Citrix XenServer ® 7.0 Installation Guide

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Citrix, Inc.
851 West Cypress Creek Road
Fort Lauderdale, FL 33309
United States of America

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Chapter 1. Welcome

1.1. About This Document

This document is an installation guide for Citrix XenServer®, the complete server virtualization platform from Citrix®. It contains procedures to guide you through the installation, configuration, and initial operation of XenServer. This document also contains information about troubleshooting problems that might occur during installation and points you to additional resources.

This document is primarily aimed at system administrators who wish to set up XenServer hosts on physical servers.

1.2. Introducing XenServer

XenServer is the complete server virtualization platform from Citrix. The XenServer package contains all you need to create and manage a deployment of virtual x86 computers running on Xen, the open-source paravirtualizing hypervisor with near-native performance. XenServer is optimized for both Windows and Linux virtual servers.

XenServer runs directly on server hardware without requiring an underlying operating system, which results in an efficient and scalable system. XenServer works by abstracting elements from the physical machine (such as hard drives, resources and ports) and allocating them to the *virtual machines* running on it.

A virtual machine (VM) is a computer composed entirely of software that can run its own operating system and applications as if it were a physical computer. A VM behaves exactly like a physical computer and contains its own virtual (software-based) CPU, RAM, hard disk and network interface card (NIC).

XenServer lets you create VMs, take VM disk snapshots and manage VM workloads. For a comprehensive list of major XenServer features, visit www.citrix.com/xenserver.

1.2.1. Benefits of Using XenServer

Using XenServer reduces costs by:

- Consolidating multiple VMs onto physical servers
- Reducing the number of separate disk images that need to be managed
- Allowing for easy integration with existing networking and storage infrastructures

Using XenServer increases flexibility by:

- Allowing you to schedule zero downtime maintenance by using XenMotion to live migrate VMs between XenServer hosts
- Increasing availability of VMs by using High Availability to configure policies that restart VMs on another XenServer host if one fails
- Increasing portability of VM images, as one VM image will work on a range of deployment infrastructures

1.2.2. Administering XenServer

There are two methods by which to administer XenServer: XenCenter and the XenServer Command-Line Interface (CLI).

XenCenter is a graphical, Windows-based user interface. XenCenter allows you to manage XenServer hosts, pools and shared storage, and to deploy, manage and monitor VMs from your Windows desktop machine.

The XenCenter on-line *Help* is a useful resource for getting started with XenCenter and for context-sensitive assistance.

The **XenServer Command-line Interface (CLI)** allows you to administer XenServer using the Linux-based xe commands.

1.3. XenServer Documentation

XenServer documentation shipped with this release includes:

- *XenServer Release Notes* cover new features in XenServer 7.0 and any advisories and known issues that affect this release.
- *XenServer Quick Start Guide* provides an introduction for new users to the XenServer environment and components. This guide steps through the installation and configuration essentials to get XenServer and the XenCenter management console up and running quickly. After installation, it demonstrates how to create a Windows VM, VM template and pool of XenServer hosts. It introduces basic administrative tasks and advanced features, such as shared storage, VM snapshots and XenMotion live migration.
- *XenServer Installation Guide* steps through the installation, configuration and initial operation of XenServer and the XenCenter management console.
- *XenServer Virtual Machine User's Guide* describes how to install Windows and Linux VMs within a XenServer environment. This guide explains how to create new VMs from installation media, from VM templates included in the XenServer package and from existing physical machines (P2V). It explains how to import disk images and how to import and export appliances.
- *XenServer Administrator's Guide* gives an in-depth description of the tasks involved in configuring a XenServer deployment, including setting up storage, networking and pools. It describes how to administer XenServer using the xe Command Line Interface.
- *vSwitch Controller User's Guide* is a comprehensive user guide to the vSwitch Controller for XenServer.
- *Supplemental Packs and the DDK* introduces the XenServer Driver Development Kit, which can be used to modify and extend the functionality of XenServer.
- *XenServer Software Development Kit Guide* presents an overview of the XenServer SDK. It includes code samples that demonstrate how to write applications that interface with XenServer hosts.
- *XenAPI Specification* is a reference guide for programmers to the XenServer API.

For additional resources, visit the Citrix Knowledge Center.

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Chapter 2. System Requirements

2.1. System Requirements

XenServer requires at least two separate physical x86 computers: one to be the XenServer host and the other to run the XenCenter application. The XenServer host computer is dedicated entirely to the task of running XenServer — hosting VMs — and is **not** used for other applications.

> **Warning:**
>
> The installation of any third party software directly on the XenServer host (i.e. into the dom0 control domain) is not supported, except where it is supplied as a supplemental pack and is explicitly endorsed by Citrix.

The computer that runs XenCenter can be any general-purpose Windows computer that satisfies the hardware requirements and can be used to run other applications.

2.1.1. XenServer Host System Requirements

While XenServer will generally be deployed on server-class hardware, XenServer is also compatible with many models of workstations and laptops. For a comprehensive XenServer hardware compatibility list, see http://www.citrix.com/xenserver/hcl. The following describes the recommended XenServer hardware specifications.

The XenServer host must be a 64-bit x86 server-class machine devoted to hosting VMs. This machine will run an optimized and hardened Linux partition with a Xen-enabled kernel which controls the interaction between the virtualized devices seen by VMs and the physical hardware.

XenServer can make use of:

- up to 5TB of RAM
- up to 16 NICs
- up to 288 logical processors per host.

> **Note:**
>
> The maximum number of logical processors supported differs by CPU. Consult the *XenServer Hardware Compatibility List* (HCL) for more details.

The system requirements for the XenServer host are:

CPUs	One or more 64-bit x86 CPU(s), 1.5GHz minimum, 2 GHz or faster multicore CPU recommended To support VMs running Windows, an Intel VT or AMD-V 64-bit x86-based system with one or more CPU(s) is required. **Note:** To run Windows VMs, hardware support for virtualization must be enabled on the XenServer host. This is an option in the BIOS. It is possible your BIOS might have virtualization support disabled. Consult your BIOS documentation for more details. To support VMs running supported paravirtualized Linux, a standard 64-bit x86-based system with one or more CPU(s) is required.

RAM	2GB minimum, 4GB or more recommended
Disk Space	Locally attached storage (PATA, SATA, SCSI) with 46GB of disk space minimum, 70GB of disk space recommended, or SAN via HBA (not through software) if installing with multipath boot from SAN (see http://hcl.vmd.citrix.com for a detailed list of compatible storage solutions).
Network	100Mbit/s or faster NIC. One or more gigabit, or 10 gigabit NIC(s) is recommended for faster P2V and export/import data transfers and VM live migration. For redundancy, multiple NICs are recommended. The configuration of NICs will differ depending on the storage type. See vendor documentation for details.

Note:

In some support cases, serial console access is required for debug purposes. Therefore, when setting up a XenServer configuration, it is recommended that serial console access is configured. For hosts that do not have physical serial port (such as a Blade server) or where suitable physical infrastructure is not available, customers should investigate if an embedded management device, such as Dell DRAC or HP iLO can be configured. For more information on setting up serial console access, see CTX121442, *How to Set Up a Serial Cable for Troubleshooting on XenServer*.

2.1.2. XenCenter System Requirements

The system requirements for XenCenter are:

Operating System	Windows 8.1, Windows 8, Windows 7 SP1, Windows Vista SP2, Windows Server 2012R2, Windows Server 2012, Windows Server 2008R2 SP1, Windows Server 2008 SP2
.NET Framework	Version 4.5
CPU Speed	750MHz minimum, 1GHz or faster recommended
RAM	1GB minimum, 2GB or more recommended
Disk Space	100MB minimum
Network	100Mb or faster NIC
Screen Resolution	1024x768 pixels, minimum

XenCenter is compatible with all versions of XenServer from 6.0 onwards.

2.1.3. Supported Guest Operating Systems

For a list of supported VM operating systems, see the *XenServer Virtual Machine User's Guide*.

Chapter 3. Licensing XenServer

XenServer 7.0 is available in two commercial editions:

- Standard
- Enterprise

The **Standard** edition is our entry-level commercial offering, with a range of features that will suit the needs of those customers who want a robust and high performing virtualization platform, but do not require the premium features offered by the Enterprise edition; while still wishing to benefit from the assurance of comprehensive Citrix support and maintenance.

The **Enterprise** edition is our premium offering, optimized for both server, desktop and cloud workloads. In addition to the Standard edition, the Enterprise edition offers the following features:

Customers who have purchased XenApp or XenDesktop continue to have an entitlement to XenServer, which includes all the features contained within the Standard edition and many of those in the Enterprise edition, to include:

- Automated Windows VM Driver Updates
- Automatic updating of the Management Agent
- Support for SMB storage
- Direct Inspect APIs
- Dynamic Workload Balancing
- GPU Virtualization (vGPU) with NVIDIA GRID and Intel GVT-g
- VMware vSphere to XenServer Conversion utilities
- Intel Secure Measured Boot (TXT)
- Export Pool Resource Data
- In-memory read caching

> **Note:**
>
> Customers who have purchased XenApp or XenDesktop continue to have an entitlement to XenServer, which includes all the features contained within the Enterprise edition. Customers should note that the In-memory read caching feature is available only for XenApp and XenDesktop Platinum customers.

Applying a license

XenServer uses the same licensing mechanism, as used by many other Citrix products. XenServer 7.0 licensing requires Citrix License Server 11.12.1 or higher. You can download the License Server from Citrix Licensing. After purchasing a license, you will be provided with a .LIC license key. This license key should be installed on either:

- a Windows server running the **Citrix License Server** software.
- the Linux-based **Citrix License Server** virtual appliance.

Customers should allocate product licenses using a Citrix License Server, as with other Citrix components. From version 6.2.0 onwards, XenServer (other than through the XenDesktop licenses) is licensed on a per-socket basis. Allocation of licenses is managed centrally and enforced by a standalone Citrix License Server, physical or virtual, in the environment. After applying a per-socket license, XenServer will display as Citrix XenServer Per-Socket Edition. All hosts in a pool must be licensed. Mixed pools of licensed and unlicensed hosts will behave as if all hosts were unlicensed.

> **Note:**

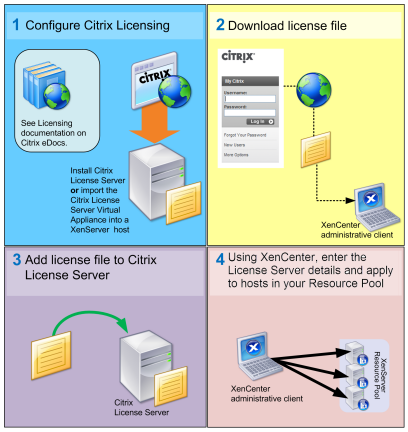
Upgrades to the Enterprise edition are available from the Standard edition. Click here to purchase a XenServer 7.0 license.

For instructions on applying a XenServer license to a Citrix License Server Virtual Appliance, see CTX200159 – How to Apply a XenServer License File to Citrix License Server Virtual Appliance (CLSVA).

To license Citrix XenServer:

1. Install the Citrix License Server and console.

   For detailed installation procedures, see Licensing on the Citrix Product Documentation website.
2. Obtain your Citrix XenServer license files and load them on the Citrix License Server.
3. Configure licensing for each Citrix XenServer host using XenCenter or the xe CLI.

