation Guide* available on the Citrix XenServer Dell Edition website at **citrix.com/xenserver/dell**.

Additionally, you can create VMs by importing an existing exported VM.

NOTE: The standard editions of XenServer provide two Debian templates. Each template contains a complete basic Debian Linux distribution. Each template also supports physical to virtual conversion (P2V) of existing instances of Red Hat® Enterprise Linux® 3.6, 3.8, 4.2-4.3, and Novell® SUSE® Linux Enterprise Server 9 SP2 and SP3 operating systems. Due to space constraints imposed by the flash media on which XenServer Dell Edition runs, you cannot create VMs of these types with the XenServer Dell Edition. However, you can import instances of VMs created and exported with the standard edition of XenServer.

In general, when you install VMs, ensure that you follow the memory and disk-space guidelines of the operating system and any relevant applications that you want to run. For information on the recommended memory and disk-space guidelines, see the *XenServer Virtual Machine Installation Guide* available on the Citrix XenServer Dell Edition website at **citrix.com/xenserver/dell**.

NOTE: Individual versions of the operating systems may also impose their own maximum limits on the amount of memory supported (e.g., for licensing reasons).

NOTE: Preboot Execution Environment (PXE) installation of Linux VMs is not supported at this time.

Table 1-1. Supported Operating Systems and Installation Methods for VMs

Operating System	Vendor Installation From Media	Vendor Installation From Network Repository
Windows Vista® Enterprise Edition (32-bit) SP1	X	X
Windows Server® 2003, Enterprise, Data Center, and Small Business Server editions (32-bit) SP0, SP1, SP2, and R2	X	X
Windows Server 2003 Server, Enterprise, Data Center, and Small Business Server editions (64-bit)	X	X
Microsoft Windows XP SP3	X	X
Microsoft Windows 2000 SP4	X	X
Community Enterprise Operating System (CentOS) 4.5-4.7	X	X
CentOS 5.0-5.3 (32-bit)	X	X
CentOS 5.0-5.3 (64-bit)	X	X
Oracle® Enterprise Linux 5.0-5.3 (32-bit)	X	X
Oracle Enterprise Linux 5.0-5.3 (64-bit)	X	X

Table 1-1. Supported Operating Systems and Installation Methods for VMs *(continued)*

Operating System	Vendor Installation From Media	Vendor Installation From Network Repository
Red Hat Enterprise Linux 4.1, 4.4- 4.7 (32-bit)		X
Red Hat Enterprise Linux 5.0-5.2 (32-bit)	X	X
Red Hat Enterprise Linux 5.0-5.2 (64-bit)	X	X
SUSE Linux Enterprise Server 9 (32-bit) SP4		X
SUSE Linux Enterprise Server 10 (64-bit) SP1-SP2	X	X
SUSE Linux Enterprise Server 11 (32-bit)	X	X
SUSE Linux Enterprise Server 11 (64-bit)	X	X

XenMotion Support Requirements

XenMotion is the capability of a VM to migrate between physical hosts within a XenServer resource pool with no interruption in service. XenMotion is only possible among hosts that are part of a resource pool.

A resource pool is an aggregate of one or more homogeneous XenServer hosts, and can support up to a maximum of sixteen hosts.

Homogeneous XenServer hosts have the following features:

- Each CPU is from the same vendor
- Each CPU is the same model (except for stepping)
- Each CPU has the same feature flags

For more information on resource pool requirements other than processor models, see the *XenServer Administrator's Guide* available on the Citrix XenServer Dell Edition website at **citrix.com/xenserver/dell.**

2

Installing and Configuring Citrix® XenServer™ Dell™ Edition

This section describes steps to install and setup the first boot for a XenServer Dell Edition host.

Installing XenServer Dell Edition

If you downloaded XenServer Dell Edition from the Citrix or Dell website, you must first install the software on your system.

NOTE: If your XenServer host was factory-installed at Dell, you can skip the following installation steps and proceed to "Configuring the XenServer Host" on page 16.

To install XenServer:

1. Burn the downloaded ISO image to a media.
2. Insert the XenServer installation media into the CD/DVD drive of the system and boot to the media.
3. Select the installation target (flash device).
4. Select **Removable media** when you are prompted for an image media.
5. Confirm your selections.

   The installer partitions the target device and the installation begins. The time required to install XenServer Dell Edition varies according to the size of the target device.

Configuring the XenServer Host

1 Connect the network cables to the appropriate NIC connectors.

NOTE: If you are going to separate the virtual machine (VM) or storage IP traffic from the Management console traffic, ensure that your network cables are connected appropriately.

2 Turn on the system. Citrix XenServer boots automatically.

NOTE: Ensure that you are booting from the flash device.

The XenServer local console menu is displayed after booting and provides a range of management and configuration options for the XenServer host.

3 Change the root password when prompted.

4 If you have connected the Gb1 port, the XenServer management interface is configured on Gb1 with the Dynamic Host Configuration Protocol (DHCP) settings by default. It is recommended that you use a static IP address and the physical interface as per your network environment.

5 Navigate to **Network and Management Interface→Configure Management Interface** and select the physical network interface through which you plan to manage XenServer.

6 Provide a valid IP address, netmask, gateway, and hostname for the management interface.
XenCenter uses free-form names to refer to XenServer hosts. It is recommended that you copy the hostname that you set to the XenCenter name for the XenServer host.

7 In the **Network and Management Interface** window:

a Select **Add/Remove DNS Server** and add valid DNS server(s).

b Select **Network Time (NTP)** and configure your XenServer host to synchronize with a NTP system if available in your network.

Your XenServer host is now configured.

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Citrix® XenCenter®

XenCenter is the client application for managing the Citrix XenServer® host and its virtual machines (VMs). The following table outlines the system requirements for XenCenter.

Table 3-1. XenCenter System Requirements

Operating system	Microsoft® Windows® XP, Microsoft Windows Server® 2003, or Microsoft Windows Vista®, with .NET framework version 2.0 or above installed
CPU Speed	750 MHz minimum, 1 GHz or faster recommended
RAM	1 GB minimum, 2 GB or more recommended
Disk space	100 MB minimum
Network interface card	100Mb or faster NIC

You can download the installer for XenCenter from the Citrix XenServer Dell Edition website at **citrix.com/xenserver/dell** or from the XenServer host at **http://<xenserver IP address>**.

NOTE: You need to register at the Citrix XenServer Dell Edition website at **citrix.com/xenserver/dell** to download the XenCenter installer from the website.

Installing XenCenter

NOTE: Before installing XenCenter, uninstall all previous versions of the software from your system.

1. Navigate to the directory where you downloaded the XenCenter installer and locate the file. Double-click the icon to launch the application installer.
2. Follow the instructions displayed in the installer window. When the installer prompts you for an installation directory, choose one of the following options:
   a. Click **Browse** to change the default installation location.
   b. Click **Next** to accept the default path **C:\Program Files\Citrix\XenCenter**.

NOTE: By default, XenCenter allows you to save usernames and passwords.

To disable XenCenter from saving the passwords and usernames feature, perform the following steps:

   a. Open the registry editor and navigate to the key **HKEY_CURRENT_USER\Software\Citrix\XenCenter**.
   b. Add the **AllowCredentialSave** key with the string value **false**. This prevents XenCenter from saving usernames and passwords, and disables the **Save and Restore Connection State** option in the **Tools→Save and Restore** menu in XenCenter.

3. On the management station, start the XenCenter application.
4. In the XenCenter wizard, select **Add New Server**, provide the hostname/IP address and login information for your XenServer and click **Connect**. You are now ready to start managing your XenServer host using XenCenter. For more information on advanced setup procedures, see the product documentation available on the Citrix XenServer Dell Edition website at **citrix.com/xenserver/dell**.
5. If you purchased Citrix Essentials for XenServer Dell Enterprise Edition, you must redeem the activation code from the license card you received with your system.

   You must redeem your authorization code(s) for enterprise license files from the Citrix Dell Edition Product Gallery website located at **citrix.com/xenserver/dell.** You need to register in this website. For more

information on activating the software, see "Citrix XenServer Dell Edition Licensing Options" on page 11.

You may apply your Enterprise license file(s) by using the XenServer local console or XenCenter.

- To apply the file in the local console, see "Install XenServer License" on page 61.
- To apply the file in XenCenter:
  - **a** Highlight the host.
  - **b** Click the **Server** drop-down menu.
  - **c** Click **Install License Key**, and then select the file.

Removing XenCenter

1. Select **Control Panel** from the **Start** menu.
2. In Windows XP, 2000, or 2003, select **Add or Remove Programs**. In Windows Vista, select **Programs and Features**.

   A list of programs installed on the system displays. Scroll down, if necessary, and select **XenCenter**.
3. In Windows XP, 2000, or 2003, click the **Remove** button. In Windows Vista, select **Uninstall** from the toolbar above the list of programs. This removes the XenServer application.
4. When the removal is complete, a message is displayed. Click **OK** to close the message box.

NOTE: For more information on using XenCenter to manage your Dell XenServer host, see the online help. You can access online help by selecting **Help Contents** from the **Help** menu. You can also press <F1> to access context-sensitive help from any screen, dialog box, or wizard.

