

iStorage Server: High-Availability iSCSI SAN for Citrix Xen Server

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KernSafe Technologies, Inc.

www.kernsafe.com

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Overview

iStorage Server is a network based storage virtualization software powered by KernSafe Technologies, Inc. Being a powerful, full-featured and software-only iSCSI Target SAN solution, that can quickly convert existing Windows computer into IP SAN. Storage media of iSCSI Target can include existing storage devices such as the entire hard disks or partitions, CD-RWs, tapes and USB storage devices, as well as disk image file or CD image files including ISO9660(.iso), .bin, .mdf, .cdi, .b5i, .nrg, .ccd, .sub, .img, .raw and other image file formats. Furthermore, iStorage Server also supports a lot of features such as: VHD (Virtual Hard Disk) target, snapshots, STPI, RAID-1 and failover, these features are very important and popular in storage industry world and make iStorage Server is suitable for any size of business.

Citrix Xen Server™ is the only enterprise-class, cloud-proven virtualization platform that delivers the critical features of live migration and centralized multi-server management at no cost. Xen Server is an open and powerful server virtualization solution that radically reduces datacenter costs by transforming static and complex datacenter environments into more dynamic, easy to manage IT service delivery centers.

High availability is the implementation of technology so that if a component fails, another can take over for it. By using highly available platforms, the downtime for a system can be reduced, and, in many cases, it can be reduced to a short enough time that the users of the system do not see the failure.

After iStorage Server 2.0, it supports server side mirroring, synchronous replication and failover which allows user to create a high-availability iSCSI SAN for Citrix XenServer.

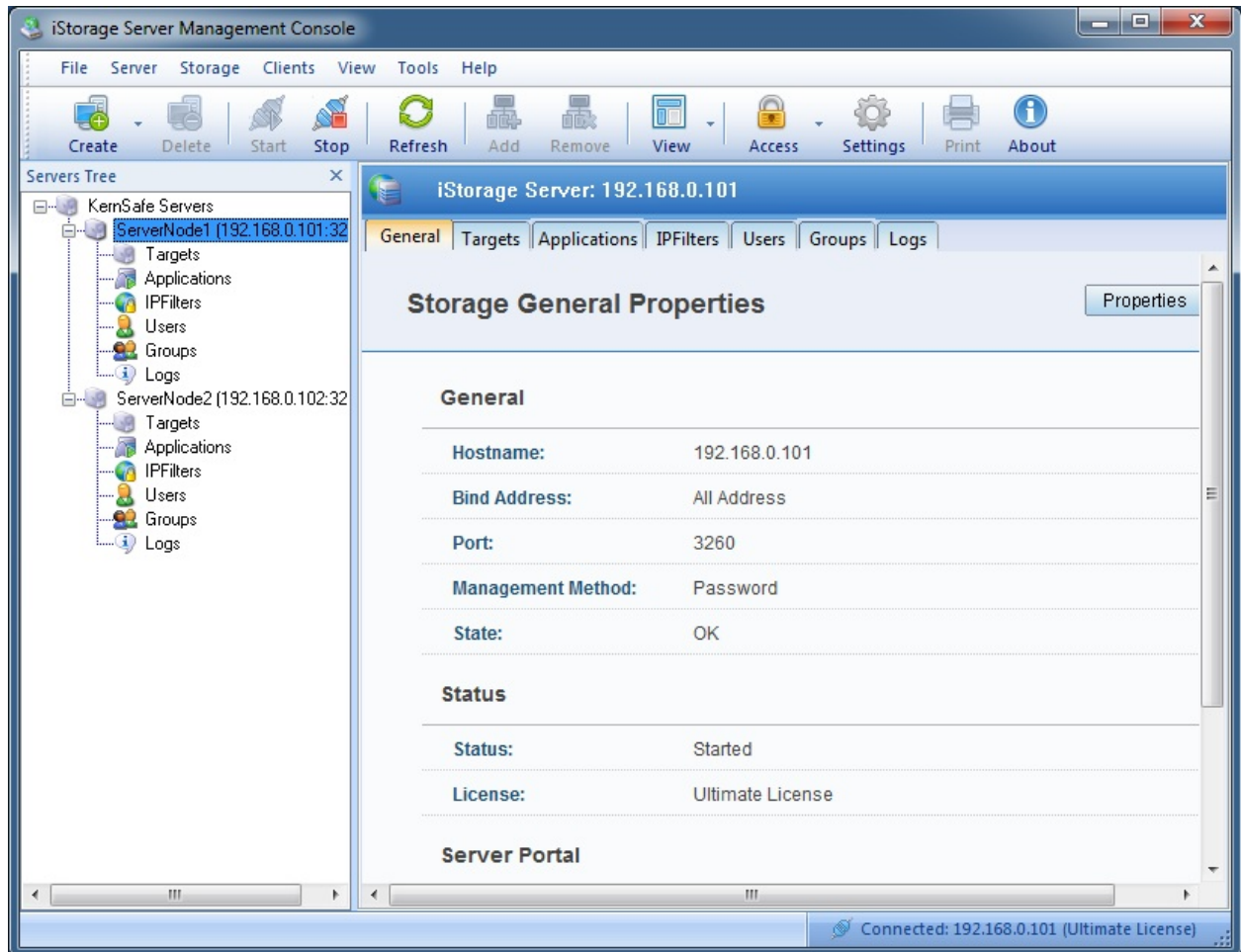
We need two targets which has the same name and the same size on two servers, in this document, we used servernode1 192.168.0.101 and servernode2 192.168.0.102.

Install Xen Server

You need a server running Xen Server. Xen Server must first be installed on to a suitable machine that will be used to create the virtual environment. For how to obtain or install Citrix Xen Server, please contact the Citrix supplier.

Configuring on Server1

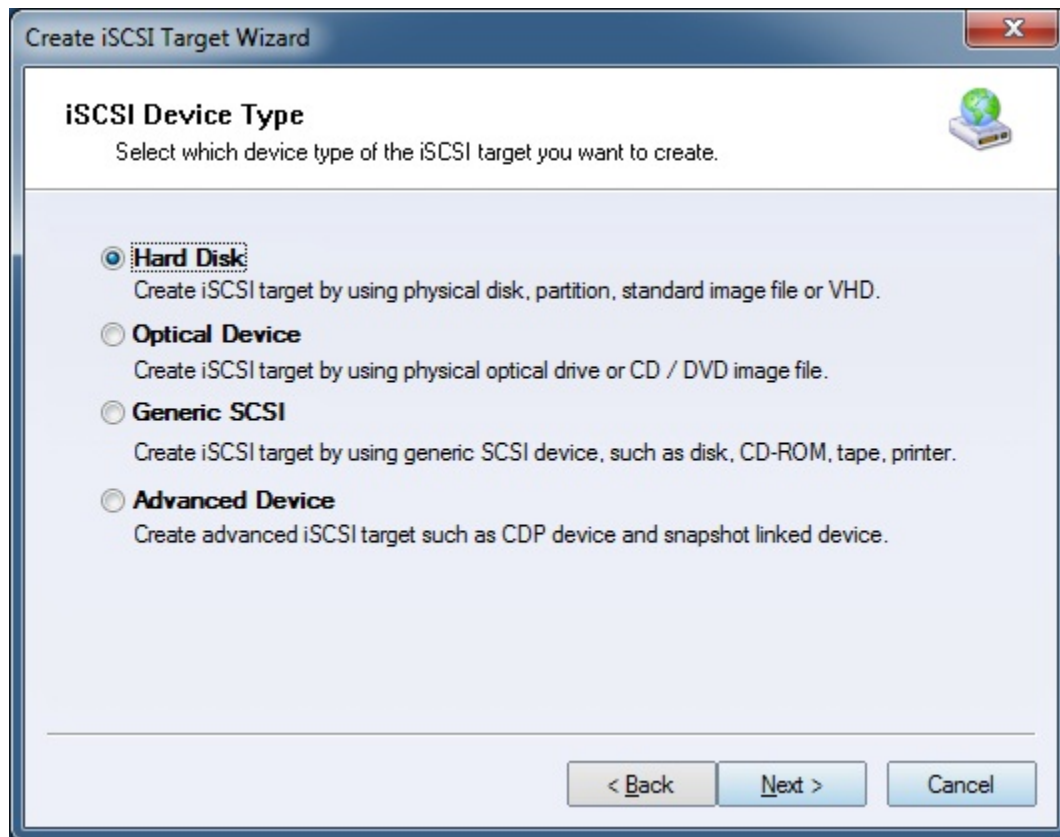
Open iStorage Server Management Console.



Create Target

Launch the iStorage Server Management Console, press the **Create** button on the toolbar of iStorage Server management console, the **Create Device Wizard** is shown.

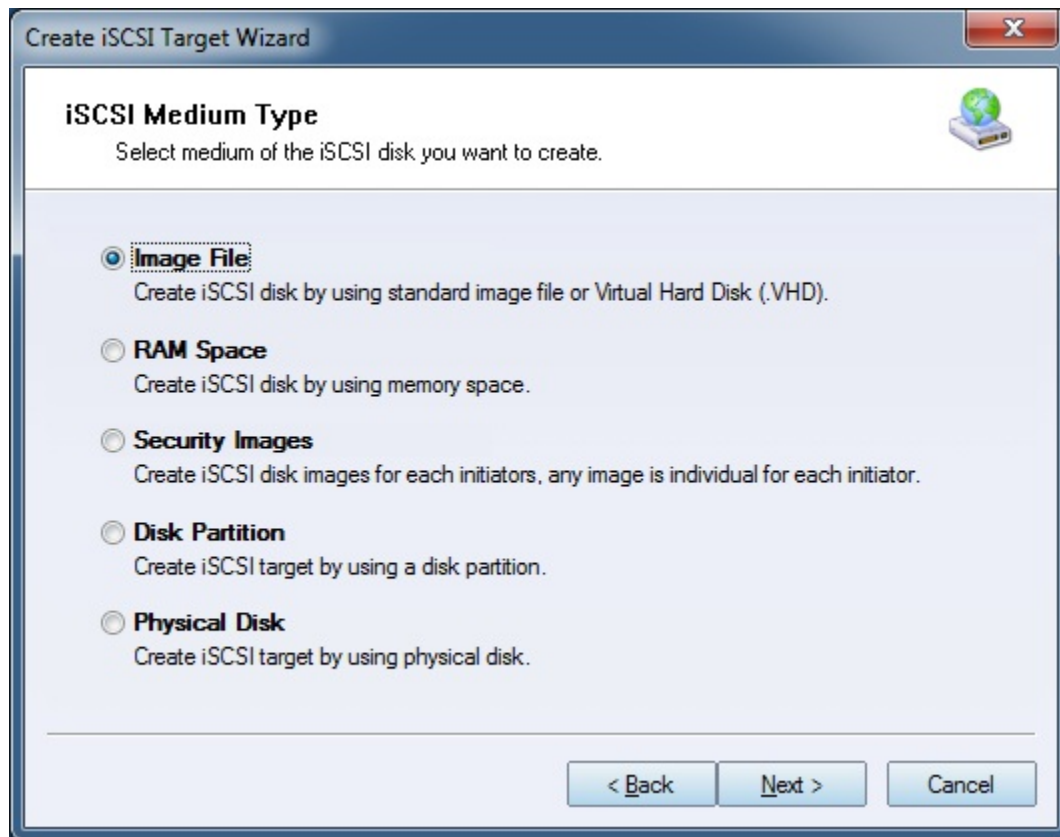
Select a device type



Choose **Hard Disk**.

Press the **Next** button to continue.

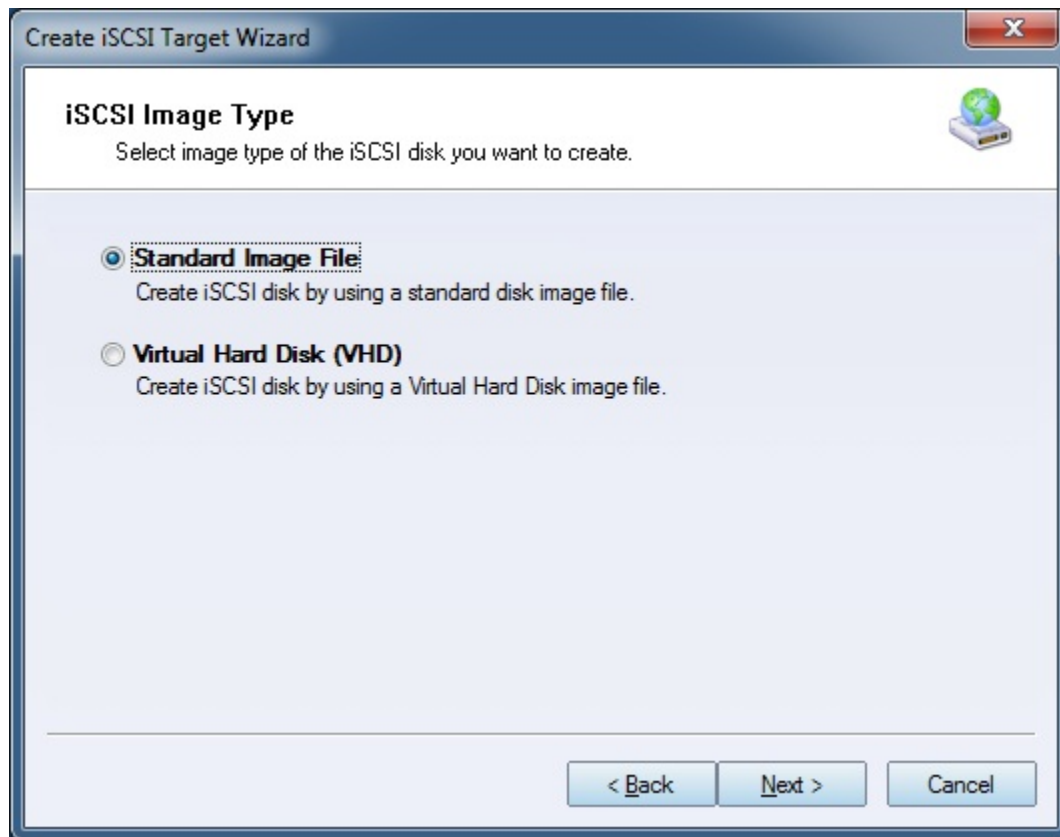
Select a medium type.



Choose **Image File** in **iSCSI Medium Type** window.

Then press **Next** button to continue.

Select an Image type.



Choose **Standard Image File**.

Press the **Next** button to continue.

Specify image file path and size.

Create iSCSI Target Wizard

Virtual Image Disk Configuration

Specify a image file full path and parameters.