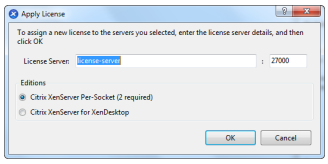


How to configure licensing for Citrix XenServer hosts using XenCenter

Fore more information on using XenCenter press F1 to access the context sensitive Online Help.

1. On the **Tools** menu, select **License Manager**.
2. Select the host(s) or pool/s that you wish to assign a license. Click **Assign License**.

   This displays the **Apply License** window:



3. In the **Apply License** window, choose the Citrix XenServer edition that you wish to license, and then enter the Citrix License Server details.

   Note:

   By default, the License Server uses port 27000 for communication with Citrix products. If you changed the default port on the License Server, enter the appropriate number in the **Port number** box. For more information about changing port numbers due to conflicts, refer to Licensing topics on the Citrix Product Documentation website.

   Select **OK** to proceed.

   XenCenter contacts the specified License Server and checks out a license for the specified host(s) or pool/s. The information shown in the XenCenter License Manager will be updated.

To release a license (to revert a licensed XenServer host to unlicensed XenServer): from the **License Manager**, select a host, and then click **Release License**.

To configure licensing for Citrix XenServer hosts using the xe CLI:

- Run the **host-apply-edition** command. For example, enter the following:

```
xe host-apply-edition edition=  enterprise-per-socket|desktop-plus|desktop|standard-per-socke
  license-server-address=<license_server_address> host-uuid=<uuid_of_host> \
  license-server-port=<license_server_port>
```

You will only need to supply the license server IP address and port number parameters for the first time you assign a license. The values are stored and used automatically if in future, you do not specify the license server parameters.

If no host UUID is specified, the license will be applied to the host that you are running the command on.

To configure a pool

- Run the **pool-apply-edition** command. For example, enter the following:

```
xe pool-apply-edition edition=  enterprise-per-socket|desktop-plus|desktop|standard-per-socke
  license-server-address=<license_server_address> pool-uuid=<uuid_of_pool> \
  license-server-port=<license_server_port>
```

3.1. Additional Licensing Information

This section discusses miscellaneous licensing information, such as, license expiry and grace periods.

Refer to the *XenServer 7.0 Licensing FAQ* for more information.

License Expiry

XenCenter notifies you when your license is due to expire. You should purchase a license before it expires. When a XenServer license expires:

- XenCenter License Manager will display the status as Unlicensed.
- you will no longer be able to access licensed features or receive Citrix Technical Support for any host within the pool until you purchase another license.

License Grace Period

Citrix licensing has built-in timeout technology. After a startup license is checked out by a XenServer host, XenServer and the License Server exchange "heartbeat" messages every five minutes to indicate to each other that they are still up and running. If a XenServer host cannot contact the License Server, for example, due to problems with the License Server hardware or software or network failures, the server lapses into a 30-day licensing grace period. During the grace period, XenServer licenses itself through cached information and the hosts are allowed to continue operations as if they were still in communication with the License Server. The grace period is 30 days and when the grace period runs out, XenServer reverts to an unlicensed state. After communication is re-established between XenServer and the License Server, the grace period is reset.

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Chapter 4. Installing XenServer and XenCenter

This chapter steps through installing the XenServer host software on physical servers, installing XenCenter on Windows workstations and finally connecting them to form the infrastructure for creating and running Virtual Machines (VMs).

After guiding you through installation, this chapter describes a selection of common installation and deployment scenarios.

4.1. Installation Media and Methods

XenServer installs directly on bare-metal hardware avoiding the complexity, overhead, and performance bottlenecks of an underlying operating system. It uses the device drivers available from the Linux kernel. As a result, XenServer can run on a wide variety of hardware and storage devices. However, Citrix recommends that you use certified device drivers; refer to the XenServer Hardware Compatibility List (HCL) for details.

The XenServer host consists of:

- The **Xen Hypervisor**: The hypervisor is the basic abstraction layer of software. The hypervisor is responsible for low-level tasks such as CPU scheduling and is responsible for memory isolation for resident VMs. The hypervisor abstracts from the hardware for the VMs. The hypervisor has no knowledge of networking, external storage devices, video, etc. The *Linux Foundation Xen Project* community develops and maintains the Xen hypervisor as free software licensed under the GNU General Public License. XenServer 7.0 uses v4.6 of the Xen hypervisor
- The **Control Domain**: Also known as 'Domain0', or 'dom0', the Control Domain is a secure, privileged Linux VM (based on a CentOS 7.2 distribution) that runs the XenServer management toolstack. Besides providing XenServer management functions, the Control Domain also runs the driver stack that provides user created Virtual Machines (VMs) access to physical devices.
- The **management toolstack**: Also known as **xapi**, this software toolstack controls VM lifecycle operations, host and VM networking, VM storage, user authentication, and allows the management of XenServer resource pools. xapi provides the publicly documented XenAPI Management Interface which is used by all tools that manage VMs and resource pools.
- VM templates, for installing popular operating systems as VMs.
- A local Storage Repository (SR) reserved for VMs.

> **Important:**
>
> The XenServer host must be installed on a dedicated 64-bit x86 server.
>
> Do not install any other operating system in a dual-boot configuration with the XenServer host; this is an unsupported configuration.

Installation Media

Installers for both the XenServer host and XenCenter are located on the installation media. The installation media also includes the *Readme First*, which provides descriptions of and links to helpful resources, including product documentation for XenServer and XenServer components.

Installation Methods

There are three methods by which to install the XenServer host:

- From a CD

You can download the installer (ISO file format) and burn it to a CD. To download the installer, visit the XenServer Downloads page.

The main XenServer installation file contains the basic packages required to set up XenServer on your host and install XenCenter on your Windows computer, in conjunction with the desired Windows installation media.

- Set up a network-accessible TFTP server to boot.

  For details about setting up a TFTP server to boot the installer using network, see Appendix C, *Network Boot Installations*.

- Install XenServer to a remote disk on a SAN to enable boot from SAN

  For details, see Appendix B, *Boot From SAN Environments*.

Supplemental Packs

You can install any required supplemental pack after installing XenServer. To do so, mount the appropriate installation media on the XenServer host, and then run the script **install.sh**, located in the root directory of the CD.

Upgrades

The installer presents the option to upgrade if it detects a previously installed version of XenServer. The upgrade process follows the first-time installation process, but several setup steps are bypassed. The existing settings are retained, including networking configuration, system time and so on.

> **Important:**
>
> Upgrading requires careful planning and attention. For detailed information about upgrading individual XenServer hosts and pools, see Chapter 7, *Upgrading XenServer*.

4.2. Installing the XenServer Host

> **Warning:**
>
> Installing XenServer will overwrite data on any hard drives that you select to use for the installation. Back up data that you wish to preserve before proceeding.

To install or upgrade the XenServer host:

1. Boot the computer from the installation CD or, if applicable, network-boot from your TFTP server.
2. Following the initial boot messages and the **Welcome to XenServer** screen, select your keyboard layout for the installation.

   > **Tip:**
   >
   > Throughout the installation, quickly advance to the next screen by pressing **F12**. Use **Tab** to move between elements, and **Space** or **Enter** to select. For general help, press **F1**.
   >
   > **Note:**
   >
   > If a **System Hardware** warning screen is displayed and you suspect that hardware virtualization assist support is available on your system, check the support site of your hardware manufacturer for BIOS upgrades.

3. The **Welcome to XenServer Setup** screen is displayed.

   XenServer ships with a broad driver set that supports most modern server hardware configurations. However, if you have been provided with any supplemental packs containing additional essential drivers, press **F9**. The installer will then step you through installing the necessary drivers.

   Once you have installed all of the required drivers, select **Ok** to proceed.

XenServer enables customers to configure the XenServer installation to boot from FCoE. Press **F10** and follow the instructions displayed on the screen to set up FCoE.

Note:

Before enabling XenServer to boot from FCoE, the configuration required to expose a LUN to the host must be completed manually, including configuring the storage fabric and allocating LUNs to your SAN's public world wide name (PWWN). After completing this configuration, available LUN should be mounted to the host's CNA as a SCSI device. The SCSI device can then be used to access the LUN as if it were a locally attached SCSI device. For information about configuring the physical switch and the array to support FCoE, refer to the documentation provided by the vendor.

4. The XenServer End User License Agreement (EULA) is displayed. Use the **Page Up** and **Page Down** keys to scroll through and read the agreement. Choose **Accept EULA** to proceed.
5. Select an installation action, as appropriate. You may see any of the following options:

   - *Perform clean installation*
   - *Upgrade*: if the installer detects a previously-installed version of XenServer, it offers the option to upgrade. For details on upgrading your XenServer host, see Chapter 7, *Upgrading XenServer*.
   - *Restore*: if the installer detects a previously-created backup installation, it offers the option to restore XenServer from the backup. For details, see the *XenServer Administrator's Guide*.

   Make your selection, and choose **Ok** to proceed.
6. If you have multiple local hard disks, choose a Primary Disk for the installation. Select **Ok**.
7. Choose which disk(s) you would like to use for virtual machine storage. Information about a specific disk can be viewed by pressing **F5**.

   If you want to use Thin Provisioning to optimize the utilization of available storage, select **Enable thin provisioning**. XenDesktop users are *strongly* recommended to select this option in order for local caching to work properly. For details, see Chapter 6, *XenServer and IntelliCache*.

   Choose **Ok**.
8. Select your installation media source.

   If installing from a CD, choose **Local media**. If installing using network, select **HTTP or FTP** or **NFS**, as appropriate. Choose **Ok** to proceed.

   If you select **Local media**, the next screen asks if you want to install any supplemental packs from a CD. If you plan to install any supplemental packs provided by your hardware supplier, choose **Yes**.

   If you select **HTTP or FTP** or **NFS**:

   a. Set up networking so that the installer can connect to the XenServer installation media files.

      If the computer has multiple NICs, select one of them to be used to access the XenServer installation media files, and then choose **Ok** to proceed.

   b. Choose **Automatic configuration (DHCP)** to configure the NIC using DHCP, or **Static configuration** to configure the NIC manually. If you choose **Static configuration**, enter details as appropriate.

   c. If you choose **HTTP or FTP**, you are then prompted to provide the URL for your HTTP or FTP repository, and a username and password, if appropriate.

      If you choose **NFS**, you are prompted to provide the server and path of your NFS share.

      Select **Ok** to proceed.

9. Indicate if you want to verify the integrity of the installation media. If you select **Verify installation source**, the MD5 checksum of the packages is calculated and checked against the known value. Verification may take some time. Make your selection and choose **Ok** to proceed.
10. Set and confirm a root password, which XenCenter will use to connect to the XenServer host. You will also use this password (with username "root") to log into **xsconsole**, the system configuration console.
11. Set up the primary management interface that will be used to connect to XenCenter.

    If your computer has multiple NICs, select the NIC which you wish to use for management. Choose **Ok** to proceed.
12. Configure the Management NIC IP address by choosing **Automatic configuration (DHCP)** to configure the NIC using DHCP, or **Static configuration** to manually configure the NIC.

    Note:

    To be part of a pool, XenServer hosts must have static IP addresses or be DNS addressable. When using DHCP, ensure that a static DHCP reservation policy is in place.
13. Specify the hostname and the DNS configuration, manually or automatically via DHCP.

    In the **Hostname Configuration** section, select **Automatically set via DHCP** to have the DHCP server provide the hostname along with the IP address. If you select **Manually specify**, enter the desired hostname for the server in the field provided.

    Note:

    If manually specifying the hostname, enter a short hostname and *not the fully qualified domain name (FQDN)*. Entering an FQDN may cause external authentication to fail, or the XenServer host may be added to AD with a different name.