4

Systems Management Using Dell™ OpenManage™

Dell OpenManage Systems Management software suite is a suite of system management applications for managing Dell PowerEdge™ systems. This section lists the features available in OpenManage that are supported in Citrix® XenServer® Dell Edition. This section also points out specific tasks that are not supported.

For more information on each of these features, see the Dell Systems Management: OpenManage website at **dell.com/openmanage**.

Dell OpenManage Server Administrator

Dell OpenManage Server Administrator provides single server management with a secure command line or web-based graphical management user interface. Citrix XenServer Dell Edition comes pre-installed with majority of the OpenManage Server Administrator components, providing a ready-to-use systems management framework without any additional software installation requirement.

There are several sub-components in OpenManage Server Administrator which are described below.

- **Instrumentation Services** — Provides hardware instrumentation and configuration information.
- **Storage Management** — Provides monitoring and instrumentation of the storage connected to the Dell PowerEdge RAID Controller (PERC) and Serial Attached SCSI (SAS) families of controllers.
- **Dell Systems Management Server Administration (DSM SA)** — Provides remote or local access to OpenManage Server Administrator from any system with a supported web browser and network connection.
- **DSM SA Shared Services** — Runs an inventory collector at startup to perform a software inventory of the system to be consumed by OpenManage Server Administrator's Simple Network Management Protocol(SNMP) and Common Information Model (CIM) providers. This allows a remote software update using Dell IT Assistant.

Dell Remote Access Controller

Dell Remote Access Controller (DRAC) is designed to allow anywhere, anytime "Lights Out" monitoring, troubleshooting, and system repairs and upgrades independent of the operating system status.

Dell IT Assistant

Dell IT Assistant (ITA) provides an integrated view of Dell's comprehensive suite of server monitoring and reporting tools. It includes one-to-many management for Dell systems. ITA can also be used to perform BIOS and firmware updates.

Hardware monitoring of Dell systems is supported with Citrix XenServer Dell Edition. Power monitoring of Dell systems is supported on PowerEdge systems that have power monitoring capability. Performance monitoring of Dell systems is not supported with Citrix XenServer Dell Edition.

Dell Systems Build and Update Utility

The Dell Systems Build and Update Utility provides functionality to update and deploy Dell systems. It contains basic functionality provided by OpenManage Server Update Utility and OpenManage Deployment Toolkit. The Dell Systems Build and Update Utility can be used to update the system firmware, configure system components such as DRAC and iDRAC, and configure RAID groups through a graphical interactive wizard.

Server Update Utility

The Server Update Utility helps simplify single server updates with the latest system software features including inventories, reports, recommendations, and checks for prerequisite conditions.

Only the command line option is supported with Citrix XenServer Dell Edition.

Dell Update Package

As the central component of the OpenManage server management family, Dell Update Package framework helps you to update system software on your PowerEdge systems in a scalable, non-intrusive manner. Dell Update Package features include:

- Self-extracting files that allow you to update system software including BIOS, firmware, drivers, OpenManage Server Administrator, etc.
- Pre-installation checks for prerequisites such as system model, operating system version, and dependent software to help you avoid sequencing errors.
- Intuitive dialogs to help simplify installation.
- Scriptable and silent capabilities that can enable unattended installation.

Dell Update Packages for updating only system BIOS and firmware are supported with Citrix XenServer Dell Edition. Since the majority of Citrix XenServer Dell Edition image file system is Read-Only, the driver and OpenManage Server Administrator update packages are not supported.

IPMI Baseboard Management Controller

IPMI Baseboard Management Controller (BMC) provides a standard interface for monitoring and managing Dell systems.

Using Dell OpenManage in Citrix XenServer Dell Edition Environment

Dell OpenManage Server Administrator components are pre-installed in Citrix XenServer Dell Edition and cannot be uninstalled or reinstalled. By default, all installed OpenManage Server Administrator services start when the XenServer host boots.

To start, stop, restart, or check the status of OpenManage services, log in to the XenServer local console and run the following commands, as needed:

```
# srvadmin-services.sh start
# srvadmin-services.sh stop
# srvadmin-services.sh restart
# srvadmin-services.sh status
```

To disable OpenManage services so that services do not start at boot, log in to the XenServer local console shell and run the following commands:

```
# chkconfig --level 3 dsm_om_shrsvc off
# chkconfig --level 3 instsvcdrv off
# chkconfig --level 3 dataeng off
# chkconfig --level 3 dsm_om_connsvc off
# chkconfig --level 3 ipmi off
```

To enable the disabled OpenManage services, log in to the XenServer local console shell and run the following commands:

```
# chkconfig --level 3 dsm_om_shrsvc on
# chkconfig --level 3 instsvcdrv on
# chkconfig --level 3 dataeng on
# chkconfig --level 3 dsm_om_connsvc on
# chkconfig --level 3 ipmi on
```

To connect to the XenServer host and access the OpenManage Server Administrator web-based interface, type the following web address in a supported browser window from a client system:

```
https://<XenServer hostname/IP Address>:1311
```

NOTE: 1311 is the default port used by the OpenManage Web server.

The XenServer host firewall is pre-configured to allow ports used by OpenManage Server Administrator, so no additional firewall configuration is required. If you change the default OpenManage Server Administrator port to a value other than **1311**, make the associated change in **/etc/sysconfig/iptables**. Restart the **iptables** service on the XenServer host by running the following command on the XenServer local console shell:

```
$ service iptables restart
```

To check the version of OpenManage installed, run the following command on the XenServer local console shell:

```
$ omreport about
```

To view the system summary, run the following command on the XenServer local console shell:

```
$ omreport system summary
```

For more information on using OpenManage to manage Dell systems, see the Dell OpenManage Server Administrator documentation available on the Dell Support website at **support.dell.com/manuals**.

Using ITA in a Citrix XenServer Environment

ITA can be used for discovery, monitoring, and management of XenServer hosts. ITA uses Simple Network Management Protocol (SNMP) to manage Dell systems running Citrix XenServer Dell Edition.

To manage XenServer hosts using ITA, follow the steps below:

1. **Specify SNMP community name**: Log in to the XenServer local console shell and edit the following entries in the **/etc/snmp/snmpd.conf** file to set your SNMP community name:

   ```
   rocommunity <community name>
   ```

   ```
   trapcommunity <community name>
   ```

2. **Configure SNMP traps**: Configure the SNMP daemon to send SNMP trap messages to the management console. Edit the **/etc/snmp/snmpd.conf** file and edit the following line at the end of the file:

   ```
   trapsink <ITA_IP_Address> <community name>
   ```

3. After you edit the **/etc/snmp/snmpd.conf** file, save the file and restart the **snmpd** service by running the following command on the XenServer local console shell:

   ```
   # service snmpd restart
   ```

4. Perform a discovery and inventory of the XenServer host in ITA by specifying the XenServer hostname or the management IP address.

   The ITA discovers the XenServer hosts and lists them under **Servers**.

For more information on using ITA to discover, perform inventory, monitor, and manage Dell systems, see the Dell OpenManage IT Assistant documentation available on the Dell Support website at **support.dell.com/manuals**.

Change Management in XenServer Dell Edition

Dell Update Packages for supported PowerEdge systems are available for download from the Dell Support website at **support.dell.com**. ITA provides a centralized software update capability. You can load Dell Update Packages and System Update Sets (system bundles) into the ITA repository, either from the *Dell Server Updates* media or from the Dell Support website. You can also apply updates individually on each XenServer host.

Before you apply an update to the system, ensure all the virtual machines (VMs) on the system are powered down or the host is in maintenance mode so that there are no active VMs on the XenServer host.

To download a Dell Update Package for the XenServer host:

1. Go to **support.dell.com**.
2. Select **Drivers and Downloads**.
3. Select the appropriate system model (example: PowerEdge R710) or enter the **Service Tag** of the system.
4. Select **Red Hat® Enterprise Linux® 5** from the Operating System drop-down menu.
5. Click to expand **BIOS**, and then click **Dell - BIOS**.
6. Download the Update Package for Red Hat Linux and the GnuPG signature file.

To upgrade the system or device firmware or BIOS using ITA, you must create a software update task. To create a software update task:

1. Download the corresponding BIN and .sign files from the Dell Support website at **support.dell.com**.
2. In the ITA console, add the Dell Update Package to the ITA repository in the **Manage→Software Updates** tab.
3. Create a task for **Software Update** and provide the required host details.

NOTE: ITA uses the SSH port for installation of the Dell Update Packages. Ensure that SSH is enabled on the XenServer host. If disabled, you can enable SSH from **XenServer local console→Remote Service Configuration→ Enable/Disable Remote Shell**.

You can also upload the update package to the XenServer host using a file transfer program and then run the package. Log in to the XenServer host as a root user and perform the following steps:

1. Upload the update package (*.BIN file) to **/var/tmp**.
2. Login to the XenServer local console shell.
3. Run the **BIN** file that you downloaded.
4. Follow the instructions provided by the update package.
5. Reboot the system if required by the update package.

For more information on using Dell Update Package with ITA, see the Dell OpenManage ITA documentation available on the Dell Support website at **support.dell.com/manuals**.