Image file parameters

☒ Create a new image file ☐ Use existing image file

Full path and name of the image file:

C:\XenData.img Browse

Device Size in MBs: 102400

☐ Fill with zeros ☐ Enable windows cache

File system options

☐ Sparse file (Recommended for image files smaller then 1TB)

☐ Compressed (Enable file system compress feature)

☐ Encrypted (Enable NTFS encryption feature)

< Back Next > Cancel

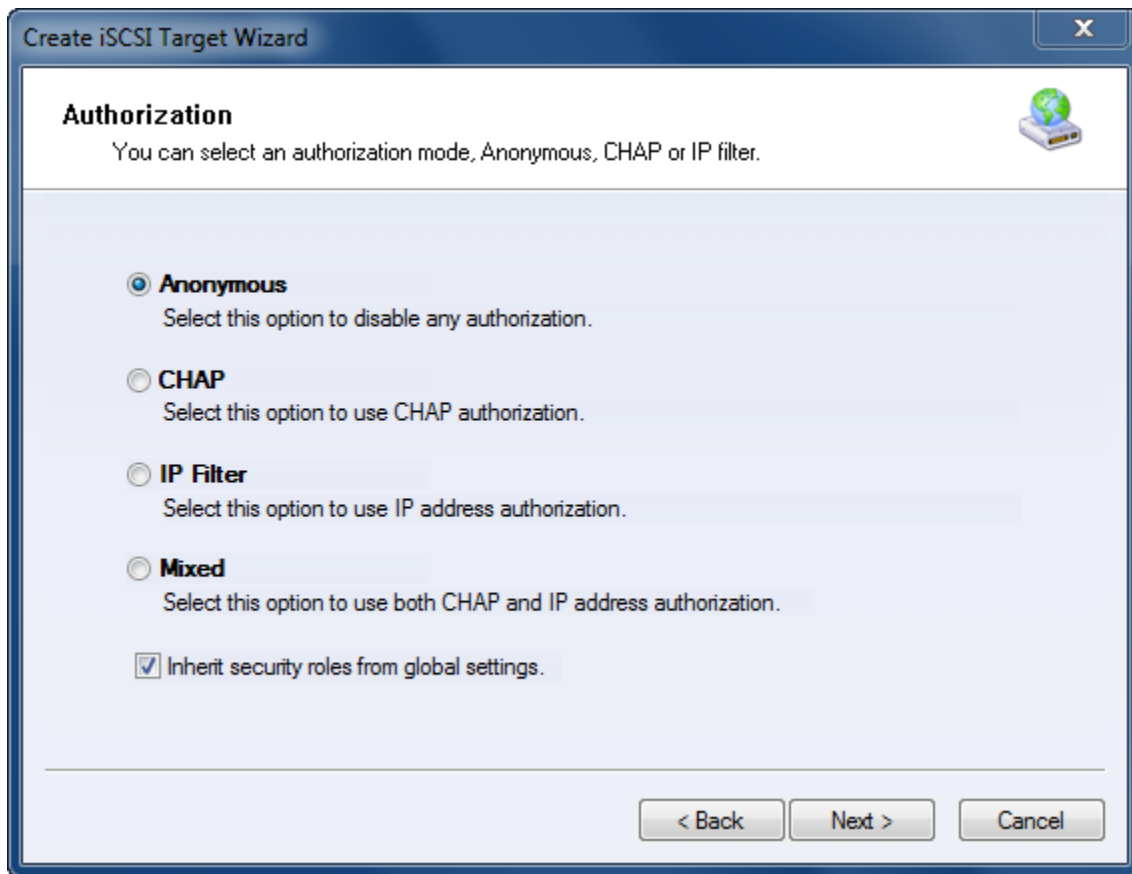
Specify the image file.

Specify the device size.

If you check **Use sparse file on NTFS file system**, the size of disk image file only depend on its content used, it can save your hard disk space.

Press the **Next** button to continue.

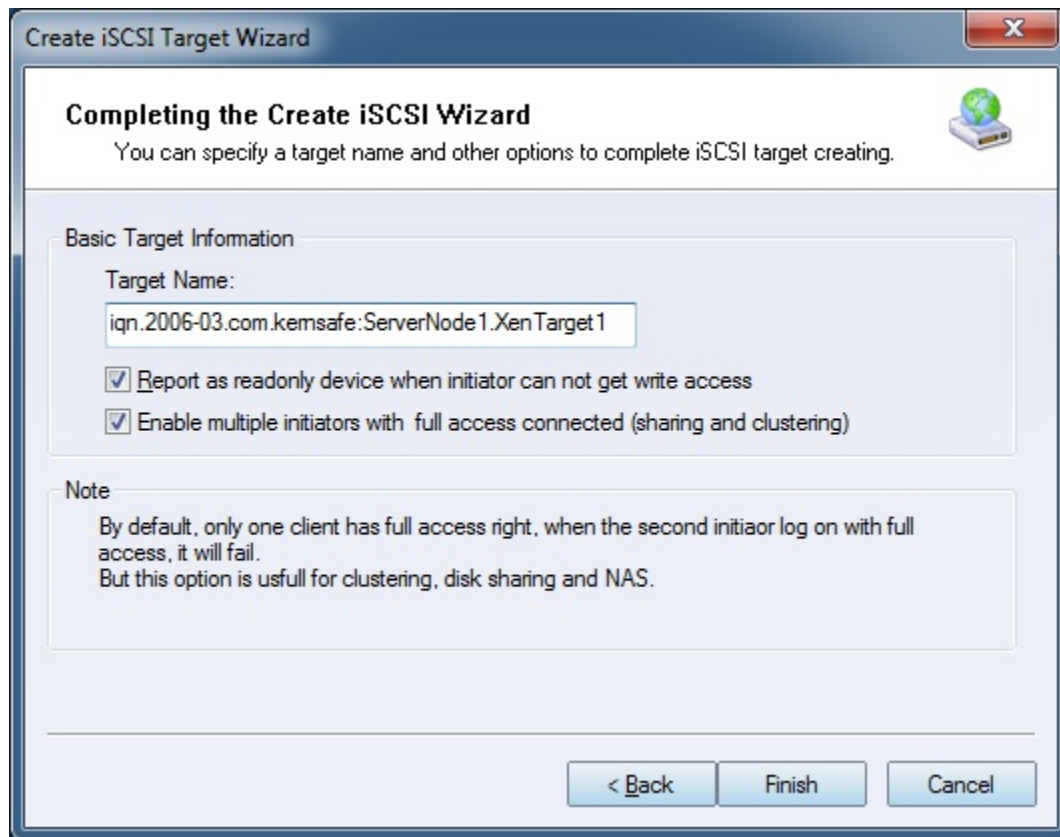
Set authorization mode.



Choose **Anonymous** authorization.

Press the **Next** button to continue.

Finish creating iSCSI Target



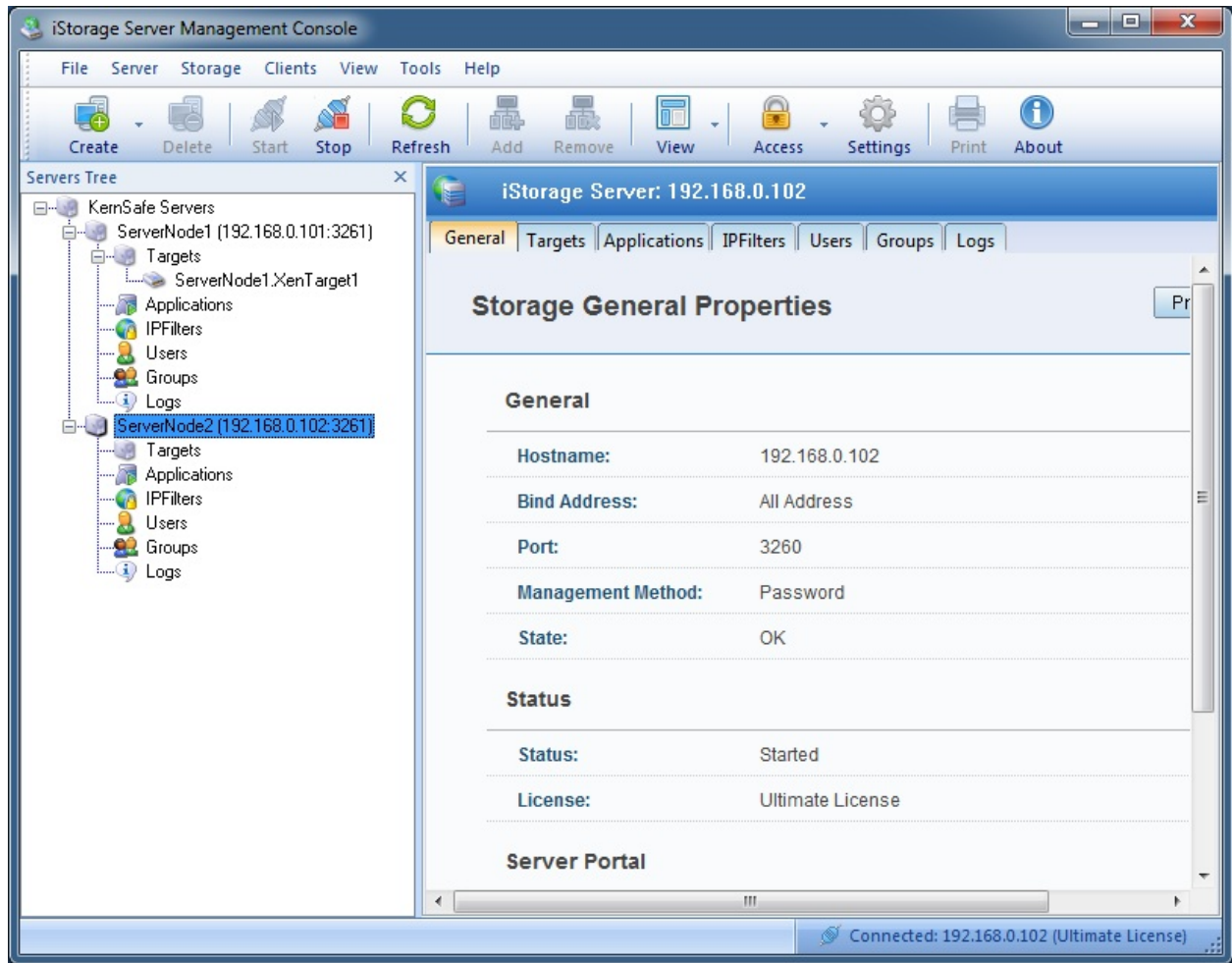
Type a target name in the Target Name field, we use **KernSafe. XenTarget1** as an example.

Check the **Enable multiple initiators with full access connected (sharing and clustering)** check box.

Press the **Finish** button to complete create target.

Configuring on Server2

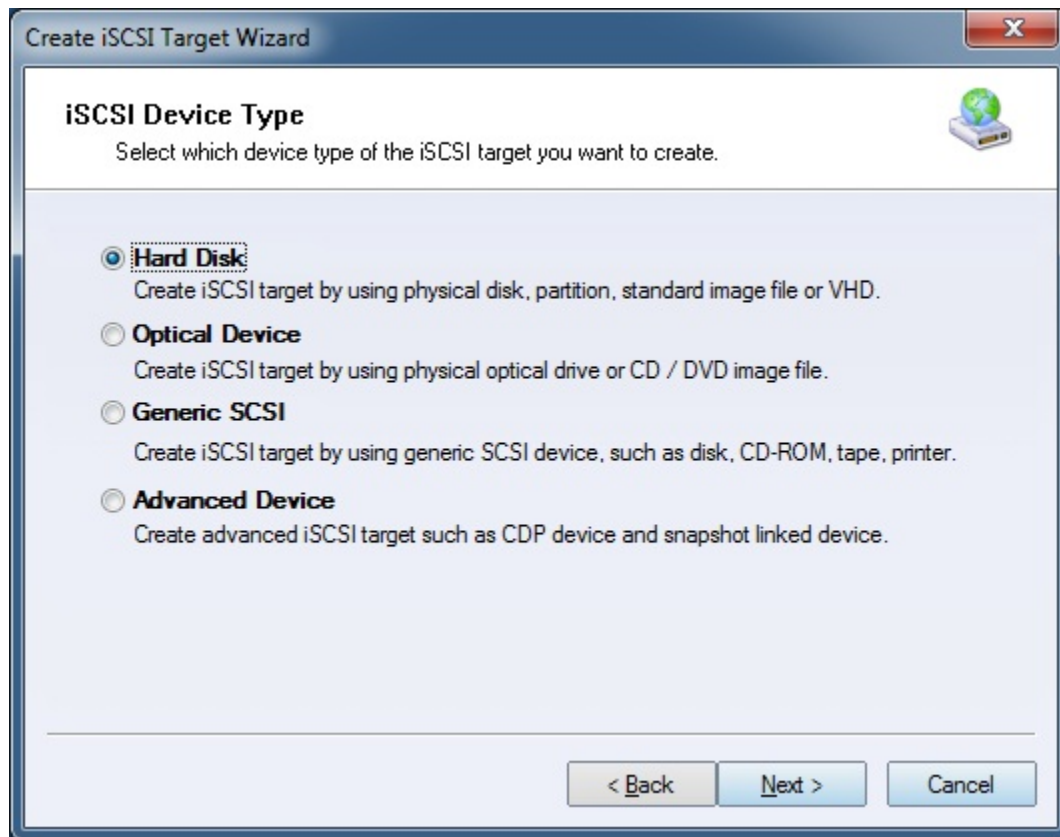
Open **iStorage Server Management Console**.



Create Target

Launch the **iStorage Server management console**, press the **Create** button on the toolbar of iStorage Server management console, the **Create Device Wizard** is shown.

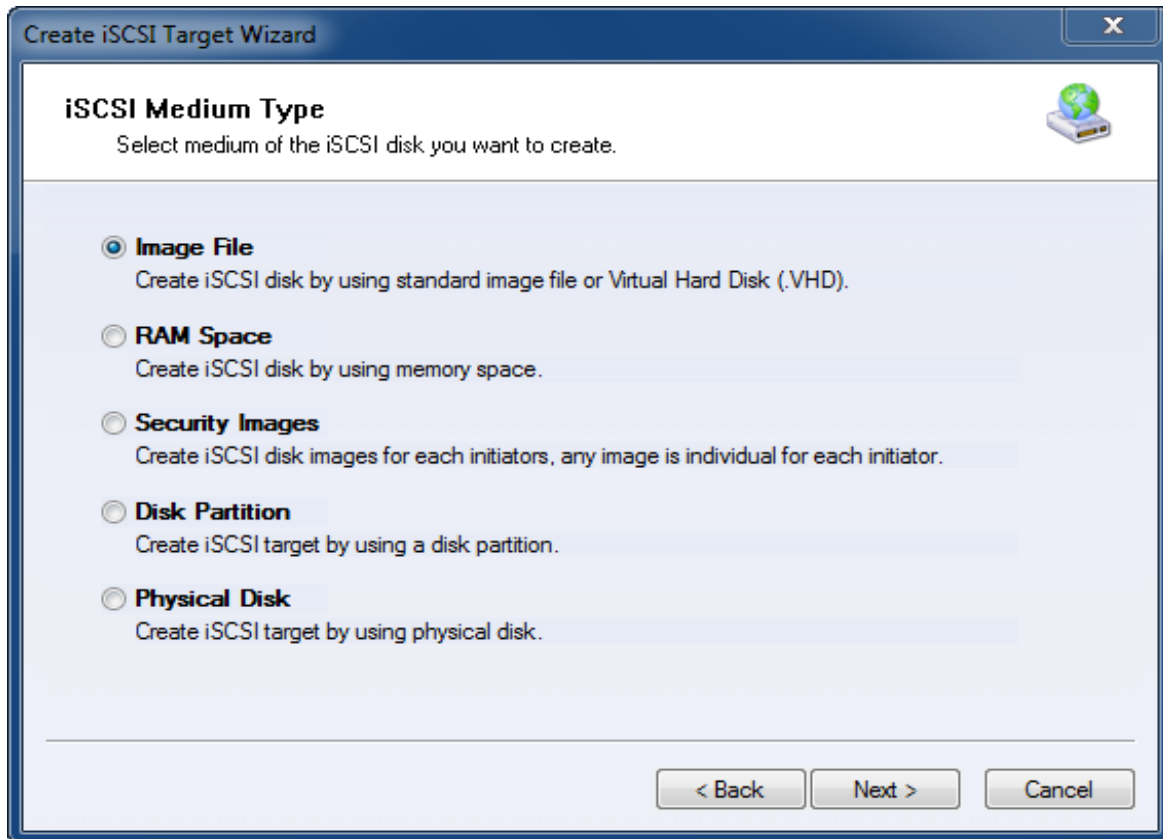
Select a device type



Choose **Hard Disk**.