    In the **DNS Configuration** section, choose **Automatically set via DHCP** to get name service configuration using DHCP. If you select **Manually specify**, enter the IP address(es) of your primary (required), secondary (optional), and tertiary (optional) DNS servers in the fields provided.

    Select **Ok** to proceed.
14. Select your time zone — the geographical area and then city. You can type the first letter of the desired locale to jump to the first entry that begins with this letter. Choose **Ok** to proceed.
15. Specify how you would like the server to determine local time: using NTP or manual time entry. Make your selection, and choose **Ok** to proceed.
16. If using NTP, either select **NTP is configured by my DHCP server** to have DHCP set the time server or enter at least one NTP server name or IP address in the fields below. Choose **Ok**.

    Note:

    XenServer assumes that the time setting in the BIOS of the server is the current time in UTC.
17. Select **Install XenServer**.

    If you elected to set the date and time manually, you will be prompted to do so during the installation. Once set, choose **Ok** to proceed.
18. If you are installing from a CD and elected to include supplemental packs, you will be prompted to insert them. Eject the XenServer installation CD, and insert the supplemental pack CD. Choose **Ok**.

    Select **Use media** to proceed with the installation.

    Repeat for each pack to be installed.
19. From the **Installation Complete** screen, eject the installation CD (if installing from CD) and select **Ok** to reboot the server.

After the server reboots, XenServer displays **xsconsole**, a system configuration console. To access a local shell from **xsconsole**, press **Alt+F3**; to return to **xsconsole**, press **Alt+F1**

Note:

Make note of the IP address displayed. You will use this when you connect XenCenter to the XenServer host.

4.2.1. XenServer Host Partition Layout

XenServer 7.0 introduces a new host disk partition layout. By moving log files to a larger, separate partition, we enable more detailed logs to be held, over a longer period of time, improving the ability to diagnose issues. Simultaneously, this alleviates demands on Dom0's root disk, and avoids potential space issues due to log file disk space consumption. The new layout contains the following partitions:

- 18GB XenServer host control domain (dom0) partition
- 18GB backup partition
- 4GB logs partition
- 1GB swap partition
- 0.5GB UEFI boot partition

In XenServer 6.5.0 and earlier releases, the 4 GB control domain (dom0) partition was used for all dom0 functions, including swap and logging. Customers who do not use remote syslog and those with third-party monitoring tools and supplemental packs found the size of the partition to be limited. XenServer 7.0 eliminates this issue and provides a dedicated 18GB partition to dom0. In addition, a larger partition dedicated to dom0 reduces demand on the dom0 root disk which can offer significant performance improvements.

The introduction of the 4GB dedicated log partition eliminates scenarios where excessive logging filled up the dom0 partition and affected the behavior of the host. This also enables customers to retain a detailed list of logs for a longer period of time, improving the ability to diagnose issues.

With the introduction of support for UEFI boot in XenServer 7.0, the new partition layout also contains a dedicated 500MB required for UEFI boot.

Note:

Customers installing XenServer 7.0 with the new partition layout described above should ensure they have a disk that is at least 46GB in size.

Customers who would like to install XenServer 7.0 on smaller devices, that is devices with more than 12GB but less than 46GB disk space, can perform a clean installation of XenServer 7.0 using the legacy DOS partition layout. For more information, see Appendix D, *Installing XenServer on Small Devices*.

Important:

Citrix recommends that you allocate a minimum of 46GB disk space and install XenServer 7.0 using the new GPT partition layout.

Upgrading to the New Partition Layout

When upgrading to XenServer 7.0 from a previous version of XenServer using XenCenter, the host partition layout will be upgraded to the new layout, provided:

- There is at least 46GB of disk space on the local SR
- There are no VDIs present on the local SR

- You use XenCenter issued with XenServer 7.0 to perform a Rolling Pool Upgrade (RPU) to XenServer 7.0

  Warning:

  Customers cannot upgrade to the new host partition layout using xe CLI.

During the upgrade process, the RPU wizard checks for VDIs on the local SR. If there are any virtual disks (VDIs) present during the upgrade process, the wizard prompts you to move the VDI. You should move VDIs on the local SR to a shared SR and then restart the upgrade process in order to continue with the new layout. If, for any reason, the VDIs cannot be moved, or if there is insufficient space (less than 46GB) on the local SR, the upgrade will proceed with the old partition layout and allocates 0.5GB of disk space from the dom0 partition to UEFI boot.

Restoring the Old Partition Layout

If you plan to restore XenServer from version 7.0 to version 6.x, the host partition layout reverts to the 6.x layout. Refer to the corresponding *XenServer Administrator's Guide* for details.

Legacy Partition Layouts

- XenServer 5.6 Service Pack 2 and earlier used DOS partition tables to separate the root file system and backups from the local storage.
- XenServer 6.0 introduced GUID partition tables to separate root file system, backup and local storage.
- Installing XenServer 7.0 with `disable-gpt` on machines with mandatory initial partition that must be preserved, for example, the Dell Utility Partition, will continue to use the DOS partitioning scheme. Upgrades from a XenServer 5.x release to 6.0 and then to 7.0 will continue to use the existing DOS partitioning so as not to destroy any existing local storage.

The following table lists the installation and upgrade scenarios and the partition layout that will be applied after these operations:

Operation	Number of partitions before upgrade	Number of partitions after installation/ upgrade	Partition table type
Clean installation with at least 46GB of primary disk space	NA	6*	New GPT
Clean installation with `disable-gpt` with a minimum of 12GB of primary disk space	NA	3† (4 ‡ if there is a Utility partition)	DOS
Upgrading from XenServer 6.x to 7.0 with VMs on local SR or with less than 46GB of primary disk space	3	4	Old GPT
Upgrading from XenServer 6.x to 7.0 without any VMs on local storage or with more than 46GB of primary disk space	3	6	New GPT
Upgrading from XenServer 6.x DOS partition (and Utility partition, if any) to XenServer 7.0	3 (4 if there is a Utility partition)	3 (4 if there is a Utility partition)	DOS

*includes root, backup, local SR (if any), boot, log, and SWAP

†includes root, backup, and local SR (if any)

‡includes root, backup, local SR (if any), and boot

4.3. Installing XenCenter

XenCenter must be installed on a remote Windows machine that can connect to the XenServer host through your network. The .NET framework version 3.5 must also be installed on this workstation.

The XenCenter installation media is bundled with the XenServer installation media. You can also download the latest version of XenCenter from the Citrix XenServer Download page.

To install XenCenter:

1. Before installing XenCenter, be sure to uninstall any previous version.
2. Launch the installer.

   If installing from a XenServer installation CD:

   a. Insert the CD into the DVD drive of the computer which you want to run XenCenter.

   b. Open the `client_install` folder on the CD. Double-click `XenCenterSetup.exe` to begin the installation.
3. Follow the Setup wizard, which allows you to modify the default destination folder and then to install XenCenter.

4.4. Connecting XenCenter to the XenServer Host

To connect XenCenter to the XenServer host:

1. Launch XenCenter. The program opens to the **Home** tab.
2. Click the **Add New Server** icon.
3. Enter the IP address of the XenServer host in the **Server** field. Type the root username and password that you set during XenServer installation. Click **Add**.
4. The first time you add a new host, the **Save and Restore Connection State** dialog box appears. This enables you to set your preferences for storing your host connection information and automatically restoring host connections.

   If you later need to change your preferences, you can do so using XenCenter or the Windows Registry Editor.

   To do so in XenCenter: from the main menu, select **Tools** and then **Options**. The **Options** dialog box opens. Select the **Save and Restore** tab and set your preferences. Click **OK** to save your changes.

   To do so using the Windows Registry Editor, navigate to the key `HKEY_LOCAL_MACHINE\Software\Citrix\XenCenter` (if you installed XenServer for use by all users) and add a key named `AllowCredentialSave` with the string value `true` or `false`.

Chapter 5. Installation and Deployment Scenarios

This chapter steps through the following common installation and deployment scenarios:

- One or more XenServer host(s) with local storage
- Pools of XenServer hosts with shared storage:
  - Multiple XenServer hosts with shared NFS storage
  - Multiple XenServer hosts with shared iSCSI storage

5.1. XenServer Hosts with Local Storage

The simplest deployment of XenServer is to run VMs on one or more XenServer host(s) with local storage.

> **Note:**
>
> Without shared storage, XenMotion live migration of VMs between XenServer hosts is not available.

Basic hardware requirements:

- One or more 64-bit x86 server(s) with local storage
- One or more Windows workstation(s), on the same network as the XenServer host(s)

High-level procedure:

1. Install the XenServer host software on the server(s).
2. Install XenCenter on the workstation(s).
3. Connect XenCenter to the XenServer host(s).

   Once you have connected XenCenter to a XenServer host, storage is automatically configured on the local disk of the host.

5.2. Pools of XenServer Hosts with Shared Storage

A **pool** is comprised of multiple XenServer host installations, bound together as a single managed entity. When combined with shared storage, a pool enables VMs to be started on *any* XenServer host in the pool that has sufficient memory, and then dynamically moved between hosts while running (XenMotion), and with minimal downtime. If an individual XenServer host suffers a hardware failure, you can restart the failed VM(s) on another host in the same pool.

If the High Availability (HA) feature is enabled, protected VMs are *automatically* moved in the event of a host failure.

To set up **shared storage** between hosts in a pool, you need to create a storage repository. A XenServer storage repository (SR) is a storage container in which virtual disks are stored. SRs, like virtual disks, are persistent, on-disk objects that exist independently of XenServer. SRs can exist on different types of physical storage devices, both internal and external, including local disk devices and shared network storage. A number of different types of storage are available when you create a new SR, including:

- NFS VHD storage
- Software iSCSI storage
- Hardware HBA storage

This following sections step through setting up two common shared storage solutions — NFS and iSCSI — for a pool of XenServer hosts. Before you create a new SR, you need to configure your NFS or iSCSI storage. Setup differs depending on the type of storage solution that you use, so it is best to refer to your vendor documentation for details. In all cases, to be part of a pool, the servers providing shared storage must have static IP addresses or be DNS addressable. For further information on setting up shared storage, see the *XenServer Administrator's Guide*.

It is recommended that you create a pool before you add shared storage. For pool requirements and setup procedures, see the XenCenter *Help* or the *XenServer Administrator's Guide*.

5.2.1. XenServer Hosts with Shared NFS Storage

Basic hardware requirements:

- Two or more 64-bit x86 servers with local storage
- One or more Windows workstation(s), on the same network as the XenServer hosts
- A server exporting a shared directory over NFS

High-level procedure:

1. Install the XenServer host software on the servers.
2. Install XenCenter on the workstation(s).
3. Connect XenCenter to the XenServer hosts.
4. Create your pool of XenServer hosts.
5. Configure the NFS server.
6. Create an SR on the NFS share at the pool level.

Configuring you NFS storage

Before you create an SR, you need to configure the NFS storage. To be part of a pool, the NFS share must have a static IP address or be DNS addressable. You must also configure the NFS server to have one or more target(s) that can be mounted by NFS clients (for example, XenServer hosts in a pool). Setup differs depending on your storage solution, so it is best to see your vendor documentation for details.

To create an SR on the NFS share at the pool level in XenCenter:

1. On the **Resources** pane, select the pool. On the toolbar, click the **New Storage** button. The New Storage Repository wizard opens.
2. Under **Virtual disk storage**, choose NFS VHD as the storage type. Choose **Next** to continue.
3. Enter a name for the new SR and the name of the share where it is located. Click **Scan** to have the wizard scan for existing NFS SRs in the specified location.