Using the Racadm Command

Run the **racadm** command, normally found at **/usr/sbin/racadm**, from the following locations, depending on the type of PowerEdge system:

- Run the **racadm** command from **/opt/dell/srvadmin/rac5/bin/racadm** if you have one of the following systems: PowerEdge 2950-iii, PowerEdge 1950-iii, PowerEdge 2900-iii, PowerEdge R805, PowerEdge R900 or PowerEdge R905.
- Run the **racadm** command from **/opt/dell/srvadmin/idrac/bin/racadm** if you have one of the following systems: PowerEdge M600, PowerEdge M605, PowerEdge M805, PowerEdge M905, PowerEdge R710, PowerEdge R610, PowerEdge T610, PowerEdge T710, PowerEdge M610 or PowerEdge M710.

5

Configuring Storage

Local Storage Repository (SR) Configuration

A local storage repository (SR) is a storage for virtual machines (VMs) on the local hard disk drives of a Dell™ PowerEdge™ system. Depending on the storage configuration of the system, a local SR may be automatically created during the Citrix® XenServer® Dell™ Edition first boot. A local SR is automatically created on the system if the local storage volume has a Dell utility partition (UP) or a Dell UP and a Dell No Operating System (NOS) partition.

Typically, a system ordered from Dell with local storage and XenServer is configured with both the Dell UP and NOS partitions. Therefore, a Local SR named *Local Storage* is created at first boot.

If no SR is created, follow the steps below to create a new storage volume and SR.

Step 1: Creating a New Storage Volume

Using the storage controller BIOS or Dell OpenManage™ Server Administrator Storage Manager, create a new storage volume on the XenServer host.

Creating a Volume Using Controller BIOS

You can create a new storage volume from the storage controller BIOS. To create a new virtual disk using the controller BIOS, follow the appropriate set of instructions for your controller card from your controller card documentation available on the Dell Support website at **support.dell.com/manuals**.

Creating a Volume Using Dell OpenManage Server Administrator Storage Management

You can create a new storage volume or virtual disk on the disks attached to Dell PowerEdge RAID Controller(PERC) or Serial Attached SCSI (SAS) storage controllers, as illustrated in Figure 5-1, using OpenManage Server Administrator Storage Management. To create a new virtual disk, follow the steps in the *Dell OpenManage Server Administrator Storage Management User's Guide* available on the Dell Support website at **support.dell.com/manuals**.

Step 2: Creating the Storage Repository

After you create a new storage volume or virtual disk, create an SR on the new volume, as illustrated in Figure 5-2.

CAUTION: Creating an SR on a storage volume completely erases any data on the volume.

1. On the XenServer local console, go to **Disk and Storage Repositories→ Claim Local Disk as SR**.
2. Press <F8> to erase the disk and continue the SR creation process.
3. Select the newly-created storage volume device and press <Enter> to create an SR.
4. Press <F8> to confirm the creation of SR.
   The process may take several minutes to complete.
5. After the SR is created, press <F8> to reboot the server to complete the SR creation process.

Figure 5-1. Create Virtual Disk Using Dell Open Manage Storage Manager

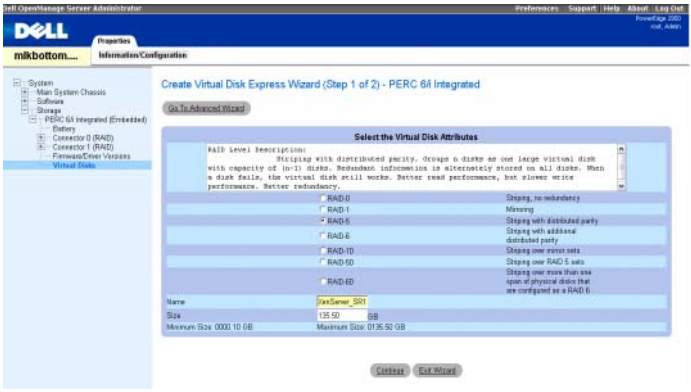
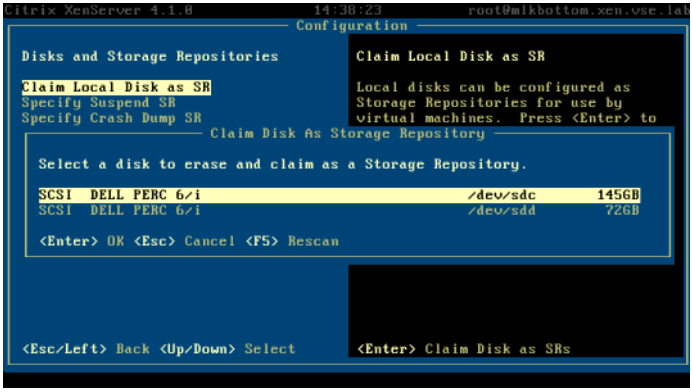


Figure 5-2. Create SR On the Newly Created Virtual Disk



Deploying XenServer Dell Edition With Dell Storage Arrays

This section describes deployment steps to use the Dell PowerVault™ and Dell EqualLogic™ storage arrays with Citrix XenServer Dell Edition.

Dell PowerVault MD1000 and PowerVault MD1120 Storage Enclosure

- The PowerVault MD1000 storage enclosure is capable of housing up to fifteen 3.5-inch disk drives. This direct-attached storage enclosure supports both SAS and Serial ATA (SATA) disk drives.
- The PowerVault MD1120 storage enclosure is capable of housing up to twenty-four 2.5-inch SAS disk drives.
- Each port on the PERC 6/E enables up to three PowerVault MD1120 storage enclosures to be daisy-chained to a single host. Alternatively, you can split the PowerVault MD1120 storage enclosure's disk drives between two systems.
- You must set the enclosure mode switch to the mode you want to use before the you turn on the enclosure.
- Shared storage for XenServer resource pools is not supported in the PowerVault MD1000 or PowerVault MD1120 storage enclosure host-based RAID solution.

Creating an SR on PowerVault MD1000 or PowerVault MD1120 Storage Enclosures

The process to create an SR on virtual disks on the PowerVault MD1000 or PowerVault MD1120 controller is the same as creating an SR on the local hard disk storage of the host. For more instructions on creating an SR on the PowerVault MD1000 or PowerVault MD1120 storage enclosures, see "Local Storage Repository (SR) Configuration" on page 29.

PowerVault MD3000 RAID Enclosure

The PowerVault MD3000 RAID enclosure is designed for high availability, offering redundant access to data storage. It features dual active or active RAID controller modules, redundant power supplies, and redundant fans. The PowerVault MD3000 RAID enclosure is designed for high-performance environments that includes either of the following:

- Two-node fully redundant XenServer hosts
- Multi-host storage access for up to four servers.

XenServer hosts connected to the same RAID controller module can share the storage volume on the PowerVault MD3000 RAID enclosure. You can migrate VMs across two hosts using Citrix® XenMotion™.

- Built for high-performance, the PowerVault MD3000 RAID enclosure is a modular disk storage array capable of housing up to fifteen 3.5-inch SAS or SATA disk drives.
- The PowerVault MD3000 RAID enclosure is expandable by simply adding up to two additional PowerVault MD1000 expansion enclosures.
- The entire array subsystem is managed from a single, user friendly software application — known as the Modular Disk Storage Manager (MDSM)— which streamlines the management and maintenance of storage as it scales.
- In-band management of a PowerVault MD3000 RAID enclosure from a XenServer host is not supported.
- To manage PowerVault MD3000 RAID enclosures using MDSM, install the MDSM software on a separate supported Microsoft® Windows® or Redhat® Enterprise Linux® management station.

Citrix XenServer Dell Edition includes the Dell Remote Access Controller (DRAC) multi-pathing driver that enables high availability configurations with PowerVault MD3000 RAID enclosures.

Creating an SR on a PowerVault MD3000 RAID Enclosure

Follow the steps below to create an SR on a storage volume on a PowerVault MD3000 RAID enclosure.

1. Create and configure a virtual disk using the PowerVault MD3000 MDSM software (installed on your management station). Ensure that the newly-created virtual disk is controlled by the RAID controller to which your XenServer hosts have access.
2. Map the newly-created virtual disk to the XenServer hosts. For more information on managing hosts and virtual disks on the PowerVault MD3000 RAID enclosure, see the *PowerVault MD3000 Users Guide* available on the Dell Support website at **support.dell.com/manuals**.
3. If you are configuring storage on the PowerVault MD3000 RAID enclosure for a XenServer pool, add all hosts to the XenServer pool. Ensure that the newly-created virtual disk is visible to all mapped hosts. Log in to the XenServer local console shell on each XenServer host and run the following command:

   ```
   # mppBusRescan
   ```

4. On the XenServer host or pool master, identify the disk ID of the PowerVault MD3000 storage volume:

   Run the following command to get the SCSI device name for the storage volume:

   ```
   # /opt/mpp/lsvdev
   ```

   The output of this command is similar to one below:

   ```
   [root@xs1~]# /opt/mpp/lsvdev
           Array Name      Lun    sd device
           -------------------------------------
           MD3000_Array1    0     -> /dev/sdc
   ```

Note the SCSI device name (/dev/sdX) and find the corresponding disk ID in the output of the following command:

```
# ls -ltr /dev/disk/by-id
```

The output of this command is similar to one below:

```
scsi-36001c23000c967da00000bae47ecaeeb ->
../../sdc
```

5 Run one of the following commands to create an SR on the PowerVault MD3000 virtual disk:

If you are adding storage to a pool:

```
# xe sr-create content-type=user name-label=
<label_of_SR> shared=true type=lvmohba device-
config:device=/dev/disk/by-id/<disk_id>
```

If you are adding storage to a stand-alone host:

```
# xe sr-create content-type=user name-label=
<label_of_SR> type=lvmohba device-
config:device=/dev/disk/by-id/<disk_id>
```

NOTE: <disk_id> is the ID noted in step 4.