Press the **Next** button to continue.

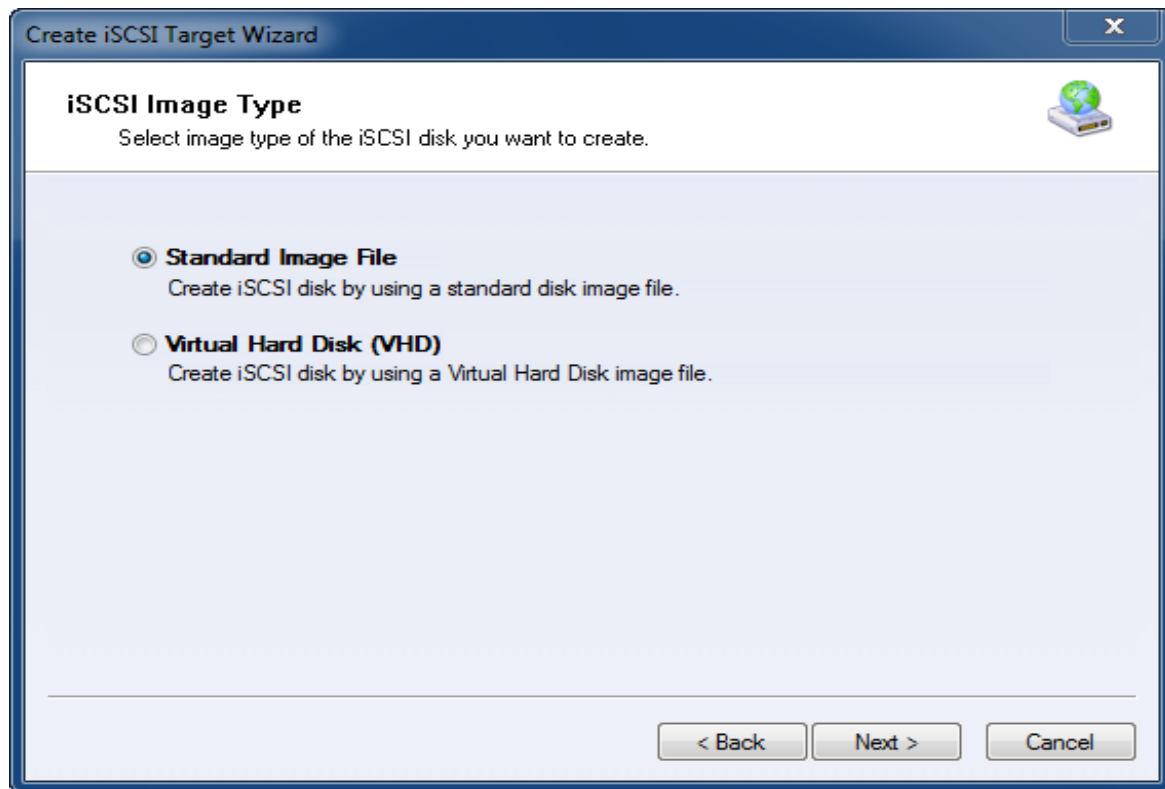
Select a medium type.



Choose **Image File** in **iSCSI Medium Type** window.

Then press **Next** button to continue.

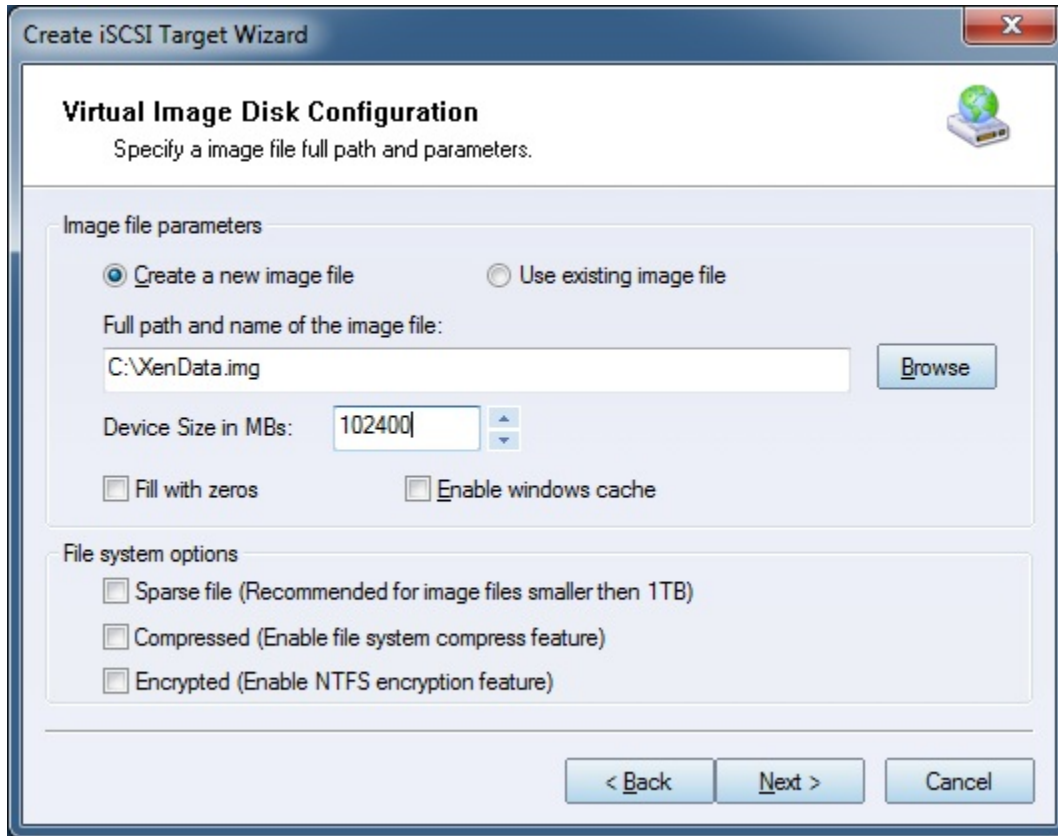
Select an Image type.



Choose **Standard Image File**.

Press the **Next** button to continue.

Specify image file path and size.



Create iSCSI Target Wizard

Virtual Image Disk Configuration
Specify a image file full path and parameters.

Image file parameters

☒ Create a new image file ☐ Use existing image file

Full path and name of the image file:
C:\XenData.img **Browse**

Device Size in MBs: 102400

☐ Fill with zeros ☐ Enable windows cache

File system options

☐ Sparse file (Recommended for image files smaller then 1TB)
☐ Compressed (Enable file system compress feature)
☐ Encrypted (Enable NTFS encryption feature)

< Back Next > Cancel

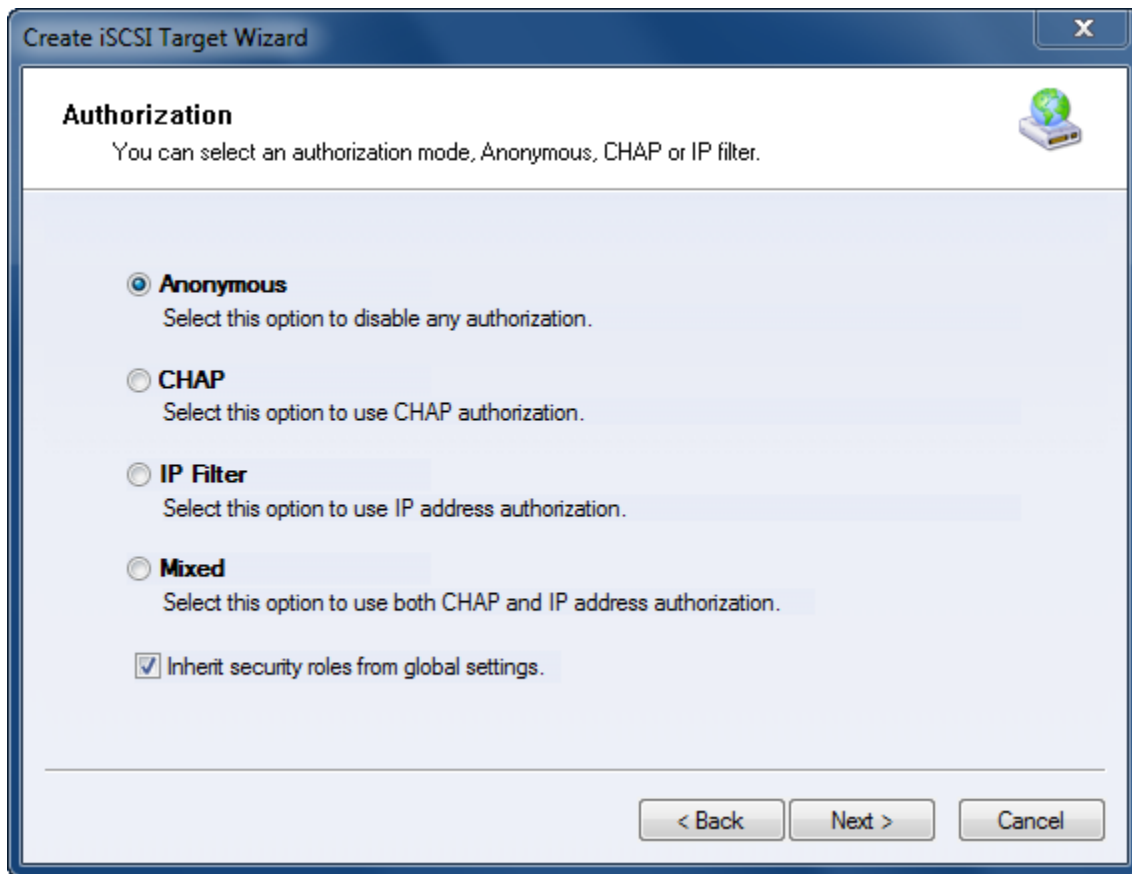
Specify the image file.

Specify the device size.

If you check **Use sparse file on NTFS file system**, the size of disk image file only depend on its content used, it can save your hard disk space.

Press the **Next** button to continue.

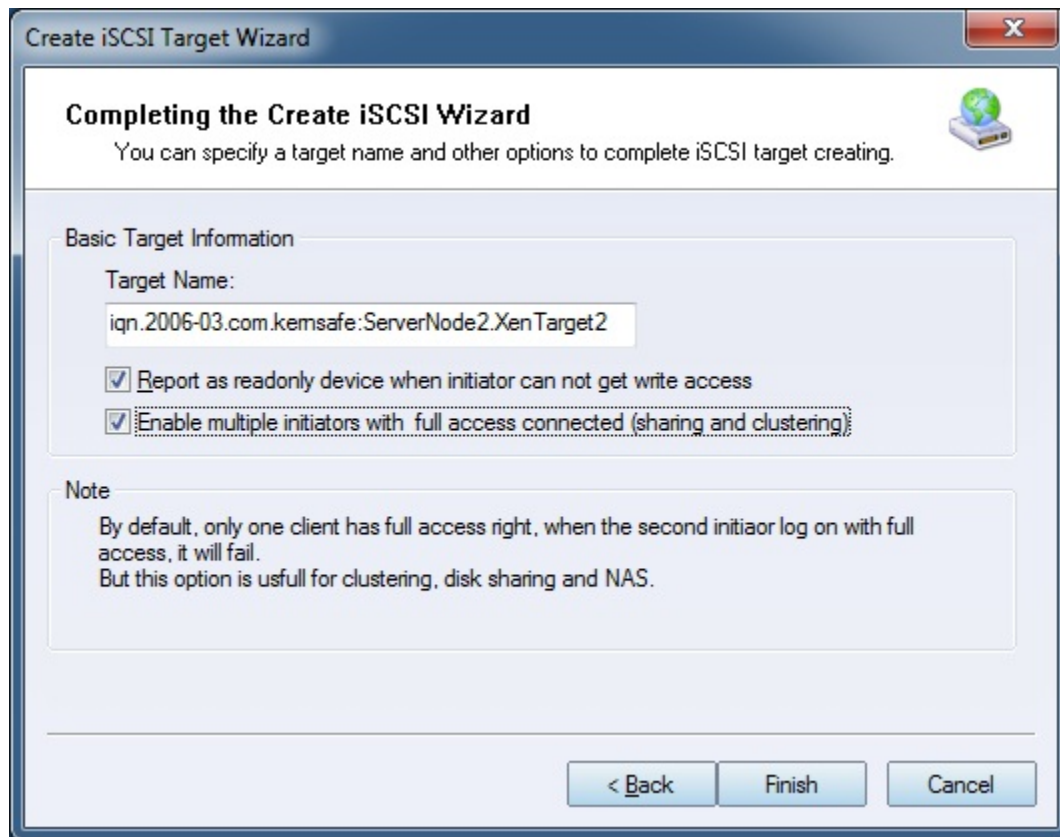
Set authorization mode.



Choose **Anonymous** Authorization.

Press the **Next** button to continue.

Finish creating iSCSI Target



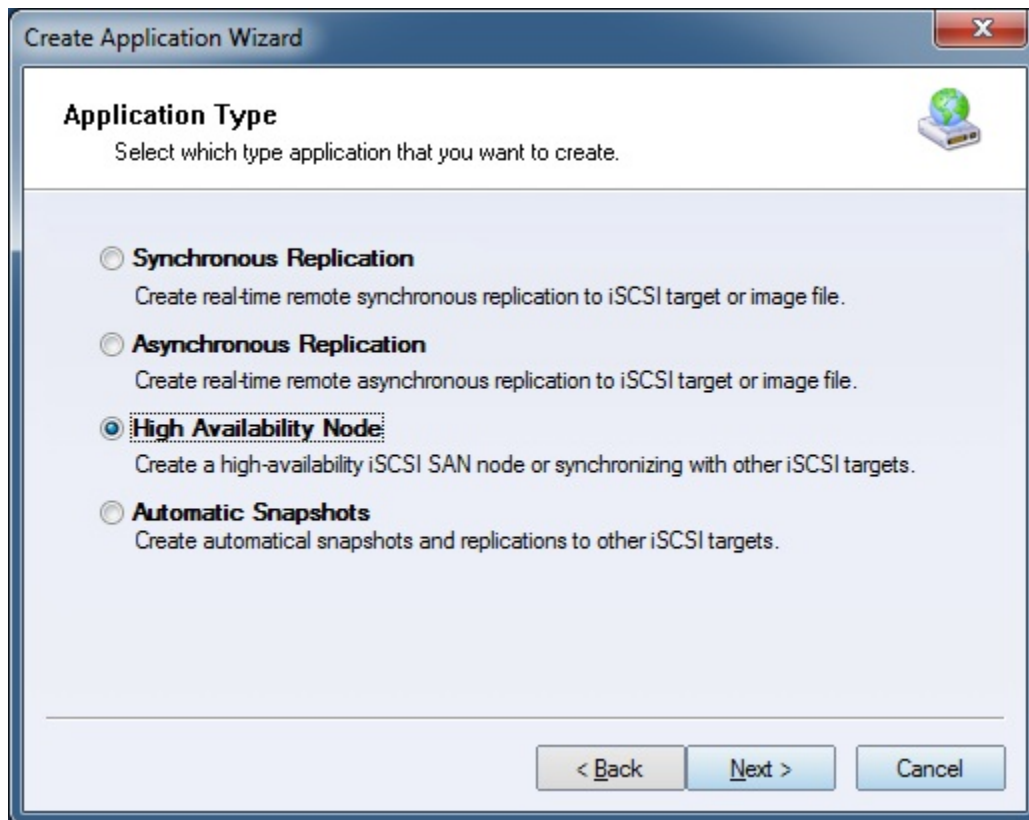
Type a target name in the Target Name field, the target name must be the same as the target on server1.