   Note:

   The NFS server must be configured to export the specified path to all XenServer hosts in the pool.
4. Click **Finish**.

   The new SR appears in the **Resources** pane, at the pool level.

Creating an SR on the NFS share at the pool level using the xe CLI:

1. Open a console on any XenServer host in the pool.
2. Create the storage repository on *server:/path* by entering the following:

   ```
   xe sr-create content-type=user type=nfs name-label=<sr_name=> \
        shared=true device-config:server=<server> \
        device-config:serverpath=<path>
   ```

   The *device-config-server* argument refers to the name of the NFS server and the *device-config-serverpath* argument refers to the path on the server. Since *shared* is set to true, the shared storage is automatically connected to every host in the pool and any hosts that subsequently join are also connected to the storage. The UUID of the created storage repository is printed to the console.
3. Find the UUID of the pool by using the **pool-list** command.
4. Set the new SR as the pool-wide default by entering the following:

   ```
   xe pool-param-set uuid=<pool_uuid> \
        default-SR=<storage_repository_uuid>
   ```

   As shared storage has been set as the pool-wide default, all future VMs will have their disks created on this SR.

5.2.2. XenServer Hosts with Shared iSCSI Storage

Basic hardware requirements:

- Two or more 64-bit x86 servers with local storage
- One or more Windows workstation(s), on the same network as the XenServer hosts
- A server providing a shared directory over iSCSI

High-level procedure:

1. Install the XenServer host software on the servers.
2. Install XenCenter on the workstation(s).
3. Connect XenCenter to the XenServer hosts.
4. Create your pool of XenServer hosts.
5. Configure the iSCSI storage.
6. If necessary, enable multiple initiators on your iSCSI device.
7. If necessary, configure the iSCSI IQN for each XenServer host.

8. Create an SR on the iSCSI share at the pool level.

Configuring your iSCSI storage

Before you create an SR, you need to configure the iSCSI storage. To be part of a pool, the iSCSI storage must have a static IP address or be DNS addressable. You will also need to provide an iSCSI target LUN on the SAN for the VM storage, and then configure XenServer hosts to be able to see and access it. Both the iSCSI target and each iSCSI initiator on each XenServer host must have a valid and **unique** iSCSI Qualified Name (IQN). For configuration details, it is best to see your vendor documentation.

Configuring an iSCSI IQN for each XenServer host

Upon installation, XenServer automatically attributes a unique IQN to each host. If you need to adhere to a local administrative naming policy, you can change the IQN by entering the following on the host console:

```
xe-set-iscsi-iqn <iscsi_iqn>
```

Or, you can use the xe CLI by entering the following:

```
xe host-param-set uuid=<host_uuid> other-config-iscsi_iqn=<iscsi_iqn>
```

To create an SR on the iSCSI share at the pool level using XenCenter:

Warning:

When using XenCenter to create SRs for iSCSI and NetApp storage, any existing contents of the volume are destroyed.

1. On the **Resources** pane, select the pool. On the toolbar, click the **New Storage** button. The New Storage Repository wizard opens.
2. Under **Virtual disk storage**, choose Software iSCSI as the storage type. Choose **Next** to continue.
3. Enter a name for the new SR and then the IP address or DNS name of the iSCSI target.

   Note:

   The iSCSI storage target must be configured to enable every XenServer host in the pool to have access to one or more LUN(s).
4. If you have configured the iSCSI target to use CHAP authentication, enter the User and Password.
5. Click the **Discover IQNs** button, and then choose the iSCSI target IQN from the Target IQN list.

   Warning:

   The iSCSI target and all servers in the pool must have *unique* IQNs.
6. Click the **Discover LUNs** button, and then choose the LUN on which to create the SR from the Target LUN list.

   Warning:

   Each individual iSCSI storage repository must be contained entirely on a single LUN, and may not span more than one LUN. Any data present on the chosen LUN will be destroyed.
7. Click **Finish**.

   The new SR appears in the **Resources** pane, at the pool level.

To create an SR on the iSCSI share at the pool level using the xe CLI:

1. On the console of any server in the pool, run the command:

```
xe sr-create name-label=<name_for_sr> \
content-type=user device-config-target=<iscsi_server_ip_address> \
device-config-targetIQN=<iscsi_target_iqn> \
device-config-localIQN=<iscsi_local_iqn> \
type=lvmoiscsi shared=true device-config-LUNid=<lun_id>
```

The *device-config-target* argument refers to the name or IP address of the iSCSI server. The *device-config-LUNid* argument can be a list of LUN IDs (separated by commas). Since the *shared* argument is set to `true`, the shared storage is automatically connected to every host in the pool and any hosts that subsequently join are also connected to the storage.

The command returns the UUID of the created storage repository.

2. Find the UUID of the pool by running the **pool-list** command.
3. Set the new SR as the pool-wide default by entering the following:

```
xe pool-param-set uuid=<pool_uuid> default-SR=<iscsi_shared_sr_uuid>
```

As shared storage has been set as the pool-wide default, all future VMs will have their disks created on this SR.

Chapter 6. XenServer and IntelliCache

Note:

This feature is only supported when using XenServer with XenDesktop.

Using XenServer with *IntelliCache* makes hosted Virtual Desktop Infrastructure deployments more cost-effective by enabling you to use a combination of shared storage and local storage. It is of particular benefit when many Virtual Machines (VMs) all share a common OS image. The load on the storage array is reduced and performance is enhanced. In addition, network traffic to and from shared storage is reduced as the local storage caches the master image from shared storage.

IntelliCache works by caching data from a VMs parent VDI in local storage on the VM host. This local cache is then populated as data is read from the parent VDI. When many VMs share a common parent VDI (for example by all being based on a particular master image), the data pulled into the cache by a read from one VM can be used by another VM. This means that further access to the master image on shared storage is not required.

A thin provisioned, local SR is an IntelliCache prerequisite. Thin Provisioning is a way of optimizing the utilization of available storage. This approach allows you to make more use of local storage instead of shared storage. It relies on on-demand allocation of blocks of data instead of the traditional method of pre-allocating all of the blocks.

Important:

Thin Provisioning changes the default local storage type of the host from LVM to EXT3. Thin Provisioning **must be** enabled in order for XenDesktop local caching to work properly.

Thin Provisioning allows the administrator to present more storage space to the VMs connecting to the Storage Repository (SR) than is actually available on the SR. There are no space guarantees, and allocation of a LUN does not claim any data blocks until the VM writes data.

Warning:

Thin provisioned SRs may run out of physical space, as the VMs within can grow to consume disk capacity on demand. IntelliCache VMs handle this condition by automatically falling back to shared storage if the local SR cache is full. It is not recommended to mix traditional virtual machines and IntelliCache VMs on the same SR, as intellicache VMs may grow quickly in size.

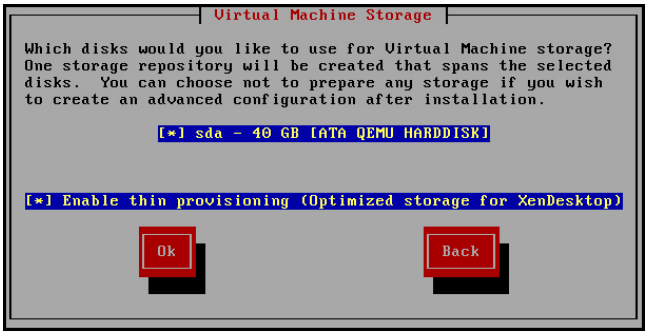
6.1. IntelliCache Deployment

IntelliCache must be enabled either during host installation or be enabled manually on a running host using the CLI.

Citrix recommends that you use a high performance local storage device to ensure the fastest possible data transfer such as a Solid State Disk or a high performance RAID array. Both data throughput and storage capacity should be considered when sizing local disks. The shared storage type, used to host the source Virtual Disk Image (VDI), must be NFS or EXT based.

6.1.1. Enabling on Host Installation

To enable IntelliCache during host installation, on the Virtual Machine Storage screen, select **Enable thin provisioning (Optimized storage for XenDesktop)**. This selects the host's local SR to be the one to be used for the local caching of VM VDIs.



6.1.2. Converting an Existing Host to Use Thin Provisioning

To destroy an existing LVM based local SR, and replace it with a thin provisioned EXT3 based SR, enter the following commands.

> **Warning:**
>
> These commands will destroy your existing local SR, and VMs on the SR will be permanently deleted.

```
localsr=`xe sr-list type=lvm host=<hostname> params=uuid --minimal`
    echo localsr=$localsr
    pbd=`xe pbd-list sr-uuid=$localsr params=uuid --minimal`
    echo pbd=$pbd
    xe pbd-unplug uuid=$pbd
    xe pbd-destroy uuid=$pbd
    xe sr-forget uuid=$localsr
    sed -i "s/'lvm'/'ext'/" /etc/firstboot.d/data/default-storage.conf
    rm -f /etc/firstboot.d/state/10-prepare-storage
    rm -f /etc/firstboot.d/state/15-set-default-storage
    service firstboot start
    xe sr-list type=ext
```

To enable local caching, enter the following commands:

```
xe host-disable host=<hostname>
    localsr=`xe sr-list type=ext host=<hostname> params=uuid --minimal`
    xe host-enable-local-storage-caching host=<hostname> sr-uuid=$localsr
    xe host-enable host=<hostname>
```

6.1.3. VM Boot Behavior

There are two options for the behavior of a VM VDI when the VM is booted:

1. **Shared Desktop Mode**

   On VM boot, the VDI is reverted to the state it was in at the previous boot. All changes while the VM is running will be lost when the VM is next booted.

   Select this option if you plan to deliver standardized desktops to which users cannot make permanent changes.

2. **Private Desktop Mode**

   On VM boot, the VDI is in the state it was left in at the last shutdown.

   Select this option if you plan to allow users to make permanent changes to their desktops.

6.1.3.1. VM Caching Behavior Settings

The VDI flag **allow-caching** dictates the caching behavior:

6.1.3.1.1. Shared Desktop Mode

For shared desktops, the **on-boot** option is set to `reset` and the **allow-caching** flag is set to `true`, new VM data is written only to local storage – there will be no writes to shared storage. This means that the load on shared storage is significantly reduced. However the VM cannot be migrated between hosts.

6.1.3.1.2. Private Desktop Mode

For private desktops, the **on-boot** option is set to `persist` and the **allow-caching** flag is set to `true`, new VM data is written to both local and shared storage. Reads of cached data do not require I/O traffic to shared storage so the load on shared storage is somewhat reduced. VM Migration to another host is permitted and the local cache on the new host is populated as data is read.

6.1.4. Implementation Details and Troubleshooting

Q: Is IntelliCache compatible with XenMotion and High Availability?

A: You can use XenMotion and High Availability with IntelliCache when virtual desktops are in Private mode, that is when `on-boot=persist`

> **Warning:**
>
> A VM cannot be migrated if any of its VDIs have caching behavior flags set to `on-boot=reset` and `allow-caching=true`. Migration attempts for VMs with these properties will fail.

Q: Where does the local cache live on the local disk?

A: The cache lives in a Storage Repository (SR). Each host has a configuration parameter (called **local-cache-sr**) indicating which (local) SR is to be used for the cache files. Typically this will be a EXT type SR. When you run VMs with IntelliCache, you will see files inside the SR with names `<uuid>.vhdcache`. This is the cache file for the VDI with the given UUID. These files are not displayed in XenCenter – the only way of seeing them is by logging into dom0 and listing the contents of `/var/run/sr-mount/<sr-uuid>`

Q: How do I specify a particular SR for use as the cache?