PowerVault MD3000i Storage Array

- The Dell PowerVault MD3000i storage array consists of a standard or high-availability configuration.
- The standard model has a single controller with two 1GbE ports. It can be deployed to support up to 16 hosts non-redundantly.
- The high-availability model has dual controllers with two 1GbE ports per controller for a total of four 1GbE ports. The dual controller option can connect up to 16 fully-redundant hosts.
- The entire PowerVault MD3000i storage array is managed from a single, user-friendly software application—MDSM—which streamlines the management and maintenance of storage as it scales.
- In-band management of an PowerVault MD3000i storage array from a XenServer host is not supported. To manage PowerVault MD3000i storage arrays using MDSM, install the MDSM software on a separate supported Micorsoft Windows or Linux management station.

XenServer Dell Edition comes pre-installed with the open-iSCSI initiator that can be used to connect to PowerVault MD3000i storage arrays. Alternatively, a software iSCSI initiator inside a virtual machine (VM) can be used to add a storage volume from PowerVault MD3000i storage array. By default, the physical network interface on which the XenServer management interface is configured is chosen to route the IP storage traffic. However, a physical interface or a bond of multiple interfaces can be configured to segregate storage traffic from management traffic. For more details on specific configuration steps, see "High Availability Configuration and IP Storage Traffic Segregation" on page 49.

NOTE: For specific steps on using MD3000i with an iSCSI initiator running inside a virtual machine, see the Software Installation section of *MD3000i Systems Installation Guide* available on the Dell Support website at **support.dell.com/manuals**.

Creating an SR on PowerVault MD3000i Storage Arrays

To create an SR on a storage volume on a PowerVault MD3000i storage array:

1. Change the iSCSI IQN of the XenServer host to a string of your choice by selecting the host in Citrix XenCenter™, viewing its **General** tab, and clicking the **Edit** button.
   The **Edit General Settings** dialog box is displayed, where you can modify the iSCSI IQN string.
2. Using the MDSM interface, create virtual disks on the PowerVault MD3000i storage enclosure using the steps described in *Dell PowerVault Modular Disk Storage Manager User's Guide* available on the Dell Support website at **support.dell.com/manuals**. Ensure that the XenServer hosts have a physical path to the controller which owns the newly created virtual disk.
3. From the **Mappings** tab in the Storage Array Profile window, note the controller number which owns the newly-created volume. If you wish to provide the XenServer hosts access to more than one volume, ensure all the volumes are on the same PowerVault MD3000i MD3000i controller.

   To change the controller that owns a volume, in the MDSM interface:

   a. Go to **Modify→Change Virtual Disk Ownership/Preferred Path**.
   b. Select the appropriate Disk Group and the virtual disk.
   c. Select RAID Controller Module 0 or 1 as the virtual disk owner and click **Change**.

4 Run the Modular Disk Storage Manager and manually add the XenServer host(s) based on the new iSCSI IQN entered in step 1. After opening the MDSM and selecting the PowerVault MD3000i storage array to be configured, select the **Configure** tab.

NOTE: In the examples to follow the storage array "sg23_training" is a PowerVault MD3000i storage array with virtual disks already configured using the Create Virtual Disks selection. The new system being added to an existing host group is named **Valhalla**.

5 From the **Configure** tab, select **Configure Host Access (Manual)**. Enter the host name for the server which has XenServer software installed. Select **Linux** as the host type.

6 From the next screen, specify the iSCSI initiator by selecting the **New** button. On the **Enter New iSCSI Initiator** screen enter the XenServer iSCSI initiator name configured in step 1. The label is auto-populated with the server name. See Figure 5-3.

Figure 5-3. iSCSI Initiator Window

7 Host Group configuration starts from the **Configure Host Access (Manual) - Specify Host Group** screen. If provisioning storage as shared storage for a XenServer pool, a host group must be defined so the MD3000i storage subsystem has a configured iSCSI path to each of the hosts.

8 Select **Yes: This host will share access to the same virtual disks with other hosts** and determine which of the following two options applies to your host group:

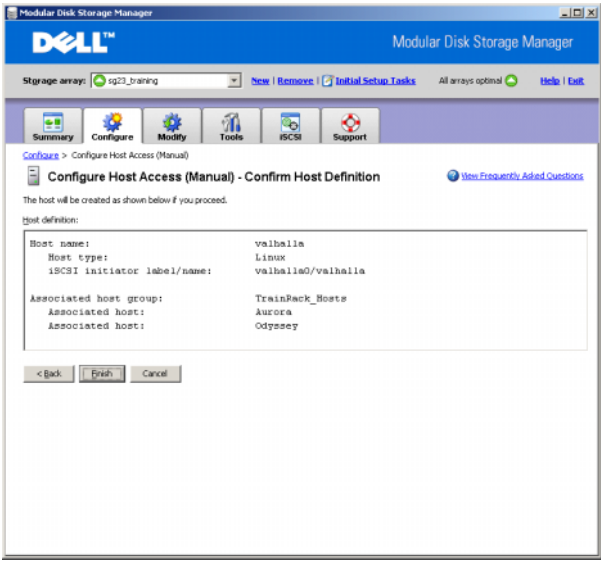
a If you want a new host group, select the radio button for that option and enter a name for your host group using standard host naming conventions. For example, no spaces.

b If you have already created one or more host groups, select the radio button enabling selection from a drop-down menu that lists the existing host groups. Use this option for configuring the second, third, etc. hosts in a group. After you select the host group, previously configured hosts for that host group are displayed.

NOTE: These host groups are shown as Linux hosts even though they are configured as XenServer hosts.

9 Select **Next**. A confirmation screen in which the new server being configured is displayed and the other previously configured associated hosts are named. For the first server configured in a new host group, no associated hosts are listed under the **Associated host group.** See Figure 5-4.

Figure 5-4. Modular Disk Storage Manager – Configure Tab



10 Select **Finish** to confirm the new host definition. This initiates the wizard configuration of the new host.

11 On completion, select **Yes** to proceed to the next host you wish to configure, or select **No** to end the configuration wizard.

12 Return to XenCenter and create a new SR by connecting to the desired XenServer host and clicking on its **Storage** tab.

13 Click **Add**, choose the iSCSI radio button for Virtual disk storage, and click **Next**.

14 Enter the name for the new SR in the **Name** field.

15 Enter the portal IP address of the PowerVault MD300i controller that owns the LUN created in step 2 in the target host field.

16 Enter `3260` in the port field.

17 Click on **Discover IQNs** and **Discover LUNs** to populate the **Target IQN** and **Target LUN** fields.

18 Select the appropriate LUN and click **Finish** to create a new SR.

Dell EqualLogic PS Series

Dell EqualLogic PS Series iSCSI arrays simplify storage deployment by offering high performance, reliability, intelligent automation, and seamless virtualization of a single pool of storage.

The foundation of an EqualLogic storage array is a PS Series group — an iSCSI SAN including one or more PS Series storage array members connected to an IP network and managed as a single system. Each array has fully redundant hardware and up to three active network connections for maximum bandwidth. Integrated virtualization firmware provides:

- Seamless scalability
- Automatic RAID configuration and spare disk configuration
- Automatic network, performance, and capacity load balancing

All PS Series models have dual active/passive controllers with three 1-GbE ports per controller for a total of six 1-GbE ports.

By default, the physical network interface on which the XenServer management interface is configured is chosen to route the IP storage traffic. However, a different physical interface or a bond of two network interfaces

can be configured to segregate storage traffic from management traffic. See "High Availability Configuration and IP Storage Traffic Segregation" on page 49 for more details on specific configuration steps.

Creating a Storage Repository on Dell EqualLogic PS Series Arrays

With XenServer, two types of SRs can be created on PS Series arrays:

- LVM Over iSCSI (lvmoiscsi) SRs utilize the Linux Volume Manager (LVM) to create a logical volume per virtual disk image (VDI). The entire volume on the PS Series array is used to hold VDIs.
- EqualLogic (equal) SRs utilize the XenServer storage adapter to manage VM storage on PS Series arrays. For each XenServer VDI, a corresponding volume on the PS Series array is created, allowing for advanced VM lifecycle operations, such as snapshots, fast clones, thin provisioning, etc.

Creating an LVM Over iSCSI (lvmoiscsi) SR

1. Configure the EqualLogic storage array, create a group, set a member RAID policy, and create a volume by following the instructions available on the *PS Series Storage Arrays Quickstart Guide* available on the Dell EqualLogic PS Series iSCSI SAN Arrays website at **equallogic.com/products**.
2. Enable shared access from multiple initiators for the storage volume:
   a. In the PS series group manager user interface, right-click the storage volume, and click **Modify Volume Settings**.
   b. Click the **Advanced** tab, and then click to check **Enable shared access to the iSCSI target from multiple initiators**.
3. Return to XenCenter and create an SR by connecting to the desired XenServer host or the pool master if you are adding storage to a pool, and clicking on its **Storage** tab.
4. Click the **Add…** button, choose the **iSCSI** radio button for Virtual disk storage, and select **Next**.
5. Enter the name for the new SR in the **Name** field, EqualLogic array group IP address in the **Target Host** field, and 3260 in the **Port** field.