Check the **Enable multiple initiators with full access connected (sharing and clustering)** check box.

Press the **Finish** button to complete create target.

Creating Application on server1

On Server1, right click **Applications** on the left tree of the main interface, choose **Create Application** on the pop-up menu, the **Create Application Wizard** widow will be shown.



Choose **Failover iSCSI SAN Node**.

Then press **Next** to continue.

Create Application Wizard

Failover Configuration

You can specify two servers to fail over each other.

Base Target

Target Name	Device Type
<input checked="" type="checkbox"/> iqn.2006-03.com.kemsafe:ServerNode1.XenTarget1	Disk

Partner Target

Setting

< Back Next > Cancel

Check the **KernSafe.XenTarget1** storage and click **Edit** to find the mirror target.

Select iSCSI Target

iSCSI Source

Host Name: Port:

CHAP

☐ Use CHAP to logon

User Name:

Secret:

Target

Target: ▼

Discovery OK Cancel

Input the IP and port of server2 in **iSCSI Source** tab, and then click **Discovery** on the bottom of the window to find the mirror target, choose the **KernSafe.XenTarget2** in the down-list.

Press **OK** button to continue.

Note: If the target needs CHAP authorization, you should provide User name and secret to login.

Create Application Wizard

Failover Configuration
You can specify two servers to fail over each other.

Base Target

Target Name	Device Type	
<input checked="" type="checkbox"/> iqn.2006-03.com.kemsafe:ServerNode1.XenTarget1	Disk	

Partner Target

iqn.2006-03.com.kemsafe:ServerNode2.XenTarget2 Setting

< Back Next > Cancel

The mirror target will be added to the window, then click **Next** button to continue.

The screenshot shows a Windows-style dialog box titled "Create Application Wizard" with a close button (X) in the top right corner. The main heading is "Synchronization Settings" with a subtext "You can specify parameters for synchronization." and a small globe icon. The dialog is divided into two sections: "Sync Interface" and "Heartbeat Interface". Each section has two rows of input fields: "Local Address" and "Local Port" for the local side, and "Remote Address" and "Remote Port" for the remote side. In the "Sync Interface" section, the local address is "192.168.1.101", local port is "Any", remote address is "192.168.1.102", and remote port is "3260". In the "Heartbeat Interface" section, the local address is "192.168.0.101", local port is "Any", remote address is "192.168.0.102", and remote port is "3260". Below these sections is a text label "Specify a folder to save temporary data dump (folder must exist):" followed by a text input field containing "C:\Temp\" and a "Browse" button. At the bottom of the dialog are three buttons: "< Back", "Next >", and "Cancel".

Create Application Wizard

Synchronization Settings

You can specify parameters for synchronization.

Sync Interface

Local Address: 192.168.1.101 Local Port: Any

Remote Address: 192.168.1.102 Remote Port: 3260

Heartbeat Interface

Local Address: 192.168.0.101 Local Port: Any

Remote Address: 192.168.0.102 Remote Port: 3260

Specify a folder to save temporary data dump (folder must exist):

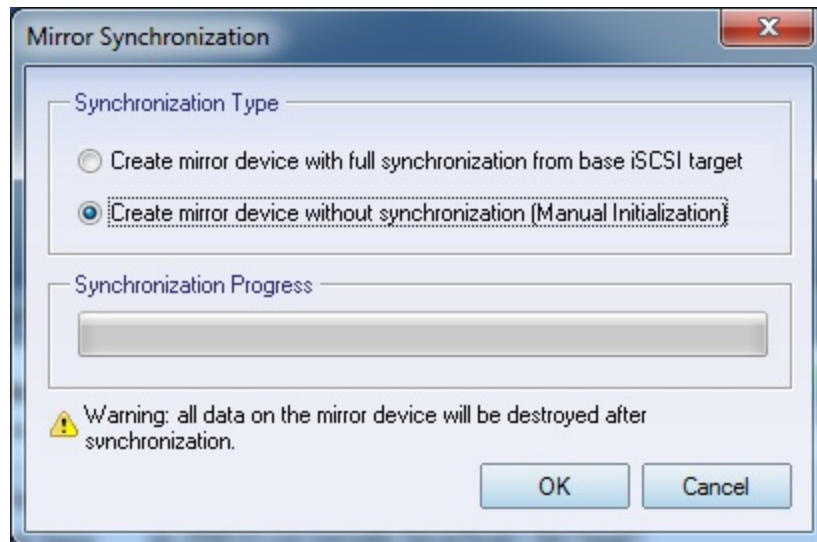
C:\Temp\ Browse

< Back Next > Cancel

Specify local interface, port for Sync interface and Heartbeat interface, if you have two NIC for each server, you can specify different address-pair for Sync interface and Heartbeat interface, if you have only one NIC for synchronous, you can use same address for Sync and Heartbeat.

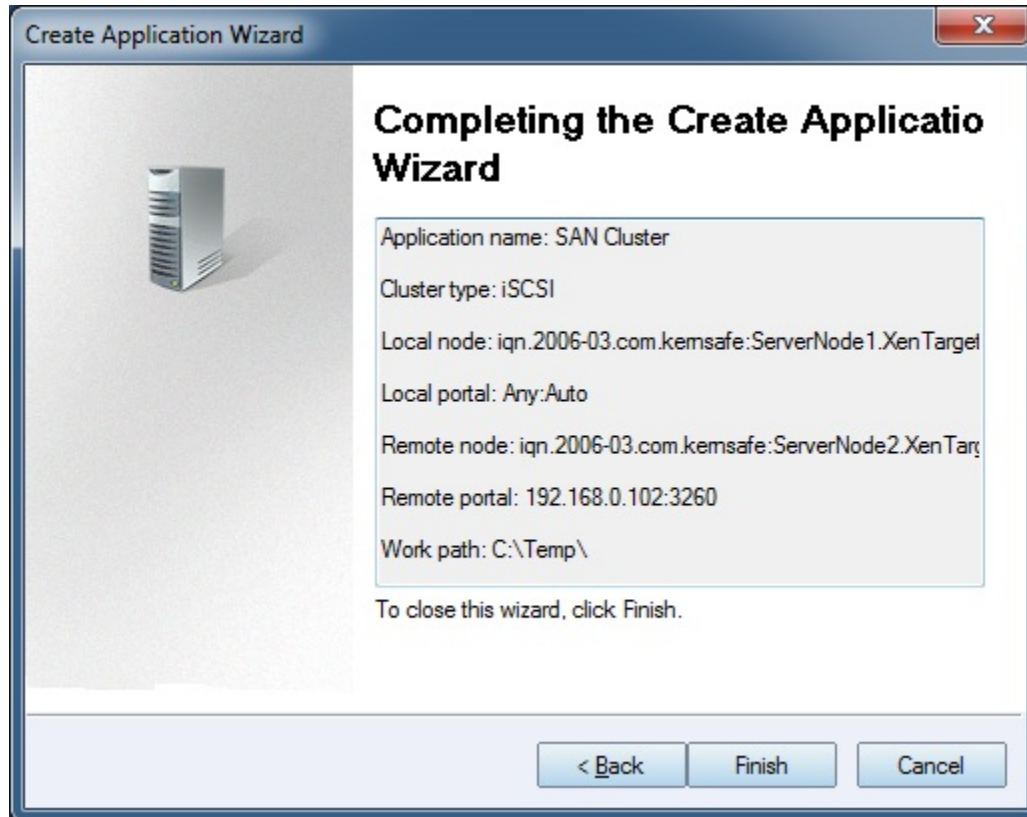
Specify the protocol and port.

Press **Next** to continue



Now, the mirror target should be synchronized to the base target, if the two targets are both the new one and do not be initialized, we can choose **Create mirror device without synchronization (Manual Initialization)**, otherwise, we must choose **Create mirror device with full synchronization from base iSCSI target**.

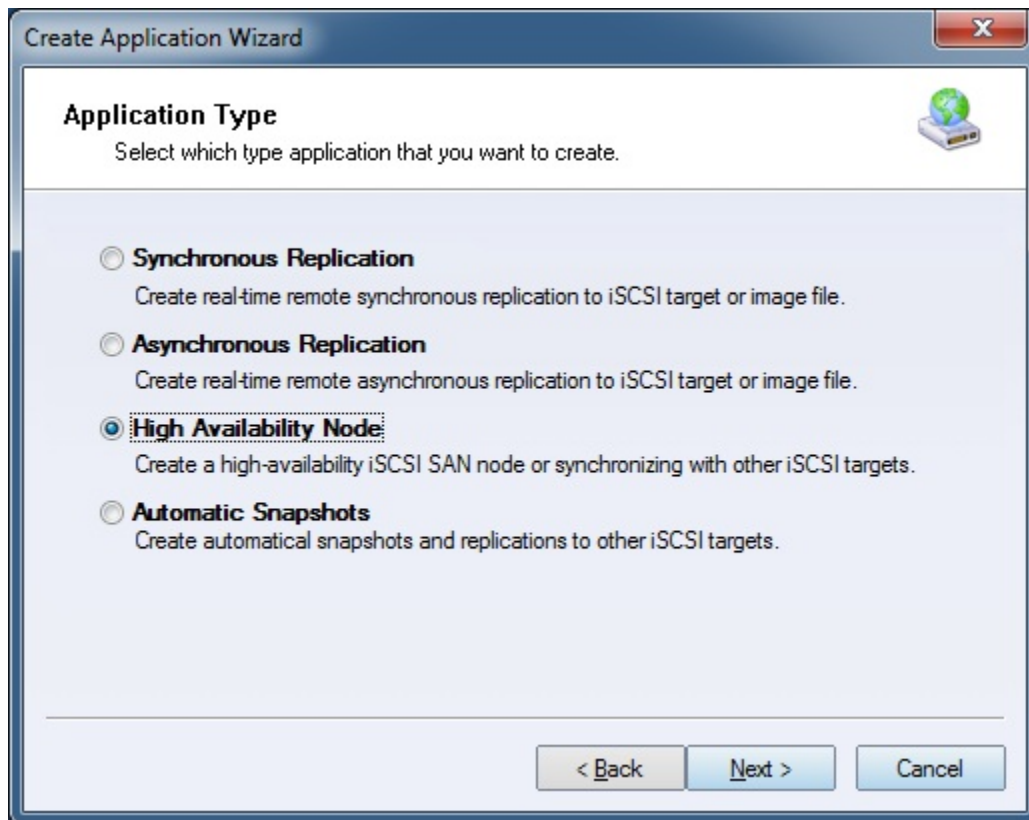
Press **OK** button to continue.



Click **Finish** button to complete the application creation.

Creating Application on server2

On Server2, right click **Applications** on the left tree of the main interface, choose **Create Application** on the pop-up menu, the **Create Application Wizard** window will be shown.



Choose **Failover iSCSI SAN Node**.

Then press **Next** to continue.

Create Application Wizard

Failover Configuration

You can specify two servers to fail over each other.

Base Target

Target Name	Device Type
<input checked="" type="checkbox"/> iqn.2006-03.com.kemsafe:ServerNode2.XenTarget2	Disk

Partner Target

Check the **KernSafe.XenTarget2** storage and click **Edit** to find the mirror target.

Select iSCSI Target

iSCSI Source

Host Name: Port:

CHAP

☐ Use CHAP to logon

User Name:

Secret:

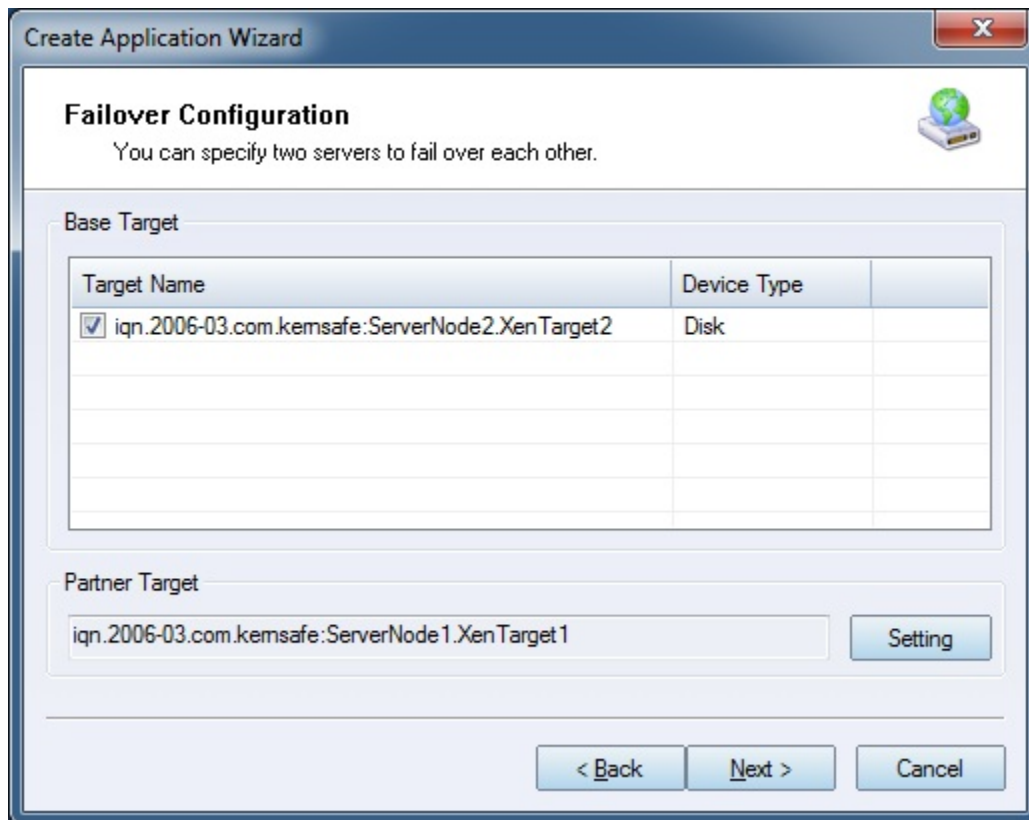
Target

Target:

Input the IP and port of server1 in **iSCSI Source** tab, and then click **Discovery** on the bottom of the window to find the mirror target, choose the **KernSafe.XenTarget1** in the down-list.

Press **OK** button to continue.

Note: If the target needs CHAP authorization, you should provide User name and secret to login.



Create Application Wizard

Failover Configuration
You can specify two servers to fail over each other.

Base Target

Target Name	Device Type
<input checked="" type="checkbox"/> iqn.2006-03.com.kemsafe:ServerNode2.XenTarget2	Disk

Partner Target

iqn.2006-03.com.kemsafe:ServerNode1.XenTarget1 Setting

< Back Next > Cancel

The mirror target will be added to the window, then click **Next** button to continue.