A: The host object field **local-cache-sr** refers to a local SR. You can view its value by running the following command:

```
xe sr-list params=local-cache-sr,uuid,name-label
```

This field is set either:

- after host installation, if the "Enable thin provisioning" option was selected in the host installer
- by executing `xe host-enable-local-storage-caching host=<host> sr-uuid=<sr>`. This command requires the specified host to be disabled, VMs must be shut down if this command is used.

The first option uses the EXT type local SR and is created during host installation. The second option, uses the SR that is specified on the command-line.

Warning:

These steps are only necessary for users who have configured more than one local SR.

Q: When is the local cache deleted?

A: A VDI cache file is only deleted when the VDI itself is deleted. The cache is reset when a VDI is attached to a VM (for example on VM start). If the host is offline when the VDI is deleted, the SR synchronisation that runs on startup will garbage collect the cache file.

Note:

The cache file is not deleted from the host when a VM is migrated to a different host or shut down.

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Chapter 7. Upgrading XenServer

This chapter documents how to upgrade your XenServer deployment using XenCenter and the xe CLI. It guides you through upgrading your XenServer hosts — both pooled and standalone — automatically (using the XenCenter Rolling Pool Upgrade wizard) and manually.

XenServer hosts must be running at least version 6.0 in order to upgrade directly to version 7.0. Customers wishing to upgrade from earlier versions of XenServer should first upgrade to version 6.2.0, before upgrading to version 7.0 .

The following table lists the upgrade path from previous versions of XenServer:

Version	Direct upgrade to XenServer 7.0?
XenServer 6.5.0	Yes
XenServer 6.2.0	Yes
XenServer 6.1.0	Yes
XenServer 6.0.2	Yes
XenServer 6.0	Yes
XenServer 5.6, 5.6 Feature Pack 1, 5.6 Service Pack 2	No. You must first upgrade to XenServer 6.2.0, and then to version 7.0
XenServer 5.5	No. You must first upgrade to XenServer 5.6 (or 5.6 Feature Pack 1, or 5.6 Service Pack 2), and then to 6.2.0, and finally to version 7.0.
XenServer 5.0.0	No. You must first upgrade to XenServer 5.5, then to 5.6 (or to 5.6 Feature Pack 1 or 5.6 Service Pack 2), then to 6.2.0, and finally to version 7.0

Note:

System administrators may prefer to perform a clean installation of the most recent version of XenServer rather than performing one or more upgrades. VMs can be exported from all versions of XenServer from 4.0 and directly imported into 7.0. For more information, please refer to the Importing and Exporting VMs chapter in the *Virtual Machine User's Guide.*

Important:

Upgrading a XenServer host — and particularly a pool of XenServer hosts — requires careful planning and attention. Be sure to map your upgrade path carefully, or to use the XenCenter Rolling Pool Upgrade wizard, and to be absolutely sure that you choose the option to *upgrade* when you are stepping through the installer so as to avoid losing any existing data.

Important:

Boot from SAN settings are *not* inherited during the manual upgrade process. When upgrading using the ISO or PXE process, customers should follow the same instructions as used in the installation process below to ensure that `multipathd` is correctly configured. For more information see Appendix B, *Boot From SAN Environments*.

7.1. Rolling Pool Upgrades

With XenServer, you can perform rolling pool upgrades. A rolling upgrade allows you to upgrade all of the hosts in a pool in such a way that services and resources offered by the pool are available throughout the upgrade

process. This upgrade method keeps critical VMs running by enabling you to live migrate them to other hosts in the pool and then to upgrade one host at a time. This process takes only one XenServer host offline at a time.

You can perform a rolling pool upgrade using XenCenter or the xe CLI. If you are using XenCenter, Citrix recommends using the Rolling Pool Upgrade wizard. This wizard organizes the upgrade path automatically and guides you through the upgrade procedure. If you are using the xe CLI, you need to perform the rolling upgrade manually by first planning your upgrade path and then live migrating running VMs between XenServer hosts accordingly.

Important:

Rolling Pool Upgrade should **not** be used with Boot from SAN environments. For more information on upgrading boot from SAN environments see Appendix B, *Boot From SAN Environments*.

Warning:

Integrated StorageLink (iSL) has been removed from XenServer version 6.5.0 and higher, and these SR types are no longer available. Applications, code, or usage that depend on iSL will not function in XenServer 6.5.0 and higher. See CTX141433 for information about migrating existing virtual disks (VDIs) from a iSL SR to an iSCSI or Fibre Channel SR.

7.1.1. Upgrading XenServer Hosts Using the XenCenter Rolling Pool Upgrade Wizard

You can use the Rolling Pool Upgrade wizard to upgrade XenServer hosts — hosts in a pool or standalone — to the current version of XenServer

The wizard guides you through the upgrade procedure and organizes the upgrade path automatically. For pools, each of the hosts in the pool is upgraded in turn, starting with the pool master. Before starting an upgrade, the wizard conducts a series of prechecks to ensure that certain pool-wide features, such as HA, are temporarily disabled and that each host in the pool is prepared for upgrade (for example, that the CD/DVD drive of each host is empty). Only one host is offline at a time, and any running VMs are automatically migrated off each host before the upgrade is installed on that host.

The wizard can operate in **Manual** or **Automatic** mode:

- In **Manual Mode**, you must manually run the XenServer installer on each XenServer host in turn and follow the on-screen instructions on the serial console of the host. Once the upgrade begins, XenCenter prompts you to insert the XenCenter installation media or specify a network boot server for each host that you upgrade.
- In **Automatic Mode**, the wizard uses network installation files located on an HTTP, NFS or FTP server to upgrade each host in turn, without requiring you to insert installation media, manually reboot, or step through the installer on each host. If you choose to perform a rolling pool upgrade in this manner, then you must unpack the XenServer installation media onto your HTTP, NFS or FTP server before starting the upgrade.

Before You Upgrade

Before you begin your upgrade, be sure to make the following preparations:

- Download and install XenCenter issued with XenServer 7.0 from the XenServer Product Download page. Using earlier versions of XenCenter to upgrade to a newer version of XenServer is not supported.
- Citrix strongly recommends that you take a backup of the state of your existing pool using the **pool-dump-database** xe CLI command (see the *XenServer Administrator's Guide*). Taking a backup state ensures that you can revert a partially complete rolling upgrade to its original state without losing VM data.
- Ensure that your hosts are not over-provisioned: check that hosts have sufficient memory to carry out the upgrade. As a general guideline, if N equals the total number of hosts in a pool, then there needs to be sufficient memory across N-1 hosts to run all of the live VMs in the pool, as the Rolling Pool Upgrade wizard migrates VMs from and shuts down one host in a pool at a time. It is best to suspend any non-critical VMs during the upgrade process.

While the Rolling Pool Upgrade wizard checks that the following actions have been taken, you may choose to perform them before you begin:

- Empty the CD/DVD drives of the VMs in the pool(s).
- Disable HA.

To upgrade XenServer hosts using the XenCenter Rolling Pool Upgrade wizard:

1. Open the Rolling Pool Upgrade wizard: on the **Tools** menu, select **Rolling Pool Upgrade**.
2. Read the **Before You Start** information, and then click **Next** to continue.
3. Select the pool(s) and/or individual hosts that you wish to upgrade, and then click **Next**.
4. Choose **Automatic Mode** or **Manual Mode**, depending on whether you are planning an automated upgrade from network installation files located on an HTTP, NFS or FTP server, or a manual upgrade from either a CD/DVD or using network boot (using already existing infrastructure).

   Note:

   If you choose **Manual Mode**, you must run the XenServer installer on each XenServer host in turn and follow the on-screen instructions on the serial console of the host. Once the upgrade begins, XenCenter prompts you to insert the XenServer installation media or specify a network boot server for each host that you upgrade.

   Once you have selected your Upgrade Mode, click **Run Prechecks**.
5. Follow the recommendations to resolve any upgrade prechecks that have failed. If you would like XenCenter to automatically resolve all failed prechecks, click **Resolve All**.

   Once all prechecks have been resolved, click **Next** to continue.
6. Prepare the XenServer installation media.

   If you chose **Automatic Mode**, enter the installation media details. Choose **HTTP**, **NFS** or **FTP** and then specify the path, username and password, as appropriate.

   Note:

   Enter the username and password associated with your HTTP, NFS or FTP server, if you have configured security credentials. Do not enter the username and password associated with your XenServer pool.

   If you chose **Manual Mode**, note the upgrade plan and instructions.

   Click **Start Upgrade**.
7. Once the upgrade begins, the Rolling Pool Upgrade wizard guides you through any actions you need to take to upgrade each host. Follow the instructions until you have upgraded all hosts in the pool(s).

   Once the upgrade completes, the wizard prints a summary. Click **Finish** to close the wizard.

7.1.2. Upgrading XenServer Hosts Using the xe CLI

Important:

Performing a rolling pool upgrade using the xe CLI requires extremely careful planning. Be sure to read the following section with care before you begin.

7.1.2.1. Planning an Upgrade Path

As you plan your upgrade, it is very important to be aware of the following:

- **You can only migrate VMs from a XenServer host running an older version of XenServer to one running the same version or higher** (for example, from version 5.6 to version 5.6 or from version 5.6 to version 7.0). You **cannot** migrate VMs from an upgraded host to one running an older version of XenServer (for example, from version 7.0 to version 5.6). Be sure to allow for space on your XenServer hosts accordingly.
- **Citrix strongly advises against running a mixed-mode pool (one with multiple versions of XenServer co-existing) for longer than necessary**, as the pool operates in a degraded state during upgrade.
- **Key control operations are not available during upgrade and should not be attempted**. Though VMs continue to function as normal, VM actions other than migrate may not be available (for example, shut down, copy and export). In particular, it is not safe to perform storage-related operations such as adding, removing or resizing virtual disks.
- **Always upgrade the master host first.** Do not place the host into maintenance mode using XenCenter before performing the upgrade as this will cause a new master to be designated.
- **Citrix strongly recommends that you take a backup of the state of your existing pool** using the **pool-dump-database** xe CLI command (see the *XenServer Administrator's Guide*). This allows you to revert a partially complete rolling upgrade back to its original state without losing any VM data. Because it is not possible to migrate a VM from an upgraded XenServer host to a XenServer host running an older version of XenServer, it may be necessary to shut down VMs if you need to revert the rolling upgrade for any reason.

Before you begin your rolling pool upgrade:

- If you are using XenCenter, upgrade XenCenter to the latest version. The newer version of XenCenter will correctly control older versions of XenServer hosts.
- Empty the CD/DVD drives of the VMs in the pool. For details and instructions, see Section 7.2.1, "Before You Upgrade a Single XenServer Host".
- Disable HA.

7.1.2.2. Performing Rolling Pool Upgrades Using the xe CLI

To upgrade a pool of XenServer hosts using the xe CLI:

1. **Start with the pool master**. Disable the master by using the **host-disable** command. This prevents any new VMs from starting on the specified host.
2. Ensure that no VMs are running on the master. Shut down, suspend or migrate VMs to other hosts in the pool.

   To migrate specified VMs to specified hosts, use the **vm-migrate** command. By using the **vm-migrate** command, you will have full control over the distribution of migrated VMs to other hosts in the pool.