6 Click **Discover IQNs** to perform target discovery.

Each volume on an EqualLogic array has a unique target name with LUN ID set to "0".

7 Select the appropriate IQN and then click **Discover LUNs** to discover the LUN associated with the target.

8 Select the LUN and click **Finish** to create a new SR.

Creating an EqualLogic (Equal) SR

NOTE: To use an EqualLogic SR, the firmware version of the PS Series array must be 4.0.1 or higher.

1 Configure the EqualLogic array, create a group, set a member RAID policy, and create a volume by following the instructions available in the PS Series online help.

2 Enable SSH access for the group members.

a In the PS Series group manager user interface, click **Group Configuration**, and then click the **Administration** tab.

b Under CLI access options for the group, select **Enable SSH**, and then save the configuration.

3 Using the XenCenter interface, right-click on the XenServer host or the pool for which you would like to create an SR and select **New Storage Repository**.

4 In the **Choose the type of new storage** window, select **Dell EqualLogic** and click **Next**.

5 In the **Enter the Dell EqualLogic file details** window, enter a name for the SR, the group IP of your PS Series group, the username and password for an account with administrative privileges for the group or pool, and optional CHAP credentials, if set on the array. Click **Next**.

6 Under **Reattach an existing SR or create a new SR**, click to select **Create a new SR on the following storage pool**.

NOTE: You can view the details on the available storage pool, including the size of the pool, available space, the number of existing volumes, and members in the pool.

7 Click **Thin Provisioning** for all volumes associated with the new SR, if desired.

8 Click **Finish** to create the new SR.

For more information on using the XenServer EqualLogic Storage Adapter, see *Using Dell EqualLogic PS Series Arrays with XenServer* available on the Dell- Virtualization with Dell and Citrix website at **dell.com/xenserver**.

Moving an SR Between Hosts

If you wish to remove an SR from an existing XenServer host and use it with a different host, you must back up the SR from the first host and restore it on the second host:

1 Access the **Backup, Update and Restore** menu in the local console on the XenServer host or pool master.

2 Trigger an immediate metadata backup to the SR being moved using the **Backup Virtual Machine Metadata** menu option.

The metadata backup creates a backup VDI, if necessary, and attaches it to the host, and then backs up all the metadata to that SR.

NOTE: You can schedule the metadata backup process to occur daily, weekly, or monthly using the **Schedule Virtual Machine Metadata** option.

3 Perform a metadata restoration operation using the **Restore Virtual Machine Metadata** menu option. The metadata restoration operation can restore only VM records associated with the selected SR, or all of the VM records found.

NOTE: There is also an option to test which VMs will be imported without actually performing the restoration operation.

Resizing An SR After Changing the Size of An LVM-Based Storage Volume

If you change the size of a LVM-based volume (SAS, iSCSI, or Fibre Channel)—for example, if you increase the size of the volume on your iSCSI storage array—the size of the SR on that volume does not get updated.

To adjust the size of the SR:

1. Turn off all virtual machines on the SR.
2. Note the universally unique identifier (UUID) of the SR.
   Run the `xe sr-list` command on the XenServer host and identify the SR by its name label.
3. To identify the Physical Block Device (PBD) UUID corresponding to the SR, run the following command on XenServer:

   ```
   # xe sr-param-list uuid=<SR UUID>|grep PBD
   ```

   where <SR UUID> is the UUID of SR noted in step 2
4. To unplug the Physical Block Device (PBD) corresponding to the Storage Repository, run the following command:

   ```
   # xe pbd-unplug uuid=<PBD UUID>
   ```

   where <PBD UUID> is the UUID of PBD noted in step 3.
5. To plug the PBD, run the following command:

   ```
   # xe pbd-plug uuid=<PBD UUID>
   ```

6 Find the physical volume device SCSI device mapping name on which the SR exists.

Identify the volume group (VG) corresponding to the SR.

Run the following command on the XenServer host:

```
# pvs
```

The output of this command is similar to the output given below:

```
PV         VG
Fmt  Attr PSize  PFree

  /dev/sdd   VG_XenStorage-058e9a1d-9b7e-71bc-
7a4c-5b78d6e30bcb lvm2 a-   80.00G 38.00G

  /dev/sde   VG_XenStorage-4684b6c6-be6d-6267-
b7b5-834a1fd30f65 lvm2 a-   59.99G 45.99G
```

The volume groups (VG) are named as VS_XenStorage-<SR UUID>.

7 Use the SR UUID noted in step 2 to identify the correct volume group and the corresponding Physical Volume (PV) from the output of the above command.

8 To resize the physical volume, run the following command:

```
# pvresize /dev/sd<x>
```

9 To scan the SR, run the following command:

```
# xe sr-scan uuid=<SR UUID>
```

10 The SR size now gets updated to the new size of the physical volume.

11 Turn on the VMs.

6

Recovering the Citrix® XenServer™ Host

Whenever possible, leave the installed state of Citrix XenServer Dell™ Edition unaltered. Treat the XenServer hosts as if they are appliances and do not install any additional packages or start additional services on them.

XenServer uses a per-host database to store metadata about virtual machines (VMs) and associated resources, such as storage and networking. When combined with storage repositories (SRs), this database forms the complete view of all VMs available across the pool. To make your XenServer deployment readily recoverable, ensure that you back up this database regularly.

Database Backup From XenServer Local Console

For the standard single XenServer case, you can back up the database using the XenServer local console.

To back up the XenServer database with the XenServer local console:

1. Insert a removable media device such as a USB stick to save the backup.
2. Select **Backup, Restore and Update** from the XenServer local console menu and press <Enter>.
3. Select **Backup Server State** and press <Enter>.

   You are prompted to select the removable media device you want to write the backup to. Select the appropriate device and press <Enter>.

4 You are prompted to provide a filename for the backup. Type the desired filename and press <Enter>.

   The backup file is written to the selected media.

5 Remove the media with the backed-up file and store it in a safe place. When required, you can use this media to recover the XenServer state.

   For more information on backing up the database for single-server and pooled servers using Citrix XenCenter® or the XenServer CLI, see the *XenServer Installation Guide* available on the Citrix XenServer Dell Edition website at **citrix.com/xenserver/dell**.

Using the Recovery Media

In case the flash storage becomes corrupt or fails and needs to be replaced, you can recover the factory-installed XenServer image by using the recovery media. You can download the recovery media from the Citrix XenServer Dell Edition website at **citrix.com/xenserver/dell**. After recovering the factory-default image, you can restore the XenServer database and resume running your VMs.

To recover the XenServer using the recovery media:

1 Burn the downloaded recovery media ISO to a media or attach the ISO to the host using the Dell Remote Access Controller (DRAC) virtual media option.

2 Insert the new flash storage in the system.

3 Boot the system from the media.

4 The recovery media prompts you to copy the image to the desired storage. It then copies the factory default image to the device.

5 When complete, remove the recovery media, reboot the system, and boot from the internal storage.

Restoring the XenServer Database

After you restore the XenServer host to the factory-default configuration, restore the backed-up XenServer database to regain your VMs and the particular network and storage configuration. This process differs depending on whether you have a single host or a resource pool, and whether the restored XenServer is to be a member or master of the pool. For the default case, you can use the XenServer local console.

To restore the XenServer database with the XenServer local console:

1. Insert the removable media device with which you performed backup of the XenServer database.
2. Select **Backup, Restore and Update** from the local console menu and press <Enter>.
3. Select **Restore Server State** from Backup and press <Enter>.
   You are prompted to select which removable media device you want to restore the backup from. Select the appropriate device and press <Enter>.
4. You are prompted to select the backup file to restore from. Select the desired filename and press <Enter>.
   The contents of the backup file are restored to the XenServer media.
5. Remove the media with the backed-up file and store it in a safe place for possible later use.
6. When complete, reboot the system.

For details on restoring the remote database for pooled hosts, see the XenServer documentation available on the Citrix XenServer Dell Edition website at **citrix.com/xenserver/dell**.

Recovering XenServer After a Board Replacement

In the event of a motherboard change in your XenServer host, the system service tag must be reset to its original value for XenServer to function. Download the latest asset.com utility from **ftp.us.dell.com/utility**. In the DOS prompt, type `asset.com /s <service tag>`.

Resetting the Root Password

If you lose or forget the root password, you can reset it using the *XenServer Dell Edition Recovery Media*. For more information, see "Using the Recovery Media" on page 46.

To reset the root password:

1. Boot using the recovery media.
2. Select your preferred key map.
3. Select **Reset the password for an existing installation**.
4. Follow the on-screen instructions.

Updating the XenServer Image to a new Version

The XenServer Dell Edition differs from the standard editions in the way it updates drivers and other components. There is no provision to individually load updated drivers. You can only apply update packages provided by Citrix.