Create Application Wizard

Synchronization Settings

You can specify parameters for synchronization.

Sync Interface

Local Address: 192.168.1.102 Local Port: Any

Remote Address: 192.168.1.101 Remote Port: 3260

Heartbeat Interface

Local Address: 192.168.0.102 Local Port: Any

Remote Address: 192.168.0.101 Remote Port: 3260

Specify a folder to save temporary data dump (folder must exist):

C:\Temp\ Browse

< Back Next > Cancel

Specify Sync and Heartbeat interface.

Press the Next button to continue.

Mirror Synchronization

Synchronization Type

☐ Create mirror device with full synchronization from base iSCSI target

☒ Create mirror device without synchronization (Manual Initialization)

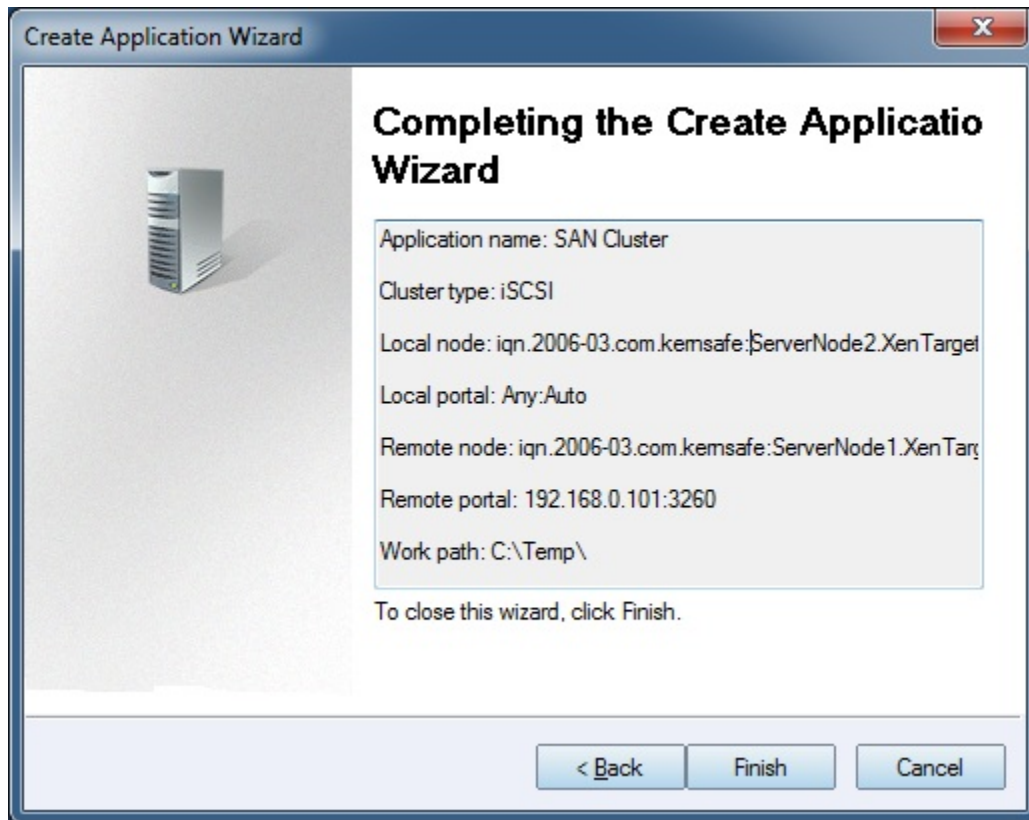
Synchronization Progress

Warning: all data on the mirror device will be destroyed after synchronization.

OK Cancel

Now, the mirror target should be synchronized to the base target, if the two targets are both the new one and do not be initialized, we can choose **Create mirror device without synchronization (Manual Initialization)**, otherwise, we must choose **Create mirror device with full synchronization from base iSCSI target**.

Press **OK** button to continue.

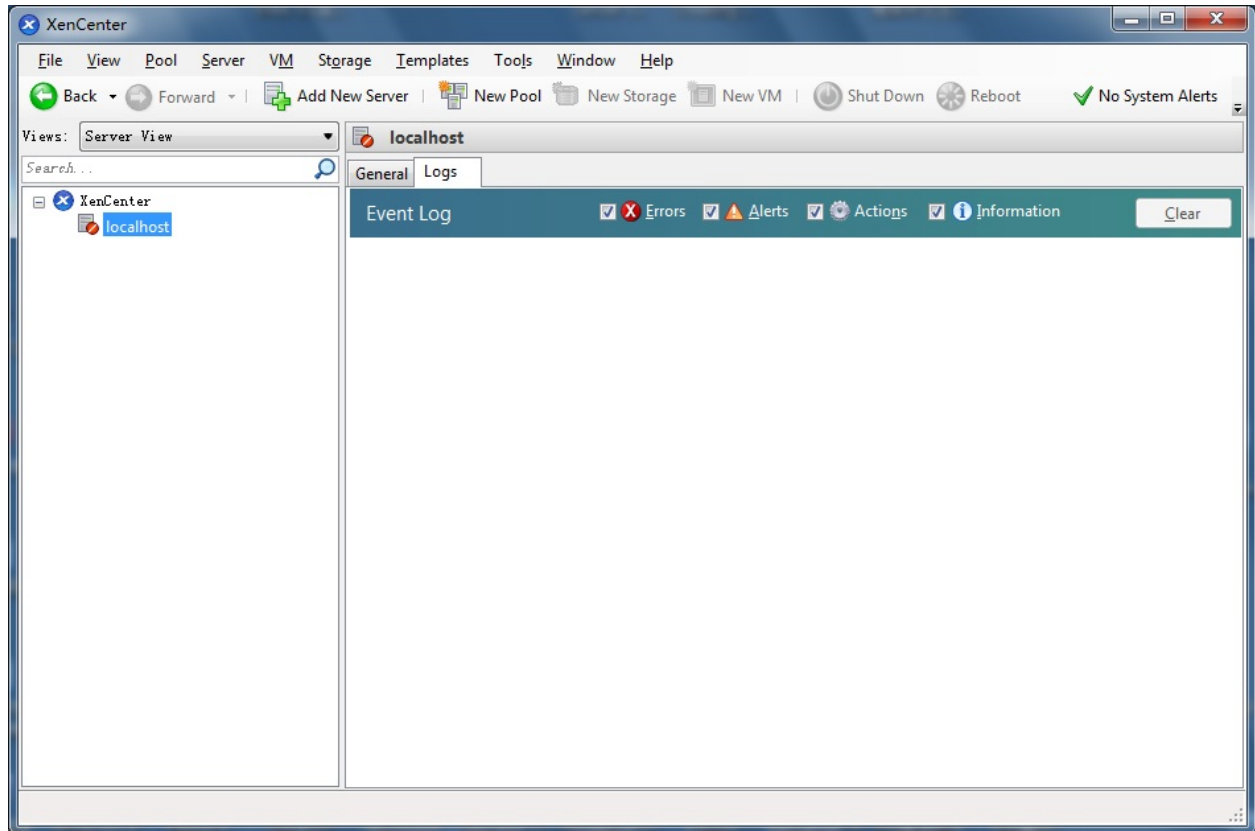


Click **Finish** button to complete the application creation.

Configuring Xen Server

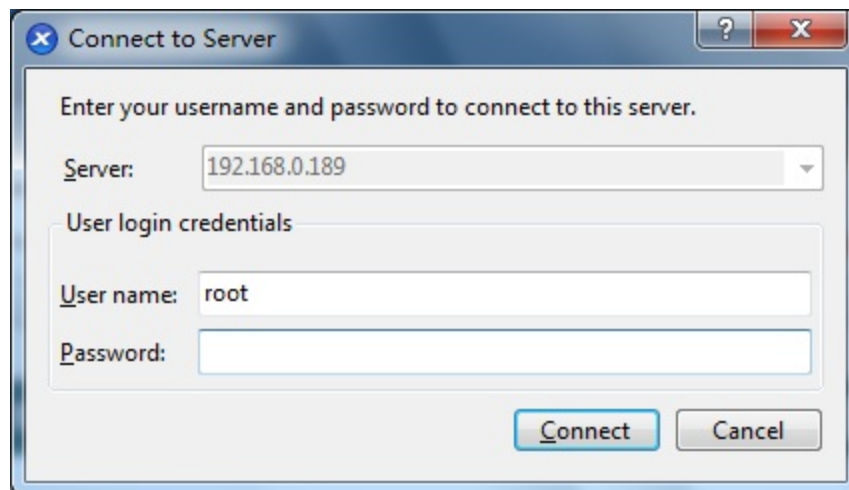
Log On to Xen Server

Open Xen Server console.



Click **Add New Server** in the tool bar.

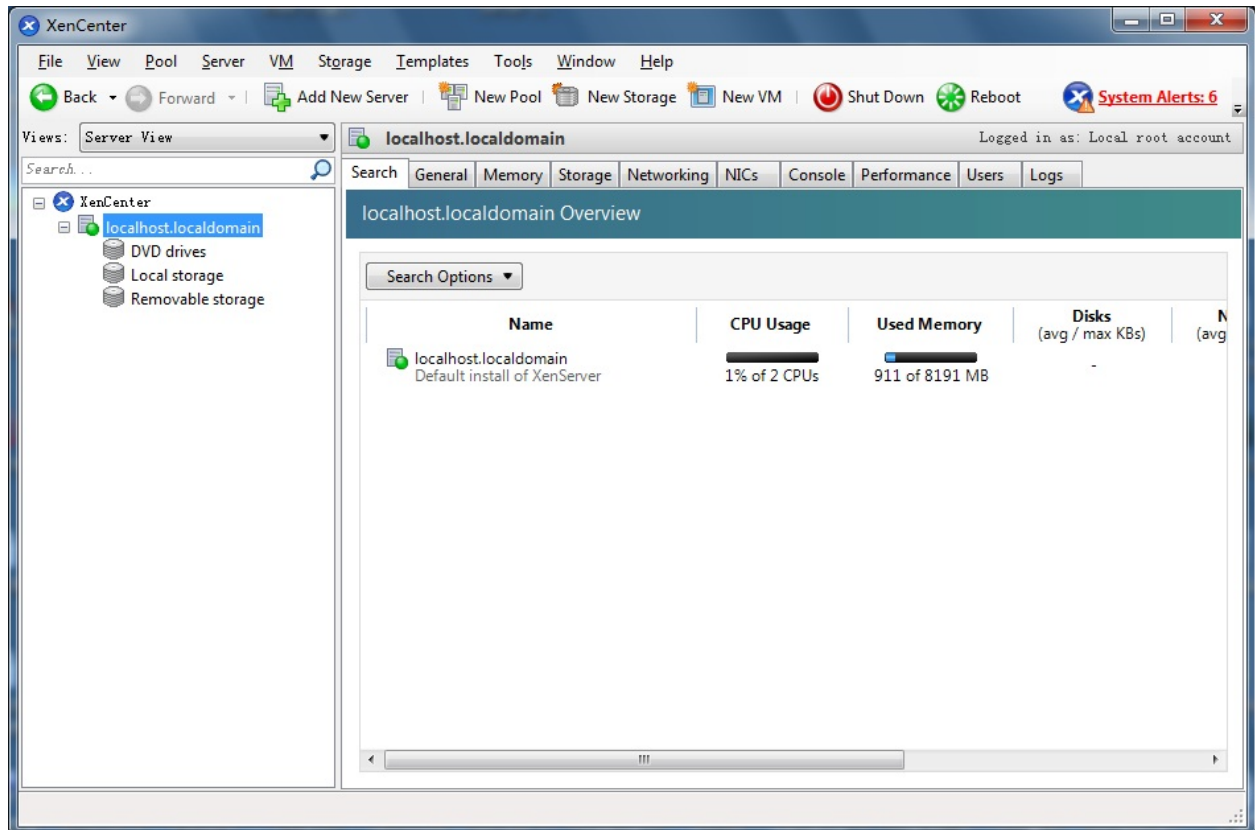
Add New Server dialog is shown.



Input IP address / Name with which running Xen Server, User name and password.

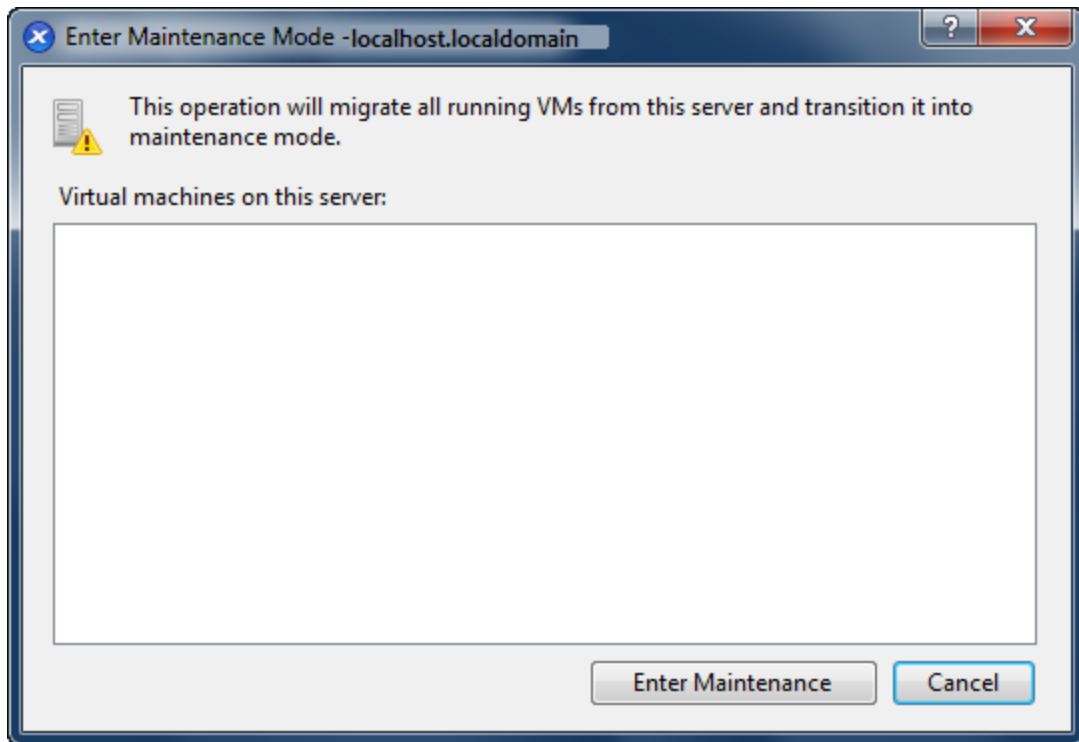
Press the **Connect** button to continue.

The XenCenter which is connected to Xen Server is shown.