   To live migrate all VMs to other hosts in the pool, use the **host-evacuate** command. By using the **host-evacuate** command, you leave the distribution of migrated VMs to XenServer.
3. Shut down the pool master.

   Important:

   You will be unable to contact the pool master until the upgrade of the master is complete. Shutting down the pool master causes the other hosts in the pool to enter *emergency mode*. In general, a XenServer host enters emergency mode when it is a member of a pool whose master has disappeared from the network and cannot be contacted after a number of attempts. VMs continue to run on hosts in emergency mode, but control operations are not available.
4. Boot the pool master using the XenServer installation media and method of your choice (such as, installation CD or network). Follow the XenServer installation procedure (see Chapter 4, *Installing XenServer and XenCenter*) until the installer offers you the option to upgrade. **Choose to upgrade.**

   Warning:

Be absolutely sure to select the upgrade option so as to avoid losing any existing data.

Warning:

If anything interrupts the upgrade of the pool master or if the upgrade fails for any reason, do not attempt to proceed with the upgrade. Reboot the pool master and restore to a working version of the master. For details on restoring a XenServer host, see the *XenServer Administrator's Guide*.

Once your pool master restarts, the other hosts in the pool will leave emergency mode and normal service is restored after a few minutes.

5. On the pool master, start or resume any shut down or suspended VMs. Migrate any VMs that you wish back to the pool master.
6. Select the next XenServer host in your upgrade path. Disable the host.
7. Ensure that no VMs are running on the host. Shut down, suspend or migrate VMs to other hosts in the pool.
8. Shut down the host.
9. Follow the upgrade procedure for the host, as described for the master in Step 4.

   Note:

   If the upgrade of a host that is not the master fails or is interrupted, you do not need to revert. Use the **host-forget** command to forget the host. Re-install XenServer on the host, and then join it, as a new host, to the pool using the **pool-join** command.
10. On the host, start or resume any shutdown or suspended VMs. Migrate any VMs that you wish back to the host.
11. Repeat Steps 6 – 10 for the rest of the hosts in the pool.
12. Once each host in the pool has been upgraded, it is important to upgrade the XenServer Tools on all VMs. Please refer to the *XenServer Virtual Machine User's Guide* for details.

    Note:

    Running older versions of the XenServer Tools on newer XenServer installations is not supported, except during the upgrade process.

7.2. Upgrading a Single XenServer Host Using the xe CLI

7.2.1. Before You Upgrade a Single XenServer Host

Before upgrading a standalone XenServer host, you will be required to either shut down or suspend any VMs running on that host. It is important to eject and empty CD/DVD drives of any VMs that you plan to suspend. If you do not empty the CD/DVD drives, you may not be able to resume the suspended VMs after upgrade.

An *empty* VM CD/DVD drive means that the VM is attached to neither an ISO image nor a physical CD/DVD mounted via the XenServer host. Further, it requires that the VM not be attached to any physical CD/DVD drive on the XenServer host at all.

To empty the CD/DVD drive of a VM using the xe CLI:

1. Identify which VMs do not have empty CD/DVD drives by entering the following:

   ```
   xe vbd-list type=CD empty=false
   ```

   This returns a list of all the VM CD/DVD drives that are not empty, for example:

```
uuid ( RO) : abae3997-39af-2764-04a1-ffc501d132d9
vm-uuid ( RO): 340a8b49-866e-b27c-99d1-fb41457344d9
vm-name-label ( RO): VM02_DemoLinux
vdi-uuid ( RO): a14b0345-b20a-4027-a233-7cbd1e005ede
empty ( RO): false
device ( RO): xvdd

uuid ( RO) : ec174a21-452f-7fd8-c02b-86370fa0f654
vm-uuid ( RO): db80f319-016d-0e5f-d8db-3a6565256c71
vm-name-label ( RO): VM01_DemoLinux
vdi-uuid ( RO): a14b0345-b20a-4027-a233-7cbd1e005ede
empty ( RO): false
device ( RO): xvdd
```

Note the `uuid`, which is the first item in the list.

2. To empty the CD/DVD drives of the VMs listed, enter the following:

```
xe vbd-eject uuid=<uuid>
```

7.2.2. Upgrading a Single XenServer Host Using the xe CLI

To upgrade a single XenServer host using the xe CLI:

1. Disable the XenServer host that you wish to upgrade by entering the following:

```
xe host-disable <host-selector>=<host_selector_value>
```

When a XenServer host is disabled, VMs can neither be created nor started on that host. VMs also cannot be migrated to a disabled host.

2. Shut down or suspend any VMs running on the host that you wish to upgrade by using the **xe vm-shutdown** or **xe vm-suspend** commands.
3. Shut down the host by using the **xe host-shutdown** command.
4. Follow the XenServer installation procedure (see Chapter 4, *Installing XenServer and XenCenter*) until the installer offers you the option to upgrade. **Choose to upgrade.**

Warning:

Be absolutely sure to select the upgrade option so as to avoid losing any existing data.

You will not be required to re-enter any settings during the setup procedure. The upgrade process follows the first-time installation process but several setup steps are bypassed, and the existing settings for networking configuration, system time, and so on are retained.

Once your host restarts, normal service is restored after a few minutes.

5. Restart any shutdown VMs, and/or resume any suspended VMs.

Chapter 8. Applying Updates to XenServer

Between releases of XenServer, Citrix occasionally releases updates as Hotfixes and Service Packs. Hotfixes generally supply bug fixes to one or more specific issues; whereas Service Packs contain accumulated bug fixes and, occasionally, feature improvements and enhancements. This chapter describes the general procedures for applying updates to your XenServer environment through XenCenter and the xe CLI. For more information about applying updates using XenCenter, refer to the XenCenter Help.

Updates are made available from the Citrix Knowledge Center. Citrix recommends that customers regularly check the Knowledge Center for new updates. Alternatively, you can subscribe to email alerts for updates to XenServer by registering for an account at http://www.citrix.com/support/. In addition, you can configure XenCenter to periodically check for available XenServer and XenCenter updates and new versions; any Alerts will be displayed in the **Notifications** pane.

Updates can often be applied with minimal service interruption. Citrix recommends that customers use XenCenter to apply all updates. If you are updating a pool of XenServer hosts, you can avoid downtime of VMs by using XenCenter's **Install Update** wizard to apply updates, updating one host at a time, automatically migrating VMs away from each host as the hotfix or update is applied.

8.1. Preparing a Pool for an Update

Updates to XenServer can be delivered as a Hotfix or a Service Pack. Pay careful attention to the Release Note that is published with each update. Each update may have unique installation instructions, particularly with regard to preparatory and post-update operations. The following sections offer general guidance and instructions for applying updates to your XenServer deployment.

> **Important:**
>
> Before you apply an update to a XenServer pool, customers should pay careful attention to the following:
>
> 1. Customers **MUST** upgrade each host in a pool to XenServer 7.0 **BEFORE** applying any 7.0 hotfixes or updates.
> 2. Back up your data before applying an update, just as you would with any other maintenance operations. For backup procedures, see the *XenServer Administrator's Guide*.
> 3. Update **ALL** hosts in a pool within a short period: running a mixed-mode pool (a pool that includes updated and non-updated hosts) is not a supported configuration. This should be scheduled to minimise the amount of time that a pool runs in a mixed state.
> 4. Update all hosts within a pool sequentially, always starting with the pool master. XenCenter's **Install Update** wizard manages this process automatically.
> 5. After applying a hotfix to all hosts in a pool, customers should update any required driver disks **before** restarting XenServer hosts.

Before you begin updating:

- Log into a user account with full access permissions (for example, as a Pool Administrator or using a local root account).
- Empty the CD/DVD drives of any VMs you plan to suspend. For details and instructions, see Section 7.2.1, "Before You Upgrade a Single XenServer Host".
- If applicable, disable High Availability (HA).

8.2. Applying updates to a Pool using XenCenter

The update installation mechanism in XenCenter allows you to download and extract the selected update from the Citrix Support website, and enables you to apply an update to multiple hosts and pools simultaneously

using the **Install Update** wizard. During the process, the Install Update wizard automatically migrates VMs off each server, places the server in Maintenance mode, applies the update, reboots the host if required, and then, migrate the VMs back to the updated host. Any actions that were taken at the precheck stage to enable the updates to be applied, such as turning off HA, will be reverted.

The **Install Update** wizard carries out a series of checks known as Prechecks before starting the update process - these checks ensure that the pool is in a valid configuration state. It then manages the update path and VM migration automatically. If you prefer to control the update path and VM migration manually, you can update each host individually.

To Update a Pool Using XenCenter:

1. From the XenCenter navigation pane, click **Notifications** and then **Updates**. This provides a list of available updates.

   Alternatively:

   a. From the XenCenter menu, select **Tools** and then **Install Update**.

   b. Read the information displayed on the **Before You Start** page and then click **Next**.

   c. The Install Update wizard lists available updates on the **Select Update** page. Select the required update from the list and then click **Next**.

   d. Select the pool and servers that you would like to update and click **Next**.

   e. Proceed to Step 4 to continue with the update installation process.

   Note:

   XenCenter periodically checks for XenServer and XenCenter updates by default. Click **Refresh** to manually check for available updates. If the **Updates** tab cannot find any updates because you have disabled automatic check for updates, a message appears on the Updates tab. Click **Check for Updates Now** to manually check for updates.

2. From the **Updates** list, select the required update and then click **Download and Install** from the **Actions** drop-down list. This extracts the update and opens the **Install Update** wizard on the **Select Servers** page with the relevant hosts selected. If you would like to make any changes to the pool or the hosts being updated, clear the check boxes. Any hosts or pools that cannot be updated will be greyed out.

   Note:

   Citrix strongly recommends that customers read the release notes published with each update. To open the release note in your browser, click the **Actions** drop-down list and then select **Go to Web Page**.

3. Review the server selection and click **Next** to continue.

4. The Install Update wizard performs checks to ensure there is sufficient space to upload the update. If there is enough space, the wizard successfully completes the upload. If there is insufficient space to upload the update, an error will be displayed:

   - To free up required space, if there are any residual hotfix update files remaining on the host that can be deleted, the wizard offers to clean up these files. Click **Clean up** to review your options and remove the files. Note that this action does not uninstall hotfixes.
   - If the **Install Update** wizard cannot free up the space required for the upload, you must manually delete files on your host. Click **More Info** for information about space required and take necessary action to free up the required space.

5. The **Install Update** wizard performs a number of update prechecks, including the space available on the hosts, to ensure that the pool is in a valid configuration state.

   Follow the on-screen recommendations to resolve any update prechecks that have failed. If you want XenCenter to automatically resolve all failed prechecks, click **Resolve All**.

Once all Prechecks have been resolved, click **Next**.

6. Choose the **Update Mode**. Review the information displayed on the screen and select an appropriate mode.

   The check box **Allow XenCenter to delete the update installation file** is selected by default. This option deletes the installation file after the update has been installed. If you clear the check box, the update file will be saved on the server, which can consume disk space on your server.

   Note:

   If you click **Cancel** at this stage, the Install Update wizard reverts the changes and removes the update file from the server.

7. Click **Install update** to proceed with the installation. The Install Update wizard shows the progress of the update, displaying the major operations that XenCenter performs while updating each server in the pool
8. When the update has been applied, click **Finish** to close Install Update wizard.
9. If you chose to manually perform post-update actions, do so now.