Updates are provided as downloads on the Citrix XenServer Dell Edition website at **citrix.com/xenserver/dell**. When an update is available, download the update package and save it on a removable storage device, such as a USB stick.

To install updates using the XenServer local console:

1. Select **Backup, Restore and Update** from the local console menu.
2. Select **Apply Update** and follow the prompts.

   NOTE: You may be required to manually enter the filename of the update file.
3. Reboot the system.

To install updates using XenCenter, ensure that you are using the **Automatic** mode. For more information, see the **Updating Servers** section in the XenCenter online help.

7

Best Practices

High Availability Configuration and IP Storage Traffic Segregation

- **High Availability** — Use Citrix® XenCenter® to create a network interface bond using two NIC ports. This provides high availability for storage traffic.
- **IP Storage Traffic Segregation** — To segregate IP storage traffic, create a new host interface. In XenCenter, click on the host and select **Management Interfaces**. Create a new interface and configure the IP settings so that the storage management interface is on a separate subnet than the host management interface. To segregate IP storage traffic from host management traffic, the storage interface must be on a separate subnet than the host management interface.

NOTE: As a best practice, it is recommended to use a static IP address for the host management and storage interface.

Scripted Backup of XenServer Host Database

To protect against unintentional configuration loss, it is recommended that you regularly back up the XenServer host database. This operation can be performed using XenCenter. However, it is beneficial to script a recurring backup from your management system where XenCenter is installed. To accomplish this, perform the following steps from your management system:

1. Create a directory to house the backup batch file and host database backup files. For example, **C:\backup**.
2. Create a new batch file, and paste the following text into its contents:

```
@echo off

if "%1" == "" goto error

if "%2" == "" goto error
```

```
if "%3" == "" goto error

set hh=%time:~0,2%

if %time:~0,1%=="" set hh=0%hh:~1,1%

set timestamp=
%date:~10,4%%date:~4,2%%date:~7,2%_%hh%%time:~3,2
%%time:~6,2%

"C:\Program Files\Citrix\XenCenter\xe.exe" -s %1 -
u %2 -pw %3 host-backup file-name=
%1_%timestamp%.xbk

goto end

:error

echo usage is ^"backup ^<hostname or IP^>
^<username^> ^<password^>^"

pause

:end

exit
```

3 Create a **Scheduled Task**. In the **Run** field, enter the path to the batch file followed by the hostname or IP address, username, and password. For example:

```
c:\backup\backup.bat 172.17.40.70 root
rootpassword
```

Enter the directory you created in step 1 in the **Start in** field.

Using Storage Array Snapshots for LVM-Based Storage Repositories

Using storage array snapshot features available on the Dell™ PowerVault™ MD3000, MD3000i and Dell EqualLogic® storage arrays, a point in time copy of the Logical Volume Manager (LVM) based storage repositories can be taken for tasks such as backup, data mining, reporting, testing software upgrades, etc., in the virtual machines (VMs). A typical operation involves:

- Taking a snapshot of the storage repository (SR).
- Backing up the VM(s) metadata on an SR on the primary Citrix XenServer® Dell™ Edition host.
- Attaching the snapshot to a secondary XenServer host.
- Restoring the VM(s) metadata on the secondary host.

A snapshot restore operation can also be performed to go back to a previous known good state.

NOTE: XenServer 5.5 includes the ability to create snapshots at the VM level.

NOTE: A Xen VSS provider included as part of Citrix XenTools® enables quiesced VM snapshots. Quiesced VM snapshots are only supported for Dell EqualLogic™ PS Series arrays and Dell EqualLogic storage repositories.
Quiesced snapshots take advantage of the Microsoft® Windows® Volume Snapshot Service (VSS) for services that support it so that a supported application (for example, Microsoft Exchange® or Microsoft SQL Server®) can flush data to the disk and prepare for the snapshot before it is taken.
For more information on creating and managing VM snapshots, see the *XenServer Reference Manual* available on the Citrix XenServer Dell Edition website at citrix.com/xenserver/dell.

With varying degree of impact on file system and application consistency and service availability, you can run snapshot operations on an SR in essentially three ways as discussed in the sections below.

Shut Down VMs Before a Snapshot

In scenarios where you cannot achieve application consistency using frameworks such as Microsoft VSS or VDS, etc., you can create a snapshot or clone of an SR when VMs are powered down and ensure a volume recovery that is clean. Scenarios where all virtual disks of a VM are virtualized through the XenServer domain fall into this category. Though this approach guarantees file system-consistent and application-consistent volume recovery, there is service downtime as VMs on the SR need to be shut down before a snapshot operation. This approach is useful when there are multiple VMs on an SR. Follow the steps below to take a snapshot in such a scenario:

1. Shut down all the VMs on the SR.
2. From the primary XenServer host, backup the VM metadata for the VMs on the SR.
3. Take a snapshot of the SR.
4. Start up the VMs on the primary XenServer host.
5. Attach the snapshot of the SR on the secondary XenServer host.
6. On the secondary XenServer host, restore the VM metadata to recover VMs.
7. Turn on the VMs on the secondary XenServer host.

Suspend VMs Before a Snapshot

In this scenario you suspend the VMs and the suspended state is saved in the **Suspend Storage Repository**. After you suspend the VMs on the SR, you can take a snapshot of the Suspend SR and the SR on which the VM virtual disks reside. This ensures file system and application consistent snapshots. When you boot the VMs from the suspended state, the VMs resume at the point where they were suspended.

The service downtime depends on the memory state of the VMs on the SR. This approach is useful when there are multiple VMs on an SR. To take a snapshot in such a scenario:

1. Suspend all the VMs on the SR. You must install XenTools and run them in all VMs.
2. From the primary XenServer host, backup the VM metadata for the VMs on the SR.

3 Take a snapshot of the SR and the Suspend SR if it is different from the SR for which the snapshot was created.

4 Power on the VMs on the primary XenServer host.

5 Attach the snapshot of the SR and Suspend SR if it is different from the SR for which the snapshot was created on the secondary XenServer host.

6 Restore the VM metadata to the recovered VMs.

7 Boot the VMs on the secondary XenServer host.

Snapshot a volume when VMs are running

In this scenario, you initiate a snapshot operation on an SR when the VM is in a running state and performing I/O operations to the storage volume. Unlike the scenarios described above, there is no service downtime.

In LVM-based SRs, if you take a storage volume snapshot it results in a file system and application crash consistent snapshot.

When you run an iSCSI initiator inside the VM to connect directly to SAN volumes, in which the I/O operations to virtual disks is entirely controlled by the VM, you can use array-based snapshots. You can also use frameworks such as Microsoft VSS or VDS to create application-consistent snapshots. This approach is useful when each virtual disk of a VM is a separate volume on storage array.

Backup the VM Metadata

This section explains the steps required to backup the VM metadata from the primary XenServer host. This metadata can then be restored on the secondary XenServer host where VMs need to be recovered.

To back up the VM metadata:

1 Access the **Backup, Update and Restore** menu in the local console on the XenServer host or pool master.

2 Trigger an immediate metadata backup to the SR being moved using the **Backup Virtual Machine Metadata** menu option. The metadata backup creates a backup virtual desktop infrastructure (VDI), if necessary, and attaches it to the host, and then backs up all the metadata to that SR.

Attach the SR Snapshot to the Secondary XenServer Host

Make the snapshot volume available to the secondary XenServer host by attaching the SR. For snapshots of iSCSI volumes, just attach the SR to the XenServer host using XenCenter.

If the snapshot resides on a Dell PowerVault™ MD3000 RAID enclosure, follow the steps below to attach the snapshot as an SR to a XenServer host.

1. Note the universally unique identifier (UUID) of the SR for which the snapshot was created. You can identify the SR by its name label by running the following command on the primary XenServer host:

   ```
   # xe sr-list
   ```

2. Run the following command:

   ```
   # xe sr-introduce content-type=user name-label=
   SAS_snapshot type=lvmohba uuid=<sr_uuid>
   ```

3. To identify the disk ID of the storage volume, run the following command:

   ```
   # ls -ltr /dev/disk/by-id
   ```

4. To identify the host UUID, run the following command:

   ```
   # xe host-list
   ```

5. Run the following command:

   ```
   # xe pbd-create device-config:device=/dev/disk/by-
   id/<disk_id> host-uuid=<host_uuid> sr-uuid=
   <sr_uuid>
   ```

6. To identify the PBD UUID, run the following command:

   ```
   # xe pbd-list
   ```

7. Run the following command:

   ```
   # xe pbd-plug uuid=<pbd_uuid>
   ```

Restoring VM Metadata to Recover VMs from a Snapshot

To restore the VM metadata to recover VMs from a Snapshot:

1. Access the **Backup, Update and Restore** menu in the local console on the XenServer host or pool master.
2. Perform a metadata restoration operation using the **Restore Virtual Machine Metadata** menu option.

   The metadata restoration operation can restore only VM records associated with the selected SR, or all of the VM records found potentially from other SRs which were present at the time of the backup.

   NOTE: There is also an option to test which VMs are imported without actually performing the restoration operation.

Adjusting SCSI Timeouts to Tolerate Storage Controller Failures

To account for time that an I/O may take to complete in a case where the Dell PowerVault MD3000 or the PowerVault MD3000i storage array goes through exception recovery on I/O operations, it is recommended to adjust the SCSI timeouts on XenServer hosts and VMs that are resident on the SRs on the PowerVault MD3000 or the PowerVault MD3000i storage arrays.