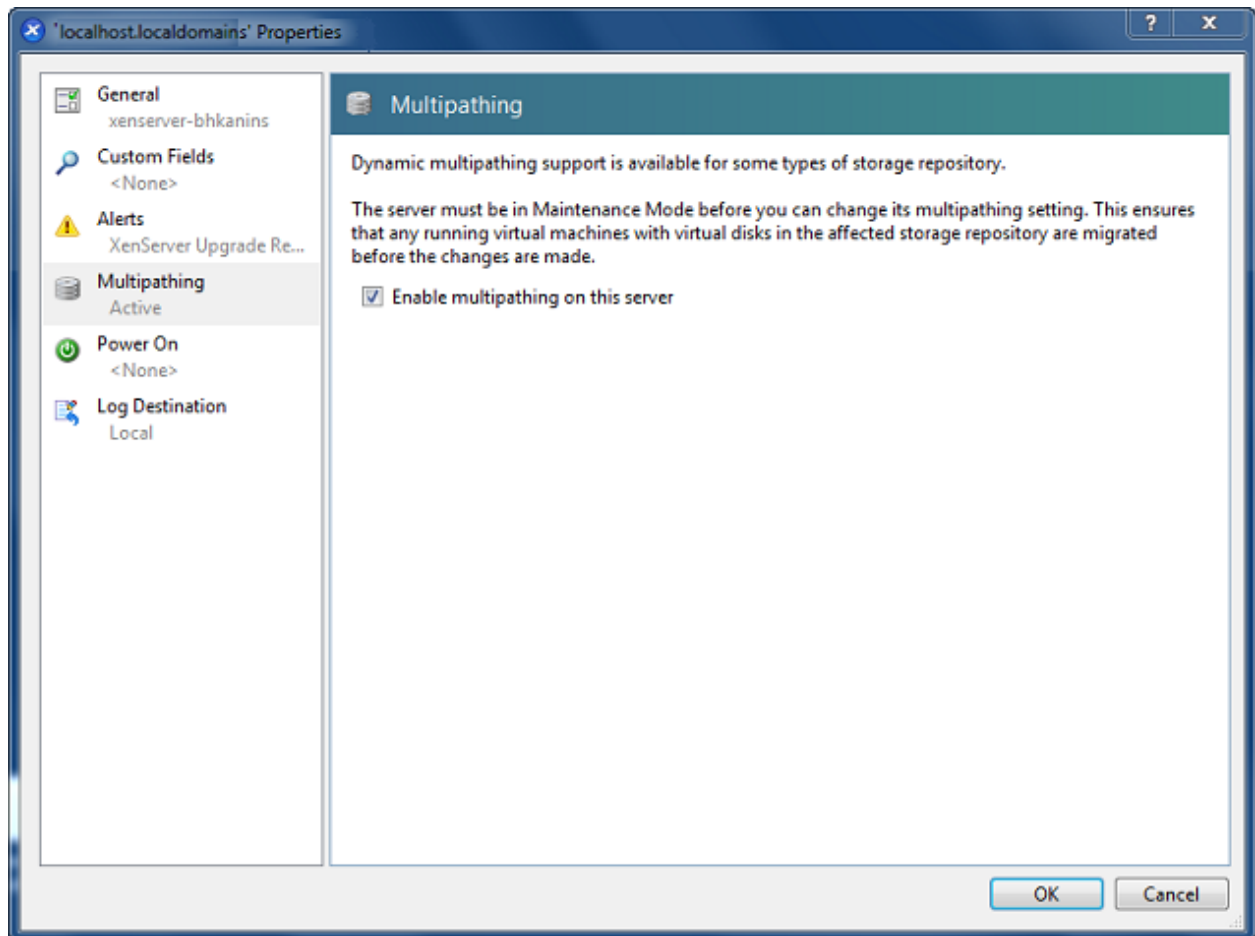
Enable Multipathing

Before to add storage, we must ensure that the Xen Server have enabled multipathing, we should to this by entering maintenance mode and change this property, click **Server->Enter Maintenance mode**, the following window is shown.



Click **Enter Maintenance** button, the server will enter maintenance mode.

Click **Server->properties**, click **Multipathing** on the left panel of the pop-up window, the following window is shown.



Check **Enable multipathing on this server** and press **OK** button to exit, this server have now enabled multipathing.

After enabling multipath on server you need to add a KernSafe device to multipath configuration file.

You can do it by switching to server console and starting typing fallowing commands:

```
# cd etc
```

```
vi multipath.conf
```



```
[root@localhost etc]# vi multipath.conf
```

After you will start editing (by pressing i) that document, find **## Use user friendly names, instead of using WWIDs as names.** and add default settings.

Use user friendly names, instead of using WWIDs as names.

```
defaults {  
  
    user_friendly_names no  
  
    path_grouping_policy group_by_prio/multibus  
  
    polling_interval_10  
  
}
```

```

## following lines.
#blacklist_exceptions {
#    device {
#        vendor    "IBM"
#        product   "S/390.*"
#    }
#}

## Use user friendly names, instead of using WWIDs as names.
defaults {
    user_friendly_names no
    path_grouping_policy group_by_prio/multibus
    polling_interval_10
}

## some vendor specific modifications
devices {
    device {
        vendor "DELL"
        product "MD3000i"
        path_grouping_policy group_by_prio
        getuid_callout "/sbin/scsi_id -g -u -s /block/%n"
    }
}

```

Save the document by pressing **ESC** and **:wq**.

Then **Exit Maintenance Mode.....**

Next step is to restart multipath service by typing:

chkconfig multipathd reset

```

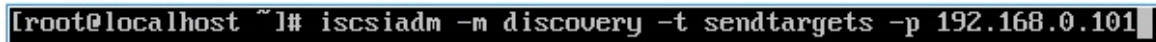
[root@localhost ~]# chkconfig multipathd reset
[root@localhost ~]# █

```

In the next step we need to discover and connect to our iSCSI targets.

We can discover targets using this command:

iscsiadm -m discovery -t sendtargets --portal 192.168.0.101

A terminal window with a black background and white text. The prompt is [root@localhost ~]#. The command entered is iscsiadm -m discovery -t sendtargets -p 192.168.0.101. A white cursor is at the end of the command.

```
[root@localhost ~]# iscsiadm -m discovery -t sendtargets -p 192.168.0.101
```

Do the following for second portal as well.

iscsiadm -m discovery -t sendtargets --portal 192.168.0.102

After you will successfully discover two targets you can log into then using this command:

**# iscsiadm -m node -T iqn.2006-03.com.kernsafe:ServerNode1.XenTarget1 -p
192.168.0.101 --op update -n node.startup -v automatic**

It will also connect automatically to iSCSI target upon boot.

```
[root@localhost ~]# iscsiadm -m node -T iqn.2006-03.com.kernsafe:ServerNode1.XenTarget1 -p 192.168.0.101 --op update -n node.startup -v automatic
```

Do the following for second target as well.

```
# iscsiadm -m node -T iqn.2006-03.com.kernsafe:ServerNode2.XenTarget2 -p 192.168.0.102 --op update -n node.startup -v automatic
```

Then restart the iscsi service :

```
# Service iscsi restart - Restart iscsi service:
```

Other useful commands


```
# iscsiadm -m node -T iqn.2006-03.com.kernsafe:KernSafe.XenTarget1 -p 192.168.0.101 -u -- Log out the target
```

For more information, please visit <http://support.citrix.com/article/CTX118791>.

Add iSCSI storage device into Xen Server

Click **New Storage**, **New Storage Repository** dialog is shown.

New Storage Repository - localhost.localdomain



Choose the type of new storage

Type

Location

Virtual disk storage

☐ NFS VHD

☒ Software iSCSI

☐ Hardware HBA

☐ Advanced StorageLink technology


ISO library

☐ Windows File Sharing (CIFS)

☐ NFS ISO

Shared Logical Volume Manager (LVM) support is available using either iSCSI or Fibre Channel access to a shared LUN.

Using the LVM-based shared SR provides the same performance benefits as unshared LVM for local disk storage, however in the shared context, iSCSI or Fibre Channel-based SRs enable VM agility— VMs may be started on any server in a pool and migrated between them.





< Previous

Next >

Finish

Cancel

New Storage Repository - localhost.localdomain


 **What do you want to call this Storage Repository?** 

Type	Provide a name and a description (optional) for your SR.
Name	
Location	

Name:

☒ Autogenerate description based on SR settings (e.g., IP address, LUN etc.)

Description:



< Previous Next > Cancel

Input IP address and port (if not 3260) of the Host that runs iStorage Server, press the **Discover IQNs** button, a list of Targets in drop-down control is shown.

New Storage Repository - localhost

Enter a path for your iSCSI storage

Type
Name
Location

Provide a target host for your iSCSI storage, indicating your target IQN and your target LUN before proceeding.

Target Host: 192.168.0.101,192.168.0.102 : 3260

☐ Use CHAP

User:

Password:

Target IQN: * (192.168.0.101,192.168.0.102:3260) Discover IQNs

Target LUN: Discover LUNs

CITRIX

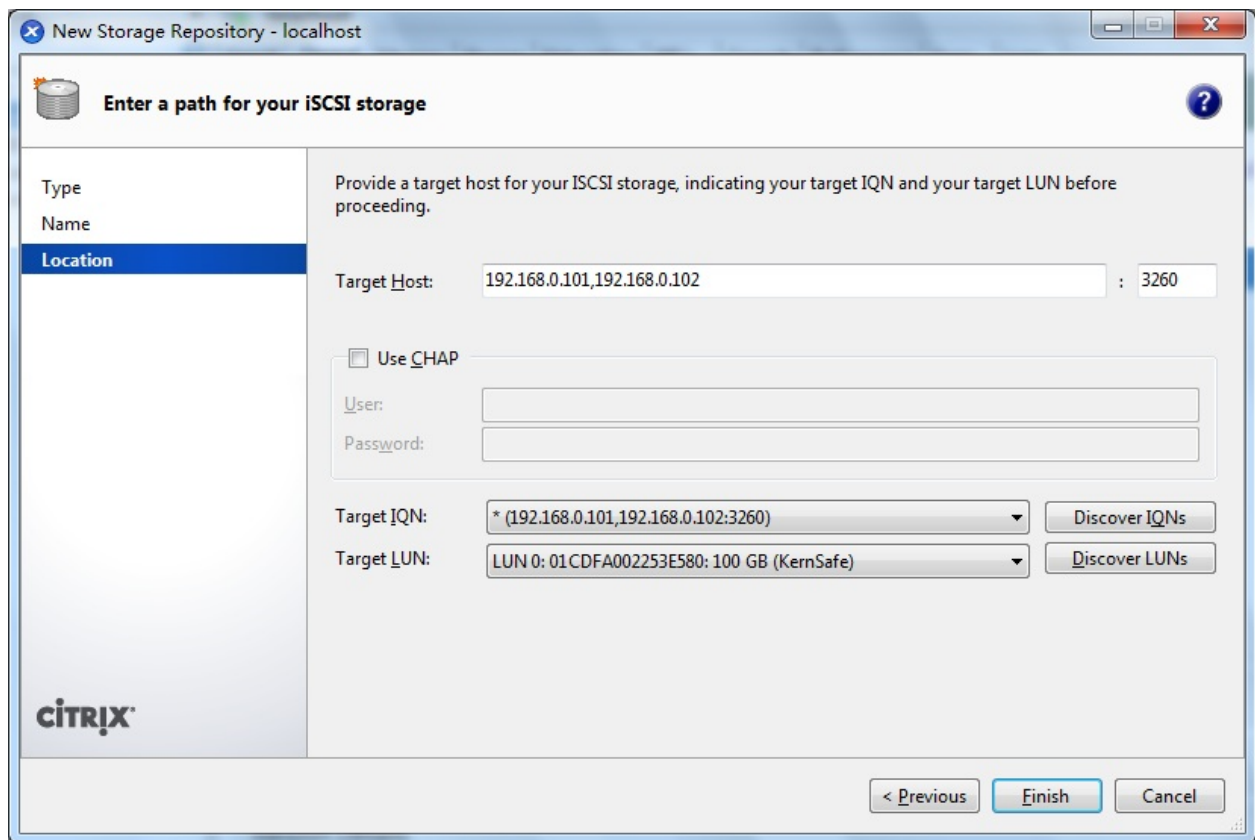
< Previous Finish Cancel

Select desired target in the list.

If the target you want to connect to has CHAP Authentication, check **Use CHAP** and input user name and secret.

Press the **Discover LUNs** button.

The iSCSI Target now contains a valid LUN. Here we create a 10G image file device as a demo.



The dialog box is titled "New Storage Repository - localhost". It has a sidebar on the left with a tree view containing "Type", "Name", and "Location", where "Location" is selected. The main area is titled "Enter a path for your iSCSI storage" and contains the following fields and controls:

- Instruction: "Provide a target host for your iSCSI storage, indicating your target IQN and your target LUN before proceeding."
- Target Host: A text field containing "192.168.0.101,192.168.0.102" followed by a port field containing "3260".
- Use CHAP: A checkbox that is currently unchecked.
- User: A text field.
- Password: A text field.
- Target IQN: A dropdown menu showing "* (192.168.0.101,192.168.0.102:3260)".
- Target LUN: A dropdown menu showing "LUN 0: 01CDFA002253E580: 100 GB (KernSafe)".
- Buttons: "Discover IQNs" and "Discover LUNs" next to their respective dropdowns.
- Buttons: "< Previous", "Finish", and "Cancel" at the bottom right.
- Citrix logo in the bottom left corner.

Press the **Finish** button to continue.

The following dialog is shown, press the **Yes** button to proceed.



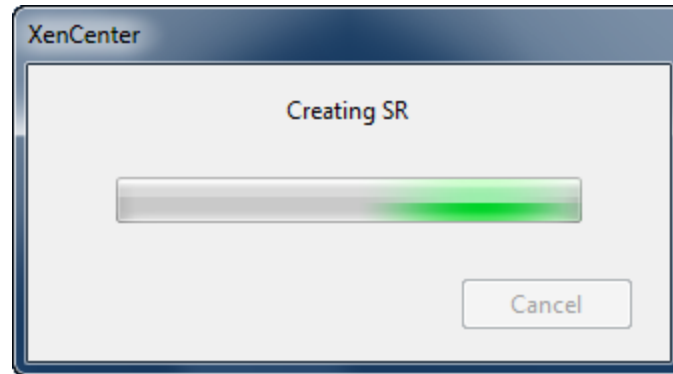
The dialog box is titled "Location" and contains a warning icon (yellow triangle with an exclamation mark). The text inside reads:

Creating a new virtual disk on this LUN will destroy any data present. You must ensure that no other system is using the LUN, including any XenServers, or the virtual disk may become corrupted while in use.