To Update a Pool of XenServer Hosts Using the xe CLI:

1. Download the update file (`.xsupdate` file extension) to a known location on the computer running the xe CLI. Note the path to the file.
2. Upload the update file to the pool you wish to update by running the following:

   ```
   xe -s <server> -u <username> -pw <password> patch-upload file-name=<filename>
   ```

   Here, **-s** refers to the name of the pool master. XenServer assigns the update file a UUID, which this command prints. Note the UUID.

   Tip:

   Once an update file has been uploaded to a XenServer host, you can use the **patch-list** and **patch-param-list** commands to view information about the file.

3. If XenServer detects any errors or preparatory steps that have not been taken (for example, VMs are running in the pool), it alerts you. Be sure to follow any guidance before continuing with the update.

   If necessary, you can shut down or suspend any VMs on the host(s) that you wish to update by using the **vm-shutdown** or **vm-suspend** commands.

   To migrate specified VMs to specified hosts, use the **vm-migrate** command. By using the **vm-migrate** command, you will have full control over the distribution of migrated VMs to other hosts in the pool.

   To automatically live migrate all VMs to other hosts in the pool, use the **host-evacuate** command. By using the **host-evacuate** command, you leave the distribution of migrated VMs to XenServer.

4. Update the pool, specifying the UUID of the update file, by running the following:

   ```
   xe patch-pool-apply uuid=<UUID_of_file>
   ```

   This applies the update or hotfix to all hosts in the pool.

   Alternatively, if you need to update and restart hosts in a rolling manner, you can apply the update file to an individual host by running the following:

   ```
   xe patch-apply host-uuid=<UUID_of_host> uuid=<UUID_of_file>
   ```

5. Verify that the update was applied by using the **patch-list** command. If the update has been successful, the *hosts* field contains the host UUID.
6. Perform any post-update operations, as necessary (such as, rebooting the hosts).

   Note:

If you need to reclaim space on the pool master, large update files can be deleted from the disk by using the **patch-pool-clean** command. The update information stored in the database of the master is always retained. If required, these files can be uploaded again using the **patch-upload** command.

To Update Individual Hosts Using the xe CLI:

1. Download the update file (`.xsupdate` file extension) to a known location on the computer running the xe CLI. Note the path to the file.
2. Shut down or suspend any VMs on the host(s) that you wish to update by using the **vm-shutdown** or **vm-suspend** commands.
3. Upload the update file to the host you wish to update by running the following:

   ```
   xe -s <server> -u <username> -pw <password> patch-upload file-name=<filename>
   ```

   Here, **-s** refers to the hostname. XenServer assigns the update file a UUID, which this command prints. Note the UUID.

   Tip:

   Once an update file has been uploaded to a XenServer host, you can use the **patch-list** and **patch-param-list** commands to view information about the update file.
4. If XenServer detects any errors or preparatory steps that have not been taken (for example, VMs are running on the host), it alerts you. Be sure to follow any guidance before continuing with the update.
5. Update the host, specifying the UUIDs of the host and the update file, by running the following:

   ```
   xe patch-apply host-uuid=<UUID_of_host> uuid=<UUID_of_file>
   ```
6. Verify that the update has been successfully applied by using the **patch-list** command. If the update has been successful, the *hosts* field contains the host UUID.
7. Perform any post-update operations, as necessary (such as, rebooting the host).

Appendix A. Troubleshooting

Citrix provides two forms of support: free, self-help support from www.citrix.com/support and paid-for Support Services, which you can purchase from the Support site. With Citrix Technical Support, you can open a Support Case online or contact the support center by phone if you experience technical difficulties during installation.

For information on the different types of support and maintenance programmes offered by Citrix, see www.citrix.com/support/programs.html

The Citrix support site, www.citrix.com/support, hosts a number of resources that may be helpful to you if you experience odd behavior, crashes, or other problems during installation. Resources include: forums, knowledge base articles, software updates, security bulletins, tools, and product documentation.

In most cases, if you experience an unknown error during installation, Citrix Technical Support will request that you capture the log file from your host and then send it along for the Support team to inspect. If requested, follow the procedure below.

Using a keyboard connected directly to the host machine (not connected over a serial port), you can access three virtual terminals during installation:

- Press **Alt+F1** to access the main XenServer Installer
- Press **Alt+F2** to access a local shell
- Press **Alt+F3** to access the event log

To capture and save the log file:

1. Press **Alt+F2** to access the local shell.
2. Enter the following:

   ```
   /opt/xensource/installer/report.py
   ```

3. You are prompted to choose where you would like to save the log file: **NFS**, **FTP** or **Local media**.

   Select **NFS** or **FTP** to copy the log file to another machine on your network. To do so, networking must be working properly, and you must have write access to a remote machine.

   Select **Local media** to save the file to a removable storage device, such as a USB flash drive, on the local machine.

   Once you have made your selections, the program writes the log file to your chosen location. The filename is `support.tar.bz2`.

Appendix B. Boot From SAN Environments

Boot from SAN environments offer a number of advantages, including high performance, redundancy and space consolidation. In these environments, the boot disk resides on a remote SAN, and not on the local host. The diskless host communicates with the SAN through a host bus adapter (HBA), and the HBA's BIOS contains the instructions that enable the host to find the boot disk.

Boot from SAN depends on SAN-based disk arrays with either hardware **Fibre Channel** or **HBA iSCSI** adapter support on the host. For a fully redundant boot from SAN environment, you will need to configure multiple paths for I/O access. To do so, the root device should have multipath support enabled. For information on multipath availability for your SAN environment, consult your storage vendor or administrator. If you have multiple paths available, then you can enable multipathing in your XenServer deployment upon installation.

> **Warning:**
>
> Boot from SAN settings are *not* inherited during the upgrade process. When upgrading using the ISO or network-boot, customers should follow the same instructions as used in the installation process below to ensure that `multipath` is correctly configured.

To install XenServer to a remote disk on a SAN with multipathing enabled:

1. On the Welcome to XenServer screen, press **F2**.
2. At the boot prompt, enter `multipath`

The XenServer installation process configures a XenServer host which boots from a remote SAN with multipathing enabled.

To enable file system multipathing using PXE or UEFI installation, customers should add `device_mapper_multipath=yes` to their configuration file. The following is an example configuration:

```
default xenserver
label xenserver
  kernel mboot.c32
  append /tftpboot/xenserver/xen.gz dom0_max_vcpus=1-2 dom0_mem=1024M,max:1024M com1=115200,8n1 \
  console=com1,vga --- /tftpboot/xenserver/vmlinuz \
  xencons=hvc console=hvc0 console=tty0 \
  device_mapper_multipath=yes \
  install --- /tftpboot/xenserver/install.img
```

For additional information on storage multipathing in your XenServer environment, please see the *XenServer Administrator's Guide*.

B.1. Software-boot-from-iSCSI for Cisco UCS

The Software-boot-from-iSCSI feature enables customers to install and boot XenServer from SAN using iSCSI. Using this feature, XenServer can be installed to, booted from, and run from a LUN provided by an iSCSI target specified in the iSCSI Boot Firmware Table (iBFT). This allows the root disk to be attached through iSCSI.

XenServer supports the following features for Software-boot-from-iSCSI:

- Host installation through PXE-boot
- Cisco UCS vNIC [*]
- Jumbo Frames (MTU=9000) configured with the Cisco UCS manager
- Cisco UCS line-rate limiting
- Untagged VLANs

[*]Software-boot-from-iSCSI has been tested in Legacy BIOS and UEFI boot mode using Cisco UCS vNICs and Power Vault, NetApp and EqualLogic arrays. Other configurations may work, however, they have not been validated.

- Networks using the vSwitch backend
- LVHDoISCSI SRs and NFS SRs on the same or different SAN/NAS
- Multipathing of the iSCSI root disk
- Compatibility with common XenServer (Network, Maintenance) operations

Requirements

- The primary management interface (IP addressable) and the network for VM traffic, must use separate interfaces.
- Storage (iSCSI targets) must be on a separate Layer 3 (IP) network to all other network interfaces with IP addresses on the host.
- Storage must be on the same subnet as the storage interface of the XenServer host.

B.1.1. Installing XenServer Using CD Media

Perform the following steps to install XenServer using a CD:

1. Access the boot menu; at the `boot:` prompt enter `menu.c32`
2. Use the cursor keys to select an installation option:
   - For a single path LUN select **install**
   - For a multipathed LUN select **multipath**
3. Press the tab key.

   Edit the line ending with the following:

   ```
   --- /install.img
   ```
4. Using the cursor keys, edit this line to read:

   ```
   use_ibft --- /install.img
   ```
5. Press **Enter**.

   XenServer host installation proceeds as normal.

B.1.2. Installing XenServer Using PXE

Perform the following steps to install XenServer using PXE:

> **Note:**
>
> You must ensure to add the keyword **use_ibft** in the kernel parameters. If multipathing is required, you must add **device_mapper_multipath=enabled**.

The following example shows PXE configuration for a single LUN:

```
label XenServer
kernel mboot.c32
append XS/xen.gz dom0_max_vcpus=2 dom0_mem=1024M,max:1024M
com1=115200,8n1 console=com1,vga --- XS/vmlinuz xencons=hvc console=tty0
console=hvc0 use_ibft --- XS/install.img
```

The following example shows PXE configuration for a multipathed LUN:

```
label XenServer
kernel mboot.c32
append XS/xen.gz dom0_max_vcpus=2 dom0_mem=1024M,max:1024M
com1=115200,8n1 console=com1,vga --- XS/vmlinuz xencons=hvc console=tty0
console=hvc0 use_ibft device_mapper_multipath=enabled --- XS/install.img
```

Appendix C. Network Boot Installations

This appendix describes how to configure your PXE and UEFI environment for XenServer installation.

XenServer 7.0 introduces support for booting hosts using the UEFI mode. UEFI mode provides a rich set of standardized facilities to the bootloader and operating systems. This allows XenServer to be more easily installed on hosts where UEFI is the default boot mode.

The following section contains information about setting up your TFTP and NFS, FTP or HTTP servers to enable PXE and UEFI booting of XenServer host installations. It then describes how to create an XML answer file, which allows you to perform unattended installations.

C.1. Configuring your PXE and UEFI Environment for XenServer Installation

Before you set up the XenServer installation media, you need to configure your TFTP and DHCP servers. The following sections contain information on how to configure your TFTP server for PXE and UEFI booting. Consult your vendor documentation for general setup procedures.

> **Note:**
>
> XenServer 6.0 moved from MBR disk partitioning to GUID Partition Table (GPT). Some third-party PXE deployment systems may attempt to read the partition table on a machine's hard disk *before* deploying the image to the host.
>
> If the deployment system has not been updated to be compatible with GPT partitioning scheme, and the hard disk has previously been used for a version of XenServer (or any other Operating System) that uses GPT, the PXE deployment system may fail. If this happens, a workaround is to delete the partition table on the disk.

In addition to the TFTP and DHCP servers, you need an NFS, FTP, or HTTP server to house the XenServer installation files. These servers can co-exist on one, or be distributed across different servers on the network.

Additionally, each XenServer host that you want to PXE boot needs a PXE boot-enabled Ethernet card.

The following steps assume that the Linux server you are using has RPM support.

Configuring your TFTP Server for PXE boot

To configure your TFTP server for PXE boot:

1. In the `/tftpboot` directory, create a new directory called `xenserver`.
2. Copy the `mboot.c32` and `pxelinux.0` files from the `/usr/lib/syslinux` directory to the `/tftboot` directory.

   > **Note:**
   >
   > Citrix strongly recommends using `mboot.c32` and `pxelinux.0` files from the same source (for example, from the same XenServer ISO).