Adjusting SCSI Timeouts for the PowerVault MD3000 RAID Enclosure

If the XenServer host is connected to the PowerVault MD3000 RAID enclosure, you can adjust the SCSI timeout of the Windows VMs residing on the SR resident on the PowerVault MD3000 RAID enclosure by changing the registry settings. Follow the steps below:

1. Navigate to **HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\disk\TimeOutValue**.
2. Create the value if it is not present. Set this value to **200**.

NOTE: Do not modify the SCSI timeout in the paravirtualized Linux VMs as the VM virtual disks are not presented as SCSI disks.

Adjusting SCSI Timeouts for the PowerVault MD3000i Storage Arrays

If the XenServer host is connected to the PowerVault MD3000i storage arrays, on the XenServer host, you can change the SCSI timeout value for the SCSI device(s) on the PowerVault MD3000i storage arrays. Follow the steps below:

1. Create a new **udev** rule file with name **96-md3000i-sto.rules** at **/etc/udev/rules.d/** and add the following text:

   ```
   KERNEL=="sd*[!0-9]", ACTION=="add", SYSFS{model}==
   "MD3000i", SYSFS{vendor}=="DELL", RUN+="/bin/sh -c
   'echo 200 > /sys$DEVPATH/device/timeout'"
   ```

2. Save the file. Attach the iSCSI volume to the XenServer host and create an SR.
3. Adjust the SCSI timeout on the Windows VMs residing on the SR resident on the PowerVault MD3000i by changing the following registry setting:
   HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\disk\TimeOutValue.
4. Create the value if it is not present. Set this value to **200**.

NOTE: Do not modify the SCSI timeout in the paravirtualized Linux VMs as the VM virtual disks are not presented as SCSI disks.

Using an iSCSI initiator inside a VM is the same as using an iSCSI initiator in a physical system. For specific steps to install the relevant Dell multi-pathing drivers and supported iSCSI initiators, and to attach the PowerVault MD3000i volumes to a VM using the iSCSI initiator inside the VM, see the *MD3000i Systems Installation Guide* available on the Dell Support website at **support.dell.com/manuals**. There are no extra steps required to modify the SCSI timeouts when Dell multi-pathing drivers control the LUN(s) on a PowerVault MD3000i array.

Configuring XenServer Management Network for High Availability

For detailed instructions on configuring XenServer management network for HA, see the "Creating NIC Bonds" section of the *XenServer Administrator's Guide* available on the Citrix XenServer Dell Edition website at **citrix.com/xenserver/dell**.

A

Appendix

Citrix® XenServer™ Dell™ Edition Local Console Menu Items

The host local console can be used to configure the Citrix XenServer Dell Edition and to set up storage repositories (SRs) for virtual machines (VMs).

NOTE: Installing, running, and managing VMs can be accomplished by opening a command shell and using the **xe** command line interface. It is recommended that you use the XenCenter management interface to work with VMs.

For information on how to download and install Citrix XenCenter® on a Dell PowerEdge™ system running the Microsoft® Windows® operating system, select **Manage Server Using XenCenter** from the XenServer local console menu. You can use XenCenter as the management console for XenServer.

On the left side of the XenServer local console, there is a list of menu names or commands. Use the up- and down- arrow keys to select from the list, and press <Enter> to display the menu or initiate the command.

The following sections cover the XenServer local console menus and sub-menus.

Status Display

Displays the system vendor and model, the XenServer version and build, and the configuration of the management NIC, i.e., its device name, IP address, netmask, and gateway.

Manage Server Using XenCenter

Provides a download link to get the XenCenter application from the Citrix XenServer Dell Edition website at **citrix.com/xenserver/dell**.

Network and Management Interface

Provides a menu of commands for setting up network configuration of the management interface.

Configure Management Interface

Allows you to select and configure which of the NICs available on the system is used as the XenServer management interface.

Add/Remove DNS Servers

Allows you to manage DNS servers. For example you can add additional servers or remove existing servers.

Network Time (NTP)

Allows you to configure network time servers for synchronizing clock time between servers. You can enable or disable NTP, and add or remove NTP servers.

Test Network

Allows you to use the Linux **ping** command for testing the configured network. You can ping several fixed addresses such as the local address, the gateway address, or an Internet address. You can also choose to ping a custom address by providing an IP address.

Display NICs

Displays the network interfaces on the system by description, device name, and MAC address, and displays if they are connected or not.

Authentication

Log In/Out

Provides a login prompt.

Change Password

Allows changing of the root user password. It also changes the password for local and remote login shells. If the host is in a Resource Pool, it also changes the password of the Pool master.

To change the root password, perform the following steps:

1. From the XenServer local console, select **Authentication**. The Authentication menu replaces the list in the left pane.
2. Select **Change Password** and press <Enter>. A **Change Password** box is displayed.
3. Type the current password, type the new password, and then repeat it in the required field. Press <Enter> to set the new password.

Change Auto-Logout Time

Allows changing of the auto-logout timer. The default is five minutes. You are automatically logged out if there is no keyboard activity for the logout time period. The timeout applies to this console and to local shells started from this console.

Virtual Machines (VMs)

VMs Running on This Host

Displays detailed information on the VMs running on the XenServer host.

Host Performance Information

Displays XenServer host CPU and memory usage information.

All VMs

Displays detailed information about all the VMs in the Resource Pool.

Disk and Storage Repositories

Current Storage Repositories

Displays detailed information about SRs.

Create New Storage Repository

Used to create a new SR.

Attach Existing Storage Repository

Used to attach an existing storage repository or ISO library.

Specify Suspend SR

Allows you to specify the SR where you save the suspended image of a VM. By default, this is not configured.

Specify Crash Dump SR

Allows you to specify the SR where you save the crash dumps of the VMs. By default, this is not configured.

Claim a Local Disk as SR

Local disks can be configured as SRs for VMs. Press <Enter> to list the available disks and claim one or more for VM storage.

NOTE: Local disks are automatically claimed for use as SRs for XenServer VMs on first boot if the disks contain the Dell utility partition.

Resource Pool Configuration

Join a Resource Pool

Used to join a Resource Pool. Allows the host to share SRs and migrate the VMs between hosts in the Pool.

Join a Resource Pool (forced)

Same as "Join a Resource Pool" on page 60.

CAUTION: Forcing a host to join a pool is a dangerous operation and may lead to VM and data corruption.

Remove This Host From the Pool

Removing a host from a the pool permanently deletes and re initializes all local SRs on the host. The data in local SRs is lost and the host immediately reboots.

Designate a New Pool Master

Used to designate a new host as master of the Resource Pool.

XenServer Details and Licensing

Displays the XenServer product name, version, version of Xen, kernel version, the Product SKU, expiration date for the license, and the number of sockets.

Press <Enter> to see further license details and to access the **Install XenServer License** sub-menu.

Install XenServer License

Allows you to install a XenServer license to update to the XenServer Enterprise edition.

To install a XenServer license, perform the following steps:

1. Select **Install XenServer License** on the left, and press <Enter>.
2. Log in if prompted.
3. A dialog box is displayed. Select the device containing the License file and press <Enter>.

Hardware and BIOS Information

System Description

Displays the system manufacturer, the system model, the service tag number, and the asset tag number.

Processor

Displays the number of logical CPUs, the number of populated CPU sockets, the total number of CPU sockets, and the CPU description string.

System Memory

Displays the total memory, the number of populated memory sockets, and the total number of memory sockets.

Local Storage Controllers

Lists the storage controllers on the server.

BIOS Information

Displays the system BIOS vendor and version.

Baseboard Management Controller (BMC) Information

Displays the BMC firmware version.

Keyboard and Time Zone

Keyboard Language and Layout

Use this option to select the correct keyboard language and layout for your keyboard.

Set Time Zone

Use this option to set the time zone for the system.

To set the time zone:

1. Select **Set Timezone** and press <Enter>.
2. Log in if prompted.
3. A dialog box displays. Select the Region and press <Enter>.
4. Select a City within the Region and press <Enter>.
5. A box appears with the new time zone setting and the current time. Press <Enter> to clear the message.

Remote Service Configuration

This menu configures remote databases, access by remote secure shell (ssh), and remote logging (syslog) to remote servers.

Remote Logging (syslog)

Allows configuration of a remote system to be the destination for syslog messages.

To configure a remote system for receiving the syslog messages:

1. Select **Remote Logging** (syslog) and press <Enter>
2. Log in if prompted.
3. A dialog box displays. Enter the destination IP address or leave it blank to disable remote logging. Press <Enter>.

Enable or Disable a Remote Shell

Enables or disables system-login using **ssh**. By default, it is enabled. Press <Enter> to toggle between states.

Backup, Restore, and Update

Schedule Virtual Machine Metadata

Press <Enter> to schedule regular VM metadata backups.

Backup Virtual Machine Metadata

Press <Enter> to backup VM metadata to an SR.

Restore Virtual Machine Metadata

Press <Enter> to restore VM metadata from an SR.

Apply Update

Press <Enter> to update the XenServer image on the flash media.

Backup Server State

Press <Enter> to backup the system state to a removable media.