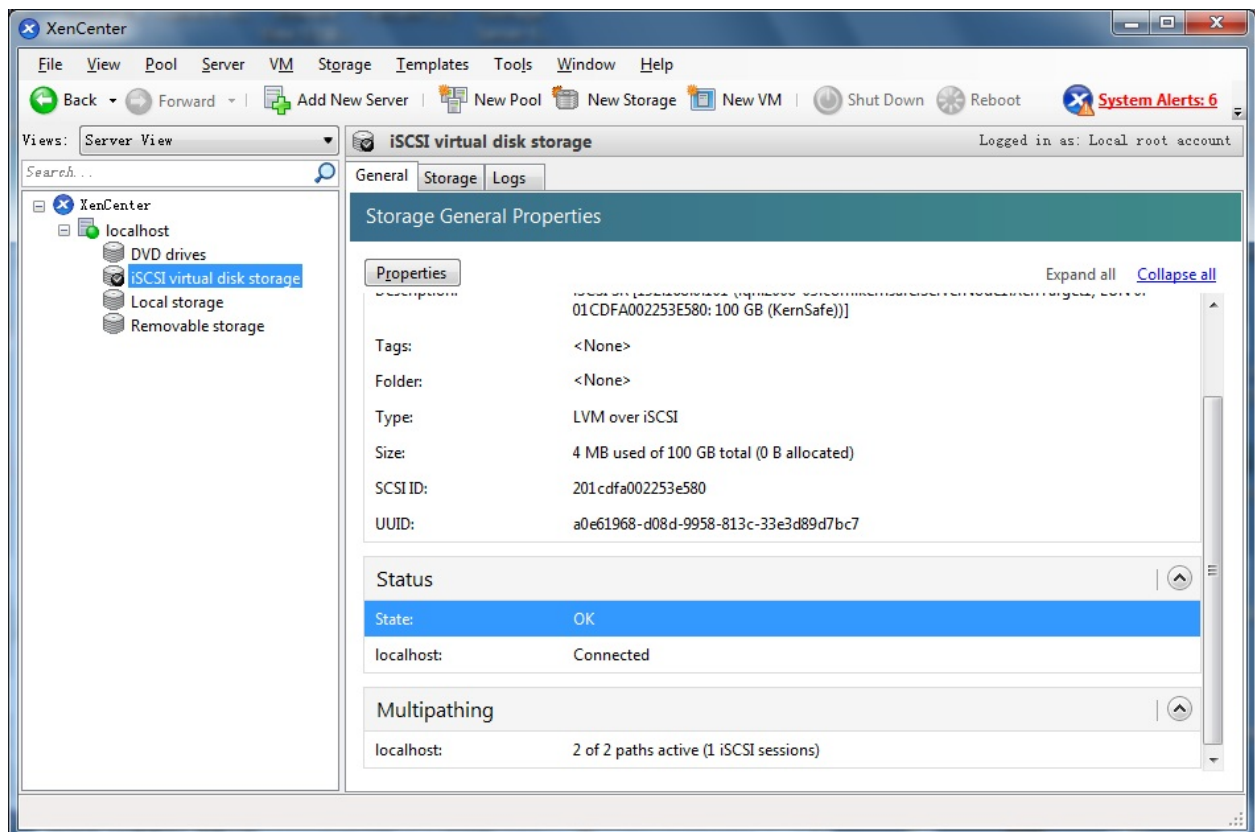
Do you wish to format the disk?

Buttons: "Yes" and "No" at the bottom right.

Now Xen Server is carrying on a series of operations, such as **Creating SR**, to create data structures required by data repositories.



Sorted! You now see an iSCSI storage device successfully added into Xen Server.



At the bottom of this interface you can see there are 2 of 2 paths active.

If by some reasons you will see only 1 path active, go back to your server console and type:

```
# /opt/xensource/sm/mpathcount.py
```

This causes to refresh multipath status in virtual storage.

```
[root@localhost etc]# /opt/xensource/sm/mpathcount.py  
[root@localhost etc]#
```

After you will do it, you should be able to see proper 2 out of 2 paths active.

You can type:

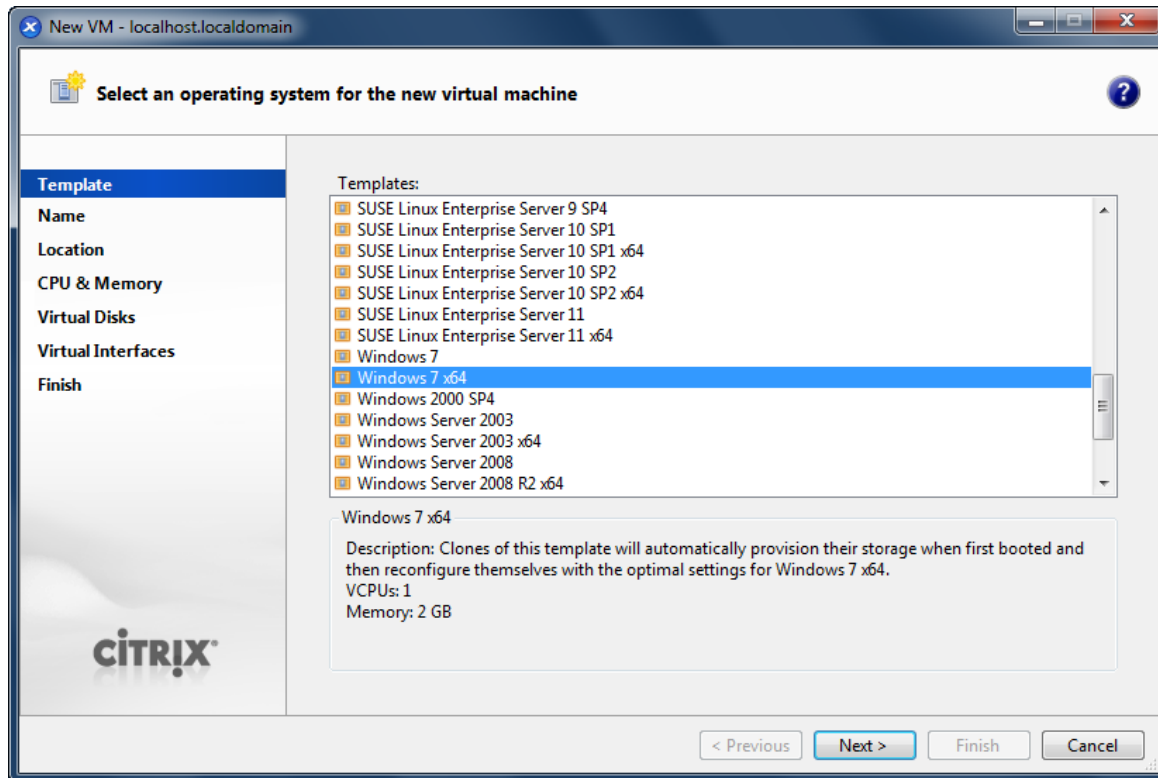
#multipath -ll

```
[root@localhost ~]# multipath -ll
201cdfa002253e580 dm-1 KernSafe,iSCSI Adapter
[size=100G][features=0][hwhandler=0][rw]
\_ round-robin 0 [prio=2][active]
  \_ 18:0:0:0 sdb 8:16   [active][ready]
  \_ 14:0:0:0 sdc 8:32   [active][ready]
[root@localhost ~]# █
```

Create a virtual machine

Click **New VM** on Xen Server console.

Select **Windows 7 x64** in the following wizard.



Input the desired name and description.

New VM - localhost.localdomain

Enter a name and description for the new virtual machine

Template

Name

Location

CPU & Memory

Virtual Disks

Virtual Interfaces

Finish

CITRIX

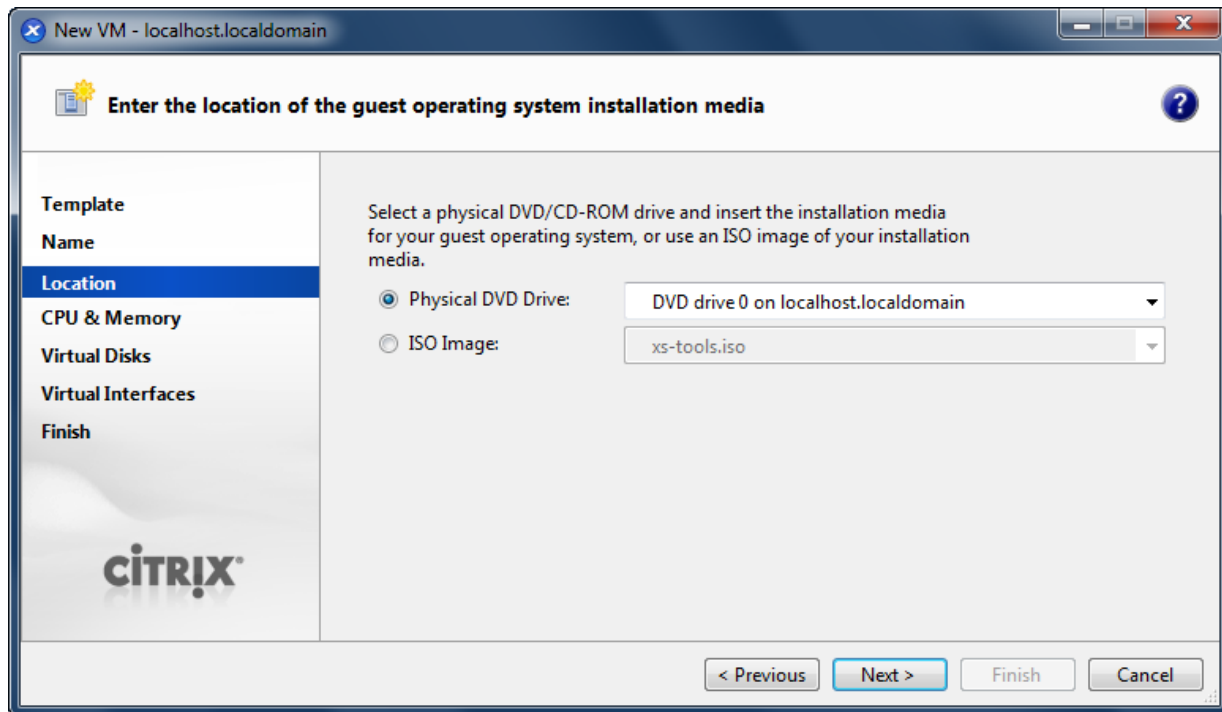
Name: Windows 7 x64 (1)

Description:

< Previous Next > Finish Cancel

Press the **Next** to continue.

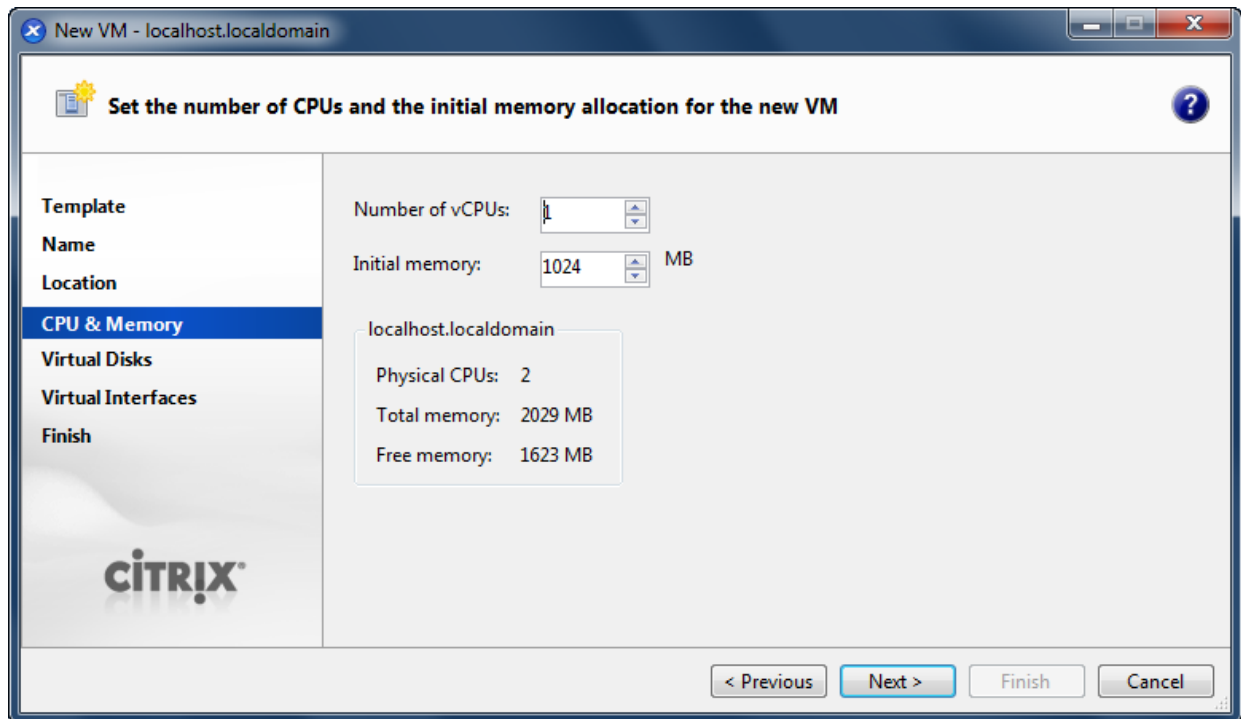
Select installation media for operating system.



Choose **physical DVD Drive** on XenServer.

Press the **Next** button to continue.

Specify the number of CPUs and memory size.

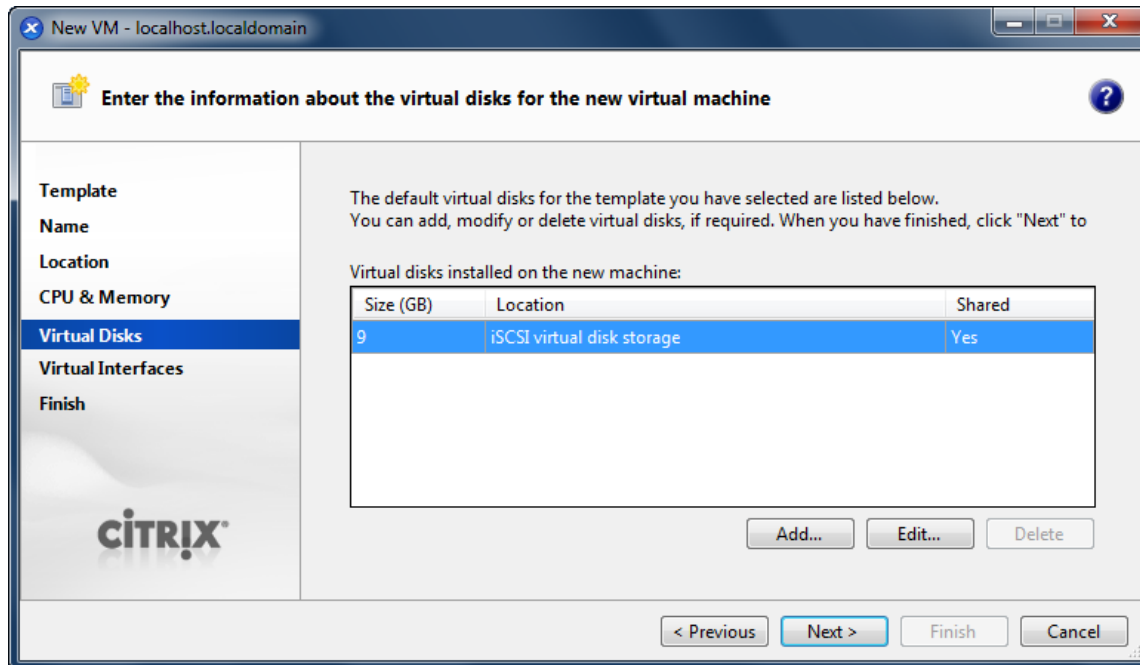


Select number of vCPUs.

Specify initial memory size.