3. From the XenServer installation media, copy the files `install.img` (from the root directory), `vmlinuz` and `xen.gz` (from the `/boot` directory) to the new `/tftpboot/xenserver` directory on the TFTP server.
4. In the `/tftboot` directory, create a new directory called `pxelinux.cfg`.
5. In the `pxelinux.cfg` directory, create your new configuration file called `default`.

The content of this file depends on how you want to configure your PXE boot environment. Two sample configurations are listed below. The first example configuration starts an installation on any machine that boots from the TFTP server and leaves you to manually respond to the installation prompts. The second performs an unattended installation.

Note:

The following examples show how to configure the installer to run on the physical console, *tty0*. To use a different default, ensure that the console you want to use is the rightmost.

```
default xenserver
label xenserver
 kernel mboot.c32
 append /tftpboot/xenserver/xen.gz dom0_max_vcpus=1-2 dom0_mem=1024M,max:1024M com1=115200,8n
 console=com1,vga --- /tftpboot/xenserver/vmlinuz \
 xencons=hvc console=hvc0 console=tty0 \
 --- /tftpboot/xenserver/install.img
```

A sample configuration that performs an unattended installation using the answer file at the URL specified:

Note:

To specify which network adapter should be used for retrieving the answer file, include the `answerfile_device=ethX` or `answerfile_device=MAC` parameter and specify either the ethernet device number or the MAC address of the device.

```
default xenserver-auto
label xenserver-auto
   kernel mboot.c32
   append /tftpboot/xenserver/xen.gz dom0_max_vcpus=1-2 dom0_mem=1024M,max:1024M com1=115200,
      console=com1,vga --- /tftpboot/xenserver/vmlinuz \
      xencons=hvc console=hvc0 console=tty0 \
      answerfile=http://pxehost.example.com/answerfile \
      install --- /tftpboot/xenserver/install.img
```

For more information on PXE configuration file syntax, see the SYSLINUX website.

Configuring your TFTP Server for UEFI boot

To configure your TFTP server for UEFI boot:

1. In the `/tftpboot` directory, create a new directory called `EFI/xenserver`.
2. Configure your DHCP server to provide `/EFI/xenserver/grubx64.efi` as the boot file.
3. Create `grub.cfg` file. For example:

```
menuentry "XenServer Install (serial)" {
    multiboot2 /EFI/xenserver/xen.gz dom0_mem=1024M,max:1024M watchdog dom0_max_vcpus=4 com1=
    module2 /EFI/xenserver/vmlinuz console=hvc0
    module2 /EFI/xenserver/install.img
}
```

4. Copy `grub.cfg` file to `/tftpboot/EFI/xenserver` directory on the TFTP server.
5. From the XenServer installation media, copy the files `grubx64.efi`, `install.img` (from the root directory), `vmlinuz` and `xen.gz` (from the `/boot` directory) to the new `/tftpboot/EFI/xenserver` directory on the TFTP server.

Note:

The following examples show how to configure the installer to run on the physical console, tty0. To use a different default, ensure that the console you want to use is the leftmost.

```
default xenserver
label xenserver
 kernel mboot.c32
 append /tftpboot/EFI/xenserver/xen.gz dom0_mem=1024M,max:1024M watchdog dom0_max_vcpus=4 com
 console=com1,vga --- /tftpboot/EFI/xenserver/vmlinuz \
 console=hvc0 console=tty0 \
 --- /tftpboot/EFI/xenserver/install.img
```

A sample configuration that performs an unattended installation using the answer file at the URL specified:

Note:

To specify which network adapter should be used for retrieving the answer file, include the `answerfile_device=ethX` or `answerfile_device=MAC` parameter and specify either the ethernet device number or the MAC address of the device.

```
 default xenserver-auto
label xenserver-auto
   kernel mboot.c32
   append /tftpboot/EFI/xenserver/xen.gz dom0_mem=1024M,max:1024M watchdog dom0_max_vcpus=4 c
      console=com1,vga --- /tftpboot/EFI/xenserver/vmlinuz \
      console=hvc0 console=tty0 \
      answerfile=http://pxehost.example.com/answerfile \
      install --- /tftpboot/EFI/xenserver/install.img
```

Please refer to your server operating system manual for details for your specific operating system. The information here is a guide that can be used for Red Hat, Fedora, and some other RPM-based distributions.

To set up the XenServer installation media on a HTTP, FTP, or NFS server:

1. On the server, create a new directory from which the XenServer installation media can be exported via HTTP, FTP or NFS.
2. Copy the entire contents of the XenServer installation media to the newly created directory on the HTTP, FTP or NFS server. This is your installation repository.

   Note:

   - When copying the XenServer installation media, customers should make sure to copy the file `.treeinfo` to the newly created directory.
   - To make Supplemental Packs available during installation, copy the contents of each Supplemental Pack ISO into a separate directory within the main installation repository. Customers must create a text file called `XS-REPOSITORY-LIST` and include the directory name in which the Supplemental Pack resides (on a new line). Otherwise, the Supplemental Pack will not be installed. For more information, see XenServer 7.0 Supplemental Pack & DDK Guide.

Preparing the destination system

1. Start the system and enter the Boot Menu (**F12** in most BIOS programs) and select to boot from your Ethernet card.
2. The system should then PXE boot from the installation source you set up, and the installation script will commence. If you have set up an answer file, the installation can proceed unattended.

C.2. Creating an answer file for unattended PXE and UEFI installation

To perform installations in an unattended fashion, you need to create an XML answer file. Here is an example answer file:

```
<?xml version="1.0"?>
   <installation srtype="ext">
      <primary-disk>sda</primary-disk>
      <guest-disk>sdb</guest-disk>
      <guest-disk>sdc</guest-disk>
      <keymap>us</keymap>
      <root-password>mypassword</root-password>
      <source type="url">http://pxehost.example.com/XenServer/</source>
   <post-install-script type="url">
   http://pxehost.example.com/myscripts/post-install-script
   </post-install-script>
      <admin-interface name="eth0" proto="dhcp" />
      <timezone>Europe/London</timezone>
   </installation>
```

All nodes should be within a root node named *installation*.

> **Note:**
>
> If you wish to enable Thin Provisioning, you can specify an `srtype` attribute as `ext`. If this attribute is not specified, the default local storage type is LVM. Thin Provisioning sets the local storage type to EXT3 and enables local caching for XenDesktop to work properly. For details, see Chapter 6, *XenServer and IntelliCache*.

The following is a summary of the elements. All values should be text in the nodes, unless otherwise stated. Required elements are indicated.

Element	Description	Required?
<primary-disk>	The name of the storage device where the control domain should be installed, equivalent to the choice made on the *Select Primary Disk* step of the interactive installation process. Attributes: You can specify a guest-storage attribute with possible values *yes* and *no*. For example: <primary-disk guest-storage="no">sda</primary-disk> If this attribute is not specified, the default is *yes*. If you specify *no*, it is possible to automate an installation scenario where no storage repository is created, if, in addition, no guest-disk keys are specified.	Y
<guest-disk>	The name of a storage device to be used for storing guests. You should use one of these elements for each extra disk.	N
<keymap>	The name of the keymap to use during installation. <keymap>us</keymap> The default value, *us* will be considered if you do not specify a value for this attribute.	Y

Element	Description	Required?
<root-password>	The desired root password for the XenServer host. If a password is not provided, a prompt will be displayed when the host is first booted. Attributes: Type: *hash* or *plaintext* For example: `<root-password type="hash">hashedpassword</root`	N

<source>	Where the packages should be installed from.
	
	Attributes:
	
	type: *url*, *nfs*, or *local*
	
	If local, leave the element empty. For example,
	
	`<source type="url">`
	`http://server/packages`
	`</source>`
	`<source type="local" />`
	`<source type="nfs">`
	`server:/packages`
	`</source>`
		Y

<driver-source>	Where the Supplemental Packs containing device drivers should be installed from. Optional. Element may occur multiple times.
	
	Attributes:
	
	type: *url*, *nfs*, or *local*
	
	If local, leave the element empty. For example,
	
	`<driver-source type="url">`
	`http://server/drivers`
	`</driver-source>`
	`<driver-source type="local" />`
	`<driver-source type="nfs">`
	`server:/drivers`
	`</driver-source>`
		N

Element	Description	Required?

<script>	Where the post-install-script is.
	
	Attributes:
	
	stage: *filesystem-populated*, *installation-start*, or *installation-complete*
	
	When *filesystem-populated* is used, the script is invoked just before root file system is unmounted (for example, after installation/upgrade, initrds already built, etc.). The script will receive an argument that is the mount point of the root file system.
	
	When *installation-complete* is used, the script will be run once the installer has finished all operations (and hence the root file system will be unmounted). The script will receive an argument that will have a value of zero if the installation completed successfully, and will be non-zero if the installation failed for any reason.
	
	type: *url*, *nfs*, or *local*
	
	If *url* or *nfs*, put the URL or NFS path in the PCDATA; if *local*, leave the PCDATA empty. For example,
	
	`<script stage="filesystem-populated"`
	`type="url">`
	`http://prehost.example.com/post-install-script`
	`</script>`
	`<script stage="installation-start"`
	`type="local">`
	`file:///scripts/run.sh`
	`</script>`
	`<script stage="installation-complete"`
	`type="nfs">`
	`server:/scripts/installation-pass-fail-script`
	`</script>`
	
	Note that if a local file is used, ensure that the path is absolute. This will generally mean that the `file://` prefix will be followed by a further forward slash, and the complete path to the script.
		N

Element	Description	Required?
<admin-interface>	The single network interface to be used as the host administration interface. Attributes: proto: *dhcp* or *static* name: *eth0* for example. Children: • <ipaddr>: The IP address, if proto="static" • <subnet>: The subnet mask, if proto="static" • <gateway>: The gateway, if proto="static" All three child elements are *required* if proto="static"	N
<timezone>	In the format used by the TZ variable, for example Europe/London, or America/Los_Angeles.	Y
<name-server>	The IP address of a nameserver. You should use one of these elements for each nameserver you want to use.	N
<hostname>	Specify if you want to manually set a hostname.	N
<ntp-server>	Specify one or more NTP servers.	N

You can also perform automated upgrades by changing the answer file appropriately. Set the mode attribute of the installation element to *upgrade*, specify the disk on which the existing installation lives with the *existing-installation* element, and leave the *primary-disk* and *guest-disk* elements unspecified. For example:

```
<?xml version="1.0"?>
   <installation mode="upgrade">
        <existing-installation>sda</existing-installation>
        <source type="url">http://pxehost.example.com/XenServer/</source>
        <post-install-script type="url">
        http://pxehost.example.com/myscripts/post-install-script
        </post-install-script>
   </installation>
```

Appendix D. Installing XenServer on Small Devices

XenServer enables customers with smaller devices, that is, devices with more than 12GB but less than 46GB of disk space, to install XenServer 7.0 using the legacy DOS partition layout. The legacy DOS partition layout includes:

- 4GB Boot partition
- 4GB Backup partition
- SR partition (if present on the local disk)

To install XenServer 7.0 on small devices, you must add **disable-gpt** to the dom0 parameters. You can use menu.c32 to add the parameter to dom0.

> **Note:**
>
> Any utility partition presented by the host to the installer before the installation process will be preserved.
>
> **Important:**
>
> Citrix recommends that you allocate a minimum of 46GB disk space and install XenServer 7.0 using the new GPT partition layout. For more information, see Section 4.2.1, "XenServer Host Partition Layout".