Restore Server State from Backup

Press <Enter> to restore the system state from a backup on a removable media.

Technical Support

Validate Server Configuration

Checks the basic configuration of the XenServer. The information displayed includes the following

- Whether VT is enabled on the CPU.
- Whether a default local SR is created.
- Whether a management NIC is assigned.

Upload Bug Report

Allows you to upload a bug report file to a support FTP site.

Save Bug Report

Allows you to save a bug report file to a removable media.

Enable/Disable Verbose Boot Mode

Controls the level of information displayed when the XenServer boots.

Reset to Factory Defaults

Resets all configuration information to factory default values, deletes all VMs, and deletes all SRs on local disks.

Reboot or Shutdown

This option allows you to shut down or reboot the system.

Reboot Server

Reboots the system into the normal operating mode.

Shutdown Server

Shuts down the system.

Enter or Exit Maintenance Mode

Entering **Maintenance Mode** is used before shutting down a host for maintenance. It migrates all VMs running on the host to other hosts in the Resource Pool.

Local Command Shell

Opens a local command shell for user root on the system. From this shell, you can execute basic Linux commands and the XenServer **xe** command line interface (CLI), with which you can manage the XenServer control domain, SRs, and VMs. It is recommended to use the XenCenter administration console. For detailed reference, and examples to use the CLI for storage management, see the *XenServer Administrator's Guide* available on the Citrix XenServer Dell Edition website at **citrix.com/xenserver/dell**. For details on using the CLI to install and manage VMs, see the *XenServer VM Installation Guide* available on the Citrix XenServer Dell Edition website at **citrix.com/xenserver/dell**.

B

Appendix

NIC Enumeration in Citrix® XenServer™ Dell™ Edition

NIC enumeration, i.e., mapping of the physical network interface to the **ethX** device name in XenServer Dell Edition is based on the device position in the system. The integrated LAN on Motherboard (LOM) ports are always enumerated first in order of their physical marked position (GB1, GB2, etc.). The add-in network cards are enumerated after the LOM ports in ascending order of the slot position and the PCI bus, device or function information.

For example, if there are 2 LOM ports in a system and one dual port network adapter in the PCI slot 4, the NIC enumeration is as follows:

- **eth0**: LOM Port 1 (Gb1)
- **eth1**: LOM Port 2 (Gb2)
- **eth2** and **eth3**: ports on adapter in slot 4 (arranged in ascending bus, device or function number)

You can find the NIC enumeration and corresponding position in the system by logging in to the XenServer local console shell and running the following command:

```
# biosdevname -d
```

The output of the command must be similar to the one below:

```
BIOS device: eth0

Kernel name: eth0

Permanant MAC: 00:1E:4F:1F:77:67

Assigned MAC : 00:1E:4F:1F:77:67

Driver: bnx2

Driver version: 1.6.7b

Firmware version: 3.5.12 UMP 1.1.8
```

```
Bus Info: 0000:03:00.0
PCI name      : 0000:03:00.0
PCI Slot      : embedded
SMBIOS Device Type: Ethernet
SMBIOS Instance: 1
SMBIOS Enabled: True

BIOS device: eth1
Kernel name: eth1
Permanant MAC: 00:1E:4F:1F:77:69
Assigned MAC : 00:1E:4F:1F:77:69
Driver: bnx2
Driver version: 1.6.7b
Firmware version: 3.5.12 UMP 1.1.8
Bus Info: 0000:07:00.0
PCI name      : 0000:07:00.0
PCI Slot      : embedded
SMBIOS Device Type: Ethernet
SMBIOS Instance: 2
SMBIOS Enabled: True

BIOS device: eth2
Kernel name: eth2
Permanant MAC: 00:15:17:24:A4:B0
Assigned MAC : 00:15:17:24:A4:B0
Driver: e1000
```

```
Driver version: 7.6.9.2-NAPI
Firmware version: 5.6-2
Bus Info: 0000:0b:00.0
PCI name      : 0000:0b:00.0
PCI Slot      : 4
BIOS device: eth3
Kernel name: eth3
Permanant MAC: 00:15:17:24:A4:B1
Assigned MAC : 00:15:17:24:A4:B1
Driver: e1000
Driver version: 7.6.9.2-NAPI
Firmware version: 5.6-2
Bus Info: 0000:0b:00.1
PCI name      : 0000:0b:00.1
PCI Slot      : 4
```

The BIOS device name is the name suggested by the system BIOS. The BIOS device name is used by the XenServer kernel to enumerate the device name. As shown in the above output, the PCI slot and the System Management BIOS (SMBIOS) instance fields for **eth0** and **eth1** display that these devices are two LOM NIC ports on the system. Fields PCI slot filed for **eth2** and **eth3** display that these devices are two ports on a dual port network adapter present in the PCI slot number 4.

The **BIOS device name** field must match the **kernel name** field. In rare cases, after the XenServer boots for the first time, the BIOS device name may not match the kernel device name. To resolve this issue, log in to the XenServer local console shell and restart the **xapi** service by running the following command:

```
# service xapi restart
```

C

Appendix

Supported Hardware

Systems

The following Dell™ PowerEdge™ systems are supported:

- PowerEdge 1950 III, 2900 III, and 2950 III
- PowerEdge R805
- PowerEdge R900 and R905
- PowerEdge M600, M605, M805 and M905
- PowerEdge R710, R610, T610, T710, M610 and M710

Table C-1. Storage Arrays—Host HBA Failover

Storage Type/Model	Host HBA Failover	Array Controller Failover	Shared Storage for Citrix® XenServer™ Hosts
Direct Attached: Dell PowerVault™ MD1000 storage array	No	Not applicable	No
Direct Attached: PowerVault MD1120 storage array	No	Not applicable	No
Direct Attached: PowerVault MD3000 storage array	Yes	Yes	Yes

Table C-2. Storage Arrays–NIC Bonding for Storage Traffic

Storage Type/Model	NIC Bonding for Storage Traffic	Array Controller Failover	Shared Storage for XenServer Hosts
iSCSI: PowerVault MD3000i storage array	Yes	Yes	Yes
iSCSI: EqualLogic® PS 5000 series storage array	Yes	Yes	Yes
iSCSI: EqualLogic PS 6000 series storage array	Yes	Yes	Yes

NOTE: For more details on reference configurations, see "Configuring Storage" on page 29.

D

Appendix

Troubleshooting

This section provides troubleshooting steps for typical issues.

The Dell™ PowerEdge™ System Does Not Boot Into Citrix® XenServer™ Dell™ Edition

Symptoms

- The Citrix XenServer Dell Edition software does not boot.
- You receive a `No OS found` message at start up.

Resolution

Check the boot order—The internal flash storage device may no longer be selected as the first boot device. This can happen if the device has recently been removed due to failure. To correct this:

1. Turn on the system. Press <F2> when prompted in the upper right corner of the screen.
2. In the **Setup** menu, scroll down to **Boot Sequence** and press <Enter>.
3. Make sure **Hard drive c:** is selected, and then press <Enter>.
4. Scroll down to **Hard-Disk Drive Sequence**, and then press <Enter>.
5. Select **Internal USB** or **SD Card**, and then use the left- and right-arrow keys to select the first device in the list.
6. Press <Esc> twice, save your settings, and then reboot the system.

Unable to Power on a Microsoft® Windows® Virtual Machine (VM)

Symptom

On powering on a Windows VM, the error `HVM is required for this operation` displays.

Resolution

1. Enable CPU Virtualization Technology in the system BIOS. Log in to the XenServer local console shell and run the following command:

   ```
   # omconfig chassis biossetup attribute=cpuvt setting=enabled
   ```

2. Reboot the system.

Unable to Boot to the Dell Utility Partition (UP)

Symptom

Upon pressing the <F10> key during POST or selecting **Boot to Utility Partition** in the boot menu, the system does not boot to the UP and the following message displays:

```
Missing Operating System
```

Resolution

1. Enter **System Setup**.
2. Use the up- and down-arrow keys to highlight **Hard-Disk Drive Sequence**, and then press <Enter>.
3. Use the up- and down-arrow keys to highlight the appropriate internal storage controller device.
4. Use the left- and right-arrow keys to make the selected device the first device in the list (before **Internal USB**).
5. Press <Esc> twice, save your changes, and then reboot the system.
6. Press <F10> during POST to boot to the UP.

NOTE: To boot to the internal USB device, you must make **Internal USB** the first device in the **Hard Disk Drive Sequence**.

E

Appendix

References

- Dell|Citrix XenServer solutions home page located at **dell.com/xenserver**
- Citrix® XenServer™ Dell™ Edition product documentation and downloads located at **citrix.com/xenserver/dell**
- Dell PowerVault™ MD1000 documentation located at **support.dell.com/support/edocs/systems/md1000**
- Dell PowerVault MD1120 documentation located at **support.dell.com/support/edocs/systems/md1120**
- Dell PowerVault MD3000 documentation located at **support.dell.com/support/edocs/systems/md3000**
- Dell PowerVault MD3000i documentation located at **support.dell.com/support/edocs/systems/md3000i**
- Dell EqualLogic® documentation located at **equallogic.com/resourcecenter/documentcenter.aspx**
- Dell Enterprise Technology Center Wiki located at **delltechcenter.com**

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