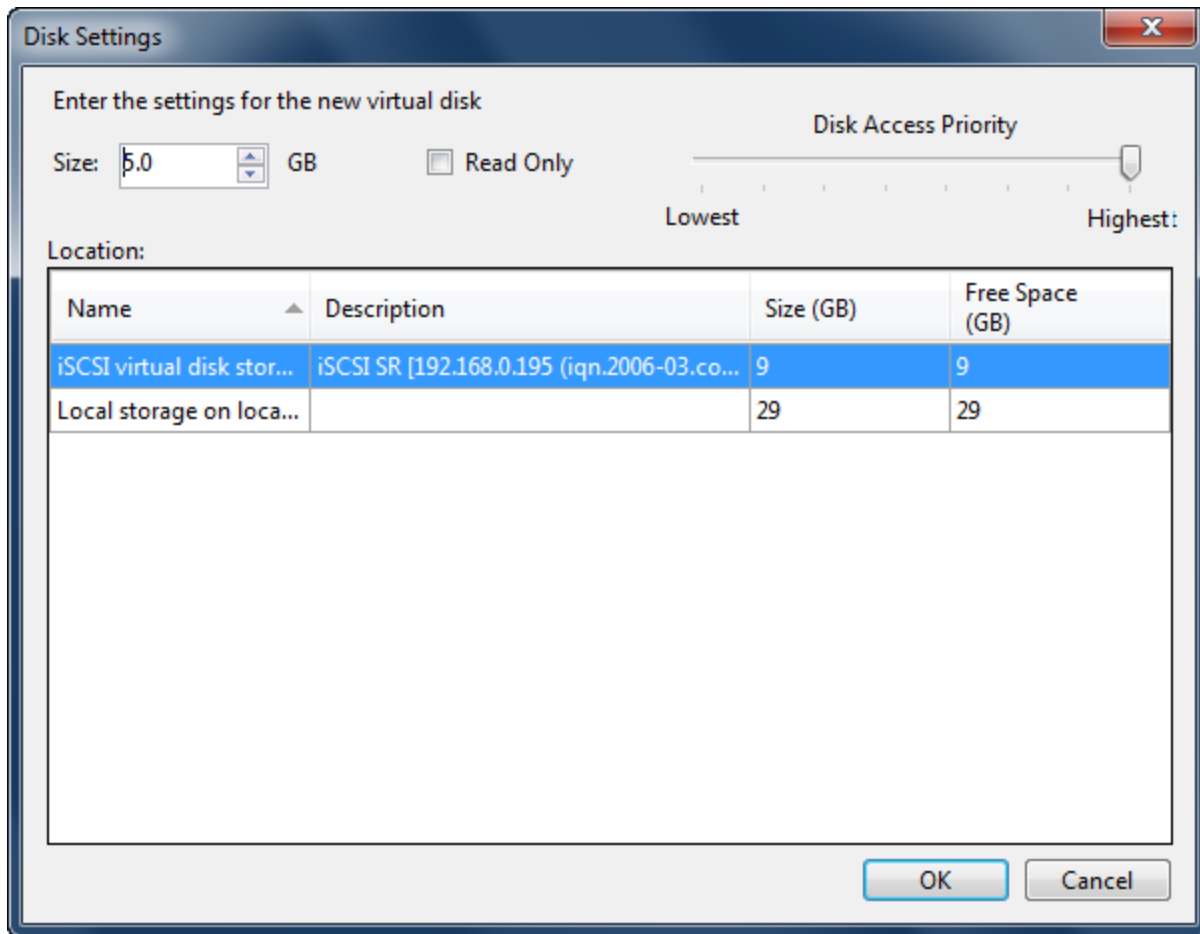
Press the **Next** button to continue.

Select storage device.



First you see an **iSCSI Virtual disk storage** device, which is previously created by iStorage Server. It is Xen Server's default storage device. If you want to add other virtual disk, press the **Add** button.

Select **iSCSI virtual disk storage...** and then press the **Next** button, the **Disk Settings dialog** is shown.



Specify the size of the new virtual disk.

Press the **OK** button to finish the wizard.

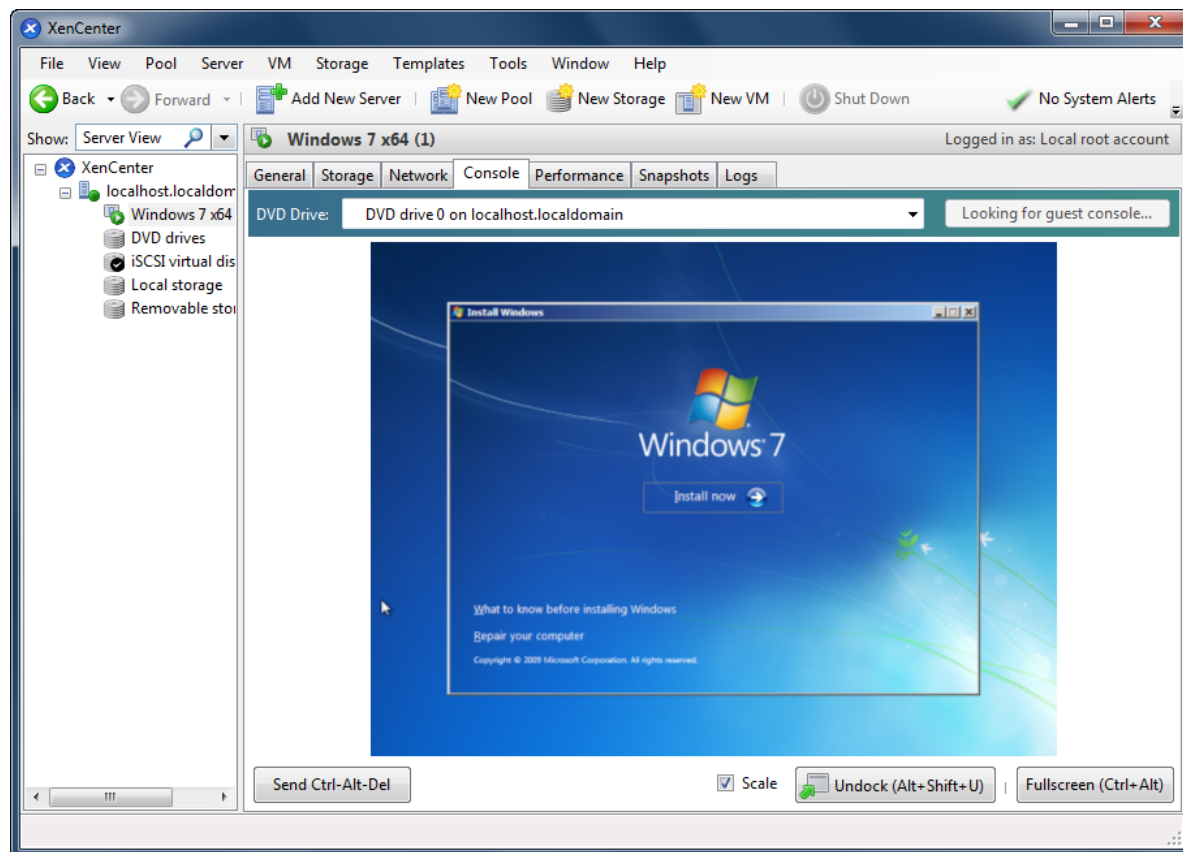
A virtual machine is built.

Note that before Version 5.5 update1 in the Storage labels of your virtual machine, you need to exchange the position of iSCSI Virtual Storage and Local Storage (make sure iSCSI Virtual Storage at position 0) so that the operating system can be installed on this iSCSI device.

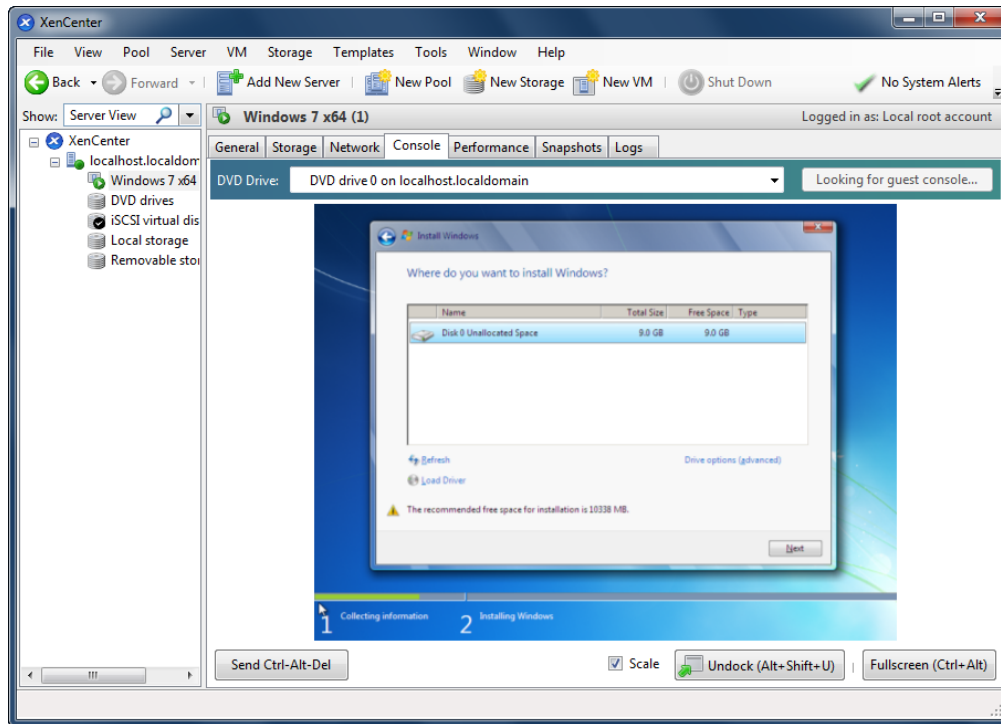
Install Operating system

Run the virtual machine and set up the operating system.

The process is just like that on real machine.

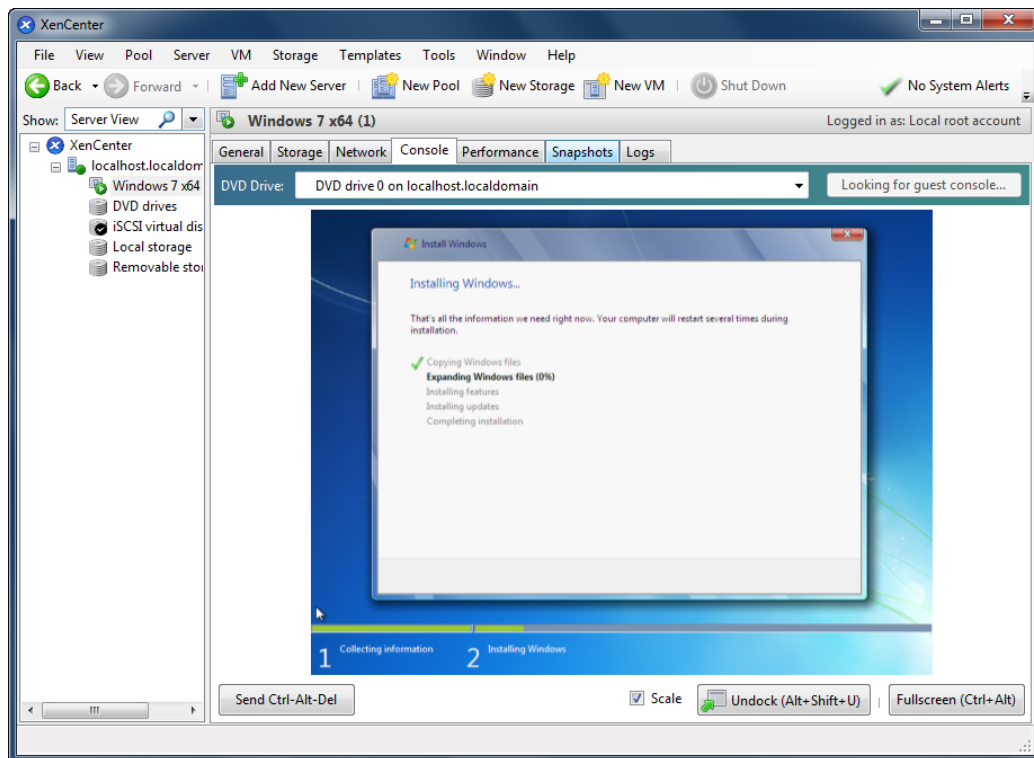


Press the **Install Now** button to install OS.

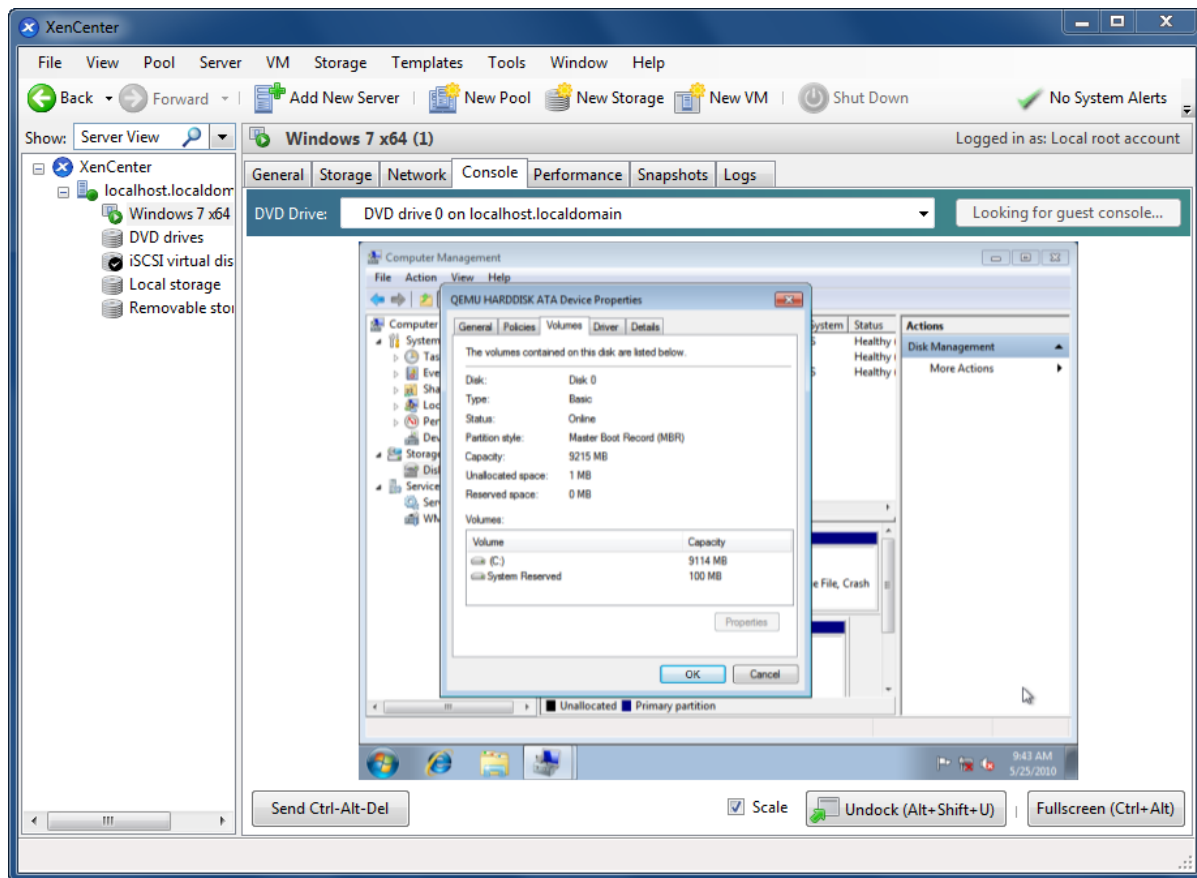


Select the 9G disk. Just like that on a real hard disk.

Setup starts copying files



Last, with all work done, we'll see iSCSI virtual storage device in the virtual operating system.



Likewise, you may install Windows Server 2003, Windows XP, Vista and Windows Server 2008, or even any version of Linux as you wish.

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